

CAR-OPS 1
COMMERCIAL AIR TRANSPORTATION (AEROPLANES)

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FOREWORD

a. The Civil Aviation Requirements for Air Operator Certificate Holders (CAR-OPS) have been issued by the Civil Aviation Affairs of Oman (hereinafter called the AUTHORITY) under the provisions of the Civil Aviation Law of the Sultanate of Oman.

b. ICAO Annex 6 has been selected to provide the basic structure of CAR-OPS 1, the CAR for Commercial Air Transportation (Aeroplane), but with additional sub-division where considered appropriate. The content of Annex 6 has been used and added to where necessary by making use of existing European regulations (EU-OPS)

c. Definitions and abbreviations of terms used in CAR-OPS 1 that are considered generally applicable are contained in CAR-1, Definitions and Abbreviations. However, definitions and abbreviations of terms used in CAR-OPS 1 that are specific to a Subpart of CAR-OPS 1 are normally given in the Subpart concerned or, exceptionally, in the associated compliance or interpretative material.

d. CAR-OPS 1 is based on the EU-OPS 1 and the same paragraph numbering has been used for easy reference purposes.

Headings of paragraph's with significant changes from the original EU-OPS paragraph are shown in ***Bold Italic***.

e. Section 2 of the CAR-OPS 1 contains Acceptable Means of Compliance, Advisory Circulars and Interpretative/Explanatory Material that has been agreed for inclusion in CAR-OPS 1.

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

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

The acronyms AC and IEM also indicate the nature of the material and for this purpose the three 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.
- Advisory Circulars (AC) are non-requirements that are provided as interpretations, explanations and/or acceptable means of compliance.
- Interpretative/Explanatory Material (IEM) helps to illustrate the meaning of a requirement.

f. Amendments to the text in CAR-OPS 1 are issued as amendment pages containing revised paragraphs.

New, amended and corrected text will be enclosed within brackets until a subsequent 'Change' is issued

g. The editing practices used in this document are as follows:

- (a) 'Shall' is used to indicate a mandatory requirement and may appear in CARs.
- (b) 'Should' is used to indicate a recommendation and normally appears in AMCs and IEMs.
- (c) 'May' is used to indicate discretion by the AUTHORITY, the industry or the applicant, as appropriate.
- (d) 'Will' indicates a mandatory requirement and is used to advise pilots of action incumbent on the AUTHORITY

NOTE: The use of the male gender implies the female gender and vice versa

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AC/AMC/IEM R — TRANSPORT OF DANGEROUS GOODS BY AIR

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SECTION 1 – REQUIREMENTS**SUBPART A - APPLICABILITY****CAR-OPS 1.001 Applicability**

(a) CAR-OPS 1 prescribes requirements applicable to the operation of any civil aeroplane for the purpose of commercial air transportation by any operator whose principal place of business is in the Sultanate of Oman.

CAR-OPS 1 does not apply:

- (1) to aeroplanes when used in military, customs and police services; nor
- (2) to parachute dropping and fire fighting flights, and to associated positioning and return flights in which the persons carried are those who would normally be carried on parachute dropping or fire fighting; nor
- (3) to flights immediately before, during, or immediately after an aerial work activity provided these flights are connected with that aerial work activity and in which, excluding crew members, no more than 6 persons indispensable to the aerial work activity are carried.

CAR-OPS 1.003 Definitions

For the purpose of this CAR:

1. “accepted/acceptable” means not objected to by the Authority as suitable for the purpose intended.
2. “approved (by the Authority)” means documented (by the Authority) as suitable for the purpose intended.
3. “Master minimum equipment list (MMEL)” means a master list (including a preamble) appropriate to an aircraft type which determines those instruments, items of equipment or functions that, while maintaining the level of safety intended in the applicable airworthiness certification specifications, may temporarily be inoperative either due to the inherent redundancy of the design, and/or due to specified operational and maintenance procedures, conditions and limitations, and in accordance with the applicable procedures for Continued Airworthiness.
4. “Minimum equipment list (MEL)” means a list (including a preamble) which provides for the operation of aircraft, under specified conditions, with particular instruments, items of equipment or functions inoperative at the commencement of flight. This list is prepared by the operator for his own particular aircraft taking account of their aircraft definition and the relevant operational and maintenance conditions in accordance with a procedure.

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CAR-OPS 1.004 Operating rules

The holder of a commercial aeroplane operating certificate shall comply with the requirements of CAR-OPS 0, unless otherwise specified in this CAR.

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SUBPART B – GENERAL**CAR–OPS 1.005 General**

(See Appendix 1 to CAR-OPS 1.005(a))

(a) An operator shall not operate an aeroplane for the purpose of commercial air transportation other than in accordance with CAR–OPS Part 1. For operations of Performance Class B aeroplanes; alleviated requirements, can be found in Appendix 1 to CAR-OPS 1.005(a).

[(b) An operator shall comply with the applicable retroactive airworthiness requirements for aeroplanes operated for the purpose of commercial air transportation.]

(c) Each aeroplane shall be operated in compliance with the terms of its Certificate of Airworthiness and within the approved limitations contained in its Aeroplane Flight Manual.

(d) Air Taxi and Aeroplane Emergency Medical Service (EMS) operations shall be conducted in accordance with the requirements contained in CAR–OPS 1

(e) All Synthetic Training Devices (STD), such as Flight Simulators or Flight Training Devices (FTD), replacing an aeroplane for training and/or checking purposes are to be qualified in accordance with CAR-STD requirements and user approved by the AUTHORITY for the exercises to be conducted.

Rev.2

CAR–OPS 1.010 Exemptions

The AUTHORITY may exceptionally and temporarily grant an exemption from the provisions of CAR–OPS 1 when satisfied that there is a need and subject to compliance with any supplementary condition the AUTHORITY considers necessary in order to ensure an acceptable level of safety in the particular case.

CAR–OPS 1.015 Operational Directives

(a) The AUTHORITY may direct by means of an Operational Directive that an operation shall be prohibited, limited or subject to certain conditions, in the interests of safe operations.

(b) Operational Directives state:

- (1) The reason for issue;
- (2) Applicability and duration; and
- (3) Action required by the operator(s).

(c) Operational Directives are supplementary to the provisions of CAR–OPS 1.

CAR–OPS 1.020 Laws, Regulations and Procedures – Operator’s Responsibilities

(a) An operator must ensure that:

- (1) All employees are made aware that they shall comply with the laws, regulations and procedures of those States in which operations are conducted and which are pertinent to the performance of their duties; and
- (2) All crew members are familiar with the laws, regulations and procedures pertinent to the performance of their duties.

CAR-OPS 1.025 Common Language

- (a) An operator must ensure that all crew members can communicate in a common language.
- (b) An operator must ensure that all operations personnel are able to understand the language in which those parts of the Operations Manual which pertain to their duties and responsibilities are written.

CAR-OPS 1.030 Minimum Equipment Lists – Operator’s Responsibilities

- (a) An operator shall establish, for each aeroplane, a Minimum Equipment List (MEL) approved by the AUTHORITY. This shall be based upon, but no less restrictive than, the relevant Master Minimum Equipment List (MMEL) (if this exists) accepted by the AUTHORITY.
- (b) An operator shall not operate an aeroplane other than in accordance with the MEL unless permitted by the AUTHORITY. Any such permission will in no circumstances permit operation outside the constraints of the MMEL.

CAR-OPS 1.035 Quality system

(See AMC OPS 1.035 and IEM OPS 1.035)

- (a) An operator shall establish one Quality System and designate one Quality Manager to monitor compliance with, and the adequacy of, procedures required to ensure safe operational practices and airworthy aeroplanes. Compliance monitoring must include a feed-back system to the Accountable Manager (See also CAR-OPS 1.175(h)) to ensure corrective action as necessary.
- (b) The Quality System must include a Quality Assurance Programme that contains procedures designed to verify that all operations are being conducted in accordance with all applicable requirements, standards and procedures.
- (c) The Quality System and the Quality Manager must be acceptable to the AUTHORITY.
- (d) The quality system must be described in relevant documentation.
- (e) Notwithstanding sub-paragraph (a) above, the AUTHORITY may accept the nomination of two Quality Managers, one for operations and one for maintenance, provided that the operator has designated one Quality Management Unit to ensure that the Quality System is applied uniformly throughout the entire operation.

CAR-OPS 1.037 Safety Management System]

(See AC OPS 1.037(a)(2).and AC
OPS 1.037(a)(4))

- (a) An operator shall establish and maintain a [Safety Management System] in accordance with ICAO SMS Document 9859, which may be integrated with the Quality System, including:
 - (1) Programmes to achieve and maintain risk awareness by all persons involved in operations; and
 - (2) An occurrence reporting scheme to enable the collation and assessment of relevant incident and accident reports in order to identify adverse trends or to address deficiencies in the interests of flight safety. The scheme shall protect the identity of the reporter and include the possibility that reports may be submitted anonymously and
 - (3) Evaluation of relevant information relating to incidents and accidents and the promulgation of related information, but not the attribution of blame; and

- (4) From 1 January 2010, a flight data monitoring programme for those aeroplanes in excess of 27 000kg MCTOM. Flight Data Monitoring (FDM) is the pro-active use of digital flight data from routine operations to improve aviation safety. The flight data monitoring programme shall be non-punitive and contain adequate safeguards to protect the source(s) of the data. (See AC OPS 1.037 (a)(4)); and
- (5) The appointment of a person accountable for managing the programme.
- (b) Proposals for corrective action resulting from the [Safety Management System] shall be the responsibility of the person accountable for managing the programme.
- (c) The effectiveness of changes resulting from proposals for corrective action identified by the accident and flight safety programme shall be monitored by the Quality Manager.

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CAR-OPS 1.040 Crew members

- (a) An operator shall ensure that all operating flight and cabin crew members have been trained in, and are proficient to perform, their assigned duties.
- (b) Where there are crew members, other than cabin crew members, who carry out their duties in the passenger compartment of an aeroplane, an operator shall ensure that these:
- (1). are not confused by the passengers with the cabin crew members;
 - (2). do not occupy required cabin crew assigned stations;
 - (3). do not impede the cabin crew members in their duties.]

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CAR-OPS 1.045 Intentionally blank

CAR-OPS 1.050 Search and rescue information

An operator shall ensure that essential information pertinent to the intended flight concerning search and rescue services is easily accessible on the flight deck.

CAR-OPS 1.055 Information on emergency and survival equipment carried

An operator shall ensure that there are available for immediate communication to rescue coordination centres, lists containing information on the emergency and survival equipment carried on board all of his aeroplanes. The information shall include, as applicable, the number, colour and type of life-rafts and pyrotechnics, details of emergency medical supplies, water supplies and the type and frequencies of emergency portable radio equipment.

CAR-OPS 1.060 Ditching

An operator shall not operate an aeroplane with an approved passenger seating configuration of more than 30 passengers on overwater flights at a distance from land suitable for making an emergency landing, greater than 120 minutes at cruising speed, or 400 nautical miles, whichever

is the lesser, unless the aeroplane complies with the ditching requirements prescribed in the applicable airworthiness code.

CAR–OPS 1.065 Carriage of weapons of war and munitions of war

(See IEM OPS 1.065)

(a) An operator shall not transport weapons of war and munitions of war by air unless an approval to do so has been granted by all States concerned.

(b) An operator shall ensure that weapons of war and munitions of war are:

(1) Stowed in the aeroplane in a place which is inaccessible to passengers during flight; and

(2) In the case of firearms, unloaded, unless, before the commencement of the flight, approval has been granted by all States concerned that such weapons of war and munitions of war may be carried in circumstances that differ in part or in total from those indicated in this sub-paragraph.

(c) An operator shall ensure that the commander is notified before a flight begins of the details and location on board the aeroplane of any weapons of war and munitions of war intended to be carried.

Note; See also CAR-OPS 0.015

CAR–OPS 1.070 Carriage of sporting weapons and ammunition

(See IEM OPS 1.070)

(a) An operator shall take all reasonable measures to ensure that any sporting weapons intended to be carried by air are reported to him.

(b) An operator accepting the carriage of sporting weapons shall ensure that they are:

(1) Stowed in the aeroplane in a place which is inaccessible to passengers during flight unless the AUTHORITY has determined that compliance is impracticable and has accepted that other procedures might apply; and

(2) In the case of firearms or other weapons that can contain ammunition, unloaded.

(c) Ammunition for sporting weapons may be carried in passengers' checked baggage, subject to certain limitations, in accordance with the Technical Instructions (see CAR–OPS 1.1160(b)(5)) as defined in CAR– OPS 1.1150(a)(14).

Note; See also CAR-OPS 0.015

CAR–OPS 1.075 Method of carriage of persons

(a) An operator shall take all reasonable measures to ensure that no person is in any part of an aeroplane in flight which is not a part designed for the accommodation of persons unless temporary access has been granted by the commander to any part of the aeroplane:

(1) For the purpose of taking action necessary for the safety of the aeroplane or of any person, animal or goods therein; or

(2) In which cargo or stores are carried, being a part which is designed to enable a person to have access thereto while the aeroplane is in flight.

CAR-OPS 1.080 *Offering dangerous goods for transport by air*

See CAR-OPS 0.02

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CAR-OPS 1.085 **Crew responsibilities**

See AC OPS 1.085(e)(3)

- (a) A crew member shall be responsible for the proper execution of his duties that:
- (1) Are related to the safety of the aeroplane and its occupants; and
 - (2) Are specified in the instructions and procedures laid down in the Operations Manual.
- (b) A crew member shall:
- (1) Report to the commander any fault, failure, malfunction or defect which he believes may affect the airworthiness or safe operation of the aeroplane including emergency systems.
 - (2) Report to the commander any incident that endangered, or could have endangered, the safety of operation; and
 - (3) Make use of the operator's occurrence reporting schemes in accordance with CAR-OPS 1.037(a)(2). In all such cases, a copy of the report(s) shall be communicated to the commander concerned.
- (c) Nothing in paragraph (b) above shall oblige a crew member to report an occurrence which has already been reported by another crew member.
- (d) A crew member shall not perform duties on an aeroplane:
- (1) While under the influence of any drug that may affect his faculties in a manner contrary to safety;
 - (2) Until a reasonable time period has elapsed after deep water diving;
 - (3) Following blood donation except when a reasonable time period has elapsed;
 - (4) If he is in any doubt of being able to accomplish his assigned duties; or
 - (5) If he knows or suspects that he is suffering from fatigue, or feels unfit to the extent that the flight may be endangered.
- (e) A crew member shall not:
- (1) Consume alcohol less than [12] hours prior to the specified reporting time for flight duty or the commencement of standby;
 - (2) Commence a flight duty period with a blood alcohol level in excess of 0.2 promille;
 - (3) Consume alcohol during the flight duty period or whilst on standby.
- (f) The commander shall:
- (1) Be responsible for the safety of all crew members, passengers and cargo on board, as soon as he arrives on board, until he leaves the aeroplane at the end of the flight;
 - (2) Be responsible for the operation and safety of the aeroplane from the moment the aeroplane is first ready to move for the purpose of taxiing prior to take-off until the moment it finally comes to rest at the end of the flight and the engine(s) used as primary propulsion units are shut down.
 - (3) Have Authority to give all commands he deems necessary for the purpose of securing the safety of the aeroplane and of persons or property carried therein;

- (4) Have Authority to disembark any person, or any part of the cargo, which, in his opinion, may represent a potential hazard to the safety of the aeroplane or its occupants;
- (5) Not allow a person to be carried in the aeroplane who appears to be under the influence of alcohol or drugs to the extent that the safety of the aeroplane or its occupants is likely to be endangered;
- (6) Have the right to refuse transportation of inadmissible passengers, deportees or persons in custody if their carriage poses any risk to the safety of the aeroplane or its occupants;
- (7) Ensure that all passengers are briefed on the location of emergency exits and the location and use of relevant safety and emergency equipment;
- (8) Ensure that all operational procedures and check lists are complied with in accordance with the Operations Manual;
- (9) Not permit any crew member to perform any activity during take-off, initial climb, final approach and landing except those duties required for the safe operation of the aeroplane;
- (10) Not permit:
 - (i) A flight data recorder to be disabled, switched off or erased during flight nor permit recorded data to be erased after flight in the event of an accident or an incident subject to mandatory reporting;
 - (ii) A cockpit voice recorder to be disabled or switched off during flight unless he believes that the recorded data, which otherwise would be erased automatically, should be preserved for incident or accident investigation nor permit recorded data to be manually erased during or after flight in the event of an accident or an incident subject to mandatory reporting;
- (11) Decide whether or not to accept an aeroplane with unserviceabilities allowed by the CDL or MEL; and
- (12) Ensure that the pre-flight inspection has been carried out.

(g) The commander or the pilot to whom conduct of the flight has been delegated shall, in an emergency situation that requires immediate decision and action, take any action he considers necessary under the circumstances. In such cases he may deviate from rules, operational procedures and methods in the interest of safety.

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CAR-OPS 1.090 Authority of the commander

An operator shall take all reasonable measures to ensure that all persons carried in the aeroplane obey all lawful commands given by the commander for the purpose of securing the safety of the aeroplane and of persons or property carried therein.

CAR-OPS 1.095 Authority to taxi an aeroplane

See CAR-OPS 0.085

Rev.1

CAR-OPS 1.100 Admission to flight deck

(a) An operator must ensure that no person, other than a flight crew member assigned to a flight, is admitted to, or carried in, the flight deck unless that person is:

- (1) An operating crew member;

- (2) A representative of the AUTHORITY responsible for certification, licensing or inspection if this is required for the performance of his official duties; or
 - (3) Permitted by, and carried in accordance with instructions contained in the Operations Manual.
- (b) The commander shall ensure that:
- (1) In the interests of safety, admission to the flight deck does not cause distraction and/or interfere with the flight's operation; and
 - (2) All persons carried on the flight deck are made familiar with the relevant safety procedures.
- (c) The final decision regarding the admission to the flight deck shall be the responsibility of the commander.

CAR-OPS 1.105 Unauthorised carriage

An operator shall take all reasonable measures to ensure that no person secretes himself or secretes cargo on board an aeroplane.

CAR-OPS 1.110 *Portable electronic devices*

See CAR-OPS 0.010

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CAR-OPS 1.115 *Alcohol and drugs*

See CAR-OPS 0.030

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CAR-OPS 1.120 Endangering safety

(a) An operator shall take all reasonable measures to ensure that no person recklessly or negligently acts or omits to act:

- (1) So as to endanger an aeroplane or person therein;
- (2) So as to cause or permit an aeroplane to endanger any person or property.

CAR-OPS 1.125 *Documents to be carried*

(See Appendix 1 to CAR-OPS 1.125)
(See CAR-OPS 0.050)

(a) In addition of the requirements of CAR 0.050 an operator shall ensure that the following documents are carried on each flight:

- (1) The original or a copy of the Third party liability Insurance Certificate(s).
- (2) The original or a [certified true] copy of the Air Operator Certificate;

(b) Each flight crew member shall, on each flight, carry a valid flight crew licence with appropriate rating(s) for the purpose of the flight.

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CAR–OPS 1.130 Manuals to be carried

See AC OPS 1.130

(a) An operator shall ensure that:

- (1) The current parts of the Operations Manual relevant to the duties of the crew are carried on each flight;
- (2) Those parts of the Operations Manual which are required for the conduct of a flight are easily accessible to the crew on board the aeroplane; and
- (3) The current Aeroplane Flight Manual is carried in the aeroplane unless the AUTHORITY has accepted that the Operations Manual prescribed in CAR–OPS 1.1045, Appendix 1, Part B contains relevant information for that aeroplane.

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CAR–OPS 1.135 Additional information and forms to be carried

(a) An operator shall ensure that, in addition to the documents and manuals prescribed in CAR–OPS 1.125 and CAR–OPS 1.130, the following information and forms, relevant to the type and area of operation, are carried on each flight:

- (1) Operational Flight Plan containing at least the information required in CAR–OPS 1.1060;
- (2) Aeroplane Technical Log containing at least the information required in CAR–OPS 1.915(a);
- (3) Details of the filed ATS flight plan;
- (4) Appropriate NOTAM/AIS briefing documentation;
- (5) Appropriate meteorological information;
- (6) Mass and balance documentation as specified in Subpart J;
- (7) Notification of special categories of passenger such as security personnel, if not considered as crew, handicapped persons, inadmissible passengers, deportees and persons in custody;
- (8) Notification of special loads including dangerous goods including written information to the commander as prescribed in CAR–OPS 1.1215(d);
- (9) Current maps and charts and associated documents as prescribed in CAR–OPS 1.290(b)(7);
- (10) Any other documentation which may be required by the States concerned with this flight, such as cargo manifest, passenger manifest etc; and
- (11) Forms to comply with the reporting requirements of the AUTHORITY and the operator.

(b) The AUTHORITY may permit the information detailed in sub-paragraph (a) above, or parts thereof, to be presented in a form other than on printed paper. An acceptable standard of accessibility, usability and reliability must be assured.

CAR–OPS 1.140 Information retained on the ground

(a) An operator shall ensure that:

- (1) At least for the duration of each flight or series of flights;

- (i) Information relevant to the flight and appropriate for the type of operation is preserved on the ground; and
 - (ii) The information is retained until it has been duplicated at the place at which it will be stored in accordance with CAR-OPS 1.1065; or, if this is impracticable,
 - (iii) The same information is carried in a fireproof container in the aeroplane.
- (b) The information referred to in subparagraph (a) above includes:
- (1) A copy of the operational flight plan where appropriate;
 - (2) Copies of the relevant part(s) of the aeroplane technical log;
 - (3) Route specific NOTAM documentation if specifically edited by the operator;
 - (4) Mass and balance documentation if required (CAR-OPS 1.625 refers); and
 - (5) Special loads notification.

CAR-OPS 1.145 Power to inspect

An operator shall ensure that any person authorised by the AUTHORITY is permitted at any time to board and fly in any aeroplane operated in accordance with an AOC issued by that AUTHORITY and to enter and remain on the flight deck provided that the commander may refuse access to the flight deck if, in his opinion, the safety of the aeroplane would thereby be endangered.

CAR-OPS 1.150 Production of documentation and records

- (a) An operator shall:
- (1) Give any person authorised by the AUTHORITY access to any documents and records which are related to flight operations or maintenance; and
 - (2) Produce all such documents and records, when requested to do so by the AUTHORITY, within a reasonable period of time.
- (b) The commander shall, within a reasonable time of being requested to do so by a person authorised by an Authority, produce to that person the documentation required to be carried on board.

CAR-OPS 1.155 Preservation of documentation

An operator shall ensure that:

- (1) Any original documentation, or copies thereof, that he is required to preserve is preserved for the required retention period even if he ceases to be the operator of the aeroplane; and
- (2) Where a crew member, in respect of whom an operator has kept a record in accordance with Subpart Q, becomes a crew member for another operator, that record is made available to the new operator.

CAR-OPS 1.160 Preservation, production and use of flight recorder recordings

(See AC OPS 1.160(a)(1) and (2))

- (a) *Preservation of recordings*

- (1) Following an accident, the operator of an aeroplane on which a flight recorder is carried shall, to the extent possible, preserve the original recorded data pertaining to that accident, as retained by the recorder for a period of 60 days unless otherwise directed by the investigating Authority.
 - (2) Unless prior permission has been granted by the AUTHORITY, following an incident that is subject to mandatory reporting, the operator of an aeroplane on which a flight recorder is carried shall, to the extent possible, preserve the original recorded data pertaining to that incident, as retained by the recorder for a period of 60 days unless otherwise directed by the AUTHORITY.
 - (3) Additionally, when the AUTHORITY so directs, the operator of an aeroplane on which a flight recorder is carried shall preserve the original recorded data for a period of 60 days unless otherwise directed by the investigating AUTHORITY.
 - (4) When a flight data recorder is required to be carried aboard an aeroplane, the operator of that aeroplane shall:
 - (i) Save the recordings for the period of operating time as required by CAR–OPS 1.715, 1.720 and 1.725 except that, for the purpose of testing and maintaining flight data recorders, up to one hour of the oldest recorded material at the time of testing may be erased; and
 - (ii) Keep a document which presents the information necessary to retrieve and convert the stored data into engineering units.
- (b) *Production of recordings.* The operator of an aeroplane on which a flight recorder is carried shall, within a reasonable time after being requested to do so by the AUTHORITY, produce any recording made by a flight recorder which is available or has been preserved.
- (c) *Use of recordings*
- (1) The cockpit voice recorder recordings may not be used for purposes other than for the investigation of an accident or incident subject to mandatory reporting except with the consent of all crew members concerned.
 - (2) The flight data recorder recordings may not be used for purposes other than for the investigation of an accident or incident subject to mandatory reporting except when such records are:
 - (i) Used by the operator for airworthiness or maintenance purposes only; or
 - (ii) De-identified; or
 - (iii) Disclosed under secure procedures. circumstances are beyond the control of the operator.

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CAR–OPS 1.165 Leasing

- (a) *Terminology* Terms used in this paragraph have the following meaning:
 - (1) *Dry lease* – Is when the aeroplane is operated under the AOC of the lessee.
 - (2) *Wet lease* – Is when the aeroplane is operated under the AOC of the lessor.
- (b) *Leasing of aeroplanes*
 - (1) *Dry lease-in*
 - (i) An operator shall not dry lease-in an aeroplane from an entity or operator, unless approved by the AUTHORITY. Any conditions which are part of this approval must be included in the lease agreement.

(ii) An operator shall ensure that, with regard to aeroplanes that are dry leased-in, any differences from the requirements prescribed in Subparts K, L, and/or CAR-26, are notified to and are acceptable to the AUTHORITY.

(2) *Wet lease-in*

(i) An operator shall not wet lease-in an aeroplane from an entity or operator without the approval of the AUTHORITY.

(ii) An operator shall ensure that, with regard to aeroplanes that are wet leased-in:

- (A) The safety standards of the lessor with respect to maintenance and operation are equivalent to CARs;
- (B) The lessor is an operator holding an AOC issued by a State which is a signatory to the Chicago Convention;
- (C) The aeroplane has a standard Certificate of Airworthiness issued in accordance with ICAO Annex 8.
- (D) Any CAR requirement made applicable by the AUTHORITY is complied with.

(3) *Dry lease-out*

(i) An operator may dry lease-out an aeroplane for the purpose of commercial air transportation to any operator of a State which is signatory to the Chicago Convention provided that the following conditions are met:

- (A) The AUTHORITY has exempted the operator from the relevant provisions of CAR-OPS Part 1 and, after the foreign regulatory Authority has accepted responsibility in writing for surveillance of the maintenance and operation of the aeroplane(s), has removed the aeroplane from its AOC; and
- (B) The aeroplane is maintained according to an approved maintenance programme.

(4) *Wet lease-out.* An operator providing an aeroplane and complete crew to another entity and retaining all the functions and responsibilities prescribed in Subpart C, shall remain the operator of the aeroplane.

(c) *Leasing of aeroplanes at short notice.* In circumstances where an operator is faced with an immediate, urgent and unforeseen need for a replacement aeroplane, the approval required by sub-paragraph (b)(2)(i) above may be deemed to have been given, provided that:

- (1) The lessor is an operator holding an AOC issued by a State which is a signatory to the Chicago Convention; and
- (2) The lease-in period does not exceed 5 consecutive days; and
- (3) The AUTHORITY is immediately notified of the use of this provision.

CAR-OPS 1.170 *Intentionally blank*

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Appendix 1 to CAR-OPS 1.005 Operations of performance class B aeroplanes.

(See AC to Appendix 1 to CAR-OPS 1.005(a))

(a) *Terminology*

- (1) A to A operations – Take-off and landing are made at the same place.
- (2) A to B operations – Take-off and landing are made at different places.
- (3) Night – The hours between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise, as may be prescribed by the appropriate AUTHORITY.

(b) Operations, to which this Appendix is applicable, may be conducted in accordance with the following alleviations:

(1) *CAR-OPS 1.035 Quality System:*

See: AMC OPS 1.175 for description of small and very small operators.

In the case of a very small operator, the post of Quality Manager may be held by a nominated postholder if external auditors are used. This applies also where the accountable manager is holding one or several of the nominated posts.

(2) *CAR-OPS 1.037 Accident prevention and flight safety programme:*

(See AC to Appendix 1 to JAR-OPS 1.005(a))

(3) *CAR-OPS 1.075 Methods of carriage of persons:*

Not required for VFR operations of single engine aeroplanes.

(4) *CAR-OPS 1.100 Admission to the flight deck:*

- (i) An operator must establish rules for the carriage of passengers in a pilot seat.
- (ii) The commander must ensure that:
 - (A) Carriage of passengers in a pilot seat does not cause distraction and/or interference with the operation of the flight; and
 - (B) The passenger occupying a pilot seat is made familiar with the relevant restrictions and safety

(5) *CAR-OPS 1.105 Unauthorized Carriage:*

Not required for VFR operations of single engine aeroplanes

(6) *CAR-OPS 1.135 Additional information and forms to be carried:*

- (i) For A to A VFR operations of single engine aeroplanes by day, the following documents need not be carried:
 - (A) Operational Flight Plan;
 - (B) Aeroplane Technical Log;
 - (C) NOTAM/AIS briefing documentation;
 - (D) Meteorological Information;
 - (E) Notification of special categories of passengers and;
 - (F) Notification of special loads including dangerous goods.
- (ii) For A to B VFR operations of single engine aeroplanes by day. Notification of special categories of passengers as described in CAR-OPS 1.135 (a)(7) does not need to be carried.
- (iii) For A to B VFR operations by day, the Operational Flight Plan may be in a simplified form and must meet the needs of the type of operation.

(7) *CAR-OPS 1.215 Use of Air Traffic*

For VFR operations of single engine aeroplanes by day, non-mandatory contact with ATS shall be maintained to the extent appropriate to the nature of the operation. Search and rescue services must be ensured in accordance with CAR-OPS 1.300.

(8) *CAR-OPS 1.225 Aerodrome Operating Minima:*

For VFR operations, the standard VFR operating minima will normally cover this requirement. Where necessary, the operator shall specify additional requirements taking into account such factors as radio coverage, terrain, nature of sites for take-off and landing, flight conditions and ATS capacity

(9) *CAR-OPS 1.235 Noise abatement procedures:*

Not applicable to VFR operations of single engine aeroplanes.

(10) *CAR-OPS 1.240 Routes and Areas of Operation:*

Subparagraph (a)(1) is not applicable to A to A VFR operations of single engine aeroplanes by day

(11) *CAR-OPS 1.250 Establishment of minimum flight altitudes:*

For VFR operations by day, this requirement is applicable as follows. An operator shall ensure that operations are only conducted along such routes or within such areas for which a safe terrain clearance can be maintained and shall take account of such factors as temperature, terrain, unfavourable meteorological conditions (e.g. severe turbulence and descending air currents, corrections for temperature and pressure variations from standard values).

(12) *CAR-OPS 1.255 Fuel Policy:*

(i) For A to A Flights - An operator shall specify the minimum fuel contents at which a flight must end. This minimum, final reserve, fuel must not be less than the amount needed to fly for a period of 45 minutes.

(ii) For A to B Flights – An operator shall ensure that the pre-flight calculation of usable fuel required for a flight includes;

(A) Taxi fuel - Fuel consumed before take-off, if significant; and

(B) Trip fuel (Fuel to reach the destination); and

(C) Reserve fuel -

(1) Contingency fuel -Fuel that is not less than 5% of the planned trip fuel or, in the event of in-flight re-planning, 5% of the trip fuel for the remainder of the flight; and

(2)Final reserve fuel - Fuel to fly for an additional period of 45 minutes (piston engines) or 30 minutes (turbine engines); and

(D) Alternate fuel - Fuel to reach the destination alternate via the destination, if a destination alternate is required

(E) Extra fuel – Fuel that the commander may require in addition to that required under subparagraphs (A) – (D) above.

(13) *CAR-OPS 1.265 Carriage of inadmissible passengers, deportees or persons in custody:*

For VFR operations of single engine aeroplanes where it is not intended to carry inadmissible passengers, deportees or persons in custody, an operator is not required to establish procedures for the carriage of such passengers.

(14) *CAR-OPS 1.280 Passenger Seating:*

Not applicable to VFR operations of single engine aeroplanes.

(15) *CAR-OPS 1.285 Passenger Briefing:*

Demonstration and briefing shall be given as appropriate to the kind of operations. In single pilot operations, the pilot may not be allocated tasks distracting him from his flying duties.

(16) *CAR-OPS 1.290 Flight Preparation:*

- (i) Operational Flight Plan for A to A operations - Not Required.
- (ii) A to B operations under VFR by day - An operator shall ensure that a simplified form of an operational flight plan which is relevant to the type of operation is completed for each flight.

(17) *CAR-OPS 1.295 Selection of aerodromes:*

Not applicable to VFR operations. The necessary instructions for the use of aerodromes and sites for take-off and landing are to be issued with reference to CAR-OPS 1.220.

(18) *CAR-OPS 1.310 Crew members at stations:*

For VFR operations, instructions on this matter are required only where two pilot operations are conducted.

(19) *CAR-OPS 1.375 In-flight fuel management:*

Appendix 1 to CAR-OPS 1.375 is not required to be applied to VFR operations of single engine aeroplanes by day.

(20) *CAR-OPS 1.405 Commencement and continuation of approach:*

Not applicable to VFR operations.

(21) *CAR-OPS 1.410 Operating procedures- threshold crossing height:*

Not applicable to VFR operations.

(22) *CAR-OPS 1.430 to 1.460, including appendices:*

Not applicable to VFR operations.

(23) *CAR-OPS 1.530 Take-off:*

- (i) Subparagraph (a) applies with the following addition. The AUTHORITY may, on a case by case basis, accept other performance data produced by the operator and based on demonstration and/or documented experience. Subparagraphs (b) and (c) apply with the following addition.

Where the requirements of this paragraph cannot be complied with due to physical limitations relating to extending the runway and there is a clear public interest and necessity for the operation, the AUTHORITY may accept, on a case by case basis, other performance, not conflicting with the Aeroplane Flight Manual, data relating to special procedures, produced by the operator based on demonstration and/or documented experience.

- (ii) An operator wishing to conduct operations according to subparagraph (i) must have the prior approval of the AUTHORITY. Such an approval will:

- (A) Specify the type of aeroplane;
- (B) Specify the type of operation;
- (C) Specify the aerodrome(s) and runways concerned;
- (D) Restrict the take-off to be conducted under VMC;
- (E) Specify the crew qualification, and
- (F) Be limited to aeroplanes where the first type certificate was first issued before 1 January 2005.

- (iii) The operation must be accepted by the state in which the aerodrome is located.

(24) *CAR-OPS 1.535 Take-off Obstacle*

Clearance – Multi-Engined aeroplanes:

- (i) Subparagraphs (a)(3), (a)(4), (a)(5), (b)(2), (c)(1), (c)(2) and the Appendix are not applicable to VFR operations by day.
- (ii) For IFR or VFR operations by day, sub-paragraphs (b) and (c) apply with the following variations.

- (A) Visual course guidance is considered available when the flight visibility is 1 500 m or more
- (B) The maximum corridor width required is 300 m when flight visibility is 1 500 m or more.

(25) *CAR-OPS 1.545 Landing Destination and Alternate Aerodromes:*

(i) Subparagraph (a) applies with the following addition. The AUTHORITY may, on a case by case basis, accept other performance data produced by the operator and based on demonstration and/or documented experience. Subparagraphs (b) and (c) apply with the following addition.

Where the requirements of this paragraph cannot be complied with due to physical limitations relating to extending the runway and there is a clear public interest and necessity for the operation, the AUTHORITY may accept, on a case by case basis, other performance, not conflicting with the Aeroplane Flight Manual, data relating to special procedures, produced by the operator based on demonstration and/or documented experience.

(ii) An operator wishing to conduct operations according to subparagraph (i) must have the prior approval of the AUTHORITY. Such an approval will:

- (A) Specify the type of aeroplane;
- (B) Specify the type of operation;
- (C) Specify the aerodrome(s) and runways concerned;
- (D) Restrict the final approach and landing to be conducted under VMC;
- (E) Specify the crew qualification, and
- (F) Be limited to aeroplanes where the first type certificate was first issued before 1 January 2005.

(iii) The operation must be accepted by the state in which the aerodrome is located.

(26) *CAR-OPS 1.550 Landing Dry Runways:*

(i) Subparagraph (a) applies with the following addition. The AUTHORITY may, on a case by case basis, accept other performance data produced by the operator and based on demonstration and/or documented experience. Subparagraphs (b) and (c) apply with the following addition.

Where the requirements of this paragraph cannot be complied with due to physical limitations relating to extending the runway and there is a clear public interest and necessity for the operation, the AUTHORITY may accept, on a case by case basis, other performance, not conflicting with the Aeroplane Flight Manual, data relating to special procedures, produced by the operator based on demonstration and/or documented experience.

(ii) An operator wishing to conduct operations according to subparagraph (i) must have the prior approval of the AUTHORITY. Such an approval will:

- (A) Specify the type of aeroplane;
- (B) Specify the type of operation;
- (C) Specify the aerodrome(s) and runways concerned;
- (D) Restrict the final approach and landing to be conducted under VMC;
- (E) Specify the crew qualification, and
- (F) Be limited to aeroplanes where the first type certificate was first issued before 1 January 2005.

(iii) The operation must be accepted by the state in which the aerodrome is located.

(27) *CAR-OPS 1.640 Aeroplane operating lights:*

The AUTHORITY may grant an exemption from some or all of the requirements of subparagraph (a) until 1 January 2005 for the operation of single engine aeroplanes, operated under VFR by day, first issued with an individual certificate of airworthiness before 22 May 1995, without an electrical generating system. This is subject to approval of any other state overflown

(28) *CAR-OPS 1.650 Day VFR operations:*

Paragraph 1.650 is applicable with the following addition. Single engine aeroplanes, first issued with an individual certificate of airworthiness before 22 May 1995, may be exempted from the requirements of subparagraphs (f), (g), (h) and (i) by the Authority if the fulfillment would require retrofitting.

(29) *CAR-OPS 1.940 Composition of Flight Crew:*

Subparagraphs (a)(2), (a)(4), and (b) are not applicable to VFR operations by day, except that (a)(4) must be applied in full where 2 pilots are required by CAR-OPS 1.

(30) *CAR-OPS 1.945 Conversion training and checking:*

- (i) Subparagraph (a)(7) – Line flying under supervision (LIFUS) may be performed on any aeroplane within the applicable class. The amount of LIFUS required is dependant on the complexity of the operations to be performed.
- (ii) Subparagraph (a)(8) is not required.

(31) *CAR-OPS 1.955 Nomination as commander:*

Subparagraph (b) applies as follows. The AUTHORITY may accept an abbreviated command course relevant to the type of operation

(32) *CAR-OPS 1.960 Commanders holding a Commercial Pilot Licence*

Subparagraph (a)(1)(i) is not applicable to VFR operations by day.

(33) *CAR-OPS 1.965 Recurrent training and checking:*

- (i) Subparagraph (a)(1) shall be applied as follows for VFR operations by day. All training and checking shall be relevant to the type of operation and class of aeroplane on which the flight crew member operates with due account taken of any specialised equipment used.
- (ii) Subparagraph (a)(3)(ii) applies as follows. Training in the aeroplane may be conducted by a Class Rating Examiner (CRE), a Flight Examiner (FE) or a Type Rating Examiner (TRE).
- (iii) Subparagraph (a)(4)(i) applies as follows. Operator proficiency check may be conducted by a Type Rating Examiner (TRE), Class Rating Examiner (CRE) or by a suitably qualified commander nominated by the operator and acceptable to the AUTHORITY, trained in CRM concepts and the assessment of CRM skills.
- (iv) Sub-paragraph (b)(2) shall be applicable as follows for VFR operations by day. - In those cases where the operations are conducted during seasons not longer than 8 consecutive months, 1 operator proficiency check is sufficient. This proficiency check must be undertaken before commencing commercial air transport operations.

(34) *CAR-OPS 1.968 Pilot qualification for either pilot's seat:*

Appendix 1 is not applicable to VFR operations of single engine aeroplanes by day.

(35) *CAR-OPS 1.975 Route and Aerodrome Competence:*

- (i) For VFR operations by day, subparagraphs (b), (c) and (d) are not applicable, except that the operator shall ensure that in the cases where a special approval by the state of the aerodrome is required, the associated requirements are observed.
- (ii) For IFR operations or VFR operations by night, as an alternative to subparagraphs (b) - (d), route and aerodrome competence may be revalidated as follows.
 - (A) Except for operations to the most demanding aerodromes, by completion of at least 10 sectors within the area of operation during the preceding 12 months in addition to any required self briefing.
 - (B) Operations to the most demanding aerodromes may be performed only if
 - (1) The commander has been qualified at the aerodrome within the preceding 36 months; by a visit as an operating flight crew member or as an observer.

- (2) The approach is performed in VMC from the applicable minimum sector altitude; and
- (3) An adequate self-briefing has been made prior to the flight

(36) *CAR-OPS 1.980 More than one type or variant:*

- (i) Not applicable if operations are limited to single pilot classes of piston engine aeroplanes under VFR by day.
- (ii) For IFR and VFR Night Operations, the requirement in Appendix 1 to CAR-OPS 1 980, subparagraph (d)(2)(i) for 500 hours in the relevant crew position before exercising the privileges of 2 licence endorsements, is reduced to 100 hours or sectors if one of the endorsements is related to a class. A check flight must be completed before the pilot is released for duties as Commander

(37) *CAR-OPS 1.981 Operation of helicopters and aeroplanes:*

Subparagraph (a)(1) is not applicable if operations are limited to single pilot classes of piston engine aeroplanes .

(38) *CAR-OPS 1.1240 Training programmes:*

The training programmes shall be adapted to the kind of operations performed. A self-study training programme may be acceptable for VFR operations.

(39) *CAR-OPS 1.1045 Operations Manual – structure and contents:*

See AMC OPS 1.1045

(40) *CAR-OPS 1.1060 Operational flight plan:*

Not required for A to A VFR/Day operations.

For A to B VFR/Day operations the requirement is applicable but the flight plan may be in a simplified form relevant to the kind of operations conducted.

(cf. CAR-OPS 1.135).

(41) *CAR-OPS 1.1070 MME – Maintenance Management Exposition:*

The MME may be adapted to the operation to be conducted. (See AC to Appendix 1 to CAR-OPS 1.005(a))

(42) *CAR-OPS 1.1071 Aeroplane technical log:*

Applicable as indicated for CAR-OPS 1.915.

(43) *Subpart R - Transport of dangerous goods by air:*

See AC to Appendix 1 to CAR-OPS 1.005(a)

(44) *CAR-OPS 1.1235 Security requirements:*

See AC to Appendix 1 to JAR-OPS 1.005(a)

(45) *CAR-OPS 1.1240 Training programmes:*

The training programmes shall be adapted to the kind of operations performed. A self-study training programme may be acceptable for VFR operations.

(46) *CAR-OPS 1.1250 Aeroplane search procedure checklist:*

Not applicable for VFR operations by day.

Rev. 1

Appendix 1 to CAR-OPS 1.125 Documents to be carried

See CAR-OPS 1.125

In case of loss or theft of documents specified in CAR-OPS 1.125, the operation is allowed to continue until the flight reaches the base or a place where a replacement document can be provided.

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SUBPART C – OPERATOR CERTIFICATION AND SUPERVISION**CAR–OPS 1.175 General rules for Air Operator Certification**

Note 1: Appendix 1 to this paragraph specifies the contents and conditions of the AOC.

Note 2: Appendix 2 to this paragraph specifies the management and organisation requirements.

(a) An operator shall not operate an aeroplane for the purpose of commercial air transportation otherwise than under, and in accordance with, the terms and conditions of an Air Operator Certificate (AOC).

(b) An applicant for an AOC, or variation of an AOC, shall allow the AUTHORITY to examine all safety aspects of the proposed operation.

(c) An applicant for an AOC must:

- (1) Not hold an AOC issued by another Authority unless specifically approved by the Authorities concerned;
- (2) Have his principal place of business and, if any, his registered office located in the Sultanate of Oman; (See IEM OPS 1.175(c)(2));
- (3) Have registered the aeroplanes which are to be operated under the AOC in the Sultanate of Oman; and
- (4) Satisfy the AUTHORITY that he is able to conduct safe operations.

(d) Notwithstanding sub-paragraph (c)(3) above, an operator may operate, with the mutual agreement of the AUTHORITY and another Authority, aeroplanes registered on the national register of the other Authority.

(e) An operator shall grant the AUTHORITY access to his organisation and aeroplanes and shall ensure that, with respect to maintenance, access is granted to any associated CAR–145 maintenance organisation, to determine continued compliance with CAR–OPS 1.

(f) An AOC will be varied, suspended or revoked if the AUTHORITY is no longer satisfied that the operator can maintain safe operations.

(g) The operator must satisfy the AUTHORITY that;

- (1) Its organisation and management are suitable and properly matched to the scale and scope of the operation; and
- (2) Procedures for the supervision of operations have been defined.

(h) The operator must have nominated an accountable manager 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. (See AC OPS 1.035)

(i) The operator must have nominated post holders, acceptable to the AUTHORITY, who are responsible for the management and supervision of the following areas,

- (1) Flight operations;
- (2) The maintenance system;
- (3) Crew training; and
- (4) Ground operations.

(See AC OPS 1.175(i))

(j) A Person may hold more than one of the nominated posts if acceptable to the AUTHORITY but, for operators who employ 21 or more full time staff, a minimum of two persons are required to cover the four areas of responsibility. (See AC OPS 1.175(j) & (k).)

(k) For operators who employ 20 or less full time staff, one or more of the nominated posts may be filled by the accountable manager if acceptable to the AUTHORITY. (See AC OPS 1.175(j) & (k).)

(l) The operator must ensure that every flight is conducted in accordance with the provisions of the Operations Manual.

(m) The operator must arrange appropriate ground handling facilities to ensure the safe handling of its flights.

(n) The operator must ensure that its aeroplanes are equipped and its crews are qualified, as required for the area and type of operation.

(o) The operator must comply with the maintenance requirements, in accordance with CAR M Subpart G, for all aeroplanes operated under the terms of its AOC.

(p) The operator must provide the AUTHORITY with a copy of the Operations Manual, as specified in Subpart P and all amendments or revisions to it.

(q) The operator must maintain operational support facilities at the main operating base, appropriate for the area and type of operation.

Rev. 1

CAR-OPS 1.180 Issue, variation and continued validity of an AOC

(a) An operator will not be granted an AOC, or a variation to an AOC, and that AOC will not remain valid unless:

- (1) Aeroplanes operated have a standard Certificate of Airworthiness issued in accordance with ICAO Annex 8.
- (2) The maintenance system has been approved by the AUTHORITY in accordance with CAR M; and
- (3) He has satisfied the AUTHORITY that he has the ability to:
 - (i) Establish and maintain an adequate organisation;
 - (ii) Establish and maintain a quality system in accordance with CAR-OPS 1.035;
 - (iii) Comply with required training programmes;
 - (iv) Comply with maintenance requirements, consistent with the nature and extent of the operations specified, including the relevant items prescribed in CAR-OPS 1.175(g) to (o); and
 - (v) Comply with CAR-OPS 1.175.

(b) Notwithstanding the provisions of CAR-OPS 1.185(f), the operator must notify the AUTHORITY as soon as practicable of any changes to the information submitted in accordance with CAR-OPS 1.185(a) below.

(c) If the AUTHORITY is not satisfied that the requirements of subparagraph (a) above have been met, the AUTHORITY may require the conduct of one or more demonstration flights, operated as if they were commercial air transport flights.

Rev. 1

CAR–OPS 1.185 Administrative requirements

(See IEM OPS 1.185(b))

(a) An operator shall ensure that the following information is included in the initial application for an AOC and, when applicable, any variation or renewal applied for:

- (1) The official name and business name, address and mailing address of the applicant;
- (2) A description of the proposed operation;
- (3) A description of the management organisation;
- (4) The name of the accountable manager;
- (5) The names of major post holders, including those responsible for flight operations, the maintenance system, crew training and ground operations together with their qualifications and experience; and
- (6) The Operations Manual.

(b) In respect of the operator's maintenance system only, the following information must be included in the initial application for an AOC and, when applicable, any variation or renewal applied for, and for each aeroplane type to be operated (see IEM OPS 1.185(b)):

- (1) The Operator's [Continued Airworthiness] Management Exposition;
- (2) The operator's aeroplane maintenance programme(s);
- (3) The aeroplane technical log;
- (4) Where appropriate, the technical specification(s) of the maintenance contract(s) between the operator and any CAR–145 approved maintenance organisation;
- (5) The number of aeroplanes.

(c) The application for an initial issue of an AOC must be submitted at least 90 days before the date of intended operation except that the Operations Manual may be submitted later but not less than 60 days before the date of intended operation.

(d) The application for the variation of an AOC must be submitted at least 30 days, or as otherwise agreed, before the date of intended operation.

(e) The application for the renewal of an AOC must be submitted at least 30 days, or as otherwise agreed, before the end of the existing period of validity.

(f) Other than in exceptional circumstances, the AUTHORITY must be given at least 10 days prior notice of a proposed change of a nominated post holder.

Rev. 2

CAR–OPS 1.190 *Intentionally blank*

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Appendix 1 to CAR–OPS 1.175 Contents and conditions of the Air Operator Certificate

An AOC specifies the:

- (a) [Name and location (principal place of business) of the operator, including the names of the Accountable Manager, Postholders, Quality and Flight Safety Manager.]
- (b) Date of issue and period of validity;
- (c) Description of the type of operations authorised;
- (d) Type(s) of aeroplane(s) authorised for use;
- (e) Registration markings of the authorised aeroplane(s) except that operators may obtain approval for a system to inform the AUTHORITY about the registration markings for aeroplanes operated under its AOC;
- (f) Authorised areas of operation;
- (g) Special limitations; and
- (h) Special authorisations/approvals e.g.:
 - CAT II/CAT III (including approved minima)
 - MNPS
 - ETOPS
 - RNAV (PBN)
 - RVSM
 - Transportation of Dangerous Goods.
 - Authorisation to provide cabin crew initial safety training and, if applicable, to issue the attestation provided for in Subpart O, for those operators who provide such training directly or indirectly.

