



JCAR OPS3 SECTION 2
ACCEPTABLE MEANS OF COMPLIANCE
AND
INTERPRETATIVE/ EXPLANATORY MATERIAL (AMC & IEM)

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ACCEPTABLE MEANS OF COMPLIANCE AND INTERPRETATIVE/ EXPLANATORY MATERIAL (AMC & IEM)**1 GENERAL**

1.1 This Section contains Acceptable Means of Compliance and Interpretative/Explanatory Material that has been agreed for inclusion in JCAR ops3.

1.2 Where a particular JCAR ops3 paragraph does not have an Acceptable Means of Compliance or any Interpretative/Explanatory Material, it is considered that no supplementary material is required.

2 PRESENTATION

2.1 The Acceptable Means of Compliance and Interpretative/Explanatory Material are presented in full page width on loose pages, each page being identified by the date of issue or the Change number under which it is amended or reissued.

2.2 A numbering system has been used in which the Acceptable Means of Compliance or Interpretative/Explanatory Material uses the same number as the JCAR ops3 paragraph to which it refers. The number is introduced by the letters AMC or IEM to distinguish the material from the JCAR ops3 itself.

2.3 The acronyms AMC and IEM also indicate the nature of the material and for this purpose the two types of material are defined as follows:

Acceptable Means of Compliance (AMC) illustrate a means, or several alternative means, but not necessarily the only possible means by which a requirement can be met. It should however be noted that where a new AMC is developed, any such AMC (which may be additional to an existing AMC) will be amended into the document following consultation under the NPA procedure.

Interpretative/Explanatory Material (IEM) helps to illustrate the meaning of a requirement.

2.4 New AMC or IEM material may, in the first place, be made available rapidly by being published as a **Temporary Guidance Leaflet (TGL)**. The procedures associated with Temporary Guidance Leaflets are included in the CARC Inspectors Manual.

Note: Any person who considers that there may be alternative AMCs or IEMs to those published should submit details to the Flight Ops Standard Director, with a copy to the Commission, for alternatives to be properly considered by the JCAA. Possible alternative AMCs or IEMs may not be used until published by the JCAA as AMCs, IEMs or TGLs.

2.5 Explanatory Notes not forming part of the AMC or IEM text appear in a smaller typeface.

2.6 New, amended or corrected text is enclosed within heavy brackets.

AMC/IEM B – GENERAL**ACJ to Appendix 1 to JCAR ops3.005(d)****The HEMS philosophy****See Appendix 1 to JCAR ops3.005(d)****1 Introduction**

This ACJ 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 the HEMS appendix to provide a system of safety to the appropriate standard. It discusses the difference between HEMS, Air Ambulance and SAR - in regulatory terms. It also discusses the application of Operations to Public Interest Sites in the HEMS context.

2 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 the view of the Helicopter Sub-Committee (HSC) three groups are being protected:

- Third parties (including property) - highest protection.
- Passengers (including patients)
- Crew members (including task specialists) - lowest

It is for the Authority to facilitate a method for the assessment of risk - or as it is more commonly known, safety management.

3 Risk management

Safety management textbooks¹ describe four different approaches to the management of risk. All but the first have been used in the production of the HEMS appendix and, if we consider that the engine failure accountability of Class I performance 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):

Applying the taxonomy to HEMS gives:

- Zero Risk; no risk of accident with a harmful consequence - Class 1 performance (within the qualification stated above) - the HEMS Operating Base.
- 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 landing sites at hospitals in a congested hostile environment the risk is contained to the deck edge strike case - and so in effect minimised to an

exposure of seconds).

- 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).
- As Low as Reasonably Practical; where additional controls are not economically or reasonably practical - operations at the HEMS operational site (the accident site).

It is stated in ops3.005(d) that “..HEMS operations shall be conducted in accordance with the requirement contained in ops3 except for the variations contained in Appendix 1 to ANNEX 3.005(d) for which a special approval is required.”

In simple terms there are three areas in HEMS operations where risk, beyond that allowed in the main body of ops3, is defined and accepted:

- in the en-route phase; where alleviation is given from height and visibility rules;
- at the accident site; where alleviation is given from the performance and size requirement; and
- at an elevated hospital site in a congested hostile environment; where alleviation is given from the deck edge strike - providing elements of the Appendix 1 to ops3.517(a) 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 crew member) is mandated. (HEMS crews - including medical passengers - are also expected to operate in accordance with good CRM principles.)

4 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 JCAR ops3 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.

If we can provide a road ambulance analogy:

- 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).
- 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; the aviation risk should be proportional 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 principle 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 judgment 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.

5 Search and rescue (SAR)

SAR operations, because they are conducted with substantial alleviations from operational and performance standards; are strictly controlled; the crews are trained to the appropriate standard; and they are held at a high state of readiness. Control and tasking is usually exercised by the Police (or the Military or Coastguard in a maritime State) and mandated under State Regulations.

It was not intended when JCAR ops3 was introduced, that HEMS operations would be conducted by operators not holding an AOC or operating to other than HEMS standards. It was also not expected that the SAR label would be used to circumvent the intent of JCAR ops3 or permit HEMS operations to a lesser standard.

6 Operating under a HEMS approval

The HEMS appendix originally contained the definitions for Air Ambulance and SAR - introduced to clarify the differences between the three activities. In consideration that, in some States, confusion has been the result, all references to activities other than HEMS have now been removed from the appendix and placed into ACJ material.

There are only two possibilities; transportation as passengers or cargo under the full auspices of JCAR ops3 (this does not permit any of the alleviations of the HEMS appendix - landing and take-off performance must be in compliance with the performance subparts of JCARops3); or operations under a HEMS approval.

7 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:

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 heliport and for that reason no alleviation from operating procedures or performance rules are contained in the HEMS appendix.

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.

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 was 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 alleviations under the HEMS rules.

8 Problems with hospital sites

During implementation of JCAR ops3, 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 power unit failure are eliminated, or limited by the exposure time concept, a number of landing sites exist which do not (or never can) allow operations to Performance Class 1 or 2 requirements.

These sites are generally found in a congested hostile environment:

- in the grounds of hospitals; or
- on hospital buildings;

The problem of hospital sites is mainly historical and, whilst the Authority could insist that such sites not be used - or used at such a low weight that critical power unit 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 (Appendix 1 to ops3.005(d) sub-paragraph (c)(2)(i)(A)) attracts alleviation until 2005, 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; the

dimensions; any non-conformance with Annex 14; the main risks; and, the contingency plan should an incident occur. Each entry should also contain a diagram (or annotated photograph) showing the main aspects of the site.

9 Summary

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

- Absolute levels of safety are conditioned by society.
- Potential risk must only be to a level appropriate to the task.
- Protection is afforded at levels appropriate to the occupants.
- The HEMS appendix addresses a number of risk areas and mitigation is built in
- Only HEMS operations are dealt with by the appendix.
- There are three main categories of HEMS sites and each is addressed appropriately.
- State alleviation from the requirement at a hospital site is available but such alleviations should be strictly controlled by a system of registration.
- SAR is a State controlled activity and the label should not be used by operators to circumvent HEMS regulations.

ACJ to Appendix 1 to ops3.005(d), paragraph (a)(4)

HEMS mission.

(See Appendix 1 to ops3.005(d), paragraph (a)(4))

1 A HEMS mission normally starts and ends at the HEMS Operating Base following tasking by the “HEMS Dispatch Centre”. Tasking can also occur when airborne, or on the ground at locations other than the HEMS Operating Base.

2 It is intended that the following elements be regarded as integral parts of the HEMS mission

- flights to and from the HEMS Operating Site when initiated by the HEMS Dispatch Centre;
- flights to and from a heliport for the delivery or pick-up of medical supplies and/or persons required for completion of the HEMS mission;
- flights to and from a heliport for refuelling required for completion of the HEMS mission.

All these flights are subject to the applicable requirements and alleviations of the HEMS appendix.

ACJ to Appendix 1 to ops3.005(d) sub-paragraph (b) HEMS - Contents of the Operations Manual

See Appendix 1 to ops3.005(d) sub-paragraph (b)

1 The Operations Manual should contain instructions for the conduct of flights, adapted to the operations area, including at least the following:

- a. operating minima;
- b. recommended routes for regular flights to surveyed sites (with the minimum flight altitude);
- c. guidance for the selection of the HEMS operating site in case of a flight to an un surveyed site;
- d. the safety altitude for the area overflown; and
- e. procedures to be followed in case of inadvertent entry into cloud.

**ACJ to Appendix 1 to ops3.005(d) sub-paragraph (c)(2)(i)(B)
Operations to a HEMS operating site located in a hostile environment**

See Appendix 1 to ops3.005(d) sub-paragraph (c)(2)(i)(B)

The alleviation from engine failure accountability at a HEMS Operating Site extends to HEMS/HHO where:

a HEMS crew member; or a medical passenger; or ill or injured persons and other persons directly involved in the HEMS flight - are required to be hoisted as part of the HEMS flight.

**IEM to Appendix 1 to ops3.005(d), sub-paragraph (c)(2)(i)(C)
HEMS operating site**

See Appendix 1 to ops3.005(d) sub-paragraph (c)(2)(i)(C)

When selecting a HEMS operating site it should have a minimum dimension of at least 2D. For night operations, unsurveyed HEMS operating sites should have dimensions of at least 4D in length and 2D in width.

**ACJ to Appendix 1 to ops3.005(d) sub-paragraph (c)(3)(ii)(B)
Relevant Experience**

See Appendix 1 to - ops3.005(d) sub-paragraph (c)(3)(ii)(B)

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

ACJ to Appendix 1 to ops3.005(d) sub-paragraph (c)(3)(iii)**Recency**

See Appendix 1 to JCAR ops3.005(d) sub-paragraph(c)(3)(iii)

For the purposes of this requirement, recency may be obtained in a VFR helicopter using vision limiting devices such as goggles or screens, or in a STD.

ACJ to Appendix 1 to JCAR ops3.005(d), sub-paragraph (c)(3)(iv)**HEMS crew member**

See Appendix 1 to JCAR ops3.005(d), sub-paragraph (c)(3)(iv)

1. When the crew is composed of one pilot and one HEMS crew member, the latter should be seated in the front seat (copilot seat) during the flight, so as to be able to accomplish the tasks that the commander may delegate, as necessary:

- a. assistance in navigation;
- b. assistance in radio communication/ radio navigation means selection;
- c. reading of check-lists ;
- d. monitoring of parameters;
- e. collision avoidance;
- f. assistance in the selection of the landing site;
- g. assistance in the detection of obstacles during approach and take-off phases;

2. The commander may also delegate to the HEMS crew member tasks on the ground:

- a. assistance in preparing the helicopter and dedicated medical specialist equipment for subsequent HEMS departure;
- b. assistance in the application of safety measures during ground operations with rotors turning (including: crowd control, embarking and disembarking of passengers, refuelling etc.).

3. When a HEMS crew member is carried it is his primary task to assist the commander. However, there are occasions when this may not be possible:

a. At a HEMS operating site a commander may be required to fetch additional medical supplies, the HEMS crew member may be left to give assistance to ill or injured persons whilst the commander undertakes this flight. (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.)

b. After arriving at the HEMS Operating Site, the installation of the stretcher may preclude the HEMS crew member from occupying the front seat.

- c. If the medical passenger requires the assistance of the HEMS crew member in flight.
 - d. If the alleviations of 3.a, 3.b or 3.c are used, reduction of operating minima contained in Appendix 1 to JCAR ops3.005(d), sub-paragraph (c)(4) should not be used.
 - e. With the exception of 3.a above, a commander should not land at a HEMS operating site without the HEMS crew member assisting from the front seat (copilot seat).
4. When two pilots are carried, there is no requirement for a HEMS crew member provided that the pilot non-flying (PNF) performs the aviation tasks of a HEMS crew member.

**AMC to Appendix 1 to JCAR ops3.005(d), sub-paragraph (c)(3)(iv)(B)(B2) Helicopter
Emergency Medical Service****See Appendix 1 to JCAR ops3.005(d), sub-paragraph (c)(3)(iv)(B)(B2)**

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

ACJ to Appendix 1 to JCAR ops3.005(d), sub-paragraph (e)(1)(ii)(B)**Line checks****See Appendix 1 to JCAR ops3.005(d), sub-paragraph (e)(1)(ii)(B)**

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.

IEM to Appendix 1 to JCAR ops3.005(d), sub-paragraph (e)(4)**Ground Emergency Service Personnel****See Appendix 1 to JCAR ops3.005(d), sub-paragraph (e)(4)**

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.

IEM to Appendix 1 to JCAR ops3.005(e)**Helicopter operations over a hostile environment located outside a congested area****See Appendix 1 to JCAR ops3.005(e)**

1 The subject Appendix has been produced to allow a number of existing operations to continue. It is expected that the alleviation will be used only in the following circumstances:

1.1 Mountain Operations; where present generation multi-engined aircraft cannot meet the requirement of Performance Class 1 or 2 at altitude.

1.2 Operations in Remote Areas; where existing operations are being conducted safely; and where alternative surface transportation will not provide the same level of safety as single-engined helicopters; and where, because of the low density of population, economic circumstances do not justify the replacement of single-engined by multi-engined helicopters (as in the case of remote arctic settlements).

2 The State issuing the AOC and the State in which operations will be conducted should give prior approval.

3 If both approvals have been given by a single State, it should not withhold, without justification, approval for aircraft of another State.

4 Such approvals should only be given after both States have considered the technical and economic justification for the operation.

ACJ to Appendix 1 to JCAR ops3.005(f) sub-paragraph (b)(3) and Appendix 1**to JCAR ops3.005(g) sub-paragraph (a)(3)****Local operations****See Appendix 1 to JCAR ops3.005(f) sub-paragraph (b)(3) and Appendix 1 to JCAR ops3.005(g) sub-paragraph (a)(3)**

1. Part of Appendix 1 to JCAR ops3.005(f) (and the whole of Appendix 1 to JCAR ops3.005(g)) contain alleviations for “local operations”. For such operations it is intended that approval will constrain the definition of “local” to be within a distance of 20 - 25nm. However, such arbitrary distances have always presented difficulties as there are always special factors which could influence such a decision. Authorities are therefore not expected to authorise local operations beyond 25nm without good operational reasons.

2. In defining “local operations” (as described in 1. above), the Authority should, except where such operations specifically “include” cross border excursions (such as sight seeing flights in the Mont Blanc or Matterhorn areas), constrain operations to be within the State boundary.

ACJ to Appendix 1 to JCAR ops3.005(f) paragraph (d)(19))

Recent experience (designated groups)

(See Appendix 1 to JCAR ops3.005(f) paragraph (d)(19))

1. The following helicopters and designated groups (which contain helicopters with similar characteristics) may be used for the purpose of recency obtained in accordance with Appendix 1 to - JCAR ops3.005(f) paragraph (d)(19):

- (a) Group 1 - Bell 206/206L, Bell 407.
- (b) Group 2 - Hughes 369, MD 500 N, MD 520 N, MD 600.
- (c) Group 3 - SA 341/342, EC 120, EC 130.
- (d) Group 4 - SA 313/318, SA 315/316/319, AS 350.
- (e) Group 5 - (All types listed in Appendix 1 to -FCL 2.245(b)(3)), R22, R44.

2. Additional groups may be constructed or other types may be added to the designated groups if acceptable to the Authority.

IEM to Appendix 1 to JCAR ops3.005(f) Operations for small helicopters (VFR day only)

See Appendix 1 to JCAR ops3.005(f)

1. Appendix 1 to JCAR ops3.005(f) contains prohibitions and alleviations when operating small helicopters VFR day only.

1.1 Where a rule in JCAR ops3 contains a paragraph that already allows an alternative method of compliance to be submitted for approval it is not discussed (in this IEM or the Appendix).

1.2 Where a rule is partially applicable (some paragraphs IFR some paragraphs VFR), the rule is not referenced (in this IEM or the Appendix) and normal interpretation should be applied.

2. The following rules are considered not to apply for small helicopters operating to Appendix 1 to JCAR ops3.005(f):

JCAR ops3.075 Method of carriage of persons

JCAR ops3.105 Unauthorised carriage

JCAR ops3.225 Heliport Operating Minima

JCAR ops3.230 Departure and Approach procedures

JCAR ops3.295 Selection of heliports

JCAR ops3.395 Ground proximity detection

JCAR ops3.405 Commencement and continuations of approach

Subpart E except JCAR ops3.465 and Appendix 1 to JCAR ops3.465

JCAR ops3.652 IFR or night operations - Flight and navigational instruments and associated equipment

JCAR ops3.655 Additional equipment for single pilot operation under IFR;

JCAR ops3.670 Airborne Weather Radar Equipment

JCAR ops3.695 Public address system

JCAR ops3.700 Cockpit voice recorders 1

JCAR ops3.705 Cockpit voice recorders 2

JCAR ops3.715 Flight data recorders 1

JCAR ops3.720 Flight data recorders 2

JCAR ops3.810 Megaphones

JCAR ops3.815 Emergency lighting

JCAR ops3.855 Audio Selector Panel

JCAR ops3.865 Communication and Navigation equipment for operations under IFR, or under VFR over routes not navigated by reference to visual landmarks

ACJ to Appendix 1 to JCAR ops3.005(h), sub-paragraph (d)(2)(iv)

Criteria for two pilot HHO

See Appendix 1 to JCAR ops3.005(h), sub-paragraph (d)(2)(iv)

A crew of two pilots may be required when:

1. The weather conditions are below VFR minima at the offshore vessel or structure.
2. There are adverse weather conditions at the HHO site (i.e. turbulence, vessel movement,

visibility).

3. The type of helicopter requires a second pilot to be carried because of cockpit visibility; or handling characteristics; or lack of automatic flight control systems.

ACJ to Appendix 1 to JCAR ops3.005(i)**Helicopter operations to/from a public interest site****See Appendix 1 to JCAR ops3.005(i)****1 General**

Appendix 1 to JCAR ops3 .005(i) - containing alleviations for public interest sites - was introduced in January 2002 to address problems that had been encountered by member States at hospital (and lighthouse) sites due to the applicable performance requirements of Subparts G and H. These problems were enumerated in ACJ to Appendix 1 to JCAR ops3.005(d) paragraph 8, part of which is reproduced below.

Problems with hospital sites

During implementation of JCAR ops3, 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 power unit failure are eliminated, or limited by the exposure time concept, a number of landing sites exist which do not (or never can) allow operations to Performance Class 1 or 2 requirements.

These sites are generally found in a congested hostile environment:

- in the grounds of hospitals; or
- on hospital buildings;

The problem of hospital sites is mainly historical and, whilst the Authority could insist that such sites not be used - or used at such a low weight that critical power unit 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 (Appendix 1 to JCAR ops3 .005(d) sub-paragraph (c)(2)(i)(A)) attracts alleviation until 2005, 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. ...

As stated in this ACJ and embodied in the text of the appendix, the solution was short term. During the comment period of NPA 18, representations were made to the Authority that the alleviation should be

extended to 2009. The review committee, in not accepting this request, had in mind that this was a short-term solution to address an immediate problem, and a permanent solution should be sought.

2. Public Interest Sites after 1 January 2005

Although elimination of such sites would remove the problem, it is recognized that phasing out, or rebuilding existing hospital and lighthouse heliports, is a long-term goal which may not be cost-effective, or even possible, in some States.

It should be noted however that existing paragraph (c) of the appendix limits the problem by confining approvals to public interest sites established before 1 July 2002 (established in this context means either: built before that date; or brought into service before that date – this precise wording was used to avoid problems associated with a ground level heliport where no building would be required). Thus the problem of these sites is contained and reducing in severity. This date was set approximately 6 months after the intended implementation of this original appendix.

From 1st January 2005 the approval of a public interest site will be confined to those sites where a CAT A procedure alone cannot solve the problem. The determination of whether the helicopter can or cannot be operated in accordance with Subpart G (Performance Class 1) should be established with the helicopter at a realistic payload and fuel to complete the mission. However, in order to reduce the risk at those sites, the application of the requirements contained in paragraph (d)(2) of the appendix will be required.

Additionally and in order to promote understanding of the problem, the text contained in paragraph (e) of the appendix has been amended to refer to Subpart G of JCAR ops3 and not to Annex 14 as in the original appendix. Thus Part C of the Operations Manual should reflect the non-conformance with that Subpart.

The following paragraphs discuss the problem and solutions.

3. The problem associated with public interest sites

There are a number of problems: some of which can be solved with the use of appropriate helicopters and procedures; and others which, because of the size of the heliport or the obstacle environment, cannot. They consist of:

- a. Helicopters that cannot meet the performance criteria required by Subpart G;
- b. The size of the FATO of the heliport (smaller than that required by the manufacturers' procedure);
- c. An obstacle environment that prevents the use of the manufacturers procedure (obstacles in the back-up area)
- d. An obstacle environment that does not allow recovery following a power unit failure in the critical phase of take-off (a line of buildings requiring a demanding gradient of climb) at a realistic payload and fuel to complete the mission.

e. A ground level heliport (exposure is not permitted);

3.1 Problems associated with a; it was recognised at the time of the adoption of the original appendix that, although the number of helicopters not meeting the absolute performance criteria of a. above were dwindling, existing HEMS and lighthouse fleets could not be replaced until 2005. (There is still a possibility that limited production will not allow the complete replacement of such limited power helicopters before the 2004 date; it is therefore suggested that Authorities should, providing an order position can be established by the operator, allow the continued use of such helicopters for a limited period, without the additional mitigation required by paragraph (d)(2) of the appendix.)

3.2 Problems associated with b.; the inability to climb and conduct a rejected landing back to the heliport following an engine failure before the Decision Point (DP).

3.3 Problems associated with c.; as in b.

3.4 Problems associated with d; climb into an obstacle following an engine failure after DP.

3.5 Problems associated with e.; may be related to;

- the size of the FATO which is too small for the manufacturers' procedure;
- no room for back-up;
- an obstacle in the take-off path; or
- a mixture of all three.

With the exception of case a., problems cannot be solved in the immediate future but can, when mitigated with the use of the latest generation of helicopters (operated at a weight that can allow useful payloads and endurance), minimise exposure to risk.

4. Long Term Solution

Although not offering a complete solution, it was felt that a significant increase in safety could be achieved by applying an additional performance margin to such operations. This solution could also be seen as mitigation proportional to the problem and would allow the time restriction of 2004 to be removed.

The required performance level of 8% climb gradient in the first segment, reflects ICAO Annex 14 Volume II in Table 4-3 – Dimensions and slopes of obstacle limitations surfaces for Performance Class 2.

The performance delta is achieved without the provision of further manufacturers data by using existing graphs to provide the RTOM.

If we examine the solution in relation to the original problem the effects can be seen.

4.1 Solution with relation to b.; although the problem still exists, the safest procedure is a dynamic take-off reducing the time taken to achieve V_{stayup} and thus allowing VFR recovery – if the failure occurs at or after V_y and 200 feet, an IFR recovery is possible.

4.2 Solution with relation to c.; as in b. above.

4.3 Solution with relation to d.; once again this does not give a complete solution, however the performance delta minimise the time during which a climb over the obstacle cannot be achieved.

4.4 Solution with relation to e.; as in 4.1 to 4.3 above.

ACJ to Appendix 1 to JCAR ops3.005(i) sub-paragraph(a)(1) Improvement program for Public Interest Sites

(See Appendix 1 to JCAR ops3.005(i) sub-paragraph (a)(1))

1. General

Although it is accepted that there will be a number of public interest sites that will remain for some time, it is in the interest of safety that the numbers are reduced and eventually, as a goal, all sites eliminated. A reduction of sites can be achieved in two ways:

- a. By an improvement in the performance of helicopters such that HOGE OEI is possible at weights where the mission can be performed.
- b. By the use of a site improvement program: to take out of service those sites where the exposure is greatest; or by improving sites such that the performance requirement can be met.

2. Improvement in Performance

The advent of more powerful modern twin-engine helicopters has put into reach the ability to achieve the aim stated in 1.a. above. A number of these helicopters are, in 2003, almost at the point where HOGE OEI with mission payload is possible. However, although technically feasible, it is not economically justifiable to require an immediate and complete re-equipping of all HEMS fleets.

3. Improvement of Sites

Where a site could be improved by redevelopment, for example by increasing the size of the FATO, it should be done; where the problems of a site are due to the obstacle environment, a program to re-site the facility or remove the obstacle(s) should be undertaken as a priority.

4. Summary

As was stated in paragraph 1. above, it is in the interest of States to reduce the risk of an accident due to an engine failure on take-off or landing. This could be achieved with a combination of policies: the use more appropriate helicopters; or, improvement by redevelopment of a site; or, the re-siting of facilities to alternative locations.

Some States have already undertaken to remove or improve public interest sites by using one, or more of the above methods. For those States where a compliance program is under way, the choice of reduction by elimination or redevelopment should not be put on hold whilst waiting for new generation helicopters. The improvement policy should be achieved in a reasonable time horizon – and this should be an element of the compliance program.

The approval to operate to public interest sites could be conditional upon such improvement programs being put into place. Unless such a policy is instituted, there will be no incentive for public interest sites to be eliminated in a reasonable time horizon.

ACJ to Appendix 1 to JCAR ops3.005(i) sub-paragraph (d)(2) Helicopter mass limitation for operations at a public interest site

(See Appendix 1 to JCAR ops3.005(i) sub-paragraph (d)(2))

The helicopter mass limitation at take-off or landing specified in Appendix 1 to JCAR ops3.005(i) sub-paragraph (d)(2) should be determined using the climb performance data from 35 ft to 200 ft at V_{toss} (First segment of the take-off flight path) contained in the Category A supplement of the Helicopter Flight Manual (or equivalent manufacturer data acceptable to the AUTHORITY according to IEM.480(a)(1) and (a)(2)).

The first segment climb data to be considered is established for a climb at the take-off safety speed V_{toss} , with the landing gear extended (when the landing gear is retractable), with the critical power unit inoperative and the remaining power units operating at an appropriate power rating (the 2 min 30 sec or 2 min One Engine Inoperative power rating, depending on the helicopter type certification). The appropriate V_{toss} , is the value specified in the Category A performance section of the Helicopter Flight Manual for vertical take-off and landing procedures (VTOL or Helipad or equivalent).

The ambient conditions at the heliport (pressure-altitude and temperature) should be taken into account.

The data is usually provided in charts one of the following ways:

- Height gain in ft over a horizontal distance of 100 ft in the first segment configuration (35 ft to 200 ft, V_{toss} , 2 min 30 sec / 2 min OEI power rating). This chart should be entered with a height gain of 8 ft per 100 ft horizontally travelled, resulting in a mass value for every pressure-altitude/temperature combination considered.
- Horizontal distance to climb from 35 ft to 200 ft in the first segment configuration (V_{toss} , 2 min 30 sec / 2 min OEI power rating). This chart should be entered with a horizontally distance of 628 m (2 062 ft), resulting in a mass value for every pressure-altitude/temperature combination considered.
- Rate of climb in the first segment configuration (35 ft to 200 ft, V_{toss} , 2 min 30 sec / 2 min OEI power rating). This chart can be entered with a rate of climb equal to the climb speed (V_{toss}) value in knots (converted to True Airspeed) multiplied by 8.1, resulting in a mass value for every pressure-altitude/temperature combination considered.

AMC JCAR ops3.035

Quality System

See JCAR ops3.035

1 Introduction

1.1 In order to show compliance with JCAR ops3.035, an operator should establish his Quality System in accordance with the instructions and information contained in the succeeding paragraphs.

2 General

2.1 Terminology

a. The terms used in the context of the requirement for an operator's Quality System have the following meanings:

i. **Accountable Manager.** The person acceptable to the Authority who has corporate authority for ensuring that all operations and maintenance activities can be financed and carried out to the standard required by the Authority, and any additional requirements defined by the operator.

ii. **Quality Assurance.** All those planned and systematic actions necessary to provide adequate confidence that operational and maintenance practices satisfy given requirements.

iii. **Quality Manager.** The manager, acceptable to the Authority, responsible for the management of the Quality System, monitoring function and requesting remedial actions.

2.2 Quality Policy

2.2.1 An operator should establish a formal written Quality Policy Statement that is a commitment by the Accountable Manager as to what the Quality System is intended to achieve. The Quality Policy should reflect the achievement and continued compliance with JCAR ops3 together with any additional standards specified by the operator.

2.2.2 The Accountable Manager is an essential part of the AOC holder's management organization. With regard to the text in JCAR ops3.175(h) and the above terminology, the term 'Accountable Manager' is intended to mean the Chief Executive/President/Managing Director/Director General/General Manager etc. of the operator's organisation, who by virtue of his position has overall responsibility (including financial) for managing the organisation.

2.2.3 The position of the Accountable Manager in the organisation should be such that at least the Nominated Postholders for Operations and Maintenance and the Quality Manager have direct access to him.

2.2.4 The Accountable Manager will have overall responsibility for the AOC holders Quality System

including the frequency, format and structure of the internal management evaluation activities as prescribed in paragraph 4.9 below.

2.3 Purpose of the Quality System

2.3.1 The Quality System should enable the operator to monitor compliance with JCAR ops3, the Operations Manual, maintenance management exposition, and any other standards specified by that operator, or the Authority, to ensure safe operations and airworthy aircraft.

2.4 Quality Manager

2.4.1 The function of the Quality Manager to monitor compliance with, and the adequacy of, procedures required to ensure safe operational practices and airworthy helicopters, as required by JCAR ops3.035(a), may be carried out by more than one person by means of different, but complementary, Quality Assurance Programmes.

2.4.2 The primary role of the Quality Manager is to verify, by monitoring activity in the fields of flight operations, maintenance, crew training and ground operations, that the standards required by the Authority, and any additional requirements defined by the operator, are being carried out under the supervision of the relevant Nominated Postholder.

2.4.3 The Quality Manager should be responsible for ensuring that the Quality Assurance Programme is properly established, implemented and maintained.

2.4.4 The Quality Manager should:

- a. Have direct access to the Accountable Manager;
- b. Not be one of the nominated post holders; and
- c. Have access to all parts of the operator's organisation.

2.4.5 In the case of small/very small operators (see paragraph 7.3 below), the posts of the Accountable Manager and the Quality Manager may be combined. However, in this event, quality audits should be conducted by independent personnel. In accordance with paragraph 2.4.4.b above, it will not be possible for the Accountable Manager to be one of the nominated postholders.

3 Quality System

3.1 Introduction

3.1.1 The operator's Quality System should ensure compliance with and adequacy of operational and maintenance activities requirements, standards and procedures.

3.1.2 The operator should specify the basic structure of the Quality System applicable to the

operation.

3.1.3 The Quality System should be structured according to the size and complexity of the operation to be monitored ('small operators' see also paragraph 7 below).

3.2 Scope

3.2.1 As a minimum, the Quality System should address the following:

- a. The provisions of -OPS;
- b. The operator's additional standards and operating procedures;
- c. The operator's Quality Policy;
- d. The operator's organisational structure;
- e. Responsibility for the development, establishment and management of the Quality System;
- f. Documentation, including manuals, reports and records;
- g. Quality Procedures;
- h. Quality Assurance Programme;
- i. The required financial, material, and human resources; and
- j. Training requirements.

3.2.2 The quality system should include a feedback system to the Accountable Manager to ensure that corrective actions are both identified and promptly addressed. The feedback system should also specify who is required to rectify discrepancies and non-compliance in each particular case, and the procedure to

be followed if remedial action is not completed within an appropriate timescale.

3.3 Relevant Documentation

3.3.1 Relevant documentation includes the relevant part(s) of the Operations Manual and the Operator's Maintenance Management Exposition, which may be included in a separate Quality Manual.

3.3.2 In addition, relevant documentation should also include the following:

- a. Quality Policy;
- b. Terminology;

- c. Specified operational standards;
 - d. A description of the organisation;
 - e. The allocation of duties and responsibilities;
 - f. Procedures to ensure regulatory compliance;
 - g. The Quality Assurance Programme, reflecting;
 - i. Schedule of the monitoring process;
 - ii. Audit procedures;
 - iii. Reporting procedures;
 - iv. Follow-up and remedial action procedures;
 - v. Recording system;
 - h. The training syllabus; and
 - i. Document control.
- 4 Quality Assurance Programme (See JCAR ops3.035(b).)

4.1 Introduction

4.1.1 The Quality Assurance Programme should include all planned and systematic actions necessary to provide confidence that all operations and maintenance are conducted in accordance with all applicable requirements, standards and procedures.

4.1.2 When establishing a Quality Assurance Programme, consideration should, at least, be given to the paragraphs 4.2 to 4.9 below:

4.2 Quality Inspection

4.2.1 The primary purpose of a quality inspection is to observe a particular event/action/document etc., in order to verify whether established procedures and requirements are followed during the accomplishment of that event and whether the required standard is achieved.

4.2.2 Typical subject areas for quality inspections are:

- a. Actual flight operation;

- b. Ground De/Anti-icing, if appropriate;
- c. Flight Support Services;
- d. Load Control;
- e. Maintenance;
- f. Technical Standards; and
- g. Training Standards.

4.3 Audit

4.3.1 An audit is a systematic, and independent comparison of the way in which an operation is being conducted against the way in which the published procedures say it should be conducted.

4.3.2 Audits should include at least the following procedures and processes:

- a. A statement explaining the scope of the audit;
- b. Planning and preparation;
- c. Gathering and recording evidence; and
- d. Analysis of the evidence.

4.3.3 Techniques which contribute to an effective audit are:

- a. Interviews or discussions with personnel;
- b. A review of published documents;
- c. The examination of an adequate sample of records;
- d. The witnessing of the activities which make up the operation; and
- e. The preservation of documents and the recording of observations.

4.4 Auditors

4.4.1 An operator should decide, depending on the complexity of the operation, whether to make use of a dedicated audit team or a single auditor. In any event, the auditor or audit team should have relevant operational and/or maintenance experience.

4.4.2 The responsibilities of the auditors should be clearly defined in the relevant documentation.

4.5 Auditor's Independence

4.5.1 Auditors should not have any day-to-day involvement in the area of the operation and/or maintenance activity which is to be audited. An operator may, in addition to using the services of full-time dedicated personnel belonging to a separate quality department, undertake the monitoring of specific areas or activities by the use of part-time auditors. An operator whose structure and size does not justify the establishment of full-time auditors, may undertake the audit function by the use of part-time personnel from within his own organisation or from an external source under the terms of an agreement acceptable to the Authority. In all cases the operator should develop suitable procedures to ensure that persons directly responsible for the activities to be audited are not selected as part of the auditing team. Where external auditors are used, it is essential that any external specialist is familiar with the type of operation and/or maintenance conducted by the operator.

4.5.2 The operator's Quality Assurance Programme should identify the persons within the company who have the experience, responsibility and authority to:

- a. Perform quality inspections and audits as part of ongoing Quality Assurance;
- b. Identify and record any concerns or findings, and the evidence necessary to substantiate such concerns or findings;
- c. Initiate or recommend solutions to concerns or findings through designated reporting channels;
- d. Verify the implementation of solutions within specific timescales;
- e. Report directly to the Quality Manager.

4.6 Audit Scope

4.6.1 Operators are required to monitor compliance with the procedures they have designed to ensure safe operations, airworthy aircraft and the serviceability of both operational and safety equipment. In doing so they should as a minimum, and where appropriate, monitor:

- a. Organisation;
- b. Plans and Company objectives;
- c. Operational Procedures;
- d. Flight Safety;
- e. Operator certification (AOC/Operations specification);
- f. Supervision;

- g. Helicopter Performance;
- h. All Weather Operations;
- i. Communications and Navigational Equipment and Practices;
- j. Mass, Balance and Helicopter Loading;
- k. Instruments and Safety Equipment;
- l. Manuals, Logs, and Records;
- m. Flight and Duty Time Limitations, Rest Requirements, and Scheduling;
- n. Helicopter Maintenance/Operations interface;
- o. Use of the MEL;
- p. Maintenance Programmes and Continued Airworthiness;
- q. Airworthiness Directives management;
- r. Maintenance Accomplishment;
- s. Defect Deferral;
- t. Flight Crew;
- u. Cabin Crew, if appropriate;
- v. Dangerous Goods;
- w. Security; and
- x. Training.

4.7 Audit Scheduling

4.7.1 A Quality Assurance Programme should include a defined audit schedule and a periodic review cycle area by area. The schedule should be flexible, and allow unscheduled audits when trends are identified. Follow-up audits should be scheduled when necessary to verify that corrective action was carried out and that it was effective.

4.7.2 An operator should establish a schedule of audits to be completed during a specified calendar period. All aspects of the operation should be reviewed within every period of 12 months in accordance with the programme unless an extension to the audit period is accepted as explained below. An operator

may increase the frequency of audits at his discretion but should not decrease the frequency without the agreement of the Authority. It is considered unlikely that a frequency of greater than 24 months would be acceptable for any audit topic.

4.7.3 When an operator defines the audit schedule, significant changes to the management, organisation, operation, or technologies should be considered as well as changes to the regulatory requirements.

4.8 Monitoring and Corrective Action

4.8.1 The aim of monitoring within the Quality System is primarily to investigate and judge its effectiveness and thereby to ensure that defined policy, operational, and maintenance standards are continuously complied with. Monitoring activity is based upon quality inspections, audits, corrective action and follow-up. The operator should establish and publish a procedure to monitor regulatory compliance on a continuing basis. This monitoring activity should be aimed at eliminating the causes of unsatisfactory performance.

4.8.2 Any non-compliance identified as a result of monitoring should be communicated to the manager responsible for taking corrective action or, if appropriate, the Accountable Manager. Such non-compliance should be recorded, for the purpose of further investigation, in order to determine the cause and to enable the recommendation of appropriate corrective action.

4.8.3 The Quality Assurance Programme should include procedures to ensure that corrective actions are taken in response to findings. These procedures should monitor such actions to verify their effectiveness and that they have been completed. Organisational responsibility and accountability for the implementation of corrective action resides with the department cited in the report identifying the finding. The Accountable Manager will have the ultimate responsibility for resourcing the corrective action and ensuring, through the Quality Manager, that the corrective action has re-established compliance with the standard required by the Authority, and any additional requirements defined by the operator.

4.8.4 Corrective action

a. Subsequent to the quality inspection/audit, the operator should establish:

- i. The seriousness of any findings and any need for immediate corrective action;
- ii. The origin of the finding;
- iii. What corrective actions are required to ensure that the non-compliance does not recur;
- iv. A schedule for corrective action;

v. The identification of individuals or departments responsible for implementing corrective action;

and

vi. Allocation of resources by the Accountable Manager, where appropriate.

4.8.5 The Quality Manager should:

- a. Verify that corrective action is taken by the manager responsible in response to any finding(s) of non-compliance;
- b. Verify that corrective action includes the elements outlined in paragraph 4.8.4 above;
- c. Monitor the implementation and completion of corrective action;
- d. Provide management with an independent assessment of corrective action, implementation and completion;
- e. Evaluate the effectiveness of corrective action through the follow-up process.

4.9 Management Evaluation

4.9.1 A management evaluation is a comprehensive, systematic, documented review of operational policies, procedures, and systems and should consider:

- a. The results of inspections, audits and any other indicators; and
- b. The overall effectiveness of the management organisation in achieving stated objectives.

4.9.2 A management evaluation should identify and correct trends, and prevent, where possible, future non-conformities. Conclusions and recommendations made as a result of an evaluation should be submitted in writing to the responsible manager for action. The responsible manager should be an individual who has the authority to resolve issues and take action.

4.9.3 The Accountable Manager should decide upon the frequency, format, and structure of internal management evaluation activities.

4.10 Recording

4.10.1 Accurate, complete, and readily accessible records documenting the results of the Quality Assurance Programme should be maintained by the operator. Records are essential data to enable an operator to analyse and determine the root causes of non-conformity, so that areas of non-compliance can be identified and addressed.

10.2 The following records should be retained for a period of 5 years:

- a. Audit Schedules;
- b. Inspection and Audit reports;
- c. Responses to findings;
- d. Corrective action reports;
- e. Follow-up and closure reports; and
- f. Management Evaluation reports.

5 Quality Assurance Responsibility for Sub-Contractors

5.1 Sub-Contractors

5.1.1 Operators may decide to sub-contract out certain activities to external agencies for the provision of services related to areas such as:

- a. Ground De-icing/Anti-icing;
- b. Maintenance;
- c. Ground handling;
- d. Flight Support (including Performance calculations, flight planning, navigation database and despatch);
- e. Training; and
- f. Manual preparation.

5.1.2 The ultimate responsibility for the quality of the product or service always remains with the operator. A written agreement should exist between the operator and the sub-contractor clearly defining the services and quality to be provided. The sub-contractor's activities relevant to the agreement should be included in the operator's Quality Assurance Programme.

5.1.3 The operator should ensure that the sub-contractor has the necessary authorisation/approval when required, and commands the resources and competence to undertake the task. If the operator requires the sub-contractor to conduct activity which exceeds the sub-contractor's authorisation/approval, the operator is responsible for ensuring that the sub-contractor's quality assurance takes account of such additional requirements.

6 Quality System Training

6.1 General

6.1.1 An operator should establish effective, well planned and resourced quality related training for all personnel.

6.1.2 Those responsible for managing the Quality System should receive training covering:

- a. An introduction to the concept of the Quality System;
- b. Quality management;
- c. The Concept of Quality Assurance;
- d. Quality manuals;
- e. Audit techniques;
- f. Reporting and recording; and
- g. The way in which the Quality System will function in the company.

6.1.3 Time should be provided to train every individual involved in quality management and for briefing the remainder of the employees. The allocation of time and resources should be governed by the size and complexity of the operation concerned.

6.2 Sources of Training

6.2.1 Quality management courses are available from the various National or International Standards Institutions, and an operator should consider whether to offer such courses to those likely to be involved in the management of Quality Systems. Operators with sufficient appropriately qualified staff should consider whether to carry out in-house training.

7 Organisations with 20 or less full time employees

7.1 Introduction

The requirement to establish and document a Quality System, and to employ a Quality Manager applies to all operators. References to large and small operators elsewhere in the requirements are governed by aircraft capacity (i.e. more or less than 10 seats) and by mass (greater or less than 3 175 kg maximum certificated take-off mass (MCTOM)). Such terminology is not relevant when considering the scale of an operation and the Quality System required. In the context of quality systems therefore, operators should be categorised according to the number of full time staff employees.

7.2 Scale of Operation

7.2.1 Operators who employ 5 or less full time staff are considered to be 'very small' while those employing between 6 and 20 full time employees are regarded as 'small' operators as far as quality systems are concerned. Full-time in this context means employed for not less than 35 hours per week

excluding vacation periods.

7.2.2 Complex quality systems could be inappropriate for small or very small operators and the clerical effort required to draw up manuals and procedures for a complex system may stretch their resources. It is therefore accepted that such operators should tailor their quality systems to suit the size and complexity of their operation and allocate resources accordingly.

7.3 Quality Systems for small/very small Operators

7.3.1 For the 'very small' operator it may be appropriate to develop a Quality Assurance Programme that employs a checklist. The checklist should have a supporting schedule that requires completion of all checklist items within a specified timescale, together with a statement acknowledging completion of a periodic review by top management. An occasional independent overview of the checklist content and achievement of the Quality Assurance should be undertaken.

7.3.2 The 'small' operator may decide to employ an internal or external system or a combination of the two. In these circumstances it would be acceptable for external specialists and or qualified organizations to manage the quality system on behalf of the Quality Manager.

7.3.3 If the independent quality monitoring function is being conducted by an organisation other than the one carrying out the operations, it is necessary for the audit schedule to be shown in the relevant documentation.

7.3.4 Whatever arrangements are made, the operator retains the ultimate responsibility for quality activities and corrective actions.