Rev 2

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Appendix 2 to CAR–OPS 1.175 The management and organisation of an AOC holder

(a) *General* An operator must have a sound and effective management structure in order to ensure the safe conduct of air operations. Nominated post holders must have managerial competency together with appropriate technical/operational qualifications in aviation.

(b) *Nominated post holders*

(1) A description of the functions and the responsibilities of the nominated post holders, including their names, must be contained in the Operations Manual and the AUTHORITY must be given notice in writing of any intended or actual change in appointments or functions.

(2) The operator must make arrangements to ensure continuity of supervision in the absence of nominated post holders.

(3) A person nominated as a post holder by the holder of an AOC must not be nominated as a post holder by the holder of any other AOC, unless acceptable to the Authorities concerned.

(4) Persons nominated as post holders must be contracted to work sufficient hours to fulfil the management functions associated with the scale and scope of the operation.

(c) *Adequacy and supervision of staff*

(1) *Crew members.* The operator must employ sufficient flight and cabin crew for the planned operation, trained and checked in accordance with Subpart N and Subpart O as appropriate.

(2) *Ground Staff*

(i) The number of ground staff is dependent upon the nature and the scale of operations. Operations and ground handling departments, in particular, must be staffed by trained personnel who have a thorough understanding of their responsibilities within the organisation.

(ii) An operator contracting other organisations to provide certain services, retains responsibility for the maintenance of proper standards. In such circumstances, a nominated post holder must be given the task of ensuring that any contractor employed meets the required standards.

(3) *Supervision*

(i) The number of supervisors to be appointed is dependent upon the structure of the operator and the number of staff employed.

(ii) The duties and responsibilities of these supervisors must be defined, and any other commitments arranged so that they can discharge their supervisory responsibilities.

(iii) The supervision of crew members and ground staff must be exercised by individuals possessing experience and personal qualities sufficient to ensure the attainment of the standards specified in the operations manual.

(d) *Accommodation facilities*

(1) An operator must ensure that working space available at each operating base is sufficient for personnel pertaining to the safety of flight operations. Consideration must be given to the needs of ground staff, those concerned with operational control, the storage and display of essential records, and flight planning by crews.

(2) Office services must be capable, without delay, of distributing operational instructions and other information to all concerned.

(e) *Documentation.* The operator must make arrangements for the production of manuals, amendments and other documentation.

SUBPART D – OPERATIONAL PROCEDURES**CAR-OPS 1.192 Terminology**

The terms which are listed below are for use within the context of this regulation.

(a) Adequate Aerodrome. An aerodrome which the operator considers to be satisfactory, taking account of the applicable performance requirements and runway characteristics; at the expected time of use, the aerodrome will be available and equipped with necessary ancillary services such as ATS, sufficient lighting, communications, weather reporting, nav aids and emergency services.

(b) ETOPS (Extended range operations for two engine aeroplanes). ETOPS operations are those with two engine aeroplanes approved by the Authority (ETOPS approval), to operate beyond the threshold distance determined in accordance with CAR-OPS 1.245 (a) from an Adequate Aerodrome.

(c) Adequate ETOPS en-route alternate aerodrome. An adequate aerodrome, which additionally, at the expected time of use, has an ATS facility and at least one instrument approach procedure.

(d) En-route alternate (ERA) aerodrome. An adequate aerodrome along the route, which may be required at the planning stage.

(e) 3 % ERA. An en-route alternate aerodrome selected for the purposes of reducing contingency fuel to 3 %.

(f) Isolated aerodrome. If acceptable to the Authority, the destination aerodrome can be considered as an isolated aerodrome, if the fuel required (diversion plus final) to the nearest adequate destination alternate aerodrome is more than:

For aeroplanes with reciprocating engines, fuel to fly for 45 minutes plus 15 % of the flight time planned to be spent at cruising level or two hours, whichever is less; or

For aeroplanes with turbine engines, fuel to fly for two hours at normal cruise consumption above the destination aerodrome, including final reserve fuel.

(g) Equivalent position. A position that can be established by means of a DME distance, a suitably located NDB or VOR, SRE or PAR fix or any other suitable fix between three and five miles from threshold that independently establishes the position of the aeroplane.

(h) Critical phases of flight. Critical phases of flight are the take-off run, the take-off flight path, the final approach, the landing, including the landing roll, and any other phases of flight at the discretion of the commander.

(i) Contingency fuel. The fuel required to compensate for unforeseen factors which could have an influence on the fuel consumption to the destination aerodrome such as deviations of an individual aeroplane from the expected fuel consumption data, deviations from forecast meteorological conditions and deviations from planned routings and/or cruising levels/altitudes.

(j) Separate runways. Runways at the same aerodrome that are separate landing surfaces. These runways may overlay or cross in such a way that if one of the runways is blocked, it will not prevent the planned type of operations on the other runway. Each runway shall have a separate approach procedure based on a separate navigation aid.

(k) Approved one-engine-inoperative cruise speed. For ETOPS, the approved one-engine-inoperative cruise speed for the intended area of operation shall be a speed, within the certified limits of the aeroplane, selected by the operator and approved by the regulatory Authority.

(l) ETOPS area. An ETOPS area is an area containing airspace within which an ETOPS approved aeroplane remains in excess of the specified flying time in still air (in standard conditions) at the approved one-engine-inoperative cruise speed from an adequate ETOPS route alternate aerodrome.

(m) Dispatch. ETOPS planning minima applies until dispatch. Dispatch is when the aircraft first moves under its own power for the purpose of taking off.

Rev 1

CAR-OPS 1.195 Operational Control

(See AC OPS 1.195)

An operator shall:

(a) Establish and maintain a method of exercising operational control approved by the AUTHORITY; and

(b) Exercise operational control over any flight operated under the terms of his AOC.

(c) See CAR-OPS 0 Subpart W for requirements for Operations officers and dispatchers.

An operator shall provide an Operations Manual in accordance with Subpart P for the use and guidance of operations personnel.

Rev.1

CAR-OPS 1.205 Competence of operations personnel

(See AC OPS 1.205)

An operator shall ensure that all personnel assigned to, or directly involved in, ground and flight operations are properly instructed, have demonstrated their abilities in their particular duties and are aware of their responsibilities and the relationship of such duties to the operation as a whole.

Rev.1

CAR-OPS 1.210 Establishment of procedures

(See AMC OPS 1.210(a).)

(a) An operator shall establish procedures and instructions, for each aeroplane type, containing ground staff and crew members' duties for all types of operation on the ground and in flight.

(b) An operator shall establish a check-list system to be used by crew members for all phases of operation of the aeroplane under normal, abnormal and emergency conditions as applicable, to ensure that the operating procedures in the Operations Manual are followed. (See IEM OPS 1.210 (b).)

(c) An operator shall not require a crew member to perform any activities during critical phases of the flight other than those required for the safe operation of the aeroplane. (See IEM OPS 1.210(c).)

CAR-OPS 1.215 Use of Air Traffic Services

An operator shall ensure that Air Traffic Services are used for all flights whenever available.

CAR-OPS 1.216 In-flight Operational Instructions

(See AC OPS 1.216)

An operator shall ensure that his in-flight operational instructions involving a change to the air traffic flight plan shall, when practicable, be coordinated with the appropriate Air Traffic Service unit before transmission to an aeroplane.

Rev.1

CAR-OPS 1.220 Authorisation of Aerodromes by the Operator

(See OPS 1.192)

An operator shall only authorise use of aerodromes that are adequate for the type(s) of aeroplane and operation(s) concerned.

CAR-OPS 1.225 Aerodrome Operating Minima

(a) An operator shall specify aerodrome operating minima, established in accordance with CAR-OPS 1.430 for each departure, destination or alternate aerodrome authorised to be used in accordance with CAR-OPS 1.220.

(b) Any increment imposed by the AUTHORITY must be added to the minima specified in accordance with sub-paragraph (a) above.

(c) The minima for a specific type of approach and landing procedure are considered applicable if:

- (1) The ground equipment shown on the respective chart required for the intended procedure is operative;
- (2) The aeroplane systems required for the type of approach are operative;
- (3) The required aeroplane performance criteria are met; and
- (4) The crew is qualified accordingly.

CAR-OPS 1.230 Instrument departure and approach procedures

(a) An operator shall ensure that instrument departure and approach procedures established by the State in which the aerodrome is located are used.

(b) Notwithstanding sub-paragraph (a) above, a commander may accept an ATC clearance to deviate from a published departure or arrival route, provided obstacle clearance criteria are observed and full account is taken of the operating conditions. The final approach must be flown visually or in accordance with the established instrument approach procedure.

(c) Different procedures to those required to be used in accordance with sub-paragraph (a) above may only be implemented by an operator provided they have been approved by the State in which the aerodrome is located, if required, and accepted by the AUTHORITY.

CAR-OPS 1.235 Noise abatement procedures

(a) An operator shall establish operating procedures for noise abatement during instrument flight operations in compliance with ICAO PANS OPS Volume 1 (Doc 8168-OPS/611).

(b) Take-off climb procedures for noise abatement specified by an operator for any one aeroplane type should be the same for all aerodromes.

CAR-OPS 1.240 Routes and areas of operation

(a) An operator shall ensure that operations are only conducted along such routes or within such areas, for which:

- (1) Ground facilities and services, including meteorological services, are provided which are adequate for the planned operation;
- (2) The performance of the aeroplane intended to be used is adequate to comply with minimum flight altitude requirements;
- (3) The equipment of the aeroplane intended to be used meets the minimum requirements for the planned operation;
- (4) Appropriate maps and charts are available (CAR-OPS 1.135(a)(9) refers);
- (5) If two-engined aeroplanes are used, adequate aerodromes are available within the time/distance limitations of CAR-OPS 1.245.
- (6) If single-engine aeroplanes are used, surfaces are available which permit a safe forced landing to be executed.

(b) An operator shall ensure that operations are conducted in accordance with any restriction on the routes or the areas of operation, imposed by the AUTHORITY.

CAR-OPS 1.241 Operation in defined airspace with Reduced Vertical Separation Minima (RVSM)

(See CAR-OPS 0.194)

An operator shall not operate an aeroplane in defined portions of airspace where, based on Regional Air Navigation Agreement, a vertical separation minimum of 300m (1 000ft) applies unless approved to do so by the AUTHORITY (RVSM Approval). (See also CAR-OPS 1.872.)
Rev. 1

[CAR OPS 1.243 Operations in areas with Performance Based Navigation (PBN) requirements

(See AC OPS 1.243)

(a) An operator shall ensure that an aeroplane operated in areas, or through portions of airspace, or on routes where navigation performance requirements have been specified, is certified according to these requirements, and, if required, that the Authority has granted the relevant operational approval. (See also OPS 1.865 (c)(2), OPS 1.870 and OPS 1.872).

(b) An operator of an aeroplane operating in areas referred to in (a) shall ensure that all contingency procedures, specified by the Authority responsible for the airspace concerned, have been included in the Operations Manual.

(c) AC OPS 1.243 provides for PBN guidance and approval procedures]

Rev 2

CAR-OPS 1.245 Maximum distance from an adequate aerodrome for two-engined aeroplanes without an ETOPS Approval

(See OPS 1.192)

(a) Unless specifically approved by the AUTHORITY in accordance with CAR-OPS 1.246(a) (ETOPS Approval), an operator shall not operate a two-engined aeroplane over a route which contains a point further from an adequate aerodrome than, in the case of:

- (1) Performance Class A aeroplanes with either:
 - (i) A maximum approved passenger seating configuration of 20 or more; or
 - (ii) A maximum take-off mass of 45 360kg or more, the distance flown in 60 minutes at the one-engine-inoperative cruise speed determined in accordance with subparagraph (b) below;
- (2) Performance Class A aeroplanes with:
 - (i) A maximum approved passenger seating configuration of 19 or less; and
 - (ii) A maximum take-off mass less than 45 360 kg,

the distance flown in 120 minutes or, if approved by the AUTHORITY, up to 180 minutes for turbo-jet aeroplanes, at the one-engine-inoperative cruise speed determined in accordance with subparagraph (b) below (See AMC OPS 1.245(a)(2));

- (3) Performance Class B or C aeroplanes:
 - (i) The distance flown in 120 minutes at the one-engine-inoperative cruise speed determined in accordance with subparagraph (b) below; or
 - (ii) 300 nautical miles, whichever is less. (See IEM OPS 1.245(a).)

(b) An operator shall determine a speed for the calculation of the maximum distance to an adequate aerodrome for each two-engined aeroplane type or variant operated, not exceeding V_{MO} , based upon the true airspeed that the aeroplane can maintain with one-engine-inoperative under the following conditions:

- (1) International Standard Atmosphere (ISA);
- (2) Level flight:
 - (i) For turbojet aeroplanes at:
 - (A) FL 170; or
 - (B) At the maximum flight level to which the aeroplane, with one engine inoperative, can climb, and maintain, using the gross rate of climb specified in the AFM, whichever is less.
 - (ii) For propeller driven aeroplanes at:
 - (A) FL 80; or
 - (B) At the maximum flight level to which the aeroplane, with one engine inoperative, can climb, and maintain, using the gross rate of climb specified in the AFM, whichever is less.
- (3) Maximum continuous thrust or power on the remaining operating engine;
- (4) An aeroplane mass not less than that resulting from:
 - (i) Take-off at sea-level at maximum take-off mass; and
 - (ii) All engines climb to the optimum long range cruise altitude; and

- (iii) All engines cruise at the long range cruise speed at this altitude, until the time elapsed since take-off is equal to the applicable threshold prescribed in subparagraph (a) above.

(c) An operator must ensure that the following data, specific to each type or variant, is included in the Operations Manual:

- (1) The one-engine-inoperative cruise speed determined in accordance with subparagraph (b) above; and
- (2) The maximum distance from an adequate aerodrome determined in accordance with subparagraphs (a) and (b) above.

Note: The speeds and altitudes (flight levels) specified above are only intended to be used for establishing the maximum distance from an adequate aerodrome.

Rev 2

CAR-OPS 1.246 Extended range operations with two-engined aeroplanes (ETOPS)

(See OPS 1.192)

(a) An operator shall not conduct operations beyond the threshold distance determined in accordance with CAR-OPS 1.245 unless approved to do so by the AUTHORITY (ETOPS approval) (See EASA AMC 20-6)

(b) Prior to conducting an ETOPS flight, an operator shall ensure that an adequate ETOPS en-route alternate is available, within either the approved diversion time or a diversion time based on the MEL generated serviceability status of the aeroplane, whichever is shorter. (See also CAR-OPS 1.297(d).)

Rev 2

CAR-OPS 1.250 Establishment of minimum flight altitudes

(a) An operator shall establish minimum flight altitudes and the methods to determine those altitudes for all route segments to be flown which provide the required terrain clearance taking into account the requirements of Subparts F to I.

(b) Every method for establishing minimum flight altitudes must be approved by the AUTHORITY.

(c) Where minimum flight altitudes established by States overflown are higher than those established by the operator, the higher values shall apply.

(d) An operator shall take into account the following factors when establishing minimum flight altitudes:

- (1) The accuracy with which the position of the aeroplane can be determined;
- (2) The probable inaccuracies in the indications of the altimeters used;
- (3) The characteristics of the terrain (e.g. sudden changes in the elevation) along the routes or in the areas where operations are to be conducted.
- (4) The probability of encountering unfavourable meteorological conditions (e.g. severe turbulence and descending air currents); and
- (5) Possible inaccuracies in aeronautical charts.

(e) In fulfilling the requirements prescribed in sub-paragraph (d) above due consideration shall be given to:

- (1) Corrections for temperature and pressure variations from standard values;
- (2) The ATC requirements; and

- (3) Any foreseeable contingencies along the planned route.

CAR-OPS 1.255 Fuel policy

[(See Appendix 1 and Appendix 2 to OPS 1.255)]

(a) An operator must establish a fuel policy for the purpose of flight planning and in-flight replanning to ensure that every flight carries sufficient fuel for the planned operation and reserves to cover deviations from the planned operation.

(b) An operator shall ensure that the planning of flights is at least based upon (1) and (2) below:

- (1) Procedures contained in the Operations Manual and data derived from:
 - (i) Data provided by the aeroplane manufacturer; or
 - (ii) Current aeroplane specific data derived from a fuel consumption monitoring system.
- (2) The operating conditions under which the flight is to be conducted including:
 - (i) Realistic aeroplane fuel consumption data;
 - (ii) Anticipated masses;
 - (iii) Expected meteorological conditions; and
 - (iv) Air Traffic Services procedures and restrictions.

(c) An operator shall ensure that the pre-flight calculation of usable fuel required for a flight includes:

- (1) Taxi fuel;
- (2) Trip fuel;
- (3) Reserve fuel consisting of:
 - (i) Contingency fuel (see IEM OPS 1.255(c)(3)(i));
 - (ii) Alternate fuel, if a destination alternate is required. (This does not preclude selection of the departure aerodrome as the destination alternate);
 - (iii) Final reserve fuel; and
 - (iv) Additional fuel, if required by the type of operation (e.g. ETOPS); and
- (4) Extra fuel if required by the commander.

(d) An operator shall ensure that in-flight replanning procedures for calculating usable fuel required when a flight has to proceed along a route or to a destination other than originally planned includes:

- (1) Trip fuel for the remainder of the flight;
- (2) Reserve fuel consisting of:
 - (i) Contingency fuel;
 - (ii) Alternate fuel, if a destination alternate is required. (This does not preclude selection of the departure aerodrome as the destination alternate);
 - (iii) Final reserve fuel; and
 - (iv) Additional fuel, if required by the type of operation (e.g. ETOPS); and
- (3) Extra fuel if required by the commander.

Rev.2

CAR-OPS 1.260 Carriage of Persons with Reduced Mobility

(See IEM OPS 1.260)

(a) An operator shall establish procedures for the carriage of Persons with Reduced Mobility (PRMs).

(b) An operator shall ensure that PRMs are not allocated, nor occupy, seats where their presence could:

- (1) Impede the crew in their duties;
- (2) Obstruct access to emergency equipment; or
- (3) Impede the emergency evacuation of the aeroplane.

(c) The commander must be notified when PRMs are to be carried on board.

CAR-OPS 1.265 Carriage of inadmissible passengers, deportees or persons in custody

An operator shall establish procedures for the transportation of inadmissible passengers, deportees or persons in custody to ensure the safety of the aeroplane and its occupants. The commander must be notified when the above-mentioned persons are to be carried on board.

CAR-OPS 1.270 Stowage of baggage and cargo

(See Appendix 1 to CAR-OPS 1.270 & AMC OPS 1.270)

(a) An operator shall establish procedures to ensure that only such hand baggage is taken into the passenger cabin as can be adequately and securely stowed.

(b) An operator shall establish procedures to ensure that all baggage and cargo on board, which might cause injury or damage, or obstruct aisles and exits if displaced, is placed in stowages designed to prevent movement.

CAR-OPS 1.275 *Intentionally blank***CAR-OPS 1.280 Passenger Seating**

(See IEM OPS 1.280)

(See AC OPS 1.280)

An operator shall establish procedures to ensure that passengers are seated where, in the event that an emergency evacuation is required, they may best assist and not hinder evacuation from the aeroplane.

Rev. 1

CAR-OPS 1.285 Passenger briefing

An operator shall ensure that:

(a) *General.*

(1) Passengers are given a verbal briefing in both Arabic and English about safety matters. Parts or all of the briefing may be provided by an audio-visual presentation.

(2) Passengers are provided with a safety briefing card on which picture type instructions indicate the operation of emergency equipment and exits likely to be used by passengers.

- (b) *Before take-off*
- (1) Passengers are briefed on the following items if applicable:
 - (i) Smoking regulations;
 - (ii) Back of the seat to be in the upright position and tray table stowed;
 - (iii) Location of emergency exits;
 - (iv) Location and use of floor proximity escape path markings;
 - (v) Stowage of hand baggage;
 - (vi) Restrictions on the use of portable electronic devices; and
 - (vii) The location and the contents of the safety briefing card, and,
 - (2) Passengers receive a demonstration of the following:
 - (i) The use of safety belts and/or safety harnesses, including how to fasten and unfasten the safety belts and/or safety harnesses;
 - (ii) The location and use of oxygen equipment if required (CAR–OPS 1.770 and CAR–OPS 1.775 refer). Passengers must also be briefed to extinguish all smoking materials when oxygen is being used; and
 - (iii) The location and use of life jackets if required (CAR–OPS 1.825 refers).
- (c) *After take-off*
- (1) Passengers are reminded of the following if applicable:
 - (i) Smoking regulations; and
 - (ii) Use of safety belts and/or safety harnesses.
- (d) *Before landing*
- (1) Passengers are reminded of the following if applicable:
 - (i) Smoking regulations;
 - (ii) Use of safety belts and/or safety harnesses;
 - (iii) Back of the seat to be in the upright position and tray table stowed;
 - (iv) Re-stowage of hand baggage; and
 - (v) Restrictions on the use of portable electronic devices.
- (e) *After landing*
- (1) Passengers are reminded of the following:
 - (i) Smoking regulations; and
 - (ii) Use of safety belts and/or safety harnesses.
- (f) In an emergency during flight, passengers are instructed in such emergency action as may be appropriate to the circumstances.

Rev. 1

CAR–OPS 1.290 Flight preparation

- (a) An operator shall ensure that an operational flight plan is completed for each intended flight.

- (b) The commander shall not commence a flight unless he is satisfied that:
- (1) The aeroplane is airworthy;
 - (2) The aeroplane is not operated contrary to the provisions of the Configuration Deviation List (CDL);
 - (3) The instruments and equipment required for the flight to be conducted, in accordance with Subparts K and L, are available;
 - (4) The instruments and equipment are in operable condition except as provided in the MEL;
 - (5) Those parts of the operations manual which are required for the conduct of the flight are available;
 - (6) The documents, additional information and forms required to be available by CAR-OPS 1.125 and CAR-OPS 1.135 are on board;
 - (7) Current maps, charts and associated documentation or equivalent data are available to cover the intended operation of the aeroplane including any diversion which may reasonably be expected. This shall include any conversion tables necessary to support operations where metric heights, altitudes and flight levels must be used;
 - (8) Ground facilities and services required for the planned flight are available and adequate;
 - (9) The provisions specified in the operations manual in respect of fuel, oil and oxygen requirements, minimum safe altitudes, aerodrome operating minima and availability of alternate aerodromes, where required, can be complied with for the planned flight;
 - (10) The load is properly distributed and safely secured;
 - (11) The mass of the aeroplane, at the commencement of take-off roll, will be such that the flight can be conducted in compliance with Subparts F to I as applicable; and
 - (12) Any operational limitation in addition to those covered by sub-paragraphs (9) and (11) above can be complied with.

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CAR-OPS 1.295 Selection of aerodromes

(a) An operator shall establish procedures for the selection of destination and/or alternate aerodromes in accordance with CAR-OPS 1.220 when planning a flight.

(b) An operator must select and specify in the operational flight plan a take-off alternate if it would not be possible to return to the aerodrome of departure for meteorological or performance reasons. The take-off alternate shall be located within:

- (1) For two-engined aeroplanes, either:
 - (i) One hour flight time at a one-engine-inoperative cruising speed according to the AFM in still air standard conditions based on the actual take-off mass; or
 - (ii) The operator's approved ETOPS diversion time, subject to any MEL restriction, up to a maximum of two hours, at the one-engine-inoperative cruising speed according to the AFM in still air standard conditions based on the actual take-off mass for aeroplanes and crews authorized for ETOPS; or
- (2) Two hours flight time at a one-engine-inoperative cruising speed according to the AFM in still air standard conditions based on the actual take-off mass for three and four-engined aeroplanes; and

- (3) If the AFM does not contain a one-engine-inoperative cruising speed, the speed to be used for calculation must be that which is achieved with the remaining engine(s) set at maximum continuous power.
- (c) An operator must select at least one destination alternate for each IFR flight unless:
- (1) Both:
 - (i) The duration of the planned flight from take-off to landing does not exceed 6 hours; and
 - (ii) Two separate runways are available and useable at the destination and the appropriate weather reports or forecasts for the destination aerodrome, or any combination thereof, indicate that for the period from one hour before until one hour after the expected time of arrival at destination, the ceiling will be at least 2 000 ft or circling height + 500 ft, whichever is greater, and the visibility will be at least 5 km. (see IEM OPS 1.295(c)(1)(ii)); or
 - (2) The destination is isolated and no adequate destination alternate exists.
- (d) An operator must select two destination alternates when:
- (1) The appropriate weather reports or forecasts for the destination, or any combination thereof, indicate that during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival, the weather conditions will be below the applicable planning minima; or
 - (2) No meteorological information is available.
- (e) An operator shall specify any required alternate(s) in the operational flight plan.

CAR-OPS 1.297 Planning minima for IFR flights

(See AC OPS 1.297(b))

(See AMC OPS 1.297)

(a) *Planning minima for take-off alternates.* An operator shall not select an aerodrome as a take-off alternate aerodrome unless the appropriate weather reports or forecasts or any combination thereof indicate that, during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the applicable landing minima specified in accordance with CAR-OPS 1.225. The ceiling must be taken into account when the only approaches available are non-precision and/or circling approaches. Any limitation related to one engine inoperative operations must be taken into account.

(b) *Planning minima for destination and destination alternate aerodromes.* An operator shall only select the destination aerodrome and/or destination alternate aerodrome(s) when the appropriate weather reports or forecasts, or any combination thereof, indicate that, during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the applicable planning minima as follows:

- (1) Planning minima for a destination aerodrome except isolated destination aerodromes:
 - (i) RVR/visibility specified in accordance with CAR-OPS 1.225; and
 - (ii) For a non-precision approach or a circling approach, the ceiling at or above MDH; and
- (2) Two destination alternate aerodromes are selected under OPS 1.295(d).

(c) Planning minima for a:

- destination alternate aerodrome, or isolated aerodrome, or
- 3 % ERA aerodrome, or
- en-route alternate aerodrome required at the planning stage

An operator shall only select an aerodrome for one of those purposes when the appropriate weather reports or forecasts, or any combination thereof, indicate that, during a period commencing one hour before and ending one hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the planning minima in

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Table 1 Planning minima – En-route and destination alternates

Type of approach	Planning Minima
Cat II and III	Cat I (Note 1)
Cat I	Non-precision (Notes 1 & 2)
Non-precision	Non-precision (Notes 1 & 2) plus 200 ft/1 000 m
Circling	Circling

Note 1 RVR.

Note 2 The ceiling must be at or above the MDH.

(c) *Planning minima for an en-route alternate aerodrome.* An operator shall not select an aerodrome as an en-route alternate aerodrome unless the appropriate weather reports or forecasts, or any combination thereof, indicate that, during a period commencing 1 hour before and ending 1 hour after the expected time of arrival at the aerodrome, the weather conditions will be at or above the planning minima in accordance with Table 1 above. (See also AMC OPS 1.255, paragraph 1.3.a.ii.)

(d) *Planning minima for an ETOPS en-route alternate aerodrome.* An operator shall only select an aerodrome as an ETOPS en-route alternate aerodrome when the appropriate weather reports or forecasts, or any combination thereof, indicate that, between the anticipated time of landing until one hour after the latest possible time of landing, conditions calculated by adding the additional limits of Table 2 will exist. An operator shall include in the Operations Manual the method for determining the operating minima at the planned ETOPS en-route alternate aerodrome.

Table 2

Planning minima — ETOPS		
Approach facility	Alternate airfield ceiling	Weather minima Visibility/RVR
Precision approach procedure.	Authorised DH/DA plus an increment of 200 ft	Authorised visibility plus an increment of 800 metres
Non-precision approach or circling approach	Authorised MDH/MDA plus an increment of 400 ft	Authorised visibility plus an increment of 1 500 metres

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CAR-OPS 1.300 Submission of ATS Flight Plan

(See AMC OPS 1.300)

An operator shall ensure that a flight is not commenced unless an ATS flight plan has been submitted, or adequate information has been deposited in order to permit alerting services to be activated if required.

CAR-OPS 1.305 Refuelling/defuelling with passengers embarking, on board or disembarking

(See Appendix 1 to CAR-OPS 1.305)

(See IEM OPS 1.305)

An operator shall ensure that no aeroplane is refuelled/defuelled with Avgas or wide cut type fuel (e.g. Jet-B or equivalent) or when a mixture of these types of fuel might occur, when passengers are embarking, on board or disembarking. In all other cases necessary precautions must be taken and the aeroplane must be properly manned by qualified personnel ready to initiate and direct an evacuation of the aeroplane by the most practical and expeditious means available.

CAR-OPS 1.307 Refuelling/defuelling with wide-cut fuel

(See IEM OPS 1.307)

An operator shall establish procedures for refuelling/defuelling with wide-cut fuel (e.g. Jet-B or equivalent) if this is required.

CAR-OPS 1.308 Push back and Towing

(See AC OPS 1.308)

(a) The operator shall ensure that all push back and towing procedures comply with appropriate aviation standards and procedures.

(b) The operator shall ensure that pre- or posttaxi positioning of the aeroplane is not executed by towbarless towing unless

(1) an aeroplane is protected by its own design from damage to the nose wheel steering system due to towbarless towing operation, or

(2) a system/procedure is provided to alert the flight crew that such damage may have or has occurred, or

(3) the towbarless towing vehicle is designed to prevent damage to the aeroplane type.

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CAR-OPS 1.310 Crew Members at stations

(See IEM OPS 1.310(b))

(a) Flight crew members

(1) During take-off and landing each flight crew member required to be on flight deck duty shall be at his station.

(2) During all other phases of flight each flight crew member required to be on flight deck duty shall remain at his station unless his absence is necessary for the performance of his duties in connection with the operation, or for physiological needs provided at least one suitably qualified pilot remains at the controls of the aeroplane at all times.

(3) During all phases of flight each flight crew member required to be on flight deck duty shall remain alert. If a lack of alertness is encountered, appropriate countermeasures shall be used. If unexpected fatigue is experienced a controlled rest procedure, organised by the commander, can be used if workload permits (see AC OPS 1.310(a)(3)). Controlled rest taken in this way may never be considered to be part of a rest period for purposes of calculating flight time limitations nor used to justify any duty period.

(c) *Cabin crew members.* On all the decks of the aeroplane that are occupied by passengers, required cabin crew members shall be seated at their assigned stations during take-off and landing, critical phases of flight.

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[CAR-OPS 1.311 Minimum number of cabin crew required to be on board an aeroplane during ground operations with passengers

(see Appendix 1 to OPS 1.311)

An operator shall ensure that, whenever any passengers are on board an aeroplane, the minimum number of cabin crew required in accordance with OPS 1.990(a), (b), (c) and (d) are present in the passenger cabin, except:

(a) When the aeroplane is on the ground at a parking place, the number of cabin crew present in the passenger cabin may be reduced below the number determined by OPS 1.990(a), (b) and (c). The minimum number of cabin crew required in these circumstances shall be one per pair of floor-level emergency exits on each passenger deck, or one for every 50, or fraction of 50, passengers present on board, whichever is greater, provided that:

- (1) the operator has established a procedure for the evacuation of passengers with this reduced number of cabin crew that has been accepted by the Authority as providing equivalent safety; and
- (2) no refuelling/defuelling is taking place; and
- (3) the senior cabin crew member has performed the pre-boarding safety briefing to the Cabin Crew; and
- (4) the senior cabin crew member is present in the passenger cabin; and

(5) the pre-boarding cabin checks have been completed.

This reduction is not permitted when the number of cabin crew is determined by using OPS 1.990(d).

(b) During disembarkation when the number of passengers remaining on board is less than 20, the minimum number of cabin crew present in the passenger cabin may be reduced below the minimum number of cabin crew required in accordance with OPS 1.990(a), (b), (c) and (d), provided that:

- (1) the operator has established a procedure for the evacuation of passengers with this reduced number of cabin crew that has been accepted by the Authority as providing equivalent safety; and
- (2) the senior cabin crew member is present in the passenger cabin.]

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CAR–OPS 1.315 Assisting means for emergency evacuation

An operator shall establish procedures to ensure that before taxiing, take-off and landing, and when safe and practicable to do so, an assisting means for emergency evacuation that deploys automatically, is armed.

CAR–OPS 1.320 Seats, safety belts and harnesses

(a) *Crew members*

(1) During take-off and landing, and whenever deemed necessary by the commander in the interest of safety, each crew member shall be properly secured by all safety belts and harnesses provided.

(2) During other phases of the flight each flight crew member on the flight deck shall keep his safety belt fastened while at his station.

(b) *Passengers*

(1) Before take-off and landing, and during taxiing, and whenever deemed necessary in the interest of safety, the commander shall ensure that each passenger on board occupies a seat or berth with his safety belt, or harness where provided, properly secured.

(2) An operator shall make provision for, and the commander shall ensure that multiple occupancy of aeroplane seats may only be allowed on specified seats and does not occur other than by one adult and one infant who is properly secured by a supplementary loop belt or other restraint device.

CAR–OPS 1.325 Securing of passenger cabin and galley(s)

(a) An operator shall establish procedures to ensure that before taxiing, take-off and landing all exits and escape paths are unobstructed.

(b) The commander shall ensure that before take-off and landing, and whenever deemed necessary in the interest of safety, all equipment and baggage is properly secured.

CAR–OPS 1.330 Accessibility of emergency equipment

The commander shall ensure that relevant emergency equipment remains easily accessible for immediate use.

CAR-OPS 1.335 Smoking on board

- (a) The commander shall ensure that no person on board is allowed to smoke:
 - (1) Whenever deemed necessary in the interest of safety;
 - (2) While the aeroplane is on the ground unless specifically permitted in accordance with procedures defined in the Operations Manual;
 - (3) Outside designated smoking areas, in the aisle(s) and in the toilet(s);
 - (4) In cargo compartments and/or other areas where cargo is carried which is not stored in flame resistant containers or covered by flame resistant canvas; and
 - (5) In those areas of the cabin where oxygen is being supplied.

CAR-OPS 1.340 Meteorological Conditions

- (a) On an IFR flight a commander shall not:
 - (1) Commence take-off; nor
 - (2) Continue beyond the point from which a revised flight plan applies in the event of in-flight replanning, unless information is available indicating that the expected weather conditions at the destination and/or required alternate aerodrome(s) prescribed in CAR-OPS 1.295 are at or above the planning minima, prescribed in CAR-OPS 1.297.
- (b) On an IFR flight a commander shall not continue beyond:
 - (1) The decision point when using the decision point procedure (AMC OPS 1.255, paragraph 2 refers); or
 - (2) The pre-determined point when using the pre-determined point procedure (AMC OPS 1.255, paragraph 4 refers), unless information is available indicating that the expected weather conditions at the destination and/or required alternate aerodrome(s) prescribed in CAR-OPS 1.295 are at or above the applicable aerodrome operating minima prescribed in CAR-OPS 1.225.
- (c) On an IFR flight, a commander shall not continue towards the planned destination aerodrome unless the latest information available indicates that, at the expected time of arrival, the weather conditions at the destination, or at least one destination alternate aerodrome, are at or above the applicable aerodrome operating minima.
- (d) On a VFR flight a commander shall not commence take-off unless current meteorological reports or a combination of current reports and forecasts indicate that the meteorological conditions along the route or that part of the route to be flown under VFR will, at the appropriate time, be such as to render compliance with these rules possible.

CAR-OPS 1.345 Ice and other contaminants – ground procedures

(See AC OPS 1.345)

- (a) An operator shall establish procedures to be followed when ground de-icing and anti-icing and related inspections of the aeroplane(s) are necessary.
- (b) A commander shall not commence take-off unless the external surfaces are clear of any deposit which might adversely affect the performance and/or controllability of the aeroplane except as permitted in the Aeroplane Flight Manual.

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CAR-OPS 1.346 Ice and other contaminants – flight procedures

(See AC OPS 1.346)

(a) An operator shall establish procedures for flights in expected or actual icing conditions. (See AC OPS 1.346 and CAR-OPS 1.675)

(b) A commander shall not commence a flight nor intentionally fly into expected or actual icing conditions unless the aeroplane is certificated and equipped to cope with such conditions.

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CAR-OPS 1.350 Fuel and oil supply

A commander shall not commence a flight unless he is satisfied that the aeroplane carries at least the planned amount of fuel and oil to complete the flight safely, taking into account the expected operating conditions.

CAR-OPS 1.355 Take-off conditions

Before commencing take-off, a commander must satisfy himself that, according to the information available to him, the weather at the aerodrome and the condition of the runway intended to be used should not prevent a safe take-off and departure.

CAR-OPS 1.360 Application of take-off minima

Before commencing take-off, a commander must satisfy himself that the RVR or visibility in the take-off direction of the aeroplane is equal to or better than the applicable minimum.

CAR-OPS 1.365 Minimum flight altitudes

(See IEM OPS 1.250)

The commander or the pilot to whom conduct of the flight has been delegated shall not fly below specified minimum altitudes except when necessary for take-off or landing.

CAR-OPS 1.370 Simulated abnormal situations in flight

An operator shall establish procedures to ensure that abnormal or emergency situations requiring the application of part or all of abnormal or emergency procedures and simulation of IMC by artificial means, are not simulated during commercial air transportation flights.

CAR-OPS 1.375 In-flight fuel management

[(a) in-flight fuel checks.

(1). a commander must ensure that fuel checks are carried out in-flight at regular intervals. The usable remaining fuel must be recorded and evaluated to:

- (i) compare actual consumption with planned consumption;
- (ii) check that the usable remaining fuel is sufficient to complete the flight, in accordance with paragraph (b) “Inflight fuel management” below; and
- (iii) determine the expected usable fuel remaining on arrival at the destination aerodrome;

(2). the relevant fuel data must be recorded.

(b) in-flight fuel management.

(1). the flight must be conducted so that the expected usable fuel remaining on arrival at the destination aerodrome is not less than:

- (i) the required alternate fuel plus final reserve fuel, or
- (ii) the final reserve fuel if no alternate aerodrome is required;

(2). however, if, as a result of an in-flight fuel check, the expected usable fuel remaining on arrival at the destination aerodrome is less than:

- (i) the required alternate fuel plus final reserve fuel, the commander must take into account the traffic and the operational conditions prevailing at the destination aerodrome, at the destination alternate aerodrome and at any other adequate aerodrome, in deciding whether to proceed to the destination aerodrome or to divert so as to perform a safe landing with not less than final reserve fuel, or
- (ii) the final reserve fuel if no alternate aerodrome is required, the commander must take appropriate action and proceed to an adequate aerodrome so as to perform a safe landing with not less than final reserve fuel;

(3). the commander shall declare an emergency when calculated usable fuel on landing, at the nearest adequate aerodrome where a safe landing can be performed, is less than final reserve fuel.

4. additional conditions for specific procedures.

(i) On a flight using the RCF procedure, in order to proceed to the Destination 1 aerodrome, the commander must ensure that the usable fuel remaining at the decision point is at least the total of:

- trip fuel from the decision point to the Destination 1 aerodrome; and
- contingency fuel equal to 5 % of trip fuel from the decision point to the Destination 1 aerodrome; and
- destination 1 aerodrome alternate fuel, if a destination 1 alternate aerodrome is required; and
- Final reserve fuel

(ii) On a flight using the PDP procedure in order to proceed to the destination aerodrome, the commander must ensure that the usable fuel remaining at the PDP is at least the total of:

- trip fuel from the PDP to the destination aerodrome; and
- contingency fuel from the PDP to the destination aerodrome calculated in accordance with Appendix 1 to OPS 1.255 Paragraph 1.3; and
- fuel required according to Appendix 1 to OPS 1.255 Paragraph 3.1.d]

Rev.2

CAR–OPS 1.380 *Intentionally blank*

CAR–OPS 1.385 **Use of supplemental oxygen**

A commander shall ensure that flight crew members engaged in performing duties essential to the safe operation of an aeroplane in flight use supplemental oxygen continuously whenever cabin altitude exceeds 10 000 ft for a period in excess of 30 minutes and whenever the cabin altitude exceeds 13 000 ft.

CAR-OPS 1.390 Cosmic radiation

(a) An operator shall take account of the in-flight exposure to cosmic radiation of all crew members while on duty (including positioning) and shall take the following measures for those crew liable to be subject to exposure of more than 1 mSv per year (See AC OPS 1.390(a)(1));

- (1) Assess their exposure
- (2) Take into account the assessed exposure when organising working schedules with a view to reduce the doses of highly exposed crew members (See AC OPS 1.390(a)(2));
- (3) Inform the crew members concerned of the health risks their work involves (See AC OPS 1.390(a)(3));
- (4) Ensure that the working schedules for female crew members, once they have notified the operator that they are pregnant, keep the equivalent dose to the foetus as low as can reasonably be achieved and in any case ensure that the dose does not exceed 1 mSv for the remainder of the pregnancy;
- (5) Ensure that individual records are kept for those crew members who are liable to high exposure. These exposures are to be notified to the individual on an annual basis, and also upon leaving the operator.

- (b) (1) An operator shall not operate an aeroplane above 15 000m (49 000ft) unless the equipment specified in CAR-OPS 1.680(a)(1) is serviceable, or the procedure prescribed in CAR-OPS 1.680(a)(2) is complied with.
- (2) The commander or the pilot to whom conduct of the flight has been delegated shall initiate a descent as soon as practicable when the limit values of cosmic radiation dose rate specified in the Operations Manual are exceeded. (See CAR-OPS 1.680(a)(1))

CAR-OPS 1.395 Ground proximity detection

When undue proximity to the ground is detected by any flight crew member or by a ground proximity warning system, the commander or the pilot to whom conduct of the flight has been delegated shall ensure that corrective action is initiated immediately to establish safe flight conditions.

CAR-OPS 1.398 Use of Airborne Collision Avoidance System (ACAS)

(See

An operator shall establish procedures to ensure that:

(a) When ACAS is installed and serviceable, it shall be used in flight in a mode that enables Resolution Advisories (RA) to be produced unless to do so would not be appropriate for conditions existing at the time.

(b) When undue proximity to another aircraft (RA) is detected by ACAS, the commander or the pilot to whom conduct of the flight has been delegated shall ensure that corrective action is initiated immediately to establish safe separation unless the intruder has been visually identified and has been determined not to be a threat.

[The corrective action must:

- (i) never be in a sense opposite to that indicated by the RA;
- (ii) be in the correct sense indicated by the RA even if this is in conflict with the vertical element of an ATC instruction;
- (iii) be the minimum possible to comply with the RA indication.

(c) prescribed ACAS ATC communications are specified.

(d) when the conflict is resolved the aeroplane is promptly returned to the terms of the ATC instructions or clearance.]

Rev. 2

CAR-OPS 1.400 Approach and landing conditions

(See IEM OPS 1.400)

Before commencing an approach to land, the commander must satisfy himself that, according to the information available to him, the weather at the aerodrome and the condition of the runway intended to be used should not prevent a safe approach, landing or missed approach, having regard to the performance information contained in the Operations Manual.

CAR-OPS 1.405 Commencement and continuation of approach

(See IEM OPS 1.405(a).)

(a) The commander or the pilot to whom conduct of the flight has been delegated may commence an instrument approach regardless of the reported RVR/Visibility but the approach shall not be continued beyond the outer marker, or equivalent position, if the reported RVR/visibility is less than the applicable minima.

(b) Where RVR is not available, RVR values may be derived by converting the reported visibility in accordance with Appendix 1 to CAR-OPS 1.430, sub-paragraph (h).

(c) If, after passing the outer marker or equivalent position in accordance with (a) above, the reported RVR/visibility falls below the applicable minimum, the approach may be continued to DA/H or MDA/H.

(d) Where no outer marker or equivalent position exists, the commander or the pilot to whom conduct of the flight has been delegated shall make the decision to continue or abandon the approach before descending below 1000 ft above the aerodrome on the final approach segment. If the MDA/H is at or above 1000 ft above the aerodrome, the operator shall establish a height, for each approach procedure, below which the approach shall not be continued if the RVR/visibility is less than the applicable minima.

(e) The approach may be continued below DA/H or MDA/H and the landing may be completed provided that the required visual reference is established at the DA/H or MDA/H and is maintained.

(f) The touch-down zone RVR is always controlling. If reported and relevant, the mid point and stop end RVR are also controlling. The minimum RVR value for the mid-point is 125 m or the RVR required for the touch-down zone if less, and 75 m for the stop-end. For aeroplanes equipped with a roll-out guidance or control system, the minimum RVR value for the mid-point is 75 m.

Note. "Relevant", in this context, means that part of the runway used during the high speed phase of the landing down to a speed of approximately 60 knots.

CAR-OPS 1.410 Operating procedures – Threshold crossing height

An operator must establish operational procedures designed to ensure that an aeroplane being used to conduct precision approaches crosses the threshold by a safe margin, with the aeroplane in the landing configuration and attitude.

CAR-OPS 1.415 Journey log

A commander shall ensure that the Journey log is completed.

CAR-OPS 1.420 Occurrence reporting**(a) Terminology**

(1) *Incident* An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.

(2) *Serious Incident* An incident involving circumstances indicating that an accident nearly occurred.

(3) *Accident* An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all persons have disembarked, in which:

(i) a person is fatally or seriously injured as a result of:

(A) being in the aircraft;

(B) direct contact with any part of the aircraft, including parts which have become detached from the aircraft; or,

(C) direct exposure to jet blast;

except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew: or

(ii) the aircraft sustains damage or structural failure which adversely affects the structural strength, performance or flight characteristics of the aircraft; and would normally require major repair or replacement of the affected component; except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, tyres, brakes, fairings, small dents or puncture holes in the aircraft skin: or

(iii) the aircraft is missing or is completely inaccessible

(b) *Incident Reporting* An operator shall establish procedures for reporting incidents taking into account responsibilities described below and circumstances described in sub-paragraph (d) below.

(1) CAR-OPS 1.085(b) specifies the responsibilities of crew members for reporting incidents that endanger, or could endanger, the safety of operation.

(2) The commander or the operator of an aeroplane shall submit a report to the AUTHORITY of any incident that endangers or could endanger the safety of operation.

(3) Reports must be despatched within 72 hours of the time when the incident was identified unless exceptional circumstances prevent this.

(4) A commander shall ensure that all known or suspected technical defects and all exceedances of technical limitations occurring while he was responsible for the flight are recorded in the aircraft technical log. If the deficiency or exceedance of technical limitations endangers or could endanger the safety of operation, the commander must in addition initiate the submission of a report to the AUTHORITY in accordance with paragraph (b)(2) above.

(5) In the case of incidents reported in accordance with sub-paragraphs (b)(1), (b)(2) and (b)(3) above, arising from, or relating to, any failure, malfunction or defect in the

aeroplane, its equipment or any item of ground support equipment, or which cause or might cause adverse effects on the continuing airworthiness of the aeroplane, the operator must also inform the organisation responsible for the design or the supplier or, if applicable, the organisation responsible for continued airworthiness, at the same time as a report is submitted to the AUTHORITY.

(c) *Accident and Serious Incident Reporting* An operator shall establish procedures for reporting accidents and serious incidents taking into account responsibilities described below and circumstances described in sub-paragraph (d) below.

(1) A commander shall notify the operator of any accident or serious incident occurring while he was responsible for the flight. In the event that the commander is incapable of providing such notification, this task shall be undertaken by any other member of the crew if they are able to do so, note being taken of the succession of command specified by the operator.

(2) An operator shall ensure that the AUTHORITY, the nearest appropriate Authority (if not the AUTHORITY), and any other organisation required by the Sultanate of Oman to be informed, are notified by the quickest means available of any accident or serious incident and - in the case of accidents only - at least before the aeroplane is moved unless exceptional circumstances prevent this.

(3) The commander or the operator of an aeroplane shall submit a report to the AUTHORITY within 72 hours of the time when the accident or serious incident occurred.

(d) *Specific Reports.* Occurrences for which specific notification and reporting methods must be used are described below;

(1) *Air Traffic Incidents* A commander shall without delay notify the air traffic service unit concerned of the incident and shall inform them of his intention to submit an air traffic incident report after the flight has ended whenever an aircraft in flight has been endangered by:

- (i) A near collision with any other flying device;
- (ii) Faulty air traffic procedures or lack of compliance with applicable procedures by air traffic services or by the flight crew;
- (iii) Failure of air traffic services facilities.

In addition, the commander shall notify the AUTHORITY of the incident.

(2) *Airborne Collision Avoidance System Resolution Advisory* A commander shall notify the air traffic service unit concerned and submit an ACAS report to the AUTHORITY whenever an aircraft in flight has manoeuvred in response to an ACAS Resolution Advisory.

(3) *Bird Hazards and Strikes*

- (i) A commander shall immediately inform the local air traffic service unit whenever a potential bird hazard is observed.
- (ii) If he is aware that a bird strike has occurred, a commander shall submit a written bird strike report after landing to the AUTHORITY whenever an aircraft for which he is responsible suffers a bird strike that results in significant damage to the aircraft or the loss or malfunction of any essential service. If the bird strike is discovered when the commander is not available, the operator is responsible for submitting the report.

(4) *In-flight Emergencies with Dangerous Goods on Board* If an in-flight emergency occurs and the situation permits, a commander shall inform the appropriate air traffic service unit of any dangerous goods on board. After the aircraft has landed, the

commander shall, if the occurrence has been associated with and was related to the transport of dangerous goods, comply also with the reporting requirements specified in CAR-OPS 1.1225. (See AMC OPS 1.420(d)(4))

(5) *Unlawful Interference* Following an act of unlawful interference on board an aircraft, the commander or, in his absence, the operator shall submit a report as soon as practicable to the local Authority and to the AUTHORITY. (See also CAR-OPS 1.1245)

(6) *Encountering Potential Hazardous Conditions* A commander shall notify the appropriate air traffic services unit as soon as practicable whenever a potentially hazardous condition such as an irregularity in a ground or navigational facility, a meteorological phenomenon or a volcanic ash cloud is encountered during flight.

CAR-OPS 1.425 *Intentionally blank*

[Appendix 1 to OPS 1.255 Fuel policy

An operator must base the company fuel policy, including calculation of the amount of fuel to be on board for departure, on the following planning criteria:

1. Basic procedure

The usable fuel to be on board for departure must be the amount of:

1.1. Taxi fuel, which shall not be less than the amount, expected to be used prior to take-off. Local conditions at the departure

aerodrome and APU consumption shall be taken into account;

1.2. Trip fuel, which shall include:

(a) fuel for take-off and climb from aerodrome elevation to initial cruising level/altitude, taking into account the

expected departure routing; and

(b) fuel from top of climb to top of descent, including any step climb/descent; and

(c) fuel from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure; and

(d) fuel for approach and landing at the destination aerodrome;

1.3. Contingency fuel, except as provided for in Paragraph 2 “Reduced Contingency Fuel”, which shall be the higher of a. or b. below:

(a) Either:

(i) 5 % of the planned trip fuel or, in the event of in-flight re-planning, 5 % of the trip fuel for the remainder of the flight; or

(ii) Not less than 3 % of the planned trip fuel or, in the event of in-flight re-planning, 3 % of the trip fuel for the remainder of the flight, provided that an en-route alternate aerodrome is available in accordance with Appendix 2 to OPS 1.255; or

(iii) An amount of fuel sufficient for 20 minutes flying time based upon the planned trip fuel consumption provided that the operator has established a fuel consumption monitoring programme for individual aeroplanes and uses valid data determined by means of such a programme for fuel calculation; or

(iv) An amount of fuel based on a statistical method approved by the Authority which ensures an appropriate statistical coverage of the deviation from the planned to the actual trip fuel. This method is used to monitor the fuel consumption on each city pair/aeroplane combination and the operator uses this data for a statistical analysis to calculate contingency fuel for that city pair/aeroplane combination.

(b) An amount to fly for five minutes at holding speed at 1 500 ft (450 m), above the destination aerodrome in standard conditions.

1.4. Alternate fuel which shall:

(a) include:

(i) fuel for a missed approach from the applicable MDA/DH at the destination aerodrome to missed approach altitude, taking into account the complete missed approach procedure; and

(ii) fuel for climb from missed approach altitude to cruising level/altitude, taking into account the expected departure routing; and

(iii) fuel for cruise from top of climb to top of descent, taking into account the expected routing; and

(iv) fuel for descent from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure; and

(v) fuel for executing an approach and landing at the destination alternate aerodrome selected in accordance with OPS 1.295.

- (b) where two destination alternate aerodromes are required in accordance with OPS 1.295(d), be sufficient to proceed to the alternate aerodrome which requires the greater amount of alternate fuel.
- 1.5. Final reserve fuel, which shall be:
- (a) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes; or
 - (b) for aeroplanes with turbine engines, fuel to fly for 30 minutes at holding speed at 1 500 ft (450 m) above aerodrome elevation in standard conditions, calculated with the estimated mass on arrival at the destination alternate aerodrome or the destination aerodrome, when no destination alternate aerodrome is required.
- 1.6. The minimum additional fuel, which shall permit:
- (a) the aeroplane to descend as necessary and proceed to an adequate alternate aerodrome in the event of engine failure or loss of pressurisation, whichever requires the greater amount of fuel based on the assumption that such a failure occurs at the most critical point along the route, and
 - (i) hold there for 15 minutes at 1 500 ft (450 m) above aerodrome elevation in standard conditions; and
 - (ii) make an approach and landing, except that additional fuel is only required, if the minimum amount of fuel calculated in accordance with subparagraphs 1.2. to 1.5. above is not sufficient for such an event, and
 - (b) Holding for 15 minutes at 1 500 ft (450 m) above destination aerodrome elevation in standard conditions, when a flight is operated without a destination alternate aerodrome;
- 1.7. Extra fuel, which shall be at the discretion of the commander.

2. *Reduced Contingency Fuel (RCF) Procedure*

If an operator's fuel policy includes pre-flight planning to a Destination 1 aerodrome (commercial destination) with a reduced contingency fuel procedure using a decision point along the route and a Destination 2 aerodrome (optional refuel destination), the amount of usable fuel, on board for departure, shall be the greater of 2.1. or 2.2. below:

- 2.1. the sum of:
- (a) taxi fuel; and
 - (b) trip fuel to the Destination 1 aerodrome, via the decision point; and
 - (c) contingency fuel equal to not less than 5 % of the estimated fuel consumption from the decision point to the Destination 1 aerodrome; and
 - (d) alternate fuel or no alternate fuel if the decision point is at less than six hours from the Destination 1 aerodrome and the requirements of OPS 1.295(c)(1)(ii) are fulfilled; and
 - (e) final reserve fuel; and
 - (f) additional fuel; and
 - (g) extra fuel if required by the commander.
- 2.2. The sum of:
- (a) taxi fuel; and
 - (b) trip fuel to the Destination 2 aerodrome, via the decision point; and
 - (c) contingency fuel equal to not less than the amount calculated in accordance with subparagraph 1.3 above from departure aerodrome to the Destination 2 aerodrome; and
 - (d) alternate fuel, if a Destination 2 alternate aerodrome is required; and
 - (e) final reserve fuel; and
 - (f) additional fuel; and
 - (g) extra fuel if required by the commander.

3. *pre-determined point (PDP) procedure*

If an operator's fuel policy includes planning to a destination alternate aerodrome where the distance between the destination aerodrome and the destination alternate aerodrome is such that a flight can only be routed via a predetermined

point to one of these aerodromes, the amount of usable fuel, on board for departure, shall be the greater of 3.1 or 3.2 below:

3.1. the sum of:

- (a) taxi fuel; and
- (b) trip fuel from the departure aerodrome to the destination aerodrome, via the predetermined point; and
- (c) contingency fuel calculated in accordance with subparagraph 1.3. above; and
- (d) additional fuel if required, but not less than:
 - (i) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes plus 15 % of the flight time planned to be spent at cruising level or two hours, whichever is less; or
 - (ii) for aeroplanes with turbine engines, fuel to fly for two hours at normal cruise consumption above the destination aerodrome. This shall not be less than final reserve fuel; and
- (e) extra fuel if required by the commander; or

3.2. the sum of:

- (a) taxi fuel; and
- (b) trip fuel from the departure aerodrome to the destination alternate aerodrome, via the predetermined point; and
- (c) contingency fuel calculated in accordance with subparagraph 1.3 above; and
- (d) additional fuel if required, but not less than:
 - (i) For aeroplanes with reciprocating engines: fuel to fly for 45 minutes; or
 - (ii) For aeroplanes with turbine engines: fuel to fly for 30 minutes at holding speed at 1 500 ft (450 m) above the destination alternate aerodrome elevation in standard conditions. This shall not be less than final reserve fuel; and
- (e) Extra fuel if required by the commander.

4. Isolated aerodrome procedure

If an operator's fuel policy includes planning to an isolated aerodrome, the last possible point of diversion to any available en-route alternate aerodrome shall be used as the pre-determined point. See paragraph 3 above.]

Rev. 2

[Appendix 2 to OPS 1.255 Fuel policy

Location of the 3 % En-Route Alternate (3 % ERA) aerodrome for the purposes of reducing contingency fuel to 3 % (See Appendix 1 to OPS 1.255 (1.3)(a)(ii) and OPS 1.192).

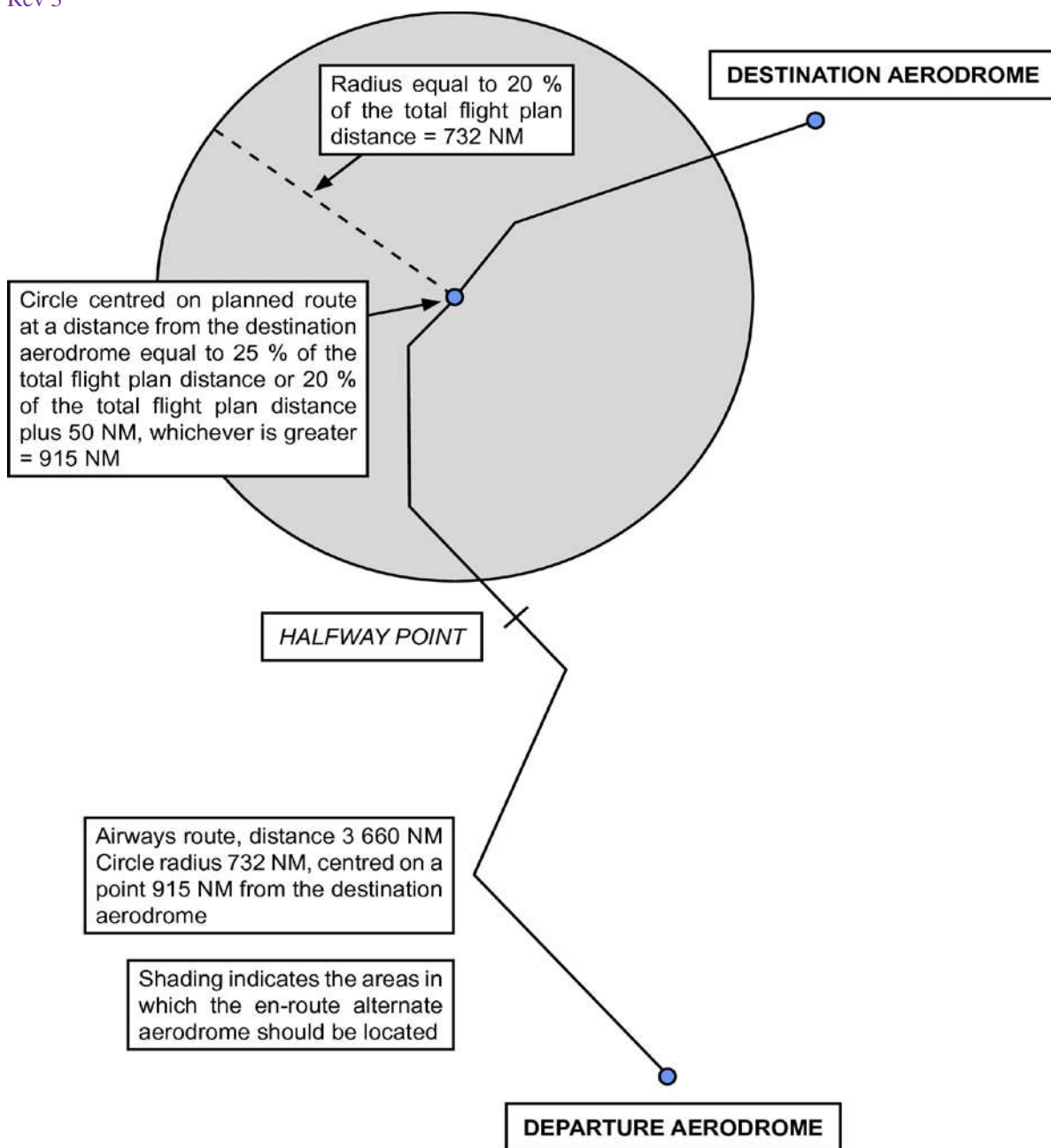
The 3 % ERA aerodrome shall be located within a circle having a radius equal to 20 % of the total flight plan distance, the centre of which lies on the planned route at a distance from the destination aerodrome of 25 % of the total flight plan distance, or at least 20 % of the total flight plan distance plus 50 nm, whichever is greater, all distances are to be calculated in still air conditions (see figure 1).

Rev. 3

Figure 1

Location of the 3 % en-route alternate (3 % ERA) aerodrome for the purposes of reducing contingency fuel]

Rev 3



Appendix 1 to CAR–OPS 1.270 Stowage of baggage and cargo

(a) Procedures established by an operator to ensure that hand baggage and cargo is adequately and securely stowed must take account of the following:

- (1) Each item carried in a cabin must be stowed only in a location that is capable of restraining it;
- (2) Mass limitations placarded on or adjacent to stowages must not be exceeded;
- (3) Underseat stowages must not be used unless the seat is equipped with a restraint bar and the baggage is of such size that it may adequately be restrained by this equipment;
- (4) Items must not be stowed in toilets or against bulkheads that are incapable of restraining articles against movement forwards, sideways or upwards and unless the bulkheads carry a placard specifying the greatest mass that may be placed there;
- (5) Baggage and cargo placed in lockers must not be of such size that they prevent latched doors from being closed securely;
- (6) Baggage and cargo must not be placed where it can impede access to emergency equipment; and
- (7) Checks must be made before take-off, before landing, and whenever the fasten seat belts signs are illuminated or it is otherwise so ordered to ensure that baggage is stowed where it cannot impede evacuation from the aircraft or cause injury by falling (or other movement) as may be appropriate to the phase of flight.

Appendix 1 to CAR–OPS 1.305 Refuelling/defuelling with passengers embarking, on board or disembarking

(a) An operator must establish operational procedures for re/defuelling with passengers embarking, on board or disembarking to ensure the following precautions are taken:

- (1) One qualified person must remain at a specified location during fuelling operations with passengers on board. This qualified person must be capable of handling emergency procedures concerning fire protection and fire-fighting, handling communications and initiating and directing an evacuation;
- (2) A two-way communication shall be established and shall remain available by the aeroplane's inter-communication system or other suitable means between the ground crew supervising the refuelling and the qualified personnel on board the aeroplane;
- (3) Crew, staff and passengers must be warned that re/defuelling will take place;
- (4) 'Fasten Seat Belts' signs must be off;
- (5) 'NO SMOKING' signs must be on, together with interior lighting to enable emergency exits to be identified;
- (6) Passengers must be instructed to unfasten their seat belts and refrain from smoking;
- (7) Sufficient qualified personnel must be on board and be prepared for an immediate emergency evacuation;
- (8) If the presence of fuel vapour is detected inside the aeroplane, or any other hazard arises during re/defuelling, fuelling must be stopped immediately;
- (9) The ground area beneath the exits intended for emergency evacuation and slide deployment areas must be kept clear; and
- (10) Provision is made for a safe and rapid evacuation.

Rev. 1

[Appendix 1 to OPS 1.311 Minimum number of cabin crew required to be on board an aeroplane during ground operations with passengers]

When operating under OPS 1.311 an operator shall establish operational procedures to ensure that:

1. electrical power is available on the aeroplane;
2. a means of initiating an evacuation is available to the senior cabin crew member, or at least one member of the flight crew is on the flight deck;
3. cabin crew stations and associated duties are specified in the operations manual; and
4. cabin crew remain aware of the position of servicing and loading vehicles at and near the exits.]

SUBPART E – ALL WEATHER OPERATIONS**CAR–OPS 1.430 Aerodrome Operating Minima – General**

[(See Appendix 1 to CAR-OPS 1.430, Appendix 2 to CAR-OPS 1.430,)]

(a)1. An operator shall establish, for each aerodrome planned to be used, aerodrome operating minima that are not lower than the values given in Appendix 1. The method of determination of such minima must be acceptable to the Authority. Such minima shall not be lower than any that may be established for such aerodromes by the State in which the aerodrome is located, except when specifically approved by that State.

The use of HUD, HUDLS or EVS may allow operations with lower visibilities than normally associated with the aerodrome operating minima. States which promulgate aerodrome operating minima may also promulgate regulations for reduced visibility minima associated with the use of HUD or EVS.

(a)2. Notwithstanding paragraph (a)1. above, in-flight calculation of minima for use at unplanned alternate aerodromes and/or for approaches utilising EVS shall be carried out in accordance with a method acceptable to the Authority.

(b) In establishing the aerodrome operating minima which will apply to any particular operation, an operator must take full account of:

1. the type, performance and handling characteristics of the aeroplane;
2. the composition of the flight crew, their competence and experience;
3. the dimensions and characteristics of the runways which may be selected for use;
4. the adequacy and performance of the available visual and non-visual ground aids (See Appendix 1 to OPS 1.430 Table 6a);
5. the equipment available on the aeroplane for the purpose of navigation and/or control of the flight path, as appropriate, during the take-off, the approach, the flare, the landing, roll-out and the missed approach;
6. the obstacles in the approach, missed approach and the climb-out areas required for the execution of contingency procedures and necessary clearance;
7. the obstacle clearance altitude/height for the instrument approach procedures;
8. the means to determine and report meteorological conditions; and
9. the flight technique to be used during the final approach. (

c) The aeroplane categories referred to in this Subpart must be derived in accordance with the method given in Appendix 2 to CAR–OPS 1.430

(d)1. All approaches shall be flown as stabilised approaches (SAp) unless otherwise approved by the Authority for a particular approach to a particular runway.

(d)2. All non-precision approaches shall be flown using the continuous descent final approaches (CDFA) technique unless otherwise approved by the Authority for a particular approach to a particular runway. When calculating the minima in accordance with Appendix 1), the operator shall ensure that the applicable minimum RVR is increased by 200 metres (m) for Cat A/B aeroplanes and by 400 m for Cat C/D aeroplanes for approaches not flown using the CDFA technique, providing that the resulting RVR/CMV value does not exceed 5 000 m.

(d)3. Notwithstanding the requirements in (d)2. above, an Authority may exempt an operator from the requirement to increase the RVR when not applying the CDFA technique.

(d)4. Exemptions as described in paragraph (d)3. must be limited to locations where there is a clear public interest to maintain current operations. The exemptions must be based on the operator's experience, training programme and flight crew qualification. The exemptions must be reviewed at regular intervals and must be terminated as soon as facilities are improved to allow application of the CDFA technique.

(e)1. The Authority may exempt an operator from the requirement to increase the RVR above 1 500 m (Cat A/B aeroplanes) or above 2 400 m (Cat C/D aeroplanes), when approving an operation to a particular runway where it is not practicable to fly an approach using the CDFA technique or where the criteria in paragraph (c) of Appendix 1 to OPS 1.430 cannot be met.

(e)2. Exemptions as described in paragraph (e)1. must be limited to locations where there is a clear public interest to maintain current operations. The exemptions must be based on the operator's experience, training programme and flight crew qualification. The exemptions must be reviewed at regular intervals and must be terminated as soon as facilities are improved to allow application of the CDFA technique.}

Rev. 2

CAR-OPS 1.435 Terminology

(a) Terms used in this Subpart and not defined in CAR-1 have the following meaning:

(1) *Circling*. The visual phase of an instrument approach to bring an aircraft into position for landing on a runway which is not suitably located for a straight-in approach.

(2) *Low Visibility Procedures (LVP)*. Procedures applied at an aerodrome for the purpose of ensuring safe operations during Category II and III approaches and Low Visibility Take-offs.

(3) *Low Visibility Take-Off (LVTO)*. A take-off where the Runway Visual Range (RVR) is less than 400 m.

(4) *Flight control system*. A system which includes an automatic landing system and/or a hybrid landing system.

(5) *Fail-Passive flight control system*. A flight control system is fail-passive if, in the event of a failure, there is no significant out-of-trim condition or deviation of flight path or attitude but the landing is not completed automatically. For a fail-passive automatic flight control system the pilot assumes control of the aeroplane after a failure.

(6) *Fail-Operational flight control system*. A flight control system is fail-operational if, in the event of a failure below alert height, the approach, flare and landing, can be completed automatically. In the event of a failure, the automatic landing system will operate as a fail-passive system.

(7) *Fail-operational hybrid landing system*. A system which consists of a primary fail-passive automatic landing system and a secondary independent guidance system enabling the pilot to complete a landing manually after failure of the primary system.

Note: A typical secondary independent guidance system consists of a monitored head-up display providing guidance which normally takes the form of command information but it may alternatively be situation (or deviation) information.

(8) *Visual approach*. An approach when either part or all of an instrument approach procedure is not completed and the approach is executed with visual reference to the terrain.

9. *Continuous descent final approach (CDFA)*” A specific technique for flying the final-approach segment of a non-precision instrument approach procedure as a continuous descent, without level-off, from an altitude/height at or above the Final Approach Fix altitude / height to a point approximately 15 m (50 feet) above the landing runway threshold or the point where the flare manoeuvre should begin for the type of aeroplane flown.

10. *Stabilised approach (SAp)*. An approach which is flown in a controlled and appropriate manner in terms of configuration, energy and control of the flight path from a pre-determined point or altitude/height down to a point 50 feet above the threshold or the point where the flare manoeuvre is initiated if higher.

11. *Head-up display (HUD)* A display system which presents flight information into the pilot’s forward external field of view and which does not significantly restrict the external view.

12. *“Head-up guidance landing system (HUDLS)”*. The total airborne system which provides head-up guidance to the pilot during the approach and landing and/or go-around. It includes all sensors, computers, power supplies, indications and controls. A HUDLS is typically used for primary approach guidance to decision heights of 50 ft.

13. *“Hybrid head-up display landing system (hybrid HUDLS)”*. A system which consists of a primary fail-passive automatic landing system and a secondary independent HUD/HUDLS enabling the pilot to complete a landing manually after failure of the primary system.

Note: Typically, the secondary independent HUD/HUDLS provides guidance which normally takes the form of command information, but it may alternatively be situation (or deviation) information.

14. *“Enhanced vision system (EVS)”*. An electronic means of displaying a real-time image of the external scene through the use of imaging sensors.

15. *“Converted meteorological visibility (CMV)”*. A value (equivalent to an RVR) which is derived from the reported meteorological visibility, as converted in accordance with the requirements in this subpart.

16. *“Lower than Standard Category I Operation”*. A Category I Instrument Approach and Landing Operation using Category I DH, with an RVR lower than would normally be associated with the applicable DH.

17. *“Other than Standard Category II Operation”*. A Category II Instrument Approach and Landing Operation to a runway where some or all of the elements of the ICAO Annex 14 Precision Approach Category II lighting system are not available.

18. *“GNSS landing system (GLS)”*. An approach operation using augmented GNSS information to provide guidance to the aircraft based on its lateral and vertical GNSS position. (It uses geometric altitude reference for its final approach slope).]

Rev. 2

CAR–OPS 1.440 Low visibility operations – General operating rules

(See Appendix 1 to CAR–OPS 1.440)

- (a) An operator shall not conduct Category II or III operations unless:

- (1) Each aeroplane concerned is certificated for operations with decision heights below 200 ft, or no decision height, and equipped in accordance with JAR-AWO or an equivalent accepted by the AUTHORITY;
- (2) A suitable system for recording approach and/or automatic landing success and failure is established and maintained to monitor the overall safety of the operation;
- (3) The operations are approved by the AUTHORITY;
- (4) The flight crew consists of at least 2 pilots; and
- (5) Decision Height is determined by means of a radio altimeter.

(b) An operator shall not conduct low visibility take-offs in less than 150 m RVR (Category A, B and C aeroplanes) or 200 m RVR (Category D aeroplanes) unless approved by the AUTHORITY.

[(c) An operator shall not conduct lower than Standard Category I operations unless approved by the AUTHORITY.]

Rev. 2

CAR-OPS 1.445 Low visibility operations – Aerodrome considerations

(a) An operator shall not use an aerodrome for Category II or III operations unless the aerodrome is approved for such operations by the State in which the aerodrome is located.

(b) An operator shall verify that Low Visibility Procedures (LVP) have been established, and will be enforced, at those aerodromes where low visibility operations are to be conducted.

CAR-OPS 1.450 Low visibility operations – Training and Qualifications

[(See Appendix 1 to OPS 1.450)]

An operator shall ensure that, prior to conducting low visibility take-off, lower than Standard Category I, other than Standard Category II, Category II and III operations or approaches utilising EVS:

1. Each flight crew member:
 - (i) Completes the training and checking requirements prescribed in Appendix 1 including Flight simulator training in operating to the limiting values of RVR/CMV and Decision Height appropriate to the operator's approval; and
 - (ii) Is qualified in accordance with Appendix 1;
2. The training and checking is conducted in accordance with a detailed syllabus approved by the Authority and included in the Operations Manual. This training is in addition to that prescribed in Subpart N; and
3. The flight crew qualification is specific to the operation and the aeroplane type.]

CAR-OPS 1.455 Low visibility operations – Operating Procedures

(See Appendix 1 to CAR-OPS 1.455)

[(a) An operator must establish procedures and instructions to be used for low visibility take-off, approaches utilising EVS,
Lower than Standard Category I, other than Standard Category II, Category II and III operations.
These procedures must be included in the Operations Manual and contain the duties of flight crew

members during taxiing, take-off, approach, flare, landing, roll-out and missed approach as appropriate.

(b) The commander shall satisfy himself/herself that:

1. The status of the visual and non-visual facilities is sufficient prior to commencing a low visibility take-off, an approach utilising EVS, a lower than Standard Category I, an other than Standard Category II, or a Category II or III approach;
2. Appropriate LVPs are in force according to information received from Air Traffic Services, before commencing a low visibility take-off, a lower than Standard Category I, an other than Standard Category II, or a Category II or III approach; and
3. The flight crew members are properly qualified prior to commencing a low visibility take-off in an RVR of less than 150 m (Category A, B and C aeroplanes) or 200 m (Cat D aeroplanes), an approach utilising EVS, a lower than Standard Category I, an other than Standard Category II or a Category II or III approach.]

CAR-OPS 1.460 Low visibility operations – Minimum equipment

(a) An operator must include in the Operations Manual the minimum equipment that has to be serviceable at the commencement of a Low Visibility Take-off or a Category II or III approach in accordance with the AFM or other approved document.

(b) The commander shall satisfy himself that the status of the aeroplane and of the relevant airborne systems is appropriate for the specific operation to be conducted.

CAR-OPS 1.465 VFR Operating minima

An operator shall ensure that VFR flights are conducted in accordance with the Visual Flight Rules as specified in CAR-OPS 0. Subpart E1.

Rev. 1

Appendix 1 to CAR-OPS 1.430 Aerodrome Operating Minima

(See IEM to Appendix 1 to CAR-OPS 1.430)

(a) *Take-off Minima*(1) *General*

(i) Take-off minima established by the operator must be expressed as visibility or RVR limits, taking into account all relevant factors for each aerodrome planned to be used and the aeroplane characteristics. Where there is a specific need to see and avoid obstacles on departure and/or for a forced landing, additional conditions (e.g. ceiling) must be specified.

(ii) The commander shall not commence take-off unless the weather conditions at the aerodrome of departure are equal to or better than applicable minima for landing at that aerodrome unless a suitable take-off alternate aerodrome is available.

(iii) When the reported meteorological visibility is below that required for take-off and RVR is not reported, a take-off may only be commenced if the commander can determine that the RVR/visibility along the take-off runway is equal to or better than the required minimum.

(iv) When no reported meteorological visibility or RVR is available, a take-off may only be commenced if the commander can determine that the RVR/visibility along the take-off runway is equal to or better than the required minimum.

(2) *Visual reference.* The take-off minima must be selected to ensure sufficient guidance to control the aeroplane in the event of both a discontinued take-off in adverse circumstances and a continued take-off after failure of the critical power unit.

(3) *Required RVR/Visibility*

(i) For multi-engined aeroplanes, whose performance is such that, in the event of a critical power unit failure at any point during take-off, the aeroplane can either stop or continue the take-off to a height of 1 500 ft above the aerodrome while clearing obstacles by the required margins, the take-off minima established by an operator must be expressed as RVR/Visibility values not lower than those given in Table 1 below except as provided in paragraph (4) below:

Table 1 – RVR/Visibility for take-off

Take-off RVR/Visibility	
Facilities	RVR/Visibility (Note 3)
Nil (Day only)	500 m
Runway edge lighting and/or centreline marking	250/300 m (Notes 1 & 2)
Runway edge and centreline lighting	200/250 m (Note 1)
Runway edge and centreline lighting and multiple RVR information	150/200 m (Notes 1 & 4)

Note 1: The higher values apply to Category D aeroplanes.

Note 2: For night operations at least runway edge and runway end lights are required.

Note 3: The reported RVR/Visibility value representative of the initial part of the take-off run can be replaced by pilot assessment.

Note 4: The required RVR value must be achieved for all of the relevant RVR reporting points with the exception given in Note 3 above.

(ii) For multi-engined aeroplanes whose performance is such that they cannot comply with the performance conditions in sub-paragraph (a)(3)(i) above in the event of a critical power unit failure, there may be a need to re-land immediately and to see and avoid obstacles in the take-off area. Such aeroplanes may be operated to the following take-off minima provided they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the height specified. The take-off minima established by an operator must be based upon the height from which the one engine inoperative net take-off flight path can be constructed. The RVR minima used may not be lower than either of the values given in Table 1 above or Table 2 below.

Table 2 – Assumed engine failure height above the runway versus RVR/Visibility

Take-off RVR/Visibility – flight path	
Assumed engine failure height above the take-off runway	RVR/Visibility (Note 2)
< 50 ft	200 m
51 – 100 ft	300 m
101 – 150 ft	400 m
151 – 200 ft	500 m
201 – 300 ft	1 000 m
> 300 ft	1 500 m (Note 1)

Note 1: 1 500 m is also applicable if no positive take-off flight path can be constructed.

Note 2: The reported RVR/Visibility value representative of the initial part of the take-off run can be replaced by pilot assessment.

(iii) When reported RVR, or meteorological visibility is not available, the commander shall not commence take-off unless he can determine that the actual conditions satisfy the applicable take-off minima.

(4) *Exceptions to sub-paragraph (a)(3)(i) above:*

(i) Subject to the approval of the AUTHORITY, and provided the requirements in paragraphs (A) to (E) below have been satisfied, an operator may reduce the take-off minima to 125 m RVR (Category A, B and C aeroplanes) or 150 m RVR (Category D aeroplanes) when:

- (A) Low Visibility Procedures are in force;
- (B) High intensity runway centreline lights spaced 15 m or less and high intensity edge lights spaced 60 m or less are in operation;
- (C) Flight crew members have satisfactorily completed training in a Flight Simulator;
- (D) A 90 m visual segment is available from the cockpit at the start of the take-off run; and

(E) The required RVR value has been achieved for all of the relevant RVR reporting points.

- (ii) Subject to the approval of the Authority, an operator of an aeroplane using either:
- (A) an approved lateral guidance system; or,
 - (B) an approved HUD/HUDLS for take-off may reduce the take-off minima to an RVR less than 125 m (Category A, B and C aeroplanes) or 150 m (Category D aeroplanes) but not lower than 75 m provided runway protection and facilities equivalent to Category III landing operations are available.

(b) Category I, APV and non-precision approach operations

1. A Category I approach operation is a precision instrument approach and landing using ILS, MLS, GLS (GNSS/GBAS) or PAR with a decision height not lower than 200 ft and with an RVR not less than 550 m, unless accepted by the Authority.
2. A non-precision approach (NPA) operation is an instrument approach using any of the facilities described in Table 3 (System minima), with a MDH or DH not lower than 250 ft and an RVR/CMV of not less than 750 m, unless accepted by the Authority.
3. An APV operation is an instrument approach which utilises lateral and vertical guidance, but does not meet the requirements established for precision approach and landing operations, with a DH not lower than 250 ft and a runway visual range of not less than 600m unless approved by the Authority.
4. Decision height (DH). An operator must ensure that the decision height to be used for an approach is not lower than:
 - (i) the minimum height to which the approach aid can be used without the required visual reference; or
 - (ii) the OCH for the category of aeroplane; or
 - (iii) the published approach procedure decision height where applicable; or
 - (iv) 200 ft for Category I approach operations; or
 - (v) the system minimum in Table 3; or
 - (vi) the lowest decision height specified in the Aeroplane Flight Manual (AFM) or equivalent document, if stated; whichever is higher.
5. Minimum descent height (MDH). An operator must ensure that the minimum descent height for an approach is not lower than:
 - (i) the OCH for the category of aeroplane; or
 - (ii) the system minimum in Table 3; or
 - (iii) the minimum descent height specified in the Aeroplane Flight Manual (AFM) if stated; whichever is higher.
6. Visual reference. A pilot may not continue an approach below MDA/MDH unless at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:
 - (i) elements of the approach light system;
 - (ii) the threshold;
 - (iii) the threshold markings;
 - (iv) the threshold lights;
 - (v) the threshold identification lights;
 - (vi) the visual glide slope indicator;
 - (vii) the touchdown zone or touchdown zone markings;
 - (viii) the touchdown zone lights;

Facility	Lowest DH/MDH
Localiser with or without DME	250 ft
SRA (terminating at 1/2 NM)	250 ft
SRA (terminating at 1 NM)	300 ft
SRA (terminating at 2 NM or more)	350 ft
RNAV/LNAV	300 ft
VOR	300 ft
VOR/DME	250 ft
NDB	350 ft
NDB/DME	300 ft
VDF	350 ft

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System minima v. facilities

System minima	
Facility	Lowest DH/MDH
Localiser with or without DME	250 ft
SRA (terminating at 1/2 NM)	250 ft
SRA (terminating at 1 NM)	300 ft
SRA (terminating at 2 NM or more)	350 ft
RNAV/LNAV	300 ft
VOR	300 ft
VOR/DME	250 ft
NDB	350 ft
NDB/DME	300 ft
VDF	350 ft

(c) Criteria for establishing RVR/Converted Met Visibility (Ref Table 6)

1. In order to qualify for the lowest allowable values of RVR/CMV detailed in Table 6 (applicable to each approach grouping) the instrument approach shall meet at least the following facility requirements and associated conditions:

(i) Instrument approaches with designated vertical profile up to and including 4,5° for Category A and B aeroplanes, or 3,77° for Category C and D aeroplanes, unless other approach angles are approved by the Authority, where the facilities are:

(A) ILS/MLS/GLS/PAR; or

(B) APV; and where the final approach track is offset by not more than 15° for Category A and B aeroplanes or by not more than 5° for Category C and D aeroplanes.

(ii) Instrument approaches flown using the CDFA technique with a nominal vertical profile, up to and including 4,5° for Category A and B aeroplanes, or 3,77° for Category C and D aeroplanes, unless other approach angles are approved by the Authority where the facilities are NDB, NDB/DME, VOR, VOR/DME, LLZ, LLZ/DME, VDF, SRA or RNAV/LNAV, with a final-approach segment of at least 3NM, which also fulfil the following criteria:

(A) The final approach track is offset by not more than 15° for Category A and B aeroplanes or by not more than 5° for Category C and D aeroplanes; and

(B) The FAF or another appropriate fix where descent is initiated is available, or distance to THR is available by FMS/RNAV or DME; and

(C) If the MAPt is determined by timing, the distance from FAF to THR is ≤ 8 NM.

(iii) Instrument approaches where the facilities are NDB, NDB/DME, VOR, VOR/DME, LLZ, LLZ/DME, VDF, SRA or RNAV/LNAV, not fulfilling the criteria in paragraph (c)1.(ii) above, or with an MDH \geq 1 200 ft.

2. The missed approach, after an approach has been flown using the CDFA technique, shall be executed when reaching the decision altitude (height) or the MAPt, whichever occurs first. The lateral part of the missed approach procedure must be flown via the MAPt unless otherwise stated on the approach chart.

(d) Determination of RVR/CMV/Visibility minima for Category I, APV and non-precision approach operations

1. The minimum RVR/CMV/Visibility shall be the highest of the values derived from Table 5 or Table 6 but not greater than the maximum values shown in Table 6 where applicable

2. The values in Table 5 are derived from the formula below. Required RVR/visibility (m) = $[(DH/MDH \text{ (ft)} \times 0,3048)/\tan\alpha] - \text{length of approach lights (m)}$

Note 1: α is the calculation angle, being a default value of 3,00 degrees increasing in steps

3. With the approval of the Authority, the formula may be used with the actual approach slope and/or the actual length of the approach lights for a particular runway.

4. If the approach is flown with a level flight segment at or above MDA/H, 200 metres shall be added for Cat A and B aeroplane and 400 metres for Cat C and D aeroplane to the minimum RVR/CMV value resulting from the application of Tables 5 and 6.

Note: The added value corresponds to the time/distance required to establish the aeroplane on the final descent.

5. An RVR of less than 750 m as indicated in Table 5 may be used:

(i) for Category I approach operations to runways with FALS (see below), Runway Touchdown Zone Lights (RTZL) and Runway Centreline Lights (RCLL) provided that the DH is not more than 200 ft; or

(ii) for Category I approach operations to runways without RTZL and RCLL when using an approved HUDLS, or equivalent approved system, or when conducting a coupled approach or flight-director-flown approach to a DH equal to or greater than 200 ft. The ILS must not be promulgated as a restricted facility; or

(iii) for APV approach operations to runways with FALS, RTZL and RCLL when using an approved HUD.

6. The Authority may approve RVR values lower than those given in Table 5, for HUDLS and auto-land operations in accordance with paragraph (e) of this Appendix.

7. The visual aids comprise standard runway day markings and approach and runway lighting (runway edge lights, threshold lights, runway end lights and in some cases also touch-down zone and/or runway centre line lights).

The approach light configurations acceptable are classified and listed in Table 4 below.

8. Notwithstanding the requirements in paragraph (d)7. above, the Authority may approve that RVR values relevant to a Basic Approach Lighting System (BALS) are used on runways where the approach lights are restricted in length below 210m due to terrain or water, but where at least one cross-bar is available.

9. For night operations or for any operation where credit for runway and approach lights is required, the lights must be on and serviceable except as provided for in Table 6a.

Table 4

Approach light systems

OPS Class of Facility	Length, configuration and intensity of approach lights
FALS (full approach light system)	ICAO: Precision approach CAT I Lighting System (HIALS 720 m ≥) distance coded centreline, Barrette centreline
IALS (intermediate approach light system)	ICAO: Simple approach lighting system (HIALS 420-719 m) single source, Barrette
BALS (basic approach light system)	Any other approach lighting System (HIALS, MIALS or ALS 210-419 m)
NALS (no approach light system)	Any other approach lighting system (HIALS, MIALS or ALS < 210 m) or no approach lights

Table 5
RVR/CMV (See Table 11) v. DH/MDH

DH or MDH			Class of Lighting Facility			
			FALS	IALS	BALS	NALS
			See paragraphs (d)5, (d)6 and (d)10 about RVR < 750 m			
Feet			Metres			
200	—	210	550	750	1 000	1 200
211	—	220	550	800	1 000	1 200
221	—	230	550	800	1 000	1 200
231	—	240	550	800	1 000	1 200
241	—	250	550	800	1 000	1 300
251	—	260	600	800	1 100	1 300
261	—	280	600	900	1 100	1 300
281	—	300	650	900	1 200	1 400
301	—	320	700	1 000	1 200	1 400
321	—	340	800	1 100	1 300	1 500
341	—	360	900	1 200	1 400	1 600
361	—	380	1 000	1 300	1 500	1 700
381	—	400	1 100	1 400	1 600	1 800
401	—	420	1 200	1 500	1 700	1 900
421	—	440	1 300	1 600	1 800	2 000
441	—	460	1 400	1 700	1 900	2 100
461	—	480	1 500	1 800	2 000	2 200
481	—	500	1 500	1 800	2 100	2 300
501	—	520	1 600	1 900	2 100	2 400
521	—	540	1 700	2 000	2 200	2 400
541	—	560	1 800	2 100	2 300	2 500
561	—	580	1 900	2 200	2 400	2 600
581	—	600	2 000	2 300	2 500	2 700
601	—	620	2 100	2 400	2 600	2 800
621	—	640	2 200	2 500	2 700	2 900
641	—	660	2 300	2 600	2 800	3 000
661	—	680	2 400	2 700	2 900	3 100
681	—	700	2 500	2 800	3 000	3 200
701	—	720	2 600	2 900	3 100	3 300
721	—	740	2 700	3 000	3 200	3 400
741	—	760	2 700	3 000	3 300	3 500
761	—	800	2 900	3 200	3 400	3 600
801	—	850	3 100	3 400	3 600	3 800
851	—	900	3 300	3 600	3 800	4 000
901	—	950	3 600	3 900	4 100	4 300
951	—	1 000	3 800	4 100	4 300	4 500
1 001	—	1 100	4 100	4 400	4 600	4 900
1 101	—	1 200	4 600	4 900	5 000	5 000
1 201 and above			5 000	5 000	5 000	5 000

Table 6

Minimum and maximum applicable RVR/converted met visibility (see Table 11) for all instrument approaches down to CAT I minima (lower and upper cut-off limits):

Facility/conditions	RVR/CMV (m)	Aeroplane category			
		A	B	C	D
ILS, MLS, GLS, PAR and APV	Min	According to Table 5			
	Max	1 500	1 500	2 400	2 400
NDB, NDB/DME, VOR, VOR/DME, LLZ, LLZ/DME, VDF, SRA, RNAV/LNAV with a procedure which fulfils the criteria in paragraph (c)1.(ii):	Min	750	750	750	750
	Max	1 500	1 500	2 400	2 400
For NDB, NDB/DME, VOR, VOR/DME, LLZ, LLZ/DME, VDF, SRA, RNAV/LNAV: — not fulfilling the criteria in paragraph (c)1.(ii) above, or — with a DH or MDH \geq 1 200 ft	Min	1 000	1 000	1 200	1 200
	Max	According to Table 5 if flown using the CDFA technique, otherwise an add-on of 200/400 m applies to the values in Table 5 but not to result in a value exceeding 5 000 m.			

Table 6a

Failed or downgraded equipment — effect on landing minima:

Failed or downgraded equipment (Note 1)	Effect on landing minima				
	CAT IIIB (Note 2)	CAT IIIA	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
Touchdown 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 runway in use	No effect if other ground source available				
Celiometer	No effect				
Approach lights	Not allowed for operations with DH > 50 ft		Not allowed	minima as for nil facilities	
Approach lights except the last 210 m	No effect		Not allowed	minima as for nil facilities	
Approach lights except the last 420 m	No effect			minima as for intermediate facilities	

Failed or downgraded equipment (Note 1)	Effect on landing minima				
	CAT IIIB (Note 2)	CAT IIIA	CAT II	CAT I	Non precision
Standby power for approach lights	No effect				
Whole runway light system	Not allowed			Day — minima as for nil facilities Night — Not allowed	
Edge lights	Day only; Night — not allowed				
Centreline lights	Day — RVR 300m Night — not allowed		Day — RVR 300 m Night — 550 m	No effect	
Centreline lights spacing increased to 30 m	RVR 150m	No effect			
Touchdown zone lights	Day — RVR 200 m Night — 300 m	Day — RVR 300 m Night — 550 m		No effect	
Standby power for runway lights	Not allowed			No effect	
Taxiway light system	No effect — except delays due to reduced movement rate				

Note 1: Conditions applicable to Table 6a:

- (a) multiple failures of runway lights other than indicated in Table 6a are not acceptable.
- (b) deficiencies of approach and runway lights are treated separately.
- (c) Category II or III operations. A combination of deficiencies in runway lights and RVR assessment equipment is not allowed.
- (d) failures other than ILS affect RVR only and not DH.

Note 2: For CAT IIIB operations with no DH, an operator shall ensure that, for aeroplanes authorised to conduct no DH operations with the lowest RVR limitations, the following applies in addition to the content of Table 6a:

- (a) RVR. At least one RVR value must be available at the aerodrome;
- (b) runway lights
 - (i) no runway edge lights, or no centre lights — Day — RVR 200 m; night — not allowed;
 - (ii) no TDZ lights — no restrictions;
 - (iii) no standby power to runway lights — Day — RVR 200 m; night — not allowed.

10. Single pilot operations. For single pilot operations, an operator must calculate the minimum RVR/visibility for all approaches in accordance with OPS 1.430 and this Appendix.

(i) An RVR of less than 800 metres as indicated in Table 5 may be used for Category I approaches provided any of the following is used at least down to the applicable DH:

- (A) a suitable autopilot, coupled to an ILS or MLS which is not promulgated as restricted; or
- (B) an approved HUDLS (including, where appropriate, EVS), or equivalent approved system.

(ii) Where RTZL and/or RCLL are not available, the minimum RVR/CMV shall not be less than 600 m.

(iii) An RVR of less than 800 metres as indicated in Table 5 may be used for APV operations to runways with FALS, RTZL and RCLL when using an approved HUDLS, or equivalent approved system, or when conducting a coupled approach to a DH equal to or greater than 250 ft.

e) Lower than Standard Category I Operations

1. Decision height.

A lower than Standard Category I Operation decision height must not be lower than:

- (i) the minimum decision height specified in the AFM, if stated; or
- (ii) the minimum height to which the precision approach aid can be used without the required visual reference or
- (iii) the OCH for the category of aeroplane; or
- (iv) the decision height to which the flight crew is authorised to operate; or (v) 200 ft. whichever is higher.

2. Type of facility.

An ILS/MLS which supports a lower than Standard Category I operation must be an unrestricted facility with a straight-in course (≤ 30 offset) and the ILS must be certificated to:

- (i) Class I/T/1 for operations to a minimum of 450m RVR; or
- (ii) Class II/D/2 for operations to less than 450m RVR.

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

3. Required RVR/CMV.

The lowest minima to be used by an operator for lower than Standard Category I operations are stipulated in Table 6b below:

Table 6b

Lower than Standard Category I Minimum RVR/CMV v. approach light system

Lower than Standard Category I minima						
DH(ft)			Class of lighting facility			
			FALS	IALS	BALS	NALS
			RVR/CMV (metres)			
200	—	210	400	500	600	750
211	—	220	450	550	650	800
221	—	230	500	600	700	900
231	—	240	500	650	750	1 000
241	—	249	550	700	800	1 100

Note 1: The visual aids comprise standard runway day markings, approach lighting, runway edge lights, threshold lights, runway end lights and, for operations below 450m, shall include touch-down zone and/or runway centre line lights.

4. Visual reference. A pilot shall not continue an approach below decision height unless visual reference containing a segment of at least three consecutive lights being the centre line of the approach lights, or touchdown zone lights, or runway centre line lights, or runway edge lights, or a combination of these is attained and can be maintained.

This visual reference must include a lateral element of the ground pattern, i.e. an approach lighting crossbar or the landing threshold or a barrette of the touchdown zone lighting unless the operation is conducted utilising an approved HUDLS usable to at least 150 ft.

5. Approval.

To conduct lower than Standard Category I operations:

- (i) the approach shall be flown auto-coupled to an auto-land; or an approved HUDLS shall be used to at least 150 ft above the threshold.
- (ii) the aeroplane shall be certificated in accordance with CS-AWO to conduct Category II operations;
- (iii) the auto-land system shall be approved for Category IIIA operations;
- (iv) in service proving requirements shall be completed in accordance with Appendix 1 to OPS 1.440 paragraph (h);
- (v) training specified in Appendix 1 to OPS 1.450 paragraph (h) shall be completed, this shall include training and checking in a Flight Simulator using the appropriate ground and visual aids at the lowest applicable RVR;
- (vi) the Operator must ensure that Low Visibility procedures are established and in operation at the intended aerodrome of landing; and
- (vii) the Operator shall be approved by the Authority.

(f) Precision approach — Category II and other than Standard Category II operations

1. General.

- (i) A Category II operation is a precision instrument approach and landing using ILS or MLS with:
 - (A) A decision height below 200 ft but not lower than 100 ft; and
 - (B) A runway visual range of not less than 300 m.
- (ii) An other than Standard Category II operation is a precision instrument approach and landing using ILS or MLS which meets facility requirements as established in paragraph (iii) below with:
 - (A) A decision height below 200 ft but not lower than 100 ft; (See Table 7b below) and
 - (B) A runway visual range of not less than 350/400 m. (See Table 7b below)
- (iii) The ILS/MLS that supports other than a Standard Category II operation shall be an unrestricted facility with a straight in course (≤ 30 offset) and the ILS shall be certificated to:
 - (A) Class I/T/1 for operations down to 450m RVR and to a DH of 200 ft or more; or,
 - (B) Class II/D/2 for operations in RVRs of less than 450m or to a DH of less than 200 ft.

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

2. Decision Height. An operator must ensure that the decision height for:

- (i) Other than Standard Category II and Category II operations is not lower than:
 - (A) The minimum decision height specified in the AFM, if stated; or
 - (B) The minimum height to which the precision approach aid can be used without the required visual reference; or
 - (C) The OCH for the category of aeroplane; or
 - (D) The decision height to which the flight crew is authorised to operate; or
 - (E) 100 ft. whichever is higher

3. Visual reference. A pilot may not continue an approach below either the Category II or the other than Standard Category II decision height determined in accordance with subparagraph (d)2. above unless visual reference containing a segment of at least 3 consecutive lights being the centre line of the approach lights, or touchdown zone lights, or runway centre line lights, or runway edge lights, or a combination of these is attained and can be maintained.

This visual reference must include a lateral element of the ground pattern, i.e. an approach lighting crossbar or the landing threshold or a barrette of the touchdown zone lighting unless the operation is conducted utilising an approved HUDLS to touchdown.

4. (i) Required RVR. The lowest minima to be used by an operator for Category II operations are:

Table 7a

RVR for Cat II operations v. DH

Category II minima		
DH(ft)	Auto-coupled/Approved HUDLS to below DH (Note 1a)	
	RVR Aeroplane Category A, B and C	RVR Aeroplane Category D
100-120	300 m	300/350m (Note 2a)
121-140	400 m	400 m
141 and above	450 m	450m

Note 1a: The reference to "auto-coupled to below DH/Approved HUDLS" in this table means continued use of the automatic flight control system or the HUDLS down to a height of 80 % of the DH. Thus airworthiness requirements may, through minimum engagement height for the automatic flight control system, affect the DH to be applied.