IEM JCAR ops3.035

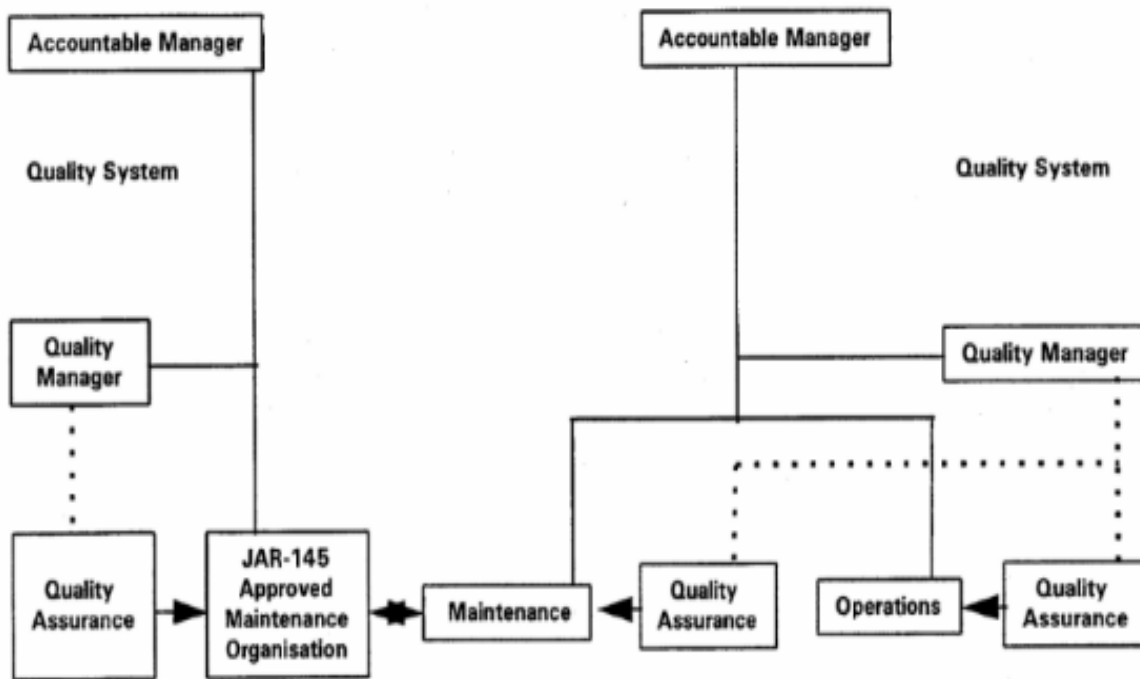
Quality System - Organisation examples

See JCAR ops3.035

The following diagrams illustrate two typical examples of Quality organisations.

1 Quality System within an AOC holder's organisation when the AOC holder also holds a JCAR 145 approval.

2 Quality Systems related to an AOC holder's organisation where aircraft maintenance is contracted out to a -145 approved organisation which is not integrated with the AOC holder:



Note: The Quality System and Quality Audit Programme of the AOC holder should assure that the maintenance carried out by the -145 approved organisation is in accordance with requirements specified by the AOC holder.

IEM JCAR ops3.037

Accident prevention and flight safety programme

See JCAR ops3.037

- 1 Guidance material for the establishment of a safety programme can be found in:
 - a. ICAO Doc 9422 (Accident Prevention Manual); and
 - b. ICAO Doc 9376 (Preparation of an Operational Manual).
- 2 Where available, use may be made of analysis of flight data recorder information (See also - JCAR ops3.160(c).)

ACJ JCAR ops3.037(a)(2)
Occurrence Reporting Scheme See
JCAR ops3.037(a)(2)

1. The overall objective of the scheme described in JCAR ops3 .037(a)(2) is to use reported information to improve the level of flight safety and not to attribute blame.
2. The detailed objectives of the scheme are:

- a. To enable an assessment of the safety implications of each relevant incident and accident to be made, including previous similar occurrences, so that any necessary action can be initiated; and
 - b. To ensure that knowledge of relevant incidents and accidents is disseminated so that other persons and organisations may learn from them.
3. The scheme is an essential part of the overall monitoring function; it is complementary to the normal day to day procedures and ‘control’ systems and is not intended to duplicate or supersede any of them. The scheme is a tool to identify those occasions where routine procedures have failed.
- (Occurrences that have to be reported and responsibilities for submitting reports are described in - JCAR ops3.420.)
4. Occurrences should remain in the database when judged reportable by the person submitting the report as the significance of such reports may only become obvious at a later date.

IEM JCAR ops3.065**Carriage of weapons of war and munitions of war****See JCAR ops3.065**

- 1 There is no internationally agreed definition of weapons of war and munitions of war. Some States may have defined them for their particular purposes or for national need.
- 2 It should be the responsibility of the operator to check, with the State(s) concerned, whether or not a particular weapon or munition is regarded as a weapon of war or munition of war. In this context, States which may be concerned with granting approvals for the carriage of weapons of war or munitions of war are those of origin, transit, overflight and destination of the consignment and the State of the operator.
- 3 Where weapons of war or munitions of war are also dangerous goods by definition (e.g. torpedoes, bombs, etc.), Subpart R will also apply. (See also IEM JCAR ops3.070)

IEM JCAR ops3.070**Carriage of sporting weapons****See JCAR ops3.070**

- 1 There is no internationally agreed definition of sporting weapons. In general they may be any weapon which is not a weapon of war or munition of war (See IEM JCAR ops3.065). Sporting weapons include hunting knives, bows and other similar articles. An antique weapon, which at one time may have been a weapon of war or munition of war, such as a musket, may now be regarded as a sporting weapon.
- 2 A firearm is any gun, rifle or pistol which fires a projectile.
- 3 In the absence of a specific definition, for the purpose of JCAR ops3 and in order to provide some

guidance to operators, the following firearms are generally regarded as being sporting weapons:

- a. Those designed for shooting game, birds and other animals;
- b. Those used for target shooting, clay-pigeon shooting and competition shooting, providing the weapons are not those on standard issue to military forces;
- c. Airguns, dart guns, starting pistols, etc.

4 A firearm, which is not a weapon of war or munition of war, should be treated as a sporting weapon for the purposes of its carriage on a helicopter.

5 Other procedures for the carriage of sporting weapons may need to be considered if the helicopter does not have a separate compartment in which the weapons can be stowed. These procedures should take into account the nature of the flight, its origin and destination, and the possibility of unlawful interference. As far as possible, the weapons should be stowed so they are not immediately accessible to the passengers (e.g. in locked boxes, in checked baggage which is stowed under other baggage or under fixed netting). If procedures other than those in JCAR ops3.070(b)(1) are applied, the commander should be notified accordingly.

ACJ JCAR ops3.125**Documents to be carried****See JCAR ops3.125**

In case of loss or theft of documents specified in JCAR ops3.125, the operation is allowed to continue until the flight reaches the base or a place where a replacement document can be provided.

IEM JCAR ops3.160(a)**Preservation of recordings See****JCAR ops3.160(a)**

The phrase 'to the extent possible' means that either:

1. There may be technical reasons why all of the data cannot be preserved, or
2. The helicopter may have been despatched with unserviceable recording equipment as permitted by JCAR ops3.700(f), JCAR ops3.705(f), JCAR ops3.715(h), or JCAR ops3.720(h).

AMC/IEM C – OPERATOR CERTIFICATION & SUPERVISION

ACJ JCAR ops3.175(i)

Nominated Postholders - Competence

See JCAR ops3.175(i)

1. *General.*

1.1 A nominee for postholder should be able to demonstrate experience and the ability to perform effectively the functions associated with the post and with the scale of the operation; and

1.2 Nominated postholders should have:

1.2.1 Practical experience and expertise in the application of aviation safety standards and safe operating practices;

1.2.2 Comprehensive knowledge of:

a. JCAR ops3 and any associated requirements and procedures;

b. The AOC holder's Operations Specifications;

c. The need for, and content of, the relevant parts of the AOC holder's Operations Manual;

1.2.3 Familiarity with Quality Systems;

1.2.4 Appropriate management experience.

2. *Flight Operations.* The nominated postholder or his deputy should hold, or have held, a Flight Crew Licence appropriate to the type of operation conducted under the AOC in accordance with the following:

2.1 If the AOC includes helicopters certificated for a minimum crew of 2 pilots - An Airline Transport Pilot's Licence issued or validated by a AUTHORITY Member State:

2.2 If the AOC is limited to helicopters certificated for a minimum crew of 1 pilot - A Commercial Pilot's Licence issued or validated by a AUTHORITY Member State.

3. For larger companies or companies with complex structures, postholders should be expected to satisfy the Authority that they possess the appropriate experience and licensing requirements which are listed in paragraphs 4 to 6 below.

4. *Maintenance System.* The nominated postholder should possess the following:

4.1 Relevant engineering degree, or aircraft maintenance technician with additional education

acceptable to the Authority. 'Relevant engineering degree' means an engineering degree from Aeronautical, Mechanical, Electrical, Electronic, Avionic or other studies relevant to the maintenance of aircraft/aircraft components.

- 4.2 Thorough familiarity with the organisation's Maintenance Management Exposition.
- 4.3 Knowledge of the relevant type(s) of helicopter;
- 4.4 Knowledge of maintenance methods.
5. *Crew Training*. The nominated postholder or his deputy should be a current Type Rating Instructor on a type operated under the AOC.
 - 5.1 The nominated Postholder should have a thorough knowledge of the AOC holder's crew training concept for Flight Crew and for Cabin Crew when relevant.
6. *Ground Operations*. The nominated postholder should have a thorough knowledge of the AOC holder's ground operations concept.

ACJ JCAR ops3.175(j)**Combination of nominated postholder's responsibilities****See JCAR ops3.175(j)**

1. The acceptability of a single person holding several posts, possibly in combination with being the accountable manager as well, will depend upon the nature and scale of the operation. The two main areas of concern are competence and an individual's capacity to meet his responsibilities.
2. As regards competence in the different areas of responsibility, there should not be any difference from the requirements applicable to persons holding only one post.
3. The capacity of an individual to meet his responsibilities will primarily be dependent upon the scale of the operation. However the complexity of the organisation or of the operation may prevent, or limit, combinations of posts which may be acceptable in other circumstances.
4. In most circumstances, the responsibilities of a nominated postholder will rest with a single individual. However, in the area of ground operations, it may be acceptable for these responsibilities to be split, provided that the responsibilities of each individual concerned are clearly defined.
5. The intent of JCAR ops3.175 is neither to prescribe any specific organisational hierarchy within the operator's organisation on a AUTHORITY wide basis nor to prevent an Authority from requiring a certain hierarchy before it is satisfied that the management organisation is suitable.

ACJ JCAR ops3.175(j) & (k)

Employment of staff

See JCAR ops3.175(j) & (k)

In the context of JCAR ops3.175(j) & (k), the expression "full-time staff" means members of staff who are employed for not less than (an average of) 35 hours per week excluding vacation periods. For the purpose of establishing the scale of operation, administrative staff, not directly involved in operations or maintenance, should be excluded.

IEM JCAR ops3.175

The management organisation of an AOC holder

See JCAR ops3.175(g) - (o)

1 Function and Purpose

1.1 The safe conduct of air operations is achieved by an operator and an Authority working in harmony towards a common aim. The functions of the two bodies are different, well defined, but complementary. In essence, the operator complies with the standards set through putting in place a sound and competent management structure. The Authority working within a framework of law statutes), sets and monitors the standards expected from operators.

2 Responsibilities of Management

2.1 The responsibilities of management related to JCAR ops3 should include at least the following five main functions:

- a. Determination of the operator's flight safety policy;
- b. Allocation of responsibilities and duties and issuing instructions to individuals, sufficient for implementation of company policy and the maintenance of safety standards;
- c. Monitoring of flight safety standards;
- d. Recording and analysis of any deviations from company standards and ensuring corrective action;
- e. Evaluating the safety record of the company in order to avoid the development of undesirable trends.

IEM JCAR ops3.175(c)(2)

Principal place of business

See JCAR ops3.175(c)(2)

1 JCAR ops3.175(c)(2) requires an operator to have his principal place of business located in the State responsible for issuing the AOC.

2 In order to ensure proper jurisdiction by that State over the operator, the term ‘principal place of business’ is interpreted as meaning the State in which the administrative headquarters and the operator’s operational and maintenance management are based.

IEM JCAR ops3.185(b)

Maintenance management exposition details

See JCAR ops3.185(b)

1 The operator's organisation’s maintenance management exposition should reflect the details of any sub-contract(s).

2 A change of helicopter type or of the PART 145 approved maintenance organisation may require the submission of an acceptable amendment to the operator's management exposition.

AMC/IEM D – OPERATIONAL PROCEDURES

ACJ JCAR ops3.195

Operational Control

(See JCAR ops3.195)

1 Operational control means the exercise by the operator, in the interest of safety, of responsibility for the initiation, continuation, termination or diversion of a flight. This does not imply a requirement for licensed flight dispatchers or a full flight watch system.

2 The organisation and methods established to exercise operational control should be included in the operations manual and should cover at least a description of responsibilities concerning the initiation, continuation, termination or diversion of each flight.

AMC JCAR ops3.210(a) Establishment of procedures

See JCAR ops3.210(a)

An operator should specify the contents of safety briefings for all cabin crew members prior to the commencement of a flight or series of flights.

IEM JCAR ops3.210(b) Establishment of procedures

See JCAR ops3.210

When an operator establishes procedures and a checklist system for use by cabin crew with respect to the helicopter cabin, at least the following items should be taken into account:

ITEM	PRE-TAKE-OFF	IN-FLIGHT	PRE-LANDING	POST-LANDING
1. Brief of cabin crew by the senior cabin crew member prior to commencement of a flight or series of flights.	x			
2. Check of safety equipment in accordance with operator's policies and procedures.				
3. Security checks as required by Subpart S (- JCAR ops3.1250).				
4. Supervision of passenger embarkation and disembarkation (JCAR ops3 .075; JCAR ops3.105; - JCAR ops3.270; - JCAR ops3.280; JCAR ops3.305).	x			x

5. Securing of passenger cabin (e.g. seat belts, cabin cargo/baggage etc. (JCAR ops3 .280; JCAR ops3.285; JCAR ops3.310).	x		x	
6. Securing of galleys and stowage of equipment (JCAR ops3.325).				
7. Intentionally left blank.				
8. Intentionally left blank.				
9. 'Cabin secure' report to flight crew.	x		x	
10. Operation of cabin lights.	x	if required	x	
11. Cabin crew at crew stations for take-off and landing. (JCAR ops3 .210(c)/IEM JCAR ops3.210(c), -JCAR ops3..310)	x		x	X
12. Surveillance of passenger cabin.	x	x	x	X
13. Prevention and detection of fire in the cabin, galleys and toilets and instructions for actions to be taken.	x	x	x	X
14. Action to be taken when turbulence is encountered. (See also JCAR ops3 .320 and - JCAR ops3.325).	x	x		
15. Intentionally left blank.	x			
16. Reporting of any deficiency and/or unserviceability of equipment.	x	x	x	X

ACJ JCAR ops3.210(d)

The intent of this paragraph is to ensure that the pilot remains at the controls when the rotors are turning under power whilst not preventing ground runs being conducted by qualified personnel other than pilots. The operator should ensure that the qualification of personnel, other than pilots, who are authorised to conduct ground runs is described in the appropriate manual.

AMC No 1 to JCAR ops3.220 Authorisation of Heliports by the operator**See JCAR ops3.220**

- 1 When defining sites for use as heliports (including infrequent or temporary heliports) for the type(s) of helicopter(s) and operation(s) concerned, an operator should take account of the following:
 - 2 An adequate site is a site which the operator considers to be satisfactory, taking account of the applicable performance requirements and site characteristics (guidance on standards and criteria are contained in ICAO Annex 14 Volume 2 and in the ICAO 'Heliport Manual' (Doc 9261-AN/903)).
 - 3 The operator should have in place a procedure for the survey of sites by a competent person. Such a procedure should take account for possible changes to the site characteristics which may have taken place since last surveyed.
 - 4 Sites which are pre-surveyed should be specifically authorised in the operator's Operations Manual. The Operations Manual should contain diagrams or/and ground and aerial photographs, and depiction (pictorial) and description of:
 - a. The overall dimensions of the site;
 - b. Location and height of relevant obstacles to approach and take-off profiles, and in the manoeuvring area;
 - c. Approach and take-off flight paths;
 - d. Surface condition (blowing dust/snow/sand);
 - e. Helicopter types authorised with reference to performance requirements;
 - f. Provision of control of third parties on the ground (if applicable);
 - g. Procedure for activating site with land owner or controlling authority;
 - h. Other useful information, for example appropriate ATS agency and frequency;
 - i. Lighting (if applicable);
 - 5 For sites which are not pre-surveyed, the Operator should have in place a enables the pilot to make, from the air, a judgment on the suitability of a site. Items (a) to (f) inclusive in (4) above should be considered.
 - 6 Operations to non pre-surveyed sites by night (except in accordance with Appendix 1 to JCAR ops3.005(d) -(c)(2)(i)(C)) should not be permitted.

AMC No 2 to JCAR ops3.220 Authorisation of Heliports by the operator - Helidecks

See JCAR ops3.220

See JCAR ops3.1045

1 The content of Part C of the Operations Manual relating to the specific authorisation of helidecks should contain both the listing of helideck limitations in a Helideck Limitations List (HLL) and a pictorial representation (template) of each helideck showing all necessary information of a permanent nature. The HLL will show, and be amended as necessary to indicate, the most recent status of each helideck concerning non-compliance with ICAO Annex 14 Volume 2, limitations, warnings, cautions or other comments of operational importance. An example of a typical template is shown in Figure 1.

2 In order to ensure that the safety of flights is not compromised, the operator should obtain relevant information and details for compilation of the HLL, and the pictorial representation, from the owner/operator of the helideck.

3 When listing helidecks, if more than one name of the helideck exists, the most common name should be used, other names should also be included. After renaming a helideck, the old name should be included in the HLL for the ensuing 6 months.

4 All helideck limitations should be included in the HLL. Helidecks without limitations should also be listed. With complex installations and combinations of installations (e.g. co-locations), a separate listing in the HLL, accompanied by diagrams where necessary, may be required.

5 Each helideck should be assessed (based on limitations, warnings, cautions or comments) to determine its acceptability with respect to the following which, as a minimum, should cover the factors listed below:

- a. The physical characteristics of the helideck.
- b. The preservation of obstacle protected surfaces is the most basic safeguard for all flights.
These surfaces are:
 - (i) The minimum 210° obstacle free surface (OFS);
 - (ii) The 150° limited obstacle surface (LOS); and
 - (iii) The minimum 180° falling "5:1" - gradient with respect to significant obstacles. If this is infringed or if an adjacent installation or vessel infringes the obstacle clearance surfaces or criteria related to a helideck, an assessment should be made to determine any possible negative effect which may lead to operating restrictions.
- c. Marking and lighting:
 - (i) Adequate perimeter lighting;

- (ii) Adequate floodlighting;
 - (iii) Status lights (NB for night and day operations e.g. Aldis Lamp);
 - (iv) Dominant obstacle paint schemes and lighting;
 - (v) Helideck markings; and
 - (vi) General installation lighting levels. Any limited authorisation in this respect should be annotated "daylight only operations" on the HLL.
- d. Deck surface:**
- (i) Surface friction;
 - (ii) Helideck net;
 - (iii) Drainage system;
 - (iv) Deck edge netting;
 - (v) Tie down system; and
 - (vi) Cleaning of all contaminants.
- e. Environment:**
- (i) Foreign Object Damage;
 - (ii) Physical turbulence generators;
 - (iii) Bird control,
 - (iv) Air quality degradation due to exhaust emissions, hot gas vents or cold gas vents; and
 - (v) Adjacent helidecks may need to be included in air quality assessment.
- f. Rescue and fire fighting:**
- (i) Primary and complementary media types, quantities, capacity and systems personal protective equipment and clothing, breathing apparatus; and
 - (ii) Crash box;
- g. Communications & Navigation:**

- (i) Aeronautical Radio(s);
 - (ii) R/T callsign to match helideck name and side identification which should be simple and unique;
 - (iii) NDB or equivalent (as appropriate);
 - (iv) Radio log; and
 - (v) Light signal (e.g. Aldis Lamp).
- h. Fuelling facilities:**
- (i) In accordance with the relevant national guidance and regulations;
- i. Additional operational and handling equipment:**
- (i) Windsock;
 - (ii) Wind recording;
 - (iii) Deck motion recording and reporting where applicable;
 - (iv) Passenger briefing system;
 - (v) Chocks;
 - (vi) Tie downs; and
 - (vii) Weighing scales.
- j. Personnel:**
- (i) Trained helideck staff (e.g. Helicopter Landing Officer/Helicopter Deck Assistant and fire fighters etc.).
- k. Other:**
- (i) as appropriate.

6 For helidecks about which there is incomplete information, a 'limited' authorisation based on the information available may be issued by the operator prior to the first helicopter visit. During subsequent operations and before full authorisation is given, information should be gathered and the following procedures should apply:

- a. Pictorial (static) representation:**

- (i) Template (see figure 1) blanks should be available, to be filled out during flight preparation on the basis of the information given by the helideck owner/operator and flight crew observations.
- (ii) Where possible, suitably annotated photographs may be used until the HLL and template has been completed.
- (iii) Until the HLL and Template has been completed, operational restrictions (e.g. performance, routing etc.) may be applied.
- (iv) Any previous inspection reports should be obtained by the operator.
- (v) An inspection of the helideck should be carried out to verify the content of the completed HLL and template, following which the helideck may be fully authorised for operations.

b. With reference to the above, the HLL should contain at least the following:

- (i) HLL revision date and number;
- (ii) Generic list of helideck motion limitations;
- (iii) Name of Helideck;
- (iv) 'D'-value of the helideck; and
- (v) Limitations, warnings, cautions and comments.

c. The template should contain at least the following (see example below):

- (i) Installation/Vessel name;
- (ii) R/T Callsign;
- (iii) Helideck Identification Marking;
- (iv) Side Panel Identification Marking;
- (v) Helideck elevation;
- (vi) Maximum installation/vessel height;
- (vii) 'D' Value;
- (viii) Type of installation/vessel;

- Fixed manned

- Fixed unmanned
 - Ship type (e.g. diving support vessel)
 - Semi-submersible
 - Jack-up
- (ix) Name of owner/operator;
- (x) Geographical position;
- (xi) Com/Nav Frequencies and Ident;
- (xii) General drawing preferably looking into the helideck with annotations showing location of derrick, masts, cranes, flare stack, turbine and gas exhausts, side identification panels, windsock etc.;
- (xiii) Plan view drawing, chart orientation from the general drawing, to show the above. The plan view will also show the 210 degree bisector orientation in degrees true;
- (xiv) Type of fuelling:
- Pressure and Gravity
 - Pressure only
 - Gravity only
 - None
- (xv) Type and nature of fire fighting equipment;
- (xvi) Availability of GPU;
- (xvii) Deck heading;
- (xviii) Maximum allowable mass;
- (xix) Status light (Yes/No); and
- (xx) Revision date of publication.

NAME		R/T CALLSIGN:	HELIDeck IDENT:
HELIDeck ELEV 200'		MAX HEIGHT: 350'	SIDE IDENT:
TYPE INSTALLATION (1)		D = 22 M	
POS: N E W65849grid		OPERATOR (2)	
		ATIS : V 123.45	
COM	log traffic deck : V 123.45	NAV	NDB : 123 + ident DME : 123 VOR/DME : 123 VOR : 123

Fuelling: (3)	GPU: (4)	deck head:
max all mass: T	status light: (5)	revision date

1. Fixed manned; fixed unmanned; small ship; large ship; semi-submersible; jack-up.
2. NAM, AMOCO etc.
3. Pressure/gravity; pressure; gravity; no.
4. Yes; no; 28V DC.
5. Yes; no.

Figure 1 – Helideck Template

IEM JCAR ops3.240(a)(6)

Coastal Transit

See JCAR ops3.240(a)(6)

1 Introduction

1.1 A helicopter operating overwater in Performance Class 3, has to have certain equipment fitted. This equipment varies with the distance from land that the helicopter is expected to operate. The aim of

this IEM is to discuss that distance, bring into focus what fit is required and to clarify the operator's responsibility, when a decision is made to conduct coastal transit operations.

1.2 In the case of operations north of 45N or south of 45S, the coastal corridor facility may or may not be available in a particular state, as it is related to the State definition of open sea area as described in the definition of hostile environment and IEM JCAR ops3.480(a)(12).

1.3 Where the term Coastal Transit is used, it means the conduct of operations overwater within the coastal corridor in conditions where there is reasonable expectation that; the flight can be conducted safely in the conditions prevailing; and, following an engine failure, a safe forced landing and successful evacuation can be achieved; and survival of the crew and passengers can be assured until rescue is effected.

1.4 Coastal corridor is a variable distance from the coastline to a maximum distance corresponding to 3 minutes flying at normal cruising speed.

2 Establishing the width of the coastal corridor.

2.1 The distance from land of Coastal Transit, is defined the boundary of a corridor that extends from the land, to a maximum distance of up to 3 minutes at normal cruising speed (approximately 5 - 6 nm). Land in this context includes sustainable ice (see a. to c. below) and, where the coastal region includes islands, the surrounding waters may be included in the corridor and aggregated with the coast and each other. Coastal transit need not be applied to inland waterways, estuary crossing or river transit.

a. In some areas, the formation of ice is such that it can be possible to land, or force land, without hazard to the helicopter or occupants. Unless the Authority considers that operating to, or over, such ice fields is unacceptable, the operator may regard the definition of the "land" extends to these areas.

b. The interpretation of the following rules may be conditional on a.

above: JCAR ops3.240(a)(6)

JCAR ops3.825

JCAR ops3.827

JCAR ops3.830

JCAR ops3.843

c. In view of the fact that such featureless and flat white surfaces could present a hazard and could lead to white-out conditions, the definition of land does not extend to flights over ice fields in the following rules:

JCAR ops3.650(i)

JCAR ops3.660

2.2 The width of the corridor is variable from not safe to conduct operations in the conditions prevailing, to the maximum of 3 minutes wide. A number of factors will, on the day, indicate if it can be used - and how wide it can be. These factors will include but not be restricted to:

- a. The meteorological conditions prevailing in the corridor;
- b. The instrument fit of the aircraft;
- c. The certification of the aircraft - particularly with regard to floats;
- d. The sea state;
- e. The temperature of the water;
- f. The time to rescue; and
- g. The survival equipment carried.

These can be broadly divided into three functional groups:

Those which meet the requirement for safe flying - a. and b..

Those which meet the requirement for a safe forced landing and evacuation - a., b., c. and d..

Those which meet the requirement for survival following a forced landing and successful evacuation - a., d., e., f. and g..

3 Requirement for safe flying

3.1 It is generally recognised that when flying out of sight of land in certain meteorological conditions, such as occur in high pressure weather patterns (goldfish bowl - no horizon, light winds and low visibility), the absence of a basic panel (and training) can lead to disorientation. In addition, lack of depth perception in these conditions demands the use of a radio altimeter with an audio voice warning as an added safety benefit - particularly when autorotation to the surface of the water may be required.

3.2 In these conditions a helicopter, without the required instruments and radio altimeter, should be confined to a corridor in which a pilot can maintain reference using the visual cues on the land.

4 Requirement for a safe forced landing and evacuation

4.1 Weather and sea state both affect the outcome of an autorotation following an engine failure. It is recognised that the measurement of sea state is problematical and when assessing such conditions, good judgement has to be exercised by the operator and the commander.

4.2 Where floats have been certificated only for emergency use (and not for ditching), operations must be limited to those sea states which meet the requirement for such use - where a safe evacuation is possible. (Ditching certification requires compliance with a comprehensive number of requirements relating to rotorcraft water entry, flotation and trim, occupant egress and occupant survival. Emergency flotation systems, generally fitted to smaller Part 27 rotorcraft, are approved against a broad requirement that the equipment must perform its intended function and not hazard the rotorcraft or its occupants. In practice, the most significant difference between ditching and emergency flotation systems is substantiation of the water entry phase. Ditching requirements call for water entry procedures and techniques to be established and promulgated in the Flight Manual. The fuselage/flotation equipment must thereafter be shown to be able to withstand loads under defined water entry conditions which relate to these procedures. For emergency flotation equipment, there is no requirement to define the water entry technique and no specific conditions defined for the structural substantiation.)

5 Requirements for survival

5.1 Survival of crew members and passengers, following a successful autorotation and evacuation, is dependant on the clothing worn, the equipment carried and worn, the temperature of the sea and the sea state (see IEM JCAR ops3.827). Search and rescue response/capability consistent with the anticipated exposure should be available before the conditions in the corridor can be considered non-hostile.

5.2 Coastal Transit can be conducted (including north of 45N and south of 45S - when the definition of open sea areas allows) providing the requirements of paragraph 3 and 4 are met, and the conditions for a non-hostile coastal corridor are satisfied.

IEM JCAR ops3.243 Operations in areas with specific navigation performance requirements

See JCAR ops3.243

1 The requirements and procedures relating to areas in which minimum navigation performance specifications are prescribed, based on Regional Air Navigation Agreements, are covered (as indicated for the type of navigation performance specification) in the following documentation:

- a. RNP information and associated procedures - ICAO DOC 9613; and
- b. EUROCONTROL Standards on Area Navigation to comply with RNP/RNAV.
- c. CARC TGL No 2 - Advisory material for the airworthiness approval of navigation systems for use in European Airspace designated for Basic RNAV Operations.

2 The following explanatory material has been developed to explain the subject of Required Navigation Performance (RNP) more fully:

- a. Objective of RNP - The RNP concept will replace the conventional method of ensuring required navigation performance by requiring the carriage of specific navigation equipment by worldwide, uniform standards of navigation performance for defined airspace and/or flight procedures. It is therefore up to an operator to decide which system(s) he will utilise to meet the requirements. However,

the operator must ensure that the system(s) used is certificated for operations in the airspace concerned.

- b. Navigational Accuracy - RNP is defined as a statement of the navigational accuracy required for operation within a defined area of airspace. Navigational accuracy is based upon a combination of navigation sensor error, airborne sensor error, display error and flight technical error in the horizontal plane. The level of accuracy is expressed as a single parameter and it defines the distance from helicopter's intended position within which the aircraft must be maintained for at least 95% of the total flying time. As an example, RNP 4 means that all aircraft remain within 4 nm of their intended positions for at least 95% of the total flying time.
- c. RNP Types for En-Route Operations - In order to consider the requirements for navigation performance for various areas of airspace and/or routes, RNP types have been defined for worldwide, uniform application in en-route operations as follows:
 - i. RNP 1 requires highly accurate position information and will be associated with high-density continental traffic. Full exploitation of the benefits of RNP 1 (in connection with area navigation (RNAV)) will require that a high percentage of aircraft achieves this level of navigation performance.
 - ii. RNP 4 will normally be applied in continental areas in which the route structure is presently based on VOR/DME.

IEM JCAR ops3.250 Establishment of Minimum Flight Altitudes

See JCAR ops3.250

1 The following are examples of some of the methods available for calculating minimum flight altitudes.

2 KSS Formula

2.1 Minimum obstacle clearance altitude (MOCA). MOCA is the sum of:

- i. The maximum terrain or obstacle elevation whichever is highest; plus
- ii. 1 000 ft for elevation up to and including 6 000 ft; or
- iii. 2 000 ft for elevation exceeding 6 000 ft rounded up to the next 100 ft.

2.1.1 The lowest MOCA to be indicated is 2 000 ft.

2.1.2 From a VOR station, the corridor width is defined as a borderline starting 5 nm either side of the VOR, diverging 4° from centreline until a width of 20 nm is reached at 70 nm out, thence paralleling the centreline until 140 nm out, thence again diverging 4° until a maximum width of 40 nm is reached at 280 nm out. Thereafter the width remains constant.

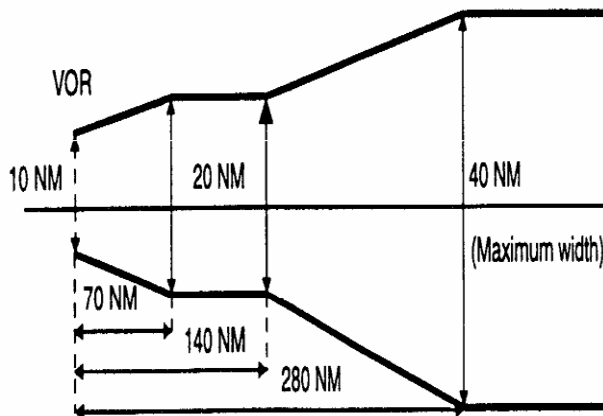


FIGURE 1

2.1.3 From an NDB, similarly, the corridor width is defined as a borderline starting 5 nm either side of the NDB diverging 7° until a width of 20 nm is reached 40 nm out, thence paralleling the centreline until 80 nm out, thence again diverging 7° until a maximum width of 60 nm is reached 245 nm out. Thereafter the width remains constant.

2.1.4 MOCA does not cover any overlapping of the corridor.

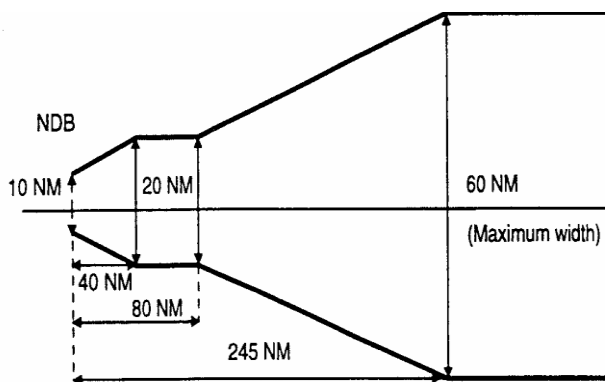


FIGURE 2

2.2 Minimum off-route altitude (MORA). MORA is calculated for an area bounded by every or every second LAT/LONG square on the Route Facility Chart (RFC)/Terminal Approach Chart (TAC) and is based on a terrain clearance as follows:

- i. Terrain with elevation up to 6 000 ft (2 000 m) – 1 000 ft above the highest terrain and obstructions;
- ii. Terrain with elevation above 6 000 ft (2 000 m) – 2 000 ft above the highest terrain and obstructions.

3 Jeppesen Formula

3.1 MORA is a minimum flight altitude computed by Jeppesen from current ONC or WAC charts. Two types of MORAs are charted which are:

- i. Route MORAs e.g. 9 800a; and ii.
- Grid MORAs e.g. 98.

3.2 Route MORA values are computed on the basis of an area extending 10 nm to either side of route centreline and including a 10 nm radius beyond the radio fix/reporting point or mileage break defining the route segment.

3.3 MORA values clear all terrain and man-made obstacles by 1 000 ft in areas where the highest terrain elevation or obstacles are up to 5 000 ft. A clearance of 2 000 ft is provided above all terrain or obstacles which are 5 001 ft and above.

3.4 A Grid MORA is an altitude computed by Jeppesen and the values are shown within each Grid formed by charted lines of latitude and longitude. Figures are shown in thousands and hundreds of feet. (omitting the last two digits so as to avoid chart congestion). Values followed by ± are believed not to exceed the altitudes shown. The same clearance criteria as explained in paragraph 3.3 above apply.

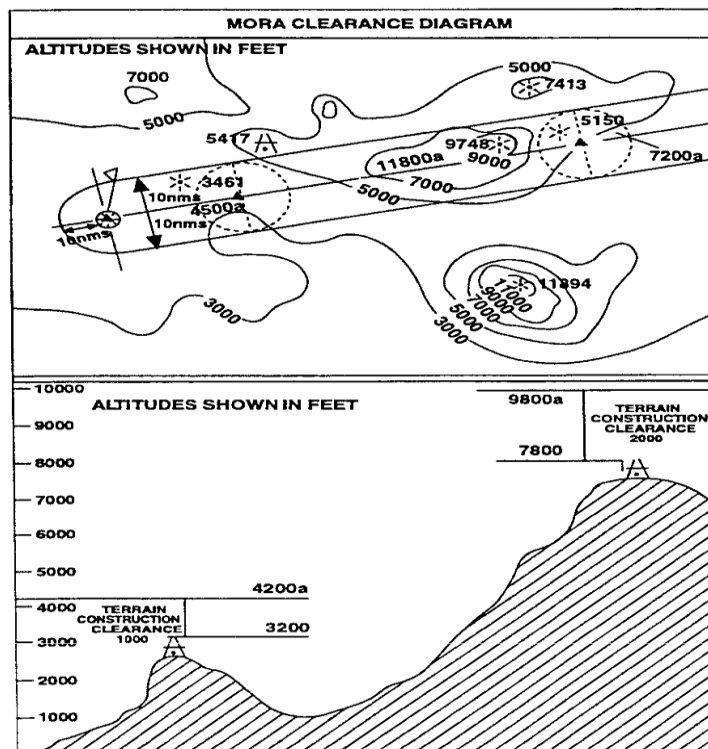


FIGURE 3

4 ATLAS Formula

4.1 Minimum safe En-route Altitude (MEA). Calculation of the MEA is based on the elevation of the highest point along the route segment concerned (extending from navigational aid to navigational aid) within a distance on either side of track as specified below:

- i. Segment length up to 100 nm – 10 nm (See Note 1 below).
- ii. Segment length more than 100 nm –10% of the segment length up to a maximum of 60 nm (See Note 2 below).

Note 1: This distance may be reduced to 5 nm within TMAs where, due to the number and type of available navigational aids, a high degree of navigational accuracy is warranted.

Note 2: In exceptional cases, where this calculation results in an operationally impracticable value, an additional special MEA may be calculated based on a distance of not less than 10 nm either side of track. Such special MEA will be shown together with an indication of the actual width of protected airspace.

4.2 The MEA is calculated by adding an increment to the elevation specified above as appropriate: Elevation of highest point Increment

Not above 5 000 ft	1 500 ft
Above 5 000 ft but not above 10 000 ft	2 000 ft
Above 10 000 ft	10% of elevation plus 1 000 ft

NOTE: For the last route segment ending over the initial approach fix, a reduction to 1 000 ft is permissible within TMAs where, due to the number and type of available navigation aids, a high degree of navigational accuracy is warranted.

The resulting value is adjusted to the nearest 100 ft.

4.3 Minimum safe Grid Altitude (MGA). Calculation of the MGA is based on the elevation of the highest point within the respective grid area.

The MGA is calculated by adding an increment to the elevation specified above as appropriate: Elevation of highest point Increment

Not above 5 000 ft	1 500 ft
Above 5 000 ft but not above 10 000 ft	2 000 ft
Above 10 000 ft	10% of elevation plus 1 000 ft

The resulting value is adjusted to the nearest 100 ft.

AMC JCAR ops3.255 Fuel Policy

See JCAR ops3.255

An operator should base the company fuel policy, including calculation of the amount of fuel to be carried, on the following planning criteria:

- 1 The amount of:
 - 1.1 Taxi fuel, which should not be less than the amount, expected to be used prior to take-off. Local conditions at the departure heliport and APU consumption should be taken into account.
 - 1.2 Trip fuel, which should include:
 - a. Fuel for take-off and climb from heliport elevation to initial cruising level/altitude, taking into account the expected departure routing;
 - b. Fuel from top of climb to top of descent, including any step climb/descent;
 - c. Fuel from top of descent to the point where the approach procedure is initiated, taking into account the expected arrival procedure; and
 - d. Fuel for approach and landing at the destination heliport.
 - 1.3 Contingency fuel, which should be:
 - a. For IFR flights, or for VFR flights in a hostile environment, 10% of the planned trip fuel; or
 - b. For VFR flights in a non-hostile environment, 5% of the planned trip fuel;
 - 1.4 Alternate fuel, which should be:
 - a. Fuel for a missed approach from the applicable MDA/DH at the destination heliport to missed approach altitude, taking into account the complete missed approach procedure;
 - b. Fuel for a climb from missed approach altitude to cruising level/altitude;
 - c. Fuel for the cruise from top of climb to top of descent;
 - d. Fuel for descent from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure; and
 - e. Fuel for executing an approach and landing at the destination alternate heliport selected in accordance with JCAR ops3.295.

- f. For helicopters operating to or from helidecks located in a hostile environment, 10% of a. to e. above.
- 1.5 Final reserve fuel, which should be:
- a. For VFR flights navigating by day with reference to visual landmarks, 20 minutes fuel at best range speed; or
- b. For IFR flights or when flying VFR and navigating by means other than by reference to visual landmarks or at night, fuel to fly for 30 minutes at holding speed at 1 500 ft (450 m) above the destination heliport in standard conditions calculated with the estimated mass on arrival above the alternate, or the destination, when no alternate is required.
- 1.6 Extra fuel, which should be at the discretion of the commander.
- 2 Isolated heliport IFR procedure. If an operator's fuel policy includes planning to an isolated heliport flying IFR, or when flying VFR and navigating by means other than by reference to visual landmarks, for which a destination alternate does not exist, the amount of fuel at departure should include:
- a. Taxi fuel;
- b. Trip fuel;
- c. Contingency fuel calculated in accordance with sub-paragraph 1.3 above;
- d. Additional fuel to fly for two hours at holding speed including final reserve fuel; and
- e. Extra fuel at the discretion of the commander.
- 3 Sufficient fuel should be carried at all times to ensure that following the failure of a power unit which occurs at the most critical point along the route, the helicopter is able to:
- a. Descend as necessary and proceed to an adequate heliport; and
- b. Hold there for 15 minutes at 1 500 ft (450 m) above heliport elevation in standard conditions; and
- c. Make an approach and landing.
- (See IEM JCAR ops3.500(a)(5) and IEM JCAR ops3.530(a)(5)).

IEM JCAR ops3.255(c)(3)(i)Contingency Fuel**See JCAR ops3.255(c)(3)(i)**

- 1 At the planning stage, not all factors which could have an influence on the fuel consumption to the destination heliport can be foreseen. Therefore, contingency fuel is carried to compensate for items

such as:

- i. Deviations of an individual helicopter from the expected fuel consumption data;
- ii. Deviations from forecast meteorological conditions; and
- iii. Deviations from planned routings and/or cruising levels/altitudes.

IEM JCAR ops3.260 Carriage of persons with Reduced Mobility

See JCAR ops3.260

1 A person with reduced mobility (PRM) is understood to mean a person whose mobility is reduced due to physical incapacity (sensory or locomotory), an intellectual deficiency, age, illness or any other cause of disability when using transport and when the situation needs special attention and the adaptation to a person's need of the service made available to all passengers.

2 In normal circumstances PRMs should not be seated adjacent to an emergency exit.

3 In circumstances in which the number of PRMs forms a significant proportion of the total number of passengers carried on board:

- a. The number of PRMs should not exceed the number of able-bodied persons capable of assisting with an emergency evacuation; and
- b. The guidance given in paragraph 2 above should be followed to the maximum extent possible.

AMC JCAR ops3.270 Cargo carriage in the passenger cabin

See JCAR ops3.270

1 In establishing procedures for the carriage of cargo in the passenger cabin of a helicopter, an operator should observe the following:

- a. That the weight of the cargo does not exceed the structural loading limit(s) of the cabin floor or seat(s);
- b. That the number/type of restraint devices and their attachment points should be capable of restraining the cargo in accordance with JAR-29.787 or equivalent;
- c. That the location of the cargo should be such that, in the event of an emergency evacuation, it will not hinder egress nor impair the cabin crew's view.

ACJ No. 1 to JCAR ops3.280 Passenger Seating

See JCAR ops3.280

See ACJ No. 2 to JCAR ops3.280

1 An operator should make provision so that:

- a. Those passengers who are allocated seats which permit direct access to emergency exits, appear to be reasonably fit, strong and able to assist the rapid evacuation of the helicopter in an emergency after an appropriate briefing by the crew;
- b. In all cases, passengers who, because of their condition, might hinder other passengers during an evacuation or who might impede the crew in carrying out their duties, should not be allocated seats which permit direct access to emergency exits. If the operator is unable to establish procedures which can be implemented at the time of passenger 'check-in', he should establish an alternative procedure acceptable to the Authority that the correct seat allocations will, in due course, be made.

2 The above text does not apply to helicopters where the normal exit also serves as an emergency exit. However in these circumstances, the operator should apply discretion when choosing passengers to sit next to a normal exit to ensure that evacuation is not hindered in the case of an emergency.

ACJ No. 2 to JCAR ops3.280 Passenger Seating**See JCAR ops3.280****See ACJ No. 1 to JCAR ops3.280**

1 The following categories of passengers are among those who should not be allocated to, or directed to seats which permit direct access to emergency exits:

- a. Passengers suffering from obvious physical, or mental, handicap to the extent that they would have difficulty in moving quickly if asked to do so;
- b. Passengers who are either substantially blind or substantially deaf to the extent that they might not readily assimilate printed or verbal instructions given;
- c. Passengers who because of age or sickness are so frail that they have difficulty in moving quickly;
- d. Passengers who are so obese that they would have difficulty in moving quickly or reaching and passing through the adjacent emergency exit;
- e. Children (whether accompanied or not) and infants;
- f. Deportees or persons in custody; and,
- g. Passengers with animals.

Note: "Direct access" means a seat from which a passenger can proceed directly to the exit without entering an aisle or passing around an obstruction.