Note 2a: 300 m may be used for a Category D aeroplane conducting an auto-land.

(ii) Required RVR. The lowest minima to be used by an operator for other than Standard Category II operations are:

Table 7b

Other than Standard Category II Minimum RVR v. approach light system

Other than Standard Category II minima					
	Auto-land or approved HUDLS utilised to touchdown				
	Class of lighting facility				
	FALS	IALS	BALS	NALS	
	See para (d)5., (d)6. and (d)10. about RVR < 750m				
	CAT A-C	CAT D	CAT A-D	CAT A-D	CAT A-D
DH (ft)	RVR metres				
100-120	350	400	450	600	700
121-140	400	450	500	600	700
141-160	450	500	500	600	750
161-199	450	500	550	650	750

Note: The visual aids required to conduct other than Standard Category II Operations comprise standard runway day markings and approach and runway lighting (runway edge lights, threshold lights, runway end lights). For operations in RVR of 400 m or less, centre line lights must be available. The approach light configurations are classified and listed in Table 4 above.

(iii) To conduct other than Standard Category II operations the operator must ensure that appropriate low visibility procedures are established and in operation at the intended aerodrome of landing.

(g) Precision approach — Category III operations

1. General. Category III operations are subdivided as follows:

(i) Category III A operations. A precision instrument approach and landing using ILS or MLS with:

- (A) a decision height lower than 100 ft; and
- (B) a runway visual range not less than 200 m.

(ii) Category III B operations. A precision instrument approach and landing using ILS or MLS with:

- (A) a decision height lower than 100 ft, or no decision height; and
- (B) a runway visual range lower than 200 m but not less than 75 m.

Note: Where the decision height (DH) and runway visual range (RVR) do not fall within the same Category, the RVR will determine in which Category the operation is to be considered.

2. Decision height. For operations in which a decision height is used, an operator must ensure that the decision height is not lower than:

- (i) the minimum decision height specified in the AFM, if stated; or
- (ii) the minimum height to which the precision approach aid can be used without the required visual reference; or
- (iii) the decision height to which the flight crew is authorised to operate.

3. No decision height operations. Operations with no decision height may only be conducted if:

- (i) the operation with no decision height is authorised in the AFM; and
- (ii) the approach aid and the aerodrome facilities can support operations with no decision height; and
- (iii) the operator has an approval for CAT III operations with no decision height.

Note: In the case of a CAT III runway it may be assumed that operations with no decision height can be supported unless specifically restricted as published in the AIP or NOTAM.

4. Visual reference

- (i) For Category IIIA operations, and for Category IIIB operations conducted either with fail-passive flight control systems, or with the use of an approved HUDLS, a pilot may not continue an approach below the decision height determined in accordance with subparagraph (g)2. above unless a visual reference containing a segment of at least three consecutive lights being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of these is attained and can be maintained.
- (ii) For Category IIIB operations conducted either with fail-operational flight control systems or with a failoperational hybrid landing system (comprising e.g. a HUDLS) using a decision height a pilot may not continue an approach below the decision height, determined in accordance with subparagraph (e)2. above, unless a visual reference containing at least one centreline light is attained and can be maintained.

4. Required RVR. The lowest minima to be used by an operator for Category III operations are:

Table 8

RVR for Cat III Operations v. DH and roll-out control/guidance system

Category III minima			
Category	Decision height (ft) (Note 2)	Roll-out control/Guidance system	RVR (m)
IIIA	Less than 100 ft	Not required	200 m
IIIB	Less than 100 ft	Fail-passive	150 m (Note 1)
IIIB	Less than 50 ft	Fail-passive	125 m
IIIB	Less than 50 ft or No decision height	Fail-operational (Note 3)	75 m

Note 1: For aeroplanes certificated in accordance with CS-AWO 321(b)3. or equivalent.

Note 2: Flight control system redundancy is determined under CS-AWO by the minimum certificated decision height.

Note 3: The fail-operational system referred to may consist of a fail-operational hybrid system.

(h) Enhanced vision systems

1. A pilot using an enhanced vision system certificated for the purpose of this paragraph and used in accordance with the procedures and limitations of the approved flight manual, may:

(i) continue an approach below DH or MDH to 100 feet above the threshold elevation of the runway provided that at least one of the following visual references is displayed and identifiable on the enhanced vision system:

(A) elements of the approach lighting; or

(B) the runway threshold, identified by at least one of the following: the beginning of the runway landing surface, the threshold lights, the threshold identification lights; and the touchdown zone, identified by at least one of the following: the runway touchdown zone landing surface, the touchdown zone lights, the touchdown zone markings or the runway lights;

(ii) reduce the calculated RVR/CMV for the approach from the value in column 1 of Table 9 below to the value in column 2:

Table 9

Approach utilising EVS RVR/CMV reduction v. normal RVR/CMV

RVR/CMV normally required	RVR/CMV for approach utilising EVS
550	350
600	400
650	450
700	450
750	500
800	550
900	600
1 000	650
1 100	750
1 200	800
1 300	900
1 400	900
1 500	1 000
1 600	1 100
1 700	1 100

RVR/CMV normally required	RVR/CMV for approach utilising EVS
1 800	1 200
1 900	1 300
2 000	1 300
2 100	1 400
2 200	1 500
2 300	1 500
2 400	1 600
2 500	1 700
2 600	1 700
2 700	1 800
2 800	1 900
2 900	1 900
3 000	2 000
3 100	2 000
3 200	2 100
3 300	2 200
3 400	2 200
3 500	2 300
3 600	2 400
3 700	2 400
3 800	2 500
3 900	2 600
4 000	2 600
4 100	2 700
4 200	2 800
4 300	2 800
4 400	2 900
4 500	3 000
4 600	3 000
4 700	3 100
4 800	3 200
4 900	3 200
5 000	3 300

2. Paragraph (h)1. above may only be used for ILS, MLS, PAR, GLS and APV Operations with a DH no lower than 200 feet or an approach flown using approved vertical flight path guidance to a MDH or DH no lower than 250 feet.

3. A pilot may not continue an approach below 100 feet above runway threshold elevation for the intended runway, unless at least one of the visual references specified below is distinctly visible and identifiable to the pilot without reliance on the enhanced vision system:

- (A) The lights or markings of the threshold; or
- (B) The lights or markings of the touchdown zone.

(i) Intentionally left blank

(j) Circling

1. Minimum descent height (MDH). The MDH for circling shall be the higher of:

- (i) the published circling OCH for the aeroplane category; or
- (ii) the minimum circling height derived from Table 10 below; or
- (iii) the DH/MDH of the preceding instrument approach procedure.

2. Minimum descent altitude (MDA). The MDA for circling shall be calculated by adding the published aerodrome elevation to the MDH, as determined by 1. above.

3. Visibility. The minimum visibility for circling shall be the higher of:

- (i) the circling visibility for the aeroplane category, if published; or
- (ii) the minimum visibility derived from Table 10 below; or
- (iii) the RVR/CMV derived from Tables 5 and 6 for the preceding instrument approach procedure.

4. Notwithstanding the requirements in subparagraph 3. above, an Authority may exempt an operator from the requirement to increase the visibility above that derived from Table 10.

5. Exemptions as described in subparagraph 4. must be limited to locations where there is a clear public interest to maintain current operations. The exemptions must be based on the operator's experience, training programme and flight crew qualification. The exemptions must be reviewed at regular intervals.

Table 10

Minimum visibility and MDH for circling v. aeroplane category

	Aeroplane Category			
	A	B	C	D
MDH (ft)	400	500	600	700
Minimum meteorological visibility (m)	1 500	1 600	2 400	3 600

2. Circling with prescribed tracks is an accepted procedure within the meaning of this paragraph.

(k) Visual approach. An operator shall not use an RVR of less than 800 m for a visual approach.

(l) Conversion of reported meteorological visibility to RVR/CMV.

1. An operator must ensure that a meteorological visibility to RVR/CMV conversion is not used for takeoff, for calculating any other required RVR minimum less than 800 m, or when reported RVR is available.

Note: If the RVR is reported as being above the maximum value assessed by the aerodrome operator, e.g. "RVR more than 1 500 metres", it is not considered to be a reported value for the purpose of this paragraph.

2. When converting meteorological visibility to RVR in all other circumstances than those in subparagraph (l)1. above, an operator must ensure that the following Table is used:

Table 11
Conversion of met visibility to RVR/CMV

Lighting elements in operation	RVR/CMV = Reported met. Visibility ×	
	Day	Night
HI approach and runway lighting	1,5	2,0
Any type of lighting installation other than above	1,0	1,5
No lighting	1,0	Not applicable

Appendix 2 to CAR–OPS 1.430 (c) Aeroplane categories – All Weather Operations*(a) Classification of aeroplanes*

The criteria taken into consideration for the classification of aeroplanes by categories is the indicated airspeed at threshold (V_{AT}) which is equal to the stalling speed (V_{SO}) multiplied by 1.3 or V_{S1G} multiplied by 1.23 in the landing configuration at the maximum certificated landing mass. If both V_{SO} and V_{S1G} are available, the higher resulting V_{AT} shall be used. The aeroplane categories corresponding to V_{AT} values are in the Table below:

Aeroplane Category	V_{AT}
A	Less than 91 kt
B	From 91 to 120 kt
C	From 121 to 140 kt
D	From 141 to 165 kt
E	From 166 to 210 kt

The landing configuration which is to be taken into consideration shall be defined by the operator or by the aeroplane manufacturer.

(b) Permanent change of category (maximum landing mass)

- (1) An operator may impose a permanent, lower, landing mass, and use this mass for determining the V_{AT} if approved by the AUTHORITY.
- (2) The category defined for a given aeroplane shall be a permanent value and thus independent of the changing conditions of day-to-day operations.

Appendix 1 to CAR–OPS 1.440 Low Visibility Operations – General Operating Rules

[(a) General. The following procedures apply to the introduction and approval of low visibility operations.

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

1. At least 30 approaches and landings must be accomplished in operations using the Category II/III systems installed

in each aircraft type if the requested DH is 50 ft or higher. If the DH is less than 50 ft, at least 100 approaches and landings will need to be accomplished unless otherwise approved by the Authority.

2. If an operator has different variants of the same type of aircraft utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type of aircraft, the operator must show that the various variants have satisfactory performance, but the operator need not conduct a full operational demonstration for each variant. The Authority may also accept a reduction of the number of approach and landings based on credit given for the experience gained by another operator with an AOC issued in accordance with OPS 1 using the same aeroplane type or variant and procedures.

3. If the number of unsuccessful approaches exceeds 5 % of the total (e.g. unsatisfactory landings, system disconnects) the evaluation programme must be extended in steps of at least 10 approaches and landings until the overall failure rate does not exceed 5 %.

(c) Data collection for operational demonstrations. Each applicant must develop a data collection method (e.g. a form to be used by the flight crew) to record approach and landing performance. The resulting data and a summary of the demonstration data shall be made available to the Authority for evaluation

(d) Data analysis. Unsatisfactory approaches and/or automatic landings shall be documented and analysed.

(e) Continuous monitoring

1. After obtaining the initial authorisation, the operations must be continuously monitored by the operator to detect any undesirable trends before they become hazardous. Flight crew reports may be used to achieve this.

2. The following information must be retained for a period of 12 months:

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

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

(A) airborne equipment faults;

(B) ground facility difficulties;

(C) missed approaches because of ATC instructions; or

(D) other reasons.

3. An operator must establish a procedure to monitor the performance of the automatic landing system or HUDLS to touchdown performance, as appropriate, of each aeroplane.

(f) Transitional periods

1. Operators with no previous Category II or III experience

- (i) An operator without previous Category II or III operational experience may be approved for Category II or IIIA operations, having gained a minimum experience of six months of Category I operations on the aeroplane type.
- (ii) On completing six months of Category II or IIIA operations on the aeroplane type the operator may be approved for Category IIIB operations. When granting such an approval, the Authority may impose higher minima than the lowest applicable for an additional period. The increase in minima will normally only refer to RVR and/or a restriction against operations with no decision height and must be selected such that they will not require any change of the operational procedures.
2. (i) Operators with previous Category II or III experience. An operator with previous Category II or III experience may obtain authorisation for a reduced transition period by application to the Authority.
- (ii) An operator authorised for Category II or III operations using auto-coupled approach procedures, with or without auto-land, and subsequently introducing manually flown Category II or III operations using a HUDLS shall be considered to be a “New Category II/III operator” for the purposes of the demonstration period provisions.
- (g) Maintenance of Category II, Category III and LVTO equipment. Maintenance instructions for the on-board guidance systems must be established by the operator, in liaison with the manufacturer, and included in the operator’s aeroplane maintenance programme prescribed in Part M, paragraph M.A.302 which must be approved by the Authority.
- (h) Eligible aerodromes and runways
1. Each aeroplane type/runway combination must be verified by the successful completion of at least one approach and landing in Category II or better conditions, prior to commencing Category III operations.
 2. For runways with irregular pre-threshold terrain or other foreseeable or known deficiencies, each aeroplane type/runway combination must be verified by operations in standard Category I or better conditions, prior to commencing
Lower than Standard Category I, Category II, or other than Standard Category II or Category III operations.
 3. If an operator has different variants of the same type of aeroplane in accordance with subparagraph 4 below, utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type of aeroplane in accordance with subparagraph 4 below, the operator must show that the variants have satisfactory operational performance, but the operator need not conduct a full operational demonstration for each variant/runway combination.
 4. For the purpose of paragraph (h), an aeroplane type or variant of an aeroplane type is deemed to be the same type/variant of aeroplane if that type/variant has the same or similar:
 - (i) level of technology, including the:
 - (A) FGS and associated displays and controls;
 - (B) the FMS and level of integration with the FGS;
 - (C) use of HUDLS.
 - (ii) Operational procedures, including:
 - (A) alert height;
 - (B) manual landing/automatic landing;
 - (C) no decision height operations;
 - (D) use of HUD/HUDLS in hybrid operations.
 - (iii) Handling characteristics, including:
 - (A) manual landing from automatic or HUDLS guided approach;
 - (B) manual go-around from automatic approach;
 - (C) automatic/manual roll out.

5. Operators using the same aeroplane type/class or variant of a type in accordance with subparagraph 4 above may take credit from each others' experience and records in complying with this paragraph.

6. Operators conducting Other than Standard Category II operations shall comply with Appendix 1 to OPS 1.440— Low Visibility Operations — General Operating Rules applicable to Category II operations.]

Rev.2

[Appendix 1 to CAR-OPS 1.450 Low Visibility Operations – Training & Qualifications

(a) **General.** An operator must ensure that flight crew member training programmes for Low Visibility Operations include structured courses of ground, Flight Simulator and/or flight training. The operator may abbreviate the course content as prescribed by sub-paragraphs (2) and (3) below provided the content of the abbreviated course is acceptable to the AUTHORITY.

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

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

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

(ii) abbreviated ground, flight simulator and/or flight training course if operating the same type/class and variant of the same type or class on which the previous Category II or Category III experience was gained. The abbreviated course is to include at least the requirements of subparagraphs (d)1, (d)2(i) or (d)2(ii) as appropriate and (d)3(i). With the approval of the Authority, the operator may reduce the number of approaches/landings required by subparagraph (d)2(i) if the type/class or the variant of the type or class has the same or similar:

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

(B) operational procedures;

(C) handling characteristics (See paragraph 4 below);

as the previously operated type or class, otherwise the requirement of (d)2(i) has to be met in full;

(D) use of HUDLS/hybrid HUDLS;

(E) use of EVS.

3. Flight crew members with Category II or Category III experience with the operator may undertake an abbreviated ground, Flight simulator and/or flight training course.

The abbreviated course when changing:

(i) aeroplane type/class is to include at least the requirements of subparagraphs (d)1, (d)2(i) or (d)2(ii) as appropriate and (d)3(i);

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

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

(B) operational procedures — integrity;

(C) handling characteristics (See paragraph 4 below);

(D) use of HUDLS/Hybrid HUDLS;

(E) use of EVS

as the previously operated type or class, then a difference course or familiarisation appropriate to the change of variant fulfils the abbreviated course requirements.

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

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

(B) operational procedures — integrity;

(C) handling characteristics (See paragraph 4 below);

(D) use of HUDLS/Hybrid HUDLS;

(E) use of EVS

then the requirements of subparagraphs (d)1, (d)2(i) or (d)2(ii) as appropriate and (d)3(i) shall be fulfilled.

With the approval of the Authority the operator may reduce the number of approaches/landings required by subparagraph (d)2(i).

4. An operator must ensure when undertaking Category II or Category III operations with different variant(s) of aeroplane within the same type or class rating that the differences and/or similarities of the aeroplanes concerned justify such operations, taking account at least the following:

(i) the level of technology, including the:

- (A) FGS and associated displays and controls;
- (B) the Flight Management System and its integration or not with the FGS;
- (C) use of HUD/HUDLS with hybrid systems and/or EVS;

(ii) operational procedures, including:

- (A) fail-passive/fail-operational, alert height;
- (B) manual landing/automatic landing;
- (C) no decision height operations;
- (D) use of HUD/HUDLS with hybrid systems;

(iii) handling characteristics, including:

- (A) manual landing from automatic HUDLS and/or EVS guided approach;
- (B) manual go-around from automatic approach;
- (C) automatic/manual roll out.

(b) Ground training. An operator must ensure that the initial ground training course for low visibility operations covers at least:

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

(c) Flight Simulator training and/or flight training

1 An operator must ensure that Flight Simulator and/or flight training for Low Visibility Operations includes:

- (i) Checks of satisfactory functioning of equipment, both on the ground and in flight;
- (ii) Effect on minima caused by changes in the status of ground installations;
- (iii) Monitoring of:
 - (A) automatic flight control systems and auto land status annunciators with emphasis on the action to be taken in the event of failures of such systems; and
 - (B) HUD/HUDLS/EVS guidance status and annunciators as appropriate, to include head down displays;
- (iv) Actions to be taken in the event of failures such as engines, electrical systems, hydraulics or flight control systems;
- (v) The effect of known unserviceabilities and use of minimum equipment lists;
- (vi) Operating limitations resulting from airworthiness certification;
- (vii) Guidance on the visual cues required at decision height together with information on maximum deviation allowed from glidepath or localiser; and
- (viii) The importance and significance of Alert Height if applicable and the action in the event of any failure above and below the Alert Height.

2 An operator must ensure that each flight crew member is trained to carry out his duties and instructed on the coordination required with other crew members. Maximum use should be made of Flight Simulators.

3 Training must be divided into phases covering normal operation with no aeroplane or equipment failures but including all weather conditions which may be encountered and detailed scenarios of aeroplane and equipment failure which could affect Category II or III operations. If the aeroplane system involves the use of hybrid or other special systems (such as head up displays or enhanced vision equipment) then flight crew members must practise the use of these systems in normal and abnormal modes during the Flight Simulator phase of training.

4 Incapacitation procedures appropriate to Low Visibility Take-offs and Category II and III operations shall be practised.

5 For aeroplanes with no Flight Simulator available to represent that specific aeroplane operators must ensure that the flight training phase specific to the visual scenarios of Category II operations is conducted in a specifically approved Flight Simulator. Such training must include a minimum of 4 approaches. The training and procedures that are type specific shall be practised in the aeroplane.

6 Initial Category II and III training shall include at least the following exercises:

- (i) approach using the appropriate flight guidance, autopilots and control systems installed in the aeroplane, to the appropriate decision height and to include transition to visual flight and landing;
- (ii) approach with all engines operating using the appropriate flight guidance systems, autopilots, HUDLS and/or EVS and control systems installed in the aeroplane down to the appropriate decision height followed by missed approach; all without external visual reference;
- (iii) where appropriate, approaches utilising automatic flight systems to provide automatic flare, landing and rollout; and

- (iv) normal operation of the applicable system both with and without acquisition of visual cues at decision height.
- 7 Subsequent phases of training must include at least:
- (i) Approaches with engine failure at various stages on the approach;
 - (ii) Approaches with critical equipment failures (e.g. electrical systems, autoflight systems, ground and/or airborne ILS/MLS systems and status monitors);
 - (iii) approaches where failures of auto flight equipment and/or HUD/HUDLS/EVS at low level require either:
 - (A) reversion to manual flight to control flare, landing and roll out or missed approach; or
 - (B) reversion to manual flight or a downgraded automatic mode to control missed approaches from, at or below decision height including those which may result in a touchdown on the runway;
 - (iv) Failures of the systems which will result in excessive localiser and/or glideslope deviation, both above and below decision height, in the minimum visual conditions authorised for the operation. In addition, a continuation to a manual landing must be practised if a head-up display forms a downgraded mode of the automatic system or the head-up display forms the only flare mode; and
 - (v) Failures and procedures specific to aeroplane type or variant.
- 8 The training programme must provide practice in handling faults which require a reversion to higher minima.
- 9 The training programme must include the handling of the aeroplane when, during a fail passive Category III approach, the fault causes the autopilot to disconnect at or below decision height when the last reported RVR is 300 m or less.
- 10 Where take-offs are conducted in RVRs of 400 m and below, training must be established to cover systems failures and engine failure resulting in continued as well as rejected take-offs.
- 11 The training programme must include, where appropriate, approaches where failures of the HUDLS and/or EVS equipment at low level require either:
- (i) reversion to head down displays to control missed approach; or
 - (ii) reversion to flight with no, or downgraded, HUDLS Guidance to control missed approaches from decision height or below, including those which may result in a touchdown on the runway.
12. An operator shall ensure that when undertaking low visibility take-off, lower than Standard Category I, other than Standard Category II, and Category II and III Operations utilising a HUD/HUDLS or hybrid HUD/HUDLS or an EVS, that the training and checking programme includes, where appropriate, the use of the HUD/HUDLS in normal operations during all phases of flight.

(d) Conversion training requirements to conduct low visibility take-off, lower than Standard Category I, other than Standard Category II, approach utilising EVS and Category II and III Operations. An operator shall ensure that each flight crew member completes the following low visibility procedures training if converting to a new type/class or variant of aeroplane in which low visibility take-off, lower than Standard Category I, Other than Standard Category II, Approach utilising EVS with an RVR of 800m or less and Category II and III Operations will be conducted. The

flight crew member experience requirements to undertake an abbreviated course are prescribed in subparagraphs (a)2, (a)3 and (a)4, above:

- 1 *Ground Training.* The appropriate requirements prescribed in sub-paragraph (b) above, taking into account the flight crew member's Category II and Category III training and experience.
- 2 *Flight Simulator Training and/or Flight training.*
 - (i) A minimum of six (eight for HUDLS with or without EVS) approaches and/or landings in a flight simulator.
The requirements for eight HUDLS approaches may be reduced to six when conducting Hybrid HUDLS operations. See subparagraph 4.(i) below.
 - (ii) Where no Flight simulator is available to represent that specific aeroplane, a minimum of three (five for HUDLS and/or EVS) approaches including at least one go-around is required on the aeroplane. For Hybrid HUDLS operations a minimum of three approaches are required, including at least one go-around.
 - (iii) Appropriate additional training if any special equipment is required such as head-up displays or enhanced vision equipment. When approach operations utilising EVS are conducted with an RVR of less than 800m, a minimum of five approaches, including at least one go-around are required on the aeroplane.
- 3 *Flight Crew Qualification.* The flight crew qualification requirements are specific to the operator and the type of aeroplane operated.
 - (i) The operator must ensure that each flight crew member completes a check before conducting Category II or III operations.
 - (ii) The check prescribed in sub-paragraph (i) above may be replaced by successful completion of the Flight Simulator and/or flight training prescribed in sub-paragraph (d)2 above.
- 4 *Line Flying under Supervision.* An operator must ensure that each flight crew member undergoes the following line flying under supervision:
 - (i) for Category II when a manual landing or a HUDLS approach to touchdown is required, a minimum of:
 - (A) three landings from autopilot disconnect;
 - (B) four landings with HUDLS used to touchdown; except that only one manual landing (two using HUDLS to touchdown) is required when the training required in subparagraph (d)2 above has been carried out in a flight simulator qualified for zero flight time conversion.
 - (ii) For Category III, a minimum of two auto lands except that:
 - (A) only 1 autoland is required when the training required in subparagraph (d)2. above has been carried out in a flight simulator qualified for zero flight time conversion;
 - (B) no autoland is required during LIFUS when the training required in subparagraph (d)2 above has been carried out in a flight simulator qualified for zero flight time (ZFT) conversion and the flight crew member successfully completed the ZFT type rating conversion course;
 - (C) the flight crew member, trained and qualified in accordance with paragraph (B) above, is qualified to operate during the conduct of LIFUS to the lowest approved DA(H) and RVR as stipulated in the Operations Manual.

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

(e) **Type and command experience.** Before commencing Category II/III operations, the following additional requirements are applicable to commanders, or pilots to whom conduct of the flight may be delegated, who are new to the aeroplane type:

1. Before commencing Category II operations, the following additional requirements are applicable to commanders, or pilots to whom conduct of the flight may be delegated, who are new to the aeroplane type/class:

- (i) 50 hours or 20 sectors on the type, including line flying under supervision; and
- (ii) 100 m must be added to the applicable Category II RVR minima when the operation requires a Category II manual landing or use of HUDLS to touchdown until:
 - (A) a total of 100 hours or 40 sectors, including LIFUS has been achieved on the type; or
 - (B) a total of 50 hours or 20 sectors, including LIFUS has been achieved on the type where the flight crew member has been previously qualified for Category II manual landing operations with another operator;
 - (C) for HUDLS operations the sector requirements in paragraphs (e) 1. and (e) 2. (i) shall always be applicable, the hours on type/class does not fulfil the requirement.

2. Before commencing Category III operations, the following additional requirements are applicable to commanders, or pilots to whom conduct of the flight may be delegated, who are new to the aeroplane type:

- (i) 50 hours or 20 sectors on the type, including line flying under supervision; and
 - (ii) 100 m must be added to the applicable Category II or Category III RVR minima unless he has previously qualified for Category II or III operations with a Community operator, until a total of 100 hours or 40 sectors, including line flying under supervision, has been achieved on the type.
3. The Authority may authorise a reduction in the above command experience requirements for flight crew members who have Category II or Category III command experience.

(f) Low Visibility Take-Off with RVR less than 150/200 m

11 An operator must ensure that prior to authorisation to conduct take-offs in RVRs below 150 m (below 200 m for Category D aeroplanes) the following training is carried out:

- (i) Normal take-off in minimum authorised RVR conditions;
- (ii) Take-off in minimum authorised RVR conditions with an engine failure between V₁ and V₂, or as soon as safety considerations permit; and
- (iii) Take-off in minimum authorised RVR conditions with an engine failure before V₁ resulting in a rejected take-off.

2 An operator must ensure that the training required by sub-paragraph (1) above is carried out in a Flight Simulator. This training must include the use of any special procedures and equipment. Where no Flight Simulator is available to represent that specific aeroplane, the AUTHORITY may approve such training in an aeroplane without the requirement for minimum RVR conditions. (See Appendix 1 to CAR-OPS 1.965.)

3 An operator must ensure that a flight crew member has completed a check before conducting low visibility take-offs in RVRs of less than 150 m (less than 200 m for Category D aeroplanes) if applicable. The check may only be replaced by successful completion of the Flight Simulator and/or flight training prescribed in sub-paragraph (f)(1) on conversion to an aeroplane type.

(g) Recurrent Training and Checking – Low Visibility Operations

1 An operator must ensure that, in conjunction with the normal recurrent training and operator proficiency checks, a pilot's knowledge and ability to perform the tasks associated with the particular category of operation for which he is authorised is checked. The required number of approaches within the validity period of the operator proficiency check (as prescribed in CAR-OPS 1.965(b)) is to be a minimum of three, one of which may be substituted by an approach and landing in the aeroplane using approved Category II or III procedures. One missed approach shall be flown during the conduct of the operator proficiency check. If the operator is authorised to conduct take-off with RVR less than 150/200 m, at least one LVTO to the lowest applicable minima shall be flown during the conduct of the operator proficiency check. (See IEM OPS 1.450(b)(i).)

2 For Category III operations an operator must use a Flight Simulator

3 An operator must ensure that, for Category III operations on aeroplanes with a fail passive flight control system, including HUDLS, a missed approach is completed at least once over the period of three consecutive operator proficiency checks as the result of an autopilot failure at or below decision height when the last reported RVR was 300 m or less.

4 The AUTHORITY may authorise recurrent training and checking for Category II and LVTO operations in an aeroplane type where no Flight Simulator to represent that specific aeroplane or an acceptable alternate is available.

(h) Additional training requirements for operators conducting lower than Standard Category I, approaches utilising EVS and other than Standard Category II Operations.

1. Operators conducting lower than Standard Category I operations shall comply with the requirements of Appendix 1 to OPS 1.450 — low visibility operations — training and qualifications applicable to Category II operations to include the requirements applicable to HUDLS (if appropriate). The operator may combine these additional requirements where appropriate provided that the operational procedures are compatible. During conversion training the total number of approaches required shall not be additional to the requirements of OPS Subpart N provided the training is conducted utilising the lowest applicable RVR. During recurrent training and checking the operator may also combine the separate requirements provided the above operational procedure requirement is met, provided that at least one approach using lower than Standard Category I minima is conducted at least once every 18 months.

2. Operators conducting other than Standard Category II operations shall comply with the requirements of Appendix

1 to OPS 1.450 — low visibility operations — training and qualifications applicable to Category II operations to include the requirements applicable to HUDLS (if appropriate). The operator may combine these additional requirements where appropriate provided that the operational procedures are compatible. During conversion training the total number of approaches required shall not be less than that required to complete Category II training utilising a HUD/HUDLS. During recurrent training and checking the operator may also combine the separate requirements provided the above operational procedure requirement is met, provided that at least one approach using other than Standard Category II minima is conducted at least once every 18 months.

3. Operators conducting approach operations utilising EVS with RVR of 800 m or less shall comply with the requirements of Appendix 1 to OPS 1.450 — Low Visibility Operations — Training and Qualifications applicable to Category II operations to include the requirements applicable to HUD (if appropriate). The operator may combine these additional requirements where appropriate provided that the operational procedures are compatible. During conversion training the total number of approaches required shall not be less than that

required to complete Category II training utilising a HUD. During recurrent training and checking the operator may also combine the separate requirements provided the above operational procedure requirement is met, provided that at least one approach utilising EVS is conducted at least once every 12 months.]

[Appendix 1 to CAR–OPS 1.455 Low Visibility Operations – Operating procedures**(a) General. Low visibility operations include:**

1. manual take-off (with or without electronic guidance systems or HUDLS/Hybrid HUD/HUDLS);
2. auto-coupled approach to below DH, with manual flare, landing and roll-out;
3. approach flown with the use of a HUDLS/Hybrid HUD/HUDLS and/or EVS);
4. auto-coupled approach followed by auto-flare, auto landing and manual roll-out; and
5. auto-coupled approach followed by auto-flare, auto landing and auto-roll-out, when the applicable RVR is less than 400 m.

Note 1: A hybrid system may be used with any of these modes of operations.

Note 2: Other forms of guidance systems or displays may be certificated and approved.

(b) Procedures and operating instructions

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

2. An operator must specify the detailed operating procedures and instructions in the Operations Manual. The instructions must be compatible with the limitations and mandatory procedures contained in the Aeroplane Flight Manual and cover the following items in particular:

- (i) checks for the satisfactory functioning of the aeroplane equipment, both before departure and in flight;
- (ii) effect on minima caused by changes in the status of the ground installations and airborne equipment;
- (iii) procedures for the take-off, approach, flare, landing, roll-out and missed approach;
- (iv) procedures to be followed in the event of failures, warnings to include HUD/HUDLS/EVS and other nonnormal situations;
- (v) the minimum visual reference required;
- (vi) the importance of correct seating and eye position;
- (vii) action which may be necessary arising from a deterioration of the visual reference;
- (viii) allocation of crew duties in the carrying out of the procedures according to subparagraphs (i) to (iv) and (vi) above, to allow the Commander to devote himself/herself mainly to supervision and decision making;
- (ix) the requirement for all height calls below 200 ft to be based on the radio altimeter and for one pilot to continue to monitor the aeroplane instruments until the landing is completed;
- (x) the requirement for the Localiser Sensitive Area to be protected;
- (xi) the use of information relating to wind velocity, wind shear, turbulence, runway contamination and use of multiple RVR assessments;
- (xii) procedures to be used for:
 - (A) lower than Standard Category I;

- (B) other than Standard Category II;
- (C) approaches utilising EVS; and
- (D) practice approaches and landing on runways at which the full Category II or Category III aerodrome procedures are not in force;
- (xiii) operating limitations resulting from airworthiness certification; and
- (xiv) information on the maximum deviation allowed from the ILS glide path and/or localiser.]

Rev. 2

SUBPART F – PERFORMANCE - GENERAL**CAR–OPS 1.470 Applicability**

(a) An operator shall ensure that multi-engine aeroplanes powered by turbo-propeller engines with a maximum approved passenger seating configuration of more than 9 or a maximum take-off mass exceeding 5700 kg, and all multi-engine turbojet powered aeroplanes are operated in accordance with Subpart G (Performance Class A).

(b) An operator shall ensure that propeller driven aeroplanes with a maximum approved passenger seating configuration of 9 or less, and a maximum take-off mass of 5700 kg or less are operated in accordance with Subpart H (Performance Class B).

(c) An operator shall ensure that aeroplanes powered by reciprocating engines with a maximum approved passenger seating configuration of more than 9 or a maximum take-off mass exceeding 5700 kg are operated in accordance with Subpart I (Performance Class C).

(d) Where full compliance with the requirements of the appropriate Subpart cannot be shown due to specific design characteristics (eg supersonic aeroplanes or seaplanes), the operator shall apply approved performance standards that ensure a level of safety equivalent to that of the appropriate Subpart.

(e) Multi-engine aeroplanes powered by turbopropeller engines with a maximum approved passenger seating configuration of more than 9 and with a maximum take-off mass of 5700 kg or less may be permitted by the AUTHORITY to operate under alternative operating limitations to those of Performance Class A which shall not be less restrictive than those of the relevant requirements of Subpart H;

CAR–OPS 1.475 General

(a) An operator shall ensure that the mass of the aeroplane:

(1) At the start of the take-off; or, in the event of in-flight replanning

(2) At the point from which the revised operational flight plan applies, is not greater than the mass at which the requirements of the appropriate Subpart can be complied with for the flight to be undertaken, allowing for expected reductions in mass as the flight proceeds, and for such fuel jettisoning as is provided for in the particular requirement.

(b) An operator shall ensure that the approved performance Data contained in the Aeroplane Flight Manual is used to determine compliance with the requirements of the appropriate Subpart, supplemented as necessary with other data acceptable to the AUTHORITY as prescribed in the relevant Subpart. When applying the factors prescribed in the appropriate Subpart, account may be taken of any operational factors already incorporated in the Aeroplane Flight Manual performance data to avoid double application of factors. (See AMC OPS 1.475(b) & IEM OPS 1.475(b)).

(c) When showing compliance with the requirements of the appropriate Subpart, due account shall be taken of aeroplane configuration, environmental conditions and the operation of systems which have an adverse effect on performance.

(d) For performance purposes, a damp runway, other than a grass runway, may be considered to be dry.

(e) An operator shall take account of charting accuracy when assessing compliance with the takeoff requirements of the applicable subpart.

Rev. 1

CAR-OPS 1.480 Terminology

(a) Terms used in Subparts F, G, H, I and J, and not defined in CAR-1, have the following meaning:

(1) *Accelerate-stop distance available (ASDA)*. The length of the take-off run available plus the length of stopway, if such stopway is declared available by the appropriate Authority and is capable of bearing the mass of the aeroplane under the prevailing operating conditions.

(2) *Contaminated runway*. A runway is considered to be contaminated when more than 25% of the runway surface area (whether in isolated areas or not) within the required length and width being used is covered by the following:

(i) Surface water more than 3 mm (0.125 in) deep, or by slush, or loose snow, equivalent to more than 3 mm (0.125 in) of water;

(ii) Snow which has been compressed into a solid mass which resists further compression and will hold together or break into lumps if picked up (compacted snow); or

(iii) Ice, including wet ice.

(3) *Damp runway*. A runway is considered damp when the surface is not dry, but when the moisture on it does not give it a shiny appearance.

(4) *Dry runway*. A dry runway is one which is neither wet nor contaminated, and includes those paved runways which have been specially prepared with grooves or porous pavement and maintained to retain 'effectively dry' braking action even when moisture is present.

(5) *Landing distance available (LDA)*. The length of the runway which is declared available by the appropriate AUTHORITY and suitable for the ground run of an aeroplane landing.

(6) *Maximum approved passenger seating configuration*. The maximum passenger seating capacity of an individual aeroplane, excluding pilot seats or flight deck seats and cabin crew seats as applicable, used by the operator, approved by the AUTHORITY and specified in the Operations Manual.

(7) *Take-off distance available (TODA)*. The length of the take-off run available plus the length of the clearway available.

(8) *Take-off mass*. The take-off mass of the aeroplane shall be taken to be its mass, including everything and everyone carried at the commencement of the take-off run.

(9) *Take-off run available (TORA)*. The length of runway which is declared available by the appropriate AUTHORITY and suitable for the ground run of an aeroplane taking off.

(10) *Wet runway*. A runway is considered wet when the runway surface is covered with water, or equivalent, less than specified in sub-paragraph (a)(2) above or when there is sufficient moisture on the runway surface to cause it to appear reflective, but without significant areas of standing water.

(b) The terms 'accelerate-stop distance', 'take-off distance', 'take-off run', 'net take-off flight path', 'one engine inoperative en-route net flight path' and 'two engines inoperative en-route net flight path' and

path' as relating to the aeroplane have their meanings defined in the airworthiness requirements under which the aeroplane was certificated, or as specified by the AUTHORITY if it finds that definition inadequate for showing compliance with the performance operating limitations.

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SUBPART G – PERFORMANCE CLASS A**CAR–OPS 1.485 General**

(a) An operator shall ensure that, for determining compliance with the requirements of this Subpart, the approved performance data in the Aeroplane Flight Manual is supplemented as necessary with other data acceptable to the AUTHORITY if the approved performance Data in the Aeroplane Flight Manual is insufficient in respect of items such as:

- (1) Accounting for reasonably expected adverse operating conditions such as take-off and landing on contaminated runways; and
- (2) Consideration of engine failure in all flight phases.

(b) [An operator shall ensure that, for the wet and contaminated runway case, performance data determined in accordance with applicable requirements on certification of large aeroplanes or equivalent acceptable to the Authority is used.]

CAR–OPS 1.490 Take-off

(a) An operator shall ensure that the take-off mass does not exceed the maximum take-off mass specified in the Aeroplane Flight Manual for the pressure altitude and the ambient temperature at the aerodrome at which the take-off is to be made.

(b) An operator must meet the following requirements when determining the maximum permitted take-off mass:

- (1) The accelerate-stop distance must not exceed the accelerate-stop distance available;
- (2) The take-off distance must not exceed the take-off distance available, with a clearway distance not exceeding half of the take-off run available;
- (3) The take-off run must not exceed the take-off run available;
- (4) Compliance with this paragraph must be shown using a single value of V_1 for the rejected and continued take-off ; and
- (5) On a wet or contaminated runway, the take-off mass must not exceed that permitted for a take-off on a dry runway under the same conditions.

(c) When showing compliance with sub-paragraph (b) above, an operator must take account of the following:

- (1) The pressure altitude at the aerodrome;
- (2) The ambient temperature at the aerodrome; and
- (3) The runway surface condition and the type of runway surface (See IEM OPS 1.490(c)(3));
- (4) The runway slope in the direction of take-off;
- (5) Not more than 50% of the reported head-wind component or not less than 150% of the reported tailwind component; and
- (6) The loss, if any, of runway length due to alignment of the aeroplane prior to take-off. (See IEM OPS 1.490(c)(6).)

CAR–OPS 1.495 Take-off obstacle clearance

(a) An operator shall ensure that the net take-off flight path clears all obstacles by a vertical distance of at least 35 ft or by a horizontal distance of at least 90 m plus $0.125 \times D$, where D is the horizontal distance the aeroplane has travelled from the end of the take-off distance available

or the end of the take-off distance if a turn is scheduled before the end of the take-off distance available. For aeroplanes with a wingspan of less than 60 m a horizontal obstacle clearance of half the aeroplane wingspan plus 60 m, plus $0.125 \times D$ may be used. (See IEM OPS 1.495(a).)

(b) When showing compliance with sub-paragraph (a) above, an operator must take account of the following:

- (1) The mass of the aeroplane at the commencement of the take-off run;
- (2) The pressure altitude at the aerodrome;
- (3) The ambient temperature at the aerodrome; and
- (4) Not more than 50% of the reported head-wind component or not less than 150% of the reported tailwind component.

(c) When showing compliance with sub-paragraph (a) above:

- (1) Track changes shall not be allowed up to the point at which the net take-off flight path has achieved a height equal to one half the wingspan but not less than 50 ft above the elevation of the end of the take-off run available. Thereafter, up to a height of 400 ft it is assumed that the aeroplane is banked by no more than 15°. Above 400 ft height bank angles greater than 15°, but not more than 25° may be scheduled;
- (2) Any part of the net take-off flight path in which the aeroplane is banked by more than 15° must clear all obstacles within the horizontal distances specified in sub-paragraphs (a), (d) and (e) of this paragraph by a vertical distance of at least 50 ft; and
- (3) An operator must use special procedures, subject to the approval of the AUTHORITY, to apply increased bank angles of not more than 20° between 200 ft and 400 ft, or not more than 30° above 400 ft (See Appendix 1 to CAR-OPS 1.495(c)(3)).
- (4) Adequate allowance must be made for the effect of bank angle on operating speeds and flight path including the distance increments resulting from increased operating speeds. (See AMC OPS 1.495(c)(4)).

(d) When showing compliance with sub-paragraph (a) above for those cases where the intended flight path does not require track changes of more than 15°, an operator need not consider those obstacles which have a lateral distance greater than:

- (1) 300 m, if the pilot is able to maintain the required navigational accuracy through the obstacle accountability area (See AMC OPS 1.495(d)(1) & (e)(1)); or
- (2) 600 m, for flights under all other conditions.

(e) When showing compliance with sub-paragraph (a) above for those cases where the intended flight path does require track changes of more than 15°, an operator need not consider those obstacles which have a lateral distance greater than:

- (1) 600 m, if the pilot is able to maintain the required navigational accuracy through the obstacle accountability area (See AMC OPS 1.495 (d)(1) & (e)(1)); or
- (2) 900 m for flights under all other conditions.

(f) An operator shall establish contingency procedures to satisfy the requirements of CAR-OPS 1.495 and to provide a safe route, avoiding obstacles, to enable the aeroplane to either comply with the en-route requirements of CAR-OPS 1.500, or land at either the aerodrome of departure or at a take-off alternate aerodrome (See IEM OPS 1.495(f)).

CAR-OPS 1.500 En-route – One Engine Inoperative

(See AMC OPS 1.500)

(a) An operator shall ensure that the one engine inoperative en-route net flight path data shown in the Aeroplane Flight Manual, appropriate to the meteorological conditions expected for the flight, complies with either sub-paragraph (b) or (c) at all points along the route. The net flight path must have a positive gradient at 1 500 ft above the aerodrome where the landing is assumed to be made after engine failure. In meteorological conditions requiring the operation of ice protection systems, the effect of their use on the net flight path must be taken into account.

(b) The gradient of the net flight path must be positive at at least 1 000 ft above all terrain and obstructions along the route within 9.3 km (5 nm) on either side of the intended track.

(c) The net flight path must permit the aeroplane to continue flight from the cruising altitude to an aerodrome where a landing can be made in accordance with CAR-OPS 1.515 or 1.520 as appropriate, the net flight path clearing vertically, by at least 2 000 ft, all terrain and obstructions along the route within 9.3 km (5 nm) on either side of the intended track in accordance with subparagraphs (1) to (4) below:

- (1) The engine is assumed to fail at the most critical point along the route;
- (2) Account is taken of the effects of winds on the flight path;
- (3) Fuel jettisoning is permitted to an extent consistent with reaching the aerodrome with the required fuel reserves, if a safe procedure is used; and
- (4) The aerodrome where the aeroplane is assumed to land after engine failure must meet the following criteria:
 - (i) The performance requirements at the expected landing mass are met; and
 - (ii) Weather reports or forecasts, or any combination thereof, and field condition reports indicate that a safe landing can be accomplished at the estimated time of landing.

(d) When showing compliance with CAR-OPS 1.500, an operator must increase the width margins of subparagraphs (b) and (c) above to 18.5 km (10 nm) if the navigational accuracy does not meet the 95% containment level.

CAR-OPS 1.505 En-route – Aeroplanes With Three Or More Engines, Two Engines Inoperative

(a) An operator shall ensure that at no point along the intended track will an aeroplane having three or more engines be more than 90 minutes, at the all-engines long range cruising speed at standard temperature in still air, away from an aerodrome at which the performance requirements applicable at the expected landing mass are met unless it complies with subparagraphs (b) to (f) below.

(b) The two engines inoperative en-route net flight path data must permit the aeroplane to continue the flight, in the expected meteorological conditions, from the point where two engines are assumed to fail simultaneously, to an aerodrome at which it is possible to land and come to a complete stop when using the prescribed procedure for a landing with two engines inoperative. The net flight path must clear vertically, by at least 2 000 ft all terrain and obstructions along the route within 9.3 km (5 nm) on either side of the intended track. At altitudes and in meteorological conditions requiring ice protection systems to be operable, the effect of their use on the net flight path data must be taken into account. If the navigational accuracy does not meet the 95% containment level, an operator must increase the width margin given above to 18.5 km (10 nm).

(c) The two engines are assumed to fail at the most critical point of that portion of the route where the aeroplane is more than 90 minutes, at the all engines long range cruising speed at standard temperature in still air, away from an aerodrome at which the performance requirements applicable at the expected landing mass are met.

(d) The net flight path must have a positive gradient at 1500 ft above the aerodrome where the landing is assumed to be made after the failure of two engines.

(e) Fuel jettisoning is permitted to an extent consistent with reaching the aerodrome with the required fuel reserves, if a safe procedure is used.

(f) The expected mass of the aeroplane at the point where the two engines are assumed to fail must not be less than that which would include sufficient fuel to proceed to an aerodrome where the landing is assumed to be made, and to arrive there at least 1 500 ft directly over the landing area and thereafter to fly level for 15 minutes.

CAR-OPS 1.510 Landing – Destination And Alternate Aerodromes

(See AMC OPS 1.510 and 1.515)

(a) An operator shall ensure that the landing mass of the aeroplane determined in accordance with CAR-OPS 1.475(a) does not exceed the maximum landing mass specified for the altitude and the ambient temperature expected for the estimated time of landing at the destination and alternate aerodrome.

(b) For instrument approaches with a missed approach gradient greater than 2.5% an operator shall verify that the expected landing mass of the aeroplane allows a missed approach with a climb gradient equal to or greater than the applicable missed approach gradient in the one-engine inoperative missed approach configuration and speed (see CAR 25.121(d)). The use of an alternative method must be approved by the AUTHORITY (see IEM OPS 1.510(b) & (c)).

(c) For instrument approaches with decision heights below 200 ft, an operator must verify that the expected landing mass of the aeroplane allows a missed approach gradient of climb, with the critical engine failed and with the speed and configuration used for go-around of at least 2.5%, or the published gradient, whichever is the greater (see CAR-AWO 243). The use of an alternative method must be approved by the AUTHORITY (see IEM OPS 1.510(b) and (c)).

CAR-OPS 1.515 Landing – Dry Runways

(See AMC OPS 1.510 and 1.515)

(a) An operator shall ensure that the landing mass of the aeroplane determined in accordance with CAR-OPS 1.475(a) for the estimated time of landing at the destination aerodrome and at any alternate aerodrome allows a full stop landing from 50 ft above the threshold:

- (1) For turbo-jet powered aeroplanes, within 60% of the landing distance available; or
- (2) For turbo-propeller powered aeroplanes, within 70% of the landing distance available;
- (3) For Steep Approach procedures the AUTHORITY may approve the use of landing distance Data factored in accordance with sub-paragraphs (a)(1) and (a)(2) above as appropriate, based on a screen height of less than 50 ft, but not less than 35 ft. (See Appendix 1 to CAR-OPS 1.515(a)(3).)
- (4) When showing compliance with sub-paragraphs (a)(1) and (a)(2) above, the AUTHORITY may exceptionally approve, when satisfied that there is a need (see Appendix 1), the use of Short Landing Operations in accordance with Appendices 1 and 2 together with any other supplementary conditions that the AUTHORITY considers necessary in order to ensure an acceptable level of safety in the particular case.

(b) When showing compliance with sub-paragraph (a) above, an operator must take account of the following:

- (1) The altitude at the aerodrome;
- (2) Not more than 50% of the head-wind component or not less than 150% of the tailwind component; and
- (3) The runway slope in the direction of landing if greater than +/-2%.

(c) When showing compliance with sub-paragraph (a) above, it must be assumed that:

- (1) The aeroplane will land on the most favourable runway, in still air; and
- (2) The aeroplane will land on the runway most likely to be assigned considering the probable wind speed and direction and the ground handling characteristics of the aeroplane, and considering other conditions such as landing aids and terrain. (See IEM OPS 1.515(c).)

(d) If an operator is unable to comply with sub-paragraph (c)(1) above for a destination aerodrome having a single runway where a landing depends upon a specified wind component, an aeroplane may be despatched if 2 alternate aerodromes are designated which permit full compliance with sub-paragraphs (a), (b) and (c). Before commencing an approach to land at the destination aerodrome the commander must satisfy him self that a landing can be made in full compliance with CAR-OPS 1.510 and sub-paragraphs (a) and (b) above.

(e) If an operator is unable to comply with sub-paragraph (c)(2) above for the destination aerodrome, the aeroplane may be despatched if an alternate aerodrome is designated which permits full compliance with sub-paragraphs (a), (b) and (c).

CAR-OPS 1.520 Landing – Wet and contaminated runways

(a) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be wet, the landing distance available is at least 115% of the required landing distance, determined in accordance with CAR-OPS 1.515.

(b) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be contaminated, the landing distance available must be at least the landing distance determined in accordance with sub-paragraph (a) above, or at least 115% of the landing distance determined in accordance with approved contaminated landing distance data or equivalent, accepted by the AUTHORITY, whichever is greater.

(c) A landing distance on a wet runway shorter than that required by sub-paragraph (a) above, but not less than that required by CAR-OPS 1.515(a), may be used if the Aeroplane Flight Manual includes specific additional information about landing distances on wet runways.

(d) A landing distance on a specially prepared contaminated runway shorter than that required by sub-paragraph (b) above, but not less than that required by CAR-OPS 1.515(a), may be used if the Aeroplane Flight Manual includes specific additional information about landing distances on contaminated runways.

(e) When showing compliance with sub-paragraphs (b), (c) and (d) above, the criteria of CAR-OPS 1.515 shall be applied accordingly except that CAR-OPS 1.515(a)(1) and (2) shall not be applied to sub-paragraph (b) above.

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Appendix 1 to CAR-OPS 1.495(c)(3) Approval of increased bank angles

For the use of increased bank angles requiring special approval, the following criteria shall be met:

- (1) The Aeroplane Flight Manual must contain approved data for the required increase of operating speed and data to allow the construction of the flight path considering the increased bank angles and speeds.
- (2) Visual guidance must be available for navigation accuracy.
- (3) Weather minima and wind limitations must be specified for each runway and approved by the AUTHORITY.
- (4) Training in accordance with CAR-OPS 1.975.

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Appendix 1 to CAR–OPS 1.515(a) (3) Steep Approach Procedures

The AUTHORITY may approve the application of Steep Approach procedures using glideslope angles of 4.5° or more and with screen heights of less than 50 ft but not less than 35 ft, provided that the following criteria are met:

- (1) The Aeroplane Flight Manual must state the maximum approved glideslope angle, any other limitations, normal, abnormal or emergency procedures for the steep approach as well as amendments to the field length data when using steep approach criteria;
- (2) A suitable glidepath reference system comprising at least a visual glidepath indicating system must be available at each aerodrome at which steep approach procedures are to be conducted; and
- (3) Weather minima must be specified and approved for each runway to be used with a steep approach. Consideration must be given to the following:
 - (i) The obstacle situation;
 - (ii) The type of glidepath reference and runway guidance such as visual aids, MLS, 3D–NAV, ILS, LLZ, VOR, NDB;
 - (iii) The minimum visual reference to be required at DH and MDA;
 - (iv) Available airborne equipment;
 - (v) Pilot qualification and special aerodrome familiarisation;
 - (vi) Aeroplane Flight Manual limitations and procedures; and
 - (vii) Missed approach criteria.

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Appendix 1 to CAR-OPS 1.515(a)(4) Short Landing Operations

(a) For the purpose of CAR-OPS 1.515(a)(4) the distance used for the calculation of the permitted landing mass may consist of the usable length of the declared safe area plus the declared landing distance available. The AUTHORITY may approve such operations in accordance with the following criteria:

- (1) *Demonstration of the need for Short Landing Operations.* There must be a clear public interest and operational necessity for the operation, either due to the remoteness of the airport or to physical limitations relating to extending the runway.
- (2) *Aeroplane and Operational Criteria.*
 - (i) Short landing operation will only be approved for aeroplanes where the vertical distance between the path of the pilot's eye and the path of the lowest part of the wheels, with the aeroplane established on the normal glide path, does not exceed 3 metres;
 - (ii) When establishing aerodrome operating minima the visibility/RVR must not be less than 1.5 km. In addition, wind limitations must be specified in the Operation Manual; and
 - (iii) Minimum pilot experience, training requirements and special aerodrome familiarisation must be specified for such operations in the Operations Manual.
- (3) It is assumed that the crossing height over the beginning of the usable length of the declared safe area is 50 ft.
- (4) *Additional criteria.* The AUTHORITY may impose such additional conditions as are deemed necessary for a safe operation taking into account the aeroplane type characteristics, orographic characteristics in the approach area, available approach aids and missed approach/baulked landing considerations. Such additional conditions may be, for instance, the requirement for VASI/PAPI – type visual slope indicator system.

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Appendix 2 to CAR-OPS 1.515(a)(4) Airfield Criteria for Short Landing Operations

- (a) The use of the safe area must be approved by the airport AUTHORITY.
- (b) The useable length of the declared safe area under the provisions of 1.515(a)(4), and this Appendix, must not exceed 90 metres.
- (c) The width of the declared safe area shall not be less than twice the runway width or twice the wing span, whichever is the greater, centred on the extended runway centre line.
- (d) The declared safe area must be clear of obstructions or depressions which would endanger an aeroplane undershooting the runway and no mobile object shall be permitted on the declared safety area while the runway is being used for short landing operations.
- (e) The slope of the declared safe area must not exceed 5% upward nor 2% downward in the direction of landing.
- (f) For the purpose of this operation, the bearing strength requirement of CAR-OPS 1.480(a)(5) need not apply to the declared safe area.

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SUBPART H – PERFORMANCE CLASS B**CAR–OPS 1.525 General**

(a) An operator shall not operate a single-engine aeroplane:

(1) At night; or

(2) In Instrument Meteorological Conditions except under Special Visual Flight Rules.

Note: Limitations on the operation of single-engine aeroplanes are covered by CAR–OPS 1.240(a)(6).

(b) An operator shall treat two-engine aeroplanes which do not meet the climb requirements of Appendix 1 to CAR–OPS 1.525(b) as single-engine aeroplanes.

CAR–OPS 1.530 Take-off

(a) An operator shall ensure that the take-off mass does not exceed the maximum take-off mass specified in the Aeroplane Flight Manual for the pressure altitude and the ambient temperature at the aerodrome at which the take-off is to be made.

(b) An operator shall ensure that the unfactored take-off distance, as specified in the Aeroplane Flight Manual does not exceed:

(1) When multiplied by a factor of 1.25, the take-off run available; or

(2) When stopway and/or clearway is available, the following:

(i) The take-off run available;

(ii) When multiplied by a factor of 1.15, the take-off distance available; and

(iii) When multiplied by a factor of 1.3, the accelerate-stop distance available.

(c) When showing compliance with sub-paragraph (b) above, an operator shall take account of the following:

(1) The mass of the aeroplane at the commencement of the take-off run;

(2) The pressure altitude at the aerodrome;

(3) The ambient temperature at the aerodrome;

(4) The runway surface condition and the type of runway surface (See AMC OPS 1.530(c)(4) & IEM OPS 1.530(c)(4));

(5) The runway slope in the direction of take-off (See AMC OPS 1.530(c)(5)); and

- (6) Not more than 50% of the reported head-wind component or not less than 150% of the reported tail-wind component.

CAR-OPS 1.535 Take-off Obstacle Clearance – Multi-Engined Aeroplanes

(See IEM OPS 1.535)

(a) An operator shall ensure that the take-off flight path of aeroplanes with two or more engines, determined in accordance with this sub-paragraph, clears all obstacles by a vertical margin of at least 50 ft, or by a horizontal distance of at least 90 m plus $0.125 \times D$, where D is the horizontal distance travelled by the aeroplane from the end of the take-off distance available or the end of the take-off distance if a turn is scheduled before the end of the take-off distance available except as provided in sub-paragraphs (b) and (c) below. For aeroplanes with a wingspan of less than 60 m a horizontal obstacle clearance of half the aeroplane wingspan plus 60 m, plus $0.125 \times D$ may be used. When showing compliance with this sub-paragraph (see AMC OPS 1.535(a) & IEM OPS 1.535(a)) it must be assumed that:

- (1) The take-off flight path begins at a height of 50 ft above the surface at the end of the take-off distance required by CAR-OPS 1.530(b) and ends at a height of 1500 ft above the surface;
- (2) The aeroplane is not banked before the aeroplane has reached a height of 50 ft above the surface, and that thereafter the angle of bank does not exceed 15° ;
- (3) Failure of the critical engine occurs at the point on the all engine take-off flight path where visual reference for the purpose of avoiding obstacles is expected to be lost;
- (4) The gradient of the take-off flight path from 50 ft to the assumed engine failure height is equal to the average all-engine gradient during climb and transition to the en-route configuration, multiplied by a factor of 0.77; and
- (5) The gradient of the take-off flight path from the height reached in accordance with sub-paragraph (4) above to the end of the take-off flight path is equal to the one engine inoperative en-route climb gradient shown in the Aeroplane Flight Manual.

(b) When showing compliance with sub-paragraph (a) above for those cases where the intended flight path does not require track changes of more than 15° , an operator need not consider those obstacles which have a lateral distance greater than:

- (1) 300 m, if the flight is conducted under conditions allowing visual course guidance navigation, or if navigational aids are available enabling the pilot to maintain the intended flight path with the same accuracy (See Appendix 1 to CAR- OPS 1.535(b)(1) & (c)(1)); or
- (2) 600 m, for flights under all other conditions.

(c) When showing compliance with sub-paragraph (a) above for those cases where the intended flight path requires track changes of more than 15° , an operator need not consider those obstacles which have a lateral distance greater than:

- (1) 600 m for flights under conditions allowing visual course guidance navigation (See Appendix 1 to CAR-OPS 1.535(b)(1) &(c)(1));

(2) 900 m for flights under all other conditions.

(d) When showing compliance with sub-paragraphs (a), (b) and (c) above, an operator must take account of the following:

- (1) The mass of the aeroplane at the commencement of the take-off run;
- (2) The pressure altitude at the aerodrome;
- (3) The ambient temperature at the aerodrome; and
- (4) Not more than 50% of the reported head-wind component or not less than 150% of the reported tail-wind component.

CAR-OPS 1.540 En-Route – Multi-engined aeroplanes

(See IEM OPS 1.540)

(a) An operator shall ensure that the aeroplane, in the meteorological conditions expected for the flight, and in the event of the failure of one engine, with the remaining engines operating within the maximum continuous power conditions specified, is capable of continuing flight at or above the relevant minimum altitudes for safe flight stated in the Operations Manual to a point 1000 ft above an aerodrome at which the performance requirements can be met.

(b) When showing compliance with sub-paragraph (a) above:

- (1) The aeroplane must not be assumed to be flying at an altitude exceeding that at which the rate of climb equals 300 ft per minute with all engines operating within the maximum continuous power conditions specified; and
- (2) The assumed en-route gradient with one engine inoperative shall be the gross gradient of descent or climb, as appropriate, respectively increased by a gradient of 0.5%, or decreased by a gradient of 0.5%.

CAR-OPS 1.542 En-Route – Single-engine aeroplanes

(See IEM OPS 1.542)

(a) An operator shall ensure that the aeroplane, in the meteorological conditions expected for the flight, and in the event of engine failure, is capable of reaching a place at which a safe forced landing can be made. For landplanes, a place on land is required, unless otherwise approved by the AUTHORITY. (See AMC OPS 1.542(a).)

(b) When showing compliance with sub-paragraph (a) above:

- (1) The aeroplane must not be assumed to be flying, with the engine operating within the maximum continuous power conditions specified, at an altitude exceeding that at which the rate of climb equals 300 ft per minute; and
- (2) The assumed en-route gradient shall be the gross gradient of descent increased by a gradient of 0.5%.

CAR-OPS 1.545 Landing – Destination and Alternate Aerodromes

(See AMC OPS 1.545 & 1.550)

An operator shall ensure that the landing mass of the aeroplane determined in accordance with CAR-OPS 1.475(a) does not exceed the maximum landing mass specified for the altitude and the ambient temperature expected for the estimated time of landing at the destination and alternate aerodrome.

CAR-OPS 1.550 Landing – Dry runway

(See AMC OPS 1.545 & 1.550)

(a) An operator shall ensure that the landing mass of the aeroplane determined in accordance with CAR-OPS 1.475(a) for the estimated time of landing allows a full stop landing from 50 ft above the threshold within 70% of the landing distance available at the destination aerodrome and at any alternate aerodrome.

(1) The AUTHORITY may approve the use of landing distance data factored in accordance with this paragraph based on a screen height of less than 50 ft, but not less than 35 ft. (See Appendix 1 to CAR – OPS 1.550(a).)

(2) The AUTHORITY may approve Short Landing Operations in accordance with the criteria in Appendix 2 to CAR-OPS 1.550(a).

(b) When showing compliance with sub-paragraph (a) above, an operator shall take account of the following:

(1) The altitude at the aerodrome;

(2) Not more than 50% of the head-wind component or not less than 150% of the tail-wind component.

(3) The runway surface condition and the type of runway surface (See AMC OPS 1.550(b)(3)); and

(4) The runway slope in the direction of landing (See AMC OPS 1.550(b)(4));

(c) For despatching an aeroplane in accordance with sub-paragraph (a) above, it must be assumed that:

(1) The aeroplane will land on the most favourable runway, in still air; and

(2) The aeroplane will land on the runway most likely to be assigned considering the probable wind speed and direction and the ground handling characteristics of the aeroplane, and considering other conditions such as landing aids and terrain. (See IEM OPS 1.550(c).)

(d) If an operator is unable to comply with sub-paragraph (c)(2) above for the destination aerodrome, the aeroplane may be despatched if an alternate aerodrome is designated which permits full compliance with sub-paragraphs (a), (b) and (c) above.

CAR-OPS 1.555 Landing – Wet and Contaminated Runways

(a) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be wet, the landing distance available is equal to or exceeds the required landing distance, determined in accordance with CAR-OPS 1.550, multiplied by a factor of 1.15. (See IEM OPS 1.555(a).)

(b) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be contaminated, the landing distance, determined by using data acceptable to the AUTHORITY for these conditions, does not exceed the landing distance available.

(c) A landing distance on a wet runway shorter than that required by sub-paragraph (a) above, but not less than that required by CAR-OPS 1.550(a), may be used if the Aeroplane Flight Manual includes specific additional information about landing distances on wet runways.

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Appendix 1 to CAR – OPS 1.525(b) General – Take-off and Landing Climb

The requirements of this Appendix are based on CAR–23.63(c)(1) and CAR–23.63(c)(2), effective 11 March 1994.

*(a) Take-off Climb**(1) All Engines Operating*

(i) The steady gradient of climb after take-off must be at least 4% with:

(A) Take-off power on each engine;

(B) The landing gear extended except that if the landing gear can be retracted in not more than 7 seconds, it may be assumed to be retracted;

(C) The wing flaps in the take-off position(s); and

(D) A climb speed not less than the greater of $1.1 V_{MC}$ and $1.2 V_{S1}$.

(2) One Engine Inoperative

(i) The steady gradient of climb at an altitude of 400 ft above the take-off surface must be measurably positive with:

(A) The critical engine inoperative and its propeller in the minimum drag position;

(B) The remaining engine at take-off power;

(C) The landing gear retracted;

(D) The wing flaps in the take-off position(s); and

(E) A climb speed equal to that achieved at 50 ft.

(ii) The steady gradient of climb must be not less than 0.75% at an altitude of 1500 ft above the take-off surface with:

(A) The critical engine inoperative and its propeller in the minimum drag position;

(B) The remaining engine at not more than maximum continuous power;

(C) The landing gear retracted;

(D) The wing flaps retracted; and

(E) A climb speed not less than $1.2 V_{S1}$.

*(b) Landing Climb**(1) All Engines Operating*

(i) The steady gradient of climb must be at least 2.5% with:

- (A) Not more than the power or thrust that is available 8 seconds after initiation of movement of the power controls from the minimum flight idle position;
- (B) The landing gear extended;
- (C) The wing flaps in the landing position; and
- (D) A climb speed equal to V_{REF} .

(2) *One engine Inoperative*

- (i) The steady gradient of climb must be not less than 0.75% at an altitude of 1500 ft above the landing surface with:
 - (A) The critical engine inoperative and its propeller in the minimum drag position;
 - (B) The remaining engine at not more than maximum continuous power;
 - (C) The landing gear retracted;
 - (D) The wing flaps retracted; and
 - (E) A climb speed not less than $1.2 V_{S1}$.

Appendix 1 to CAR – OPS 1.535(b)(1) & (c)(1) Take-off Flight Path – Visual Course Guidance Navigation

In order to allow visual course guidance navigation, an operator must ensure that the weather conditions prevailing at the time of operation including ceiling and visibility, are such that the obstacle and/or ground reference points can be seen and identified. The Operations Manual must specify, for the aerodrome(s) concerned, the minimum weather conditions which enable the flight crew to continuously determine and maintain the correct flight path with respect to ground reference points, so as to provide a safe clearance with respect to obstructions and terrain as follows:

(a) The procedure must be well defined with respect to ground reference points so that the track to be flown can be analysed for obstacle clearance requirements;

(b) The procedure must be within the capabilities of the aeroplane with respect to forward speed, bank angle and wind effects;

(c) A written and/or pictorial description of the procedure must be provided for crew use; and

(d) The limiting environmental conditions must be specified (e.g. wind, cloud, visibility, day/night, ambient lighting, obstruction lighting).

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Appendix 1 to CAR – OPS 1.550(a) Steep Approach Procedures

(a) The AUTHORITY may approve the application of Steep Approach procedures using glideslope angles of 4.5° or more, and with screen heights of less than 50 ft but not less than 35 ft, provided that the following criteria are met:

- (1) The Aeroplane Flight Manual must state the maximum approved glideslope angle, any other limitations, normal, abnormal or emergency procedures for the steep approach as well as amendments to the field length data when using steep approach criteria;
- (2) A suitable glide path reference system, comprising at least a visual glidepath indicating system, must be available at each aerodrome at which steep approach procedures are to be conducted; and
- (3) Weather minima must be specified and approved for each runway to be used with a steep approach. Consideration must be given to the following:
 - (i) The obstacle situation;
 - (ii) The type of glidepath reference and runway guidance such as visual aids, MLS, 3D-NAV, ILS, LLZ, VOR, NDB;
 - (iii) The minimum visual reference to be required at DH and MDA;
 - (iv) Available airborne equipment;
 - (v) Pilot qualification and special aerodrome familiarisation;
 - (vi) Aeroplane Flight Manual limitations and procedures; and
 - (vii) Missed approach criteria.

Appendix 2 to CAR - OPS 1.550(a) Short Landing Operations

(a) For the purpose of CAR-OPS 1.550(a)(2), the distance used for the calculation of the permitted landing mass may consist of the usable length of the declared safe area plus the declared landing distance available. The AUTHORITY may approve such operations in accordance with the following criteria:

- (1) The use of the declared safe area must be approved by the aerodrome Authority;
- (2) The declared safe area must be clear of obstructions or depressions which would endanger an aeroplane undershooting the runway, and no mobile object shall be permitted on the declared safe area while the runway is being used for short landing operations;
- (3) The slope of the declared safe area must not exceed 5% upward slope nor 2% downward slope;
- (4) The useable length of the declared safe area under the provisions of this Appendix shall not exceed 90 metres;
- (5) The width of the declared safe area shall not be less than twice the runway width, centred on the extended runway centreline;
- (6) It is assumed that the crossing height over the beginning of the usable length of the declared safe area shall not be less than 50ft.
- (7) For the purpose of this operation, the bearing strength requirement of CAR-OPS 1.480(a)(5) need not apply to the declared safe area.
- (8) Weather minima must be specified and approved for each runway to be used and shall not be less than the greater of VFR or non-precision approach minima;
- (9) Pilot requirements must be specified (CAR-OPS 1.975(a) refers);
- (10) The AUTHORITY may impose such additional conditions as are necessary for safe operation taking into account the aeroplane type characteristics, approach aids and missed approach/balked landing considerations.

SUBPART I – PERFORMANCE CLASS C

An operator shall ensure that, for determining compliance with the requirements of this Subpart, the approved performance Data in the Aeroplane Flight Manual is supplemented, as necessary, with other Data acceptable to the AUTHORITY if the approved performance Data in the Aeroplane Flight Manual is insufficient.

CAR–OPS 1.565 Take-off

(a) An operator shall ensure that the take-off mass does not exceed the maximum take-off mass specified in the Aeroplane Flight Manual for the pressure altitude and the ambient temperature at the aerodrome at which the take-off is to be made.

(b) An operator shall ensure that, for aeroplanes which have take-off field length data contained in their Aeroplane Flight Manuals that do not include engine failure accountability, the distance from the start of the take-off roll required by the aeroplane to reach a height of 50 ft above the surface with all engines operating within the maximum take-off power conditions specified, when multiplied by a factor of either:

- (1) 1.33 for aeroplanes having two engines; or
- (2) 1.25 for aeroplanes having three engines; or
- (3) 1.18 for aeroplanes having four engines, does not exceed the take-off run available at the aerodrome at which the take-off is to be made.

(c) An operator shall ensure that, for aeroplanes which have take-off field length data contained in their Aeroplane Flight Manuals which accounts for engine failure, the following requirements are met in accordance with the specifications in the Aeroplane Flight Manual:

- (1) The accelerate-stop distance must not exceed the accelerate-stop distance available;
- (2) The take-off distance must not exceed the take-off distance available, with a clearway distance not exceeding half of the take-off run available;
- (3) The take-off run must not exceed the take-off run available;
- (4) Compliance with this paragraph must be shown using a single value of V_1 for the rejected and continued take-off; and
- (5) On a wet or contaminated runway the take-off mass must not exceed that permitted for a take-off on a dry runway under the same conditions.

(d) When showing compliance with sub-paragraphs (b) and (c) above, an operator must take account of the following:

- (1) The pressure altitude at the aerodrome;
- (2) The ambient temperature at the aerodrome;

- (3) The runway surface condition and the type of runway surface (see IEM OPS 1.565(d)(3));
- (4) The runway slope in the direction of take-off (see AMC OPS 1.565(d)(4)
- (5) Not more than 50% of the reported head-wind component or not less than 150% of the reported tail-wind component; and
- (6) The loss, if any, of runway length due to alignment of the aeroplane prior to take-off. (See IEM OPS 1.565(d)(6)

CAR-OPS 1.570 Take-off Obstacle Clearance

(a) An operator shall ensure that the take-off flight path with one engine inoperative clears all obstacles by a vertical distance of at least 50 ft plus $0.01 \times D$, or by a horizontal distance of at least 90 m plus $0.125 \times D$, where D is the horizontal distance the aeroplane has travelled from the end of the take-off distance available. For aeroplanes with a wingspan of less than 60 m a horizontal obstacle clearance of half the aeroplane wingspan plus 60 m, plus $0.125 \times D$ may be used.

(b) The take-off flight path must begin at a height of 50 ft above the surface at the end of the take-off distance required by CAR-OPS 1.565(b) or (c) as applicable, and end at a height of 1500 ft above the surface.

(c) When showing compliance with sub-paragraph (a) above, an operator must take account of the following:

- (1) The mass of the aeroplane at the commencement of the take-off run;
- (2) The pressure altitude at the aerodrome;
- (3) The ambient temperature at the aerodrome; and
- (4) Not more than 50% of the reported head-wind component or not less than 150% of the reported tail-wind component.

(d) When showing compliance with sub-paragraph (a) above, track changes shall not be allowed up to that point of the take-off flight path where a height of 50 ft above the surface has been achieved. Thereafter, up to a height of 400 ft it is assumed that the aeroplane is banked by no more than 15° . Above 400 ft height bank angles greater than 15° , but not more than 25° may be scheduled. Adequate allowance must be made for the effect of bank angle on operating speeds and flight path including the distance increments resulting from increased operating speeds. (See AMC OPS 1.570(d).)

(e) When showing compliance with sub-paragraph (a) above for those cases which do not require track changes of more than 15° , an operator need not consider those obstacles which have a lateral distance greater than:

- (1) 300 m, if the pilot is able to maintain the required navigational accuracy through the obstacle accountability area (See AMC OPS 1.570(e)(1) & (f)(1)); or
- (2) 600 m, for flights under all other conditions.

(f) When showing compliance with sub-paragraph (a) above for those cases which do require track changes of more than 15° , an operator need not consider those obstacles which have a lateral distance greater than:

(1) 600 m, if the pilot is able to maintain the required navigational accuracy through the obstacle accountability area (See AMC OPS 1.570(e)(1) & (f)(1)); or

(2) 900 m for flights under all other conditions.

(g) An operator shall establish contingency procedures to satisfy the requirements of CAR-OPS 1.570 and to provide a safe route, avoiding obstacles, to enable the aeroplane to either comply with the en-route requirements of CAR-OPS 1.580, or land at either the aerodrome of departure or at a take-off alternate aerodrome.

CAR-OPS 1.575 En-Route – All Engines Operating

(a) An operator shall ensure that the aeroplane will, in the meteorological conditions expected for the flight, at any point on its route or on any planned diversion therefrom, be capable of a rate of climb of at least 300 ft per minute with all engines operating within the maximum continuous power conditions specified at:

(1) The minimum altitudes for safe flight on each stage of the route to be flown or of any planned diversion there from specified in, or calculated from the information contained in, the Operations Manual relating to the aeroplane; and

(2) The minimum altitudes necessary for compliance with the conditions prescribed in CAR-OPS 1.580 and 1.585, as appropriate.

CAR-OPS 1.580 En-Route – One Engine Inoperative

(See AMC OPS 1.580)

(a) An operator shall ensure that the aeroplane will, in the meteorological conditions expected for the flight, in the event of any one engine becoming inoperative at any point on its route or on any planned diversion there from and with the other engine or engines operating within the maximum continuous power conditions specified, be capable of continuing the flight from the cruising altitude to an aerodrome where a landing can be made in accordance with CAR-OPS 1.595 or CAR-OPS 1.600 as appropriate, clearing obstacles within 9.3 km (5 nm) either side of the intended track by a vertical interval of at least:

(1) 1000 ft when the rate of climb is zero or greater; or

(2) 2000 ft when the rate of climb is less than zero.

(b) The flight path shall have a positive slope at an altitude of 450 m (1500 ft) above the aerodrome where the landing is assumed to be made after the failure of one engine.

(c) For the purpose of this sub-paragraph the available rate of climb of the aeroplane shall be taken to be 150 ft per minute less than the gross rate of climb specified.

(d) When showing compliance with this paragraph, an operator must increase the width margins of sub-paragraph (a) above to 18.5 km (10 nm) if the navigational accuracy does not meet the 95% containment level.

(e) Fuel jettisoning is permitted to an extent consistent with reaching the aerodrome with the required fuel reserves, if a safe procedure is used.

CAR–OPS 1.585 En-Route – Aeroplanes With Three Or More Engines, Two Engines Inoperative

(a) An operator shall ensure that, at no point along the intended track, will an aeroplane having three or more engines be more than 90 minutes at the all-engine long range cruising speed at standard temperature in still air, away from an aerodrome at which the performance requirements applicable at the expected landing mass are met unless it complies with sub-paragraphs (b) to (e) below.

(b) The two-engines inoperative flight path shown must permit the aeroplane to continue the flight, in the expected meteorological conditions, clearing all obstacles within 9.3 km (5 nm) either side of the intended track by a vertical interval of at least 2000 ft, to an aerodrome at which the performance requirements applicable at the expected landing mass are met.

(c) The two engines are assumed to fail at the most critical point of that portion of the route where the aeroplane is more than 90 minutes, at the all engines long range cruising speed at standard temperature in still air, away from an aerodrome at which the performance requirements applicable at the expected landing mass are met.

(d) The expected mass of the aeroplane at the point where the two engines are assumed to fail must not be less than that which would include sufficient fuel to proceed to an aerodrome where the landing is assumed to be made, and to arrive there at an altitude of at least 450 m (1500 ft) directly over the landing area and thereafter to fly level for 15 minutes.

(e) For the purpose of this sub-paragraph the available rate of climb of the aeroplane shall be taken to be 150 ft per minute less than that specified.

(f) When showing compliance with this paragraph, an operator must increase the width margins of sub-paragraph (a) above to 18.5 km (10 nm) if the navigational accuracy does not meet the 95% containment level.

(g) Fuel jettisoning is permitted to an extent consistent with reaching the aerodrome with the required fuel reserves, if a safe procedure is used.

CAR–OPS 1.590 Landing – Destination and Alternate Aerodromes

(See AMC OPS 1.590 and 1.595)

An operator shall ensure that the landing mass of the aeroplane determined in accordance with CAR–OPS 1.475(a) does not exceed the maximum landing mass specified in the Aeroplane Flight Manual for the altitude and, if accounted for in the Aeroplane Flight Manual, the ambient temperature expected for the estimated time of landing at the destination and alternate aerodrome.

CAR–OPS 1.595 Landing – Dry Runways

(See AMC OPS 1.590 and 1.595)

(a) An operator shall ensure that the landing mass of the aeroplane determined in accordance with CAR–OPS 1.475(a) for the estimated time of landing allows a full stop landing from 50 ft above the threshold within 70% of the landing distance available at the destination and any alternate aerodrome.

(b) When showing compliance with sub-paragraph (a) above, an operator must take account of the following:

- (1) The altitude at the aerodrome;
 - (2) Not more than 50% of the head-wind component or not less than 150% of the tail-wind component;
 - (3) The type of runway surface (see AMC OPS 1.595(b)(3)); and
 - (4) The slope of the runway in the direction of landing (See AMC OPS 1.595(b)(4)).
- (c) For despatching an aeroplane in accordance with sub-paragraph (a) above it must be assumed that:
- (1) The aeroplane will land on the most favourable runway in still air; and
 - (2) The aeroplane will land on the runway most likely to be assigned considering the probable wind speed and direction and the ground handling characteristics of the aeroplane, and considering other conditions such as landing aids and terrain. (See IEM OPS 1.595(c).)
- (d) If an operator is unable to comply with sub-paragraph (c)(2) above for the destination aerodrome, the aeroplane may be despatched if an alternate aerodrome is designated which permits full compliance with sub-paragraphs (a), (b) and (c).

CAR-OPS 1.600 Landing – Wet and Contaminated Runways

- (a) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be wet, the landing distance available is equal to or exceeds the required landing distance, determined in accordance with CAR-OPS 1.595, multiplied by a factor of 1.15.
- (b) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be contaminated, the landing distance determined by using data acceptable to the AUTHORITY for these conditions, does not exceed the landing distance available.

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SUBPART J – MASS and BALANCE**CAR–OPS 1.605 General**

(See Appendix 1 to CAR–OPS 1.605)

(See Appendix 1 to CAR–OPS 1.625)

(See AC OPS 1.605)

(See AC OPS 1.620(g))

(a) An operator shall ensure that during any phase of operation, the loading, mass and centre of gravity of the aeroplane complies with the limitations specified in the approved Aeroplane Flight Manual, or the Operations Manual if more restrictive.

(b) An operator must establish the mass and the centre of gravity of any aeroplane by actual weighing prior to initial entry into service and thereafter at intervals of 4 years if individual aeroplane masses are used and 9 years if fleet masses are used. The accumulated effects of modifications and repairs on the mass and balance must be accounted for and properly documented. Furthermore, aeroplanes must be reweighed if the effect of modifications on the mass and balance is not accurately known.

(c) An operator must determine the mass of all operating items and crew members included in the aeroplane dry operating mass by weighing or by using standard masses. The influence of their position on the aeroplane centre of gravity must be determined.

(d) An operator must establish the mass of the traffic load, including any ballast, by actual weighing or determine the mass of the traffic load in accordance with standard passenger and baggage masses as specified in CAR-OPS 1.620.

(e) An operator must determine the mass of the fuel load by using the actual density or, if not known, the density calculated in accordance with a method specified in the Operations Manual. (See IEM OPS 1.605(e).)

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CAR–OPS 1.607 Terminology

(a) *Dry Operating Mass*. The total mass of the aeroplane ready for a specific type of operation excluding all usable fuel and traffic load. This mass includes items such as:

- (1) Crew and crew baggage;
- (2) Catering and removable passenger service equipment; and
- (3) Potable water and lavatory chemicals.

(b) *Maximum Zero Fuel Mass*. The maximum permissible mass of an aeroplane with no usable fuel. The mass of the fuel contained in particular tanks must be included in the zero fuel mass when it is explicitly mentioned in the Aeroplane Flight Manual limitations.

(c) *Maximum Structural Landing Mass*. The maximum permissible total aeroplane mass upon landing under normal circumstances.

(d) *Maximum Structural Take Off Mass.* The maximum permissible total aeroplane mass at the start of the take-off run.

(e) Passenger classification.

(1) Adults, male and female, are defined as persons of an age of 12 years and above.

(2) Children are defined as persons of an age of two years and above but who are less than 12 years of age.

(3) Infants are defined as persons who are less than 2 years of age.

(f) *Traffic Load.* The total mass of passengers, baggage and cargo, including any non-revenue load.

CAR-OPS 1.610 Loading, mass and balance

An operator shall specify, in the Operations Manual, the principles and methods involved in the loading and in the mass and balance system that meet the requirements of CAR-OPS 1.605. This system must cover all types of intended operations.

CAR-OPS 1.615 Mass values for crew

(a) An operator shall use the following mass values to determine the dry operating mass:

(1) Actual masses including any crew baggage; or

(2) Standard masses, including hand baggage, of 85 kg for flight crewmembers and 75 kg for cabin crewmembers; or

(3) Other standard masses acceptable to the AUTHORITY.

(b) An operator must correct the dry operating mass to account for any additional baggage. The position of this additional baggage must be accounted for when establishing the centre of gravity of the aeroplane.

CAR-OPS 1.620 Mass values for passengers and baggage

(a) An operator shall compute the mass of passengers and checked baggage using either the actual weighed mass of each person and the actual weighed mass of baggage or the standard mass values specified in Tables 1 to 3 below except where the number of passenger seats available is less than 10. In such cases passenger mass may be established by use of a verbal statement by or on behalf of each passenger and adding to it a pre-determined constant to account for hand baggage and clothing (See AMC OPS 1.620(a)). The procedure specifying when to select actual or standard masses and the procedure to be followed when using verbal statements must be included in the Operations Manual.

(b) If determining the actual mass by weighing, an operator must ensure that passengers' personal belongings and hand baggage are included. Such weighing must be conducted immediately prior to boarding and at an adjacent location.

(c) If determining the mass of passengers using standard mass values, the standard mass values in Tables 1 and 2 below must be used. The standard masses include hand baggage and the mass of any

infant below 2 years of age carried by an adult on one passenger seat. Infants occupying separate passenger seats must be considered as children for the purpose of this sub-paragraph.

(d) Mass values for passengers – 20 passenger seats or more

(1) Where the total number of passenger seats available on an aeroplane is 20 or more, the standard masses of male and female in Table 1 are applicable. As an alternative, in cases where the total number of passenger seats available is 30 or more, the 'All Adult' mass values in Table 1 are applicable.

(2) For the purpose of Table 1, holiday charter means a charter flight solely intended as an element of a holiday travel package. The holiday charter mass values apply provided that not more than 5% of passenger seats installed in the aeroplane are used for the non-revenue carriage of certain categories of passengers (See IEM OPS 1.620(d)(2)).

Table 1

Passenger seats:	20 and more		30 and more
	Male	Female	All adult
All flights except holiday charters	88 kg	70 kg	84 kg
Holiday charters	83 kg	69 kg	76 kg
Children	35 kg	35 kg	35 kg

(e) Mass values for passengers – 19 passenger seats or less

(1) Where the total number of passenger seats available on an aeroplane is 19 or less, the standard masses in Table 2 are applicable.

(2) On flights where no hand baggage is carried in the cabin or where hand baggage is accounted for separately, 6 kg may be deducted from the above male and female masses. Articles such as an overcoat, an umbrella, a small handbag or purse, reading material or a small camera are not considered as hand baggage for the purpose of this sub-paragraph.

Table 2

Passenger seats	1 – 5	6 – 9	10 – 19
Male	104 kg	96 kg	92 kg
Female	86 kg	78 kg	74 kg
Children	35 kg	35 kg	35 kg

(f) Mass values for baggage

(1) Where the total number of passenger seats available on the aeroplane is 20 or more the standard mass values given in Table 3 are applicable for each piece of checked baggage. For aeroplanes with 19 passenger seats or less, the actual mass of checked baggage, determined by weighing, must be used.

Table 3 – 20 or more passenger seats

Type of flight	Baggage standard mass
Domestic	11 kg
Intercontinental	15 kg
All other	13 kg

(g) If an operator wishes to use standard mass values other than those contained in Tables 1 to 3 above, he must advise the AUTHORITY of his reasons and gain its approval in advance. He must also submit for approval a detailed weighing survey plan and apply the statistical analysis method given in Appendix 1 to CAR–OPS 1.620(g). After verification and approval by the AUTHORITY of the results of the weighing survey, the revised standard mass values are only applicable to that operator. The revised standard mass values can only be used in circumstances consistent with those under which the survey was conducted. Where revised standard masses exceed those in Tables 1–3, then such higher values must be used. (See IEM OPS 1.620(g).)

(h) On any flight identified as carrying a significant number of passengers whose masses, including hand baggage, are expected to exceed the standard passenger mass, an operator must determine the actual mass of such passengers by weighing or by adding an adequate mass increment. (See IEM OPS 1.620(h) (i).)

(i) If standard mass values for checked baggage are used and a significant number of passengers check in baggage that is expected to exceed the standard baggage mass, an operator must determine the actual mass of such baggage by weighing or by adding an adequate mass increment. (See IEM OPS 1.620(h) & (i).)

(j) An operator shall ensure that a commander is advised when a non-standard method has been used for determining the mass of the load and that this method is stated in the mass and balance documentation.

CAR–OPS 1.625 Mass and balance documentation

(See Appendix 1 to CAR– OPS 1.625)

(a) An operator shall establish mass and balance documentation prior to each flight specifying the load and its distribution. The mass and balance documentation must enable the commander to determine that the load and its distribution is such that the mass and balance limits of the aeroplane are not exceeded. The person preparing the mass and balance documentation must be named on the document. The person supervising the loading of the aeroplane must confirm by signature that the load and its distribution are in accordance with the mass and balance documentation. This document must be acceptable to the commander, his acceptance being indicated by countersignature or equivalent. (See also CAR–OPS 1.1055(a)(12).)

(b) An operator must specify procedures for Last Minute Changes to the load.

(c) Subject to the approval of the AUTHORITY, an operator may use an alternative to the procedures required by paragraphs (a) and (b) above.

Appendix 1 to CAR–OPS 1.605 Mass and Balance – General

(See AC to Appendix 1 to CAR-OPS 1.605)

(See IEM to Appendix 1 to CAR-OPS 1.605)

(a) Determination of the dry operating mass of an aeroplane

(1) Weighing of an aeroplane

(i) New aeroplanes are normally weighed at the factory and are eligible to be placed into operation without reweighing if the mass and balance records have been adjusted for alterations or modifications to the aeroplane.

(ii) The individual mass and centre of gravity (CG) position of each aeroplane shall be re-established periodically. The maximum interval between two weighings must be defined by the operator and must meet the requirements of CAR–OPS 1.605(b). In addition, the mass and the CG of each aeroplane shall be re-established either by:

(A) Weighing; or

(B) Calculation, if the operator is able to provide the necessary justification to prove the validity of the method of calculation chosen, whenever the cumulative changes to the dry operating mass exceed $\pm 0.5\%$ of the maximum landing mass or the cumulative change in CG position exceeds 0.5% of the mean aerodynamic chord.

(2) Fleet mass and CG position

(i) For a fleet or group of aeroplanes of the same model and configuration, an average dry operating mass and CG position may be used as the fleet mass and CG position, provided that the dry operating masses and CG positions of the individual aeroplanes meet the tolerances specified in sub-paragraph (ii) below. Furthermore, the criteria specified in sub-paragraphs (iii), (iv) and (a)(3) below are applicable.

(ii) Tolerances

(A) If the dry operating mass of any aeroplane weighed, or the calculated dry operating mass of any aeroplane of a fleet, varies by more than $\pm 0.5\%$ of the maximum structural landing mass from the established dry operating fleet mass or the CG position varies by more than $\pm 0.5\%$ of the mean aerodynamic chord from the fleet CG, that aeroplane shall be omitted from that fleet. Separate fleets may be established, each with differing fleet mean masses.

(B) In cases where the aeroplane mass is within the dry operating fleet mass tolerance but its CG position falls outside the permitted fleet tolerance, the aeroplane may still be operated under the applicable dry operating fleet mass but with an individual CG position.

(C) If an individual aeroplane has, when compared with other aeroplanes of the fleet, a physical, accurately accountable difference (e.g. galley or seat configuration), that causes exceedance of the fleet tolerances, this aeroplane may be maintained in the fleet provided that appropriate corrections are applied to the mass and/or CG position for that aeroplane.

(D) Aeroplanes for which no mean aerodynamic chord has been published must be operated with their individual mass and CG position values or must be subjected to a special study and approval.

(iii) Use of fleet values

(A) After the weighing of an aeroplane, or if any change occurs in the aeroplane equipment or configuration, the operator must verify that this aeroplane falls within the tolerances specified in sub-paragraph (2)(ii) above.

(B) Aeroplanes which have not been weighed since the last fleet mass evaluation can still be kept in a fleet operated with fleet values, provided that the individual values are revised by computation and stay within the tolerances defined in sub-paragraph (2)(ii) above. If these individual values no longer fall within the permitted tolerances, the operator must either determine new fleet values fulfilling the conditions of sub-paragraphs (2)(i) and (2)(ii) above, or operate the aeroplanes not falling within the limits with their individual values.

(C) To add an aeroplane to a fleet operated with fleet values, the operator must verify by weighing or computation that its actual values fall within the tolerances specified in sub-paragraph (2)(ii) above.

(iv) To comply with sub-paragraph (2)(i) above, the fleet values must be updated at least at the end of each fleet mass evaluation.

(3) *Number of aeroplanes to be weighed to obtain fleet values*

(i) If 'n' is the number of aeroplanes in the fleet using fleet values, the operator must at least weigh, in the period between two fleet mass evaluations, a certain number of aeroplanes defined in the Table below:

Number of aeroplanes in the fleet	Minimum number of weighings
2 or 3	n
4 to 9	$\frac{n + 3}{2}$
10 or more	$\frac{n + 51}{10}$

(ii) In choosing the aeroplanes to be weighed, aeroplanes in the fleet which have not been weighed for the longest time shall be selected.

(iii) The interval between 2 fleet mass evaluations must not exceed 48 months.

(4) *Weighing procedure*

(i) The weighing must be accomplished either by the manufacturer or by an approved maintenance organisation.

(ii) Normal precautions must be taken consistent with good practices such as:

- (A) Checking for completeness of the aeroplane and equipment;
- (B) Determining that fluids are properly accounted for;
- (C) Ensuring that the aeroplane is clean; and
- (D) Ensuring that weighing is accomplished in an enclosed building.

(iii) Any equipment used for weighing must be properly calibrated, zeroed, and used in accordance with the manufacturer's instructions. Each scale must be calibrated either by the manufacturer, by a civil department of weights and measures or by an appropriately authorised organisation within 2 years or within a time period defined by the manufacturer of the weighing equipment, whichever is less. The equipment must enable the mass of the aeroplane to be established accurately. (See AMC to Appendix 1 to CAR OPS 1.605 para(a)(4)(iii).)

(b) *Special standard masses for the traffic load.* In addition to standard masses for passengers and checked baggage, an operator can submit for approval to the AUTHORITY standard masses for other load items.

(c) *Aeroplane loading*

- (1) An operator must ensure that the loading of its aeroplanes is performed under the supervision of qualified personnel.
 - (2) An operator must ensure that the loading of the freight is consistent with the data used for the calculation of the aeroplane mass and balance.
 - (3) An operator must comply with additional structural limits such as the floor strength limitations, the maximum load per running metre, the maximum mass per cargo compartment, and/or the maximum seating limits.
- (d) *Centre of gravity limits*

- (1) *Operational CG envelope.* Unless seat allocation is applied and the effects of the number of passengers per seat row, of cargo in individual cargo compartments and of fuel in individual tanks is accounted for accurately in the balance calculation, operational margins must be applied to the certificated centre of gravity envelope. In determining the CG margins, possible deviations from the assumed load distribution must be considered. If free seating is applied, the operator must introduce procedures to ensure corrective action by flight or cabin crew if extreme longitudinal seat selection occurs. The CG margins and associated operational procedures, including assumptions with regard to passenger seating, must be acceptable to the AUTHORITY. (See IEM to Appendix 1 to CAR-OPS 1.605 subparagraph (d).)
- (2) *In-flight centre of gravity.* Further to sub-paragraph (d)(1) above, the operator must show that the procedures fully account for the extreme variation in CG travel during flight caused by passenger/crew movement and fuel consumption/transfer.

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Appendix 1 to CAR – OPS 1.620(g) Procedure for establishing revised standard mass values for passengers and baggage

(See IEM to Appendix 1 to CAR–OPS 1.620 (g))

(a) Passengers

(1) *Weight sampling method.* The average mass of passengers and their hand baggage must be determined by weighing, taking random samples. The selection of random samples must by nature and extent be representative of the passenger volume, considering the type of operation, the frequency of flights on various routes, in/outbound flights, applicable season and seat capacity of the aeroplane.

(2) *Sample size.* The survey plan must cover the weighing of at least the greatest of:

(i) A number of passengers calculated from a pilot sample, using normal statistical procedures and based on a relative confidence range (accuracy) of 1% for all adult and 2% for separate male and female average masses (the statistical procedure, complemented with a worked example for determining the minimum required sample size and the average mass, is included in IEM OPS 1.620(g)); and

(ii) For aeroplanes:

(A) With a passenger seating capacity of 40 or more, a total of 2000 passengers; or

(B) With a passenger seating capacity of less than 40, a total number of 50 x (the passenger seating capacity).

(3) *Passenger masses.* Passenger masses must include the mass of the passengers' belongings which are carried when entering the aeroplane. When taking random samples of passenger masses, infants shall be weighed together with the accompanying adult. (See also CAR-OPS 1.620(C)(d) and (e).)

(4) *Weighing location.* The location for the weighing of passengers shall be selected as close as possible to the aeroplane, at a point where a change in the passenger mass by disposing of or by acquiring more personal belongings is unlikely to occur before the passengers board the aeroplane.

(5) *Weighing machine.* The weighing machine to be used for passenger weighing shall have a capacity of at least 150 kg. The mass shall be displayed at minimum graduations of 500 g. The weighing machine must be accurate to within 0.5% or 200 g whichever is the greater.

(6) *Recording of mass values.* For each flight included in the survey, the mass of the passengers, the corresponding passenger category (i.e. male/female/children) and the flight number must be recorded.

(b) *Checked baggage.* The statistical procedure for determining revised standard baggage mass values based on average baggage masses of the minimum required sample size is basically the same as for passengers and as specified in sub-paragraph (a)(1) (See also IEM OPS 1.620(g)). For baggage, the relative confidence range (accuracy) amounts to 1%. A minimum of 2000 pieces of checked baggage must be weighed.

(c) Determination of revised standard mass values for passengers and checked baggage

(1) To ensure that, in preference to the use of actual masses determined by weighing, the use of revised standard mass values for passengers and checked baggage does not adversely affect

operational safety, a statistical analysis (See IEM OPS 1.620(g)) must be carried out. Such an analysis will generate average mass values for passengers and baggage as well as other data.

(2) On aeroplanes with 20 or more passenger seats, these averages apply as revised standard male and female mass values.

(3) On smaller aeroplanes, the following increments must be added to the average passenger mass to obtain the revised standard mass values:

Number of passenger seats	Required mass increment
1 – 5 incl.	16 kg
6 – 9 incl.	8 kg
10 – 19 incl.	4 kg

Alternatively, all adult revised standard (average) mass values may be applied on aeroplanes with 30 or more passenger seats. Revised standard (average) checked baggage mass values are applicable to aeroplanes with 20 or more passenger seats.

(4) Operators have the option to submit a detailed survey plan to the AUTHORITY for approval and subsequently a deviation from the revised standard mass value provided this deviating value is determined by use of the procedure explained in this Appendix. Such deviations must be reviewed at intervals not exceeding 5 years. (See AMC to Appendix 1 to CAR-OPS 1.620(g), sub-paragraph (c)(4).)

(5) All adult revised standard mass values must be based on a male/female ratio of 80/20 in respect of all flights except holiday charters which are 50/50. If an operator wishes to obtain approval for use of a different ratio on specific routes or flights then data must be submitted to the AUTHORITY showing that the alternative male/female ratio is conservative and covers at least 84% of the actual male/female ratios on a sample of at least 100 representative flights.

(6) The average mass values found are rounded to the nearest whole number in kg. Checked baggage mass values are rounded to the nearest 0.5 kg figure, as appropriate.

Appendix 1 to CAR – OPS 1.625 Mass and Balance Documentation

(See IEM to Appendix 1 to CAR–OPS 1.625)

(a) Mass and balance documentation

(1) Contents

(i) The mass and balance documentation must contain the following information:

- (A) The aeroplane registration and type;
- (B) The flight identification number and date;
- (C) The identity of the Commander;
- (D) The identity of the person who prepared the document;
- (E) The dry operating mass and the corresponding CG of the aeroplane;
- (F) The mass of the fuel at take-off and the mass of trip fuel;
- (G) The mass of consumables other than fuel;
- (H) The components of the load including passengers, baggage, freight and ballast;
- (I) The Take-off Mass, Landing Mass and Zero Fuel Mass;
- (J) The load distribution;
- (K) The applicable aeroplane CG positions; and
- (L) The limiting mass and CG values.

(ii) Subject to the approval of the AUTHORITY, an operator may omit some of this Data from the mass and balance documentation.