AMC JCAR ops3.295(c)(1) Selection of Heliports

See JCAR ops3.295(c)(1)

- 1 Any alleviation from the requirement to select an alternate heliport for a flight to a coastal heliport under IFR is applicable only to helicopters routing from offshore, and should be based on an individual safety case assessment.
- 2 The following should be taken into account:
 - 2.1. Suitability of the weather based on the landing forecast for the destination;
 - 2.2. The fuel required to meet the IFR requirements of JCAR ops3.255 less alternate fuel;
 - 2.3. Where the destination coastal heliport is not directly on the coast it should be:
 - a. Within a distance that, with the fuel specified in 2.2. above, the helicopter can, at any time after crossing the coastline, return to the coast, descend safely and carry out a visual approach and landing with VFR fuel reserves intact, and
 - b. Geographically sited so that the helicopter can, within the Rules of the Air, and within the landing forecast:
 - (i) proceed inbound from the coast at 500 ft AGL and carry out a visual approach and landing; or
 - (ii) proceed inbound from the coast on an agreed route and carry out a visual approach and landing.
 - 2.4. Procedures for coastal heliports should be based on a landing forecast no worse than:
 - a. By Day. A cloud base of DH/MDH + 400 ft, and a visibility of 4 km, or, if descent over the sea is intended, a cloud base of 600 ft and a visibility of 4 km.
 - b. By Night. A cloud base of 1 000 ft and a visibility of 5 km.
 - 2.5. The descent to establish visual contact with the surface should take place over the sea or as part of the instrument approach;
 - 2.6. Routings and procedures for coastal heliports nominated as such should be included in the Operations Manual Part C - Route and Heliport Instructions and Information;
 - 2.7. The MEL should reflect the requirement for Airborne Radar and Radio Altimeter for this type of operation;
 - 2.8. Operational limitations for each coastal heliport should be acceptable to the Authority.

IEM JCAR ops3.295(c)(1) Selection of Heliports**See JCAR ops3.395(c)(1)**

1 The procedures contained in AMC JCAR ops3.295(c)(1) are weather critical. Consequently, a “Landing forecast” conforming to the standards contained in the Regional Air Navigation Plan and ICAO Annex 3 has been specified.

2 The “Landing forecast” consists of a concise statement of the mean or average meteorological conditions expected at an aerodrome or heliport during the two-hour period immediately following the time of issue. It contains surface wind, visibility, significant weather and cloud elements, and may contain other significant information, such as barometric pressure and temperature, as agreed between the meteorological authority and the operators concerned.

3 The detailed description of the landing forecast is promulgated in the ICAO Regional Air Navigation Plan and also in ICAO Annex 3, together with the operationally desirable accuracy of the forecast elements. In particular, the value of the observed cloud height and visibility elements should remain within the +/- 30% of the forecast values in 90% of the cases.

4 The landing forecast most commonly takes the form of a routine or special selected meteorological report in the METAR code to which a TREND is added. The code words “NOSIG”, i.e. no significant change expected; “BECMG” (becoming); or “TEMPO” (temporarily); followed by the expected change, are used. The two-hour period of validity of the forecast commences at the time of the meteorological report.

AMC JCAR ops3.295(e) Selection of Heliports**See JCAR ops3.295(e)****1 Offshore alternate deck landing environment**

The landing environment of a helideck that is proposed for use as an Offshore Alternate should be pre-surveyed and, as well as the physical characteristics, the effect of wind direction and strength, and turbulence established. This information, which should be available to the Commander at the planning stage and in flight, should be published in an appropriate form in the Operations Manual Part C (including the orientation of the helideck) such that the suitability of the helideck for use as an Offshore Alternate, can be assessed. The alternate helideck should meet the criteria for size and obstacle clearance appropriate to the performance requirements of the type of helicopter concerned.

2 Performance considerations

The use of an Offshore Alternate is restricted to helicopters which can achieve One Engine Inoperative (OEI) In Ground Effect (IGE) hover at an appropriate power rating at the Offshore alternate. Where the surface of the Offshore alternate helideck, or prevailing conditions (especially wind velocity), precludes an OEI In Ground Effect hover (IGE), OEI Out of Ground Effect (OGE) hover performance at an appropriate power rating should be used to compute the landing mass. The landing mass should be calculated from graphs provided in the relevant Part B of the Operations Manual. (When arriving at

this landing mass, due account should be taken of helicopter configuration, environmental conditions and the operation of systems which have an adverse effect on performance.) The planned landing mass of the helicopter including crew, passengers, baggage, cargo plus 30 minutes Final Reserve fuel, should not exceed the OEI landing mass at the time of approach to the Offshore alternate.

3 Weather considerations

3.1 Meteorological Observations

When the use of an Offshore Alternate is planned, an Observer acceptable should take the meteorological observations at the destination and alternate to the Authority responsible for the provision of meteorological services. (Automatic meteorological observations stations may be used if acceptable).

3.2 Weather Minima

When the use of an Offshore alternate is planned, an operator should not select a helideck as a destination or offshore alternate unless the aerodrome forecast, indicates that, during a period commencing one hour before and ending one hour after the expected time of arrival at the destination and offshore alternate, the weather conditions will be at or above the planning minima shown in Table 1 below.

Table 1

	Day	Night
Cloud Base	600 ft	800 ft
Visibility	4 km	5 km

3.3 Conditions of Fog

Where fog is forecast, or has been observed within the last two hours within 60 nm of the destination or alternate, offshore alternates should not be used.

4 Actions at Point of No Return

Before passing the Point of No Return - which should not be more that 30 minutes from the destination - the following actions should have been completed:

- 4.1 Confirmation that navigation to the destination and offshore alternate can be assured.
- 4.2 Radio contact with the destination and offshore alternate (or master station) has been established.
- 4.3 The landing forecast at the destination and offshore alternate have been obtained and confirmed to be at or above the required minima.

4.4 The requirements for One Engine Inoperative landing (see paragraph 2 above) have been checked (in light of the latest reported weather conditions) to ensure that they can be met.

4.5 To the extent possible, having regard to information on current and forecast use of the offshore alternate and on conditions prevailing, the availability of the offshore alternate should be guaranteed by the duty holder (the rig operator in the case of fixed installations and the owner in the case of mobiles) until the landing at the destination, or the offshore alternate, has been achieved (or until offshore shuttling has been completed).

5 Offshore shuttling

Provided that the actions in paragraph 4 above have been completed, offshore shuttling, using an offshore alternate, may be carried out.

IEM JCAR ops3.295(e) Off-shore alternates

See JCAR ops3.295(e)

When operating off shore, any spare payload capacity should be used to carry additional fuel if it would facilitate the use of an onshore alternate.

IEM JCAR ops3.295(e)(4) Selection of Heliports - landing forecast

See JCAR ops3.295(e)(4)

1 The procedures contained in AMC JCAR ops3.295(e) are weather critical. Consequently, meteorological data conforming to the standards contained in the Regional Air Navigation Plan and ICAO Annex 3 has been specified. As the following meteorological data is point specific, caution should be exercised when associating it with nearby heliports (or helidecks).

2 Meteorological Reports (METARs)

2.1 Routine and special meteorological observations at offshore installations should be made during periods and at a frequency agreed between the meteorological authority and the operator concerned. They should comply with the requirements contained in the meteorological section of the ICAO Regional Air Navigation Plan, and should conform to the standards and recommended practices, including the desirable accuracy of observations, promulgated in ICAO Annex 3.

2.2 Routine and selected special reports are exchanged between meteorological offices in the METAR or SPECI code forms prescribed by the World Meteorological Organisation.

3 Aerodrome Forecasts (TAFS)

3.1 The aerodrome forecast consists of a concise statement of the mean or average meteorological conditions expected at an aerodrome or heliport during a specified period of validity, which is normally not less than 9 hours, or more than 24 hours in duration. The forecast includes surface wind, visibility, weather and cloud, and expected changes of one or more of these elements during the

period. Additional elements may be included as agreed between the meteorological authority and the operators concerned. Where these forecasts relate to offshore installations, barometric pressure and temperature should be included to facilitate the planning of helicopter landing and take-off performance.

3.2 Aerodrome forecasts are most commonly exchanged in the TAF code form, and the detailed description of an aerodrome forecast is promulgated in the ICAO Regional Air Navigation Plan and also in ICAO Annex 3, together with the operationally desirable accuracy elements. In particular, the observed cloud height should remain within +/- 30% of the forecast value in 70% of cases, and the observed visibility should remain within +/- 30% of the forecast value in 80% of cases.

4 Landing Forecasts (TRENDS)

4.1 The landing forecast consists of a concise statement of the mean or average meteorological conditions expected at an aerodrome or heliport during the two-hour period immediately following the time of issue. It contains surface wind, visibility, significant weather and cloud elements, and other significant information, such as barometric pressure and temperature, as may be agreed between the meteorological authority and the operators concerned.

4.2 The detailed description of the landing forecast is promulgated in the ICAO Regional Air Navigation Plan and also in ICAO Annex 3, together with the operationally desirable accuracy of the forecast elements. In particular, the value of the observed cloud height and visibility elements should remain within +/-30% of the forecast values in 90% of the cases.

4.3 Landing forecasts most commonly take the form of routine or special selected meteorological reports in the METAR code, to which either the code words "NOSIG", i.e. no significant change expected; "BECMG" (becoming), or "TEMPO" (temporarily), followed by the expected change, are added. The two-hour period of validity commences at the time of the meteorological report.

AMC JCAR ops3.300 Submission of ATS Flight plan

See JCAR ops3.300

1 Flights without ATS flight plan. When unable to submit or to close the ATS flight plan due to lack of ATS facilities or any other means of communications to ATS, an operator should establish procedures, instructions and a list of authorised persons to be responsible for alerting search and rescue services.

2 To ensure that each flight is located at all times, these instructions should:

a. Provide the authorised person with at least the information required to be included in a VFR Flight plan, and the location, date and estimated time for re-establishing communications;

b. If an aircraft is overdue or missing, provide for notification to the appropriate ATS or Search and Rescue facility; and

c. Provide that the information will be retained at a designated place until the completion of the flight.

IEM JCAR ops3.305**Re/defuelling with passengers embarking, on board or disembarking****See JCAR ops3.305**

When re/defuelling with passengers on board, ground servicing activities and work inside the helicopter, such as catering and cleaning, should be conducted in such a manner that they do not create a hazard and that the aisles and emergency doors are unobstructed.

IEM JCAR ops3.307 Refuelling/Defuelling with wide-cut fuel**See JCAR ops3.307**

- 1 'Wide-cut fuel' (designated JET B, JP-4 or AVTAG) is an aviation turbine fuel that falls between gasoline and kerosene in the distillation range and consequently, compared to kerosene (JET A or JET A1), it has properties of higher volatility (vapour pressure), lower flash point and lower freezing point.
- 2 Wherever possible, an operator should avoid the use of wide-cut fuel types. If a situation arises such that only wide-cut fuels are available for refuelling/defuelling, operators should be aware that mixtures of wide-cut fuels and kerosene turbine fuels can result in the air/fuel mixture in the tank being in the combustible range at ambient temperatures. The extra precautions set out below are advisable to avoid arcing in the tank due to electrostatic discharge. The risk of this type of arcing can be minimised by the use of static dissipation additive in the fuel. When this additive is present in the proportions stated in the fuel specification, the normal fuelling precautions set out below are considered adequate.
- 3 Wide-cut fuel is considered to be "involved" when it is being supplied or when it is already present in aircraft fuel tanks.
- 4 When wide-cut fuel has been used, this should be recorded in the Technical Log. The next two uplifts of fuel should be treated as though they too involved the use of wide-cut fuel.
- 5 When refuelling/defuelling with turbine fuels not containing a static dissipator, and where wide-cut fuels are involved, a substantial reduction in fuelling flow rate is advisable. Reduced flow rate, as recommended by fuel suppliers and/or aeroplane manufactureres, has the following benefits:
 - a. It allows more time for any static charge build-up in the fuelling equipment to dissipate before the fuel enters the tank;
 - b. It reduces any charge which may build up due to splashing; and
 - c. Until the fuel inlet point is immersed, it reduces misting in the tank and consequently the extension of the flammable range of the fuel.
- 6 The flow rate reduction necessary is dependent upon the fuelling equipment in use and the type of filtration employed on the helicopter fuelling distribution system. It is difficult, therefore, to

quote precise flow rates. Reduction in flow rate is advisable when pressure fuelling is employed.

IEM JCAR ops3.310(b) Cabin crew seating positions

See JCAR ops3.310(b)

- 1 When determining cabin crew seating positions, the operator should ensure that they are:
 - i. Close to a floor level exit;
 - ii. Provided with a good view of the area(s) of the passenger cabin for which the cabin crew member is responsible; and
 - iii. Evenly distributed throughout the cabin, in the above order of priority.
- 2 Paragraph 1 above should not be taken as implying that, in the event of there being more such cabin crew stations than required cabin crew, the number of cabin crew members should be increased.

ACJ JCAR ops3.346 Flight in expected or actual icing conditions

See JCAR ops3.346

- 1 The procedures to be established by an operator should take account of the design, the equipment or the configuration of the helicopter and also of the training which is needed. For these reasons, different helicopter types operated by the same company may require the development of different procedures. In every case, the relevant limitations are those which are defined in the Helicopter Flight Manual (HFM) and other documents produced by the manufacturer.
- 2 For the required entries in the Operations Manual, the procedural principles which apply to flight in icing conditions are referred to under Appendix 1 to JCAR ops3.1045, A 8.3.8 and should be cross-referenced, where necessary, to supplementary, type-specific data under Appendix 1 to JCAR ops3.1045, B 4.1.
- 3 Technical content of the Procedures. The operator should ensure that the procedures take account of the following:
 - a. JCAR ops3.675;
 - b. The equipment and instruments which must be serviceable for flight in icing conditions;
 - c. The limitations on flight in icing conditions for each phase of flight. These limitations may be imposed by the helicopter's de-icing or anti-icing equipment or the necessary performance corrections which have to be made;
 - d. The criteria the Flight Crew should use to assess the effect of icing on the performance and/or controllability of the helicopter;
 - e. The means by which the Flight Crew detects, by visual cues or the use of the helicopter's ice detection system, that the flight is entering icing conditions; and

- f. The action to be taken by the Flight Crew in a deteriorating situation (which may develop rapidly) resulting in an adverse affect on the performance and/or controllability of the helicopter, due to either:
 - i. the failure of the helicopter's anti-icing or de-icing equipment to control a build-up of ice, and/or
 - ii. ice build-up on unprotected areas.

- 4 Training for despatch and flight in expected or actual icing conditions. The content of the Operations Manual, Part D, should reflect the training, both conversion and recurrent, which Flight Crew, and all other relevant operational personnel will require in order to comply with the procedures for despatch and flight in icing conditions.
 - 4.1 For the Flight Crew, the training should include:
 - a. Instruction in how to recognise, from weather reports or forecasts which are available before flight commences or during flight, the risks of encountering icing conditions along the planned route and on how to modify, as necessary, the departure and in-flight routes or profiles;
 - b. Instruction in the operational and performance limitations or margins;
 - c. The use of in-flight ice detection, anti-icing and de-icing systems in both normal and abnormal operation; and
 - d. Instruction in the differing intensities and forms of ice accretion and the consequent action which should be taken.

 - 4.2 For Crew members other than flight crew, the training should include;
 - a. Awareness of the conditions likely to produce surface contamination; and
 - b. The need to inform the Flight Crew of significant ice accretion.

ACJ JCAR ops3.398 Airborne Collision Avoidance Systems (ACAS) See JCAR ops3.398**1 Purpose**

1.1 The purpose of this ACJ is to provide guidance to operators of aircraft that carry airborne collision avoidance systems (ACAS I) equipment. It includes information on the capabilities and limitations of the equipment, and the traffic advisories (TAs) it may generate, together with advice concerning the appropriate flight crew response. Information is also provided on details that should be included in checklists, and in Operations and Training Manuals.

1.2 A list of definitions is provided in Appendix A.

2 General

2.1 Notwithstanding that a flight may be made with an air traffic control clearance, it remains the duty of a commander to take all possible measures to ensure that his aircraft does not collide with any other aircraft. Information from an air traffic control (ATC) system may be available, but this may do no more than provide advice as to the proximity of an aircraft that is perceived to constitute a potential threat and, possibly, advise the commander as to how he might best manoeuvre his aircraft to avoid it.

ACAS provides flight crew with an independent back up to visual search and the ATC system by alerting them to collision hazards.

As helicopter performance generally cannot comply with the avoidance criteria present in the algorithms for ACAS II, Resolution Advisories (RAs) and RA avoidance techniques are not covered by this ACJ. Unless otherwise stated in this document the term 'ACAS' refers to ACAS 1 systems

3 Examples of Limitations of ACAS Equipment

3.1 Dependence on Active Transponder Equipment

As ACAS relies upon information received from airborne transponders, it cannot detect the presence of aircraft whose transponders are unserviceable or which have not been selected to operate. TAs will not be produced in such circumstances, and they will not be produced in respect of any aircraft that does not carry transponder equipment, or one whose equipment is incompatible with the international standard.

3.2 Limited Capability

ACAS equipments are not capable of resolving the bearing, heading or vertical rates of intruders accurately. For this reason, pilots should not attempt to manoeuvre solely on the basis of TA information (for example in IMC).

3.3 Dependence on Altitude-Reporting Transponder Equipment

As a comparison cannot be made of both the intruder and the subject aircraft's altitudes or flight levels, ACAS is not dependent on Altitude-Reporting Transponder equipment (SSR Mode C or S). However a TA will be produced, if appropriate, in these circumstances. If this should occur, flight crew should not delay making a visual search supplemented, if the potential threat cannot be seen and gives cause for concern, with a request for assistance from ATC to help them to decide whether a change of flight path should be made.

3.4 False and Nuisance TAs

ACAS may generate false and nuisance TAs under normal and safe operating conditions.

3.4.1 False TAs may occur as a result of deficiencies in the equipment or data with which it is provided.

3.4.2 Nuisance TAs may occur if aircraft flight paths are computed by ACAS to result in potential conflicts, but the advisories are perceived by flight crew to be unwarranted due to:

- a) the intended change of flight path of either aircraft or,
 - b) the observance that adequate separation exists and that it is being maintained by both aircraft.
- TAs should be treated as genuine unless the intruder has been positively identified and assessed as constituting neither a threat nor a hazard.

3.5 Operating Limits

3.5.1 ACAS will be inhibited from producing a full range of TAs in such circumstances of flight as are outside the minimum altitudes specified for operation of the equipment. For this reason, flight crew should be aware of when ACAS will not provide a full range of TA information.

3.6 ACAS II Requirements versus Helicopter Performance

3.6.1 ACAS II relies on altitude reporting information from a SSR transponder transmitting in Mode C or Mode S. The resulting altitude deviations require minimum performance criteria to resolve the Resolution Advisory generated by the ACAS II software algorithms. For example the minimum rate of closing speed below Flight Level (FL) 100 is 480 knots, and the minimum Rate of Climb or Descent (RCOD) is 1 500 ft/MIN. Helicopters and most small fixed-wing aircraft cannot comply with these performance criteria and therefore installation of ACAS II (or ACAS III) will not be mandated for these types in the future.

4 Operations Manuals and Checklists

4.1 Operations Manuals should contain, in their introduction to ACAS, information similar to that given in Section 2 above. It should be emphasised that ACAS is not to be regarded as a substitute for the visual search expected to be maintained by flight crew, nor is it intended to replace a clearance given by ATC.

4.2 Technical details of the system should at least contain brief descriptions of: Input sources, with reference to TAs; Audio and visual indications of TAs. Equipment limitations.

4.3 Operational instructions should specify what checks flight crew should carry out prior to take-off to ensure that the ACAS equipment is serviceable, and the action they should take in the event that abnormal or fault conditions arise on the ground or in the air.

4.4 Minimum Equipment Lists should define a minimum despatch standard on occasions when ACAS may be partially or fully unserviceable. In this respect full account must be taken of any appropriate legislation that may exist, and of recommendations made by the Authority.

4.5 The Operations Manual should state clearly the actions to be taken by crews following receipt of TAs. Section 6 contains detailed guidance. Instructions should take full account of operational constraints consequent upon limitations of the equipment, such as are described in Section 3.

5 Training

- 5.1 The purpose for which training in the use of ACAS equipment should be provided is to ensure that pilots take appropriate action on receiving TAs.
- 5.2 Training should provide flight crew with information sufficient to enable them to understand the operation of ACAS equipment, including its capabilities and limitations, and the procedures they must use in response to any advisory information that may be generated.
- 5.3 The ground-training syllabus should include the following items:
 - 5.3.1 Descriptions of equipment carried on board the aircraft together with associated controls, circuit protections, information displays and all audio and visual indications.
 - 5.3.2 Abnormal or fault conditions, and such corrective or disabling actions as may be required.
 - 5.3.3 Descriptive terms associated with ACAS, and such limitations as necessarily prevent the equipment from providing total protection from approaching aircraft.
 - 5.3.4 The full sequence of events that may follow from the time an intruder aircraft is first determined to exist until such time as, both aircraft are again proceeding on their cleared or intended courses and, if appropriate, at their assigned altitudes or flight levels. Emphasis should be placed on the need to initiate manoeuvres promptly once these are deemed necessary.
- 5.4 In-flight training covering full ACAS operation including demonstration TAs is impractical. If appropriate a suitably equipped flight simulator is a more desirable way of providing training in the use of ACAS equipment and of providing crew with situations in which they may practice making proper responses.
- 5.5 Records of training provided and competency achieved should be raised and retained for a period of 2 years.

6 Action to be taken on Receiving TAs

- 6.1 The purposes of a TA are to alert flight crew to the presence of an intruder aircraft, which could require a change to the flight path of the subject aircraft, and to advise them that they should attempt to sight the potential threat.
- 6.2 Flight crew should immediately assimilate information provided by the TA, and commence a visual search of that portion of the sky within which the potential threat should be seen. They should prepare to manoeuvre the aircraft if necessary. If the potential threat cannot be seen and gives cause for concern, flight crew should seek advice from ATC.
- 6.3 If the potential threat is seen and is perceived as likely to result in a definite risk of collision, pilots should manoeuvre their aircraft as necessary ensuring where possible that the sky ahead is clear of other traffic.

6.4 When clear of the potential threat, and provided no other conflicts are seen to exist, the aircraft should be returned promptly to its intended flight path and ATC advised of any deviation from an air traffic control clearance.

6.5 Aircraft Management

6.5.1 Operators should emphasise that flight crew should verify to the best of their ability that the airspace in which they intend to manoeuvre is clear of other aircraft, and that they should inform ATC as soon as it is possible to do so of any departure made from an air traffic control clearance.

6.5.2 It should be understood that any deviation from an air traffic control clearance has the potential to cause disruption to the controller's tactical plan, and so might result in a reduction in separation between aircraft other than those originally involved. Therefore it is vital that crews maintain an effective look-out and that they return to their intended flight path as soon as is safe and practical to do so.

Appendix A Definitions

1 ACAS: An acronym for airborne collision avoidance systems.

1.1 ACAS I: An airborne collision avoidance system which utilizes interrogations of, and replies from, airborne radar beacon transponders. It provides traffic advisories only.

1.2 ACAS II: An airborne collision avoidance system which utilizes interrogations of, and replies from, airborne radar beacon transponders. It provides traffic advisories, and resolution advisories in the vertical plane. Requires specific minimum aircraft performance.

1.3 ACAS III: An airborne collision avoidance system which utilizes interrogations of, and replies from, airborne radar beacon transponders. It provides traffic advisories, and resolution advisories in the vertical and horizontal planes. Requires specific minimum aircraft performance.

2 TCAS: An acronym for traffic alert and collision avoidance systems having specific capabilities. TCAS has been developed in the USA to implement ACAS.

Note: When used within this document the terms 'ACAS' and 'TCAS', if not followed by numeric identifiers, are generic and refer to any ACAS I or TCAS I system respectively.

3 Protected Volume: A volume of airspace enclosing the ACAS aircraft which, when penetrated by or containing an intruder, will normally result in the generation of a traffic advisory or a resolution advisory.

4 Closest Point of Approach (CPA): The occurrence of minimum range between own ACAS aircraft and an intruder. Thus range at closest point of approach is the smallest range between the two aircraft, and time of closest approach is the time at which this occurs.

- 5 Traffic Advisory (TA): Advisory information provided by ACAS to caution flight crews as to the proximity of a potential threat. It should occur when the time to CPA is sensed by ACAS to have reached a set value, usually 40 seconds.
- 5.1 Traffic advisories aid visual acquisition, and may include range, altitude, and bearing of the potential threat relative to the ACAS aircraft.
- 5.2 Traffic advisories without altitude may also be reported from non altitude-reporting transponder Mode A-equipped potential threats.
- 6 Traffic: An aircraft that has come within the surveillance range of ACAS.
- 7 Proximate Traffic: An aircraft that has come within $\pm 1\ 200$ ft and 6 nm of ACAS.
- 8 Intruder: A transponder-equipped aircraft within the surveillance range of ACAS for which ACAS has an established track.
- 9 Potential Threat: An intruder that has penetrated the TA-protected volume.
- 10 Co-ordination: The process by which two ACAS-equipped aircraft select compatible RAs by the exchange of resolution advisory complements.
- 11 Subject Aircraft: The ACAS-equipped aircraft that may need to manoeuvre in order to maintain adequate separation from an established threat.
- 12 Genuine TA: The equipment provides a TA in accordance with its technical specification.
- 13 Nuisance TA: The equipment provides a TA in accordance with its technical specification, but no risk of collision exists.
- 14 False TA: A fault or failure in the system causes the equipment to provide a TA that is not in accordance with its technical specification.

Note: The FAA have published a list of definitions, details of which vary slightly from some of those given above. Others which are likely to be significant are shown below:

- a) Alert: An indicator (visual or auditory) which provides information to flight crew in a timely manner about a non-normal situation.
- b) Intruder: A target which has satisfied the traffic advisory detection criteria.

IEM JCAR ops3.400 Approach and Landing Conditions**See JCAR ops3.400**

The in-flight determination of the FATO suitability should be based on the latest available report, preferably not more than 30 minutes before the expected landing time.

IEM JCAR ops3.405(a) Commencement and continuation of approach – Equivalent position

See JCAR ops3.405(a)

The 'equivalent position' mentioned in JCAR ops3.405 can be established by means of a DME distance, a suitably located NDB or VOR, SRE or PAR fix or any other suitable fix that independently establishes the position of the helicopter.

AMC JCAR ops3.420(e) Dangerous Goods Occurrence Reporting

See JCAR ops3.420(e)

- 1 To assist the ground services in preparing for the landing of an helicopter in an emergency situation, it is essential that adequate and accurate information about any dangerous goods on board be given to the appropriate air traffic services unit. Wherever possible this information should include the proper shipping name and/or the UN/ID number, the class/division and for Class 1 the compatibility group, any identified subsidiary risk(s), the quantity and the location on board the helicopter.
- 2 When it is not considered possible to include all the information, those parts thought most relevant in the circumstances, such as the UN/ID numbers or classes/divisions and quantity, should be given.

ACJ JCAR ops3.426 Flight hours reporting

(See JCAR ops3.426)

The requirement of JCAR ops3.426 may be achieved by making available either:

- the flight hours flown by each helicopter – identified by its serial number and registration mark - during the elapsed calendar year; or
- the total flight hours of each helicopter – identified by its serial number and registration mark – on the 31st of December of the elapsed calendar year.

Where possible, the operator should have available, for each helicopter, the breakdown of hours for CAT, aerial work, general aviation. If the exact hours for the functional activity cannot be established, the estimated proportion will be sufficient.

AMC/IEM E – ALL WEATHER OPERATIONS**AMC JCAR ops3.430(b)(4) Effect on Landing Minima of temporarily failed or downgraded Ground Equipment****See JCAR ops3.430(b)(4)****1 Introduction**

1.1 This provides operators with instructions for flight crews on the effects on landing minima of temporary failures or downgrading of ground equipment.

1.2 Aerodrome facilities are expected to be installed and maintained to the standards prescribed in ICAO Annexes 10 and 14. Any deficiencies are expected to be repaired without unnecessary delay.

2 General. These instructions are intended for use both pre-flight and in-flight. It is not expected however that the commander would consult such instructions after passing the outer marker or equivalent position. If failures of ground aids are announced at such a late stage, the approach could be continued at the commander's discretion. If, however, failures are announced before such a late stage in the approach, their effect on the approach should be considered as described in Tables 1A and 1B below, and the approach may have to be abandoned to allow this to happen.

3 Operations with no Decision Height (DH)

3.1 An operator should ensure that, for aeroplanes authorised to conduct no DH operations with the lowest RVR limitations, the following applies in addition to the content of Tables 1A and 1B, below:

- i. RVR. At least one RVR value must be available at the aerodrome;
- ii. FATO/runway lights
 - a. No FATO/runway edge lights, or no centre lights - Day only min RVR 200 m;
 - b. No TDZ lights - No restrictions;
 - c. No standby power to FATO/runway lights - Day only min RVR 200 m.

4. Conditions applicable to Tables 1A & 1B

- i. Multiple failures of FATO/runway lights other than indicated in Table 1B are not acceptable.
- ii. Deficiencies of approach and FATO/runway lights are treated separately.
- iii. Category II or III operations. A combination of deficiencies in FATO/runway lights and RVR assessment equipment is not allowed.
- iv. Failures other than ILS affect RVR only and not DH.

TABLE 1A – Failed or downgraded equipment – effect on landing minima

FAILE OR DOWNGRADED EQUIPMENT	EFFECT ON LANDING MINIMA				
	CAT III B (Note 1)	CAT III A	CAT II	CAT I	NON PRECISION
ILS stand-by transmitter	Not allowed		No effect		
Outer Marker	No effect if replaced by published equivalent position				Not applicable
Middle Marker	No effect				No effect unless used as MAPT
Touch Down Zone RVR assessment system	May be temporarily replaced with midpoint RVR if approved by the State of the Aerodrome. RVR may be reported by human observation			No effect	
Midpoint or Stopend RVR	No effect				
Anemometer for R/W in use	No effect if other ground source available				
Ceilometer	No effect				

Note 1 For Cat IIIB operations with no DH, see also paragraph 3, above

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TABLE 1B – Failed or downgraded equipment – effect on landing minima

FAILED OR DOWNGRADED EQUIPMENT	EFFECT ON LANDING MINIMA				
	CAT III B (Note 1)	CAT III A	CAT II	CAT I	NON PRECISION
Approach lights	Not allowed for operations with DH>50ft		Not allowed	Minima as for nil facilities	
Approach light except the last	No effect		Not allowed		
Approach light except the last	No effect				
Standby power for approach lights	No effect		RVR as for CAT I basic facilities		No effect
While FATO light system	Not allowed			Minima as for basic facilities Day only	
Edge Lights	Day only				
Centreline lights	RVR 300 m Day only		RVR 300 m – day 550 m - night	No effect	
Centreline lights spacing increased to 30 m	RVR 150 m	No effect			
Touch Down Zone lights	RVR 200m – day 300m - night	RVR 300m – day 550m - night		No effect	
Standby power for FATO lights	Not allowed				
Taxiway light system	No effect – except delays due to reduced movement rate				

Note 1 For Cat IIIB operations with no DH, see also paragraph 3, above.

IEM to Appendix 1 to JCAR ops3.430 Aerodrome Operating Minima**See Appendix 1 to JCAR ops3.430**

The minima stated in this Appendix are based upon the experience of commonly used approach aids. This is not meant to preclude the use of other guidance systems such as Head Up Display (HUD) and Enhanced Visual Systems (EVS) but the applicable minima for such systems will need to be developed as the need arises.

IEM to Appendix 1 to JCAR ops3.430 subparagraph (a)(3)(i) Onshore heliport departure procedures**See Appendix 1 to JCAR ops3.430 subparagraph (a)(3)(i)**

The cloud base and visibility should be such as to allow the helicopter to be clear of cloud at TDP, and for the pilot flying to remain in sight of the surface until reaching the minimum speed for flight in IMC given in the HFM.

IEM to Appendix 1 to JCAR ops3.430, sub-paragraph Establishment of minimum RVR for Category II Operations.**See Appendix 1 to JCAR ops3.430, sub-paragraph (d)****1 General**

- 1.1 When establishing minimum RVR for Category II Operations, operators should pay attention to the following information which originated 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.
- 1.2 Since the inception of precision approach and landing operations various methods have been devised for the calculation of aerodrome operating minima in terms of decision height and runway visual range. It is a comparatively straightforward matter to establish the decision height for an operation but establishing the minimum RVR to be associated with that decision height so as to provide a high probability that the required visual reference will be available at that decision height has been more of a problem.
- 1.3 The methods adopted by various States to resolve the DH/RVR relationship in respect of Category II operations have varied considerably; in one instance there has been a simple approach which 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 new larger aircraft, most of the variables cancel each other out and a simple tabulation can be constructed which is applicable to a wide range of aircraft. The basic principles which are observed in establishing the values in such a table are that the scale of visual reference required by a pilot at and below decision height depends on the task that he has to carry out, and that the degree to which his 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 simulators coupled with flight trials has shown the

following:

- a. Most pilots require visual contact to be established about 3 seconds above decision height though it has been observed that this reduces to about 1 second when a fail-operational automatic landing system is being used;
- b. To establish lateral position and cross-track velocity most pilots need to see not less than a 3 light segment of the centre line of the approach lights, or runway centre line, or runway edge lights;
- c. For roll guidance most pilots need to see a lateral element of the ground pattern, i.e. an approach lighting cross bar, the landing threshold, or a barrette of the touchdown zone lighting;
- d. 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; and
- e. With regard to fog structure, data gathered in the United Kingdom over a twenty-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.

2 Category II Operations

- 2.1 The selection of the dimensions of the required visual segments which are used for Category II operations is based on the following visual requirements:
 - a. A visual segment of not less than 90 metres will need to be in view at and below decision height for pilot to be able to monitor an automatic system;
 - b. A visual segment of not less than 120 metres will need to be in view for a pilot to be able to maintain the roll attitude manually at and below decision height; and
 - c. For a manual landing using only external visual cues, a visual segment of 225 metres 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.

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

IEM to Appendix 1 to JCAR ops3.430 subparagraph (i) Airborne Radar Approach (ARA) for Overwater Operations

See Appendix 1 to JCAR ops3.430 subparagraph (i)

1 General

- 1.1 The helicopter airborne radar approach procedure (ARA) may have as many as five separate segments. These are the arrival, initial, intermediate, final, and missed approach segments. In addition, the requirements of the circling manoeuvre to a landing under visual conditions should be considered. The individual approach segments can begin and end at designated fixes, however, the segments of an ARA may often begin at specified points where no fixes are available.
- 1.2 The fixes, or points, are named to coincide with the associated segment. For example, the intermediate segment begins at the Intermediate Fix (IF) and ends at the Final Approach Fix (FAF). Where no fix is available or appropriate, the segments begin and end at specified points; for example, Intermediate Point (IP) and final approach point (FAP). The order in which this IEM discusses the segments is the order in which the pilot would fly them in a complete procedure: that is, from the arrival through initial and intermediate to a final approach and, if necessary, the missed approach.
- 1.3 Only those segments which are required by local conditions applying at the time of the approach need be included in a procedure. In constructing the procedure, the final approach track, (which should be orientated so as to be substantially into wind) should be identified first as it is the least flexible and most critical of all the segments. When the origin and the orientation of the final approach have been determined, the other necessary segments should be integrated with it to produce an orderly manoeuvring pattern which does not generate an unacceptably high work-load for the flight crew.
- 1.4 Examples of Airborne Radar Approach procedures, vertical profile and missed approach procedures are contained in Figures 1 to 5.

2 Obstacle environment

- 2.1 Each segment of the ARA is located in an over-water area which has a flat surface at sea level. However, due to the passage of large vessels which are not required to notify their presence, the exact obstacle environment cannot be determined. As the largest vessels and structures are known to reach elevations exceeding 500 ft amsl, the uncontrolled offshore obstacle environment applying to the arrival, initial and intermediate approach segments can reasonably be assumed to be capable of reaching to at least 500 ft AMSL. But, in the case of the final approach and missed approach segments, specific areas are involved within which no radar returns are permitted. In these areas the height of wave crests and the possibility that small obstacles may be present which are not visible on radar, results in an uncontrolled surface environment which extends to an elevation of 50 ft amsl.
- 2.2 Under normal circumstances, the relationship between the approach procedure and the obstacle environment is governed according to the concept that vertical separation is very easy to apply during the arrival, initial and intermediate segments, while horizontal separation, which is much more difficult to guarantee in an uncontrolled environment, is applied only in the final and missed approach segments.

3 Arrival segment

- 3.1 The arrival segment commences at the last en-route navigation fix, where the aircraft leaves the helicopter route, and it ends either at the Initial Approach Fix (IAF) or, if no course reversal, or similar manoeuvre is required, it ends at the IF. Standard en-route obstacle clearance criteria should be applied to the arrival segment.
- 4 Initial approach segment
- 4.1 The initial approach segment is only required if a course reversal, race track, or arc procedure is necessary to join the intermediate approach track. The segment commences at the IAF and on completion of the manoeuvre ends at the intermediate point (IP). The Minimum Obstacle Clearance (MOC) assigned to the initial approach segment is 1 000 ft.
- 5 Intermediate approach segment
- 5.1 The intermediate approach segment commences at the IP, or in the case of "straight in" approaches, where there is no initial approach segment, it commences at the IF. The segment ends at the FAP and should not be less than 2 nm in length. The purpose of the intermediate segment is to align and prepare the helicopter for the final approach. During the intermediate segment the helicopter should be lined up with the final approach track, the speed should be stabilised, the destination should be identified on the radar, and the final approach and missed approach areas should be identified and verified to be clear of radar returns. The MOC assigned to the intermediate segment is 500 ft.
- 6 Final approach segment
- 6.1 The final approach segment commences at the FAP and ends at the missed approach point (MAPt). The final approach area, which should be identified on radar, takes the form of a corridor between the FAP and the radar return of the destination. This corridor should not be less than 2 nm wide in order that the projected track of the helicopter does not pass closer than 1 nm to the obstacles lying outside the area.
- 6.2 On passing the FAP, the helicopter will descend below the intermediate approach altitude, and follow a descent gradient which should not be steeper than 6.5%. At this stage vertical separation from the offshore obstacle environment will be lost. However, within the final approach area, the minimum descent height (MDH), or minimum descent altitude (MDA), will provide separation from the surface environment. Descent from 1 000 ft amsl to 200 ft amsl at a constant 6.5% gradient will involve a horizontal distance of 2 nm. In order to follow the guideline that the procedure should not generate an unacceptably high work-load for the flight crew, the required actions of levelling at MDH, changing heading at the Offset Initiation Point (OIP), and turning away at MAPt should not be planned to occur at the same time. Consequently, the FAP should not normally be located at less than 4 nm from the destination.
- 6.3 During the final approach, compensation for drift should be applied and the heading which, if maintained, would take the helicopter directly to the destination, should be identified. It follows that, at an OIP located at a range of 1.5 nm, a heading change of 10° is likely to result in a track offset of 15° at 1nm, and the extended centreline of the new track can be expected to have a mean position lying some 300 - 400 metres to one side of the destination structure. The safety margin built in to the 0.75 nm Decision Range (DR) is dependent upon the rate of closure with the destination. Although the airspeed should be in the range 60/90 kt during the final approach, the ground speed, after due allowance for wind velocity,

should be no greater than 70 kts.

7 Missed approach segment

7.1 The missed approach segment commences at the MAPt and ends when the helicopter reaches minimum en-route altitude. The missed approach manoeuvre is a "turning missed approach" which must be

of not less than 30° and should not, normally, be greater than 45°. A turn away of more than 45° does not reduce the collision risk factor any further, nor will it permit a closer decision range (DR). However, turns of more than 45° may increase the risk of pilot disorientation and, by inhibiting the rate of climb (especially in the case of a one engine inoperative (OEI) go-around), may keep the helicopter at an extremely low level for longer than is desirable.

7.2 The missed approach area to be used should be identified and verified as a clear area on the radar screen during the intermediate approach segment. The base of the missed approach area is a sloping surface at 2.5% gradient starting from MDH at the MAPt. The concept is that a helicopter executing a turning missed approach will be protected by the horizontal boundaries of the missed approach area until vertical separation of more than 130 ft is achieved between the base of the area, and the offshore obstacle environment of 500 ft AMSL which prevails outside the area.

7.3 A missed approach area, taking the form of a 45° sector orientated left or right of the final approach track, originating from a point 5 nm short of the destination, and terminating on an arc 3 nm beyond the destination, will normally satisfy the requirements of a 30° turning missed approach.

8 The required visual reference

8.1 The visual reference required is that the destination shall be in view in order that a safe landing may be carried out.

9 Radar equipment

9.1 During the ARA procedure colour mapping radar equipment with a 120° sector scan and 2.5 nm range scale selected, may result in dynamic errors of the following order:

- a. bearing/tracking error $\pm 4.5^\circ$ with 95% accuracy;
- b. mean ranging error - 250 m;
- c. random ranging error ± 250 m with 95% accuracy.