(2) *Last Minute Change.* If any last minute change occurs after the completion of the mass and balance documentation, this must be brought to the attention of the commander and the last minute change must be entered on the mass and balance documentation. The maximum allowed change in the number of passengers or hold load acceptable as a last minute change must be specified in the Operations Manual. If this number is exceeded, new mass and balance documentation must be prepared.

(b) *Computerised systems.* Where mass and balance documentation is generated by a computerised mass and balance system, the operator must verify the integrity of the output data. He must establish a system to check that amendments of his input data are incorporated properly in the system and that the system is operating correctly on a continuous basis by verifying the output data at intervals not exceeding 6 months.

(c) *Onboard mass and balance systems.* An operator must obtain the approval of the AUTHORITY if he wishes to use an onboard mass and balance computer system as a primary source for despatch.

(d) *Datalink.* When mass and balance documentation is sent to aeroplanes via datalink, a copy of the final mass and balance documentation as accepted by the commander must be available on the ground.

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SUBPART K – INSTRUMENTS and EQUIPMENT**CAR–OPS 1.630 General introduction**

(See IEM OPS 1.630)

(a) An operator shall ensure that a flight does not commence unless the instruments and equipment required under this Subpart are:

(1) Approved, except as specified in sub-paragraph (c), and installed in accordance with the requirements applicable to them, including the minimum performance standard and the operational and airworthiness requirements; and

(2) In operable condition for the kind of operation being conducted except as provided in the MEL (CAR–OPS 1.030 refers).

(b) Instruments and equipment minimum performance standards are those prescribed in the applicable Joint Technical Standard Orders (JTSO) as listed in JAR–TSO, unless different performance standards are prescribed in the operational or airworthiness codes. Instruments and equipment complying with design and performance specifications other than JTSO on the date of CAR–OPS implementation may remain in service, or be installed, unless additional requirements are prescribed in this Subpart. Instruments and equipment that have already been approved do not need to comply with a revised JTSO or a revised specification, other than JTSO, unless a retroactive requirement is prescribed.

(c) The following items shall not be required to have an equipment approval:

- (1) Fuses referred to in CAR–OPS 1.635;
- (2) Electric torches referred to in CAR–OPS 1.640(a)(4);
- (3) An accurate time piece referred to in CAR–OPS 1.650(b) & 1.652(b);
- (4) Chart holder referred to in CAR–OPS 1.652(n).
- (5) First-aid kits referred to in CAR–OPS 1.745;
- (6) Emergency medical kit referred to in CAR–OPS 1.755;
- (7) Megaphones referred to in CAR–OPS 1.810;
- (8) Survival and pyrotechnic signalling equipment referred to in CAR–OPS 1.835(a) and (c); and
- (9) Sea anchors and equipment for mooring, anchoring or manoeuvring seaplanes and amphibians on water referred to in CAR–OPS 1.840.
- (10) Child restraint devices referred to in CAR–OPS 1.730(a)(3).

(d) If equipment is to be used by one flight crew member at his station during flight, it must be readily operable from his station. When a single item of equipment is required to be operated by more than one flight crew member it must be installed so that the equipment is readily operable from any station at which the equipment is required to be operated.

(e) Those instruments that are used by any one flight crew member shall be so arranged as to permit the flight crew member to see the indications readily from his station, with the minimum practicable deviation from the position and line of vision which he normally assumes when looking forward along the flight path. Whenever a single instrument is required in an aeroplane operated by more than 1 flight crew member it must be installed so that the instrument is visible from each applicable flight crew station.

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CAR-OPS 1.635 Circuit protection devices

An operator shall not operate an aeroplane in which fuses are used unless there are spare fuses available for use in flight equal to at least 10% of the number of fuses of each rating or three of each rating whichever is the greater.

CAR-OPS 1.640 Aeroplane operating lights

An operator shall not operate an aeroplane unless it is equipped with:

- (a) For flight by day:
 - (1) Anti-collision light system;
 - (2) Lighting supplied from the aeroplane's electrical system to provide adequate illumination for all instruments and equipment essential to the safe operation of the aeroplane;
 - (3) Lighting supplied from the aeroplane's electrical system to provide illumination in all passenger compartments; and
 - (4) An electric torch for each required crew member readily accessible to crew members when seated at their designated station.
- (b) For flight by night, in addition to equipment specified in paragraph (a) above:
 - (1) Navigation/position lights; and
 - (2) Two landing lights or a single light having two separately energised filaments; and
 - (3) Lights to conform with the International regulations for preventing collisions at sea if the aeroplane is a Seaplane or an Amphibian.

CAR-OPS 1.645 Windshield wipers

An operator shall not operate an aeroplane with a maximum certificated take-off mass of more than 5 700 kg unless it is equipped at each pilot station with a windshield wiper or equivalent means to maintain a clear portion of the windshield during precipitation.

CAR-OPS 1.650 Day VFR operations – Flight and navigational instruments and associated equipment

(See AMC OPS 1.650/1.652)(See IEM OPS 1.650/1.652)

An operator shall not operate an aeroplane by day in accordance with Visual Flight Rules (VFR) unless it is equipped with the flight and navigational instruments and associated equipment and, where applicable, under the conditions stated in the following sub-paragraphs:

- (a) A magnetic compass;
- (b) An accurate timepiece showing the time in hours, minutes, and seconds;
- (c) A sensitive pressure altimeter calibrated in feet with a sub-scale setting, calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight;
- (d) An airspeed indicator calibrated in knots;
- (e) A vertical speed indicator;
- (f) A turn and slip indicator, or a turn co-ordinator incorporating a slip indicator;
- (g) An attitude indicator;
- (h) A stabilised direction indicator; and

(i) A means of indicating in the flight crew compartment the outside air temperature calibrated in degrees Celsius (See AMC OPS 1.650(i) & 1.652(i)).

(j) For flights which do not exceed 60 minutes duration, which take off and land at the same aerodrome, and which remain within 50 nm of that aerodrome, the instruments prescribed in sub-paragraphs (f), (g) and (h) above, and sub-paragraphs (k)(4), (k)(5) and (k)(6) below, may all be replaced by either a turn and slip indicator, or a turn co-ordinator incorporating a slip indicator, or both an attitude indicator and a slip indicator.

(k) Whenever two pilots are required the second pilot's station shall have separate instruments as follows:

- (1) A sensitive pressure altimeter calibrated in feet with a sub-scale setting calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight;
- (2) An airspeed indicator calibrated in knots;
- (3) A vertical speed indicator;
- (4) A turn and slip indicator, or a turn co-ordinator incorporating a slip indicator;
- (5) An attitude indicator; and
- (6) A stabilised direction indicator.

(l) Each airspeed indicating system must be equipped with a heated pitot tube or equivalent means for preventing malfunction due to either condensation or icing for:

- (1) Aeroplanes with a maximum certificated take-off mass in excess of 5700 kg or having a maximum approved passenger seating configuration of more than 9;
- (2) Aeroplanes first issued with an individual certificate of airworthiness on or after 1 April 1999.

(m) Whenever duplicate instruments are required, the requirement embraces separate displays for each pilot and separate selectors or other associated equipment where appropriate.

(n) All aeroplanes must be equipped with means for indicating when power is not adequately supplied to the required flight instruments; and

(o) All aeroplanes with compressibility limitations not otherwise indicated by the required airspeed indicators shall be equipped with a Mach number indicator at each pilot's station.

(p) An operator shall not conduct Day VFR operations unless the aeroplane is equipped with a headset with boom microphone or equivalent for each flight crew member on flight deck duty (See IEM OPS 1.650(p)/1.652(s)).

CAR-OPS 1.652 IFR or night operations – Flight and navigational instruments and associated equipment

(See AMC OPS 1.650/1.652)(See IEM OPS 1.650/1.652)

An operator shall not operate an aeroplane in accordance with Instrument Flight Rules (IFR) or by night in accordance with Visual Flight Rules (VFR) unless it is equipped with the flight and navigational instruments and associated equipment and, where applicable, under the conditions stated in the following sub-paragraphs:

(a) A magnetic compass;

(b) An accurate time-piece showing the time in hours, minutes and seconds;

(c) Two sensitive pressure altimeters calibrated in feet with sub-scale settings, calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight. Not later than 1 April 2002 these altimeters must have counter drum-pointer or equivalent presentation.

(d) An airspeed indicating system with heated pitot tube or equivalent means for preventing malfunctioning due to either condensation or icing including a warning indication of pitot heater failure. The pitot heater failure warning indication requirement does not apply to those aeroplanes with a maximum approved passenger seating configuration of 9 or less or a maximum certificated take-off mass of 5 700 kg or less and issued with an individual Certificate of Airworthiness prior to 1 April 1998 (See AMC OPS 1.652(d) & (k)(2));

Note: Applicability Date 1 April 1999 (for the pitot heater failure warning indication).

- (e) A vertical speed indicator;
 - (f) A turn and slip indicator;
 - (g) An attitude indicator;
 - (h) A stabilised direction indicator;
 - (i) A means of indicating in the flight crew compartment the outside air temperature calibrated in degrees Celsius (See AMC OPS 1.650 (i) & 1.652(i)); and
 - (j) Two independent static pressure systems, except that for propeller driven aeroplanes with maximum certificated take-off mass of 5700 kg or less, one static pressure system and one alternate source of static pressure is allowed.
- (k) Whenever two pilots are required the second pilot's station shall have separate instruments as follows:

- (1) A sensitive pressure altimeter calibrated in feet with a sub-scale setting, calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight and which may be one of the 2 altimeters required by sub-paragraph (c) above. Not later than 1 April 2002 these altimeters must have counter drum-pointer or equivalent presentation.
- (2) An airspeed indicating system with heated pitot tube or equivalent means for preventing malfunctioning due to either condensation or icing including a warning indication of pitot heater failure. The pitot heater failure warning indication requirement does not apply to those aeroplanes with a maximum approved passenger seating configuration of 9 or less or a maximum certificated take-off mass of 5 700 kg or less and issued with an individual Certificate of Airworthiness prior to 1 April 1998 (See AMC OPS 1.652(d) & (k)(2));

Note: Applicability Date 1 April 1999 (for the pitot heater failure warning indication).

- (3) A vertical speed indicator;
- (4) A turn and slip indicator;
- (5) An attitude indicator; and
- (6) A stabilised direction indicator.

(l) Those aeroplanes with a maximum certificated take-off mass in excess of 5 700 kg or having a maximum approved passenger seating configuration of more than 9 seats must be equipped with an additional, standby, attitude indicator (artificial horizon), capable of being used from either pilot's station, that:

- (1) Is powered continuously during normal operation and, after a total failure of the normal electrical generating system is powered from a source independent of the normal electrical generating system;
- (2) Provides reliable operation for a minimum of 30 minutes after total failure of the normal electrical generating system, taking into account other loads on the emergency power supply and operational procedures;

- (3) Operates independently of any other attitude indicating system;
- (4) Is operative automatically after total failure of the normal electrical generating system; and
- (5) Is appropriately illuminated during all phases of operation, except for aeroplanes with a maximum certificated take-off mass of 5 700 kg or less, already registered in the Sultanate of Oman on 1 April 1995, equipped with a standby attitude indicator in the left-hand instrument panel.

(m) In complying with sub-paragraph (l) above, it must be clearly evident to the flight crew when the standby attitude indicator, required by that sub-paragraph, is being operated by emergency power. Where the standby attitude indicator has its own dedicated power supply there shall be an associated indication, either on the instrument or on the instrument panel, when this supply is in use.

(n) A chart holder in an easily readable position which can be illuminated for night operations.

(o) If the standby attitude instrument system is certificated according to CAR 25.1303(b)(4) or equivalent, the turn and slip indicators may be replaced by slip indicators.

(p) Whenever duplicate instruments are required, the requirement embraces separate displays for each pilot and separate selectors or other associated equipment where appropriate;

(q) All aeroplanes must be equipped with means for indicating when power is not adequately supplied to the required flight instruments; and

(r) All aeroplanes with compressibility limitations not otherwise indicated by the required airspeed indicators shall be equipped with a Mach number indicator at each pilot's station.

(s) An operator shall not conduct IFR or night operations unless the aeroplane is equipped with a headset with boom microphone or equivalent for each flight crew member on flight deck duty and a transmit button on the control wheel for each required pilot. (See IEM OPS 1.650(p)/1.652(s).)

CAR-OPS 1.655 Additional equipment for single pilot operation under IFR

An operator shall not conduct single pilot IFR operations unless the aeroplane is equipped with an autopilot with at least altitude hold and heading mode.

CAR-OPS 1.660 Altitude alerting system

(a) An operator shall not operate a turbine propeller powered aeroplane with a maximum certificated take-off mass in excess of 5 700 kg or having a maximum approved passenger seating configuration of more than 9 seats or a turbojet powered aeroplane unless it is equipped with an altitude alerting system capable of:

- (1) Alerting the flight crew upon approaching a preselected altitude; and
- (2) Alerting the flight crew by at least an aural signal, when deviating from a preselected altitude,

except for aeroplanes with a maximum certificated take-off mass of 5 700 kg or less having a maximum approved passenger seating configuration of more than 9 and first issued with an individual certificate of airworthiness before 1 April 1972 and already registered in the Sultanate of Oman on 1 April 1995.

CAR–OPS 1.665 Ground proximity warning system and terrain awareness warning system

[(a) An operator shall not operate a turbine powered aeroplane having a maximum certificated take-off mass in excess of 5 700 kg or a maximum approved passenger seating configuration of more than nine unless it is equipped with a ground proximity warning system that includes a predictive terrain hazard warning function (terrain awareness and warning system — TAWS).

(b) The ground proximity warning system must automatically provide, by means of aural signals, which may be supplemented by visual signals, timely and distinctive warning to the flight crew of sink rate, ground proximity, altitude loss after take-off or go-around, incorrect landing configuration and downward glide slope deviation.

(c) The terrain awareness and warning system must automatically provide the flight crew, by means of visual and aural signals and a terrain awareness display, with sufficient alerting time to prevent controlled flight into terrain events, and provided a forward looking capability and terrain clearance floor.]

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CAR-OPS 1.668 Airborne Collision Avoidance System

[An operator shall not operate a turbine powered aeroplane having a maximum certificated take-off mass in excess of 5 700 kg or a maximum approved passenger seating configuration of more than 19 unless it is equipped with an airborne collision avoidance system with a minimum performance level of at least ACAS II.]

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CAR–OPS 1.670 Airborne weather radar equipment

(a) An operator shall not operate:

- (1) A pressurised aeroplane; or
- (2) An unpressurised aeroplane which has a maximum certificated take-off mass of more than 5 700 kg; or
- (3) An unpressurised aeroplane having a maximum approved passenger seating configuration of more than 9 seats after 1 April 1999, unless it is equipped with airborne weather radar equipment whenever such an aeroplane is being operated at night or in instrument meteorological conditions in areas where thunderstorms or other potentially hazardous weather conditions, regarded as detectable with airborne weather radar, may be expected to exist along the route.

(b) For propeller driven pressurised aeroplanes having a maximum certificated take-off mass not exceeding 5 700 kg with a maximum approved passenger seating configuration not exceeding 9 seats the airborne weather radar equipment may be replaced by other equipment capable of detecting thunderstorms and other potentially hazardous weather conditions, regarded as detectable with airborne weather radar equipment, subject to approval by the AUTHORITY.

CAR–OPS 1.675 Equipment for operations in icing conditions

(a) An operator shall not operate an aeroplane in expected or actual icing conditions unless it is certificated and equipped to operate in icing conditions.

(b) An operator shall not operate an aeroplane in expected or actual icing conditions at night unless it is equipped with a means to illuminate or detect the formation of ice. Any illumination that is used must be of a type that will not cause glare or reflection that would handicap crew members in the performance of their duties.

CAR–OPS 1.680 Cosmic radiation detection equipment

(See AC OPS 1.680(a)(2)).

- (a) An operator shall not operate an aeroplane above 15 000 m (49 000 ft) unless:
- (1) It is equipped with an instrument to measure and indicate continuously the dose rate of total cosmic radiation being received (i.e. the total of ionizing and neutron radiation of galactic and solar origin) and the cumulative dose on each flight, or
 - (2) A system of on-board quarterly radiation sampling acceptable to the AUTHORITY is established (See AC OPS 1.680(a)(2)).

CAR–OPS 1.685 Flight crew interphone system

An operator shall not operate an aeroplane on which a flight crew of more than one is required unless it is equipped with a flight crew interphone system, including headsets and microphones, not of a handheld type, for use by all members of the flight crew

CAR–OPS 1.690 Crew member interphone system

(See AMC OPS 1.690(b)(6))

(See IEM OPS 1.690(b)(7))

(a) An operator shall not operate an aeroplane with a maximum certificated take-off mass exceeding 15 000 kg or having a maximum approved passenger seating configuration of more than 19 unless it is equipped with a crew member interphone system except for aeroplanes first issued with an individual certificate of airworthiness in before 1 April 1965 and already registered in the Sultanate of Oman on 1 April 1995.

- (b) The crew member interphone system required by this paragraph must:
- (1) Operate independently of the public address system except for handsets, headsets, microphones, selector switches and signalling devices;
 - (2) Provide a means of two-way communication between the flight crew compartment and:
 - (i) Each passenger compartment;
 - (ii) Each galley located other than on a passenger deck level; and
 - (iii) Each remote crew compartment that is not on the passenger deck and is not easily accessible from a passenger compartment;
 - (3) Be readily accessible for use from each of the required flight crew stations in the flight crew compartment;
 - (4) Be readily accessible for use at required cabin crew member stations close to each separate or pair of floor level emergency exits;
 - (5) Have an alerting system incorporating aural or visual signals for use by flight crew members to alert the cabin crew and for use by cabin crew members to alert the flight crew;
 - (6) Have a means for the recipient of a call to determine whether it is a normal call or an emergency call (See AMC OPS 1.690(b)(6)); and

- (7) Provide on the ground a means of two-way communication between ground personnel and at least two flight crew members. (See IEM OPS 1.690(b)(7))

CAR–OPS 1.695 Public address system

(a) An operator shall not operate an aeroplane with a maximum approved passenger seating configuration of more than 19 unless a public address system is installed.

(b) The public address system required by this paragraph must:

- (1) Operate independently of the interphone systems except for handsets, headsets, microphones, selector switches and signalling devices;
- (2) Be readily accessible for immediate use from each required flight crew member station;
- (3) For each required floor level passenger emergency exit which has an adjacent cabin crew seat, have a microphone which is readily accessible to the seated cabin crew member, except that one microphone may serve more than one exit, provided the proximity of the exits allows unassisted verbal communication between seated cabin crew members;
- (4) Be capable of operation within 10 seconds by a cabin crew member at each of those stations in the compartment from which its use is accessible; and
- (5) Be audible and intelligible at all passenger seats, toilets and cabin crew seats and work stations.

CAR–OPS 1.700 Cockpit voice recorders–1

(See AC OPS 1.700)

(a) An operator shall not operate an aeroplane first issued with an individual Certificate of Airworthiness on or after 1 April 1998, which:

- (1) Is multi-engine turbine powered and has a maximum approved passenger seating configuration of more than 9; or
- (2) Has a maximum certificated take-off mass over 5 700 kg, unless it is equipped with a cockpit voice recorder which, with reference to a time scale, records:
 - (i) Voice communications transmitted from or received on the flight deck by radio;
 - (ii) The aural environment of the flight deck, including without interruption, the audio signals received from each boom and mask microphone in use;
 - (iii) Voice communications of flight crew members on the flight deck using the aeroplane's interphone system;
 - (iv) Voice or audio signals identifying navigation or approach aids introduced into a headset or speaker; and
 - (v) Voice communications of flight crew members on the flight deck using the public address system, if installed.

(b) The cockpit voice recorder shall be capable of retaining information recorded during at least the last 2 hours of its operation except that, for those aeroplanes with a maximum certificated take-off mass of 5 700 kg or less, this period may be reduced to 30 minutes.

(c) The cockpit voice recorder must start automatically to record prior to the aeroplane moving under its own power and continue to record until the termination of the flight when the aeroplane is no longer capable of moving under its own power. In addition, depending on the

availability of electrical power, the cockpit voice recorder must start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

(d) The cockpit voice recorder must have a device to assist in locating that recorder in water.

CAR–OPS 1.705 Cockpit voice recorders–2

(See AC OPS 1.705/1.710)

(a) After 1 April 2000 an operator shall not operate any multi-engined turbine aeroplane first issued with an individual certificate of airworthiness on or after 1 January 1990 up to and including 31 March 1998 which has a maximum certificated take-off mass of 5 700 kg or less and a maximum approved passenger seating configuration of more than 9, unless it is equipped with a cockpit voice recorder which records:

- (1) Voice communications transmitted from or received on the flight deck by radio;
- (2) The aural environment of the flight deck, including where practicable, without interruption, the audio signals received from each boom and mask microphone in use;
- (3) Voice communications of flight crew members on the flight deck using the aeroplane's interphone system;
- (4) Voice or audio signals identifying navigation or approach aids introduced into a headset or speaker; and
- (5) Voice communications of flight crew members on the flight deck using the public address system, if installed.

(b) The cockpit voice recorder shall be capable of retaining information recorded during at least the last 30 minutes of its operation.

(c) The cockpit voice recorder must start to record prior to the aeroplane moving under its own power and continue to record until the termination of the flight when the aeroplane is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the cockpit voice recorder must start to record as early as possible during the cockpit checks, prior to the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

(d) The cockpit voice recorder must have a device to assist in locating that recorder in water.

CAR–OPS 1.710 Cockpit voice recorders–3

(See AC OPS 1.705/1.710)

(a) An operator shall not operate any aeroplane with a maximum certificated take-off mass over 5 700 kg first issued with an individual certificate of airworthiness, before 1 April 1998 unless it is equipped with a cockpit voice recorder which records:

- (1) Voice communications transmitted from or received on the flight deck by radio;
- (2) The aural environment of the flight deck;
- (3) Voice communications of flight crew members on the flight deck using the aeroplane's interphone system;
- (4) Voice or audio signals identifying navigation or approach aids introduced into a headset or speaker; and

- (5) Voice communications of flight crew members on the flight deck using the public address system, if installed.

(b) The cockpit voice recorder shall be capable of retaining information recorded during at least the last 30 minutes of its operation.

(c) The cockpit voice recorder must start to record prior to the aeroplane moving under its own power and continue to record until the termination of the flight when the aeroplane is no longer capable of moving under its own power.

(d) The cockpit voice recorder must have a device to assist in locating that recorder in water.

CAR-OPS 1.715 Flight data recorders-1

Appendix 1 to CAR-OPS 1.715
(See AC OPS 1.715)

(a) An operator shall not operate any aeroplane first issued with an individual Certificate of Airworthiness on or after 1 April 1998 which:

- (1) Is multi-engine turbine powered and has a maximum approved passenger seating configuration of more than 9; or
- (2) Has a maximum certificated take-off mass over 5 700 kg, unless it is equipped with a flight data recorder that uses a digital method of recording and storing data and a method of readily retrieving that data from the storage medium is available.

(b) The flight data recorder shall be capable of retaining the data recorded during at least the last 25 hours of its operation except that, for those aeroplanes with a maximum certificated take-off mass of 5 700 kg or less, this period may be reduced to 10 hours.

(c) The flight data recorder must, with reference to a timescale, record:

- (1) The parameters listed in Tables A1 or A2 of Appendix 1 to CAR-OPS 1.715 as applicable;
- (2) For those aeroplanes with a maximum certificated take-off mass over 27 000 kg, the additional parameters listed in Table B of Appendix 1 to CAR-OPS 1.715;
- (3) For aeroplanes specified in (a) above, the flight data recorder must record any dedicated parameters relating to novel or unique design or operational characteristics of the aeroplane as determined by the AUTHORITY during type or supplemental type certification; and
- (4) For aeroplanes equipped with electronic display system the parameters listed in Table C of Appendix 1 to CAR-OPS 1.715, except that, for aeroplanes first issued with an individual Certificate of Airworthiness before 20 August 2002 those parameters for which:
 - (i) The sensor is not available; or
 - (ii) The aeroplane system or equipment generating the data needs to be modified; or
 - (iii) The signals are incompatible with the recording system; do not need to be recorded if acceptable to the AUTHORITY.

(d) Data must be obtained from aeroplane sources which enable accurate correlation with information displayed to the flight crew.

(e) The flight data recorder must start automatically to record the data prior to the aeroplane being capable of moving under its own power and must stop automatically after the aeroplane is incapable of moving under its own power.

(f) The flight data recorder must have a device to assist in locating that recorder in water.

(g) Aeroplanes first issued with an individual Certificate of Airworthiness on or after 1 April 1998, but not later than 1 April 2001 may not be required to comply with CAR-OPS 1.715(c) if approved by the AUTHORITY, provided that:

- (1) Compliance with CAR-OPS 1.715(c) cannot be achieved without extensive modification (See AC-OPS 1.715(g)) to the aeroplane systems and equipment other than the flight data recorder system; and
- (2) The aeroplane complies with CAR-OPS 1.715(c) except that parameter 15b in Table A of Appendix 1 to CAR-OPS 1.720 need not to be recorded.

CAR-OPS 1.720 Flight data recorders-2

(See Appendix 1 to CAR-OPS 1.720)

(See AC OPS 1.720/1.725)

(a) An operator shall not operate any aeroplane first issued with an individual certificate of airworthiness on or after 1 June 1990 up to and including 31 March 1998 which has a maximum certificated take-off mass over 5 700 kg unless it is equipped with a flight data recorder that uses a digital method of recording and storing data and a method of readily retrieving that data from the storage medium is available.

(b) The flight data recorder shall be capable of retaining the data recorded during at least the last 25 hours of its operation.

(c) The flight data recorder must, with reference to a timescale, record:

- (1) The parameters listed in Table A of Appendix 1 to CAR-OPS 1.720; and
- (2) For those aeroplanes with a maximum certificated take-off mass over 27 000 kg the additional parameters listed in Table B of Appendix 1 to CAR-OPS 1.720.

(d) For those aeroplanes having a maximum certificated take-off mass of 27 000 kg or below, if acceptable to the AUTHORITY, parameters 14 and 15b of Table A of Appendix 1 to CAR-OPS 1.720 need not be recorded, when any of the following conditions are met:

- (1) The sensor is not readily available,
- (2) Sufficient capacity is not available in the flight recorder system,
- (3) A change is required in the equipment that generates the data.

(e) For those aeroplanes having a maximum certificated take-off mass over 27 000 kg, if acceptable to the AUTHORITY, the following parameters need not be recorded: 15b of Table A of Appendix 1 to CAR-OPS 1.720, and 23, 24, 25, 26, 27, 28, 29, 30 and 31 of Table B of Appendix 1, if any of the following conditions are met:

- (1) The sensor is not readily available,
- (2) Sufficient capacity is not available in the flight data recorder system,
- (3) A change is required in the equipment that generates the data,
- (4) For navigational data (NAV frequency selection, DME distance, latitude, longitude, ground speed and drift) the signals are not available in digital form.

(f) Individual parameters that can be derived by calculation from the other recorded parameters, need not to be recorded if acceptable to the AUTHORITY.

(g) Data must be obtained from aeroplane sources which enable accurate correlation with information displayed to the flight crew.

(h) The flight data recorder must start to record the data prior to the aeroplane being capable of moving under its own power and must stop after the aeroplane is incapable of moving under its own power.

(i) The flight data recorder must have a device to assist in locating that recorder in water.

CAR-OPS 1.725 Flight data recorders-3

(See Appendix 1 to CAR-OPS 1.725)

(See AC OPS 1.720/1.725)

(a) An operator shall not operate any turbine-engined aeroplane first issued with an individual Certificate of Airworthiness, before 1 June 1990 which has a maximum certificated take-off mass over 5 700 kg unless it is equipped with a flight data recorder that uses a digital method of recording and storing data and a method of readily retrieving that data from the storage medium is available .

(b) The flight data recorder shall be capable of retaining the data recorded during at least the last 25 hours of its operation.

(c) The flight data recorder must, with reference to a timescale, record:

(1) The parameters listed in Table A of Appendix 1 to CAR-OPS 1.725.

(2) For those aeroplanes with a maximum certificated take-off mass over 27 000 kg that are of a type first type certificated after 30 September 1969, the additional parameters from 6 to 15b of Table B of Appendix 1 to CAR-OPS 1.725 of this paragraph. The following parameters need not be recorded, if acceptable to the AUTHORITY: 13, 14 and 15b in Table B of Appendix 1 to CAR- OPS 1.725 when any of the following conditions are met:

(i) The sensor is not readily available,

(ii) Sufficient capacity is not available in the flight recorder system,

(iii) A change is required in the equipment that generates the data;

and

(3) When sufficient capacity is available on a flight recorder system, the sensor is readily available and a change is not required in the equipment that generates the data:

(i) For aeroplanes first issued with an individual Certificate of Airworthiness on or after 1 January 1989, with a maximum certificated take off mass of over 5 700 kg but not more than 27 000 kg, parameters 6 to 15b of Table B of Appendix 1 to CAR-OPS 1.725 ; and

(ii) For aeroplanes first issued with an individual Certificate of Airworthiness on or after 1 January 1987, with a maximum certificated take off mass of over 27 000 kg the remaining parameters of Table B of Appendix 1 to CAR-OPS 1.725 .

(d) Individual parameters that can be derived by calculation from the other recorded parameters, need not to be recorded if acceptable to the AUTHORITY.

(e) Data must be obtained from aircraft sources which enable accurate correlation with information displayed to the flight crew.

(f) The flight data recorder must start to record the data prior to the aeroplane being capable of moving under its own power and must stop after the aeroplane is incapable of moving under its own power.

(g) The flight data recorder must have a device to assist in locating that recorder in water.

CAR-OPS 1.727 Combination Recorder

(See AC-OPS 1.727)

(a) Compliance with Cockpit Voice recorder and flight data recorder requirements may be achieved by:

- (1) One combination recorder if the aeroplane has to be equipped with a cockpit voice recorder or with a flight data recorder only; or
- (2) One combination recorder if the aeroplane with a maximum certificated take-off mass of 5 700 kg or less has to be equipped with a cockpit voice recorder and a flight data recorder; or
- (3) Two combination recorders if the aeroplane with a maximum take-off mass over 5 700 kg has to be equipped with a cockpit voice recorder and a flight data recorder.

(b) A combination recorder is a flight recorder that records:

- (1) all voice communications and aural environment required by the relevant cockpit voice recorder paragraph; and
- (2) all parameters required by the relevant flight data recorder paragraph, with the same specifications required by those paragraphs.

CAR-OPS 1.730 Seats, seat safety belts, harnesses and child restraint devices

(See AC OPS 1.730(a)(3))

(a) An operator shall not operate an aeroplane unless it is equipped with:

- (1) A seat or berth for each person who is aged two years or more;
- (2) A safety belt, with or without a diagonal shoulder strap, or a safety harness for use in each passenger seat for each passenger aged 2 years or more;
- (3) A [child restraint device, acceptable to the AUTHORITY, for each infant (See AC OPS 1.730(a)(3);
- (4) Except as provided in sub-paragraph (b) below, a safety belt with shoulder harness for each flight crew seat and for any seat alongside a pilot's seat incorporating a device which will automatically restrain the occupant's torso in the event of rapid deceleration;
- (5) Except as provided in sub-paragraph (b) below, a safety belt with shoulder harness for each cabin crew seat and observer's seats. However, this requirement does not preclude use of passenger seats by cabin crew members carried in excess of the required cabin crew complement; and
- (6) Seats for cabin crew members located near required floor level emergency exits except that, if the emergency evacuation of passengers would be enhanced by seating cabin crew members elsewhere, other locations are acceptable. The seats shall be forward or rearward facing within 15° of the longitudinal axis of the aeroplane.

(b) All safety belts with shoulder harness must have a single point release.

(c) A safety belt with a diagonal shoulder strap for aeroplanes with a maximum certificated take-off mass not exceeding 5 700 kg or a safety belt for aeroplanes with a maximum certificated take-off mass not exceeding 2 730 kg may be permitted in place of a safety belt with shoulder harness if it is not reasonably practicable to fit the latter.

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CAR-OPS 1.731 Fasten Seat belt and No Smoking signs

An operator shall not operate an aeroplane in which all passenger seats are not visible from the flight deck, unless it is equipped with a means of indicating to all passengers and cabin crew when seat belts shall be fastened and when smoking is not allowed.

CAR-OPS 1.735 Internal doors and curtains

An operator shall not operate an aeroplane unless the following equipment is installed:

(a) In an aeroplane with a maximum approved passenger seating configuration of more than 19 passengers, a door between the passenger compartment and the flight deck compartment with a placard 'crew only' and a locking means to prevent passengers from opening it without the permission of a member of the flight crew;

(b) A means for opening each door that separates a passenger compartment from another compartment that has emergency exit provisions. The means for opening must be readily accessible;

(c) If it is necessary to pass through a doorway or curtain separating the passenger cabin from other areas to reach any required emergency exit from any passenger seat, the door or curtain must have a means to secure it in the open position;

(d) A placard on each internal door or adjacent to a curtain that is the means of access to a passenger emergency exit, to indicate that it must be secured open during take off and landing; and

(e) A means for any member of the crew to unlock any door that is normally accessible to passengers and that can be locked by passengers.

CAR-OPS 1.740 Placards
(See IEM OPS 1.740)

An operator shall not operate an aeroplane unless the following placards are installed;

(a) Every exit from the aircraft shall be marked with the words "Exit" and "Emergency Exit" in both English and Arabic script.

(b) Every exit from the aircraft shall be marked with instructions in English and Arabic to indicate the correct method of opening the exit.

(c) The markings shall be placed on or near the inside surface of the door or other closure of the exit and, if it is operable, from the outside of the aircraft on or near the exterior surface.

(d) The location instructions for all emergency equipment required to be located by a passenger shall be in English and Arabic.

Rev. 1

CAR–OPS 1.745 First-Aid Kits
(See AMC OPS 1.745)

(a) An operator shall not operate an aeroplane unless it is equipped with first-aid kits, readily accessible for use, to the following scale:

Number of passenger seats installed	Number of First-Aid Kits required
0 to 99	1
100 to 199	2
200 to 299	3
300 and more	4

(b) An operator shall ensure that first-aid kits are:

- (1) Inspected periodically to confirm, to the extent possible, that contents are maintained in the condition necessary for their intended use; and
- (2) Replenished at regular intervals, in accordance with instructions contained on their labels, or as circumstances warrant.

CAR–OPS 1.750 Intentionally blank

CAR–OPS 1.755 Emergency Medical Kit
(See AMC OPS 1.755)

(a) An operator shall not operate an aeroplane with a maximum approved passenger seating configuration of more than 30 seats unless it is equipped with an emergency medical kit if any point on the planned route is more than 60 minutes flying time (at normal cruising speed) from an aerodrome at which qualified medical assistance could be expected to be available.

(b) The commander shall ensure that drugs are not administered except by qualified doctors, nurses or similarly qualified personnel.

(c) Conditions for carriage

- (1) The emergency medical kit must be dust and moisture proof and shall be carried under security conditions, where practicable, on the flight deck; and
- (2) An operator shall ensure that emergency medical kits are:
 - (i) Inspected periodically to confirm, to the extent possible, that the contents are maintained in the condition necessary for their intended use; and
 - (ii) Replenished at regular intervals, in accordance with instructions contained on their labels, or as circumstances warrant.

CAR–OPS 1.760 First-aid oxygen
(See IEM OPS 1.760)

(a) An operator shall not operate a pressurised aeroplane, above 25 000 ft, when a cabin crew member is required to be carried, unless it is equipped with a supply of undiluted oxygen for passengers who, for physiological reasons, might require oxygen following a cabin depressurisation. The amount of oxygen shall be calculated using an average flow rate of at least 3 litres Standard Temperature Pressure Dry (STPD)/minute/person and shall be sufficient for the

remainder of the flight after cabin depressurisation when the cabin altitude exceeds 8 000 ft but does not exceed 15 000 ft, for at least 2% of the passengers carried, but in no case for less than one person. There shall be a sufficient number of dispensing units, but in no case less than two, with a means for cabin crew to use the supply. The dispensing units may be of a portable type.

(b) The amount of first-aid oxygen required for a particular operation shall be determined on the basis of cabin pressure altitudes and flight duration, consistent with the operating procedures established for each operation and route.

(c) The oxygen equipment provided shall be capable of generating a mass flow to each user of at least four litres per minute, STPD. Means may be provided to decrease the flow to not less than two litres per minute, STPD, at any altitude.

CAR-OPS 1.765 *Intentionally blank*

CAR-OPS 1.770 Supplemental oxygen – pressurised aeroplanes
(See Appendix 1 to CAR-OPS 1.770) (See AMC OPS 1.770)

(a) General

- (1) An operator shall not operate a pressurised aeroplane at pressure altitudes above 10 000 ft unless supplemental oxygen equipment, capable of storing and dispensing the oxygen supplies required by this paragraph, is provided.
- (2) The amount of supplemental oxygen required shall be determined on the basis of cabin pressure altitude, flight duration and the assumption that a cabin pressurisation failure will occur at the pressure altitude or point of flight that is most critical from the standpoint of oxygen need, and that, after the failure, the aeroplane will descend in accordance with emergency procedures specified in the Aeroplane Flight Manual to a safe altitude for the route to be flown that will allow continued safe flight and landing.
- (3) Following a cabin pressurisation failure, the cabin pressure altitude shall be considered the same as the aeroplane pressure altitude, unless it is demonstrated to the AUTHORITY that no probable failure of the cabin or pressurisation system will result in a cabin pressure altitude equal to the aeroplane pressure altitude. Under these circumstances, the demonstrated maximum cabin pressure altitude may be used as a basis for determination of oxygen supply.

(b) Oxygen equipment and supply requirements

(1) Flight crew members

- (i) Each member of the flight crew on flight deck duty shall be supplied with supplemental oxygen in accordance with Appendix 1. If all occupants of flight deck seats are supplied from the flight crew source of oxygen supply then they shall be considered as flight crew members on flight deck duty for the purpose of oxygen supply. Flight deck seat occupants, not supplied by the flight crew source, are to be considered as passengers for the purpose of oxygen supply.
- (ii) Flight crew members, not covered by sub-paragraph (b)(1)(i) above, are to be considered as passengers for the purpose of oxygen supply.
- (iii) Oxygen masks shall be located so as to be within the immediate reach of flight crew members whilst at their assigned duty station.

- (iv) Oxygen masks for use by flight crew members in pressurised aeroplanes operating at pressure altitudes above 25 000 ft, shall be a quick donning type of mask.
- (2) Cabin crew members, additional crew members and passengers
- (i) Cabin crew members and passengers shall be supplied with supplemental oxygen in accordance with Appendix 1, except when sub-paragraph (v) below applies. Cabin crew members carried in addition to the minimum number of cabin crew members required, and additional crew members, shall be considered as passengers for the purpose of oxygen supply.
- (ii) Aeroplanes intended to be operated at pressure altitudes above 25 000 ft shall be provided sufficient spare outlets and masks and/or sufficient portable oxygen units with masks for use by all required cabin crew members. The spare outlets and/or portable oxygen units are to be distributed evenly throughout the cabin to ensure immediate availability of oxygen to each required cabin crew member regardless of his location at the time of cabin pressurisation failure.
- (iii) Aeroplanes intended to be operated at pressure altitudes above 25 000 ft shall be provided an oxygen dispensing unit connected to oxygen supply terminals immediately available to each occupant, wherever seated. The total number of dispensing units and outlets shall exceed the number of seats by at least 10%. The extra units are to be evenly distributed throughout the cabin.
- (iv) Aeroplanes intended to be operated at pressure altitudes above 25 000 ft or which, if operated at or below 25 000 ft, cannot descend safely within 4 minutes to 13 000 ft, and for which the individual certificate of airworthiness was first issued by an ICAO Contracting State or elsewhere on or after 9 November 1998, shall be provided with automatically deployable oxygen equipment immediately available to each occupant, wherever seated. The total number of dispensing units and outlets shall exceed the number of seats by at least 10%. The extra units are to be evenly distributed throughout the cabin.
- (v) The oxygen supply requirements, as specified in Appendix 1, for aeroplanes not certificated to fly above 25 000 ft, may be reduced to the entire flight time between 10 000 ft and 13 000 ft cabin pressure altitudes for all required cabin crew members and for at least 10% of the passengers if, at all points along the route to be flown, the aeroplane is able to descend safely within 4 minutes to a cabin pressure altitude of 13 000 ft.

CAR–OPS 1.775 Supplemental oxygen – Non-pressurised aeroplanes

(See Appendix 1 to CAR–OPS 1.775)

(a) General

- (1) An operator shall not operate a non-pressurised aeroplane at altitudes above 10 000 ft unless supplemental oxygen equipment, capable of storing and dispensing the oxygen supplies required, is provided.
- (2) The amount of supplemental oxygen for sustenance required for a particular operation shall be determined on the basis of flight altitudes and flight duration, consistent with the operating procedures established for each operation in the Operations Manual and with the routes to be flown, and with the emergency procedures specified in the Operations Manual.
- (3) An aeroplane intended to be operated at pressure altitudes above 10 000 ft shall be provided with equipment capable of storing and dispensing the oxygen supplies required.

(b) Oxygen supply requirements

- (1) *Flight crew members.* Each member of the flight crew on flight deck duty shall be supplied with supplemental oxygen in accordance with Appendix 1. If all occupants of flight deck seats are supplied from the flight crew source of oxygen supply then they shall be considered as flight crew members on flight deck duty for the purpose of oxygen supply.
- (2) *Cabin crew members, additional crew members and passengers.* Cabin crew members and passengers shall be supplied with oxygen in accordance with Appendix 1. Cabin crew members carried in addition to the minimum number of cabin crew members required, and additional crew members, shall be considered as passengers for the purpose of oxygen supply.

CAR–OPS 1.780 Crew Protective Breathing Equipment

(a) An operator shall not operate a pressurised aeroplane or, an unpressurised aeroplane with a maximum certificated take-off mass exceeding 5 700 kg or having a maximum approved seating configuration of more than 19 seats unless:

- (1) It has equipment to protect the eyes, nose and mouth of each flight crew member while on flight deck duty and to provide oxygen for a period of not less than 15 minutes. The supply for Protective Breathing Equipment (PBE) may be provided by the supplemental oxygen required by CAR–OPS 1.770(b)(1) or CAR–OPS 1.775(b)(1). In addition, when the flight crew is more than one and a cabin crew member is not carried, portable PBE must be carried to protect the eyes, nose and mouth of one member of the flight crew and to provide breathing gas for a period of not less than 15 minutes; and
- (2) It has sufficient portable PBE to protect the eyes, nose and mouth of all required cabin crew members and to provide breathing gas for a period of not less than 15 minutes.

(b) PBE intended for flight crew use must be conveniently located on the flight deck and be easily accessible for immediate use by each required flight crew member at their assigned duty station.

(c) PBE intended for cabin crew use must be installed adjacent to each required cabin crew member duty station.

(d) An additional, easily accessible portable PBE must be provided and located at or adjacent to the hand fire extinguishers required by CAR–OPS 1.790(c) and (d) except that, where the fire

extinguisher is located inside a cargo compartment, the PBE must be stowed outside but adjacent to the entrance to that compartment.

(e) PBE while in use must not prevent communication where required by CAR-OPS 1.685, CAR-OPS 1.690, CAR-OPS 1.810 and CAR-OPS 1.850.

CAR-OPS 1.785 *Intentionally blank*

CAR-OPS 1.790 Hand fire extinguishers (See AMC OPS 1.790)

An operator shall not operate an aeroplane unless hand fire extinguishers are provided for use in crew, passenger and, as applicable, cargo compartments and galleys in accordance with the following:

(a) The type and quantity of extinguishing agent must be suitable for the kinds of fires likely to occur in the compartment where the extinguisher is intended to be used and, for personnel compartments, must minimise the hazard of toxic gas concentration;

(b) At least one hand fire extinguisher, containing Halon 1211 (bromochlorodifluoromethane, CBrClF₂), or equivalent as the extinguishing agent, must be conveniently located on the flight deck for use by the flight crew;

(c) At least one hand fire extinguisher must be located in, or readily accessible for use in, each galley not located on the main passenger deck;

(d) At least one readily accessible hand fire extinguisher must be available for use in each Class A or Class B cargo or baggage compartment and in each Class E cargo compartment that is accessible to crew members in flight; and

(e) At least the following number of hand fire extinguishers must be conveniently located in the passenger compartment(s):

Maximum approved passenger seating configuration	Number of Extinguishers
7 to 30	1
31 to 60	2
61 to 200	3
201 to 300	4
301 to 400	5
401 to 500	6
501 to 600	7
601 or more	8

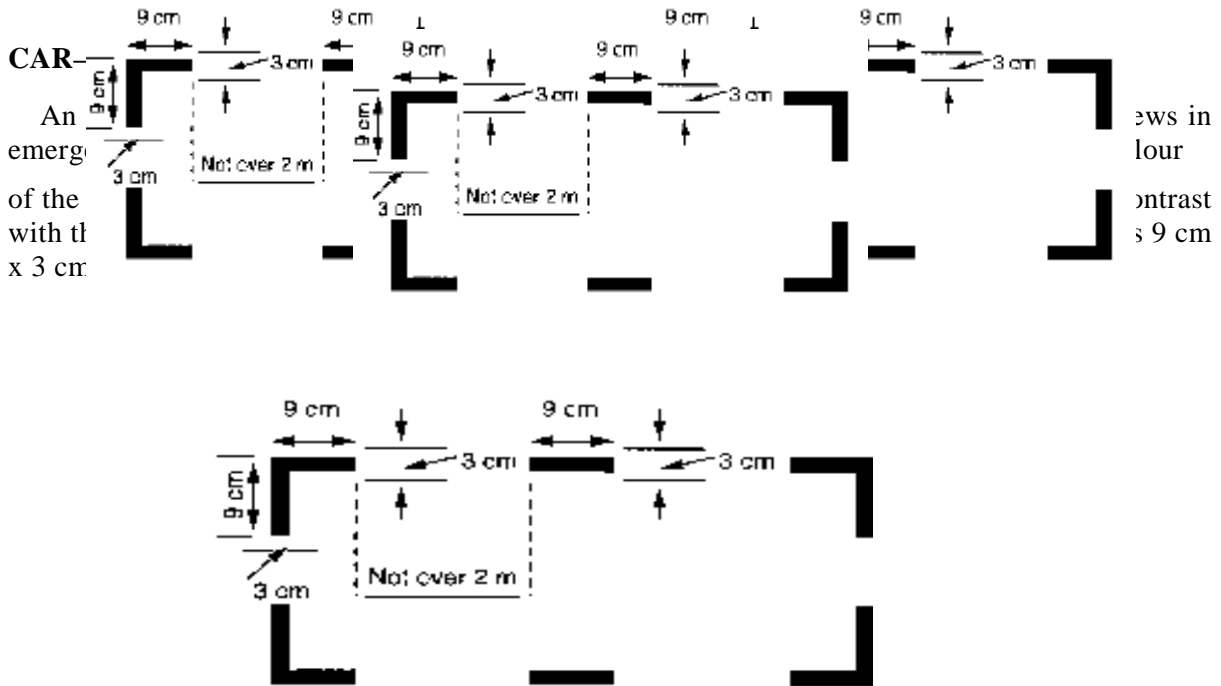
When two or more extinguishers are required, they must be evenly distributed in the passenger compartment.

(f) At least one of the required fire extinguishers located in the passenger compartment of an aeroplane with a maximum approved passenger seating configuration of at least 31, and not more than 60, and at least two of the fire extinguishers located in the passenger compartment of an aeroplane with a maximum approved passenger seating configuration of 61 or more must contain Halon 1211 (bromochlorodi-fluoromethane, CBrClF₂), or equivalent as the extinguishing agent.

CAR-OPS 1.795 Crash axes and crowbars

(a) An operator shall not operate an aeroplane with a maximum certificated take-off mass exceeding 5 700 kg or having a maximum approved passenger seating configuration of more than 9 seats unless it is equipped with at least one crash axe or crowbar located on the flight deck. If the maximum approved passenger seating configuration is more than 200 an additional crash axe or crowbar must be carried and located in or near the most rearward galley area.

(b) Crash axes and crowbars located in the passenger compartment must not be visible to passengers.

**CAR-OPS 1.805 Means for emergency evacuation**

(a) An operator shall not operate an aeroplane with passenger emergency exit sill heights:

- (1) Which are more than 1.83 metres (6 feet) above the ground with the aeroplane on the ground and the landing gear extended; or
- (2) Which would be more than 1.83 metres (6 feet) above the ground after the collapse of, or failure to extend of, one or more legs of the landing gear and for which a Type Certificate was first applied for on or after 1 April 2000, unless it has equipment or devices available at each exit, where sub-paragraphs (1) or (2) apply, to enable passengers and crew to reach the ground safely in an emergency.

(b) Such equipment or devices need not be provided at overwing exits if the designated place on the aeroplane structure at which the escape route terminates is less than 1.83 metres (6 feet) from the ground with the aeroplane on the ground, the landing gear extended, and the flaps in the take off or landing position, whichever flap position is higher from the ground.

(c) In aeroplanes required to have a separate emergency exit for the flight crew and:

- (1) For which the lowest point of the emergency exit is more than 1.83 metres (6 feet) above the ground with the landing gear extended; or,
- (2) For which a Type Certificate was first applied for on or after 1 April 2000, would be more than 1.83 metres (6 ft) above the ground after the collapse of, or failure

to extend of, one or more legs of the landing gear, there must be a device to assist all members of the flight crew in descending to reach the ground safely in an emergency.