Figure 1 - Arc Procedure

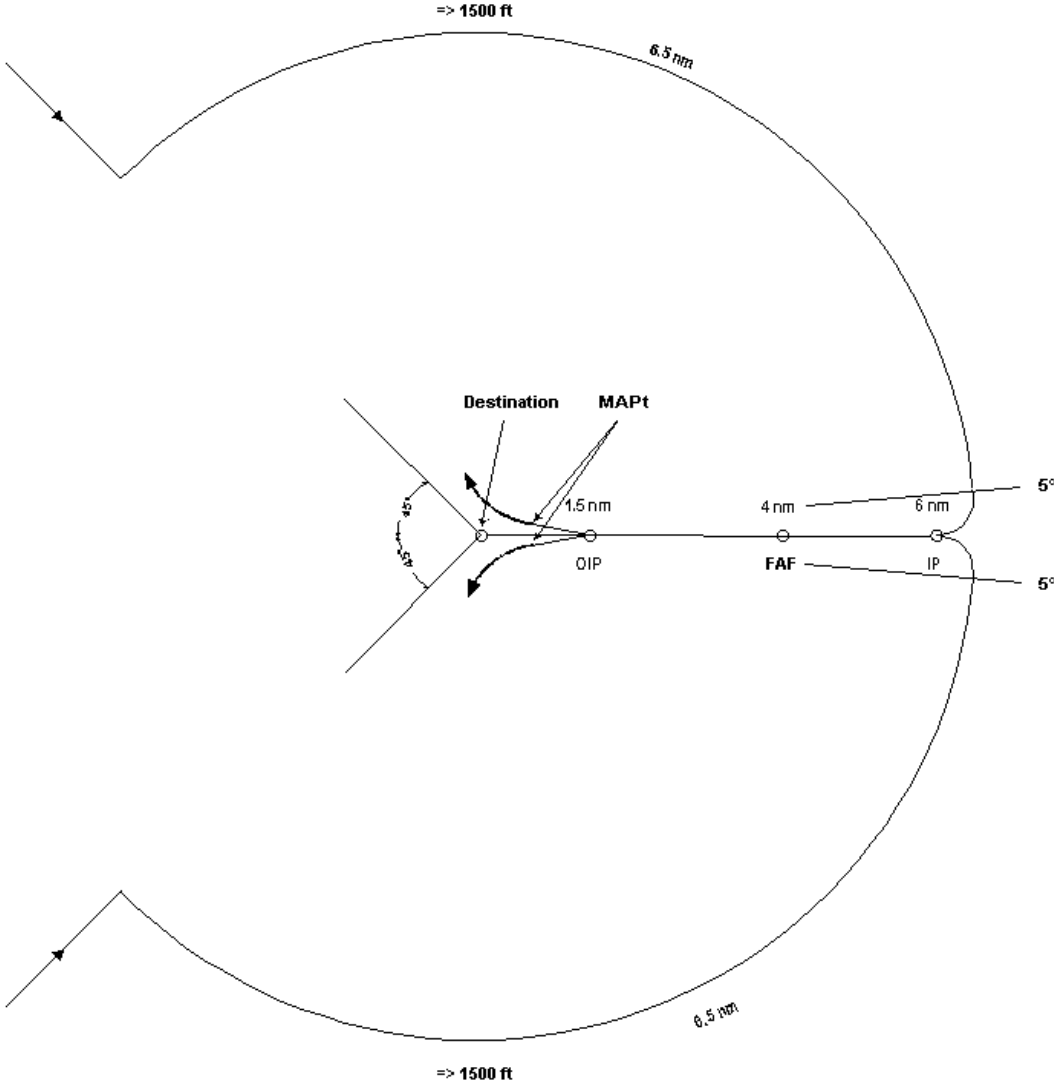


Figure 2 - Base Turn Procedure - Direct Approach

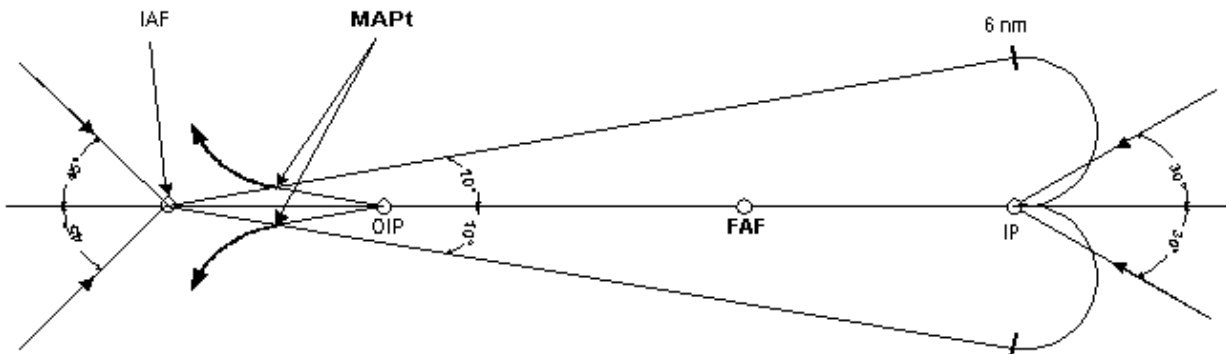


Figure 3: Vertical Profile

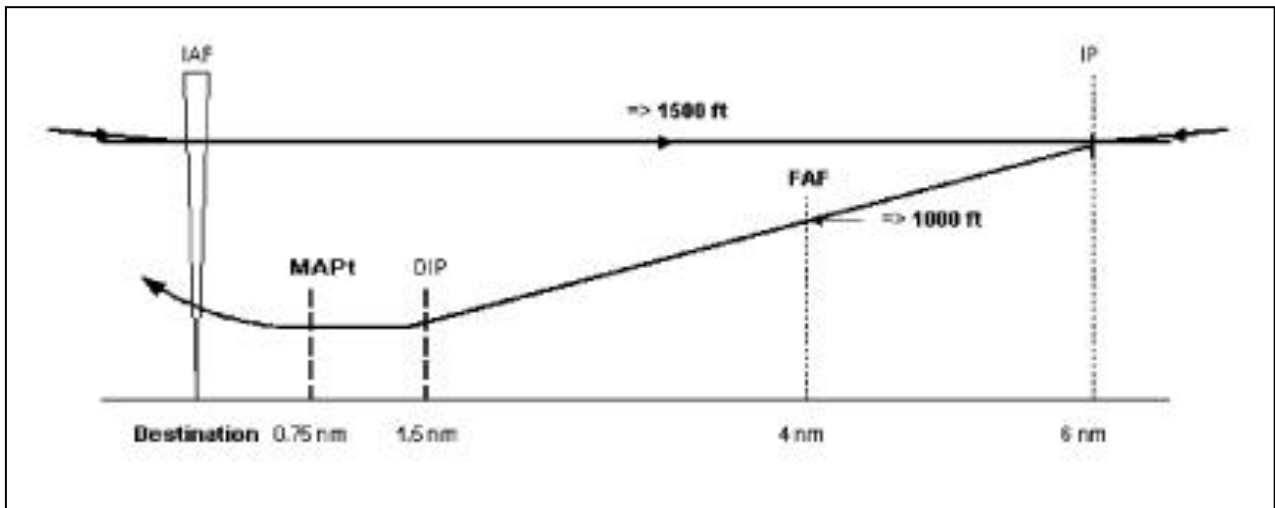


Figure 4 - Holding Pattern & Race Track Procedure

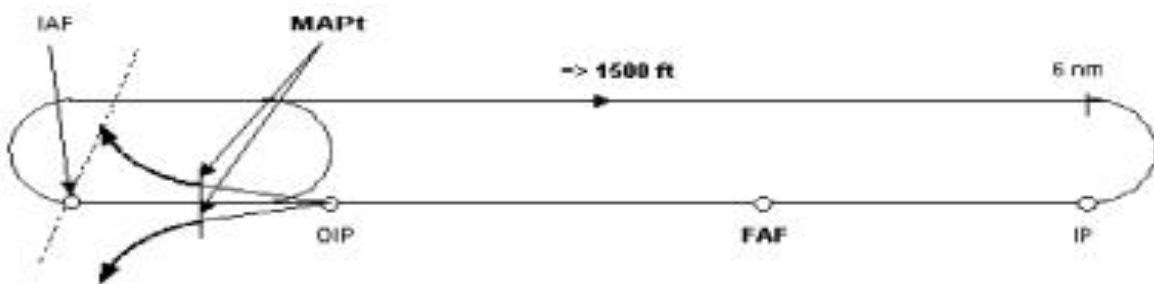
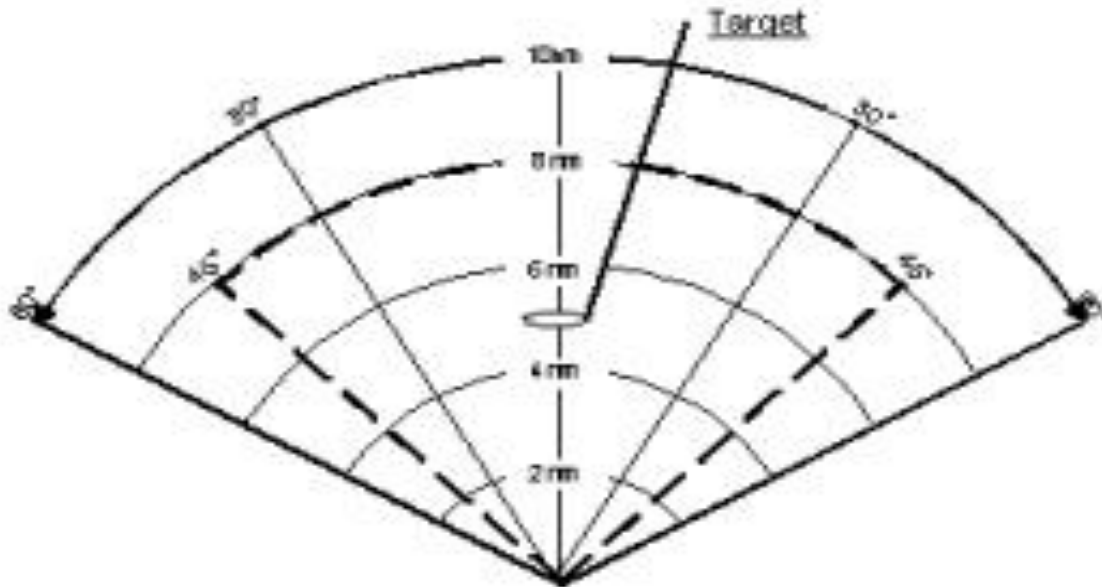


Figure 5 Missed Approach Area Left and Right.



ACJ JCAR ops3.465

Minimum Visibility for VFR Operations

See JCAR ops3.465

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).

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

AMC/IEM F – PERFORMANCE GENERAL

ACJ JCAR ops3.475(c)(3)(ii) Head-wind component for take-off and the take-off flight path

See JCAR ops3.475(c)(3)(ii)

When considering approving the use of reported wind components in excess of 50% for take-off and the take-off flight path the following should be considered:

- 1 The proximity to the FATO, and accuracy enhancements, of the wind measuring equipment; and
- 2 The existence of appropriate procedures in a supplement to the Flight Manual; and
- 3 The establishment of a safety case.

ACJ JCAR ops3.480(a)(1) and (a)(2) Category A and Category B

See JCAR ops3.480(a)(1) and (a)(2)

See JCAR ops3.485

See JCAR ops3.515(a)

See JCAR ops3.540(a)(1)

1 Helicopters which have been certificated according to any of the following standards are considered to satisfy the Category A criteria of JCAR ops3.480(a)(1). Provided that they have the necessary performance information scheduled in the Flight Manual, such helicopters are therefore eligible for Performance Class 1 or 2 operations:

- a. Certification as Category A under JAR-27 or JAR-29;
- b. Certification as Category A under FAR Part 29;
- c. Certification as Group A under BCAR Section G;
- d. Certification as Group A under BCAR-29;

2 In addition to the above, certain helicopters have been certificated under FAR Part 27 and with compliance with FAR Part 29 engine isolation requirements as specified in FAA Advisory Circular AC 27-1. These helicopters may be accepted as eligible for Performance Class 1 or 2 operations provided that compliance is established with the following additional requirements of JAR -29:

JAR 29.1027(a) Independence of engine and rotor drive system lubrication.

JAR 29.1187(e)

JAR 29.1195(a) & (b) Provision of a one-shot fire extinguishing system for each engine.

JAR 29.1197

JAR 29.1199

JAR 29.1201

JAR 29.1323(c)(1) Ability of the airspeed indicator to consistently identify the take-off decision point.

Note: The requirement to fit a fire extinguishing system may be waived if the helicopters manufacturer can demonstrate equivalent safety, based on service experience for the entire fleet showing that the actual incidence of fires in the engine fire zones has been negligible.

- 3 The JCAR ops3 performance operating rules of Subparts G, H and I were drafted in conjunction with the performance requirements of -29 Issue 1 and FAR Part 29 at Amendment 29-39. For helicopters certificated under FAR Part 29 at an earlier amendment, or under BCAR Section G or BCAR-29, performance data will have been scheduled in the Helicopter Flight Manual according to these earlier requirements. This earlier scheduled data may not be fully compatible with the JCAR ops3 rules. Before Performance Class 1 or 2 operations are approved, it should be established that scheduled performance data is available which is compatible with the requirements of Subparts G or H respectively.
- 4 Any properly certificated and appropriately equipped helicopter is considered to satisfy the Category B criteria of JCAR ops3.480(a)(2). Such helicopters are therefore eligible for Performance Class 3 operations.

IEM JCAR ops3.480(a)(13) Terminology - Hostile environment

See JCAR ops3.480(a)(13)

Those open sea areas considered to constitute a hostile environment should be designated by an Authority in the appropriate Aeronautical Information Publication or other suitable documentation.

ACJ JCAR ops3.480(a)(32) The application of TODRH

See JCAR ops3.480(a)(32)

1. DISCUSSION

Original definitions for helicopter performance were derived from aeroplanes; hence the definition of take-off distance owes much to operations from runways. Helicopters on the other hand can operate from runways, confined and restricted areas and rooftop heliports - all bounded by obstacles. As an analogy this is equivalent to a take-off from a runway with obstacles on and surrounding it.

It can therefore be seen that unless the original definitions from aeroplanes are tailored for helicopters, the flexibility of the helicopter might be constrained by the language of operational performance.

This paper concentrates on the critical term - Take-off Distance Required (TODRH) - and describes the

methods to achieve compliance with it and, in particular, the alternative procedure described in ICAO Annex 6 Attachment A 4.1.1.2(b):

The take-off distance required does not exceed the takeoff distance available; or

As an alternative, the take-off distance required may be disregarded provided that the helicopter with the critical power-unit failure at the TDP can, when continuing the take-off, clear all obstacles between the end of the take-off distance available and the point at which it becomes established in a climb at VTOSS by a vertical margin of 10.7 m (35 ft) or more. An obstacle is considered to be in the path of the helicopter if its distance from the nearest point on the surface below the intended line of flight does not exceed 30 m or 1.5 times the maximum dimension of the helicopter, whichever is greater.

2. DEFINITION OF TODRH

The definition of TODRH from JCAR ops3.480(a)(31) is as follows:

(31) Take-off distance required (TODRH). The horizontal distance required from the start of the take-off to the point at which VTOSS, a selected height, and a positive climb gradient are achieved, following failure of the critical power-unit being recognised at TDP, the remaining power-unit(s) operating within approved operating limits. The selected height is to be determined with the use of Helicopter Flight Manual data, and is to be at least 10.7 m (35 ft) above:

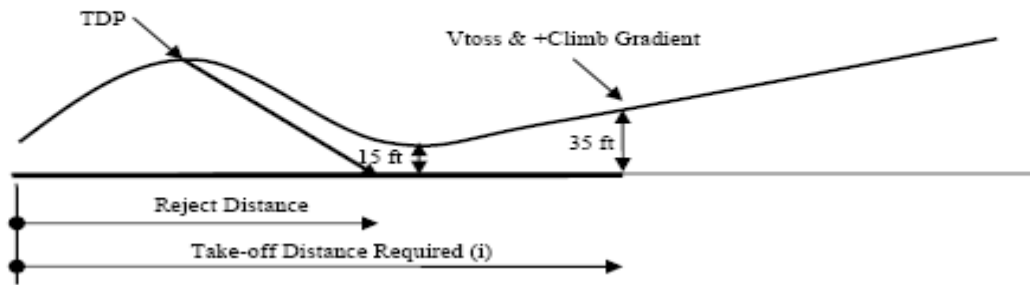
- (i) the take-off surface; or
- (ii) as an alternative, a level defined by the highest obstacle in the take-off distance required. The original definition of TODRH was based only on the first part of this definition.

3. THE CLEAR AREA PROCEDURE (RUN WAY)

In the past, helicopters certificated in Category A would have had, at the least, a 'clear area' procedure. This procedure is analogous to an aeroplane Category A procedure and assumes a runway (either metalled or grass) with a smooth surface suitable for an aeroplane take-off (see Figure 1).

The helicopter is assumed to accelerate down the FATO (runway) outside of the HV diagram. If the helicopter has an engine failure before TDP, it must be able to land back on the FATO (runway) without damage to helicopter or passengers; if there is a failure at or after TDP the aircraft is permitted to lose height - providing it does not descend below a specified height above the surface (usually 15 ft if the TDP is above 15 ft). Errors by the pilot are taken into consideration but the smooth surface of the FATO limits serious damage if the error margin is eroded (e.g. by a change of wind conditions).

Figure 1 - Clear Area take-off



The operator only has to establish that the distances required are within the distance available (take-off distance and reject distance). The original definition of TODRH meets this case exactly.

From the end of the TODRH obstacle clearance is given by the climb gradient of the first or second climb segment meeting the requirement of JCAR ops3.495 (or for PC2 - JCAR ops3.525). The clearance margin from obstacles in the take-off flight path takes account of the distance travelled from the end of the take-off distance required and operational conditions (IMC or VMC).

4. CATEGORY A PROCEDURES OTHER THAN CLEAR AREA

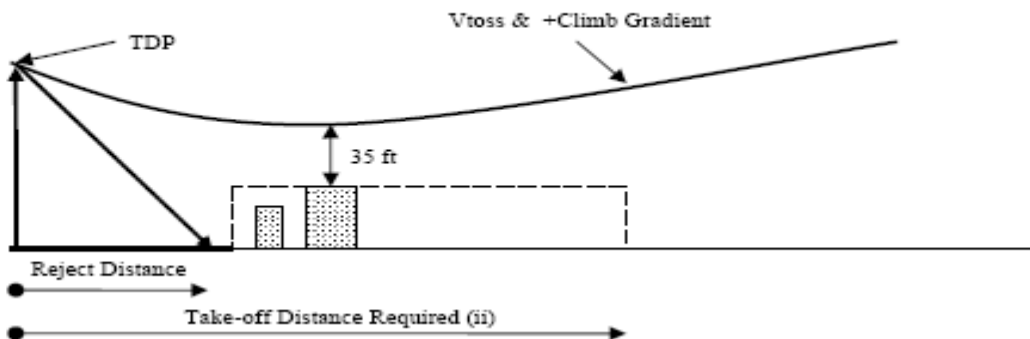
Procedures other than the clear area are treated somewhat differently. However, the short field procedure is somewhat of a hybrid as either part of the definition of TODRH can be utilised (the term 'helipad' is used in the following section to illustrate the principle only - it is not intended as a replacement for 'heliport').

4.1 Limited area, restricted area and helipad procedures (other than elevated)

The exact names of the procedure used for other than clear area are as many as there are manufacturers. However, principles for obstacle clearance are generic and the name is unimportant.

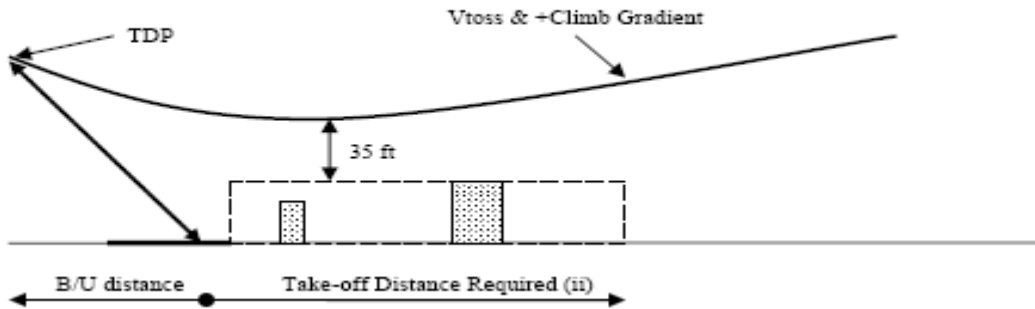
These procedures (see Figure 2 and Figure 3) are usually associated with an obstacle in the continued take-off area - usually shown as a line of trees or some other natural obstacle. As clearance above such obstacles is not readily associated with an accelerative procedure, as described in 3 above, a procedure using a vertical climb (or a steep climb in the forward, sideways or rearward direction) is utilised.

Figure 2 - Short Field take-off



With the added complication of a TDP principally defined by height together with obstacles in the continued take off area, a drop down to within 15 ft of the take-off surface is not deemed appropriate and the required obstacle clearance is set to 35 ft (usually called min-dip). The distance to the obstacle does not need to be calculated (provided it is outside the rejected distance required), as clearance above all obstacles is provided by ensuring that helicopter does not descend below the min-dip associated with a level defined by the highest obstacle in the continued take-off area.

Figure 3 - Helipad take-off



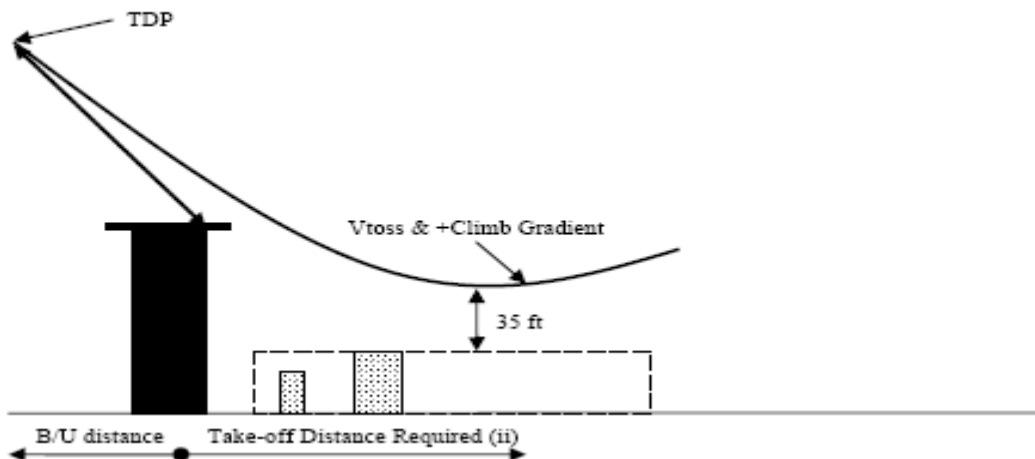
These procedures depend upon the alternative definition of TODRH.

As shown in Figure 3, the point at which V_{toss} and a positive rate of climb are met defines the TODRH. Obstacle clearance from that point is assured by meeting the requirement of JCAR ops3.495 (or for PC2 - JCAR ops3.525). Also shown in Figure 3 is the distance behind the helipad which is the back-up distance (B/U distance).

4.2 Elevated helipad procedures

The elevated helipad procedure (see Figure 4) is a special case of the ground level helipad procedure discussed above.

Figure 4 - Elevate Helipad take-off



The main difference is that drop down below the level of the take-off surface is permitted. In the drop down phase, the Category A procedure ensures deck-edge clearance but, once clear of the deck-edge, the 35 ft clearance from obstacles relies upon the calculation of drop down. The alternative definition of the TODRH is applied.

Note: 35ft may be inadequate at particular elevated heliports which are subject to adverse airflow effects, turbulence, etc.

AMC/IEM G – PERFORMANCE CLASS 1

ACJ JCAR ops3.490(d) Obstacle Clearance in the Back-up Area

See JCAR ops3.490(d)

The requirement in JCAR ops3.490(d) has been established in order to take into account the following factors:

In the back-up; the pilot has few visual cues and has to rely upon the altimeter and sight picture through the front window (if flight path guidance is not provided) to achieve an accurate rearward flight path.

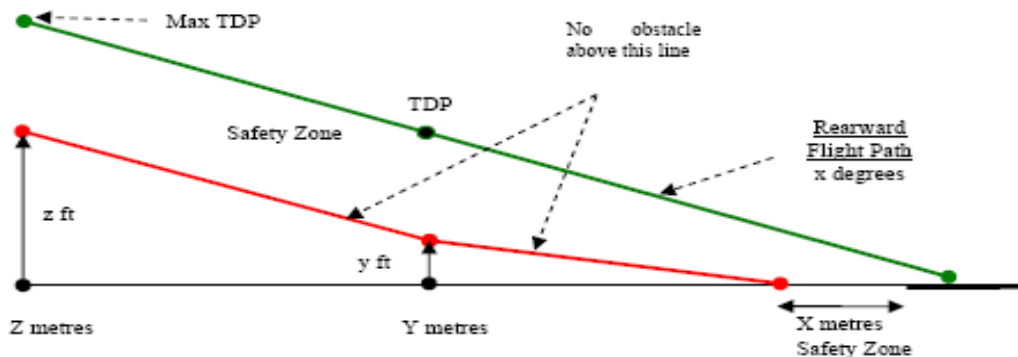
In the rejected take-off; the pilot has to be able to manage the descent against a varying forward speed whilst still ensuring an adequate clearance from obstacles until the helicopter gets in close proximity for landing on the FATO.

In the continued take-off; the pilot has to be able to accelerate to V_{toss} whilst ensuring an adequate clearance from obstacles.

The requirements of JCAR ops3.490(d) may be achieved by establishing that, in the backup area:

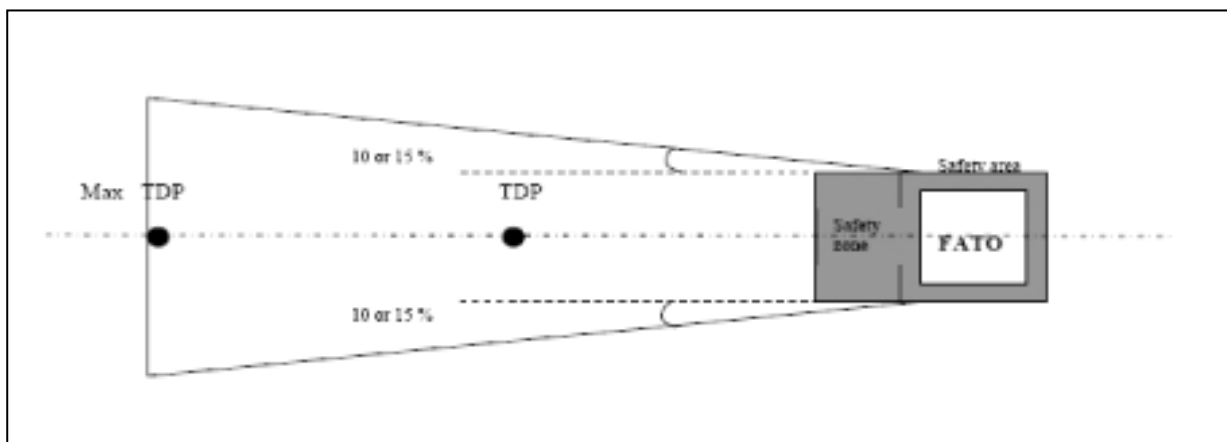
- no obstacles are located within the safety zone below the rearward flight path when described in the helicopter flight manual (see figure 1); (in the absence of such data in the helicopter flight manual, the operator should contact the manufacturer in order to define a safety zone); or
- during the backup, the rejected take-off and the continued take-off manoeuvres, obstacle clearance has been demonstrated by a means acceptable to the authority.

Figure 1 – rearward flight path



An obstacle, in the backup area, is considered if its lateral distance from the nearest point on the surface below the intended flight path is not further than half of the minimum FATO (or the equivalent term used in the Flight Manual) width defined in the Helicopter Flight Manual (or, when no width is defined 0.75 D), plus 0.25 times D (or 3m, whichever is greater); plus 0.10 for VFR day, or 0.15 for VFR night, of the distance travelled from the back of the FATO. (see figure 2).

Figure 2 – Obstacle accountability:



ACJ JCAR ops3.490 & JCAR ops3.51 Application for alternative take-off and landing procedures

Discussion

A manufacturer’s Category A procedure defines profiles and scheduled data for take-off, climb, performance at minimum operating speed and landing, under specific environmental conditions and masses.

Associated with these profiles and conditions are minimum operating surfaces, take-off distances, climb performance and landing distances; these are provided (usually in graphic form) with the take-off and landing masses and the Take-off Decision Point (TDP) and Landing Decision Point (LDP).

The landing surface and the height of the TDP are directly related to the ability of the helicopter – following a power-unit failure before or at TDP - to reject onto the surface under forced landing conditions. The main considerations in establishing the minimum size of the landing surface are the scatter during flight testing of the reject manoeuvre, with the remaining engine operating within approved limits, and the required usable cue environment.

Hence an elevated site with few visual cues - apart from the surface itself - would require a greater surface area in order that the helicopter can be accurately positioned during the reject manoeuvre within the specified area. This usually results in the stipulation of a larger surface for an elevated site than for a ground level site (where lateral cues may be present).

This could have the unfortunate side-effect that a heliport which is built 3m above the surface (and therefore elevated by definition) might be out of operational scope for some helicopters - even though there might be a rich visual cue environment where rejects are not problematical. The presence of elevated sites where ground level surface requirements might be more appropriate could be brought to the attention of the Authority.

It can be seen that the size of the surface is directly related to the requirement of the helicopter to complete a rejected take-off following a power-unit failure. If the helicopter has sufficient power such that a failure before or at TDP will not lead to a requirement for rejected take-off, the need for large surfaces is removed; sufficient power for the purpose of this ACJ is considered to be the power required for hover- out-of-ground-effect (HOGE) one-engine-inoperative (OEI).

Following a power-unit failure at or after the TDP, the continued take-off path provides OEI clearance

from the take-off surface and the distance to reach a point from where climb performance in the first, and subsequent segments, is assured.

If HOGE OEI performance exists at the height of the TDP, it follows that the continued take-off profile, which has been defined for a helicopter with a mass such that a rejected take-off would be required following a power-unit failure at or before TDP, would provide the same, or better, obstacle clearance and the same, or less, distance to reach a point where climb performance in the first, and subsequent segments, is assured.

If the TDP is shifted upwards, provided that the HOGE OEI performance is established at the revised TDP, it will not affect the shape of the continued take-off profile but should shift the min-dip upwards by the same amount that the revised TDP has been increased - with respect to the basic TDP.

Such assertions are concerned only with the vertical or the back-up procedures and can be regarded as achievable under the following circumstances:

- 1 When the procedure is flown, it is based upon a profile contained in the Helicopter Flight Manual (HFM) - with the exception of the necessity to perform a rejected take-off.
- 2 The HOGE OEI performance is specified as in AC 29-2C, MG 12 for the Human External Cargo (HEC) Class D requirements.
- 3 The TDP, if shifted upwards (or upwards and backward in the back-up procedure) will be the height at which the HOGE OEI performance is established.
- 4 If obstacles are permitted in the back-up area they should continue to be permitted with a revised TDP.

Methods of Application:

An operator may apply to the Authority for a reduction in the size of the take-off surface under the following conditions:

Compliance with the requirements of JCAR ops3.490, JCAR ops3.495 and JCAR ops3.510 can be assured with:

- 1 a procedure based upon an appropriate Category A take-off and landing profile scheduled in the HFM;
- 2 a take-off or landing mass not exceeding the mass scheduled in the HFM for a HOGE OEI in compliance with HEC Class D performance requirements ensuring that:
 - 2.1 following a power-unit failure at or before TDP, there are adequate external references to ensure that the helicopter can be landed in a controlled manner; and
 - 2.2 following a power-unit failure at or after the LDP there are adequate external references to ensure that the helicopter can be landed in a controlled manner.

An operator may apply to the Authority for an upwards shift of the TDP and LDP under the following

conditions:

Compliance with the requirements of JCAR ops3.490, JCAR ops3.495 and JCAR ops3.510 can be assured with:

3 a procedure based upon an appropriate Category A take-off and landing profile scheduled in the HFM;

4 a take-off or landing mass not exceeding the mass scheduled in the HFM for a HOGE OEI in compliance with HEC Class D performance requirements ensuring that:

4.1 following a power-unit failure at or after TDP compliance with the obstacle clearance requirements of JCAR ops3.490(a)(2)(iv) and JCAR ops3.495 can be met; and

4.2 following a power-unit failure at or before the LDP the balked landing obstacle clearance requirements of JCAR ops3.510(a)(2) and JCAR ops3.495 can be met.

Alternatively, an operator may apply to the Authority for the use of the Category A ground level surface requirement for a specific elevated heliport when it can be demonstrated that the usable cue environment at that heliport would permit such a reduction.

ACJ JCAR ops3.500(b)(3) En-route - critical power unit inoperative (fuel jettison)

See JCAR ops3.500(b)(3).

The presence of obstacles along the en-route flight path may preclude compliance with JCAR ops3.500(a)(1) at the planned mass at the critical point along the route. In this case fuel jettison at the most critical point may be planned, provided that the procedures in AMC JCAR ops3.255 paragraph 3 are complied with.

AMC/IEM H – PERFORMANCE CLASS 2

ACJ to Subpart H Operations in Performance Class 2

See Subpart H

1. INTRODUCTION

This paper describes Performance Class 2 as established in JCAR ops3, Subpart H. It has been produced for the purpose of:

- a. discussing the underlying philosophy of Operations in Performance Class 2;
- b. showing simple methods of compliance; and
- c. explaining how to determine - with examples and diagrams:
 - the take-off and landing masses;
 - the length of the safe-forced-landing area;
 - distances to establish obstacle clearance; and
 - entry point(s) into Performance Class 1.

It discusses the derivation of Performance Class 2 from ICAO Annex 6 Part III and describes an alleviation which may be approved following a Risk Assessment.

It reproduces relevant definitions; examines the basic requirements; discusses the limits of operation; and considers the benefits of the use of Performance Class 2.

It contains examples of Performance Class 2 in specific circumstances, and explains how these examples may be generalised to provide the operators with methods of calculating landing distances and obstacle clearance.

2. DEFINITIONS

To assist in the reading of this paper, definitions from JCAR ops3, Subpart F have been reproduced:

Distance DR. DR is the horizontal distance that the helicopter has travelled from the end of the take-off distance available.

Defined point after take-off (DPATO). The point, within the take-off and initial climb phase, before which the helicopter's ability to continue the flight safely, with the critical power unit inoperative, is not assured and a forced landing may be required.

Defined point before landing (DPBL). The point within the approach and landing phase, after which the

helicopter's ability to continue the flight safely, with the critical power unit inoperative, is not assured and a forced landing may be required.

Landing distance available (LDAH). The length of the final approach and take-off area plus any additional area declared available and suitable for helicopters to complete the landing manoeuvre from a defined height.

Landing distance required (LDRH). The horizontal distance required to land and come to a full stop from a point 15m (50ft) above the landing surface.

Performance Class 2. Performance Class 2 operations are those operations such that, in the event of critical power unit failure, performance is available to enable the helicopter to safely continue the flight, except when the failure occurs early during the take-off manoeuvre or late in the landing manoeuvre, in which cases a forced landing may be required.

Safe forced landing. Unavoidable landing or ditching with a reasonable expectancy of no injuries to persons in the aircraft or on the surface.

Take-off distance available. The length of the final approach and take-off area plus the length of any clearway (if provided) declared available and suitable for helicopters to complete the take-off.

The following terms, which are not defined in JCAR ops3 Subpart F, are used in the following text:

VT. A target speed at which to aim at the point of minimum ground clearance (min-dip) during acceleration from TDP to V_{toss} .

V50. A target speed and height utilised to establish a Flight Manual distance (in compliance with the requirement of CS/ 29.63) from which climbout is possible.

Vstay-up. A colloquial term used to indicate a speed at which a descent would not result following a power-unit failure. This speed is several knots lower than V_{toss} at the equivalent take-off mass.

3. WHAT DEFINES PERFORMANCE CLASS 2

Performance Class 2 can be considered as Performance Class 3 take-off or landing, and Performance Class 1 climb, cruise and descent. It comprises an All Engines Operating (AEO) obstacle clearance regime for the take-off or landing phases, and a One Engine Inoperative (OEI) obstacle clearance regime for the climb, cruise, descent, approach and missed approach phases.

Note: For the purpose of performance calculations in JCAR ops3 , the CS/ 29.67 Category A climb performance criteria is used:

- 150 ft/min at 1,000 ft (at V_y); and depending on the choice of DPATO:
- 100 ft/min up to 200 ft (at V_{toss}) at the appropriate power settings.

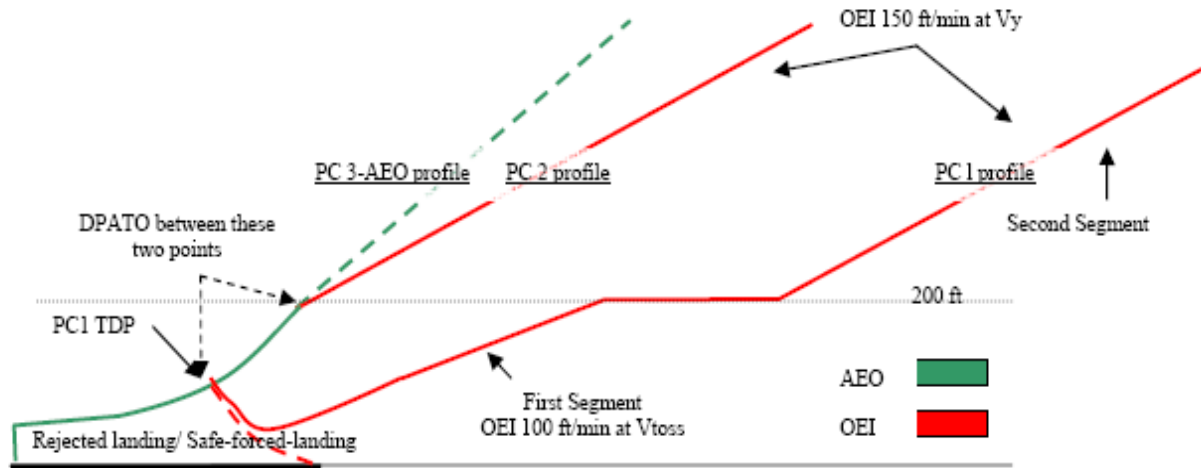
3.1 Comparison of obstacle clearance in all Performance Classes

Figure 2 shows the profiles of the three Performance Classes - superimposed on one diagram.

Performance Class 1 (PC 1); from TDP, requires OEI obstacle clearance in all phases of flight; the construction of Category A procedures, provides for a flight path to the first climb segment, a level acceleration segment to V_y (which may be shown concurrent with the first segment), followed by the second climb segment from V_y at 200 ft (see Figure 1).

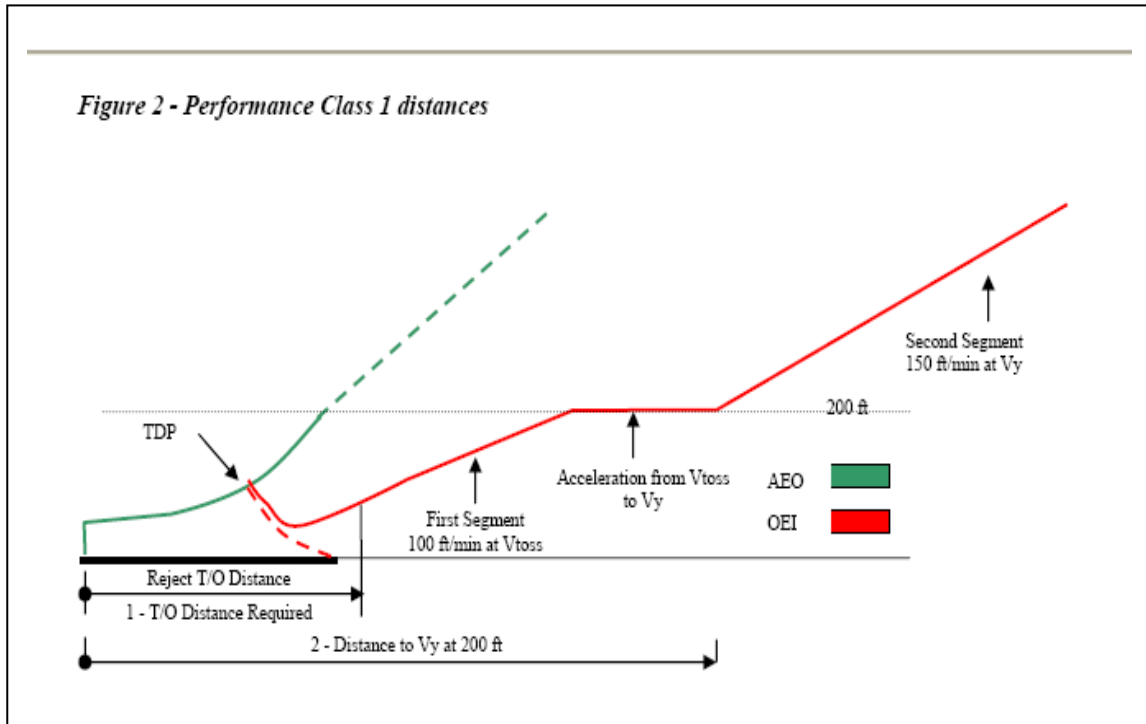
- *Performance Class 3 (PC 3); requires AEO obstacle clearance in all phases.*

Figure 1 - All Performance Classes (a comparison)



- Performance Class 2 (PC 2); requires AEO obstacle clearance to DPATO and OEI from then on. The take-off mass has the PC 1 second segment climb performance at its basis therefore, at the point where V_y at 200 ft is reached, Performance Class 1 is achieved (see also Figure 3).
- Performance Class 3 (PC 3); requires AEO obstacle clearance in all phases.

Figure 2 – Performance Class I distances



3.2 Comparison of the discontinued take-off in all Performance Classes

- PC 1 - requires a prepared surface on which a rejected landing can be undertaken (no damage); and
- PC 2 and 3 - require a safe-forced-landing surface (some damage can be tolerated but there must be a reasonable expectancy of no injuries to persons in the aircraft or third parties on the surface).

4. THE DERIVATION OF PERFORMANCE CLASS 2

Subpart H - PC 2 is primarily based on the the text of ICAO Annex 6 Part III Section II and its attachments which provide for the following:

- a. Obstacle clearance before DPATO; the helicopter shall be able, with all engines operating, to clear all obstacles by an adequate margin until it is in a position to comply with b. below.
- b. Obstacle clearance after DPATO; the helicopter shall be able, in the event of the critical power-unit becoming inoperative at any time after reaching DPATO, to continue the take-off clearing all obstacles along the flight path by an adequate margin until it is able to comply with en-route clearances.
- c. Engine failure before DPATO; before the DPATO, failure of the critical power-unit may cause the helicopter to force land; therefore a safe-forced-landing should be possible (this is analogous to the requirement for a reject in Performance Class 1 but where some damage to the helicopter can be

tolerated.)

5. BENEFITS OF JCAR ops3 PERFORMANCE CLASS 2

Operations in Performance Class 2 permit advantage to be taken of an all-engines-operating (AEO) procedure for a short period during take-off and landing - whilst retaining engine failure accountability in the climb, descent and cruise. The benefits include:

- Ability to use (the reduced) distances scheduled for the AEO - thus permitting operations to take place at smaller heliports and allowing airspace requirements to be reduced.
- Ability to operate when the safe-forced-landing distance available is located outside the boundary of the heliport.
- Ability to operate when the take-off-distance required is located outside the boundary of the heliport.
- Ability to use existing Category A profiles and distances when the surface conditions are not adequate for a reject but are suitable for a safe-forced-landing (for example when the ground is waterlogged).

Additionally, following a Risk Assessment when the use of exposure is permitted by the Authority:

- Ability to operate when a safe-forced landing is not assured in the take-off phase.
- Ability to penetrate the HV curve for short periods during take-off or landing.

6 IMPLEMENTATION OF PERFORMANCE CLASS 2 IN JCAR ops3

The following sections discuss the principles of the implementation of Performance Class 2.

6.1 Does ICAO spell it all out?

ICAO Annex 6 does not give guidance on how DPATO should be calculated nor does it require that distances be established for the take-off. However, it does require that, up to DPATO AEO, and from DPATO OEI, obstacle clearance is established (see Figure 3 and Figure 4 which are simplified versions of the diagrams contained in Annex 6 Part III, Attachment A).

Note: ICAO Annex 8 – Airworthiness of Aircraft (Part IV, Chapter 2.2.1.3.4) requires that an AEO distance be scheduled for all helicopters operating in Performance Classes 2 & 3. Annex 6 is dependent upon the scheduling of the AEO distances, required in Annex 8, to provide data for the location of DPATO.

When showing obstacle clearance, the divergent obstacle clearance height required for IFR is - as in Performance Class 1 - achieved by the application of the additional obstacle clearance of 0.01 DR (DR = the distance from the end of 'take-off-distance-available' - see the pictorial representation in Figure 4

and the definition in section 2. above).

As can also be seen from Figure 4, flight must be conducted in VFR until DPATO has been achieved (and deduced that if an engine failure occurs before DPATO, entry into IFR is not permitted (as the OEI climb gradient will not have been established)).

Figure 3 - Performance Class 2 Obstacle Clearance

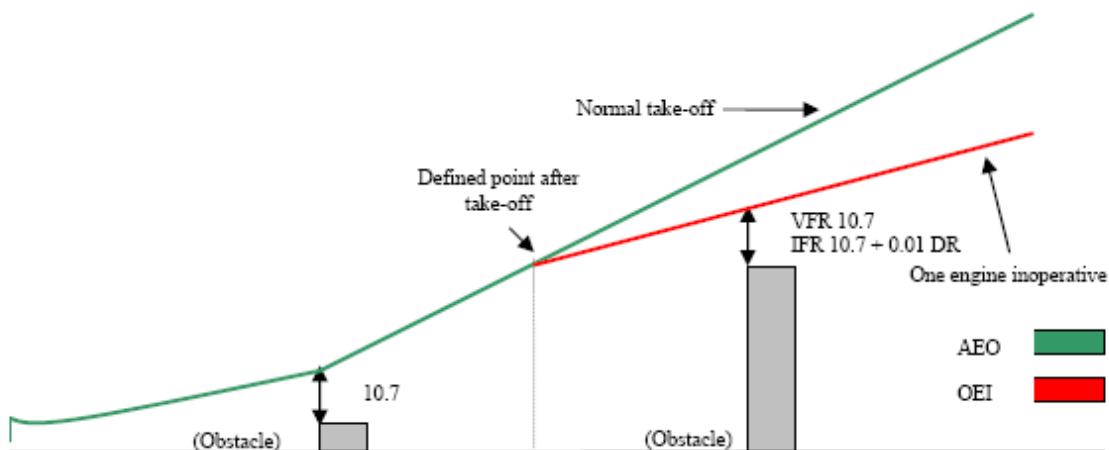
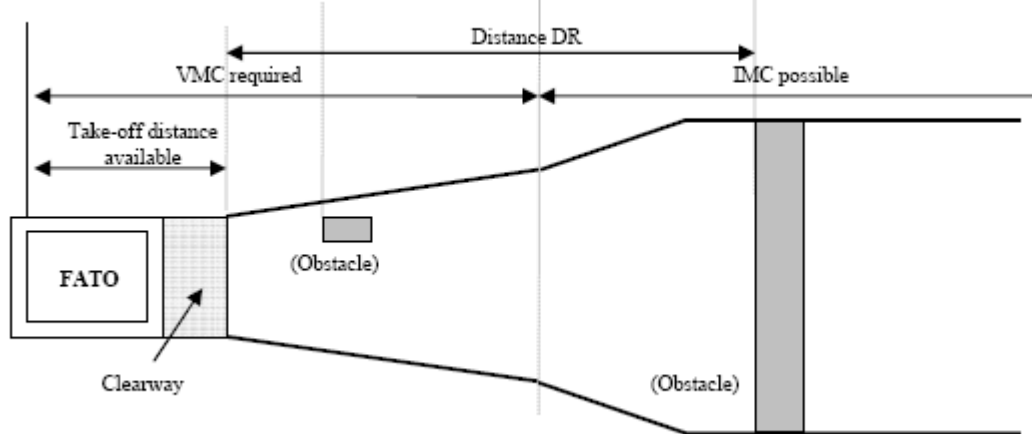


Figure 4 - Performance Class 2 Obstacle Clearance (plan view)



6.2 Function of DPATO

From the preceding paragraphs it can be seen that DPATO is germane to PC 2. It can also be seen that, in view of the many aspects of DPATO, it has, potentially, to satisfy a number of requirements which are not necessarily synchronised (nor need to be).