CAR–OPS 1.810 Megaphones

(See AMC OPS 1.810)

(a) An operator shall not operate an aeroplane with a maximum approved passenger seating configuration of more than 60 and carrying one or more passengers unless it is equipped with portable battery-powered megaphones readily accessible for use by crew members during an emergency evacuation, to the following scales:

(1) For each passenger deck:

Passenger seating configuration	Number of Megaphones Required
61 to 99	1
100 or more	2

(2) For aeroplanes with more than one passenger deck, in all cases when the total passenger seating configuration is more than 60, at least 1 megaphone is required.

CAR–OPS 1.815 Emergency lighting

(a) An operator shall not operate a passenger carrying aeroplane which has a maximum approved passenger seating configuration of more than 9 unless it is provided with an emergency lighting system having an independent power supply to facilitate the evacuation of the aeroplane. The emergency lighting system must include:

(1) For aeroplanes which have a maximum approved passenger seating configuration of more than 19:

- (i) Sources of general cabin illumination;
- (ii) Internal lighting in floor level emergency exit areas; and
- (iii) Illuminated emergency exit marking and locating signs.
- (iv) For aeroplanes for which the application for the type certificate or equivalent was filed before 1 May 1972, and when flying by night, exterior emergency lighting at all overwing exits, and at exits where descent assist means are required.
- (v) For aeroplanes for which the application for the type certificate or equivalent was filed in on or after 1 May 1972, and when flying by night, exterior emergency lighting at all passenger emergency exits.
- (vi) For aeroplanes for which the type certificate was first issued in on or after 1 January 1958, floor proximity emergency escape path marking system in the passenger compartment(s).

(2) For aeroplanes which have a maximum approved passenger seating configuration of 19 or less and are certificated to JAR–23 or JAR–25:

- (i) Sources of general cabin illumination;
- (ii) Internal lighting in emergency exit areas; and

- (iii) Illuminated emergency exit marking and locating signs.
- (3) For aeroplanes which have a maximum approved passenger seating configuration of 19 or less and are not certificated to JAR-23 or JAR-25, sources of general cabin illumination.

(b) After 1 April 1998 an operator shall not, by night, operate a passenger carrying aeroplane which has a maximum approved passenger seating configuration of 9 or less unless it is provided with a source of general cabin illumination to facilitate the evacuation of the aeroplane. The system may use dome lights or other sources of illumination already fitted on the aeroplane and which are capable of remaining operative after the aeroplane's battery has been switched off.

CAR-OPS 1.820 Emergency Locator Transmitter

(See AC OPS 1.820)

(a) An operator shall not operate an aeroplane authorised to carry more than 19 passengers unless it is equipped with at least:

1. one automatic emergency locator transmitter (ELT) or two ELTs of any type; or
2. two ELTs, one of which shall be automatic for aeroplanes first issued with an individual certificate of airworthiness after 1 July 2008.

(b) An operator shall not operate an aeroplane authorised to carry 19 passengers or less unless it is equipped with at least:

1. one ELT of any type; or
2. one automatic ELT for aeroplanes first issued with an individual certificate of airworthiness after 1 July 2008.

(c) An operator shall ensure that all ELTs carried to satisfy the above requirements operate in accordance with the relevant provisions of ICAO Annex 10, Volume III.

Rev. 2

CAR-OPS 1.825 Life Jackets

(See IEM OPS 1.825)

(a) *Land aeroplanes.* An operator shall not operate a land aeroplane:

- (1) When flying over water and at a distance of more than 50 nautical miles from the shore; or
- (2) When taking off or landing at an aerodrome where the take-off or approach path is so disposed over water that in the event of a mishap there would be a likelihood of a ditching, unless it is equipped with life jackets equipped with a survivor locator light, for each person on board. Each life jacket must be stowed in a position easily accessible from the seat or berth of the person for whose use it is provided. Life jackets for infants may be substituted by other approved flotation devices equipped with a survivor locator light.

(b) *Seaplanes and amphibians.* An operator shall not operate a seaplane or an amphibian on water unless it is equipped with life jackets equipped with a survivor locator light, for each person on board. Each life jacket must be stowed in a position easily accessible from the seat or berth of the person for whose use it is provided. Life jackets for infants may be substituted by other approved flotation devices equipped with a survivor locator light.

CAR–OPS 1.830 Life-rafts and survival ELTs for extended overwater flights

(a) On overwater flights, an operator shall not operate an aeroplane at a distance away from land, which is suitable for making an emergency landing, greater than that corresponding to:

(1) 120 minutes at cruising speed or 400 nautical miles, whichever is the lesser, for aeroplanes capable of continuing the flight to an aerodrome with the critical power unit(s) becoming inoperative at any point along the route or planned diversions; or

(2) 30 minutes at cruising speed or 100 nautical miles, whichever is the lesser, for all other aeroplanes, unless the equipment specified in sub-paragraphs (b) and (c) below is carried.

(b) Sufficient life-rafts to carry all persons on board. Unless excess rafts of enough capacity are provided, the buoyancy and seating capacity beyond the rated capacity of the rafts must accommodate all occupants of the aeroplane in the event of a loss of one raft of the largest rated capacity. The life-rafts shall be equipped with:

(1) A survivor locator light; and

(2) Life saving equipment including means of sustaining life as appropriate to the flight to be undertaken (see AMC OPS 1.830(b)(2)); and

(c) At least two survival Emergency Locator Transmitters (ELT(S)) capable of transmitting on the distress frequencies prescribed in ICAO Annex 10, Volume V, Chapter 2. (See AMC OPS 1.830(c).)

CAR–OPS 1.835 Survival equipment

(See AMC OPS 1.830(c))

(See IEM OPS 1.835)

An operator shall not operate an aeroplane across areas in which search and rescue would be especially difficult unless it is equipped with the following:

(a) Signalling equipment to make the pyrotechnical distress signals described in ICAO Annex 2;

(b) At least one ELT(S) capable of transmitting on the distress frequencies prescribed in ICAO Annex 10, Volume V, Chapter 2 (See AMC OPS 1.830(c)); and

(c) Additional survival equipment for the route to be flown taking account of the number of persons on board (See AMC OPS 1.835(c)), except that the equipment specified in sub-paragraph (c) need not be carried when the aeroplane either:

(1) Remains within a distance from an area where search and rescue is not especially difficult corresponding to:

(i) 120 minutes at the one engine inoperative cruising speed for aeroplanes capable of continuing the flight to an aerodrome with the critical power unit(s) becoming inoperative at any point along the route or planned diversions; or

(ii) 30 minutes at cruising speed for all other aeroplanes, or,

(2) For aeroplanes certificated to CAR–25 or equivalent, no greater distance than that corresponding to 90 minutes at cruising speed from an area suitable for making an emergency landing.

Rev. 1

CAR–OPS 1.840 Seaplanes and amphibians – Miscellaneous equipment

(a) An operator shall not operate a seaplane or an amphibian on water unless it is equipped with:

(1) A sea anchor and other equipment necessary to facilitate mooring, anchoring or manoeuvring the aircraft on water, appropriate to its size, weight and handling characteristics; and

(2) Equipment for making the sound signals prescribed in the International Regulations for preventing collisions at sea, where applicable.

Appendix 1 to CAR-OPS 1.715 Flight data recorders - 1 - List of parameters to be recorded

Table A1 - Aeroplanes with a maximum certificated take-off mass of over 5 700 kg

Note: The number in the left hand column reflect the Serial Numbers depicted in EUROCAE document ED55

No.	Parameter
1	Time or relative time count
2	Pressure altitude
3	Indicated airspeed
4	Heading
5	Normal acceleration
6	Pitch attitude
7	Roll attitude
8	Manual radio transmission keying
9	Propulsive thrust/ power on each engine and cockpit thrust/power lever position if applicable
10	Trailing edge flap or cockpit control selection
11	Leading edge flap or cockpit control selection
12	Thrust reverse status
13	Ground spoiler position and/or speed brake selection
14	Total or outside air temperature
15	Autopilot, autothrottle and AFCS mode and engagement status
16	Longitudinal acceleration (Body axis)
17	Lateral acceleration

Table A2- Aeroplanes with a maximum certificated take-off mass of 5 700 kg or below

Note: The number in the left hand column reflect the Serial Numbers depicted in EUROCAE document ED55

No.	Parameter
1	Time or relative time count
2	Pressure altitude
3	Indicated airspeed
4	Heading
5	Normal acceleration
6	Pitch attitude
7	Roll attitude
8	Manual radio transmission keying
9	Propulsive thrust/ power on each engine and cockpit thrust/power lever position if applicable
10	Trailing edge flap or cockpit control selection
11	Leading edge flap or cockpit control selection
12	Thrust reverse status
13	Ground spoiler position and/or speed brake selection
14	Total or outside air temperature
15	Autopilot/autothrottle engagement status
16	Angle of attack (if a suitable sensor is available)
17	Longitudinal acceleration (Body axis)

Table B - Additional parameters for aeroplanes with a maximum certificated take-off mass of over 27 000 kg

Note: The number in the left hand column reflect the Serial Numbers depicted in EUROCAE document ED55

No.	Parameter
18	Primary flight controls - Control surface position and/or pilot input (pitch, roll, yaw)
19	Pitch trim position
20	Radio altitude
21	Vertical beam deviation (ILS Glide path or MLS Elevation)
22	Horizontal beam deviation (ILS Localiser or MLS Azimuth)
23	Marker Beacon Passage
24	Warnings
25	Reserved (Navigation receiver frequency selection is recommended)
26	Reserved (DME distance is recommended)
27	Landing gear squat switch status or air/ground status
28	Ground Proximity Warning System
29	Angle of attack
30	Low pressure warning (hydraulic and pneumatic power)
31	Groundspeed
32	Landing gear or gear selector position

Table C - Aeroplanes equipped with electronic display systems

Note: The number in the center column reflect the Serial Numbers depicted in EUROCAE document ED55 table A1.5

No.	No.	Parameter
33	6	Selected barometric setting (Each pilot station)
34	7	Selected altitude
35	8	Selected speed
36	9	Selected mach
37	10	Selected vertical speed
38	11	Selected heading
39	12	Selected flight path
40	13	Selected decision height
41	14	EFIS display format
42	15	Multi function /Engine / Alerts display format

Appendix 1 to CAR-OPS 1.720 Flight data recorders - 2 - List of parameters to be recorded

Table A - Aeroplanes with a maximum certificated take-off mass of over 5 700 Kg

No.	Parameter
1	Time or relative time count
2	Pressure altitude
3	Indicated airspeed
4	Heading
5	Normal acceleration
6	Pitch attitude
7	Roll attitude
8	Manual radio transmission keying unless an alternate means to synchronise FDR and CVR recordings is provided
9	Power on each engine
10	Trailing edge flap or cockpit control selection
11	Leading edge flap or cockpit control selection
12	Thrust reverse position (for turbojet aeroplanes only)
13	Ground spoiler position and/or speed brake selection
14	Outside air temperature or Total air temperature
15a	Autopilot engagement status
15b	Autopilot operating modes, autothrottle and AFCS systems engagement status and operating modes

Table B - Additional parameters for aeroplanes with a maximum certificated take-off mass of over 27 000 kg

No.	Parameter
16	Longitudinal acceleration
17	Lateral acceleration
18	Primary flight controls - Control surface position and/or pilot input (pitch, roll and yaw)
19	Pitch trim position
20	Radio altitude
21	Glide path deviation
22	Localiser deviation
23	Marker beacon passage
24	Master warning
25	NAV 1 and NAV 2 frequency selection
26	DME 1 and DME 2 distance
27	Landing gear squat switch status
28	Ground proximity warning system
29	Angle of attack
30	Hydraulics, each system (low pressure)
31	Navigation data
32	Landing gear or gear selector position

Appendix 1 to CAR-OPS 1.725 Flight data recorders - 3 - List of parameters to be recorded

Table A - Aeroplanes with a maximum certificated take-off mass of over 5 700 Kg

No.	Parameter
1	Time or relative time count
2	Pressure altitude
3	Indicated airspeed
4	Heading
5	Normal acceleration

Table B - Additional parameters for aeroplanes with a maximum certificated take-off mass of over 27 000 kg

No.	Parameter
6	Pitch attitude
7	Roll attitude
8	Manual radio transmission keying unless an alternate means to synchronise FDR and CVR recordings is provided
9	Power on each engine
10	Trailing edge flap or cockpit control selection
11	Leading edge flap or cockpit control selection
12	Thrust reverse position (for turbojet aeroplanes only)
13	Ground spoiler position and/or speed brake selection
14	Outside air temperature or Total air temperature
15a	Autopilot engagement status
15b	Autopilot operating modes, autothrottle and AFCS systems, engagement status and operating modes
16	Longitudinal acceleration
17	Lateral acceleration
18	Primary flight controls - Control surface position and/or pilot input (pitch, roll and yaw)
19	Pitch trim position
20	Radio altitude
21	Glide path deviation
22	Localiser deviation
23	Marker beacon passage
24	Master warning
25	NAV 1 and NAV 2 frequency selection
26	DME 1 and DME 2 distance
27	Landing gear squat switch status
28	Ground proximity warning system
29	Angle of attack
30	Hydraulics, each system (low pressure)
31	Navigation data (latitude, longitude, ground speed and drift angle)
32	Landing gear or gear selector position

Appendix 1 to CAR–OPS 1.770

Oxygen – Minimum Requirements for Supplemental Oxygen for Pressurised Aeroplanes

(a)	(b)
SUPPLY FOR:	DURATION AND CABIN PRESSURE ALTITUDE
1. All occupants of flight deck seats on flight deck duty	Entire flight time when the cabin pressure altitude exceeds 13 000 ft and entire flight time when the cabin pressure altitude exceeds 10 000 ft but does not exceed 13 000 ft after the first 30 minutes at those altitudes, but in no case less than: (i) 30 minutes for aeroplanes certificated to fly at altitudes not exceeding 25 000 ft (Note 2) (ii) 2 hours for aeroplanes certificated to fly at altitudes more than 2 000 ft (Note 3).
2. All required cabin crew members	Entire flight time when cabin pressure altitude exceeds 13 000 ft but not less than 30 minutes (Note 2), and entire flight time when cabin pressure altitude is greater than 10 000 ft but does not exceed 13 000 ft after the first 30 minutes at these altitudes.
3. 100% of passengers (Note 5)	Entire flight time when the cabin pressure altitude exceeds 15 000 ft but in no case less than 10 minutes.(Note 4)
4. 30% of passengers (Note 5)	Entire flight time when the cabin pressure altitude exceeds 14 000 ft but does not exceed 15 000 ft.
5. 10% of passengers (Note 5)	Entire flight time when the cabin pressure altitude exceeds 10 000 ft but does not exceed 14 000 ft after the first 30 minutes at these altitudes.

Note 1: The supply provided must take account of the cabin pressure altitude and descent profile for the routes concerned.

Note 2: The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aeroplane's maximum certificated operating altitude to 10 000 ft in 10 minutes and followed by 20 minutes at 10 000 ft.

Note 3: The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aeroplane's maximum certificated operating altitude to 10 000 ft in 10 minutes and followed by 110 minutes at 10 000 ft. The oxygen required in CAR–OPS 1.780(a)(1) may be included in determining the supply required.

Note 4: The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aeroplane's maximum certificated operating altitude to 15 000 ft in 10 minutes.

Note 5: For the purpose of this table 'passengers' means passengers actually carried and includes infants.

Appendix 1 to CAR–OPS 1.775 Supplemental Oxygen for non-pressurised Aeroplanes

Table 1

(a) SUPPLY FOR:	(b) DURATION AND PRESSURE ALTITUDE
1. All occupants of flight deck seats on flight deck duty	Entire flight time at pressure altitudes above 10 000 ft
2. All required cabin crew members	Entire flight time at pressure altitudes above 13 000 ft and for any period exceeding 30 minutes at pressure altitudes above 10 000 ft but not exceeding 13 000 ft
3. 100% of passengers (See Note)	Entire flight time at pressure altitudes above 13 000 ft.
4. 10% of passengers (See Note)	Entire flight time after 30 minutes at pressure altitudes greater than 10 000 ft but not exceeding 13 000 ft.

Note: For the purpose of this table 'passengers' means passengers actually carried and includes infants under the age of 2.

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SUBPART L – COMMUNICATION AND NAVIGATION EQUIPMENT**CAR–OPS 1.845 General introduction**

(See IEM OPS 1.845)

(a) An operator shall ensure that a flight does not commence unless the communication and navigation equipment required under this Subpart is:

- (1) Approved and installed in accordance with the requirements applicable to them, including the minimum performance standard and the operational and airworthiness requirements;
- (2) Installed such that the failure of any single unit required for either communication or navigation purposes, or both, will not result in the failure of another unit required for communications or navigation purposes.
- (3) In operable condition for the kind of operation being conducted except as provided in the MEL (CAR–OPS 1.030 refers); and
- (4) So arranged that if equipment is to be used by one flight crew member at his station during flight it must be readily operable from his station. When a single item of equipment is required to be operated by more than one flight crew member it must be installed so that the equipment is readily operable from any station at which the equipment is required to be operated.

(b) Communication and navigation equipment minimum performance standards are those prescribed in the applicable Joint Technical Standard Orders (JTSO) as listed in JAR–TSO, unless different performance standards are prescribed in the operational or airworthiness codes. Communication and navigation equipment complying with design and performance specifications other than JTSO on the date of CAR–OPS implementation may remain in service, or be installed, unless additional requirements are prescribed in this Subpart. Communication and navigation equipment which has already been approved does not need to comply with a revised JTSO or a revised specification, other than JTSO, unless a retroactive requirement is prescribed.

CAR–OPS 1.850 Radio Equipment

(a) An operator shall not operate an aeroplane unless it is equipped with radio required for the kind of operation being conducted.

(b) Where two independent (separate and complete) radio systems are required under this Subpart, each system must have an independent antenna installation except that, where rigidly supported non-wire antennae or other antenna installations of equivalent reliability are used, only one antenna is required.

(c) The radio communication equipment required to comply with paragraph (a) above must also provide for communications on the aeronautical emergency frequency 121.5 MHz.

CAR–OPS 1.855 Audio Selector Panel

An operator shall not operate an aeroplane under IFR unless it is equipped with an audio selector panel accessible to each required flight crew member.

CAR-OPS 1.860 Radio equipment for operations under VFR over routes navigated by reference to visual landmarks

An operator shall not operate an aeroplane under VFR over routes that can be navigated by reference to visual landmarks, unless it is equipped with the radio communication equipment necessary under normal operating conditions to fulfil the following:

- (a) Communicate with appropriate ground stations;
- (b) Communicate with appropriate air traffic control facilities from any point in controlled airspace within which flights are intended; and
- (c) Receive meteorological information;

CAR-OPS 1.865 Communication and Navigation equipment for operations under IFR, or under VFR over routes not navigated by reference to visual landmarks
(See AMC OPS 1.865)

(a) An operator shall not operate an aeroplane under IFR, or under VFR over routes that cannot be navigated by reference to visual landmarks, unless the aeroplane is equipped with radio communication and navigation equipment in accordance with the requirements of air traffic services in the area(s) of operation.

(b) *Radio equipment.* An operator shall ensure that radio equipment comprises not less than:

- (1) Two independent radio communication systems necessary under normal operating conditions to communicate with an appropriate ground station from any point on the route including diversions ; and
- (2) SSR transponder equipment as required for the route being flown.]

(c) *Navigation equipment.* An operator shall ensure that navigation equipment

- (1) Comprises not less than:
 - (i) One VOR receiving system, one ADF system, one DME except that an ADF system need not be installed provided that the use of ADF is not required in any phase of the planned flight (See AC OPS 1.865(c)(1)(i));
 - (ii) One ILS or MLS where ILS or MLS is required for approach navigation purposes;
 - (iii) One Marker Beacon receiving system where a Marker Beacon is required for approach navigation purposes;
 - (iv) An Area Navigation System when area navigation is required for the route being flown;
 - (v) An additional DME system on any route, or part thereof, where navigation is based only on DME signals;
 - (vi) An additional VOR receiving system on any route, or part thereof, where navigation is based only on VOR signals; and
 - (vii) An additional ADF system on any route, or part thereof, where navigation is based only on NDB signals, or
- (2) Complies with the Required Navigation Performance (RNP) Type for operation in the airspace concerned. (See also AC OPS 1.243.)

(d) An operator may operate an aeroplane that is not equipped with the navigation equipment specified in sub-paragraph(s) (c)(1)(vi) and/or (c)(1)(vii) above, provided that it is equipped with alternative equipment authorised, for the route being flown, by the AUTHORITY. The reliability and the accuracy of alternative equipment must allow safe navigation for the intended route.

(e) An operator shall ensure that VHF communication equipment, ILS Localiser and VOR receivers installed on aeroplanes to be operated in IFR are of a type that has been approved as complying with the FM immunity performance standards (See AC OPS 1.865(e)).

Rev.1

CAR-OPS 1.866 Transponder equipment

An operator shall not operate an aeroplane unless it is equipped with;

- (1) A pressure altitude reporting SSR transponder; and
- (2) any other SSR transponder capability required for the route being flown.

CAR-OPS 1.870 Additional navigation equipment for operations in MNPS airspace

(See AC OPS 1.870)

(a) An operator shall not operate an aeroplane in MNPS airspace unless it is equipped with navigation equipment that complies with minimum navigation performance specifications prescribed in ICAO Doc 7030 in the form of Regional Supplementary Procedures.

(b) The navigation equipment required by this paragraph must be visible and usable by either pilot seated at his duty station.

(c) For unrestricted operation in MNPS airspace an aeroplane must be equipped with two independent Long Range Navigation Systems (LRNS).

(d) For operation in MNPS airspace along notified special routes an aeroplane must be equipped with one Long Range Navigation System (LRNS), unless otherwise specified.

CAR-OPS 1.872 Equipment for operation in defined airspace with Reduced Vertical Separation Minima (RVSM)

- (a) An operator shall ensure that aeroplanes operated in RVSM airspace are equipped with:
- (1) Two independent altitude measurement systems;
 - (2) An altitude alerting system;
 - (3) An automatic altitude control system; and
 - (4) A secondary surveillance radar (SSR) transponder with altitude reporting system that can be connected to the altitude measurement system in use for altitude keeping.

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SUBPART M – AEROPLANE MAINTENANCE

This Subpart has been entirely withdrawn due to the implementation of CAR M

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SUBPART N – FLIGHT CREW**CAR-OPS 1.940 Composition of Flight Crew**

(See Appendices 1 & 2 to CAR-OPS 1.940)

(See AMC OPS 1.940(a)(4));

(a) An operator shall ensure that:

- (1) The composition of the flight crew and the number of flight crew members at designated crew stations are both in compliance with, and no less than the minimum specified in, the Aeroplane Flight Manual (AFM);
- (2) The flight crew includes additional flight crew members when required by the type of operation, and is not reduced below the number specified in the Operations Manual;
- (3) All flight crew members hold an applicable and valid licence, rating and valid medical certificate, issued by the AUTHORITY in accordance with CAR-FCL requirements and are suitably qualified and competent to conduct the duties assigned to them;
- (4) Procedures are established, acceptable to the AUTHORITY, to prevent the crewing together of inexperienced flight crew members (See AMC OPS 1.940(a)(4));
- (5) One pilot amongst the flight crew, qualified as a pilot-in-command in accordance with CAR-FCL, is designated as the commander who may delegate the conduct of the flight to another suitably qualified pilot; and
- (6) When a dedicated System Panel Operator is required by the AFM, the flight crew includes one crew member who holds a Flight Engineer's licence or is a suitably qualified flight crew member and acceptable to the AUTHORITY.
- (7) When engaging the services of flight crew members who are self-employed and/or working on a freelance or part-time basis, the requirements of Subpart N are complied with. In this respect, particular attention must be paid to the total number of aircraft types or variants that a flight crew member may fly for the purposes of commercial air transportation, which must not exceed the requirements prescribed in CAR-OPS 1.980 and CAR-OPS 1.981, including when his services are engaged by another operator. For crew members serving the operator as a commander, initial operator's Crew Resource Management (CRM) training shall be completed before commencing unsupervised line flying. However, for crew members serving the operator as a commander after 1 April 2002, initial CRM training shall be completed before commencing unsupervised line flying unless the crew member has previously completed an initial operator's CRM course.

(b) *Minimum flight crew for operations under IFR or at night.* For operations under IFR or at night, an operator shall ensure that:

- (1) For all turbo-propeller aeroplanes with a maximum approved passenger seating configuration of more than 9 and for all turbojet aeroplanes, the minimum flight crew is 2 pilots; or
- (2) Aeroplanes other than those covered by sub-paragraph (b)(1) above are operated by a single pilot provided that the requirements of Appendix 2 to CAR-OPS 1.940 are satisfied. If the requirements of Appendix 2 are not satisfied, the minimum flight crew is 2 pilots.

Rev. 1

CAR-OPS 1.943 Initial Operator's Crew Resource Management (CRM) training

(See AMC OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))

(See IEM OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))

(a) When a flight crew member has not previously completed initial Operator's Crew Resource Management (CRM) training (either new employees or existing staff), then the operator shall ensure that the flight crew member completes an initial CRM training course. New employees shall complete initial Operator's CRM Training within their first year of joining an operator. Flight crew who are already operating as flight crew members in commercial air transportation and who have not completed CRM training before shall complete an initial operator's CRM training course by 1 April 2004.

(b) If the flight crew member has not previously been trained in Human Factors then a theoretical course, based on the human performance and limitations programme for the ATPL (see the requirements applicable to the issue of Flight Crew Licences) shall be completed before the initial Operator's CRM training or combined with the initial Operator's CRM training.

(c) Initial CRM training shall be conducted by at least one CRM trainer acceptable to the AUTHORITY who may be assisted by experts in order to address specific areas. (See AMC OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e)) (See IEM OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))

(d) Initial CRM training is conducted in accordance with a detailed course syllabus included in the Operations Manual.

CAR-OPS 1.945 Conversion training and checking

(See Appendix 1 to CAR-OPS 1.945)

(See AMC OPS 1.945)

(See IEM OPS 1.945)

(See AMC OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))

(See IEM OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))

(See CAR-FCL 1.261(c)(2))

(See AMC FCL 1.261(c)(2))

(a) An operator shall ensure that:

- (1) A flight crew member completes a Type Rating course which satisfies the requirements applicable to the issue of Flight Crew Licences requirements of CAR-FCL when changing from one type of aeroplane to another type or class for which a new type or class rating is required;
- (2) A flight crew member completes an operator's conversion course before commencing unsupervised line flying:
 - (i) When changing to an aeroplane for which a new type or class rating is required; or
 - (ii) When changing operator;
- (3) Conversion training is conducted by suitably qualified personnel in accordance with a detailed course syllabus included in the Operations Manual. The operator shall ensure that the personnel integrating elements of CRM into conversion training are suitably qualified;
- (4) The amount of training required by the operator's conversion course is determined after due note has been taken of the flight crew member's previous training as recorded in his training records prescribed in CAR-OPS 1.985;
- (5) The minimum standards of qualification and experience required of flight crew members before undertaking conversion training are specified in the Operations Manual;

- (6) Each flight crew member undergoes the checks required by CAR-OPS 1.965(b) and the training and checks required by CAR-OPS 1.965(d) before commencing line flying under supervision;
- (7) Upon completion of line flying under supervision, the check required by CAR-OPS 1.965(c) is undertaken;
- (8) Once an operator's conversion course has been commenced, a flight crew member does not undertake flying duties on another type or class until the course is completed or terminated; and
- (9) Elements of CRM training are integrated into the conversion course. (See (See AMC OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))(See IEM OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e) and AMC OPS 1.945(a)(9) and IEM OPS 1.945(a)(9)).

(b) In the case of changing aeroplane type or class, the check required by 1.965(b) may be combined with the type or class rating skill test under the requirements applicable to the issue of Flight Crew Licences.

(c) The operator's conversion course and the Type or Class Rating course required for the issue of Flight Crew Licences may be combined.

(d) A pilot, undertaking a ZFTT course, shall:

- (1) Commence Line Flying Under Supervision as soon as possible within 21 days after completion of the skill test.
If Line Flying Under Supervision has not been commenced within the 21 days, the operator shall provide appropriate training acceptable to the Authority.
- (2) Complete the six take-offs and landings required in Appendix CAR-FCL 1.261(c)(2) in a flight simulator, qualified in accordance with JAR-STD and user approved by the Authority, not later than 21 days after the completion of the skill test. This simulator session shall be conducted by a TRI(A) occupying a pilot's seat. If these take-offs and landings have not been performed within the 21 days, the operator shall provide refresher training acceptable to the Authority

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CAR-OPS 1.950 Differences training and Familiarisation training

- (a) An operator shall ensure that a flight crew member completes:
 - (1) Differences training which requires additional knowledge and training on an appropriate training device or the aeroplane;
 - (i) When operating another variant of an aeroplane of the same type or another type of the same class currently operated; or
 - (ii) When changing equipment and/or procedures on types or variants currently operated;
 - (2) Familiarisation training which requires the acquisition of additional knowledge:
 - (i) When operating another aeroplane of the same type; or
 - (ii) When changing equipment and/or procedures on types or variants currently operated.
- (b) The operator shall specify in the Operations Manual when such differences training or familiarisation training is required.

CAR–OPS 1.955 Nomination as commander

(a) An operator shall ensure that for upgrade to commander from co-pilot and for those joining as commanders:

- (1) A minimum level of experience, acceptable to the AUTHORITY, is specified in the Operations Manual; and
- (2) For multi-crew operations, the pilot completes an appropriate command course.

(b) The command course required by sub-paragraph (a)(2) above must be specified in the Operations Manual and include at least the following:

- (1) Training in an STD (including Line Orientated Flying Training) and/or flying training;
- (2) An operator proficiency check operating as commander;
- (3) Commander's responsibilities;
- (4) Line training in command under supervision. A minimum of 10 sectors is required for pilots already qualified on the aeroplane type;
- (5) Completion of a commander's line check as prescribed in CAR–OPS 1.965(c) and route and aerodrome competence qualification as prescribed in CAR–OPS 1.975; and
- (6) Elements of Crew Resource Management (See AMC OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e)) (See IEM OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))

CAR–OPS 1.960 Commanders holding a Commercial Pilot Licence

(a) An operator shall ensure that:

- (1) A Commercial Pilot Licence (CPL) holder does not operate as a commander of an aeroplane certificated in the Aeroplane Flight Manual for single pilot operations unless:
 - (i) When conducting passenger carrying operations under Visual Flight Rules (VFR) outside a radius of 50 nm from an aerodrome of departure, the pilot has a minimum of 500 hours total flight time on aeroplanes or holds a valid Instrument Rating; or
 - (ii) When operating on a multi-engine type under Instrument Flight Rules (IFR), the pilot has a minimum of 700 hours total flight time on aeroplanes which includes 400 hours as pilot-in-command (in accordance with CAR FCL) of which 100 hours have been under IFR including 40 hours multi-engine operation. The 400 hours as pilot-in-command may be substituted by hours operating as co-pilot on the basis of two hours co-pilot is equivalent to one hour as pilot-in-command provided those hours were gained within an established multi-pilot crew system prescribed in the Operations Manual;
- (2) In addition to sub-paragraph (a)(1)(ii) above, when operating under IFR as a single pilot, the requirements prescribed in Appendix 2 to CAR–OPS 1.940 are satisfied; and
- (3) In multi-pilot crew operations, in addition to sub-paragraph (a)(1) above, and prior to the pilot operating as commander, the command course prescribed in CAR–OPS 1.955(a)(2) is completed.

CAR-OPS 1.965 Recurrent training and checking

(See Appendices 1 & 2 to CAR-OPS 1.965)

(See AMC OPS 1.965)

(See AMC OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))

(See IEM OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))

(See IEM OPS 1.965)

(a) *General.* An operator shall ensure that:

(1) Each flight crew member undergoes recurrent training and checking and that all such training and checking is relevant to the type or variant of aeroplane on which the flight crew member operates;

(2) A recurrent training and checking programme is established in the Operations Manual and approved by the AUTHORITY;

(3) Recurrent training is conducted by the following personnel:

(i) *Ground and refresher training* – by suitably qualified personnel;

(ii) *Aeroplane/STD training* - by a Type Rating Instructor (TRI), Class Rating Instructor (CRI) or in the case of the STD content, a Synthetic Flight Instructor (SFI), providing that the TRI, CRI or SFI satisfies the operator's experience and knowledge requirements sufficient to instruct on the items specified in paragraphs (a)(1)(i)(A) and (B) of Appendix 1 to CAR-OPS 1.965;

(iii) *Emergency and safety equipment training* – by suitably qualified personnel; and

(iv) *Crew Resource Management (CRM):*

(A) Integration of CRM elements into all the phases of the recurrent training by all the personnel conducting recurrent training. The operator shall ensure that all personnel conducting recurrent training are suitably qualified to integrate elements of CRM into this training;

(B) Modular CRM training – by at least one CRM trainer acceptable to the AUTHORITY (see AMC OPS 1.943/1.945(a)(9)/1.955(b)(6)/ 1.965(e)) who may be assisted by experts in order to address specific areas.

(4) Recurrent checking is conducted by the following personnel:

(i) *Operator proficiency check* – by a Type Rating Examiner (TRE), Class Rating Examiner (CRE) or, if the check is conducted in a STD a TRE, CRE or a Synthetic Flight Examiner (SFE), trained in CRM concepts and the assessment of CFM skills;

(ii) *Line checks* – by suitably qualified commanders nominated by the operator and acceptable to the AUTHORITY;

(iii) *Emergency and safety equipment checking* – by suitably qualified personnel.

(b) *Operator Proficiency Check*

(1) An operator shall ensure that:

(i) Each flight crew member undergoes operator proficiency checks to demonstrate his competence in carrying out normal, abnormal and emergency procedures; and

(ii) The check is conducted without external visual reference when the flight crew member will be required to operate under IFR.

(iii) Each flight crew member undergoes operator proficiency checks as part of a normal flight crew complement.

- (2) The period of validity of an operator proficiency check shall be 6 calendar months in addition to the remainder of the month of issue. If issued within the final 3 calendar months of validity of a previous operator proficiency check, the period of validity shall extend from the date of issue until 6 calendar months from the expiry date of that previous operator proficiency check.

(c) *Line Check.* An operator shall ensure that each flight crew member undergoes a line check on the aeroplane to demonstrate his competence in carrying out normal line operations described in the Operations Manual. The period of validity of a line check shall be 12 calendar months, in addition to the remainder of the month of issue. If issued within the final 3 calendar months of validity of a previous line check the period of validity shall extend from the date of issue until 12 calendar months from the expiry date of that previous line check. (See AMC OPS 1.965(c)).

(d) *Emergency and Safety Equipment training and checking.* An operator shall ensure that each flight crew member undergoes training and checking on the location and use of all emergency and safety equipment carried. The period of validity of an emergency and safety equipment check shall be 12 calendar months in addition to the remainder of the month of issue. If issued within the final 3 calendar months of validity of a previous emergency and safety check, the period of validity shall extend from the date of issue until 12 calendar months from the expiry date of that previous emergency and safety equipment check. (See AMC OPS 1.965(d)).

(e) *CRM.* An operator shall ensure that:

- (1) Elements of CRM are integrated into all appropriate phases of the recurrent training, and;
- (2) Each flight crew member undergoes specific modular CRM training. All major topics of CRM training shall be covered over a period not exceeding 3 years;

(f) *Ground and Refresher training.* An operator shall ensure that each flight crew member undergoes ground and refresher training at least every 12 calendar months. If the training is conducted within 3 calendar months prior to the expiry of the 12 calendar months period, the next ground and refresher training must be completed within 12 calendar months of the original expiry date of the previous ground and refresher training.

(g) *Aeroplane/STD training.* An operator shall ensure that each flight crew member undergoes aeroplane/STD training at least every 12 calendar months. If the training is conducted within 3 calendar months prior to the expiry of the 12 calendar months period, the next aeroplane/STD training must be completed within 12 calendar months of the original expiry date of the previous aeroplane/STD training.

CAR-OPS 1.968 Pilot qualification to operate in either pilot's seat

(See Appendix 1 to CAR-OPS 1.968)

(a) An operator shall ensure that:

- (1) A pilot who may be assigned to operate in either pilot's seat completes appropriate training and checking; and
- (2) The training and checking programme is specified in the Operations Manual and is acceptable to the AUTHORITY.

CAR-OPS 1.970 Recent experience

(a) An operator shall ensure that:

- (1) *Commander.* A pilot does not operate an aeroplane as commander unless he has carried out at least three take-offs and three landings as pilot flying in an aeroplane

of the same type/class of the aeroplane type to be used, in the preceding 90 days;
and

- (2) *Co-pilot.* A co-pilot does not serve at the flight controls during take-off and landing unless he has operated the controls as a pilot for three take-offs and landings in an aeroplane of the same type/class of the aeroplane type to be used, in the preceding 90 days.

(b) The 90 day period prescribed in sub-paragraphs (a)(1) and (2) above may be extended up to a maximum of 120 days by line flying under the supervision of a Type Rating Instructor or Examiner. For periods beyond 120 days, the recency requirement is satisfied by a training flight in the aeroplane type to be used.

CAR-OPS 1.975 Route and Aerodrome Competence qualification

(See AMC OPS 1.975)

(a) An operator shall ensure that, prior to being assigned as commander or as pilot to whom the conduct of the flight may be delegated by the commander, the pilot has obtained adequate knowledge of the route to be flown and of the aerodromes (including alternates), facilities and procedures to be used.

(b) The period of validity of the route and aerodrome competence qualification shall be 12 calendar months in addition to the remainder of:

- (1) The month of qualification; or
(2) The month of the latest operation on the route or to the aerodrome.

(c) Route and aerodrome competence qualification shall be revalidated by operating on the route or to the aerodrome within the period of validity prescribed in sub-paragraph (b) above.

(d) If revalidated within the final 3 calendar months of validity of previous route and aerodrome competence qualification, the period of validity shall extend from the date of revalidation until 12 calendar months from the expiry date of that previous route and aerodrome competence qualification.

CAR-OPS 1.978 Alternative Training and Qualification Programme

(See Appendix 1 to CAR-OPS 1.978)

(See AC OPS 1.978)

(a) An operator, following a minimum of two years continuous operations, may substitute the training and checking requirements for flight crew specified in Appendix 1 to CAR-OPS 1.978(a) by an Alternative Training and Qualification Programme (ATQP) approved by the Authority. The two years continuous operations may be reduced at the discretion of the AUTHORITY.

(b) The ATQP must contain training and checking which establishes and maintains a level of proficiency demonstrated to be at least not less than the level of proficiency achieved by following the provisions of CAR-OPS 1.945, 1.965 and 1.970. The standard of flight crew training and qualification shall be established prior to the introduction of ATQP; the required ATQP training and qualification standards shall also be specified.

(c) An operator applying for approval to implement an ATQP shall provide the Authority with an implementation plan in accordance with paragraph (c) of Appendix 1 to CAR-OPS 1.978.

(d) In addition to the checks required by CAR-OPS 1.965 and 1.970 an operator shall ensure that each flight crew member undergoes a Line Orientated Evaluation (LOE).

- (1) The Line Orientated Evaluation (LOE) shall be conducted in a simulator. The LOE may be undertaken with other approved ATQP training.
- (2) The period of validity of a LOE shall be 12 calendar months, in addition to the Line Check - 24 calendar months in addition to the remainder of the month of issue.
If issued within the final 6 calendar months of validity of a previous line check, the period of validity shall extend from the date of issue until 24 calendar months from the expiry date of that previous line check. The line check may be combined with a Line Oriented Quality Evaluation (LOQE) with the approval of the AUTHORITY.
- (3) Emergency and Safety equipment checking – 24 calendar months in addition to the remainder of the month of issue. If issued within the final 6 calendar months of validity of a previous check, the period of validity shall extend from the date of issue until 24 calendar months from the expiry date of that previous check.
- (f) The ATQP shall be the responsibility of a nominated post holder.

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CAR-OPS 1.980 Operation on more than one type or variant

(See Appendix 1 to CAR-OPS 1.980)

(See AMC OPS 1.980)

- (a) An operator shall ensure that a flight crew member does not operate on more than one type or variant, unless: the flight crew member is competent to do so.
- (b) When considering operations of more than one type or variant, an operator shall ensure that the differences and/or similarities of the aeroplanes concerned justify such operations, taking account of the following:
 - (1) The level of technology;
 - (2) Operational procedures;
 - (3) Handling characteristics. (See AMC OPS 1.980(b) and IEM OPS 1.980(b))
- (c) An Operator shall ensure that a flight crew member operating more than one type or variant complies with all of the requirements prescribed in Subpart N for each type or variant unless the AUTHORITY has approved the use of credit(s) related to the training, checking and recent experience requirements.
- (d) An operator shall specify appropriate procedures and/or operational restrictions, approved by the AUTHORITY, in the Operations Manual, for any operation on more than one type or variant covering:
 - (1) The flight crew members' minimum experience level;
 - (2) The minimum experience level on one type or variant before beginning training for and operation of another type or variant;
 - (3) The process whereby flight crew qualified on one type or variant will be trained and qualified on another type or variant; and
 - (4) All applicable recent experience requirements for each type or variant.

CAR-OPS 1.981 Operation of helicopters and aeroplanes

- (a) When a flight crew member operates both helicopters and aeroplanes,:

- (1) An operator shall ensure that operations of helicopter and aeroplane are limited to one type of each.
- (2) The operator shall specify appropriate procedures and/or operational restrictions, approved by the AUTHORITY, in the Operations Manual.

CAR-OPS 1.985 Training records
(See IEM OPS 1.985)

- (a) An operator shall:
 - (1) Maintain records of all training, checking and qualification prescribed in CAR-OPS 1.945, 1.955, 1.965, 1.968 and 1.975 undertaken by a flight crew member; and
 - (2) Make the records of all conversion courses and recurrent training and checking available, on request, to the flight crew member concerned.

Appendix 1 to CAR–OPS 1.940 In-flight relief of flight crew members

(a) A flight crew member may be relieved in flight of his duties at the controls by another suitably qualified flight crew member.

(b) *Relief of the Commander*

(1) The commander may delegate conduct of the flight to:

(i) Another qualified commander; or

(ii) For operations only above FL200, a pilot qualified as detailed in sub-paragraph (c) below.

(c) *Minimum requirements for a pilot relieving the commander*

(1) Valid Airline Transport Pilot Licence;

(2) Conversion training and checking (including Type Rating training) as prescribed in CAR–OPS 1.945;

(3) All recurrent training and checking as prescribed in CAR–OPS 1.965 and CAR-OPS 1.968; and

(4) Route competence qualification as prescribed in CAR–OPS 1.975.

(d) *Relief of the co-pilot*

(1) The co-pilot may be relieved by:

(i) Another suitably qualified pilot; or

(ii) A cruise relief co-pilot qualified as detailed in sub-paragraph (e) below.

(e) *Minimum requirements for Cruise Relief Co-Pilot*

(1) Valid Commercial Pilot Licence with Instrument Rating;

(2) Conversion training and checking, including Type Rating training, as prescribed in CAR–OPS 1.945 except the requirement for take-off and landing training;

(3) All recurrent training and checking as prescribed in CAR–OPS 1.965 except the requirement for take-off and landing training; and

(4) To operate in the role of co-pilot in the cruise only and not below FL 200.

(5) Recent experience as prescribed in CAR–OPS 1.970 is not required. The pilot shall, however, carry out Flight Simulator recency and refresher flying skill training at intervals not exceeding 90 days. This refresher training may be combined with the training prescribed in CAR–OPS 1.965.

(f) *Relief of the system panel operator.* A system panel operator may be relieved in flight by a crew member who holds a Flight Engineer's licence or by a flight crew member with a qualification acceptable to the AUTHORITY.

Appendix 2 to CAR–OPS 1.940 Single pilot operations under IFR or at night

(a) Aeroplanes referred to in CAR–OPS 1.940(b)(2) may be operated by a single pilot under IFR or at night when the following requirements are satisfied:

(1) The operator shall include in the Operations Manual a pilot's conversion and recurrent training programme which includes the additional requirements for a single pilot operation;

(2) In particular, the cockpit procedures must include:

- (i) Engine management and emergency handling;
- (ii) Use of normal, abnormal and emergency checklists;
- (iii) ATC communication;
- (iv) Departure and approach procedures;
- (v) Autopilot management; and
- (vi) Use of simplified in-flight documentation;

(3) The recurrent checks required by CAR–OPS 1.965 shall be performed in the single-pilot role on the type or class of aeroplane in an environment representative of the operation;

(4) The pilot shall have a minimum of 50 hours flight time on the specific type or class of aeroplane under IFR of which 10 hours is as commander; and

(5) The minimum required recent experience for a pilot engaged in a single-pilot operation under IFR or at night shall be 5 IFR flights, including 3 instrument approaches, carried out during the preceding 90 days on the type or class of aeroplane in the single-pilot role. This requirement may be replaced by an IFR instrument approach check on the type or class of aeroplane.

Appendix 1 to CAR–OPS 1.945 Operator’s Conversion Course

(See AMC OPS 1.945)

(See AMC OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))

(See IEM OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))

(See IEM OPS 1.945)

(a) An operator’s conversion course shall include:

- (1) Ground training and checking including aeroplane systems, normal, abnormal and emergency procedures;
- (2) Emergency and safety equipment training and checking which must be completed before aeroplane training commences;
- (3) Aeroplane/STD training and checking; and
- (4) Line flying under supervision and line check.

(b) The conversion course shall be conducted in the order set out in sub-paragraph (a) above.

(c) Elements of Crew Resource Management shall be integrated into the conversion course, and conducted by suitably qualified personnel.

(d) When a flight crew member has not previously completed an operator’s conversion course, the operator shall ensure that in addition to sub-paragraph (a) above, the flight crew member undergoes general first aid training and, if applicable, ditching procedures training using the equipment in water.

Appendix 1 to CAR–OPS 1.965 Recurrent training and checking – Pilots

(See AMC OPS 1.965)

(See AMC OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))

(See IEM OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e))

(See IEM OPS 1.965)

- (a) Recurrent Training – Recurrent training shall comprise:
- (1) Ground and refresher training
 - (i) The ground and refresher training programme shall include:
 - (A) Aeroplane systems;
 - (B) Operational procedures and requirements including ground de-/anti-icing (See AMC OPS 1.345(a)) and pilot incapacitation (see AMC to Appendix 1 to CAR-OPS 1.965); and
 - (C) Accident/Incident and occurrence review.
 - (ii) Knowledge of the ground and refresher training shall be verified by a questionnaire or other suitable methods.
 - (2) Aeroplane/STD training
 - (i) The aeroplane/STD training programme shall be established such that all major failures of aeroplane systems and associated procedures will have been covered in the preceding 3 year period.
 - (ii) When engine-out manoeuvres are carried out in an aeroplane, the engine failure shall be simulated.
 - (iii) Aeroplane/STD training may be combined with the operator proficiency check.
 - (3) Emergency and Safety Equipment Training
 - (i) Emergency and safety equipment training may be combined with emergency and safety equipment checking and shall be conducted in an aeroplane or a suitable alternative training device.
 - (ii) Every year the emergency and safety equipment training programme must include the following:
 - (A) Actual donning of a lifejacket where fitted;
 - (B) Actual donning of protective breathing equipment where fitted;
 - (C) Actual handling of fire extinguishers;
 - (D) Instruction on the location and use of all emergency and safety equipment carried on the aeroplane;
 - (E) Instruction on the location and use of all types of exits; and
 - (F) Security procedures.
 - (iii) Every 3 years the programme of training must include the following:
 - (A) Actual operation of all types of exits;
 - (B) Demonstration of the method used to operate a slide where fitted;

- (C) Actual fire-fighting using equipment representative of that carried in the aeroplane on an actual or simulated fire except that, with Halon extinguishers, an alternative method acceptable to the AUTHORITY may be used;
- (D) The effects of smoke in an enclosed area and actual use of all relevant equipment in a simulated smoke-filled environment;
- (E) Actual handling of pyrotechnics, real or simulated, where fitted; and
- (F) Demonstration in the use of the life-raft(s) where fitted.

(4) *Crew Resource Management (CRM)*

- (i) Elements of CRM shall be integrated into all appropriate phases of recurrent training; and
- (ii) A specific modular CRM training programme shall be established such that all major topics of CRM training are covered over a period not exceeding 3 years, as follows:
 - (A) Human error and reliability, error chain, error prevention and detection;
 - (B) Company safety culture, SOPs, organisational factors;
 - (C) Stress, stress management, fatigue and vigilance;
 - (D) Information acquisition and processing, situation awareness, workload management;
 - (E) Decision making;
 - (F) Communication and co-ordination inside and outside the cockpit;
 - (G) Leadership and team behaviour, synergy;
 - (H) Automation and philosophy of the use of Automation (if relevant to the type);
 - (I) Specific type-related differences;
 - (J) Case based studies;
 - (K) Additional areas which warrant extra attention, as identified by the accident prevention and flight safety programme (see CAR-OPS 1.037).