It is clear that it is only possible to establish a single point for DPATO, satisfying the requirement of 4 b & 4 c above, when:

- accepting the TDP of a Category A procedure; or
- extending the safe-forced-landing requirement beyond required distances (if data is available to permit the calculation of the distance for a safe-forced-landing from the DPATO).

It could be argued that the essential requirement for DPATO is contained in section 4 b - OEI obstacle clearance. From careful examination of the flight path reproduced in Figure 3 above, it may be reasonably deduced that DPATO is the point at which adequate climb performance is established (examination of Category A procedures would indicate that this could be (in terms of mass, speed and height above the take-off surface) the conditions at the start of the first or second segments - or any point between.)

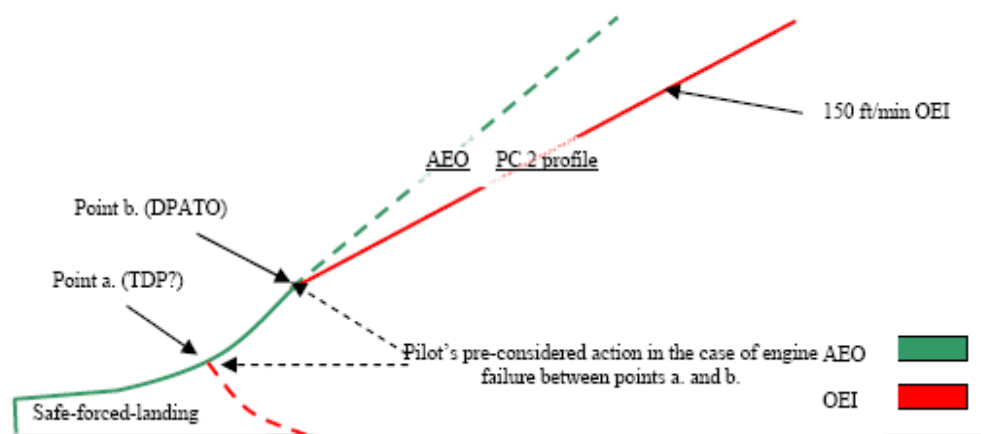
Note: The diagrams in Attachment A of ICAO Annex 6, do not appear to take account of drop down - permitted under Category A procedures; similarly with helideck departures, the potential for acceleration in drop down below deck level (once the deck edge has been cleared) is also not shown. These omissions could be regarded as a simplification of the diagram, as drop down is discussed and accepted in the accompanying ICAO text.

It may reasonably be argued that, during the take-off and before reaching an appropriate climb speed (V_{toss} or V_y), V_{stayup} will already have been achieved (where V_{stayup} is the ability to continue the flight and accelerate without descent - shown in some Category A procedures as VT or target speed) and where, in the event of an engine failure, no landing would be required.

It is postulated that, to practically satisfy all the requirements of sections 4 a, b and c above, we do not need to define DPATO at one synchronised point; we can meet requirements separately - i.e. defining the distance for a safe-forced-landing, and then establishing the OEI obstacle clearance flight path.

As the point at which the helicopter’s ability to continue the flight safely, with the critical power unit inoperative is the critical element, it is that for which DPATO is used in this text.

Figure 5 - The three elements in a PC 2 take-off



6.2.1 The three elements from the pilot's perspective

When seen from the pilot's perspective (see Figure 5), there are three elements of the PC 2 take-off - each with associated related actions which need to be considered in the case of an engine failure:

- a. action in the event of an engine failure - up to the point where a forced-landing will be required.
- b. action in the event of an engine failure - from the point where OEI obstacle clearance is established (DPATO).
- c. pre-considered action in the event of an engine failure - in the period between a. and b.

The action of the pilot in a. and b. is deterministic i.e. it remains the same for every occasion. For pre-consideration of the action at point c.; as is likely that the planned flight path will have to be abandoned (the point at which obstacle clearance using the OEI climb gradients not yet being reached) the pilot must (before take-off) have considered his options and the associated risks, and have in mind the course of action that will be pursued in the event of an engine failure during that short period. (As it is likely that any action will involve turning manoeuvres, the effect of turns on performance must be considered.)

Take-off mass for Performance Class 2

As previously stated, Performance Class 2 is an AEO take-off which, from DPATO, has to meet the requirement for OEI obstacle clearance in the climb and en-route phases. Take-off mass is therefore the mass that gives at least the minimum climb performance of 150 ft/min at V_y , at 1000 ft above the take-off point, and obstacle clearance.

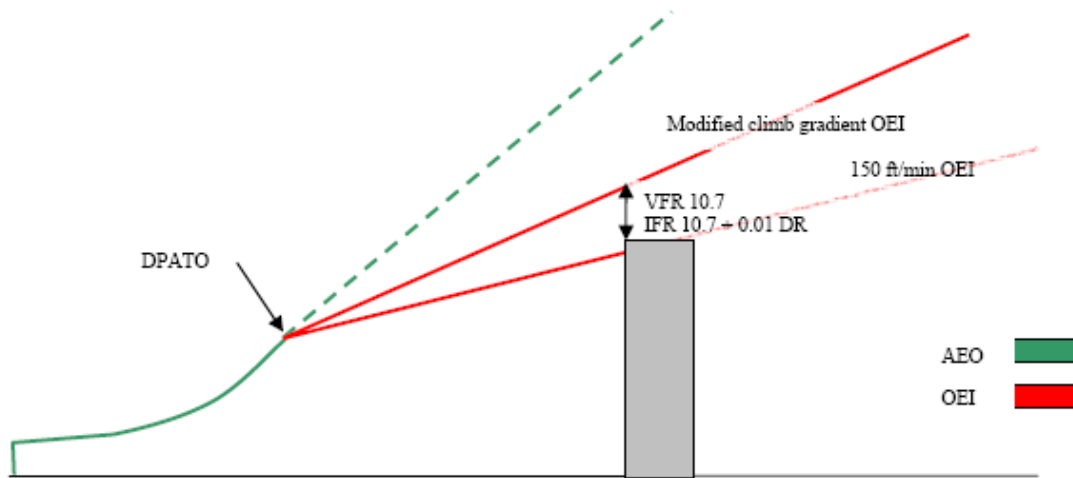
As can be seen in Figure 6 below, the take-off mass may have to be modified when it does not provide the required OEI clearance from obstacles in the take-off-flight path (exactly as in Performance Class 1). This could occur when taking off from a heliport where the flight path has to clear an obstacle such a ridge line

(or line of buildings) which can neither be:

- flown around using VFR and see and avoid; nor
- cleared using the minimum climb gradient given by the take-off mass (150 ft/min at 1,000 ft)

In this case, the take-off mass has to be modified (using data contained in the HFM) to give an appropriate climb gradient.

Figure 6 - Performance Class 2 (enhanced climb gradient)



6.4 Do distances have to be calculated?

Distances do not have to be calculated if, by using pilot judgement or standard practice, it can be established that:

- A safe-forced-landing is possible following an engine failure (notwithstanding that there might be obstacles in the take-off path); and
- Obstacles can be cleared (or avoided) - AEO in the take-off phase and OEI in the climb.

If early entry (in the sense of cloud base) into IMC is expected - an IFR departure should be planned. However, standard masses and departures can be used when described in the Operations Manual.

6.5 The use of Category A data

In Category A procedures, TDP is the point at which either a rejected landing or a safe continuation of the flight, with OEI obstacle clearance, can be performed.

For PC 2 (when using Category A data), only the safe-forced-landing (reject) distance depends on the equivalent of the TDP; if an engine fails between TDP and DPATO the pilot has to decide what action is required - it is not necessary for a safe-forced-landing distance to be established from beyond the equivalent of TDP (see Figure 5 and discussion in section 6.2.1 above).

Category A procedures based on a fixed V_{toss} are usually optimised either for the reduction of the rejected take-off distance, or the take-off distance. Category A procedures based on a variable V_{toss} allow either a reduction in required distances (low V_{toss}) or an improvement in OEI climb capability (high V_{toss}). These optimisations may be beneficial in PC 2 to satisfy the dimensions of the take-off site.

In view of the different requirements for PC 2 (from PC 1), it is perfectly acceptable for the two calculations (one to establish the safe-forced-landing distance and the other to establish DPATO) to be based upon different Category A procedures. However, if this method is used, the mass resulting from the calculation cannot be more than the mass from the more limiting of the procedures.

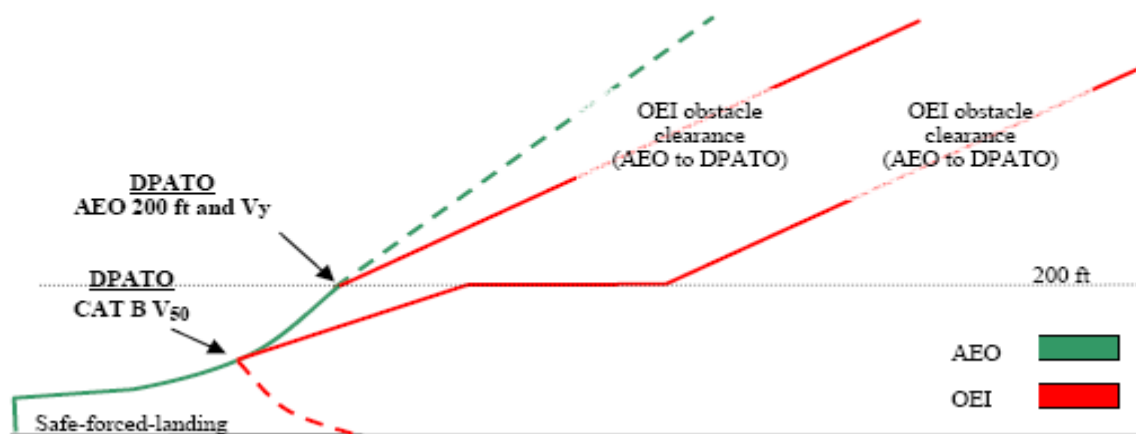
6.6 DPATO and obstacle clearance

If it is necessary for OEI obstacle clearance to be established in the climb, the starting point (DPATO) for the (obstacle clearance) gradient has to be established. Once DPATO is defined, the OEI obstacle clearance is relatively easy to calculate with data from the HFM.

6.6.1 DPATO based on AEO distance

In the simplest case; if provided, the scheduled AEO to 200 ft at V_y can be used (see Figure 7).

In the simplest case; if provided, the scheduled AEO to 200 ft at V_y can be used (see Figure 7 -Suggested AEO locations for DPATO

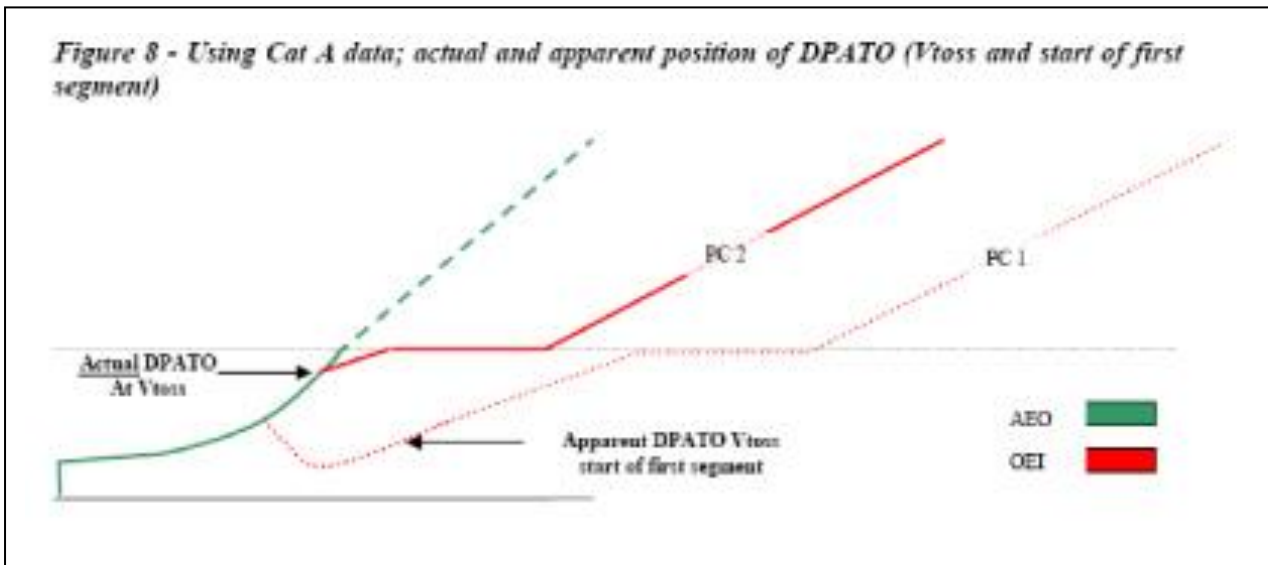


Otherwise, and if scheduled in the HFM, the AEO distance to 50ft (V_{50}) – determined in accordance with CS/ 29.63 - can be used (see Figure 7). Where this distance is used, it will be necessary to ensure that the V_{50} climb out speed is associated with a speed and mass for which OEI climb data is available so that, from V_{50} , the OEI flight path can be constructed.

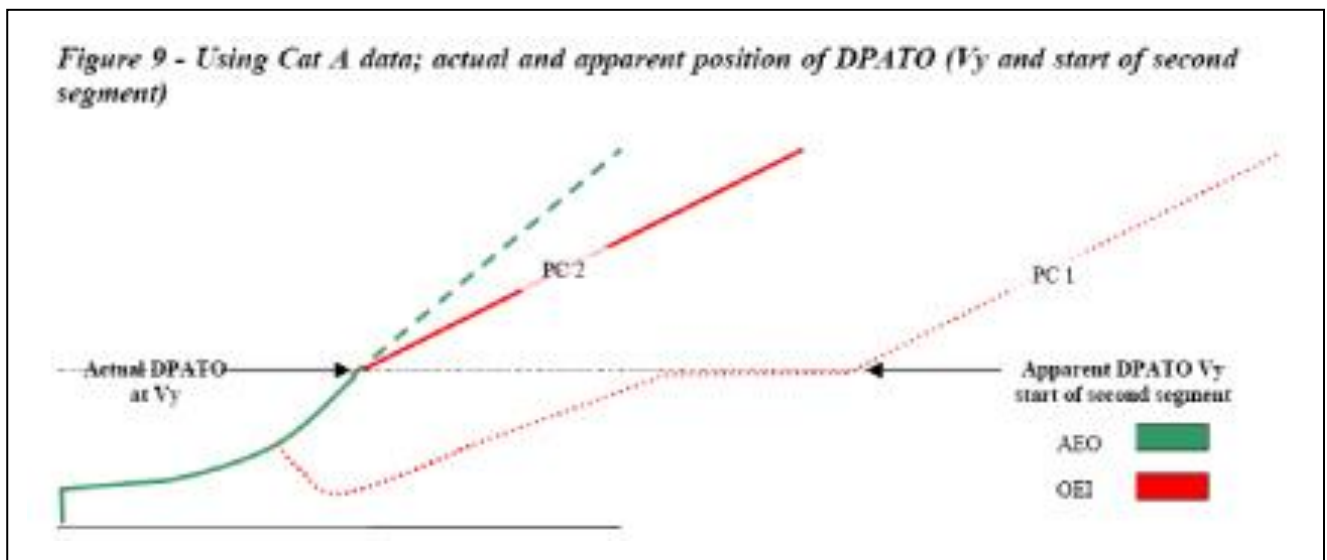
6.6.2 DPATO based on Category A distances

It is not necessary for specific AEO distances to be used (although for obvious reasons it is preferable); if they are not available, a flight path (with OEI obstacle clearance) can be established using Category A distances (see Figure 8 and Figure 9) - which will then be conservative.

Figure 8: Using Cat A data:



Note: the apparent DPATO is for planning purposes only in the case where AEO data is not available to construct the take-off flight path. The actual OEI flight path will provide better obstacle clearance than the apparent one (used to demonstrate the minimum requirement) - as seen from the firm and dashed lines in the above diagram.



6.6.3 Use of most favourable Category A data

The use of AEO data is recommended for calculating DPATO. However, where an AEO distance is not provided in the flight manual, distance to Vy at 200 ft, from the most favourable of the Category A procedures, can be used to construct a flight path (provided it can be demonstrated that AEO distance to 200 ft at Vy is always closer to the take-off point than the CAT A OEI flight path).

In order to satisfy the requirement of JCAR ops3.525, the last point from where the start of OEI obstacle

clearance can be shown is at 200 ft.

6.7 The calculation of DPATO - a summary

DPATO should be defined in terms of speed and height above the take-off surface and should be selected such that HFM data (or equivalent data) is available to establish the distance from the start of the take-off up to the DPATO (conservatively if necessary).

6.7.1 First method

DPATO is selected as the HFM Category B take-off distance (V50 speed or any other take-off distance scheduled in accordance with CS/ 29.63) provided that within the distance the helicopter can achieve:

- One of the V_{toss} values (or the unique V_{toss} value if is not variable) provided in the HFM, selected so as to assure a climb capability according to Cat A criteria; or
- V_y .

Compliance with JCAR ops3 .525 would be shown from V50 (or the scheduled Category B take-off distance).

6.7.2 Second method

DPATO is selected as equivalent to the TDP of a Category A clear area take-off procedure conducted in the same conditions.

Compliance with JCAR ops3 .525 would be shown from the point at which V_{toss} , a height of at least 35 ft above the take-off surface and a positive climb gradient are achieved (which is the Category A clear area take-off distance).

Safe-forced-landing areas should be available from the start of the take-off, to a distance equal to the Category A “clear area” rejected take-off distance.

6.7.3 Third method

As an alternative; DPATO could be selected such that Helicopter Flight Manual one engine inoperative (OEI) data is available to establish a flight path initiated with a climb at that speed. This speed should then be:

- One of the V_{toss} values (or the unique V_{toss} value if is not variable) provided in the Helicopter Flight Manual, selected so as to assure a climb capability according to Category A criteria; or
- V_y .

The height of the DPATO should be at least 35 ft and can be selected up to 200 ft. Compliance with - JCAR ops3.525 would be shown from the selected height.

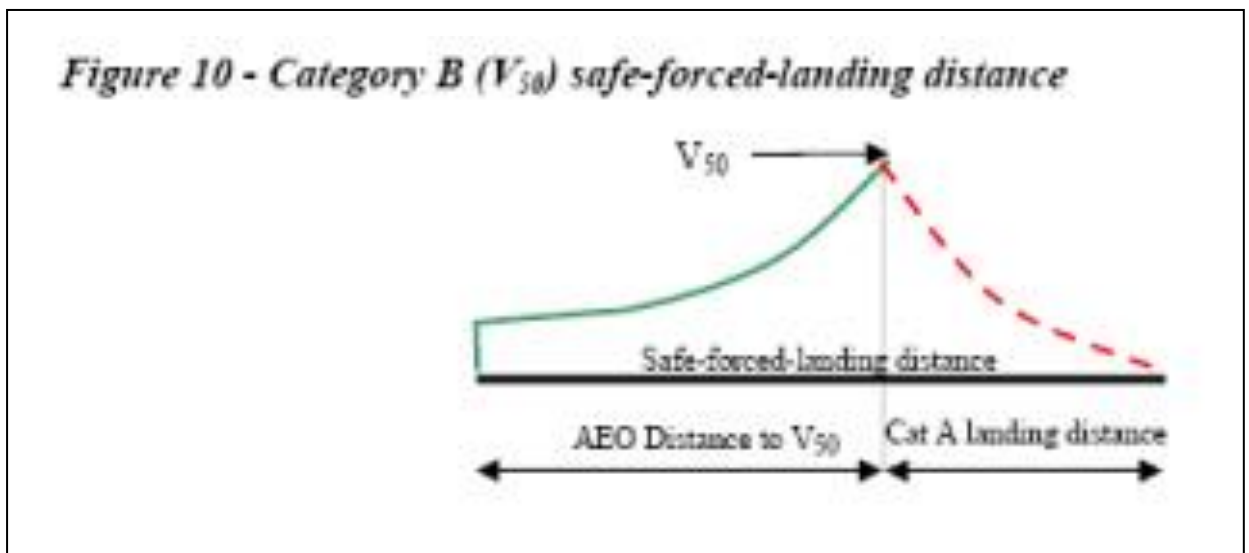
6.8 Safe-forced-landing distance

Except as provided in 6.7.2 above, the establishment of the safe-forced-landing distance could be problematical as is not likely that PC 2 specific data will be available in the HFM.

By definition, the Category A reject distance may be used when the surface is not suitable for a reject, but may be satisfactory for a safe-force-landing (for example where the surface is flooded or is covered with vegetation).

Any Category A (or other accepted) data may be used to establish the distance – however, once established it remains valid only if the Category A mass (or the mass from the accepted data) is used and the Category A (or accepted) AEO profile to the TDP is flown. In view of these constraints, the likeliest Category A procedures are the clear area or the short field (restricted area/site) procedures.

From Figure 10, it can be seen that if the Category B V_{50} procedure is used to establish DPATO, the combination of the distance to 50 ft and the Category A ‘clear area’ landing distance, required by CS/29.81 (the horizontal distance required to land and come to a complete stop from a point 50 ft above the landing surface), will give a good indication of the maximum safe-forced-landing distance required (see also the discussion on Vstayup above).



6.9 Performance Class 2 landing

For other than PC 2 operations to elevated heliport/helidecks (see the discussion in section 7.4.1 below), the principles for the landing case are much simpler. As the performance requirement for PC 1 and PC 2 landings are virtually identical, the condition of the landing surface is the main issue.

If the engine fails at any time during the approach, the helicopter must be able either: to perform a go-around meeting the requirements of JCAR ops3.525; or perform a safe-forced-landing on the surface. In

view of this, and if using PC 1 data, the LDP should not be lower than the corresponding TDP (particularly in the case of a variable TDP).

The landing mass will be identical to the take-off mass for the same site (with consideration for any reduction due to obstacle clearance - as shown in Figure 6 above).

In the case of a balked landing (i.e. the landing site becomes blocked or unavailable during the approach); the full requirement for take-off obstacle clearance must be met.

7. OPERATIONS IN PERFORMANCE CLASS 2 WITH EXPOSURE

JCAR ops3 offers an opportunity to discount the requirement for an assured safe-forced-landing area in the take-off or landing phase - subject to an approval from the Authority. The following sections deal with this option:

7.1 Limit of Exposure

As stated above, Performance Class 2 has to ensure AEO obstacle clearance to DPATO and OEI obstacle clearance from that point. This does not change with the application of exposure.

It can therefore be stated that operations with exposure are concerned only with alleviation from the requirement for the provision of a safe-forced-landing.

The absolute limit of exposure is 200 ft - from which point OEI obstacle clearance must be shown.

7.2 The principle of Risk Assessment

ICAO Annex 6 Part III Chapter 3.1.2 (Fifth Edition July 2001) states that:

- 3.1.2 Performance Class 3 helicopters shall only be operated in conditions of weather and light, and over such routes and diversions there from, that permit a safe-forced-landing to be executed in the event of engine failure. The conditions of this paragraph apply also to performance Class 2 helicopters prior to the defined point after take-off and after the defined point before landing.

The ICAO Helicopter and Tilt-rotor Study Group, is engaged in an ongoing process to amend Chapter 3 to take account of current practices – following this process the proposed text is likely to be:

- 3.1.2 In conditions where the safe continuation of flight is not ensured in the event of a critical power unit failure, helicopter operations shall be conducted in a manner that gives appropriate consideration for achieving a safe-forced-landing.

Although a safe-forced-landing may no longer be the (absolute) Standard, it is considered that Risk Assessment is obligatory to satisfy the amended requirement for 'appropriate consideration'.

Risk Assessment used in JCAR ops3 for fulfillment of this proposed Standard is consistent with principles described in 'AS/NZS 4360:1999'.

Note: terms used in this text and defined in the AS/NZS Standard are shown in Sentence Case e.g. Risk Assessment or Risk Reduction.

7.3 The application of Risk Assessment to JCAR ops3 Performance Class 2

Under circumstances where no risk attributable to engine failure (beyond that inherent in the safe-forced-landing) is present, operations in Performance Class 2 may be conducted in accordance with the non-alleviated requirements contained above - and a safe-forced-landing will be possible.

Under circumstances where such risk would be present i.e.: operations to an elevated heliport (deck edge strike); or, when permitted, operations from a site where a safe-forced-landing cannot be accomplished because the surface is inadequate; or where there is penetration into the HV curve for a short period during take-off or landing (a limitation in CS/ 29 HFMs), operations have to be conducted under a specific approval.

Provided such operations are Risk Assessed and can be conducted to an established safety target - they may be approved.

7.3.1 The elements of the Risk Management The approval process consists of an operational Risk Assessment and the application of four principles: a safety target; a helicopter reliability assessment; continuing airworthiness; and mitigating procedures.

7.3.2 The safety target

The main element of the AUTHORITY Risk Assessment when exposure was initially introduced into JCAR ops3, was the assumption that turbine engines in helicopters would have failure rates of about 1:100 000 per flying hour; which would permit (against the agreed safety target of 5×10^{-8} per event) an exposure of about 9 seconds for twins during the take-off or landing event. (When choosing this target it was assumed that the majority of current well maintained turbine powered helicopters would be capable of meeting the event target - it therefore represents the Residual Risk)

Note: Residual Risk is considered to be the risk that remains when all mitigating procedures - airworthiness and operational - are applied (see sections 7.3.4 and 7.3.5 below).

7.3.3 The reliability assessment The AUTHORITY reliability assessment was initiated to test the hypothesis (stated in 7.3.2 above) that the majority of turbine powered types would be able to meet the safety target. This hypothesis could only be confirmed by an examination of the manufacturers' power-loss data.

7.3.4 Mitigating procedures (airworthiness)

Mitigating procedures consist of a number of elements: the fulfilment of all manufacturers' safety modifications; a comprehensive reporting system (both failures and usage data); and the implementation of a Usage Monitoring System (UMS). Each of these elements is to ensure that engines, once shown to be sufficiently reliable to meet the safety target, will sustain such reliability (or improve upon it).

The monitoring system is felt to be particularly important as it had already been demonstrated that when such systems are in place it inculcates a more considered approach to operations. In addition the elimination of 'hot starts', prevented by the UMS, itself minimises the incidents of turbine burst failures.

7.3.5 Mitigating procedures (operations)

Operational and training procedures, to mitigate the risk - or minimise the consequences - are required of the operator. Such procedures are intended to minimise risk by ensuring that: the helicopter is operated within the exposed region for the minimum time; and simple but effective procedures are followed to minimise the consequence should an engine failure occur.

7.4 Operation with Exposure - the alleviation and the requirement

When operating with exposure, there is alleviation from the requirement to establish a safe-forced-landing area (which extends to landing as well as take-off); however, the requirement for obstacle clearance - AEO in the take-off and from DPATO OEI in the climb and en-route phases - remains (both for take-off and landing).

The take-off mass is obtained from the more limiting of the following:

- the climb performance of 150 ft/min at 1000 ft above the take-off point; or
- obstacle clearance (in accordance with 6.3 above); or
- AEO hover out of ground effect (HOGE) performance at the appropriate power setting. (AEO HOGE is required to ensure acceleration when (near) vertical dynamic take-off techniques are being used. Additionally for elevated heliports/helidecks, it ensures a power reserve to offset ground cushion dissipation; and ensures that, during the landing manoeuvre, a stabilised HOGE is available - should it be required.)

7.4.1 Operations to elevated heliport/helidecks

PC 2 operations to elevated heliports and helidecks are a specific case of operations with exposure. In these operations, the alleviation covers the possibility of:

- a deck-edge strike if the engine fails early in the take-off or late in the landing; and
- penetration into the HV Curve during take-off and landing; and
- forced landing with obstacles on the surface (hostile water conditions) below the elevated heliport (helideck). The take-of mass is as stated above and relevant techniques are as described in ACJ JCAR ops3.520(a)(3) and JCAR ops3.535(a)(3) Note:

It is unlikely that the DPATO will have to be calculated with operations to helidecks (due to the absence of obstacles in the take-off path).

7.4.2 Additional requirements for operations to Helidecks in a Hostile Environment

For a number of reasons (e.g. the deck size, and the helideck environment – including obstacles and wind vectors), it was not anticipated that operations in PC 1 would be technically feasible or economically justifiable by the projected AUTHORITY deadline of 2010 (OEI HOGE could have provided a method of compliance but this would have resulted in a severe and unwarranted restriction on payload/range).

However, due to the severe consequences of an engine failure to helicopters involved in take-off and landings to helidecks located in hostile sea areas (such as the North Sea or the North Atlantic), a policy of Risk Reduction is called for. As a result, enhanced Class 2 take-off and landing masses together with techniques that provide a high confidence of safety due to: deck-edge avoidance; and, drop-down that provides continued flight clear of the sea, are seen as practical measures.

For helicopters which have a Category A elevated helideck procedure, certification is satisfied by demonstrating a procedure and adjusted masses (adjusted for wind as well as temperature and pressure) which assure a 15ft deck edge clearance on take-off and landing. It is therefore recommended that manufacturers, when providing enhanced PC2 procedures, use the provision of this deck-edge clearance as their benchmark.

As the height of the helideck above the sea is a variable, drop down has to be calculated; once clear of the helideck, a helicopter operating in PC1 would be expected to meet the 35ft obstacle clearance. Under circumstances other than open sea areas and with less complex environmental conditions, this would not present difficulties. As the provision of drop down takes no account of operational circumstances, standard drop down graphs for enhanced PC2 - similar to those in existence for Category A procedures - are anticipated.

Under conditions of offshore operations, calculation of drop down is not a trivial matter - the following examples indicate some of the problems which might be encountered in hostile environments:

- Occasions when tide is not taken into account and the sea is running irregularly - the level of the obstacle (i.e. - the sea) is indefinable making a true calculation of drop down impossible.
- Occasions when it would not be possible - for operational reasons - for the approach and departure paths to be clear of obstacles - the 'standard' calculation of drop-down could not be applied.

Under these circumstances, practicality indicates that drop-down should be based upon the height of the deck AMSL and the 35ft clearance should be applied.

There are however, other and more complex issues which will also affect the deck-edge clearance and drop down calculations:

- When operating to moving decks on vessels, a recommended landing or take-off profile might not be possible because the helicopter might have to hover alongside in order that the rise and fall of the ship is mentally mapped; or, on take-off re-landing in the case of an engine failure might not be an option.

Under these circumstances, the Commander might adjust the profiles to address a hazard more serious

or more likely than that presented by an engine failure.

It is because of these and other (unforeseen) circumstances that a prescriptive requirement is not used. However, the target remains a 15ft deck-edge clearance and a 35ft obstacle clearance and data should be provided such that, where practically possible, these clearances can be planned.

As accident/incident history indicates that the main hazard is collision with obstacles on the helideck due to human error, simple and reproducible take-off and landing procedures are recommended.

In view of the reasons stated above, the future requirement for PC 1 is replaced by the new requirement that the take-off mass takes into account: the procedure; deck-edge miss; and drop down appropriate to the height of the helideck. This will require calculation of take-off mass from information produced by manufacturers reflecting these elements. It is expected that such information will be produced by performance modelling/simulation using a model validated through limited flight testing.

7.4.3 Operations to Helidecks for Helicopters with a MAPSC of more than 19

The original requirement for operations of helicopters with a MAPSC of more than 19 was PC 1 (as set out in JCAR ops3.470(a)(2)).

However, when operating to helidecks, the problems enumerated in 7.4.2 above are equally applicable to these helicopters. In view of this, but taking into account that increased numbers are (potentially) being

ACJ-1 to Appendix 1 to JCAR ops3.517(a)

Helicopter operations without an assured safe forced landing capability

1. As part of the risk assessment prior to granting an approval under Appendix 1 to JCAR ops3.517(a), the operator should provide appropriate powerplant reliability statistics available for the helicopter type and the engine type.
2. Except in the case of new engines, such data should show sudden powerloss from the set of in-flight shutdown (IFSD) events not exceeding 1 per 100,000 engine hours in a 5 year moving window. However, a rate in excess of this value, but not exceeding 3 per 100,000 engine hours, may be accepted by the Authority after an assessment showing an improving trend.
3. New engines should be assessed on a case-by-case basis.
4. After the initial assessment, updated statistics should be periodically reassessed; any adverse sustained trend will require an immediate evaluation to be accomplished by the operator in consultation with the Authority and the manufacturers concerned. The evaluation may result in corrective action or operational restrictions being applied.
5. The purpose of this paragraph is to provide guidance on how the in-service power plant sudden power loss rate is determined.

5.1. Share of roles between the helicopter and engine Type Certificate Holders (TCH).

a) The provision of documents establishing the in-service sudden power loss rate for the helicopter/engine installation; the interface with the operational Authority of the State of Design should be the Engine TCH or the Helicopter TCH depending on the way they share the corresponding analysis work.

b) The Engine TCH should provide the Helicopter TCH with a document including: the list of in-service power loss events, the applicability factor for each event (if used), and the assumptions made on the efficiency of any corrective actions implemented (if used);

c) The Engine or Helicopter TCH should provide the operational Authority of the State of Design or, where this Authority does not take responsibility, the operational Authority of the State of the Operator, with a document that details the calculation results - taking into account: the events caused by the engine and the events caused by the engine installation; the applicability factor for each event (if used), the assumptions made on the efficiency of any corrective actions implemented on the engine and on the helicopter (if used); and the calculation of the powerplant power loss rate,

5.2 Documentation The following documentation should be updated every year.

5.2.1 The document with detailed methodology and calculation as distributed to the Authority of the State of Design.

5.2.2 A summary document with results of computation as made available on request to any operational Authority.

5.2.3 A Service Letter establishing the eligibility for such operation and defining the corresponding required configuration as provided to the operators.

5.3. Definition of the “sudden in-service power loss”.

The sudden in-service power loss is an engine power loss:

- larger than 30 % of the take-off power; and
- occurring during operation; and
- without the occurrence of an early intelligible warning to inform and give sufficient time for the pilot to take any appropriate action.

5.4. Data base documentation.

Each power loss event should be documented, by the engine and/or helicopter TCH's, as follows:

- incident report number;

- engine type;
- engine serial number;
- helicopter serial number;
- date;
- event type (demanded IFSD, un-demanded IFSD);
- presumed cause;
- applicability factor when used ;
- reference and assumed efficiency of the corrective actions that will have to be applied (if any);

5.5. Counting methodology.

Various methodologies for counting engine power loss rate have been accepted by Authorities. The following is an example of one of these methodologies:

5.5.1 The events resulting from:

- unknown causes (wreckage not found or totally destroyed, undocumented or unproven statements); or
- where the engine or the elements of the engine installation have not been investigated (for example when the engine has not been returned by the customer); or
- an unsuitable or non representative use (operation or maintenance) of the helicopter or the engine are not counted as engine in-service sudden power loss and the applicability factor is 0%.

5.5.2 The events caused by:

- the engine or the engine installation; or
- the engine or helicopter maintenance, when the applied maintenance was compliant with the Maintenance Manuals are counted as engine in-service sudden power loss and the applicability factor is 100%.

5.5.3 For the events where the engine or an element of the engine installation has been submitted to investigation which did not allow to define a presumed cause

the applicability factor is 50 %.

5.6. Efficiency of corrective actions.

The corrective actions made by the engine and helicopter manufacturers on the definition or maintenance of the engine or its installation could be defined as mandatory for specific - JCAR ops3 operations. In this case the associated reliability improvement could be considered as mitigating factor for the event.

A factor defining the efficiency of the corrective action could be applied to the applicability factor of the concerned event.

5.7. Method of calculation of the powerplant power loss rate.

The detailed method of calculation of the powerplant power loss rate should be documented by engine or helicopter TCH and accepted by the relevant Authority.

ACJ-2 to Appendix 1 to JCAR ops3.517(a)**Helicopter operations without an assured safe forced landing capability**

To obtain an approval under Appendix 1 to JCAR ops3.517(a), an operator conducting operations without an assured safe forced landing capability should implement the following:

1. Attain and then maintain the helicopter/engine modification standard defined by the manufacturer that has been designated to enhance reliability during the take-off and landing phases.
2. Conduct the preventive maintenance actions recommended by the helicopter or engine manufacturer as follows:
 - 2.1 Engine oil spectrometric and debris analysis - as appropriate;
 - 2.2 Engine trend monitoring, based on available power assurance checks;
 - 2.3 Engine vibration analysis (plus any other vibration monitoring systems where fitted).
 - 2.4 Oil consumption monitoring.
3. The Usage Monitoring System should fulfil at least the following:
 - 3.1 Recording of the following data:
 - Date and time of recording, or a reliable means of establishing these parameters;
 - Amount of flight hours recorded during the day plus total flight time;
 - N1 (gas producer RPM) cycle count;
 - N2 (power turbine RPM) cycle count (if the engine features a free turbine);

- Turbine temperature exceedance: value, duration;
 - Power-shaft torque exceedance: value, duration (if a torque sensor is fitted);
 - Engine shafts speed exceedance: value, duration;
- 3.2 Data storage of the above parameters, if applicable, covering the maximum flight time in a day, and not less than 5 flight hours, with an appropriate sampling interval for each parameter.
- 3.3 The system should include a comprehensive self-test function with a malfunction indicator and a detection of power-off or sensor input disconnection.
- 3.4 A means should be available for downloading and analysis of the recorded parameters. Frequency of downloading should be sufficient to ensure data is not lost through over-writing.
- 3.5 The analysis of parameters gathered by the usage monitoring system, the frequency of such analysis and subsequent maintenance actions should be described in the maintenance documentation.
- 3.6 The data should be stored in an acceptable form and accessible to the Authority, for at least 24 months.
4. Include take-off and landing procedures in the operations manual, where they do not already exist in the Helicopter Flight Manual.
5. Establish training for flight crew which should include the discussion, demonstration, use and practice of the techniques necessary to minimise the risks;
6. Report to the manufacturer any loss of power control, engine shutdown (precautionary or otherwise) or power unit failure for any cause (excluding simulation of power unit failure during training). The content of each report should provide:
- Date and time;
 - Operator (and Maintenance organisations where relevant);
 - Type of helicopter and description of operations;
 - Registration and serial number of airframe;
 - Engine type and serial number;
 - Power unit modification standard where relevant to failure;
 - Engine position;

- Symptoms leading up to the event.
- Circumstances of power unit failure including phase of flight or ground operation;
- Consequences of the event;
- Weather/environmental conditions;
- Reason for power unit failure – if known;
- In case of an In Flight Shut Down (IFSD), nature of the IFSD (Demanded/Un-demanded);
- Procedure applied and any comment regarding engine restart potential;
- Engine hours and cycles (from new and last overhaul);
- Airframe flight hours;
- Rectification actions applied including, if any, component changes with part number and serial number of the removed equipments; and
- Any other relevant information

ACJ JCAR ops3.520(a)(3) and JCAR ops3.535(a)(3)**Procedure for continued operations to helidecks****See JCAR ops3.520(a)(3) and JCAR ops3.535(a)(3)****1 Factors to be considered when taking off from or landing on a helideck**

1.1 In order to take account of the considerable number of variables associated with the helideck environment, each take-off and landing may require a slightly different profile. Factors such as helicopter mass and centre of gravity, wind velocity, turbulence, deck size, deck elevation and orientation, obstructions, power margins, platform gas turbine exhaust plumes etc., will influence both the take-off and landing. In particular, for the landing, additional considerations such as the need for a clear go-around flight path, visibility and cloud base etc., will affect the Commander's decision on the choice of landing profile. Profiles may be modified, taking account of the relevant factors noted above and the characteristics of individual helicopter types.

2 Terminology

2.1 See JCAR ops3.480 as appropriate.

3 Performance

3.1 To perform the following take-off and landing profiles, adequate all engines operating (AEO) hover performance at the helideck is required. In order to provide a minimum level of performance, data

(derived from the Flight Manual AEO out of ground effect (OGE), with wind accountability) should be used to provide the maximum take-off or landing mass. Where a helideck is affected by downdrafts or turbulence or hot gases, or where the take-off or landing profile is obstructed, or the approach or take-off cannot be made into wind, it may be necessary to decrease this take-off or landing mass by using a suitable calculation method recommended by the manufacturer. The helicopter mass should not exceed that required by JCAR ops3.520(a)(1) or JCAR ops3.535(a)(1).

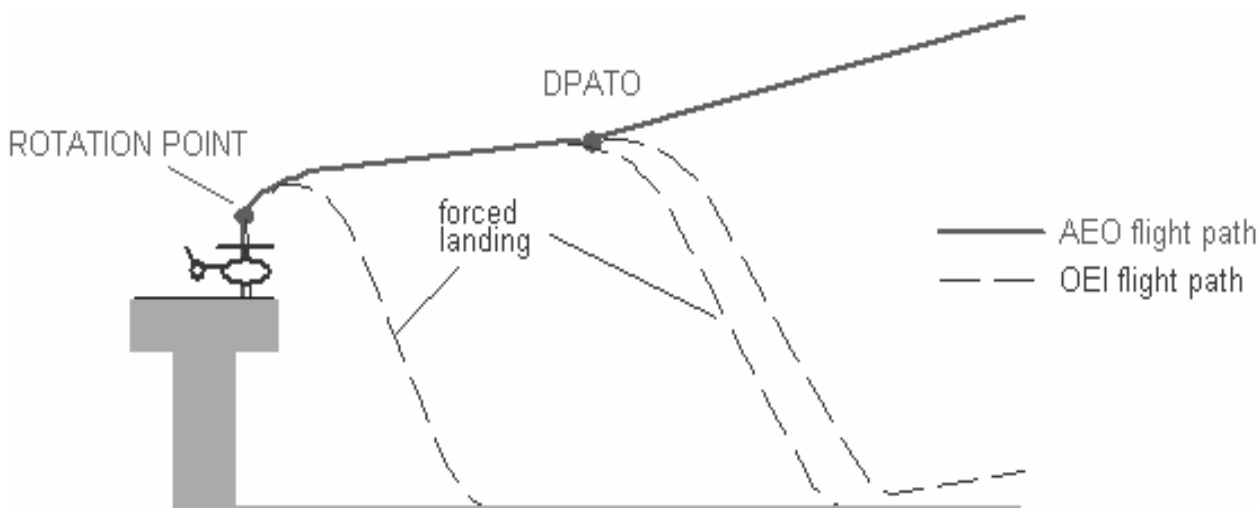
Note 1: For helicopter types no longer supported by the manufacturer, data may be established by the operator, provided they are acceptable to the Authority.

4 Take-off profile

4.1 The take-off should be performed in a dynamic manner ensuring that the helicopter continuously moves vertically from the hover to the Rotation Point (RP) and thence into forward flight. If the manoeuvre is too dynamic then there is an increased risk of losing spatial awareness (through loss of visual cues) in the event of a rejected take-off, particularly at night.

4.2 If the transition to forward flight is too slow, the helicopter is exposed to an increased risk of contacting the deck edge in the event of an engine failure at or just after the point of cyclic input (RP).

4.3 It has been found that the climb to RP is best made between 110% and 120% of the power required in the hover. This power offers a rate of climb which assists with deck-edge clearance following power unit failure at RP, whilst minimising ballooning following a failure before RP. Individual types will require selection of different values within this range.



5 Selection of a lateral visual cue

5.1 In order to obtain the maximum performance in the event of an engine failure being recognised at or just after RP, the RP must be at its optimum value, consistent with maintaining the necessary visual cues. If an engine failure is recognised just before RP, the helicopter, if operating at a low mass, may ‘balloon’ a significant height before the reject action has any effect. It is, therefore, important that the Pilot Flying selects a lateral visual marker and maintains it until the RP is achieved, particularly on decks

with few visual cues. In the event of a rejected take-off, the lateral marker will be a vital visual cue in assisting the pilot to carry out a successful landing.

6 Selection of the rotation point

6.1 The optimum RP should be selected to ensure that the take-off path will continue upwards and away from the deck with All Engines Operating (AEO), but minimising the possibility of hitting the deck edge due to the height loss in the event of an engine failure at or just after RP.

6.2 The optimum RP may vary from type to type. Lowering the RP will result in a reduced deck edge clearance in the event of an engine failure being recognised at or just after RP. Raising the RP will result in possible loss of visual cues, or a hard landing in the event of an engine failure just prior to RP.

7 Pilot reaction times

7.1 Pilot reaction time is an important factor affecting deck edge clearance in the event of an engine failure prior to or at RP. Simulation has shown that a delay of one second can result in a loss of up to 15 ft in deck edge clearance.

8 Variation of wind speed

8.1 Relative wind is an important parameter in the achieved take-off path following an engine failure; wherever practicable, take-off should be made into wind. Simulation has shown that a 10 knot wind can give an extra 5 ft deck edge clearance compared to a zero wind condition.

9 Position of the helicopter relative to the deck edge

9.1 It is important to position the helicopter as close to the deck edge (including safety nets) as possible whilst maintaining sufficient visual cues, particularly a lateral marker.

9.2 The ideal position is normally achieved when the rotor tips are positioned at the forward deck edge. This position minimises the risk of striking the deck edge following recognition of an engine failure at or just after RP. Any take-off heading which causes the helicopter to fly over obstructions below and beyond the deck edge should be avoided if possible. Therefore, the final take-off heading and position will be a compromise between the take-off path for least obstructions, relative wind, turbulence and lateral marker cue considerations.

10 Actions in the event of an engine failure at or just after RP

10.1 Once committed to the continued take-off, it is important, in the event of an engine failure, to rotate the aircraft to the optimum attitude in order to give the best chance of missing the deck edge. The optimum pitch rates and absolute pitch attitudes, should be detailed in the profile for the specific type.

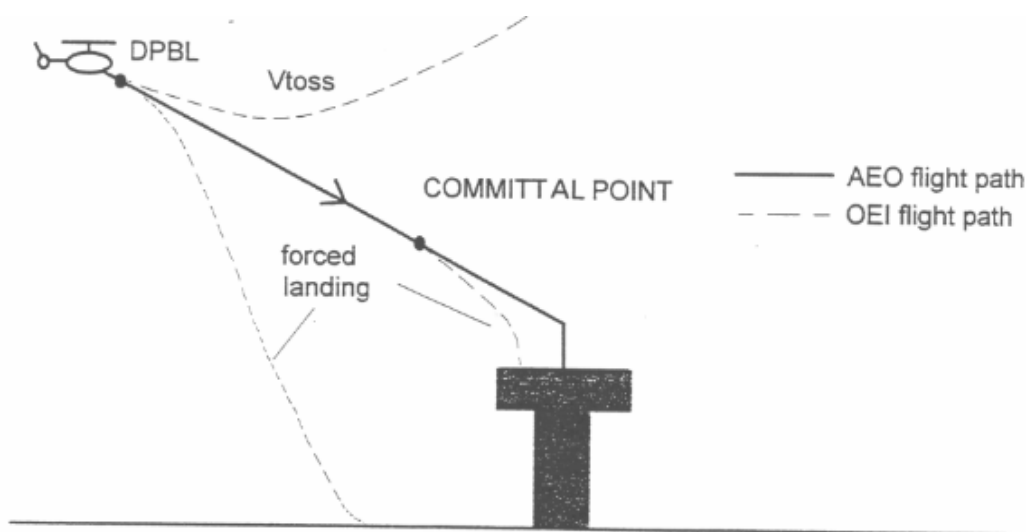
11 Take-off from helidecks which have significant movement

11.1 This technique should be used when the helideck movement and any other factors, eg insufficient visual cues, makes a successful rejected take-off unlikely. Weight should be reduced to permit an improved one engine inoperative capability, as necessary.

11.2 The optimum take-off moment is when the helideck is level and at its highest point, eg horizontal on top of the swell. Collective pitch should be applied positively and sufficiently to make an immediate transition to climbing forward flight. Because of the lack of a hover, the take-off profile should be planned and briefed prior to lift off from the deck.

12 Standard landing profile

12.1 The approach should be commenced into wind to a point outboard of the helideck. Rotor tip clearance from the helideck edge should be maintained until the aircraft approaches this position at the requisite height (type dependent) with approximately 10 kts of ground-speed and a minimal rate of descent. The aircraft is then flown on a flight path to pass over the deck edge and into a hover over the safe landing area.



13 Offset landing profile

13.1 If the normal landing profile is impracticable due to obstructions and the prevailing wind velocity, the offset procedure may be used. This should involve flying to a hover position, approximately 90° offset from the landing point, at the appropriate height and maintaining rotor tip clearance from the deck edge. The helicopter should then be flown slowly but positively sideways and down to position in a low hover over the landing point. Normally, CP will be the point at which helicopter begins to transition over the helideck edge.

14 Training

14.1 These techniques should be covered in the training required by JCAR ops3, Subpart N.

IEM JCAR ops3.520 & JCAR ops3.535

Take-off and landing

See JCAR ops3.520 and JCAR ops3.535

1 This IEM describes three types of operation to/from helidecks and elevated heliports by helicopters operating in Performance Class 2.

2 In two cases of take-off and landing, exposure time is used. During the exposure time (which is only approved for use when complying with JCAR ops3.517(a)) the probability of a power unit failure is regarded as extremely remote. If a power unit failure (engine failure) occurs during the exposure time a safe force landing may not be possible.

3 Take Off - Non-Hostile Environment (without an approval to operate with an exposure time) - JCAR ops3.520(a)(2).

3.1 Figure 1 shows a typical take-off profile for Performance Class 2 operations from a helideck or an elevated heliport in a non-hostile environment.

3.2 If an engine failure occurs during the climb to the rotation point, compliance with JCAR ops3.520(a)(2) will enable a safe landing or a safe forced landing on the deck.

3.3 If an engine failure occurs between the rotation point and the DPATO, compliance with JCAR ops3.520(a)(2) will enable a safe forced landing on the surface, clearing the deck edge.

3.4 At or after the DPATO, the OEI flight path should clear all obstacles by the margins specified in JCAR ops3.525.

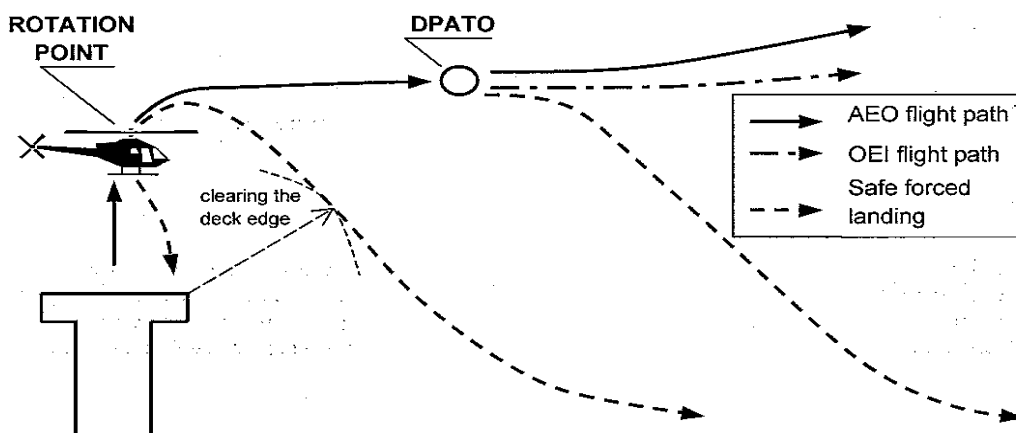


Figure 1

4 Take Off - Non-Hostile Environment (with exposure time) JCAR ops3.520(a)(3)

4.1 Figure 2 shows a typical take-off profile for Performance Class 2 operations from a helideck or an elevated heliport in a non-hostile environment (with exposure time).

4.2 If an engine failure occurs after the exposure time and before DPATO, compliance with JCAR ops3.520(a)(3) will enable a safe force landing on the surface.

4.3 At or after the DPATO, the OEI flight path should clear all obstacles by the margins specified in JCAR ops3.525.

Note: an engine failure outside of exposure time should result in a safe-forced-landing or safe continuation of the flight.

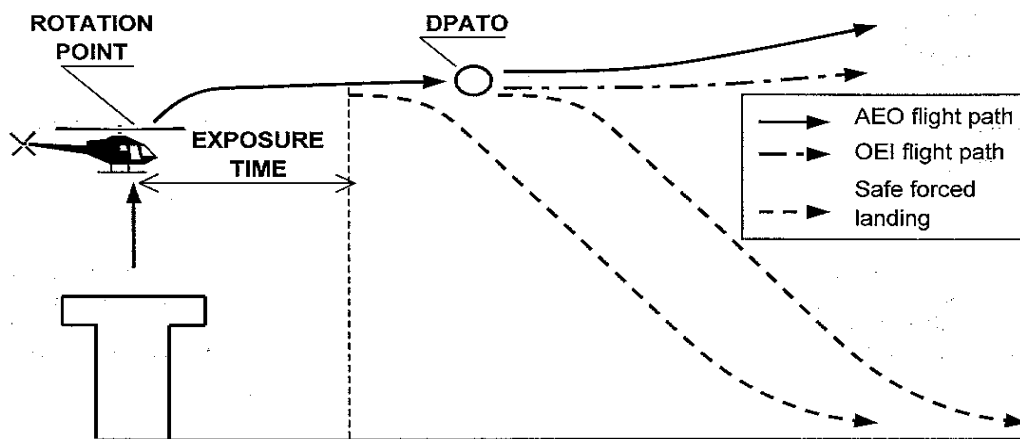


Figure 2

5 Take Off - Non-Congested Hostile Environment (with exposure time) JCAR ops3.520(a)(3)

5.1 Figure 3 shows a typical take off profile for Performance Class 2 operations from a helideck or an elevated heliport in a non-congested hostile environment (with exposure time).

5.2 If an engine failure occurs after the exposure time the helicopter is capable of continuing the flight.

5.3 At or after the DPATO, the OEI flight path should clear all obstacles by the margins specified in JCAR ops3.525.

Note: an engine failure outside of exposure time should result in a safe-forced-landing or safe continuation of the flight.

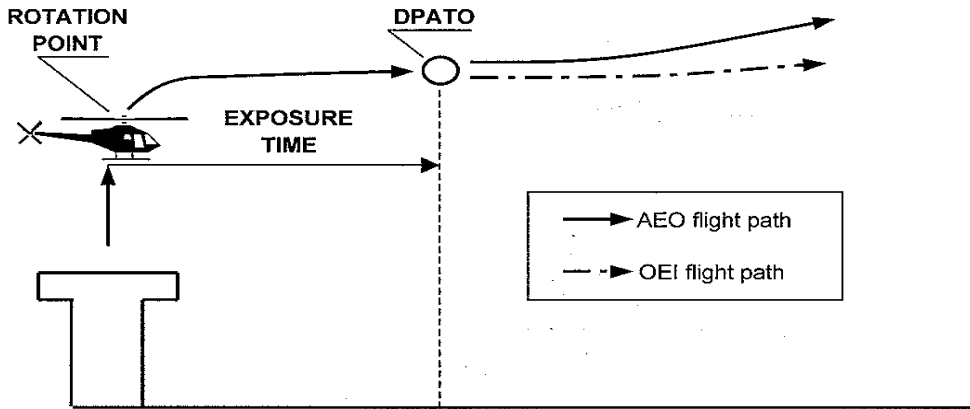


Figure 3

6. Landing - Non-Hostile Environment (without an approval to operate with an exposure time) - JCAR ops3.535(a)(2)

6.1 Figure 4 shows a typical landing profile for Performance Class 2 operations to a helideck or an elevated heliport in a non-hostile environment.

6.2 The DPBL is defined as a “window” in terms of airspeed, rate of descent, and height above the landing surface. If an engine failure occurs before the DPBL, the pilot may elect to land or to execute a bailed landing.

6.3 In the event of an engine failure being recognised after the DPBL and before the committal point, compliance with JCAR ops3.535(a)(2) will enable a safe force landing on the surface.

6.4 In the event of an engine failure at or after the committed point, compliance with JCAR ops3.535(a)(2) will enable a safe force landing on the deck.

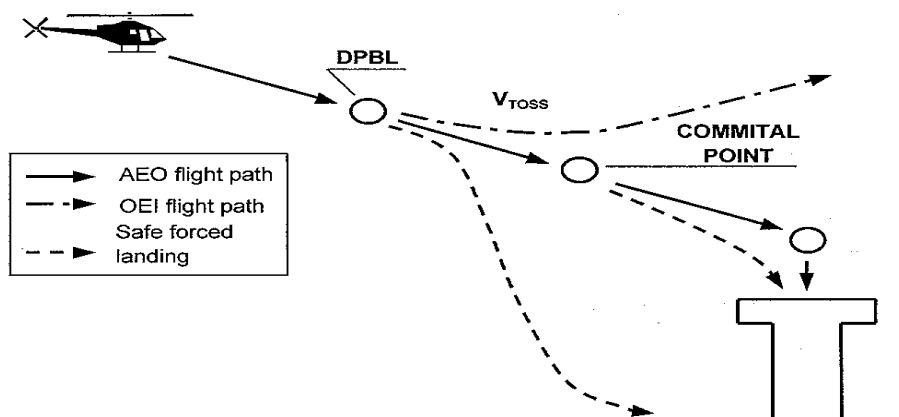


Figure 4

7 Landing - Non-Hostile Environment (with exposure time) JCAR ops3.535(a)(3)

7.1 Figure 5 shows a typical landing profile for Performance Class 2 operations to a helideck or an elevated heliport in a non-hostile environment (with exposure time).

7.2 The DPBL is defined as a “window” in terms of airspeed, rate of descent, and height above the landing surface. If an engine failure occurs before the DPBL, the pilot may elect to land or to execute a bailed landing.

7.3 In the event of an engine failure being recognised before the exposure time compliance with JCAR ops3.535(a)(3) will enable a safe force landing on the surface.

7.4 In the event of an engine failure after the exposure time, compliance with JCAR ops3.535(a)(3) will enable a safe force landing on the deck.

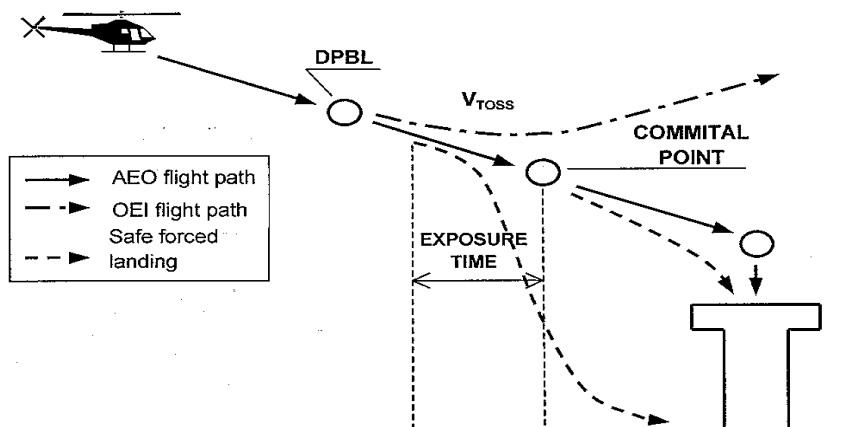


Figure 5

8. Landing - Non-Congested Hostile Environment (with exposure time) JCAR ops3.535(a)(3)

8.1 Figure 6 shows a typical landing profile for Performance Class 2 operations to a helideck or an elevated heliport in a non-congested hostile environment (with exposure time).

8.2 In the event of an engine failure at any point during the approach and landing phase up to the start of exposure time, compliance with JCAR ops3.535(a)(4) will enable the helicopter, after clearing all obstacles under the flight path, to continue the flight.

8.3 In the event of an engine failure after the exposure time, compliance with JCAR ops3.535(a)(4) will enable a safe force landing on the deck.

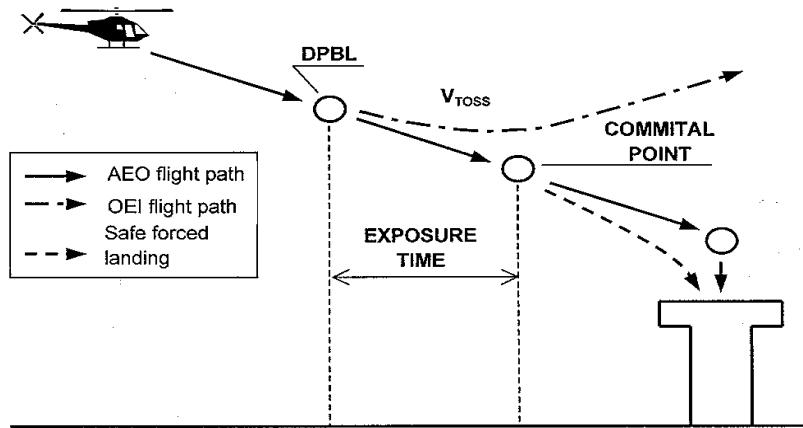


Figure 6

ACJ – PERFORMANCE CLASS 3

ACJ JCAR ops3.540(b)**The take-off and landing phases (Performance Class 3) See JCAR ops3.540(b)**

1. To understand the use of ground level exposure in Performance Class 3, it is important first to be aware of the logic behind the use of ‘take-off and landing phases’; once this is clear, it is easier to appreciate the aspects and limits of the use of ground level exposure. This ACJ shows the derivation of the term from the ICAO definition of the ‘en-route phase’ and then gives practical examples of the use, and limitations on the use, of ground level exposure in JCAR ops3.540(b).
2. The take-off phase in Performance Class 1 and Performance Class 2 may be considered to be bounded by ‘the specified point in the take-off’ from which the Take-off Flight Path begins.
 - 2.1 In Performance Class 1 this specified point is defined as “the end of the Take-off Distance Required”.
 - 2.2 In Performance Class 2 this specified point is defined as “DPATO or, as an alternative, no later than 200 ft above the take-off surface”.
 - 2.3 There is no simple equivalent point for bounding of the landing in Performance Class 1 & 2.
3. Take-off Flight Path is not used in Performance Class 3 and, consequently, the term ‘take-off and landing phases’ is used to bound the limit of exposure. For the purpose of Performance Class 3, the take-off and landing phases are considered to be bounded by:

for the take-off no later than V_y or 200 ft above the take-off surface; and for the landing 200 ft above the landing surface.

Note: in ICAO Annex 6 Part III, En-route phase is defined as being “That part of the flight from the end of the take-off and initial climb phase to the commencement of the approach and landing phase.” The use of take-off and landing phase in this text is used to distinguish the take-off from the initial climb, and the landing from the approach: they are considered to be complimentary and not contradictory.

4. Ground level exposure – and exposure for elevated heliports/helidecks in a non-hostile environment – is permitted for operations under an approval in accordance with Appendix 1 to JCAR ops3.517(a). Exposure in this case is limited to the ‘take-off and landing phases’.

What is the practical effect of this bounding of exposure? Consider a couple of examples:

A clearing: an operator may consider a take-off/landing in a clearing when there is sufficient power, with all engines operating, to clear all obstacles in the take-off path by an adequate margin (this, in ICAO, is meant to indicate 35 ft). Thus, the clearing may be bounded by bushes, fences, wires and, in the extreme, by power lines, high trees etc. Once the obstacle has been cleared – by using a steep or a vertical climb (which itself may infringe the HV diagram) - the helicopter reaches V_y or 200 ft, and from that point a safe forced landing must be possible. The effect is that whilst operation to a clearing is possible, operation to a clearing in the middle of a forest is not (except when operated in accordance with Appendix 1 to JCAR ops3.005(e)).

A heliport surrounded by rocks: the same applies when operating to a landing site that is surrounded by rocky ground. Once Vy or 200ft has been reached, a safe forced landing must be possible.

An elevated heliport/helideck: when operating to an elevated heliport/helideck in Performance Class 3, exposure is considered to be twofold: firstly, to a deck-edge strike if the engine fails after the decision to transition has been taken; and secondly, to operations in the HV diagram due to the height of the heliport/helideck. Once the take-off surface has been cleared and the helicopter has reached the knee of the HV diagram, the helicopter should be capable of making a safe forced landing.

5. Operation in accordance with JCAR ops3 .540(b) does not permit excursions into a hostile environment per se and is specifically concerned with the absence of space to abort the take-off or landing when the take-off and landing space are limited; or when operating in the HV diagram.

6. Specifically, the use of this exception to the requirement for a safe forced landing (during take-off

or landing) does not permit semi-continuous operations over a hostile environment such as a forest or hostile sea area. It can therefore be seen as a limited alleviation from JCAR ops3.540(a)(2) which states that: “operations are only conducted to/from those heliports and over such routes, areas and diversions contained in a non-hostile environment...”

AMC/IEM J – MASS & BALANCE**ACJ JCAR ops3.605****Mass values****See JCAR ops3.605**

In accordance with ICAO Annex 5 and the International System of Units (SI), the actual and limiting masses of helicopters, the payload and its constituent elements, the fuel load etc, are expressed in JCAR ops3 in units of mass (kg). However, in most approved Flight Manuals and other operational documentation, these quantities are published as weights in accordance with the common language. In the SI system, a weight is a force rather than a mass. Since the use of the term 'weight' does not cause any problem in the day-to-day handling of helicopters, its continued use in operational applications and publications is acceptable.

IEM JCAR ops3.605(e)**Fuel density****See JCAR ops3.605(e)**

1 If the actual fuel density is not known, the operator may use the standard fuel density values specified in the Operations Manual for determining the mass of the fuel load. Such standard values should be based on current fuel density measurements for the airports or areas concerned. Typical fuel density values are:

- a. Gasoline (piston engine fuel) - 0.71
- b. JET A1 (Jet fuel JP 1) - 0.79
- c. JET B (Jet fuel JP 4) - 0.76
- d. Oil - 0.88

IEM to Appendix 1 to JCAR ops3.605, sub-paragraph (a)(2)(iii)**Accuracy of weighing equipment****See Appendix 1 to JCAR ops3.605, sub-paragraph (a)(2)(iii)**

1 The mass of the helicopter as used in establishing the dry operating mass and the centre of gravity must be established accurately. Since a certain model of weighing equipment is used for initial and periodic weighing of helicopters of widely different mass classes, one single accuracy criterion for weighing equipment cannot be given. However, the weighing accuracy is considered satisfactory if the following accuracy criteria are met by the individual scales/cells of the weighing equipment used:

- a. For a scale/cell load below 2 000 kg - an accuracy of $\pm 1\%$;
- b. For a scale/cell load from 2 000 kg to 20 000 kg - an accuracy of ± 20 kg; and
- c. For a scale/cell load above 20 000 kg - an accuracy of $\pm 0.1\%$.

IEM to Appendix 1 to JCAR ops3.605, sub-paragraph (d)**Centre of gravity limits****See Appendix 1 to JCAR ops3.605, sub-paragraph (d)**

1 In the Certificate Limitations section of the Helicopter Flight Manual, forward and aft centre of gravity (CG) limits are specified. These limits ensure that the certification stability and control criteria are met throughout the whole flight. An operator should ensure that these limits are observed by defining operational procedures or a CG envelope which compensates for deviations and errors as listed below:

1.1 Deviations of actual CG at empty or operating mass from published values due, for example, to weighing errors, unaccounted modifications and/or equipment variations.

1.2 Deviations in fuel distribution in tanks from the applicable schedule.

1.3 Deviations in the distribution of baggage and cargo in the various compartments as compared with the assumed load distribution as well as inaccuracies in the actual mass of baggage and cargo.

1.4 Deviations in actual passenger seating from the seating distribution assumed when preparing the mass and balance documentation. (See Note)

1.5 Deviations of the actual CG of cargo and passenger load within individual cargo compartments or cabin sections from the normally assumed mid position.

1.6 Deviations of the CG caused by application of the prescribed fuel usage procedure (unless already covered by the certified limits).

1.7 Deviations caused by in-flight movement of cabin crew, pantry equipment and passengers.

Note: Large CG errors may occur when 'free seating' (freedom of passengers to select any seat when entering the helicopter) is permitted. Although in most cases reasonably even longitudinal passenger seating can be expected, there is a risk of an extreme forward or aft seat selection causing very large and unacceptable CG errors (assuming that the balance calculation is done on the basis of an assumed even distribution). The largest errors may occur at a load factor of approximately 50% if all passengers are seated in either the forward or aft half of the cabin. Statistical analysis indicates that the risk of such extreme seating adversely affecting the CG is greatest on small helicopters.

AMC JCAR ops3.620(a)**Passenger mass established by use of a verbal statement****See JCAR ops3.620(a)**

1 When asking each passenger on helicopters with less than 6 passenger seats for his/her mass (weight), a specific constant should be added to account for clothing. This constant should be determined by the operator on the basis of studies relevant to his particular routes, etc. and should not be less than 4 kg.

2 Personnel boarding passengers on this basis should assess the passenger's stated mass and the mass of passengers' clothing to check that they are reasonable. Such personnel should have received instruction on assessing these mass values.

IEM JCAR ops3.620(h)

Statistical evaluation of passenger and baggage mass data

See JCAR ops3.620(h)

1 Sample size (see also Appendix 1 to JCAR ops3.620(h)).

1.1 For calculating the required sample size it is necessary to make an estimate of the standard deviation on the basis of standard deviations calculated for similar populations or for preliminary surveys. The precision of a sample estimate is calculated for 95% reliability or 'significance', i.e. there is a 95% probability that the true value falls within the specified confidence interval around the estimated value. This standard deviation value is also used for calculating the standard passenger mass.

1.2 As a consequence, for the parameters of mass distribution, i.e. mean and standard deviation, three cases have to be distinguished:

a. μ, σ = the true values of the average passenger mass and standard deviation, which are unknown and which are to be estimated by weighing passenger samples.

b. μ', σ' = the 'a priori' estimates of the average passenger mass and the standard deviation, i.e. values resulting from an earlier survey, which are needed to determine the current sample size.

c. \bar{m}, \bar{s} = the estimates for the current true values of m and s , calculated from the sample. The sample size can then be calculated using the following formula:

where:

$$n \geq \frac{(1.96 * \sigma' * 100)^2}{(e'r * \mu')^2}$$

n = number of passengers to be weighed (sample size)

$e'r$ = allowed relative confidence range (accuracy) for the estimate of μ by (see also equation in paragraph 3).

NOTE: The allowed relative confidence range specifies the accuracy to be achieved when estimating the true mean. For example, if it is proposed to estimate the true mean to within $\pm 1\%$, then $e'r$ will be 1 in the above formula.

1.96 = value from the Gaussian distribution for 95% significance level of the resulting confidence interval.

2 Calculation of average mass and standard deviation. If the sample of passengers weighed is drawn at random, then the arithmetic mean of the sample (\bar{x}) is an unbiased estimate of the true average mass (μ) of the population.

2.1 Arithmetic mean of sample

$$\bar{x} = \frac{\sum_{j=1}^n x_j}{n}$$

where:

x_j = mass values of individual passengers (sampling units).

2.2 Standard deviation:

$$s = \sqrt{\frac{\sum_{j=1}^n (x_j - \bar{x})^2}{n - 1}}$$

Where:

$x_j - \bar{x}$ = deviation of the individual value from the sample mean.

3 Checking the accuracy of the sample mean. The accuracy (confidence range) which can be ascribed to the sample mean as an indicator of the true mean is a function of the standard deviation of the sample which has to be checked after the sample has been evaluated. This is done using the formula:

$$e_r = \frac{1.96 * s * 100}{\sqrt{n} * \bar{x}} \quad (\%)$$

whereby e_r should not exceed 1% for an all adult average mass and not exceed 2% for an average male and/or female mass. The result of this calculation gives the relative accuracy of the estimate of μ at the 95% significance level. This means that with 95% probability, the true average mass μ lies within the interval:

$$X - \pm \frac{1.96 * s}{\sqrt{n}}$$

4 Example of determination of the required sample size and average passenger mass

4.1 Introduction. Standard passenger mass values for mass and balance purposes require passenger weighing programs be carried out. The following example shows the various steps required for establishing the sample size and evaluating the sample data. It is provided primarily for those who are not well-versed in statistical computations. All mass figures used throughout the example are entirely fictitious.

4.2 Determination of required sample size. For calculating the required sample size, estimates of the standard (average) passenger mass and the standard deviation are needed. The ‘a priori’ estimates from an earlier survey may be used for this purpose. If such estimates are not available, a small representative sample of about 100 passengers has to be weighed so that the required values can be calculated. The latter has been assumed for the example.

Step 1: estimated average passenger mass

Step 2: estimated standard deviation

<u>n</u>	<u>x_j (kg)</u>
1	79.9
2	68.1
3	77.9
4	74.5
5	54.1
6	62.2
7	89.3
8	108.7
.	.
85	63.2
86	75.4

<u>n</u>	<u>x_j</u>	<u>(x_j - x̄)</u>	<u>(x_j - x̄)²</u>
1	79.9	+9.38	6.49
2	68.1	-2.5	6.25
3	77.9	+7.3	53.29
4	74.5	+3.9	15.21
5	54.1	-16.5	272.25
6	62.2	-8.4	70.56
7	89.3	+18.7	349.69
8	108.7	+38.1	1451.61
.	.	.	.
85	63.2	-7.4	54.76
86	75.4	-4.8	23.04

$$\sum_{j=1}^{86} x_j = 6071.6$$

$$\mu' = \bar{x} = \frac{\sum x_j}{n} = \frac{6071.6}{86}$$

$$= 70.6 \text{ kg}$$

$$\sum_{j=1}^{86} (x_j - \bar{x})^2 = 34683.40$$

$$\sigma' = \sqrt{\frac{\sum (x_j - \bar{x})^2}{n-1}}$$

$$= \sqrt{\frac{34683.40}{86-1}}$$

$$\sigma' = 20.20 \text{ kg}$$

Step 3: required sample size. The required number of passengers to be weighed should be such that the confidence range, e_r, does not exceed 1% as specified in paragraph 3.

$$n \geq \frac{(1.96 * \sigma' * 100)^2}{(e_r * \mu')^2}$$

$$n \geq \frac{(1.96 * 20.20 * 100)^2}{(1 * 70.6)^2}$$

$$n \geq 3145$$

IEM OPS 3.620(h) (continued)

$$n = 3\,180$$

$$\sum_{j=1}^{3180} X_j = 231\,186.2 \text{ kg}$$

$$\bar{x} = \frac{\sum X_j}{n} = \frac{231\,186.2}{3\,180} \text{ kg}$$

$$\bar{x} = 72.7 \text{ kg}$$

Step 2: calculation of the standard deviation.

For calculating the standard deviation the method shown in paragraph 4.2 step 2 should be applied.

$$\sum (x_j - \bar{x})^2 = 745\,145.20$$

$$s = \sqrt{\frac{\sum (x_j - \bar{x})^2}{n - 1}}$$

$$s = \sqrt{\frac{745\,145.20}{3\,180 - 1}}$$

$$s = 15.31 \text{ kg}$$

Step 3: calculation of the accuracy of the sample mean.

$$e_r = \frac{1.96 * s * 100}{\sqrt{n} * \bar{x}} \%$$

$$e_r = \frac{1.96 * 15.31 * 100}{\sqrt{3180} * 72.7} \%$$

$$e_r = 0.73\%$$

Step 4: calculation of the confidence range of the sample mean.

$$\bar{x} \pm \frac{1.96 * s}{\sqrt{n}}$$

$$\bar{x} \pm \frac{1.96 * 15.31}{\sqrt{3180}} \text{ kg}$$

$$72.7 \pm 0.5 \text{ kg}$$

The result of this calculation shows that there is a 95% probability of the actual mean for all passengers lying within the range 72.2 kg to 73.2 kg.

The result shows that at least 3 145 passengers have to be weighed to achieve the required accuracy. If e'r is chosen as 2% the result would be $n \geq 786$.

Step 4: after having established the required sample size a plan for weighing the passengers is to be worked out, as specified in Appendix 1 to JAR-OPS 3.620(h).

4.3 Determination of the passenger average mass

Step 1: Having collected the required number of passenger mass values, the average passenger mass can be calculated. For the purpose of this example it has been assumed that 3 180 passengers were weighed. The sum of the individual masses amounts to 231 186.2 kg.

**IEM to Appendix 1 to JCAR ops3.620(h)
Guidance on passenger weighing surveys****See Appendix 1 to JCAR ops3.620(h)**

1 This IEM summarises several elements of passenger weighing surveys and provides explanatory and interpretative information.

2 Information to the Authority. An operator should advise the Authority about the intent of the passenger weighing survey, explain the survey plan in general terms and obtain prior approval to proceed (JCAR ops3.620(h) refers).

3 Detailed survey plan

3.1 An operator should establish and submit for approval to the Authority a detailed weighing survey plan that is fully representative of the operation, i.e. the network or route under consideration and the survey should involve the weighing of an adequate number of passengers (JCAR ops3.620(h)).

3.2 A representative survey plan means a weighing plan specified in terms of weighing locations, dates and flight numbers giving a reasonable reflection of the operator's timetable and/or area of operation (See Appendix 1 to JCAR ops3.620(h), sub-paragraph (a)(1)).

3.3 The minimum number of passengers to be weighed is the highest of the following (See Appendix 1 to JCAR ops3.620(h) sub-paragraph (a)):

a. The number that follows from the general requirement that the sample should be representative of the total operation to which the results will be applied; this will often prove to be the overriding requirement;

or

b. The number that follows from the statistical requirement specifying the accuracy of the resulting mean values which should be at least 2% for male and female standard masses and 1% for all adult standard masses, where applicable. The required sample size can be estimated on the basis of a pilot sample (at least 100 passengers) or from a previous surveys. If analysis of the results of the survey indicates that the requirements on the accuracy of the mean values for male or female standard masses or all adult standard masses, as applicable, are not met, an additional number of representative passengers should be weighed in order to satisfy the statistical requirements.

3.4 To avoid unrealistically small samples a minimum sample size of 2 000 passengers (males + females) is also required, except for small helicopters where in view of the burden of the large number of flights to be weighed to cover 2 000 passengers, a lesser number is considered acceptable.

4 Execution of weighing programme

4.1 At the beginning of the weighing programme it is important to note, and to account for, the data requirements of the weighing survey report (See paragraph 7 below).

4.2 As far as is practicable, the weighing programme should be conducted in accordance with the specified survey plan.

4.3 Passengers and all their personal belongings should be weighed as close as possible to the boarding point and the mass, as well as the associated passenger category (male/female/child), should be recorded.

5 Analysis of results of weighing survey

5.1 The data of the weighing survey should be analysed as explained in IEM JCAR ops3.620(h). To obtain

an insight to variations per flight, per route etc. this analysis should be carried out in several stages, i.e. by flight, by route, by area, inbound/outbound, etc. Significant deviations from the weighing survey plan should be explained as well as their possible effect(s) on the results.

6 Results of the weighing survey

6.1 The results of the weighing survey should be summarised. Conclusions and any proposed deviations from published standard mass values should be justified. The results of a passenger weighing survey are average masses for passengers, including hand baggage, which may lead to proposals to adjust the standard mass values given in JCAR ops3.620 Tables 1, 2 and 3. As stated in Appendix 1 to JCAR ops3.620(h), sub-paragraph (c), these averages, rounded to the nearest whole number may, in principle, be applied as standard mass values for males and females on helicopters with 20 and more passenger seats. Because of variations in actual passenger masses, the total passenger load also varies and statistical analysis indicates that the risk of a significant overload becomes unacceptable for helicopters with less than 20 seats. This is the reason for passenger mass increments on small helicopters.

6.2 The average masses of males and females differ by some 15 kg or more and because of uncertainties in the male/female ratio the variation of the total passenger load is greater if all adult standard masses are used than when using separate male and female standard masses. Statistical analysis indicates that the use of all adult standard mass values should be limited to helicopters with 30 passenger seats or more.

6.3 As indicated in Appendix 1 to JCAR ops3.620(h), standard mass values for all adults must be based on the averages for males and females found in the sample, taking into account a reference male/female ratio of 80/20 for all flights. An operator may, based on the data from his weighing programme, or by proving a different male/female ratio, apply for approval of a different ratio on specific routes or flights.

7 Weighing survey report

7.1 The weighing survey report, reflecting the content of paragraphs 1–6 above, should be prepared in a standard format as follows:

WEIGHING SURVEY REPORT

1 Introduction

- Objective and brief description of the weighing survey

2 Weighing survey plan

- Discussion of the selected flight number, heliports, dates, etc.
- Determination of the minimum number of passengers to be weighed.
- Survey plan.

3 Analysis and discussion of weighing survey results

- Significant deviations from survey plan (if any).
- Variations in means and standard deviations in the network.
- Discussion of the (summary of) results.

4 Summary of results and conclusions

- Main results and conclusions.
- Proposed deviations from published standard mass values.

Attachment 1: Applicable summer and/or winter timetables or flight programmes.

Attachment 2: Weighing results per flight (showing individual passenger masses and sex); means and standard deviations per flight, per route, per area and for the total network.

IEM JCAR ops3.620(i) & (j) Adjustment of standard masses

See JCAR ops3.620(i) & (j)

1. When standard mass values are used, JCAR ops3.620(i) and JCAR ops3.620(j) require the operator to identify and adjust the passenger and checked baggage masses in cases where significant numbers of passengers or quantities of baggage are suspected of exceeding the standard values. This requirement implies that the Operations Manual should contain appropriate directives to ensure that:

a. Check-in, operations and cabin staff and loading personnel report or take appropriate action when a flight is identified as carrying a significant number of passengers whose masses, including hand baggage, are expected to exceed the standard passenger mass, and/or groups of passengers carrying exceptionally heavy baggage (e.g. military personnel or sports teams); and

b. On small helicopters, where the risks of overload and/or CG errors are the greatest, commanders pay special attention to the load and its distribution and make proper adjustments.

IEM to Appendix 1 to JCAR ops3.625

Mass and balance documentation

See Appendix 1 to JCAR ops3.625

The CG position need not be mentioned on the mass and balance documentation if, for example, the load distribution is in accordance with a pre-calculated balance table or if it can be shown that for the planned operations a correct balance can be ensured, whatever the real load is.

AMC/IEM K – INSTRUMENTS AND EQUIPMENT**IEM JCAR ops3.630****Instruments and Equipment - Approval and Installation****See JCAR ops3.630**

1 For Instruments and Equipment required by JCAR ops3 Subpart K, “Approved” means that compliance with the applicable JTSO design requirements and performance specifications, or equivalent, in force at the time of the equipment approval application, has been demonstrated. Where a JTSO does not exist, the applicable airworthiness standards apply unless otherwise prescribed in JCAR ops3 or JAR-26.

2 “Installed” means that the installation of Instruments and Equipment has been demonstrated to comply with the applicable airworthiness requirements of JAR-27/-29, or the relevant code used for Type Certification, and any applicable requirement prescribed in JCAR ops3.

3 Instruments and Equipment approved in accordance with design requirements and performance specifications other than JTSOs, before the applicability dates prescribed in JCAR ops3.001(b), are acceptable for use or installation on helicopters operated for the purpose of commercial air transportation provided that any additional JCAR ops3 requirement is complied with.

4 When a new version of a JTSO (or of a specification other than a JTSO) is issued, Instruments and Equipment approved in accordance with earlier requirements may be used or installed on helicopters operated for the purpose of commercial air transportation provided that such Instruments and Equipment are operational, unless removal from service or withdrawal is required by means of an amendment to - JCAR ops3 or -26.

IEM JCAR ops3.647**Equipment for operations requiring a radio communication and/or radio navigation system****See JCAR ops3.647**

A headset, as required by JCAR ops3.647, consists of a communication device which includes two earphones to receive and a microphone to transmit audio signals to the helicopter’s communication system. To comply with the minimum performance requirements, the earphones and microphone should match with the communication system’s characteristics and the flight deck environment. The headset should be adequately adjustable to fit the pilot’s head. Headset boom microphones should be of the noise cancelling type.

ACJ JCAR ops3.650/3.652

Flight and Navigational Instruments and Associated Equipment

See JCAR ops3.650/JCAR ops3.652

INSTRUMENT	FLIGHTS UNDER VFR		FLIGHTS UNDER IFR OR AT	
	SINGLE PILOT	TWO PILOTS RQUIRED	SINGLE PILOT	TWO PILOTS REQUIRED
(a)	(b)	(C)	(d)	(e)
1 Magnetic Direction Indicator	1	1	1	1
2 Accurate Time Piece	1	1	1	1
3 OAT Indicator	1	1	1	1
4 Sensitive Pressure Altimeter	1	2	2 (Note 1)	2
5 Air Speed Indicator	1	2	1	2
6 Heated Pitot System	1 (Note 2)	2 (Note 2)	1	2
7 Pitot Heat Failure Annunciator	-	-	1 (Note 3)	2 (Note 3)
8 Vertical Speed Indicator	1	2	1	2
9 Slip Indicator	1	2	1	2
10 Attitude Indicator	1 (Note 4 or	2 (Note 4 or	1 (Note 8)	2 (Note 8)
11 Gyroscopic Direction Indicator	1 (Note 4 or Note 5)	2 (Note 4 or Note 5)	1 (Note 8)	2 (Note 8)
12 Magnetic Gyroscopic	-	-	1 (Note 7)	2 (Note 7)
13 Standby Attitude Indicator	-	-	1 (Note 6)	1 (Note 6)
14 Alternate Source of Static Pressure	-	-	1	1
15 Chart Holder	-	-	1 (Note 7)	1 (Note 7)

NOTE 1: For single pilot night vfr operation one sensitive pressure altimeter may be substituted by a radio altimeter (-

JCAR ops3.652(c)).

NOTE 2: Required for helicopters with a maximum certificated take-off mass (MCTOM) over 3 175 kg or having a maximum approved passenger seating configuration (MAPSC) of more than 9 (JCAR ops3.650(l)).

NOTE 3: The pitot heater failure annunciation applies to any helicopter issued with an individual Certificate of Airworthiness after 1 August 1999. It also applies before that date when: the helicopter has a MCTOM greater than 3 175 kg and a maximum approved passenger seating configuration (MAPSC) greater than 9 (JCAR ops3.652(d)).

NOTE 4: Required for helicopters with a maximum certificated take-off mass (MCTOM) over 3 175 kg (JCAR ops3.650(i)).

NOTE 5: Required for any helicopters when operating over water; when out of sight of land or when the visibility is less than 1500 m (JCAR ops3.650(i)).

NOTE 6: For helicopters with a maximum certificated take-off mass (MCTOM) over 3 175 kg, CS-29 1303(g) may require either a gyroscopic rate-of-turn indicator combined with a slip-skid indicator (turn and bank indicator) or a standby attitude indicator satisfying the requirements of JCAR ops3 .652(h). (However, the original type certification standard should be referred to determine the exact requirement.)

NOTE 7: For IFR operation only

NOTE 8: For VFR night operations only.

AMC JCAR ops3.650/JCAR ops3.652

Flight and Navigational Instruments and Associated Equipment

See JCAR ops3.650/JCAR ops3.652

1 Individual requirements of these paragraphs may be met by combinations of instruments or by integrated flight systems or by a combination of parameters on electronic displays provided that the information so available to each required pilot is not less than that provided by the instruments and associated equipment as specified in this Subpart.

2 The equipment requirements of these paragraphs may be met by alternative means of compliance when equivalent safety of the installation has been shown during type certification approval of the helicopter for the intended kind of operation.

AMC JCAR ops3.650(g) & JCAR ops3.652(k)

Flight and Navigational Instruments and Associated Equipment

See JCAR ops3.650(g) & JCAR ops3.652(k)

A means to indicate outside air temperature may be an air temperature indicator which provides indications that are convertible to outside air temperature.

AMC JCAR ops3.652(d) & (m)(2)

Flight and Navigational Instruments and Associated Equipment

See JCAR ops3.652(d) & (m)(2)

A combined pitot heater warning indicator is acceptable provided that a means exists to identify the failed heater in systems with two or more sensors.

AMC JCAR ops3.655

Procedures for single pilot operation under IFR without an autopilot.

See JCAR ops3.655

1 Operators approved to conduct single pilot IFR operations in a helicopter without altitude hold and heading mode, should establish procedures to provide equivalent safety levels. These procedures should include the following:

- a. Appropriate training and checking additional to that contained in Appendix 1 to JCAR ops3.940(c).
- b. Appropriate increments to the heliport operating minima contained in Appendix 1 to JCAR ops3.430.

2 Any sector of the flight which is to be conducted in IMC should not be planned to exceed 45 minutes.

AMC JCAR ops3.690(b)(6)

Crew member interphone system

See JCAR ops3.690(b)(6)

1 The means of determining whether or not an interphone call is a normal or an emergency call may be one or a combination of the following:

- i. Lights of different colours;
- ii. Codes defined by the operator (e.g. Different number of rings for normal and emergency calls);

iii. Any other indicating signal acceptable to the Authority.

ACJ JCAR ops3.700

Cockpit Voice Recorders - 1

See JCAR ops3.700

Account should be taken of the operational performance requirements of EUROCAE Document ED56A (Minimum Operational Performance Requirements For Cockpit Voice Recorder Systems) dated December 1993.

ACJ JCAR ops3.700(e)

Combination Recorder

See JCAR ops3.700, JCAR ops3.705, JCAR ops3.715, JCAR ops3.720

1. Compliance with Cockpit Voice Recorder and Flight Data Recorder requirements may be achieved by the carriage of a combination recorder.

2. A combination recorder is a flight recorder that records:

a. all voice communications and aural environment required by the relevant cockpit voice recorder paragraph; and

b. all parameters required by the relevant flight data recorder paragraph, with the same specifications required by those paragraphs.

ACJ JCAR ops3.705

Cockpit Voice Recorders - 2

See JCAR ops3.705

Account should be taken of the operational performance requirements of EUROCAE Documents ED56 or ED56A (Minimum Operational Performance Requirements For Cockpit Voice Recorder Systems) dated February 1988 and December 1993 respectively.

ACJ JCAR ops3.715/JCAR ops3.720

Flight Data Recorders - 1 and 2

See JCAR ops3.715/JCAR ops3.720

1. Account should be taken of the operational performance requirements of EUROCAE Document ED55 (Minimum Operational Performance Specification For Flight Data Recorder Systems) dated May 1990. Table A refers to EUROCAE document ED-55 Table A1-4, Table B refers to ED-55 Table A1-2 and Table C refers to ED-

55 Table A1-5 parameters 6 to 15.

2. The parameters to be recorded should meet, as far as practicable, the performance specifications (designated ranges, sampling intervals, accuracy limits and minimum resolution in read-out) defined in the relevant tables of EUROCAE Minimum Operational Performance Specification for Flight Data Recorder Systems, Document ED 55 dated May 1990. The remarks columns of those tables are acceptable means of compliance to the parameter specifications.

3. For helicopters with novel or unique design or operational characteristics, additional parameters will need to be recorded as agreed by the certification authority during type or supplemental type certification.

4. If recording capacity is available, as many of the additional parameters specified in Table A1.5 of Document ED-55 dated May 1990 as possible should be recorded.

5. For the purpose of JCAR ops3.715(c)(2)(i) and JCAR ops3.720(c)(2)(i) a sensor is considered “readily available” when it is already available or can be easily incorporated.

AMC JCAR ops3.715(c)(3)**Flight Data Recorders - 1 (Parameters to be recorded)****See JCAR ops3.715(c)**

1 The parameters to meet JCAR ops3.715(c)(3) are defined in EUROCAE Minimum Operational Performance Specification for Flight Data Recorder Systems, Document ED 55 dated May 1990. The relevant sections are contained in the following Tables:

a. For helicopters with a maximum certificated take-off mass (MCTOM) over 3 175 kg up to and including 7 000 kg, Table A1.4, parameters 1 to 15 of Document ED 55 are applicable;

b. For helicopters with a maximum certificated take-off mass (MCTOM) over 7 000 kg Table A1.2, parameters 1 to 30, of Document ED 55 are applicable;

c. For helicopters with electronic display systems the additional parameters to be recorded are included in Table A1.5, parameters 6 to 15, of Document ED 55;

d. For helicopters with novel or unique design or operational characteristics, additional parameters will need to be recorded as agreed by the certification authority. These may include those listed in Table A1.5 of Document ED 55.

NOTE: The term ‘where practicable’ used in the remarks column of Table A 1.5 means that account should be taken of the following:

- i. If the sensor is already available or can be easily incorporated;
- ii. Sufficient capacity is available in the flight recorder system;
- iii. For navigational data (nav frequency selection, DME distance, latitude, longitude, groundspeed and drift) the signals are available in digital form;
- iv. The extent of modification required;
- v. The down-time period, and
- vi. Equipment software development.

IEM JCAR ops3.715(h)/JCAR ops3.720(h)**Flight Data Recorders – 1 and 2 (Inoperative Recorders)****See JCAR ops3.715(h)/JCAR ops3.720(h)**

1 In respect of the despatch criteria of JCAR ops3.715(h)/JCAR ops3.720(h), the flight data recorder is considered to be inoperative when any of the following conditions exist:

- a. Loss of the flight recording function is evident to the flight crew during the pre-flight check e.g. by means of system status monitors provided in accordance with EUROCAE document ED 55 dated May 1990 paragraph 2.6.1; or
- b. The need for maintenance has been identified by the system monitors with the setting of an indicator and the cause of that setting has not been determined; or
- c. Analyses of recorded data or maintenance actions have shown that more than 5% of the total number of individual parameters (variable and discrete), required to be recorded for the particular aircraft, are not being recorded properly.

NOTE: Where improper recording affects 5% of the parameters or less, timely corrective action should be taken by the operator in accordance with approved maintenance procedures e.g. as required by EUROCAE document ED 55 dated May 1990 paragraphs 2.16.2 and A4.1.1.

AMC JCAR ops3.720(c)(3)**Flight Data Recorders - 2 (Parameters to be recorded)****See JCAR ops3.720(c)(3)**

1. Compliance with JCAR ops3.720(c)(3) may be shown by recording, so far as is practicable, the relevant parameters as defined in EUROCAE Minimum Operational Performance Specification for Flight

Data Recorder Systems, Document ED 55 dated May 1990. The relevant sections are contained in the following tables:

- a. For helicopters with a maximum certificated take-off mass (MCTOM) over 3 175 kg up to and including 7 000 kg, Table A1.4, parameters 1 to 15 of Document ED 55 are applicable;
- b. For helicopters with a maximum certificated take-off mass (MCTOM) over 7 000 kg Table A1.2, parameters 1 to 30, of Document ED 55 are applicable;
- c. For helicopters with electronic display systems the additional parameters to be recorded are included in Table A1.5, parameters 6 to 15, of Document ED 55;
- d. For helicopters with novel or unique design or operational characteristics, additional parameters will need to be recorded as agreed by the certification authority. These may include those listed in Table A1.5 of Document ED 55.

NOTE: The term 'where practicable' used in the remarks column of Table A 1.5 and the term 'so far as is practicable'

used in paragraph 1 above means that account should be taken of the following:

- i. If the sensor is already available or can be easily incorporated;
- ii. Sufficient capacity is available in the flight recorder system;
- iii. For navigational data (nav frequency selection, DME distance, latitude, longitude, groundspeed and drift) the signals are available in digital form;
- iv. The extent of modification required;
- v. The down-time period, and
- vi. Equipment software development.

AMC JCAR ops3.745

First-Aid Kits

See JCAR ops3.745

The following should be included in the First-Aid Kits:

- Bandages (unspecified)
- Burns dressings (unspecified)
- Wound dressings, large and small Safety pins and scissors
- Small adhesive dressings
- Antiseptic wound cleaner
- Adhesive wound closures
- Adhesive tape
- Disposable resuscitation aid
- Simple analgesic e.g. paracetamol
- Antiemetic e.g. cinnarizine
- Nasal decongestant
- First-Aid handbook

→Splints, suitable for upper and lower limbs

→Gastrointestinal Antacid +

→Anti-diarrhoeal medication e.g. Loperamide +

→Ground/Air visual signal code for use by survivors.

→Disposable Gloves

A list of contents in at least 2 languages (English and one other). This should include information on the effects and side effects of drugs carried.

Note: An eye irrigator whilst not required to be carried in the first-aid kit should, where possible, be available for use on the ground.

+ For helicopters with more than 9 passenger seats installed.

AMC JCAR ops3.790

Hand Fire Extinguishers

See JCAR ops3.790

1 The number and location of hand fire extinguishers should be such as to provide adequate availability for use, account being taken of the number and size of the passenger compartments, the need to minimize the hazard of toxic gas concentrations and the location of toilets, galleys etc. These considerations may result in the number being greater than the minimum prescribed.

2 There should be at least one fire extinguisher suitable for both flammable fluid and electrical equipment fires installed on the flight deck. Additional extinguishers may be required for the protection of other compartments accessible to the crew in flight. Dry chemical fire extinguishers should not be used on the flight deck, or in any compartment not separated by a partition from the flight deck, because of the adverse effect on vision during discharge and, if non-conductive, interference with electrical contacts by the chemical residues.

3 Where only one hand fire extinguisher is required in the passenger compartments it should be located near the cabin crew member's station, where provided.

4 Where two or more hand fire extinguishers are required in the passenger compartments and their location is not otherwise dictated by consideration of paragraph 1 above, an extinguisher should be located near each end of the cabin with the remainder distributed throughout the cabin as evenly as is practicable.

5 Unless an extinguisher is clearly visible, its location should be indicated by a placard or sign.

Appropriate symbols may be used to supplement such a placard or sign.

AMC JCAR ops3.810**Megaphones**

See JCAR ops3.810

Where one megaphone is required, it should be readily accessible from a cabin crew member's assigned seat. Where two or more megaphones are required, they should be suitably distributed in the passenger cabin(s) and readily accessible to crew members assigned to direct emergency evacuations. This does not necessarily require megaphones to be positioned such that they can be reached by a crew member when strapped in a cabin crew member's seat.

IEM JCAR ops3.820**Automatic Emergency Locator Transmitter**

See JCAR ops3.820

- 1 Types of automatic Emergency Locator Transmitters are defined as follows:
 - a. Automatic Fixed (ELT (AF)). This type of ELT is intended to be permanently attached to the helicopter before and after a crash and is designed to aid SAR teams in locating a crash site;
 - b. Automatic Portable (ELT (AP)). This type of ELT is intended to be rigidly attached to the helicopter before a crash, but readily removable from the helicopter after a crash. It functions as an ELT during the crash sequence. If the ELT does not employ an integral antenna, the aircraft-mounted antenna may be disconnected and an auxiliary antenna (stored on the ELT case) attached to the ELT. The ELT can be tethered to a survivor or a life-raft. This type of ELT is intended to aid SAR teams in locating the crash site or survivor(s);
 - c. Automatic Deployable (ELT (AD)). This type of ELT is intended to be rigidly attached to the helicopter before the crash and automatically ejected and deployed after the crash sensor has determined that a crash has occurred. This type of ELT should float in water and is intended to aid SAR teams in locating the crash site.
- 2 To minimize the possibility of damage in the event of crash impact, the Automatic Emergency Locator Transmitter should be rigidly fixed to the helicopter structure as far aft as practicable with its antenna and connections so arranged as to maximize the probability of the signal being radiated after a crash.

IEM JCAR ops3.825

Life Jackets

See JCAR ops3.825

For the purpose of JCAR ops3.825, seat cushions are not considered to be flotation devices.

ACJ JCAR ops3.827

Crew Survival Suits – Estimating Survival Time

See JCAR ops3.827

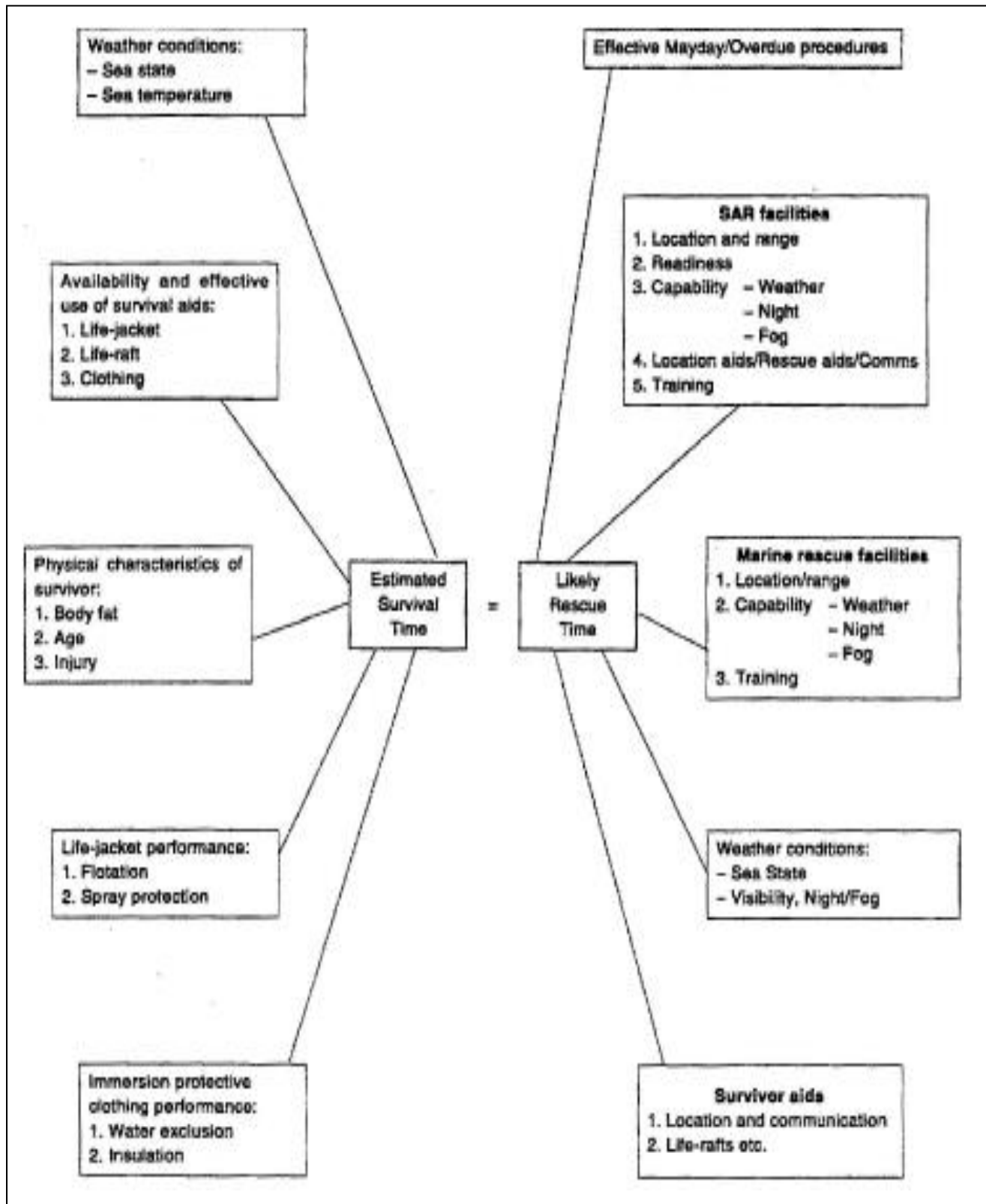
1 Introduction

1.1 A person accidentally immersed in cold seas (typically offshore Northern Europe) will have a better chance of survival if he is wearing an effective survival suit in addition to a life-jacket. By wearing the survival suit, he can slow down the rate which his body temperature falls and protect himself from the greater risk of drowning brought about by incapacitation due to hypothermia.

1.2 The complete survival suit system – suit, life-jacket and clothes worn under the suit – should be able to keep the wearer alive long enough for the rescue services to find and recover him. In practice the limit is about 3 hours. If a group of persons in the water cannot be rescued within this time they are likely to have become so scattered and separated that location will be extremely difficult, especially in the rough water typical of Northern European sea areas. If it is expected that in water protection is required for periods greater than 3 hours, improvements should be sought in the search and rescue procedures rather than in the immersion suit protection.

2 Survival times

2.1 The aim must be to ensure that a man in the water can survive long enough to be rescued, i.e. his survival time must be greater than the likely rescue time. The factors affecting both times are shown in Figure 1. The figure emphasises that survival time is influenced by many factors, physical and human. Some of the factors are relevant to survival in cold water, some are relevant in water at any temperature.



2.2 Broad estimates of likely survival times for the thin offshore individual are given in Fig. 2. As survival time is significantly affected by the prevailing weather conditions at the time of immersion, the Beaufort wind scale has been used as an indicator of these surface conditions.

Clothing assembly	Beaufort wind force	Times within which the most vulnerable individuals are likely to drown	
		(water temp 5°c)	(water temp 13°c)
Working clothes (no immersion suit)	0 – 2	Within ¼ hour	Within 1 ¼ hours
	3 – 4	Within ½ hour	Within ½ hour
	5 and above	Significantly less than ¼ hour	Significantly less than ¼ hour
Immersion suit worn over working clothes (with leakage inside suit)	0 - 2	May well exceed 3 hours	May well exceed 3 hours
	3 – 4	Within 2 ¾ hours	May well exceed 3 hours
	5 and above	Significantly less than 2 ¾ hours. May well exceed 1 hour	May well exceed 3 hours

Fig. 2 Timescale within which the most vulnerable individuals are likely to succumb to the prevailing conditions.

2.3 Consideration must also be given to escaping from the helicopter itself should it submerge or invert in the water. In this case escape time is limited to the length of time the occupants can hold their breath. The breath hold time can be greatly reduced by the effect of cold shock. Cold shock is caused by the sudden drop in skin temperature on immersion, and is characterised by a gasp reflex and uncontrolled breathing. The urge to breathe rapidly becomes overwhelming and, if still submerged, the individual will inhale water resulting in drowning. Delaying the onset of cold shock by wearing an immersion suit will extend the available escape time from a submerged helicopter.

2.4 The effects of water leakage and hydrostatic compression on the insulation quality of clothing are well recognised. In a nominally dry system the insulation is provided by still air trapped within the clothing fibres and between the layers of suit and clothes. It has been observed that many systems lose some of their insulative capacity either because the clothes under the 'waterproof' survival suit get wet to some extent or because of hydrostatic compression of the whole assembly. As a result of water leakage and compression, survival times will be shortened. The wearing of warm clothing under the suit is recommended.

2.5 Whatever type of survival suit and other clothing is provided, it should not be forgotten that significant heat loss can occur from the head.

AMC JCAR ops3.830(a)(2)

Life-rafts and ELT for extended overwater flights

See JCAR ops3.830(a)(2)

- 1 Each life-raft required by JCAR ops3.830 should conform to the following specification:
 - a. They should be of an approved design and stowed so as to facilitate their ready use in an emergency;

- b. They should be radar conspicuous to standard airborne radar equipment;
 - c. When carrying more than one life-raft on board, at least 50% should be jettisonable by the crew while seated at their normal station, where necessary by remote control;
 - d. Those life-rafts which are not jettisonable by remote control or by the crew should be of such weight as to permit handling by one person. 40 kg should be considered a maximum weight.
- 2 Each life-raft required by JCAR ops3.830 should contain at least the following:
- a. One approved survivor locator light;
 - b. One approved visual signaling device;
 - c. One canopy (for use as a sail, sunshade or rain catcher);
 - d. One radar reflector;
 - e. One 20 m retaining line designed to hold the life-raft near the helicopter but to release it if the helicopter becomes totally submerged;
 - f. One sea anchor;
 - g. One survival kit, appropriately equipped for the route to be flown, which should contain at least the following:
 - i. One life-raft repair kit;
 - ii. One bailing bucket;
 - iii. One signaling mirror;
 - iv. One police whistle;
 - v. One buoyant raft knife;
 - vi. One supplementary means of inflation;
 - vii. Seasickness tablets;
 - viii. One first-aid kit;
 - ix. One portable means of illumination;

- x. One half litre of pure water and one sea water desalting kit;
- xi. One comprehensive illustrated survival booklet in an appropriate language.

3 Batteries used in the ELTs should be replaced (or recharged, if the battery is rechargeable) when the equipment has been in use for more than 1 cumulative hour, and also when 50% of their useful life (or for rechargeable, 50% of their useful life of charge), as established by the equipment manufacturer has expired. The new expiration date for the replacement (or recharged) battery should be legibly marked on the outside of the equipment. The battery useful life (or useful life of charge) requirements of this paragraph do not apply to batteries (such as water-activated batteries) that are essentially unaffected during probable storage intervals.

AMC JCAR ops3.830(a)(3)**Survival Emergency Locator Transmitter (ELT(S))****See JCAR ops3.830(a)(3)**

1 A survival ELT (ELT(S)) is intended to be removed from the helicopter and activated by survivors of a crash. An ELT(S) should be stowed so as to facilitate its ready removal and use in an emergency. An ELT(S) may be activated manually or automatically (e.g. by water activation). It should be designed to be tethered to a life raft or a survivor.

IEM JCAR ops3.835**Survival Equipment****See JCAR ops3.835**

1 The expression 'Areas in which search and rescue would be especially difficult' should be interpreted in the context of this as meaning:

- a. Areas so designated by the State responsible for managing search and rescue; or
- b. Areas that are largely uninhabited and where:
 - i. The State responsible for managing search and rescue has not published any information to confirm that search and rescue would not be especially difficult; and
 - ii. The State referred to in (a) above does not, as a matter of policy, designate areas as being especially difficult for search and rescue.

AMC JCAR ops3.835(c)**Survival Equipment****See JCAR ops3.835(c)**

1 The following additional survival equipment should be carried when required:

- a. 500 ml of water for each 4, or fraction of 4, persons on board;
- b. One knife;
- c. First Aid Equipment;
- d. One set of Air/Ground codes;

In addition, when polar conditions are expected, the following should be carried:

- e. A means for melting snow;
 - f. 1 snow shovel and 1 ice saw;
 - g. Sleeping bags for use by $\frac{1}{3}$ of all persons on board and space blankets for the remainder or space blankets for all passengers on board;
 - h. 1 Arctic/Polar suit for each crew member carried.
- 2 If any item of equipment contained in the above list is already carried on board the helicopter in accordance with another requirement, there is no need for this to be duplicated.

IEM JCAR ops3.837(a)(2)**Additional requirements for helicopters operating to helidecks located in a hostile sea area****See JCAR ops3.837**

1 Operators should be aware that projections on the exterior surface of the helicopter, which are located in a zone delineated by boundaries which are 1.22 m (4 ft) above and 0.61 m (2 ft) below the established static water line could cause damage to a deployed liferaft. Examples of projections which need to be considered are aerials, overboard vents, unprotected split pin tails, guttering and any projection sharper than a three dimensional right angled corner.

2 While the boundaries specified in para 1 above are intended as a guide, the total area which should be considered should also take into account the likely behavior of the life raft after deployment in all sea states up to the maximum in which the helicopter is capable of remaining upright.

3 Operators and maintenance organisations are reminded that wherever a modification or alteration is made to a helicopter within the boundaries specified, the need to prevent the modification or alteration

causing damage to a deployed life raft should be taken into account in the design.

4 Particular care should also be taken during routine maintenance to ensure that additional hazards are not introduced by, for example, leaving inspection panels with sharp corners proud of the surrounding fuselage surface, or allowing door sills to deteriorate to a point where sharp edges become a hazard.

5 The same considerations apply in respect of emergency flotation equipment.

IEM JCAR ops3.843(c)

Flights overwater - Performance Class 2 take-off and landing

See JCAR ops3.843(c)

When helicopters are operated in Performance Class 2 and are taking-off or landing over water, they are exposed to a critical power unit failure. They should therefore be designed for landing on water, certificated in accordance with ditching provisions, or have the appropriate floats fitted (for a non-hostile environment).

AMC/IEM L – COMMUNICATION AND NAVIGATION EQUIPMENT**IEM JCAR ops3.845****Communication and Navigation Equipment - Approval and Installation****See JCAR ops3.845**

1 For Communication and Navigation Equipment required by JCAR ops3 Subpart L, “Approved” means that compliance with the applicable JTSO design requirements and performance specifications, or equivalent, in force at the time of the equipment approval application, has been demonstrated. Where a JTSO does not exist, the applicable airworthiness standards or equivalent apply unless otherwise prescribed in JCAR ops3 or -26.

2 “Installed” means that the installation of Communication and Navigation Equipment has been demonstrated to comply with the applicable airworthiness requirements of -27/-29, or the relevant code used for Type Certification, and any applicable requirement prescribed in JCAR ops3.

3 Communication and Navigation Equipment approved in accordance with design requirements and performance specifications other than JTSOs, before the applicability dates prescribed in JCAR ops3.001(b), are acceptable for use or installation on helicopters operated for the purpose of commercial air transportation provided that any additional JCAR ops3 requirement is complied with.

4 When a new version of a JTSO (or of a specification other than a JTSO) is issued, Communication and Navigation Equipment approved in accordance with earlier requirements may be used or installed on helicopters operated for the purpose of commercial air transportation provided that such Communication and Navigation Equipment are operational, unless removal from service or withdrawal is required by means of an amendment to JCAR ops3 or -26. The same provisions apply in the case where an existing JTSO (or a specification) is superseded by a new JTSO (or a new specification).

ACJ JCAR ops3.865(e)**FM Immunity Equipment Standards****See JCAR ops3.865(e)**

1 FM immunity performance Standards for ILS Localiser, VOR receivers and VHF communication receivers have been incorporated in ICAO Annex 10, Volume I - Radio Navigation Aids Fifth Edition dated July 1996, Chapter 3, Paragraphs 3.1.4, 3.3.8 and Volume III, Part II - Voice Communications Systems, Paragraph 2.3.3.

2 Acceptable equipment standards, consistent with ICAO Annex 10, are contained in EUROCAE Minimum Operational Performance Specifications, documents ED-22B for VOR receivers, ED-23B for VHF communication receivers and ED-46B for LOC receivers and the corresponding RTCA documents DO-186, DO-195 and DO-196.

AMC/IEM N – FLIGHT CREW

AMC JCAR ops3.940(a)(4)

Crewing of inexperienced flight crew members

See JCAR ops3.940(a)(4)

1 An operator should consider that when two flight crew members are required, a flight crew member, following completion of a Type Rating or command course, and the associated line flying under supervision, is inexperienced until either:

- a. He has achieved 50 flight hours on the type and/or in the role within a period of 60 days; or
- b. He has achieved 100 flight hours on the type and/or in the role (no time limit).

2 A lesser number of flight hours, on the type and/or in the role, may be acceptable to the Authority when:

- a. A new operator is commencing operations; or
- b. An operator introduces a new helicopter type; or
- c. Flight crew members have previously completed a type conversion course with the same operator (re-conversion); and
- d. Subject to any other conditions which the Authority may impose.

IEM JCAR ops3.940(b)(1)

Composition of Flight Crew

See JCAR ops3.940(b)(1)

1 In some States the Airspace Authorities have determined that all flight at night should be conducted under IFR. These States then make provisions for helicopter flights at night to be conducted under conditions similar to night VFR in other States.

2 For States (where national legislation requires flight in accordance with IFR at night) who take advantage of this alleviation, the operator should comply with guidance published by the Authority to ensure that the pilot is appropriately qualified.

ACJ No 1 to JCAR ops3.943

Crew Resource Management (CRM)

See JCAR ops3.943/JCAR ops3.945(a)(9)/JCAR ops3.955(b)(6)/JCAR ops3.965(e)/JCAR ops3.965(a)(3)(iv)

See ACJ No. 2 to JCAR ops3.943

1 General

1.1 Crew Resource Management (CRM) is the effective utilisation of all available resources (e.g. crew members, helicopter systems, supporting facilities and persons) to achieve safe and efficient operation.

1.2 The objective of CRM is to enhance the communication and management skills of the flight crew member concerned. The emphasis is placed on the non-technical aspects of flight crew performance.

2 Initial CRM Training

2.1 Initial CRM training programme is designed to provide knowledge of, and familiarity with, human factors relevant to flight operations.

2.2 A CRM trainer should:

- a. have followed a theoretical HPL course covering the whole syllabus of the HPL examination; or
- b. have successfully passed the Human Performance and Limitations (HPL) examination (see the requirements applicable to the issue of Flight Crew Licences); and
- c. have and maintain adequate knowledge of the operation and helicopter type; and
- d. be supervised by suitably qualified CRM training personnel when conducting their first initial CRM training session; and
- e. have knowledge of group management, group dynamics and personal awareness.

2.3 An operator should ensure that initial CRM training addresses the nature of the operations of the company concerned, as well as the associated procedures and the culture of the company. This will include areas of operations which produce particular difficulties or involve adverse climatic conditions and any unusual hazards.

2.4 If the operator does not have sufficient means to establish initial CRM training, use may be made of a course provided by another operator, or a third party or training organisation acceptable to the Authority. In this event the operator should ensure that the content of the course meets his operational requirements. When crew members from several companies follow the same course, CRM core elements should be specific to the nature of operations of the companies and the trainees

concerned.

2.5 A flight crew member's CRM skills should not be assessed during initial CRM training.

3 Conversion Course CRM training

3.1 If the flight crew member undergoes a conversion course with a change of helicopter type and/or a change of operator, elements of the Initial CRM course should be covered as required.

3.2 A flight crew member should not be assessed when completing elements of CRM training which are part of an operator's conversion course.

4 Command course CRM training

4.1 An operator should ensure that elements of the Initial CRM course are integrated into the command course and covered as required.

4.2 A flight crew member should not be assessed when completing elements of CRM training which are part of the command course, although feedback should be given.

5 Recurrent CRM training

5.1 A flight crew member should not be assessed when completing elements of CRM training which are part of recurrent training.

6. Implementation of CRM

6.1 The following table indicates which elements of CRM should be included in each type of training

Table 1

<p>Core Elements (a)</p>	<p>Initial CRM training (b)</p>	<p>Operator’s conversion course when changing type (c)</p>	<p>Operators conversion course when changing operator (d)</p>	<p>Command course (e)</p>	<p>Recurrent training (f)</p>
Human error and reliability, error chain, error prevention and detection	In depth	In depth	Overview	Overview	Overview
Company safety culture, SOPs, organisational factors		Not required	In depth	In depth	
Stress, stress management, fatigue and vigilance			Not required		
Information acquisition and processing, situational awareness, workload management		Not required	Not required	In depth	
Decision making		Overview	Overview	Overview	
Communication and coordination inside and outside the cockpit					
Leadership and team behavior					
Automation, philosophy of the use of automation (if relevant to the type)	As required	In depth	In depth	As required	As required
Specific type related differences		In depth	Not required	As required	As required
Case based studies	In depth	In depth	In depth	In depth	As appropriate

7 Co-ordination between flight crew and crew members other than flight crew training

7.1 Operators should, as far as is practicable, provide combined training for flight crew and crew members other than flight crew including briefing and debriefing.

7.2 There should be an effective liaison between flight crew and other crew members training departments. Provision should be made for flight and other crew instructors to observe and comment on each others training.

ACJ No. 2 to JCAR ops3.943**Crew Resource Management (CRM)**

See JCAR ops3.943/JCAR ops3.945(a)(9)/JCAR ops3.955(b)/JCAR ops3.965(e)/JCAR ops3.965(a)(3)(iv)

See ACJ No. 1 to JCAR ops3.943

1 CRM training should reflect the culture of the operator and be conducted by means of both classroom training and practical exercises including group discussions and accident and serious incident reviews to analyse communication problems and instances or examples of a lack of information or crew management.

2 Whenever it is practicable to do so, consideration should be given to conducting relevant parts of CRM training in synthetic training devices which reproduce, in an acceptable way, a realistic operational environment and permit interaction. This includes, but is not limited to, simulators with appropriate LOFT scenarios.

3 It is recommended that, whenever possible, initial CRM training be conducted in a group session outside the company premises so that the opportunity is provided for flight crew members to interact and communicate away from the pressures of their usual working environment.

4 **Assessment of CRM Skills**

4.1 Assessment is the process of observing, recording, interpreting and evaluating, where appropriate, pilot performance and knowledge against a required standard in the context of overall performance. It includes the concept of self-critique, and feedback which can be given continuously during training or in summary following a check.

4.2 CRM skills assessment should be included in an overall assessment of the flight crew members performance and be in accordance with approved standards. Suitable methods of assessment should be established, together with the selection criteria and training requirements of the assessors and their relevant qualifications, knowledge and skills.

4.3 Individual assessments are not appropriate until the crew member has completed the initial CRM course and completed the first OPC. For first CRM skills assessment, the following methodology is considered satisfactory:

a. An operator should establish the CRM training programme including an agreed terminology. This should be evaluated with regard to methods, length of training, depth of subjects and effectiveness.

- b. A training and standardisation programme for training personnel should then be established.
 - c. For a transition period, the evaluation system should be crew rather than individually based.
5. Levels of Training (For any CRM training, the following two levels are recognised):.
- a. Overview. When Overview training is required it will normally be instructional in style. Such training should refresh knowledge gained in earlier training.
 - b. In Depth. When In Depth Training is required it will normally be interactive in style and should include, as appropriate, case studies, group discussions, role play and consolidation of knowledge and skills. Core elements should be tailored to the specific needs of the training phase being undertaken.

ACJ JCAR ops3.945(a)(9)**Crew Resource Management - Use of Automation****See JCAR ops3.945(a)(9)**

1 The conversion course should include training in the use and knowledge of automation and in the recognition of systems and human limitations associated with the use of automation. An operator should therefore ensure that a flight crew member receives training on:

- a. The application of the operations policy concerning the use of automation as stated in the Operations Manual; and
- b. System and human limitations associated with the use of automation.

2 The objective of this training should be to provide appropriate knowledge, skills and behavioural patterns for managing and operating automated systems. Special attention should be given to how automation increases the need for crews to have a common understanding of the way in which the system performs, and any features of automation which make this understanding difficult.

AMC JCAR ops3.945**Conversion Course Syllabus****See JCAR ops3.945**

1 General

1.1 The conversion course should be conducted in the following order:

- a. Ground training covering all helicopter systems and emergency procedures (with or without flight simulator or other training device).

b. Emergency and safety equipment training and checking (completed before flying training on the helicopter commences).

c. Flying training (flight simulator and/or helicopter).

d. Line flying under supervision.

2 Ground training

2.1 Ground training should comprise a properly organised programme of ground instruction by training staff with adequate facilities, including any necessary audio, mechanical and visual aids. However, if the helicopter concerned is relatively simple, private study may be adequate if the operator provides suitable manuals and/or study notes.

2.2 The course of ground instruction should incorporate formal tests on such matters, where applicable, as helicopter systems, performance and flight planning, etc.

3 Flying training

3.1 Flying training should be structured and sufficiently comprehensive to familiarise the flight crew member thoroughly with all aspects of limitations and normal operation of the helicopter, including the use of

all cockpit equipment, and with all abnormal/emergency procedures and should be carried out by suitably qualified Type Rating Instructors and/or Type Rating Examiners.

3.2 In planning flying training on helicopters with a flight crew of 2 or more, particular emphasis should be placed on the practice of Line Orientated Flying Training (LOFT) with emphasis on Crew Resource Management (CRM) and the use of correct crew coordinated procedures, including coping with incapacitations.

3.3 Generally the same training and practice in the flying of the helicopter should be given to co-pilots as well as commanders. The 'flight handling' sections of the syllabus for commanders and co-pilots alike should include all the requirements of the appropriate proficiency check required by JCAR ops3.965.

3.4 Training should include all elements of an instrument rating test where it is likely that the flight crew member will be required to operate under IFR.

3.5 Unless the training programme has been carried out in an appropriate flight simulator, and in a manner approved for zero flight time conversions, the training required should include an element of proficiency training on a helicopter, including at least 3 take-offs and landings.

3.6 Unless already covered by paragraph 3.3 above before they are assigned to line duty all flight crew should have successfully completed a proficiency check with a Type Rating Examiner.

4 Emergency and safety equipment training and checking. Emergency and safety equipment training should take place whenever practicable in conjunction with crew members doing similar training with emphasis on co-ordinated procedures and two-way communications.

- 4.1 For new flight crew members, or as applicable on conversion, the following should be addressed:
- a. Instruction should be given on aeromedical topics which should include at least:
 - i. First aid subjects in general, and as appropriate to the helicopter type and crew complement;
 - ii. Guidance on the avoidance of food poisoning;
 - iii. The possible dangers associated with the contamination of the skin or eyes by aviation fuel and other fluids and the immediate treatment;
 - iv. The recognition and treatment of hypoxia and hyperventilation; and,
 - v. Survival training and guidance on hygiene appropriate to the routes operated.
 - b. Training should also include:
 - i. The importance of effective coordination between flight crew and crew members;
 - ii. The use of smoke protection equipment and protective clothing where carried. In the case of the first type of helicopter so equipped, training should be associated with experience of movement in a cosmetic smoke filled environment; and
 - iii. Actual firefighting using equipment representative of that carried in the helicopter;
 - iv. The operational procedures of security, rescue and emergency services.
 - c. Operators should provide survival training appropriate to their areas of operation, (e.g. polar, desert, jungle or sea), including the use of any survival equipment carried.
 - d. A comprehensive drill to cover all ditching procedures should be practised where flotation equipment is carried. This should include practice of the actual donning and inflation of a life-jacket, together with a demonstration or film of the inflation of life-rafts and/or slide-rafts and associated equipment. This practice should, in initial training, be conducted using the equipment in water, although previous certificated training with another operator or the use of similar equipment will be accepted in lieu of further wet drill training.
 - e. Instruction on the location of emergency and safety equipment, correct use of all appropriate drills, and procedures that could be required of flight crew in different emergency situations. Evacuation of the helicopter (or a realistic training device) by use of a slide where fitted should be included when the Operations Manual procedure requires the early evacuation of flight crew to assist on the ground.
 - f. On completion of emergency and safety equipment training the flight crew member should undergo the check specified in JCAR ops3.965(c).

5 Line flying under supervision

5.1 Following completion of flying training and checking as part of the conversion course, all flight crew members should operate a minimum number of sectors and/or flying hours under the supervision of a nominated flight crew member. The minimum figures should be specified in the Operations Manual and should be selected after due note has been taken of the complexity of the helicopter and the experience of the flight crew member.

5.2 On completion of the sectors and/or flying hours under supervision, a line check should be completed.

6 Passenger handling. Other than general training on dealing with people, emphasis should be placed on the following:

- a. Advice on the recognition and management of passengers who appear or become intoxicated with alcohol, under the influence of drugs or aggressive;
- b. Methods used to motivate passengers and the crowd control necessary to expedite a helicopter evacuation;
- c. Awareness of the types of dangerous goods which may, and may not, be carried in a passenger cabin, including the completion of a dangerous goods training programme; and
- d. The importance of correct seat allocation with reference to helicopter mass and balance. Particular emphasis should also be given on the seating of disabled passengers and the necessity of seating able-bodied passengers adjacent to unsupervised exits.

7 Discipline and responsibilities. Amongst other subjects, emphasis should be placed on discipline and an individual's responsibilities in relation to:

- a. His ongoing competence and fitness to operate as a flight crew member with special regard to flight time limitation requirements; and
- b. Security procedures.

8. Passenger briefing/safety demonstrations. Training should be given in the preparation of passengers for normal and emergency situations.

IEM JCAR ops3.945**Line Flying under Supervision****See JCAR ops3.945**

1 Line flying under supervision provides the opportunity for a flight crew member to carry into practice the procedures and techniques he has been made familiar with during ground and flying training on a conversion course. This is accomplished under the supervision of a flight crew member specifically nominated and trained for the task. At the end of line flying under supervision the respective student crew member is able to perform a safe and efficient flight conducted within the tasks of his crew member station.

- 2 A variety of reasonable combinations may exist with respect to:
 - a. A flight crew member's previous experience;
 - b. The complexity of the helicopter concerned; and
 - c. The type of route/role/area operations,

IEM JCAR ops3.945(a)(8)**Completion of an Operator's Conversion Course****See JCAR ops3.945(a)(8)**

- 1 A conversion course is deemed to have started when the flying or STD has begun. The theoretical element of a conversion course may be undertaken ahead of the practical element.
- 2 Under certain circumstances a conversion course may have started and reached a stage where, for unforeseen reasons, it is not possible to complete it without a delay. In these circumstances the operator may apply to the Authority to allow the pilot to revert to the original type.
- 3 Before the resumption of the conversion course the operator should establish with the Authority how much of the conversion course needs to be re-covered before continuing with the remainder of the course.

AMC JCAR ops3.965**Recurrent Training and Checking****See JCAR ops3.965**

- 1 General. The line check is performed in the helicopter. All other training and checking should be performed in the helicopter of the same type or a STD, qualified and approved for the purpose or, in the case of emergency and safety equipment training, in a suitable alternative training device. The type of equipment used for training and checking should be representative of the instrumentation, equipment and layout of the helicopter type operated by the flight crew member.
- 2 Line Checks
 - 2.1 The operator has a statutory obligation to check that his pilots are competent to perform their duties. The line check is considered a particularly important factor in the development, maintenance and refinement of high operating standards, and can provide the operator with a valuable indication of the usefulness of his training policy and methods. The requirement is for a test of ability to perform satisfactorily a complete line operation from start to finish, including pre-flight and post-flight procedures and use of the equipment provided and for an involvement of an overall assessment of the ability to perform the duties required as specified in the Operations Manual. The route chosen should be such as to give adequate representation of the scope of a pilot's normal operations. The line check is not

intended to determine competence on any particular route.

2.2 The commander in particular should also demonstrate his ability to 'manage' the operation and take appropriate command decisions.

a. Since pilots may carry out either the handling or the non-handling duties, all pilots should be checked in both roles.

3 Proficiency Training and Checking. When a flight simulator is used, the opportunity should be taken, where possible, to use Line Oriented Flying Training (LOFT).

ACJ JCAR ops3.965(d)

Emergency and Safety Equipment Training

See JCAR ops3.965(d)

1 The successful resolution of helicopter emergencies requires interaction between crew members and emphasis should be placed on the importance of effective co-ordination and two-way communication between all crew members in various emergency situations.

2 Emergency and Safety Equipment training should include joint practice in helicopter evacuations so that all who are involved are aware of the duties other crew members should perform. When such practice is not possible, combined flight crew and other crew member training should include joint discussion of emergency scenarios.

3 Emergency and safety equipment training should, as far as is practicable, take place in conjunction with other crew members undergoing similar training with emphasis on co-ordinated procedures and two-way communication between the flight deck and the cabin.

IEM to Appendix 1 to JCAR ops3.965

Recurrent training and checking

See Appendix 1 to JCAR ops3.965

1 Use and approval of Synthetic Training Devices (STD) training. Training and checking provides an opportunity for the practice of abnormal/emergency procedures which rarely arise in normal operations and is a part of a structured programme of recurrent training. This should be carried out in a Synthetic Training Device whenever possible.

2 Where there is a Flight Manual limitation on the use of certain emergency power ratings, procedures to permit realistic engine-failure training and demonstration of competence, without actual use of the emergency power ratings, must be developed in conjunction with the aircraft manufacturer and included in the aircraft flight manual. These procedures must also be approved by the Authority.

3 Where the emergency drills require action by the non-handling pilot, the check should additionally cover knowledge of these drills.

4 Because of the unacceptable risk when simulating emergencies such as rotor failure, icing problems, certain types of engine(s) (e.g. during continued take-off or go-around, total hydraulic failure etc.), or because of environmental considerations associated with some emergencies (e.g. fuel dumping) these emergencies should preferably be covered in a Synthetic Training Device. If no Synthetic Training Device is available these emergencies may be covered in the helicopter using a safe airborne simulation, bearing in mind the effect of any subsequent failure, and discussion on the ground.

5 The operator proficiency check may include the annual instrument rating test. In this case a combined check report may be used details of which shall be contained in the Operations Manual.

**AMC to Appendix 1 to JCAR ops3.965 sub-paragraph (a)(3)(iii)(D)
Water survival training**

See Appendix 1 to JCAR ops3.965 sub-paragraph (a)(3)(iii)(D)

1 Where life-rafts are fitted for extended overwater operations (such as Sea Pilot transfer; offshore operation; regular, or scheduled, coast to coast overwater operations; or other operations designated as such by the Authority), a comprehensive wet drill to cover all ditching procedures should be practised by aircraft crews. This wet drill is to include, as appropriate, practice of the actual donning and inflation of a lifejacket, together with a demonstration or film of the inflation of life-rafts. Crews should board the same (or similar) life-rafts from the water whilst wearing a life-jacket. Training should include the use of all survival equipment carried on board life-rafts and any additional survival equipment carried separately on board the aircraft.

2 Consideration should be given to the provision of further specialist training such as underwater escape training.

Note: Wet practice drill is always to be given in initial training unless the crew member concerned has received similar training provided by another operator and such an arrangement is acceptable to the Authority.

AMC JCAR ops3.975

Route/Role/Area Competence Qualification

See JCAR ops3.975

1 Route/role/area competence training should include knowledge of:

- a. Terrain and minimum safe altitudes;
- b. Seasonal meteorological conditions;
- c. Meteorological, communication and air traffic facilities, services and procedures;
- d. Search and rescue procedures;
- e. Navigational facilities associated with the route along which the flight is to take place; and

f. Obstructions, physical layout, lighting, approach aids and arrival, departure, holding and instrument approach procedures and applicable operating minima.

2 Depending on the complexity of the route and/or aerodrome, the following methods of familiarisation should be used:

a. For the less complex route/role/area and/or heliport, familiarisation by self-briefing with route documentation, or by means of programmed instruction, and

b. For the more complex routes and/or heliports, in addition to sub-paragraph 2a above, in-flight familiarisation as a commander, co-pilot or observer under supervision, or familiarisation in an approved flight simulator using a data base appropriate to the route concerned.

3 Route competence may be revalidated by operating on the route within the previous period of validity instead of the procedure given in paragraph 2 above.

AMC JCAR ops3.980**Operation on more than one type or variant****See JCAR ops3.980**

1 Operators of more than one helicopter variant or type should provide in the Operations Manual:

a. Flight crew members minimum experience level;

b. The process whereby flight crew qualified on one type or variant will be trained and qualified on another type or variant; and

c. Any additional recency requirements that may be required.

2 If a flight crew member operates more than one type or variant the following provisions should be satisfied:

a. The recency requirements specified in JCAR ops3.970 should be met and confirmed prior to commercial air transport operations on any type, and the minimum number of flights on each type within a three month period specified in the Operations Manual;

b. JCAR ops3.965 requirements with regard to recurrent training;

c. JCAR ops3.965 requirements with regard to proficiency checks may be satisfied by a 6 monthly check on any one type or variant operated. However, a proficiency check on each type or variant operated should be completed every 12 months;

d. For helicopters with a maximum certificated take-off mass (MCTOM) exceeding 5 700 kg, or with a maximum approved passenger seating configuration (MAPSC) of more than 19:

- i. The flight crew member should not fly more than two helicopter types;
- ii. A minimum of 3 months and 150 hours experience on the type or variant should be achieved before the flight crew member should commence the conversion course onto the new type or variant;
- iii. 28 days and/or 50 hours flying should then be achieved exclusively on the new type or variant; and
- iv. A flight crew member should not be rostered to fly more than one type or significantly different variant of a type during a single duty period.

- e. In the case of all other helicopters, a flight crew member should not operate more than three helicopter types or significantly different variant.

- f. For a combination of helicopter and aeroplane:
 - i. A flight crew member may fly one helicopter type or variant and one aeroplane type irrespective of their maximum certificated take-off mass (MCTOM) or the maximum approved passenger seating configuration (MAPSC) that may be carried.
 - ii. If the helicopter type is covered by paragraph 2.d. then paragraphs 2.d.ii., 2.d.iii. and 2.d.iv should also apply in this case.

IEM JCAR ops3.985

Training records

See JCAR ops3.985

A summary of training should be maintained by the operator to show a trainee's completion of each stage of training and checking.

ACJ O- CREW MEMBERS OTHER THAN FLIGHT AND CABIN CREW

ACJ JCAR ops3.995(a)(2)

Minimum requirements See - JCAR ops3.995(a)(2)

- 1 The initial medical examination or assessment and any re-assessment of crew members should be conducted by, or under the supervision of, a medical practitioner acceptable to the Authority.
- 2 An operator should maintain a medical record for each crew member.
- 3 The following medical requirements are applicable for each crew member:
 - a. Good health;
 - b. Free from any physical or mental illness which might lead to incapacitation or inability to perform crew duties;
 - c. Normal cardiorespiratory function;
 - d. Normal central nervous system;
 - e. Adequate visual acuity 6/9 with or without glasses;
 - f. Adequate hearing; and
 - g. Normal function of ear, nose and throat.

ACJ JCAR ops3.1005

Initial training

See JCAR ops3.1005

- 1 An operator should ensure that all elements of initial training are conducted by suitably qualified persons.
- 2 *Fire and Smoke Training.* An operator should ensure that fire and smoke training includes:
 - 2.1 Emphasis on the responsibility of crew to deal promptly with emergencies involving fire and smoke and, in particular, emphasis on the importance of identifying the actual source of the fire;
 - 2.2 The classification of fires and the appropriate type of extinguishing agents and procedures for particular fire situations, the techniques of application of extinguishing agents, the consequences of misapplication, and of use in a confined space; and
 - 2.3 The general procedures of ground-based emergency services at heliports.
- 3 *Water Survival Training.* An operator should ensure that, when extended overwater operations are to be conducted, water survival training includes the actual donning and use of personal flotation equipment in water by each crew member. Before first operating on a helicopter fitted with life-rafts or

other similar equipment, training must be given on the use of this equipment, as well as actual practice in water.

4 *Survival Training.* An operator should ensure that survival training is appropriate to the areas of operation, (e.g. polar, desert, jungle, sea or mountain).

5 *Medical aspects and First Aid.* An operator should ensure that medical and first aid training includes:

5.1 Instruction on first aid and the use of first-aid kits; and

5.2 The physiological effects of flying and with particular emphasis on hypoxia (when applicable).

6 *Passenger handling.* An operator should ensure that training for passenger handling includes the following:

6.1 Regulations covering the safe stowage of cabin baggage and the risk of it becoming a hazard to occupants of the cabin or otherwise obstructing or damaging emergency equipment or helicopter exits;

6.2 Duties to be undertaken in the event of encountering turbulence including securing the cabin;

6.3 Precautions to be taken when live animals are carried in the cabin;

6.4 Dangerous Goods training as prescribed in Subpart R; and

6.5 Security procedures, including the provisions of Subpart S.

7 *Communication.* An operator should ensure that, during training, emphasis is placed on the importance of effective communication between crew members and flight crew including technique, common language and terminology.

8 *Discipline and responsibilities.* An operator should ensure that each crew member receives training on:

8.1 The importance of crew members performing their duties in accordance with the Operations Manual;

8.2 Continuing competence and fitness to operate as a crew member with special regard to flight and duty time limitations and rest requirements;

8.3 An awareness of the aviation regulations relating to crew members and the role of the Authority;

8.4 General knowledge of relevant aviation terminology, theory of flight, passenger distribution, meteorology and areas of operation;

8.5 Pre-flight briefing of the crew members and the provision of necessary safety information with regard to their specific duties;

8.6 The importance of ensuring that relevant documents and manuals are kept up-to-date with amendments provided by the operator;

8.7 The importance of identifying when crew members have the authority and responsibility to initiate an evacuation and other emergency procedures; and

8.8 The importance of safety duties and responsibilities and the need to respond promptly and effectively to emergency situations.

9 An operator should ensure that appropriate JCAR ops3 requirements are included in the training of crew members.

ACJ JCAR ops3.1010**Conversion and Differences training****See JCAR ops3.1010**

1 *General.* An operator should ensure that:

1.1 Conversion and differences training is conducted by suitably qualified persons; and

1.2 During conversion and differences training, training is given on the location, removal and use of all safety and survival (and additional) equipment carried on the helicopter, as well as all normal and emergency procedures related to the helicopter type, variant and configuration to be operated.

2 *Fire and smoke training.* An operator should ensure that either:

2.1 Each crew member is given realistic and practical training in the use of all fire fighting equipment including protective clothing representative of that carried in the helicopter. This training should include:

a. Each crew member extinguishing a fire characteristic of a helicopter interior fire except that, in the case of Halon extinguishers, an alternative extinguishing agent may be used; and

b. The donning and use of protective breathing equipment (when fitted) by each crew member in an enclosed, simulated smoke-filled environment; or

2.2 Each crew member fulfils the recurrent training requirements of ACJ JCAR ops3.1015 subparagraph 3.3.

3 *Operation of doors and exits.* An operator should ensure that:

3.1 Each crew member operates and actually opens all normal and emergency exits for passenger evacuation in a helicopter or representative training device; and

3.2 The operation of all other exits is demonstrated.

4 Evacuation procedures and other emergency situations. An operator should ensure that:

4.1 Emergency evacuation training includes the recognition of planned or unplanned evacuations on land or water. This training must include recognition of when exits are unusable or when evacuation equipment is unserviceable; and

4.2 Each crew member is trained to deal with the following:

- a. An in-flight fire, with particular emphasis on identifying the actual source of the fire; and
- b. Other in-flight emergencies.

5 *Pilot incapacitation.* An operator should ensure that, where the flight crew is more than one, the crew member is trained to assist if a pilot becomes incapacitated. This training should include a demonstration of:

5.1 The pilot's seat mechanism;

5.2 Fastening and unfastening the pilot's seat harness;

5.3 Use of the pilot's oxygen equipment, when applicable; and

5.4 Use of pilots' checklists.

6 *Safety equipment.* An operator should ensure that each crew member is given realistic training on, and demonstration of, the location and use of safety equipment including the following:

6.1 Life-rafts, including the equipment attached to, and/or carried in, the raft, where applicable;

6.2 Lifejackets, infant lifejackets and flotation cots, where applicable;

6.3 Fire extinguishers;

6.4 Fire axe or crow-bar;

6.5 Emergency lights including torches;

6.6 Communications equipment, including megaphones;

6.7 Survival packs, including their contents;

6.8 Pyrotechnics (actual or representative devices);

6.9 First-aid kits, their contents and emergency medical equipment; and

6.10 Other safety equipment or systems where applicable.

7 *Passenger Briefing/Safety Demonstrations.* An operator should ensure that training is given in the preparation of passengers for normal and emergency situations in accordance with JCAR ops3.285.

8 An operator should ensure that all appropriate JCAR ops3 requirements are included in the training of crew members.

ACJ JCAR ops3.1015

Recurrent training

See JCAR ops3.1015

1 An operator should ensure that recurrent training is conducted by suitably qualified persons.

2 An operator should ensure that every year the programme of practical training includes the following:

2.1 Emergency procedures including pilot incapacitation, when applicable;

2.2 Evacuation procedures;

2.3 Touch-drills by each crew member for opening normal and emergency exits for passenger evacuation;

2.4 The location and handling of emergency equipment, and the donning by each crew member of lifejackets, and protective breathing equipment (PBE), when applicable;

2.5 First aid and the contents of the first-aid kit(s);

2.6 Stowage of articles in the cabin;

2.7 Dangerous goods procedures as prescribed in Subpart R;

2.8 Security procedures;

2.9 Incident and accident review; and

2.10 Crew Resource Management.

3 An operator should ensure that, every 3 years, recurrent training also includes:

3.1 The operation and actual opening of all normal and emergency exits for passenger evacuation in a

helicopter or representative training device;

3.2 Demonstration of the operation of all other exits;

3.3 Each crew member being given realistic and practical training in the use of all fire-fighting equipment, including protective clothing, representative of that carried in the helicopter. This training should include:

a. Each crew member extinguishing a fire characteristic of a helicopter interior fire except that, in the case of Halon extinguishers, an alternative extinguishing agent may be used; and

b. The donning and use of protective breathing equipment (when fitted) by each crew member in an enclosed, simulated smoke-filled environment.

3.4 Use of pyrotechnics (Actual or representative devices); and

3.5 Demonstration of the use of the life-raft, where fitted.

4 An operator should ensure that all appropriate JCAR ops3 requirements are included in the training of crew members.

ACJ JCAR ops3.1020

Refresher training

See JCAR ops3.1020

1 An operator should ensure that refresher training is conducted by suitably qualified persons and, for each crew member, includes at least the following:

1.1 Emergency procedures including pilot incapacitation, when applicable;

1.2 Evacuation procedures;

1.3 The operation and actual opening of all normal and emergency exits for passenger evacuation in a helicopter or representative training device;

1.4 Demonstration of the operation of all other exits; and

1.5 The location and handling of emergency equipment, and the donning of lifejackets, and protective breathing equipment, when applicable.

ACJ JCAR ops3.1025

Checking

See JCAR ops3.1025

1 Elements of training which require individual practical participation should be combined with

practical checks.

2 The checks required by -JCAR ops3.1025 should be accomplished by the method appropriate to the type of training including:

- a. Practical demonstration; and/or
- b. Computer based assessment; and/or c. In-flight checks; and/or
- d. Oral or written tests.

AMC/IEM P – MANUALS, LOGS & RECORDS

IEM JCAR ops3.1040(b)

Elements of the Operations Manual subject to approval

See JCAR ops3.1040(b)

1 A number of the provisions of JCAR ops3 require the prior approval of the Authority. As a consequence, the related sections of the Operations Manual should be subject to special attention. In practice, there are two possible options:

- a. The Authority approves a specific item (e.g. with a written response to an application) which is then included in the Operations Manual. In such cases, the Authority merely checks that the Operations Manual accurately reflects the content of the approval. In other words, such text has to be acceptable to the Authority; or
- b. An operator’s application for an approval includes the related, proposed, Operations Manual text in which case, the Authority’s written approval encompasses approval of the text.

2 In either case, it is not intended that a single item should be subject to two separate approvals.

3 The following list indicates only those elements of the Operations Manual which require specific approval by the Authority. (A full list of every approval required by JCAR ops3 in its entirety may be found in Appendix 6 of the Operations Joint Implementation Procedures (AUTHORITY Administration & Guidance Material Section 4, Part 2.)

Ops Manual Section

(App. 1 to Subject JCAR ops3 Reference JCAR ops3.1045)

A 2.4	Operational Control	JCAR ops3.195
A 5.2(f)	Procedures for flight crew to operate on more than one type or variant	JCAR ops3.980
A 5.3(c)	Procedures for cabin crew to operate on four helicopter types	JCAR ops3.1030(a)
A 8.1.1	Method of determination of minimum flight attitudes	JCAR ops3.250(b)
A 8.1.8 (i)	Standard mass values other than those specified in Subpart J	JCAR ops3.620(i)
	Mass and balance: (ii) Alternative documentation and related procedures	JCAR ops3.625(c)
	(iii) Omission of data from documentation	App. 1 to JCAR ops3.625,§(a)(1)(ii)
	(iv) Special standard masses for the traffic load	App. 1 to JCAR ops3.605, § (b)
A 8.1.11	Tech Log	JCAR ops3.915(b)
A 8.3.2(c)	RNAV (RNP)	JCAR ops3.243
A 8.4	All Weather Operations	JCAR ops3.440(a)(3), (b) & App.1

		to JCAR ops3.455, Note 2
A 8.6	Use of MEL	JCAR ops3.030(a)
A 9	Dangerous Goods	JCAR ops3.1155
B 1.1(b)	Max. approved passenger seating configuration	JCAR ops3.480(a)(15)
B 6(b)	Use of on-board mass and balance systems	App. 1 to JCAR ops3.625, § (c)
B 9	MEL	JCAR ops3.030(a)
D 2.1	Cat II Training syllabus flight crew	JCAR ops3.450(a)(2)
	Recurrent training programme flight crew	JCAR ops3.965(a)(2)
D 2.2	Recurrent training programme cabin crew	JCAR ops3.1015(b)
D 2.3a	Dangerous Goods	JCAR ops3.1220(a)

IEM JCAR ops3.1040(c)**Operations Manual - Language****See JCAR ops3.1040(c)**

1 JCAR ops3.1040(c) requires the Operations Manual to be prepared in the English language. However, it is recognised that there may be circumstances where approval for the use of another language, for part or all of the Operations Manual, is justifiable. The criteria on which such an approval may be based should include at least the following:

- a. The language(s) commonly used by the operator;
- b. The language of related documentation used, such as the HFM;
- c. Size of the operation;
- d. Scope of the operation i.e. domestic or international route structure;
- e. Type of operation e.g. VFR/IFR; and
- f. The period of time requested for the use of another language.

AMC JCAR ops3.1045**Operations Manual Contents****See JCAR ops3.1045**

1 Appendix 1 to JCAR ops3 .1045 prescribes in detail the operational policies, instructions, procedures and other information to be contained in the Operations Manual in order that operations personnel can satisfactorily perform their duties. When compiling an Operations Manual, an operator may take advantage of the contents of other relevant documents. Material produced by the operator for Part B of the Operations Manual may be supplemented with or substituted by applicable parts of the Helicopter Flight Manual required by JCAR ops3.1050 or, where such a document exists, by a Helicopter Operating Manual produced by the manufacturer of the helicopter. For Part C of the Operations Manual, material produced by the operator may be supplemented with or substituted by applicable Route Guide material produced by a specialised professional company .

2 If an operator chooses to use material from another source in his Operations Manual he should either copy the applicable material and include it directly in the relevant part of the Operations Manual, or the Operations Manual should contain a statement to the effect that a specific manual(s) (or parts thereof) may be used instead of the specified part(s) of the Operations Manual.

3 If an operator chooses to make use of material from an alternative source (e.g. Jeppesen) as explained above, this does not absolve the operator from the responsibility of verifying the applicability and suitability of this material. (See JCAR ops3.1040(k).)

IEM JCAR ops3.1045(c)**Operations Manual Structure****See JCAR ops3.1045(c) & Appendix 1 to JCAR ops3.1045**

1 JCAR ops3.1045(a) prescribes the main structure of the Operations Manual as follows:

Part A - General/Basic;

Part B - Helicopter Operating Matters - Type Related;

Part C - Route and Aerodrome Instructions and Information;

Part D - Training.

2 JCAR ops3.1045 (c) requires the operator to ensure that the detailed structure of the Operations Manual is acceptable to the Authority.

3 Appendix 1 to JCAR ops3.1045 contains a comprehensively detailed and structured list of all items to be covered in the Operations Manual. Since it is believed that a high degree of standardisation of Operations Manuals within the AUTHORITY will lead to improved overall flight safety, it is strongly recommended that the structure described in this IEM should be used by operators as far as possible. A List of Contents based upon Appendix 1 to JCAR ops3.1045 is given below.

4 Manuals which do not comply with the recommended structure may require a longer time to be accepted/approved by the Authority.

5 To facilitate comparability and usability of Operations Manuals by new personnel, formerly employed by another operator, operators are recommended not to deviate from the numbering system used in Appendix 1 to JCAR ops3.1045. If there are sections which, because of the nature of the operation, do not apply, it is recommended that operators maintain the numbering system described below and insert 'Not applicable' or 'Intentionally blank' where appropriate.

Operations Manual Structure

(List of Contents)

Part A GENERAL/BASIC

0 ADMINISTRATION AND CONTROL OF OPERATIONS MANUAL

0.1. Introduction

0.2 System of amendment and revision

1 ORGANISATION AND RESPONSIBILITIES

1.1 Organisational structure

1.2 Names of nominated postholders

1.3 Responsibilities and duties of operations management personnel

1.4 Authority, duties and responsibilities of the commander

1.5. Duties and responsibilities of crew members other than the commander

2 OPERATIONAL CONTROL AND SUPERVISION

2.1 Supervision of the operation by the operator

2.2 System of promulgation of additional operational instructions and information

2.3 Accident prevention and flight safety programme

2.4 Operational control

2.5 Powers of the Authority

3 QUALITY SYSTEM

4 CREW COMPOSITION

4.1 Crew Composition

4.2 Intentionally blank

4.3 Flight crew incapacitation

4.4 Operation on more than one type

5 QUALIFICATION REQUIREMENTS

5.1 Description of licence, qualification/competency, training, checking etc.

5.2 Flight crew

5.3 Cabin crew

5.4 Training, checking and supervisory personnel

5.5 Other operations personnel

6 CREW HEALTH PRECAUTIONS

6.1 Crew health precautions

7 FLIGHT TIME LIMITATIONS

7.1 Flight and Duty Time limitations and Rest requirements

7.2 Exceedances of flight and duty time limitations and/or reduction of rest periods

8 OPERATING PROCEDURES

8.1 Flight Preparation Instructions

8.1.1 Minimum Flight Altitudes

8.1.2 Criteria for determining the usability of aerodromes

8.1.3 Methods for the determination of Heliport Operating Minima

8.1.4 En-route Operating Minima for VFR flights or VFR portions of a flight

8.1.5 Presentation and Application of Heliport and En-route Operating Minima

8.1.6 Interpretation of meteorological information

8.1.7 Determination of the quantities of fuel, oil and water methanol carried

8.1.8 Mass and Centre of Gravity

8.1.9 ATS Flight Plan

8.1.10 Operational Flight Plan

8.1.11 Operator's Helicopter Technical Log

8.1.12 List of documents, forms and additional information to be carried

8.2 Ground Handling Instructions

8.2.1 Fuelling procedures

8.2.2 Helicopter, passengers and cargo handling procedures related to safety

8.2.3 Procedures for the refusal of embarkation

8.2.4 De-icing and Anti-icing on the Ground

- 8.3 Flight Procedures
 - 8.3.1 VFR/IFR policy
 - 8.3.2 Navigation Procedures
 - 8.3.3 Altimeter setting procedures
 - 8.3.4 Audio voice alerting device
 - 8.3.5 *Intentionally blank*
 - 8.3.6 *Intentionally blank*
 - 8.3.7 Policy and procedures for in-flight fuel management
 - 8.3.8 Adverse and potentially hazardous atmospheric conditions
 - 8.3.9 Wake Turbulence and Rotor Downwash
 - 8.3.10 Crew members at their stations
 - 8.3.11 Use of safety belts for crew and passengers
 - 8.3.12 Admission to Cockpit
 - 8.3.13 Use of vacant crew seats
 - 8.3.14 Incapacitation of crew members
 - 8.3.15 Cabin Safety Requirements
 - 8.3.16 Passenger briefing procedures
 - 8.3.17 *Intentionally blank*
- 8.4 All Weather Operations
- 8.5 *Intentionally blank*
- 8.6 Use of the Minimum Equipment and Configuration Deviation List(s)
- 8.7 Non revenue flights
- 8.8 Oxygen Requirements
- 9 DANGEROUS GOODS AND WEAPONS
- 10 SECURITY
- 11 HANDLING OF ACCIDENTS AND OCCURRENCES
- 12 RULES OF THE AIR

Part B HELICOPTER OPERATING MATTERS TYPE RELATED

- 0 GENERAL INFORMATION AND UNITS OF MEASUREMENT
- 1 LIMITATIONS
- 2 EMERGENCY PROCEDURES
- 3 NORMAL PROCEDURES
- 4 PERFORMANCE
 - 4.1 Performance data
 - 4.2 Additional performance data
- 5 MASS AND BALANCE
- 6 LOADING
- 7 FLIGHT PLANNING
- 8 CONFIGURATION DEVIATION LIST
- 9 MINIMUM EQUIPMENT LIST
- 10 SURVIVAL AND EMERGENCY EQUIPMENT INCLUDING OXYGEN
- 11 EMERGENCY EVACUATION PROCEDURES
 - 11.1 Instructions for preparation for emergency evacuation
 - 11.2 Emergency evacuation procedures
- 12 HELICOPTER SYSTEMS

Part C ROUTE AND AERODROME INSTRUCTIONS AND INFORMATION Part D TRAINING

TRAINING SYLLABI AND CHECKING PROGRAMMES – GENERAL

- 2 TRAINING SYLLABI AND CHECKING PROGRAMMES
 - 2.1 Flight Crew
 - 2.2 Cabin Crew
 - 2.3 Operations Personnel including Crew Members
 - 2.4 Operations Personnel other than Crew Members

- 3.2 Procedures to be applied in the event that personnel do not achieve or maintain required standards

- 3.3 Procedures to ensure that abnormal or emergency situations are not simulated during commercial air transportation flights

- 4 DOCUMENTATION AND STORAGE

IEM to Appendix 1 to JCAR ops3.1045

Operations Manual Contents

With reference to Operations Manual Section B, paragraph 9 (Minimum Equipment List) and 12 (Helicopter Systems) operators should give consideration to using the ATA number system when allocating chapters and numbers for helicopter systems.

IEM JCAR ops3.1055(a)(12) Signature or equivalent

See JCAR ops3.1055(a)(12)

1 JCAR ops3.1055 requires a signature or its equivalent. This IEM gives an example of how this can be arranged where normal signature by hand is impracticable and it is desirable to arrange the equivalent verification by electronic means.

2 The following conditions should be applied in order to make an electronic signature the equivalent of a conventional hand-written signature:

- i. Electronic 'signing' should be achieved by entering a Personal Identification Number (PIN) code with appropriate security etc.;
- ii. Entering the PIN code should generate a print-out of the individual's name and professional capacity on the relevant document(s) in such a way that it is evident, to anyone having a need for that information, who has signed the document;
- iii. The computer system should log information to indicate when and where each PIN code has been entered;
- iv. The use of the PIN code is, from a legal and responsibility point of view, considered to be fully equivalent to signature by hand;
- v. The requirements for record keeping remain unchanged; and.
- vi. All personnel concerned should be made aware of the conditions associated with electronic signature and should confirm this in writing.

IEM JCAR ops3.1055(b)

Journey log

See JCAR ops3.1055(b)

The 'other documentation' referred to in this paragraph might include such items as the operational flight plan, the helicopter technical log, cockpit flight report, crew lists etc.

AMC/IEM Q – FLIGHT AND DUTY TIME LIMITATIONS AND REST REQUIREMENTS

RESERVED

IEM JCAR ops3.1150(a)(3) & (a)(4)

Terminology - Dangerous Goods Accident and Dangerous Goods Incident

See JCAR ops3.1150(a)(3) & (a)(4)

As a dangerous goods accident (see JCAR ops3.1150(a)(3)) and dangerous goods incident (see - JCAR ops3.1150(a)(4)) may also constitute an aircraft accident or incident the criteria for reporting both types of occurrence should be satisfied.

IEM JCAR ops3.1155

Approval to transport dangerous goods

See JCAR ops3.1155

1 Permanent approval for the transport of dangerous goods will be reflected on the Air Operator Certificate. In other circumstances an approval may be issued separately.

2 Before the issue of an approval for the transport of dangerous goods, the operator should satisfy the Authority that adequate training has been given, that all relevant documents (e.g. for ground handling, helicopter handling, training) contain information and instructions on dangerous goods, and that there are procedures in place to ensure the safe handling of dangerous goods at all stages of air transport.

3 The exemption or approval indicated in JCAR ops3.1165(b)(1) or (2) is in addition to that indicated by JCAR ops3.1155.

IEM JCAR ops3.1160(a) Scope

See JCAR ops3.1160(a)

1 Although the Technical Instructions use the term 'aircraft' throughout the document, the wording may suggest that the provisions are relevant only to fixed wing scheduled operations. The Technical Instructions contain all the information which is relevant to the transport of dangerous goods by air, irrespective of what type of aircraft is used and in what circumstances.

2 Unless the wording in the Technical Instructions makes it otherwise apparent, all the provisions of the Technical Instructions apply on every occasion when dangerous goods are carried by helicopter. Dangerous goods may be carried other than in accordance with the Technical Instructions only when:

- a They have been exempted under JCAR ops3.1165(b)(1); or
- b. An approval has been issued under JCAR ops3.1175 or JCAR ops3.1210; or
- c. The Authority has specified different markings under JCAR ops3.1180(b).

IEM JCAR ops3.1160(b)(1)

Dangerous goods on a helicopter in accordance with the relevant regulations or for operating reasons

See JCAR ops3.1160(b)(1)

1 Dangerous goods required to be on board a helicopter in accordance with the relevant regulations or for operating reasons are those which are for:

- a. The airworthiness of the helicopter;
- b. The safe operation of the helicopter; or
- c. The health of passengers or crew.

2 Such dangerous goods include but are not limited to:

- a. Batteries;
- b. Fire extinguishers;
- c. First-aid kits;
- d. Insecticides/Air fresheners;
- e. Life saving appliances; and
- f. Portable oxygen supplies.

IEM JCAR ops3.1160(b)(3)

Veterinary aid or a humane killer for an animal

See JCAR ops3.1160(b)(3)

The dangerous goods referred to in JCAR ops3.1160(b)(3) may also be carried on a flight made by the same helicopter or preceding the flight on which the animal is carried and/or on a flight made by the same helicopter after that animal has been carried when it is impracticable to load or unload the goods at the time of the flight on which the animal is carried.

**IEM JCAR ops3.1160(b)(4) Medical Aid
for a Patient See JCAR ops3.1160(b)(4)**

1 Gas cylinders, drugs, medicines, other medical material (such as sterilising wipes) and wet cell or lithium batteries are the dangerous goods which are normally provided for use in flight as medical aid for a patient. However, what is carried may depend on the needs of the patient. These dangerous goods are not those which are a part of the normal equipment of the helicopter.

2 The dangerous goods referred to in paragraph 1 above may also be carried on a flight made by the same helicopter to collect a patient or after that patient has been delivered when it is impracticable to load or unload the goods at the time of the flight on which the patient is carried.

IEM JCAR ops3.1160(b)(5)

Scope - Dangerous goods carried by passengers or crew

See JCAR ops3.1160(b)(5)

1 The Technical Instructions exclude some dangerous goods from the requirements normally applicable to them when they are carried by passengers or crew members, subject to certain conditions.

2 For the convenience of operators who may not be familiar with the Technical Instructions, these requirements are repeated below.

3 The dangerous goods which each passenger or crew member can carry are:

a. Alcoholic beverages containing more than 24% but not exceeding 70% alcohol by volume, when in retail packagings not exceeding 5 litres and with a total not exceeding 5 litres per person.

b. Non-radioactive medicinal or toilet articles (including aerosols, hair sprays, perfumes, medicines containing alcohol); and, in checked baggage only, aerosols which are non-flammable, non-toxic and without subsidiary risk, when for sporting or home use. The net quantity of each single article should not exceed 0.5 litre or 0.5 kg and the total net quantity of all articles should not exceed 2 litres or 2 kg;

c. Safety matches or a lighter for the person's own use and when carried on him. 'Strike anywhere' matches, lighters containing unabsorbed liquid fuel (other than liquefied gas), lighter fuel and lighter refills are not permitted;

d. A hydrocarbon gas-powered hair curler, providing the safety cover is securely fitted over the heating element. Gas refills are not permitted;

e. Small carbon dioxide gas cylinders worn for the operation of mechanical limbs and spare cylinders of similar size if required to ensure an adequate supply for the duration of the journey;

- f. Radioisotopic cardiac pacemakers or other devices (including those powered by lithium batteries) implanted in a person, or radio-pharmaceuticals contained within the body of a person as a result of medical treatment;
- g. A small medical or clinical thermometer containing mercury, for the person's own use, when in its protective case;
- h. Dry ice, when used to preserve perishable items, providing the quantity of dry ice does not exceed 2 kg and the package permits the release of the gas. Carriage may be in carry-on (cabin) or checked baggage, but when in checked baggage the operator's agreement is required;
- i. When carriage is allowed by the operator, small gaseous oxygen or air cylinders for medical use;
- j. When carriage is allowed by the operator, not more than two small carbon dioxide cylinder fitted into a self-inflating life-jacket and not more than two spare cylinder;
- k. When carriage is allowed by the operator, wheelchairs or other battery-powered mobility aids with non-spillable batteries, providing the equipment is carried as checked baggage. The battery should be securely attached to the equipment, be disconnected and the terminals insulated to prevent accidental short circuits;
- l. When carriage is allowed by the operator, wheelchairs or other battery-powered mobility aids with spillable batteries, providing the equipment is carried as checked baggage. When the equipment can be loaded, stowed, secured and unloaded always in an upright position, the battery should be securely attached to the equipment, be disconnected and the terminals insulated to prevent accidental short circuits. When the equipment cannot be kept upright, the battery should be removed and carried in a strong, rigid packaging, which should be leak-tight and impervious to battery fluid. The battery in the packaging should be protected against accidental short circuits, be held upright and be surrounded by absorbent material in sufficient quantity to absorb the total liquid contents. The package containing the battery should have on it 'Battery wet, with wheelchair' or 'Battery wet, with mobility aid', bear a 'Corrosives' label and be marked to indicate its correct orientation. The package should be protected from upset by securement in the cargo compartment of the helicopter. The commander should be informed of the location of a wheelchair or mobility aid with an installed battery or of a packed battery;
- m. When carriage is allowed by the operator, cartridges for sporting weapons, providing they are in Division 1.4S (See Note), they are for that person's own use, they are securely boxed and in quantities not exceeding 5 kg gross mass and they are in checked baggage. Cartridges with explosive or incendiary projectiles are not permitted;

Note: Division 1.4S is a classification assigned to an explosive. It refers to cartridges which are packed or designed so that any dangerous effects from the accidental functioning of one or more cartridges in a package are confined within the package unless it has been degraded by fire, when the dangerous effects are limited to the extent that they do not hinder fire fighting or other emergency response efforts in the immediate vicinity of the package. Cartridges for sporting use are likely to be within Division 1.4S.

n. When carriage is allowed by the operator, a mercurial barometer or mercurial thermometer in carry-on (cabin) baggage when in the possession of a representative of a government weather bureau or similar official agency. The barometer or thermometer should be packed in a strong packaging having inside a sealed inner liner or bag of strong leak-proof and puncture resistant material impervious to mercury closed in such a way as to prevent the escape of mercury from the package irrespective of its position. The commander should be informed when such a barometer or thermometer is to be carried;

o. When carriage is allowed by the operator, heat producing articles (i.e. battery operated equipment, such as under-water torches and soldering equipment, which if accidentally activated will generate extreme heat which can cause a fire), providing the articles are in carry-on (cabin) baggage. The heat producing component or energy source should be removed to prevent accidental functioning;

IEM JCAR ops3.1165(b)(1)

States concerned with exemptions

See JCAR ops3.1165(b)(1)

1 The Technical Instructions provide that in certain circumstances dangerous goods, which are normally forbidden on a helicopter, may be carried. These circumstances include cases of extreme urgency or when other forms of transport are inappropriate or when full compliance with the prescribed requirements is contrary to the public interest. In these circumstances all the States concerned may grant exemptions from the provisions of the Technical Instructions provided that every effort is made to achieve an overall level of safety which is equivalent to that provided by the Technical Instructions.

2 The States concerned are those of origin, transit, overflight and destination of the consignment and that of the operator.

3 Where the Technical Instructions indicate that dangerous goods which are normally forbidden may be carried with an approval, the exemption procedure does not apply.

4 The exemption required by JCAR ops3.1165(b)(1) is in addition to the approval required by - JCAR ops3.1155.

AMC JCAR ops3.1175

Packing

See JCAR ops3.1175

1 The Technical Instructions detail the packagings which may be used to pack dangerous goods and the quantities allowed in the packagings. In general the packagings are those which are described as 'specification packagings' in that the Technical Instructions set down both specifications and testing for them; they bear UN specification packaging markings on them.

2 However, there may be some circumstances when it is impractical or impossible to use UN specification packagings, such as when dangerous goods are being carried from an off-shore oil or gas rig. In these

circumstances, whenever possible, the provisions for limited quantities of dangerous goods as detailed in the Technical Instructions should be used.

3 If it is not possible to use either UN specification packagings or the limited quantity provisions of the Technical Instructions, the Competent Authority may issue an exemption from the requirements of the Technical Instructions to allow the use of other packagings, providing an equivalent level of safety is achieved.

4 An equivalent level of safety can be achieved if the packagings used comply with Part 3; 1.1 of the Technical Instructions, (except where this makes reference to the need for the packagings to comply with requirements in Part 7 of those Instructions) and they are capable of withstanding a 1·8 m drop test onto a rigid, non-resilient, flat and horizontal surface. This level of safety may also be achieved if the dangerous goods conform to the requirements of the International Maritime Dangerous Goods Code, the Regulations for the International Carriage of Dangerous Goods by Rail (RID Regulations), the European Agreement on the International Carriage of Dangerous Goods by Road (ADR Regulations) or the European provisions for the International Carriage of Dangerous Goods by Inland Waterway (ADN Regulations).

5 The quantities should not exceed those specified in the relevant packing instruction for the type of packaging used (e.g. fibreboard box, metal drum).

AMC JCAR ops3.1180(b)

Marking

See JCAR ops3.1180(b)

If it is impractical or unreasonable to require that all the markings specified by the Technical Instructions appear on packages of dangerous goods, the Competent Authority may issue an exemption from the requirements of those Instructions to allow markings to be omitted when their appearance would not contribute to the level of safety. In such circumstances it should be ensured that the flight crew members are given sufficient information before a flight so they can identify the dangerous goods.

AMC JCAR ops3.1210(a)

Loading Restrictions

See JCAR ops3.1210(a)

1 On the occasions when it is not possible or reasonable to apply the full loading restrictions of the Technical Instructions to helicopters, the Competent Authority may grant an exemption from the normal requirements to allow dangerous goods to be carried on the same helicopter as passengers.

2 An exemption should only be issued when there is an essential reason for doing so. The dangerous goods may be carried in the cabin, in accessible cargo areas behind the cabin or under the cabin floor or in panniers affixed to the outside of the helicopter. The requirements in Part 5; Chapter 2 of the Technical Instructions, ~~concerning the segregation of incompatible dangerous goods, shall be met at all times~~ Where radioactive

materials are to be carried, the separation distances set down in Part 5; Chapter 2 shall be met, except that the distance shall be measured from the nearest point occupied by a passenger to the surface of the package, overpack or freight container containing the radioactive material.

AMC JCAR ops3.1215(b)

Provision of information

See JCAR ops3.1215(b)

1 *Information to Passengers*

1.1 Information to passengers should be promulgated in such a manner that passengers are warned as to the types of dangerous goods that must not be carried on board a helicopter.

1.2 As a minimum, this information should consist of:

a. Warning notices or placards sufficient in number and prominently displayed, at each of the places at an airport where tickets are issued and passengers checked in, in helicopter boarding areas and at any other place where passengers are checked in; and

b. A warning with the passenger ticket. This may be printed on the ticket or on a ticket wallet or on a leaflet.

1.3 The information to passengers may include reference to those dangerous goods which may be carried.

2 *Information to Other Persons*

2.1 Information to persons offering cargo for transport by air should be promulgated in such a manner that those persons are warned as to the need to properly identify and declare dangerous goods.

2.2 As a minimum this information should consist of warning notices or placards sufficient in number and prominently displayed at any location where cargo is accepted.

3 *General*

3.1 Information should be easily understood and identify that there are various classes of dangerous goods.

3.2 Pictographs may be used as an alternative to providing written information or to supplement such information.

AMC JCAR ops3.1215(e)

Information in the Event of a helicopter Incident or Accident

See JCAR ops3.1215(e)

The information to be provided should include the proper shipping name, UN/ID number , class, subsidiary risk(s) for which labels are required, the compatibility group for Class 1 and the quantity and location on board the helicopter.

AMC JCAR ops3.1220

Training

See JCAR ops3.1220

1 Application for Approval of Training Programmes. Applications for approval of training programmes should indicate how the training will be carried out. Training intended to give general information and guidance may be by any means including handouts, leaflets, circulars, slide presentations, videos, etc, and may take place on-the-job or off-the-job. Training intended to give 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. Applications for formal training courses should include the course objectives, the training programme syllabus/curricula and examples of the written examination to be undertaken.

2 Instructors. Instructors should have knowledge not only of training techniques but also of the transport of dangerous goods by air, in order that the subject be covered fully and questions adequately answered.

3 Areas of training. The areas of training given in Tables 1 and 2 of JCAR ops3.1220 are applicable whether the training is for general information and guidance or to give an in-depth and detailed appreciation. The extent to which any area of training should be covered is dependent upon whether it is for general information or to give in-depth appreciation. Additional areas not identified in Tables 1 and 2 may be needed, or some areas omitted, depending on the responsibilities of the individual.

4 Levels of Training

4.1 There are two levels of training:

a. Where it is intended to give an in-depth and a detailed appreciation of the whole subject or of the area(s) being covered, such that the person being trained gains in knowledge so as to be able to apply the detailed requirements of the Technical Instructions. This training should include establishing, by means of a written examination covering all the areas of the training programme, that a required minimum level of knowledge has been acquired; or

b. Where it is intended to give general information and guidance about the area(s) being covered, such that the person being trained receives an overall awareness of the subject. This training should include establishing by means of a written or oral examination covering all areas of the training programme, that a required minimum level

of knowledge has been acquired.

4.2 In the absence of other guidance, the staff referred to in JCAR ops3.1220(c)(1) should receive training to the extent identified in sub-paragraph 4.1.a, above; all other staff referred to in JCAR ops3.1220(b) and (c) should receive training to the extent identified in sub-paragraph 4.1.b above. However, where flight crew or other crew members, such as loadmasters, are responsible for checking the dangerous goods to be loaded, their training should also be to the extent identified in paragraph

4.1.a, above.

5 Training in Emergency Procedures. The training in emergency procedures should include as a minimum:

a. For those personnel covered by JCAR ops3.1220(b) and (c), except for crew members whose emergency procedures training is covered in sub-paragraphs 5b or 5c (as applicable) below:

- i. Dealing with damaged or leaking packages; and
- ii. Other actions in the event of ground emergencies arising from dangerous goods.

b. For flight crew members:

- i. Actions in the event of emergencies in flight occurring in the passenger cabin or in the cargo compartments; and
- ii. The notification to Air Traffic Services should an in-flight emergency occur. (See JCAR ops3.420(e).)

c. For crew members other than flight crew members:

- i. Dealing with incidents arising from dangerous goods carried by passengers; or
- ii. Dealing with damaged or leaking packages in flight.

6 Recurrent training. Recurrent training should cover the areas in Table 1 or Table 2 relevant to initial Dangerous Goods training unless the responsibility of the individual has changed.

7. Test to verify understanding. It is necessary to have some means of establishing that a person has gained in understanding as a result of training; this is achieved by requiring the person to undertake a test. The complexity of the test, the manner of conducting it and the questions asked should be commensurate with the duties of the person being trained; and the test should demonstrate that the training has been adequate. If the test is completed satisfactorily a certificate should be issued confirming this.

IEM JCAR ops3.1220

Training

See JCAR ops3.1220

1 Areas of Training. The areas of training identified in Tables 1 and 2 of JCAR ops3.1220 are applicable whether the training is:

- a. For general information and guidance; or
- b. To give an in-depth and detailed appreciation of the subject.

1.1 The extent to which the training should be covered and whether areas not identified in Table 1 or Table 2 need to be added or the identified areas varied, is dependent on the responsibilities of the person being trained. In particular, if a crew member is a loadmaster the appropriate areas of training required may be those in column 4 of Table 2 and not those in column 5. Also, if an operator carries only cargo, those areas relating to passengers and their baggage may be omitted from the training.

2 How to Achieve Training

2.1 Training providing general information and guidance is intended to give a general appreciation of the requirements for the transport by air of dangerous goods. It may be achieved by means of handouts, leaflets, circulars, slide presentations, videos, etc, or a mixture of several of these means. The training does not need to be given by a formal training course and may take place ‘on-the-job’ or ‘off-the-job’.

2.2 Training providing in-depth guidance and a detailed appreciation of the whole subject or particular areas of it is intended to give a level of knowledge necessary for the application of the requirements for the transport by air of dangerous goods. It should be given by a formal training course which takes place at a time when the person is not undertaking normal duties. The course may be by means of tuition or as a self-study programme or a mixture of both of these. It should cover all the areas of dangerous goods relevant to the person receiving the training, although areas not likely to be relevant may be omitted (for instance, training in the transport of radioactive materials may be excluded where they will not be carried by the operator).

AMC JCAR ops3.1225

Dangerous Goods Incident and Accident Reports

See JCAR ops3.1225

1 Any type of dangerous goods incident or accident should be reported, irrespective of whether the dangerous goods are contained in cargo, mail, passengers' baggage or crew baggage. The finding of undeclared or misdeclared dangerous goods in cargo, mail or baggage should also be reported.

2 Initial reports may be made by any means, but in all cases a written report should be made as soon as possible.

3 The report should be as precise as possible and contain all data known at the time the report is made, for example:

- a. Date of the incident or accident, or the finding of undeclared or misdeclared dangerous goods;
- b. Location, the flight number and flight date, if applicable;
- c. Description of the goods and the reference number of the air waybill, pouch, baggage tag, ticket, etc.;
- d. Proper shipping name (including the technical name, if appropriate) and UN/ID number, where known;
- e. Class or division and any subsidiary risk;
- f. Type of packaging, if applicable, and the packaging specification marking on it;
- g. Quantity involved;
- h. Name and address of the shipper, passenger, etc.;
- i. Any other relevant details;
- j. Suspected cause of the incident or accident;
- k. Action taken;
- l. Any other reporting action taken; and
- m. Name, title, address and contact number of the person making the report.

4 Copies of the relevant documents and any photographs taken should be attached to the report.