(b) *Recurrent checking.* Recurrent checking shall comprise:

(1) *Operator proficiency checks*

- (i) Where applicable, operator proficiency checks shall include the following manoeuvres:
 - (A) Rejected take-off when a Flight Simulator is available to represent that specific aeroplane, otherwise touch drills only;
 - (B) Take-off with engine failure between V_1 and V_2 or as soon as safety considerations permit;
 - (C) Precision instrument approach to minima with, in the case of multi-engined aeroplanes, one engine inoperative;
 - (D) Non-precision approach to minima;
 - (E) Missed approach on instruments from minima with, in the case of multi-engined aeroplanes, one engine inoperative; and

- (F) Landing with one engine inoperative. For single-engined aeroplanes a practice forced landing is required.
- (ii) When engine out manoeuvres are carried out in an aeroplane, the engine failure must be simulated.
- (iii) In addition to the checks prescribed in sub-paragraphs (i)(A) to (F) above, the requirements applicable to the revalidation or renewal of the aircraft Type or Class Rating must be completed every 12 months and may be combined with the operator proficiency check.
- (iv) For a pilot operating VFR only, the checks prescribed in sub-paragraphs (i)(C) to (E) above may be omitted except for an approach and go-around in a multi-engined aeroplane with one engine inoperative.
- (v) Operator proficiency checks must be conducted by a Type Rating Examiner.
- (2) *Emergency and safety equipment checks.* The items to be checked shall be those for which training has been carried out in accordance with sub-paragraph (a)(3) above.
- (3) *Line checks;*
- (i) Line checks must establish the ability to perform satisfactorily a complete line operation including pre-flight and post-flight procedures and use of the equipment provided, as specified in the Operations Manual.
- (ii) The flight crew must be assessed on their CRM skills in accordance with a methodology acceptable to the AUTHORITY and published in the Operations Manual. The purpose of such assessment is to:
- (A) Provide feedback to the crew collectively and individually and serve to identify retraining; and
- (B) Be used to improve the CRM training system.
- (iii) When pilots are assigned duties as pilot flying and pilot non-flying they must be checked in both functions.
- (iv) Line checks must be completed in an aeroplane.
- (v) Line checks must be conducted by commanders nominated by the operator and acceptable to the AUTHORITY. The person conducting the line check, who is described in CAR-OPS 1.965(a)(4)(ii), shall be trained in CRM concepts and the assessment of CRM skills and shall occupy an observer's seat where installed. In the case of longhaul operations where additional operating flightcrew are carried, the person may fulfil the function of a cruise relief pilot and shall not occupy either pilot's seat during take-off, departure, initial cruise, descent, approach and landing. His CRM assessments shall solely be based on observations made during the initial briefing, cabin briefing, cockpit briefing and those phases where he occupies the observer's seat.

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Appendix 2 to CAR-OPS 1.965 Recurrent training and checking – System Panel Operators

(a) The recurrent training and checking for System Panel Operators shall meet the requirements for pilots and any additional specific duties, omitting those items that do not apply to System Panel Operators.

(b) Recurrent training and checking for System Panel Operators shall, whenever possible, take place concurrently with a pilot undergoing recurrent training and checking.

(c) A line check shall be conducted by a commander nominated by the operator and acceptable to the AUTHORITY or by a System Panel Operator Type Rating Instructor or Examiner.

Appendix 1 to CAR–OPS 1.968 Pilot qualification to operate in either pilot’s seat

(a) Commanders whose duties also require them to operate in the right-hand seat and carry out the duties of co-pilot, or commanders required to conduct training or examining duties from the right-hand seat, shall complete additional training and checking as specified in the Operations Manual, concurrent with the operator proficiency checks prescribed in CAR–OPS 1.965(b). This additional training must include at least the following:

- (1) An engine failure during take-off;
- (2) A one engine inoperative approach and go-around; and
- (3) A one engine inoperative landing.

(b) When engine-out manoeuvres are carried out in an aeroplane, the engine failure must be simulated.

(c) When operating in the right-hand seat, the checks required by CAR–OPS for operating in the left-hand seat must, in addition, be valid and current.

(d) A pilot relieving the commander shall have demonstrated, concurrent with the operator proficiency checks prescribed in CAR-OPS 1.965(b), practice of drills and procedures which would not, normally, be the relieving pilot’s responsibility. Where the differences between left and right seats are not significant (for example because of use of autopilot) then practice may be conducted in either seat.

(e) A pilot other than the commander occupying the left-hand seat shall demonstrate practice of drills and procedures, concurrent with the operator proficiency checks prescribed in CAR–OPS 1.965(b), which would otherwise have been the commander’s responsibility acting as pilot non-flying. Where the differences between left and right seats are not significant (for example because of use of autopilot) then practice may be conducted in either seat.

Appendix 1 to JAR-OPS 1.978 Alternative Training and Qualification Programme

(See AC to Appendix 1 to JAR-OPS 1.978(b)(1))

(See AC to Appendix 1 to JAR-OPS 1.978(b)(2))

(See AC to Appendix 1 to JAR-OPS 1.978(b)(3))

(See AC to Appendix 1 to JAR-OPS 1.978(b)(4))

(See AC to Appendix 1 to JAR-OPS 1.978(b)(5))

(See AC to Appendix 1 to JAR-OPS 1.978(b)(6))

(See AC to Appendix 1 to JAR-OPS 1.978(b)(9))

(See AC to Appendix 1 to JAR-OPS 1.978(c)(1)(i))

(a) An operator's ATQP may apply to the following requirements that relate to training and qualifications:

- (1) CAR-OPS 1.450 and Appendix 1 to CAR-OPS 1.450 - Low Visibility Operations – Training and Qualifications;
- (2) CAR-OPS 1.945 Conversion training and checking and Appendix 1 to CAR-OPS 1.945;
- (3) CAR-OPS 1.950 Differences training and familiarisation training;
- (4) CAR-OPS 1.955 paragraph (b) - Nomination as commander;
- (5) CAR-OPS 1.965 Recurrent training and checking and Appendices 1 and 2 to CAR-OPS 1.965;
- (6) CAR-OPS 1.980 Operation on more than one type or variant and Appendix 1 to CAR-OPS 1.980.

(b) Components of the ATQP - An Alternative Training and Qualification Programme shall comprise the following:

- (1) Documentation that details the scope and requirements of the programme;
- (2) A task analysis to determine the tasks to be analysed in terms of:
 - (i) knowledge;
 - (ii) the required skills;
 - (iii) the associated skill based training; and, where appropriate
 - (iv) the validated behavioural markers.
- (3) Curricula – the curriculum structure and content shall be determined by task analysis, and shall include proficiency objectives including when and how those objectives shall be met. The process for curriculum development shall be acceptable to the AUTHORITY;
- (4) A specific training programme for:
 - (i) each aeroplane type/class within the ATQP;
 - (ii) the instructors (CRI/SFI/TRI), and other personnel undertaking flight crew instruction;
 - (iii) the examiners (CRE/SFE/TRE); to include a method for the standardization of the instructors and examiners;
- (5) A feedback loop for the purpose of curriculum validation and refinement, and to ascertain that the programme meets its proficiency objectives;

(6) A method for the assessment of flight crew both during conversion and recurrent training and checking. The assessment process shall include event-based assessment as part of the LOE. The method of assessment shall comply with the provisions of CAR-OPS 1.965;

(7) An integrated system of quality control, that ensures compliance with all the requirements processes and procedures of the programme;

(8) A process that describes the method to be used if the monitoring and evaluation programmes do not ensure compliance with the established proficiency and qualification standards for flight crew;

(9) A Data Monitoring/Analysis programme.

(c) Implementation - The operator shall develop an evaluation and implementation strategy acceptable to the AUTHORITY; the following requirements shall be fulfilled:

(1) The implementation process shall include the following stages:

(i) A safety case that substantiates the validity of:

(A) The revised training and qualification standards when compared with the standards achieved under CAR-OPS 1 prior to the introduction of ATQP.

(B) Any new training methods implemented as part of ATQP.

If approved by the AUTHORITY the operator may establish an equivalent method other than a formal safety case.

(ii) Undertake a task analysis as required by paragraph (b)(2) above in order to establish the operator's programme of targeted training and the associated training objectives.

(iii) A period of operation whilst data is collected and analysed to ensure the efficacy of the safety case or equivalent and validate the task analysis. During this period the operator shall continue to operate to the pre-ATQP CAR-OPS 1 requirements.

The length of this period shall be agreed with the AUTHORITY;

(2) The operator may then be approved to conduct training and qualification as specified under the ATQP.

Rev. 1

Appendix 1 to CAR-OPS 1.980 Operation on more than one type or variant

(See AMC OPS 1.980)

(a) When a flight crew member operates more than one aeroplane class, type or variant listed in AMC FCL 1.215A (class-single pilot) and/or AMC FCL 1.220 (type-single pilot), but not within a single licence endorsement, an operator must comply with the following:

- (1) A flight crew member shall not operate more than:
 - (i) Three piston engined aeroplane types or variants; or
 - (ii) Three turbo-propellor aeroplane types or variants; or
 - (iii) One turbo-propellor aeroplane type or variant and one piston engined aeroplane type or variant; or.
 - (vi) One turbo-propellor aeroplane type or variant and any aeroplane within a particular class.
- (2) CAR-OPS 1.965 for each type or variant operated unless the operator has demonstrated specific procedures and/or operational restrictions which are acceptable to the AUTHORITY.

(b) When a flight crew member operates more than one aeroplane type or variant within one or more licence endorsement as defined by CAR FCL and associated procedures for type - multi-pilot, an operator shall ensure that:

- (1) The minimum flight crew complement specified in the Operations Manual is the same for each type or variant to be operated;
- (2) A flight crew member does not operate more than two aeroplane types or variants for which a separate licence endorsement is required; and
- (3) Only aeroplanes within one licence endorsement are flown in any one flight duty period unless the operator has established procedures to ensure adequate time for preparation.

Note: In cases where more than one licence endorsement is involved, see sub-paragraphs (c) and (d) below.

(c) When a flight crew member operates more than one aeroplane type or variant listed in JAR-FCL and associated procedures for 1.220 type - single pilot and type - multi pilot, but not within a single licence endorsement, an operator must comply with:

- (1) Subparagraphs (b)(1), (b)(2) and (b)(3) above; and
- (2) Subparagraph (d) below.

(d) When a flight crew member operates more than one aeroplane type or variant listed in AMC FCL 1.220 B (type - multi pilot), but not within a single licence endorsement, an operator must comply with the following:

- (1) Subparagraphs (b)(1), (b)(2) and (b)(3) above;
- (2) Before exercising the privileges of 2 licence endorsements:
 - (i) Flight crew members must have completed two consecutive operator proficiency checks and must have 500 hours in the relevant crew position in commercial air transport operations with the same operator.

- (ii) In the case of a pilot having experience with an operator and exercising the privileges of 2 licence endorsements, and then being promoted to command with the same operator on one of those types, the required minimum experience as commander is 6 months and 300 hours, and the pilot must have completed 2 consecutive operator proficiency checks before again being eligible to exercise 2 licence endorsements.
- (3) Before commencing training for and operation of another type or variant, flight crew members must have completed 3 months and 150 hours flying on the base aeroplane which must include at least one proficiency check.
- (4) After completion of the initial line check on the new type, 50 hours flying or 20 sectors must be achieved solely on aeroplanes of the new type rating.
- (5) CAR-OPS 1.970 for each type operated unless credits have been allowed by the AUTHORITY in accordance with sub-paragraph (7) below.
- (6) The period within which line flying experience is required on each type must be specified in the Operations Manual.
- (7) Where credits are sought to reduce the training and checking and recent experience requirements between aeroplane types, the operator must demonstrate to the AUTHORITY which items need not be repeated on each type or variant because of similarities (See AMC OPS 1.980(c) and IEM OPS 1.980(c)).
- (i) CAR-OPS 1.965(b) requires two operator proficiency checks every year. When credit is given in accordance with sub-paragraph (7) above for operator proficiency checks to alternate between the two types, each operator proficiency check revalidates the operator proficiency check for the other type. Provided that the period between proficiency checks for revalidation or renewal of type rating does not exceed that prescribed in CAR-FCL for each type, the CAR-FCL requirements will be satisfied. In addition relevant and approved recurrent training must be specified in the Operations Manual.
- (ii) CAR-OPS 1.965(c) requires one line check every year. When credit is given in accordance with sub-paragraph (7) above for line checks to alternate between types or variants, each line check revalidates the line check for the other type or variant.
- (iii) Annual emergency and safety equipment training and checking must cover all requirements for each type.
- (8) CAR-OPS 1.965 for each type or variant operated unless credits have been allowed by the AUTHORITY in accordance with sub-paragraph (7) above.
- (e) When a flight crew member operates combinations of aeroplane types or variants as defined by by CAR FCL and associated procedures for type - multi-pilot, an operator must demonstrate that specific procedures and/or operational restrictions are approved in accordance with CAR-OPS 1.980.

SUBPART O – CABIN CREW**CAR–OPS 1.988 Applicability**

[An operator shall ensure that all cabin crew members comply with the requirements of this Subpart and any other safety requirements applicable to cabin crew.

For the purpose of this Regulation, “cabin crew member” means any crew member, other than a flight crew member, who performs, in the interests of safety of passengers, duties assigned to him/her by the operator or the commander in the cabin of an aeroplane]

.Rev. 2

CAR-OPS 1.989 Identification

[(a) An operator shall ensure that all cabin crew members wear the operator’s cabin crew uniform and are clearly identifiable to the passengers as a cabin crew member.

(b) Other personnel, such as medical staff, security staff, child minders, escorts, technical staff, entertainers, interpreters, who undertake tasks in the cabin, shall not wear a uniform which might identify them to passengers as a cabin crew member, unless they comply with the requirements of this Subpart and any other applicable requirements of this Regulation.]

.Rev. 2’\

CAR–OPS 1.990 Number and composition of cabin crew

(See IEM OPS 1.990)

(a) An operator shall not operate an aeroplane with a maximum approved passenger seating configuration of more than 19, when carrying one or more passengers, unless at least one cabin crew member is included in the crew for the purpose of performing duties, specified in the Operations Manual, in the interests of the safety of passengers.

(b) When complying with sub-paragraph (a) above, an operator shall ensure that the minimum number of cabin crew is the greater of:

- (1) One cabin crew member for every 50, or fraction of 50, passenger seats installed on the same deck of the aeroplane; or
- (2) The number of cabin crew who actively participated in the aeroplane cabin during the relevant emergency evacuation demonstration, or who were assumed to have taken part in the relevant analysis, except that, if the maximum approved passenger seating configuration is less than the number evacuated during the demonstration by at least 50 seats, the number of cabin crew may be reduced by 1 for every whole multiple of 50 seats by which the maximum approved passenger seating configuration falls below the certificated maximum capacity.

(c) The AUTHORITY may under exceptional circumstances require an operator to include in the crew additional cabin crew members.

(d) In unforeseen circumstances the required minimum number of cabin crew may be reduced provided that:

- (1) The number of passengers has been reduced in accordance with procedures specified in the Operations Manual; and
- (2) A report is submitted to the AUTHORITY after completion of the flight.

(e) An operator shall ensure that when engaging the services of cabin crew members who are self-employed and/or working on a freelance or part-time basis, the requirements of Subpart O are complied with. In this respect, particular attention must be paid to the total number of aircraft types or variants that a cabin crew member may fly for the purposes of commercial air transportation, which must not exceed the requirements prescribed in CAR-OPS 1.1030, including when his services are engaged by another operator.

CAR-OPS 1.995 Minimum requirements

[An operator shall ensure that each cabin crew member:

- (a) is at least 18 years of age;
- (b) has passed a medical examination or assessment at regular intervals as required by the Authority so as to check the medical fitness to discharge his/her duties;
- (c) has successfully completed initial training in accordance with OPS 1.1005 and holds an attestation of safety training;
- (d) has completed the appropriate conversion and/or differences training covering at least the subjects listed in OPS 1.1010;
- (e) shall undergo recurrent training in line with the provisions of OPS 1.1015;
- (f) is competent to perform his/her duties in accordance with procedures specified in the Operations Manual.]

CAR-OPS 1.1000 Senior cabin crew members

(a) An operator shall nominate a senior cabin crew member whenever more than one cabin crew member is assigned. For operations when more than one cabin crew member is assigned, but only one cabin crew member is required, the operator shall nominate one cabin crew member to be responsible to the commander.

[(b)The senior cabin crew member shall have responsibility to the commander for the conduct and coordination of normal and emergency procedure(s) specified in the Operations Manual. During turbulence, in the absence of any instructions from the flight crew, the senior cabin crew member shall be entitled to discontinue non-safety related duties and advise the flight crew of the level of turbulence being experienced and the need for the fasten seat belt signs to be switched on. This should be followed by the cabin crew securing the passenger cabin and other applicable areas.

(c) Where required by OPS 1.990 to carry more than one cabin crew member, an operator shall not appoint a person to the post of senior cabin crew member unless that person has at least one year's experience as an operating cabin crew member and has completed an appropriate course covering the following as a minimum:

1. pre-flight briefing:
 - (i) operating as a crew,
 - (ii) allocation of cabin crew stations and responsibilities,
 - (iii) consideration of the particular flight, including aeroplane type, equipment, area and type of operation, and categories of passengers with particular attention to disabled, infants and stretcher cases, and

2. cooperation within the crew:
 - (i) discipline, responsibilities and chain of command,
 - (ii) importance of coordination and communication,
 - (iii) pilot incapacitation, and
3. review of operator's requirements and legal requirements:
 - (i) passenger safety briefing, safety cards,
 - (ii) securing of galleys,
 - (iii) stowage of cabin baggage,
 - (iv) electronic equipment,
 - (v) procedures when fuelling with passengers on board,
 - (vi) turbulence,
 - (vii) documentation, and
4. human factors and crew resource management, and
5. accident and incident reporting, and
6. flight and duty time limitations and rest requirements.]

(d) An operator shall establish procedures to select the next most suitably qualified cabin crew member to operate as senior cabin crew member in the event of the nominated senior cabin crew member becoming unable to operate. Such procedures must be acceptable to the AUTHORITY and take account of a cabin crew member's operational experience.

(e) CRM Training: An operator shall ensure that all relevant elements in Appendix 2 to CAR-OPS 1.1005/1.1010/1.1015 Table 1, Column (a) are integrated into the training and covered to the level required by Column (f), Senior Cabin Crew Course.

Rev. 2

[CAR-OPS 1.1002 Single cabin crew member operations

(a) An operator shall ensure that each cabin crew member who does not have previous comparable experience completes the following, before operating as a single cabin crew member:

1. Training in addition to that required by OPS 1.1005 and OPS 1.1010 shall include particular emphasis on the following to reflect single cabin crew member operations:
 - (i) responsibility to the commander for the conduct of cabin safety and emergency procedure(s) specified in the Operations Manual;
 - (ii) importance of coordination and communication with the flight crew, management of unruly or disruptive passengers;
 - (iii) review of operator's requirements and legal requirements;
 - (iv) documentation;
 - (v) accident and incident reporting;
 - (vi) flight and duty time limitations.
2. Familiarisation flying of at least 20 hours and 15 sectors. Familiarisation flights shall be conducted under the supervision of a suitably experienced cabin crew member on the aeroplane type to be operated.

(b) An operator shall ensure, before a cabin crew member is assigned to operate as a single cabin crew member, that this cabin crew member is competent to perform his/her duties in accordance with the procedures specified in the Operations Manual. Suitability for single cabin crew operations shall be

addressed in the criteria for cabin crew selection, recruitment, training and assessment of competence.]

Rev.2

CAR–OPS 1.1005 [Initial safety training

(See Appendix 1 to OPS 1.1005 and Appendix 3 to OPS 1.1005/1.1010/1.1015)

(a) An operator shall ensure that each cabin crew member has, before undertaking conversion training, successfully completed initial safety training covering at least the subjects listed in Appendix 1 to OPS 1.1005.

(b) Training courses shall, at the discretion of the Authority, and subject to its approval, be provided: either

1. by the operator
 - directly, or
 - indirectly through a training organisation acting on behalf of the operator; or
2. by an approved training organisation.

(c) The programme and structure of the initial training courses shall be in accordance with the applicable requirements and shall be subject to prior approval of the Authority.

(d) At the discretion of the Authority, the Authority, the operator or the approved training organisation providing the training course, shall deliver an attestation of safety training to a cabin crew member after he/she has completed the initial safety training and successfully passed the check referred to in OPS 1.1025.

(e) Where the Authority authorises an operator or an approved training organisation to deliver the attestation of safety training to a cabin crew member, such attestation shall clearly state a reference to the approval of the Authority.]

Rev.2

CAR–OPS 1.1010 Conversion and Differences training

(See Appendix 1 to OPS 1.1005 and Appendix 3 to OPS 1.1005/1.1010/1.1015)

(a) An operator shall ensure that each cabin crew member has completed appropriate training, as specified in the Operations Manual, before undertaking assigned duties as follows:

(1) *Conversion training*; A conversion course must be completed before being:

- (i) First assigned by the operator to operate as a cabin crew member; or
- (ii) Assigned to operate another aeroplane type; and

(2) *Differences training*. Differences training must be completed before operating:

- (i) On a variant of an aeroplane type currently operated; or
- (ii) With different safety equipment, safety equipment location, or normal and emergency procedures on currently operated aeroplane types or variants.

(b) An operator shall determine the content of the conversion or differences training taking account of the cabin crew member's previous training as recorded in the cabin crew member's training records required by CAR–OPS 1.1035.

(c) An operator shall ensure that:

- (1) Conversion training is conducted in a structured and realistic manner, in accordance with Appendix 1 to CAR-OPS 1.1010;
- (2) Differences training is conducted in a structured manner; and
- (3) Conversion training, and if necessary differences training, includes the use of all safety equipment and all normal and emergency procedures applicable to the type or variant of aeroplane and involves training and practice on either a representative training device or on the actual aeroplane.

(d) Conversion and Differences training programmes, in accordance with Appendix 1 to CAR-OPS 1.1010, must be approved by the AUTHORITY.

(e) An operator shall ensure that each cabin crew member before being first assigned to duties, completes the Operator's CRM Training and Aeroplane Type Specific CRM, in accordance with Appendix 1 to CAR-OPS 1.1010(j). Cabin crew who are already operating as cabin crew members with an operator, and who have not previously completed the Operator's CRM Training, shall complete this training by the time of the next required recurrent training and checking in accordance with Appendix 1 to CAR-OPS 1.1010 (j), including Aeroplane Type Specific CRM, as relevant.

Rev. 2

CAR-OPS 1.1012 Familiarisation

(See AMC OPS 1.1012)

An operator shall ensure that, following completion of conversion training, each cabin crew member undertakes familiarisation prior to operating as one of the minimum number of cabin crew required by CAR-OPS 1.990.

CAR-OPS 1.1015 Recurrent training

(See Appendix 1 to CAR-OPS 1.1005)

[(See Appendix 3 to CAR-OPS 1.1005/1.1010/1.1015)]

(See AC OPS 1.1005/1.1010/1.1015)

(See AC OPS 1.1005/ 1.1010/1.1015/1.1020)

(a) An operator shall ensure that each cabin crew member undergoes recurrent training, covering the actions assigned to each crew member in normal and emergency procedures and drills relevant to the type(s) and/or variant(s) of aeroplane on which they operate in accordance with Appendix 1 to CAR-OPS 1.1015.

(b) An operator shall ensure that the recurrent training and checking programme, approved by the AUTHORITY, includes theoretical and practical instruction, together with individual practice, as prescribed in Appendix 1 to CAR-OPS 1.1015.

(c) The period of validity of recurrent training and the associated checking required by CAR-OPS 1.1025 shall be 12 calendar months in addition to the remainder of the month of issue. If issued within the final 3 calendar months of validity of a previous check, the period of validity shall extend from the date of issue until 12 calendar months from the expiry date of that previous check.

Rev. 2

CAR-OPS 1.1020 Refresher training

(See Appendix 1 to CAR-OPS 1.1020)

(See AMC OPS 1.1020)

(See AC OPS 1.1005/1.1010/1.1015/1.1020)

(a) An operator shall ensure that each cabin crew member who has been absent from all flying duties for more than 6 months and still remains within the period of validity of the

previous check required by CAR-OPS 1.1025(b)(3) completes refresher training specified in the Operations Manual as prescribed in Appendix 1 to CAR-OPS 1.1020 (See IEM OPS 1.1020(a)).

(b) An operator shall ensure that when a cabin crew member has not been absent from all flying duties, but has not, during the preceding 6 months, undertaken duties on a type of aeroplane as a cabin crew member required by CAR-OPS 1.990 (b), before undertaking such duties on that type, the cabin crew member either:

- (1) Completes refresher training on the type; or
- (2) Operates two re-familiarisation sectors as defined in AMC OPS 1.1012 paragraph 3.

Rev. 1

CAR-OPS 1.1025 Checking

(See AMC OPS 1.1025)

(a) An operator shall ensure that during or following completion of the training required by CAR-OPS 1.1005, 1.1010 and 1.1015, each cabin crew member undergoes a check covering the training received in order to verify his proficiency in carrying out normal and emergency safety duties. These checks must be performed by personnel acceptable to the AUTHORITY.

(b) An operator shall ensure that each cabin crew member undergoes checks as follows:

- (1) *Initial training.* The items listed in Appendix 1 to CAR-OPS 1.1005;
- (2) *Conversion and Differences training.* The items listed in Appendix 1 to CAR-OPS 1.1010; and
- (3) *Recurrent training.* The items listed in Appendix 1 to CAR-OPS 1.1015 as appropriate.

[(4). refresher training. The items listed in Appendix 1 to OPS 1.1020.]

Rev.2

CAR-OPS 1.1030 Operation on more than one type or variant

(See AC OPS 1.1030)

(a) An operator shall ensure that each cabin crew member does not operate on more than three aeroplane types except that, with the approval of the AUTHORITY, the cabin crew member may operate on four aeroplane types, provided that for at least two of the types:

- (1) Non-type specific normal and emergency procedures are identical; and
- (2) Safety equipment and type specific normal and emergency procedures are similar.

(b) For the purposes of sub-paragraph (a) above, variants of an aeroplane type are considered to be different types if they are not similar in each of the following aspects:

- (1) Emergency exit operation;
- (2) Location and type of portable safety equipment; and
- (3) Type specific emergency procedures.

CAR-OPS 1.1035 Training records

(See IEM OPS 1.1035)

(a) An operator shall:

- (1) Maintain records of all training and checking required by CAR-OPS 1.1005, 1.1010, 1.1015, 1.1020 and 1.1025; and

[(2). keep a copy of the attestation of safety training; and

(3). keep the training records and records of medical examinations or assessments up to date, showing in the case of the training records the dates and contents of the conversion, differences and recurrent training received; and

(4). make the records of all initial, conversion and recurrent training and checking available, on request, to the cabin crew.]

Rev.2

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Appendix 1 to CAR–OPS 1.1005 Initial training

See IEM to Appendix 1 to CAR–OPS 1.1005/1.1015/1.1020

See IEM to Appendix 1 to CAR–OPS 1.1005/1.1010/1.1015/1.1020

[The subjects that must be covered as a minimum by a course of initial safety training referred to in OPS 1.1005 are:]

- (a) *Fire and Smoke Training.* An operator shall ensure that fire and smoke training includes:
- (1) Emphasis on the responsibility of cabin 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) The importance of informing the flight crew immediately, as well as the specific actions necessary for co-ordination and assistance, when fire or smoke is discovered;
 - (3) The necessity for frequent checking of potential fire-risk areas including toilets, and the associated smoke detectors;
 - (4) 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
 - (5) The general procedures of ground-based emergency services at aerodromes.

(b) *Water Survival Training.* An operator shall ensure that water survival training includes the actual donning and use of personal flotation equipment in water by each cabin crew member. Before first operating on an aeroplane 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.

(c) *Survival Training.* An operator shall ensure that survival training is appropriate to the areas of operation, (e.g. polar, desert, jungle or sea).

(d) *Medical aspects and First Aid.* An operator shall ensure that medical and first aid training includes:

- (1) Instruction on first aid and the use of first-aid kits;
- (2) First aid associated with survival training and appropriate hygiene; and
- (3) The physiological effects of flying and with particular emphasis on hypoxia.

(e) *Passenger handling.* An operator shall ensure that training for passenger handling includes the following:

- (1) Advice on the recognition and management of passengers who are, or become, intoxicated with alcohol or are under the influence of drugs or are aggressive;
- (2) Methods used to motivate passengers and the crowd control necessary to expedite an aeroplane evacuation;
- (3) Regulations covering the safe stowage of cabin baggage (including cabin service items) and the risk of it becoming a hazard to occupants of the cabin or otherwise obstructing or damaging safety equipment or aeroplane exits;
- (4) The importance of correct seat allocation with reference to aeroplane mass and balance. Particular emphasis shall also be given on the seating of disabled passengers, and the necessity of seating able-bodied passengers adjacent to unsupervised exits;
- (5) Duties to be undertaken in the event of encountering turbulence including securing the cabin;
- (6) Precautions to be taken when live animals are carried in the cabin;

- (7) Dangerous Goods training as prescribed in Subpart R; and
- (8) Security procedures, including the provisions of Subpart S.

(f) *Communication.* An operator shall ensure that, during training, emphasis is placed on the importance of effective communication between cabin crew and flight crew including technique, common language and terminology.

(g) *Discipline and responsibilities.* An operator shall ensure that each cabin crew member receives training on:

- (1) The importance of cabin crew performing their duties in accordance with the Operations Manual;
- (2) Continuing competence and fitness to operate as a cabin crew member with special regard to flight and duty time limitations and rest requirements;
- (3) An awareness of the aviation regulations relating to cabin crew and the role of the AUTHORITY;
- (4) General knowledge of relevant aviation terminology, theory of flight, passenger distribution, meteorology and areas of operation;
- (5) Pre-flight briefing of the cabin crew and the provision of necessary safety information with regard to their specific duties;
- (6) The importance of ensuring that relevant documents and manuals are kept up-to-date with amendments provided by the operator;
- (7) The importance of identifying when cabin crew members have the AUTHORITY and responsibility to initiate an evacuation and other emergency procedures; and
- (8) The importance of safety duties and responsibilities and the need to respond promptly and effectively to emergency situations.

(h) *Crew Resource Management.* An operator shall ensure that CRM training satisfies the following: Introductory CRM Course:

(i) An operator shall ensure that a cabin crew member has completed an Introductory CRM Course before being first assigned to operate as a cabin crew member. Cabin crew who are already operating as cabin crew members in commercial air transportation and who have not previously completed an introductory course, shall complete an Introductory CRM Course by the time of the next required recurrent training and/or checking.

(ii) The training elements in Appendix 2 to CAR-OPS 1.1005/ 1.1010/1.1015 Table 1, Column (a) shall be covered to the level required in Column (b), Introductory CRM Course.

(iii) The Introductory CRM Course shall be conducted by at least one cabin crew CRM instructor.

Rev. 2

Appendix 1 to CAR–OPS 1.1010 Conversion and Differences training

(See IEM to Appendix 1 to CAR–OPS 1.1010/1.1015)

(See IEM to Appendix 1 to CAR–OPS 1.1005/1.1010/1.1015/1.1020)

- (a) *General.* An operator shall ensure that:
- (1) Conversion and differences training is conducted by suitably qualified persons; and
 - (2) During conversion and differences training, training is given on the location, removal and use of all safety and survival equipment carried on the aeroplane, as well as all normal and emergency procedures related to the aeroplane type, variant and configuration to be operated.
- (b) *Fire and smoke training.* An operator shall ensure that:
- (1) Each cabin 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 aeroplane. This training must include:
 - (i) Each cabin crew member extinguishing a fire characteristic of an aeroplane interior fire except that, in the case of Halon extinguishers, an alternative extinguishing agent may be used; and
 - (ii) The donning and use of protective breathing equipment by each cabin crew member in an enclosed, simulated smoke-filled environment
- (c) *Operation of doors and exits.* An operator shall ensure that:
- (1) Each cabin crew member operates and actually opens all normal and emergency exits for passenger evacuation in an aeroplane or representative training device; and
 - (2) The operation of all other exits, such as flight deck windows is demonstrated.
- (d) *Evacuation slide training.* An operator shall ensure that:
- (1) Each cabin crew member descends an evacuation slide from a height representative of the aeroplane main deck sill height;
 - (2) The slide is fitted to an aeroplane or a representative training device.
- (e) *Evacuation procedures and other emergency situations.* An operator shall ensure that:
- (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
 - (2) Each cabin crew member is trained to deal with the following:
 - (i) An in-flight fire, with particular emphasis on identifying the actual source of the fire;
 - (ii) Severe air turbulence;
 - (iii) Sudden decompression, including the donning of portable oxygen equipment by each cabin crew member; and
 - (iv) Other in-flight emergencies.
- (f) *Crowd control.* An operator shall ensure that training is provided on the practical aspects of crowd control in various emergency situations, as applicable to the aeroplane type.

(g) *Pilot incapacitation.* An operator shall ensure that, unless the minimum flight crew is more than two, each cabin crew member is trained to assist if a pilot becomes incapacitated. This training shall include a demonstration of:

- (1) The pilot's seat mechanism;
- (2) Fastening and unfastening the pilot's seat harness;
- (3) Use of the pilot's oxygen equipment; and
- (4) Use of pilots' checklists.

(h) *Safety equipment.* An operator shall ensure that each cabin crew member is given realistic training on, and demonstration of, the location and use of safety equipment including the following:

- (1) Slides, and where non self-supporting slides are carried, the use of any associated ropes;
- (2) Life-rafts and slide-rafts, including the equipment attached to, and/or carried in, the raft;
- (3) Lifejackets, infant lifejackets and flotation cots;
- (4) Dropout oxygen system;
- (5) First-aid oxygen;
- (6) Fire extinguishers;
- (7) Fire axe or crow-bar;
- (8) Emergency lights including torches;
- (9) Communications equipment, including megaphones;
- (10) Survival packs, including their contents;
- (11) Pyrotechnics (Actual or representative devices);
- (12) First-aid kits, their contents and emergency medical equipment; and
- (13) Other cabin safety equipment or systems where applicable.

(i) *Passenger Briefing/Safety Demonstrations.* An operator shall ensure that training is given in the preparation of passengers for normal and emergency situations in accordance with CAR-OPS 1.285.

(j) An operator shall ensure that all appropriate CAR-OPS requirements are included in the training of cabin crew members.

(k) *Crew Resource Management.* An operator shall ensure that:

- (1) Each cabin crew member completes the Operator's CRM Training covering the training elements in Appendix 2 to CAR-OPS 1.1005/1.1010/1.1015 Table 1, Column (a) to the level required in Column (c) before undertaking subsequent Aeroplane Type Specific CRM and/or recurrent CRM Training.
- (2) When a cabin crew member undertakes a conversion course on another aeroplane type, the training elements in Appendix 2 to CAR-OPS 1.1005/1.1010/1.1015 Table 1, Column (a) shall be covered to the level required in Column (d), Aeroplane Type Specific CRM.
- (3) The Operator's CRM Training and Aeroplane Type Specific CRM shall be conducted by a least one cabin crew CRM instructor.

Rev 1

Appendix 1 to CAR–OPS 1.1015 Recurrent training

- (a) An operator shall ensure that recurrent training is conducted by suitably qualified persons.
- (b) An operator shall ensure that every 12 calendar months the programme of practical training includes the following:
- (1) Emergency procedures including pilot incapacitation;
 - (2) Evacuation procedures including crowd control techniques;
 - (3) Touch-drills by each cabin crew member for opening normal and emergency exits for passenger evacuation;
 - (4) The location and handling of emergency equipment, including oxygen systems, and the donning by each cabin crew member of lifejackets, portable oxygen and protective breathing equipment (PBE);
 - (5) First aid and the contents of the first-aid kit(s);
 - (6) Stowage of articles in the cabin;
 - (7) Security procedures;
 - (8) Incident and accident review; and
 - [(9) awareness of the effects of surface contamination and the need to inform the flight crew of any observed surface contamination, and]
 - (10) Crew Resource Management. [An operator shall ensure that CRM training satisfies the following:
 - (i) the training elements in Appendix 2 to OPS 1.1005/1.1010/1/1.1015 Table 1, Column (a) shall be covered within a three year cycle to the level required by Column (e), Annual Recurrent CRM Training;
 - (ii) the definition and implementation of this syllabus shall be managed by a cabin crew CRM instructor;
 - (iii) when CRM training is provided by stand-alone modules, it shall be conducted by at least one cabin crew CRM]
- (c) An operator shall ensure that, at intervals not exceeding 3 years, recurrent training also includes:
- (1) Each cabin crew member operating and actually opening each type or variant of normal and emergency exit in the normal and emergency modes, including failure of power assist systems where fitted. This is to include the action and forces required to operate and deploy evacuation slides. This training shall be conducted in an aeroplane or representative training device;
 - (2) Demonstration of the operation of all other exits including flight deck windows;
 - (3) Each cabin 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 aeroplane. This training must include:
 - (i) Each cabin crew member extinguishing a fire characteristic of an aeroplane interior fire except that, in the case of Halon extinguishers, an alternative extinguishing agent may be used; and
 - (ii) The donning and use of protective breathing equipment by each cabin crew member in an enclosed, simulated smoke-filled environment.

(4) Use of pyrotechnics (Actual or representative devices); and

(5) Demonstration of the use of the life-raft, or slide-raft, where fitted.

(d) An operator shall ensure that all appropriate CAR-OPS requirements are included in the training of cabin crew members.

Rev. 2

Appendix 2 to JAR-OPS 1.1005/1.1010/ 1.1015 Training
(See AC OPS 1.1005/1.1010/11015)

1. The CRM training syllabi, together with CRM methodology and terminology, shall be included in the Operations Manual.
2. Table 1 indicates which elements of CRM shall be included in each type of training.

Table 1 CRM Training:

Training Elements (a)	Introductory CRM Course (b)	Operator's CRM Training (c)	Aeroplane Type Specific CRM (d)	Annual Recurrent CRM Training (e)	Senior Cabin Crew Course (f)
General Principles					
Human factors in aviation General instructions on CRM principles and objectives	In depth	Not required	Not required	Not required	Overview
Human performance and limitations					
From the perspective of the individual cabin crew member					
Personality awareness, human error and reliability, attitudes and behaviours, self-assessment	In depth	Not required	Not required	Overview (3 year cycle)	Not required
Stress and stress management					
Fatigue and vigilance					
Assertiveness					
Situation awareness, information acquisition and processing					
From the perspective of the whole aeroplane crew					
Error prevention and detection	Not required	In-depth	Relevant to the type(s)	Overview (3 year cycle)	Reinforcement (relevant to the Senior cabin crew duties)
Shared situation awareness, information acquisition & processing					
Workload management					
Effective communication and co-ordination between all crew members including the flight crew as well as inexperienced cabin crew members, cultural differences					
Leadership, co-operation, synergy, decision-making, delegation					
Individual and team responsibilities, decision making, and actions					
Identification and management of the passenger human factors : crowd control, passenger stress, conflict management, medical factors					
Specifics related to aeroplane types (narrow / wide bodies, single / multi deck), flight crew and cabin crew composition and number of passengers	Not required	In depth			
From the perspective of the operator and the organisation					
Company safety culture, SOPs, organisational factors, factors linked to the type of operations	Not required	In depth	Relevant to the type(s)	Overview (3 year cycle)	Reinforcement (relevant to the Senior cabin crew duties)
Effective communication and co-ordination with other operational personnel and ground services					
Participation in cabin safety incident and accident reporting					
Case based studies (see note)		Required		Required	

Note: In Column (d), if relevant aeroplane type specific case based studies are not available, then case based studies relevant to the scale and scope of the operation shall be considered.

Rev. 1

Appendix 1 to CAR–OPS 1.1020 Refresher training

(See IEM to Appendix 1 to CAR–OPS 1.1005/1.1010/1.1015/1.1020 – Training Methods)

(a) An operator shall ensure that refresher training is conducted by suitable qualified persons and, for each cabin crew member, includes at least the following:

- (1) Emergency procedures including pilot incapacitation;
- (2) Evacuation procedures including crowd control techniques;
- (3) The operation and actual opening of each type or variant of normal and emergency exit in the normal and emergency modes, including failure of power assist systems where fitted. This is to include the action and forces required to operate and deploy evacuation slides. This training shall be conducted in an aeroplane or representative training device;
- (4) Demonstration of the operation of all other exits including flight deck windows; and
- (5) The location and handling of emergency equipment, including oxygen systems, and the donning of lifejackets, portable oxygen and protective breathing equipment.

Rev. 1

[Appendix 3 to OPS 1.1005/1.1010/1.1015 Medical aspects and first aid training

Medical aspects and first aid training shall include the following subjects:

1. physiology of flight including oxygen requirements and hypoxia;
2. medical emergencies in aviation including:
 - (i) asthma;
 - (ii) choking;
 - (iii) heart attacks;
 - (iv) stress reactions and allergic reactions;
 - (v) shock;
 - (vi) stroke;
 - (vii) epilepsy;
 - (viii) diabetes;
 - (ix) air sickness;
 - (x) hyperventilation;
 - (xi) gastro-intestinal disturbances; and
 - (xii) emergency childbirth;
3. practical cardio-pulmonary resuscitation by each cabin crew member having regard to the aeroplane environment and using a specifically designed dummy;
4. basic first aid and survival training including care of:
 - (i) the unconscious;
 - (ii) burns;
 - (iii) wounds; and
 - (iv) fractures and soft tissue injuries;
5. travel health and hygiene including:
 - (i) the risk of contact with infectious diseases especially when operating into tropical and sub-tropical areas.
Reporting of infectious diseases, protection from infection and avoidance of water-borne and food-borne illness. Training shall include the means to reduce such risks;
 - (ii) hygiene on board;
 - (iii) death on board;
 - (iv) handling of clinical waste;
 - (v) aircraft disinfection; and
 - (vi) alertness management, physiological effects of fatigue, sleep physiology, circadian rhythm and time zone changes;
6. The use of appropriate aeroplane equipment including first aid kits, emergency medical kits, first aid oxygen and emergency medical equipment.]

SUBPART P – MANUALS, LOGS AND RECORDS**CAR–OPS 1.1040 General Rules for Operations Manuals**

(See IEM OPS 1.1040(b).)

(See IEM OPS 1.1040(c).)

(a) An operator shall ensure that the Operations Manual contains all instructions and information necessary for operations personnel to perform their duties.

(b) An operator shall ensure that the contents of the Operations Manual, including all amendments or revisions, do not contravene the conditions contained in the Air Operator Certificate (AOC) or any applicable regulations and are acceptable to, or, where applicable, approved by, the AUTHORITY. (See IEM OPS 1.1040(b).)

(c) Unless otherwise approved by the AUTHORITY, or prescribed by national law, an operator must prepare the Operations Manual in the English language. In addition, an operator may translate and use that manual, or parts thereof, into another language. (See IEM OPS 1.1040(c).)

(d) Should it become necessary for an operator to produce new Operations Manuals or major parts/volumes thereof, he must comply with sub-paragraph (c) above. In all other cases, an operator must comply with sub-paragraph (c) above as soon as possible and in no case later than 1 December 2010.

(e) An operator may issue an Operations Manual in separate volumes.

(f) An operator shall ensure that all operations personnel have easy access to a copy of each part of the Operations Manual which is relevant to their duties. In addition, the operator shall supply crew members with a personal copy of, or sections from, Parts A and B of the Operations Manual as are relevant for personal study.

(g) An operator shall ensure that the Operations Manual is amended or revised so that the instructions and information contained therein are kept up to date. The operator shall ensure that all operations personnel are made aware of such changes that are relevant to their duties.

(h) Each holder of an Operations Manual, or appropriate parts of it, shall keep it up to date with the amendments or revisions supplied by the operator.

(i) An operator shall supply the AUTHORITY with intended amendments and revisions in advance of the effective date. When the amendment concerns any part of the Operations Manual which must be approved in accordance with CAR–OPS, this approval shall be obtained before the amendment becomes effective. When immediate amendments or revisions are required in the interest of safety, they may be published and applied immediately, provided that any approval required has been applied for.

(j) An operator shall incorporate all amendments and revisions required by the AUTHORITY.

(k) An operator must ensure that information taken from approved documents, and any amendment of such approved documentation, is correctly reflected in the Operations Manual and that the Operations Manual contains no information contrary to any approved documentation. However, this requirement does not prevent an operator from using more conservative data and procedures.

(l) An operator must ensure that the contents of the Operations Manual are presented in a form in which they can be used without difficulty. The design of the Operations Manual shall observe Human Factors principles.

(m) An operator may be permitted by the AUTHORITY to present the Operations Manual or parts thereof in a form other than on printed paper. In such cases, an acceptable level of accessibility, usability and reliability must be assured.

(n) The use of an abridged form of the Operations Manual does not exempt the operator from the requirements of CAR-OPS 1.130.

Rev. 1

CAR-OPS 1.1045 Operations Manual – structure and contents

(See Appendix 1 to CAR-OPS 1.1045)

(See AMC OPS 1.1045)

(a) An operator shall ensure that the main structure of the Operations Manual is as follows:

Part A. *General/Basic*

This part shall comprise all non type-related operational policies, instructions and procedures needed for a safe operation.

Part B. *Aeroplane Operating Matters*

This part shall comprise all type-related instructions and procedures needed for a safe operation. It shall take account of any differences between types, variants or individual aeroplanes used by the operator.

Part C. *Route and Aerodrome Instructions and Information*

This part shall comprise all instructions and information needed for the area of operation.

Part D. *Training*

This part shall comprise all training instructions for personnel required for a safe operation.

(b) An operator shall ensure that the contents of the Operations Manual are in accordance with Appendix 1 to CAR-OPS 1.1045 and relevant to the area and type of operation.

(c) An operator shall ensure that the detailed structure of the Operations Manual is acceptable to the AUTHORITY. (See IEM OPS 1.1045(c).)

CAR-OPS 1.1050 Aeroplane Flight Manual

An operator shall keep a current approved Aeroplane Flight Manual or equivalent document for each aeroplane that it operates.

CAR-OPS 1.1055 Journey log

(a) An operator shall retain the following information for each flight in the form of a Journey Log:

- (1) Aeroplane registration;
- (2) Date;
- (3) Name(s) of crew member(s);
- (4) Duty assignment of crew member(s);
- (5) Place of departure;
- (6) Place of arrival;
- (7) Time of departure (off-block time);
- (8) Time of arrival (on-block time);
- (9) Hours of flight;
- (10) Nature of flight;

(11) Incidents, observations (if any); and

(12) Commander's signature (or equivalent). (See IEM OPS 1.1055 (a)(12).)

(b) An operator may be permitted not to keep an aeroplane journey log, or parts thereof, by the AUTHORITY if the relevant information is available in other documentation. (See IEM OPS 1.1055(b).)

(c) An operator shall ensure that all entries are made concurrently and that they are permanent in nature.

CAR-OPS 1.1060 Operational flight plan

(a) An operator must ensure that the operational flight plan used and the entries made during flight contain the following items:

- (1) Aeroplane registration;
- (2) Aeroplane type and variant;
- (3) Date of flight;
- (4) Flight identification;
- (5) Names of flight crew members;
- (6) Duty assignment of flight crew members;
- (7) Place of departure;
- (8) Time of departure (actual off-block time, take-off time);
- (9) Place of arrival (planned and actual);
- (10) Time of arrival (actual landing and on-block time);
- (11) Type of operation (ETOPS, VFR, Ferry flight, etc.);
- (12) Route and route segments with checkpoints/waypoints, distances, time and tracks;
- (13) Planned cruising speed and flying times between check-points/waypoints. Estimated and actual times overhead;
- (14) Safe altitudes and minimum levels;
- (15) Planned altitudes and flight levels;
- (16) Fuel calculations (records of in-flight fuel checks);
- (17) Fuel on board when starting engines;
- (18) Alternate(s) for destination and, where applicable, take-off and en-route, including information required in sub-paragraphs (12), (13), (14), and (15) above;
- (19) Initial ATS Flight Plan clearance and subsequent re-clearance;
- (20) In-flight re-planning calculations; and
- (21) Relevant meteorological information.

(b) Items which are readily available in other documentation or from another acceptable source or are irrelevant to the type of operation may be omitted from the operational flight plan.

(c) An operator must ensure that the operational flight plan and its use are described in the Operations Manual.

(d) An operator shall ensure that all entries on the operational flight plan are made concurrently and that they are permanent in nature.

CAR–OPS 1.1065 Document storage periods

An operator shall ensure that all records and all relevant operational and technical information for each individual flight, are stored for the periods prescribed in Appendix 1 to CAR–OPS 1.1065.

CAR–OPS 1.1070 Operator’s maintenance management exposition

An operator shall keep a current approved maintenance management exposition as prescribed in CAR–OPS 1.905.

CAR–OPS 1.1071 Aeroplane Technical Log

An operator shall keep an aeroplane technical log as prescribed in CAR–OPS 1.915.

Appendix 1 to CAR–OPS 1.1045 Operations Manual Contents

(See IEM to Appendix 1 to CAR–OPS 1.1045)

An operator shall ensure that the Operations Manual contains the following:

A. GENERAL/BASIC**0 ADMINISTRATION AND CONTROL OF OPERATIONS MANUAL****0.1 Introduction**

- (a) A statement that the manual complies with all applicable regulations and with the terms and conditions of the applicable Air Operator Certificate.
- (b) A statement that the manual contains operational instructions that are to be complied with by the relevant personnel.
- (c) A list and brief description of the various parts, their contents, applicability and use.
- (d) Explanations and definitions of terms and words needed for the use of the manual.

0.2 System of amendment and revision

- (a) Details of the person(s) responsible for the issuance and insertion of amendments and revisions.
- (b) A record of amendments and revisions with insertion dates and effective dates.
- (c) A statement that handwritten amendments and revisions are not permitted except in situations requiring immediate amendment or revision in the interest of safety.
- (d) A description of the system for the annotation of pages and their effective dates.
- (e) A list of effective pages.
- (f) Annotation of changes (on text pages and, as far as practicable, on charts and diagrams).
- (g) Temporary revisions.
- (h) A description of the distribution system for the manuals, amendments and revisions.

1 ORGANISATION AND RESPONSIBILITIES

1.1 *Organisational structure.* A description of the organisational structure including the general company organigram and operations department organigram. The organigram must depict the relationship between the Operations Department and the other Departments of the company. In particular, the subordination and reporting lines of all Divisions, Departments etc, which pertain to the safety of flight operations, must be shown.

1.2 *Nominated postholders.* The name of each nominated postholder responsible for flight operations, the maintenance system, crew training and ground operations, as prescribed in CAR–OPS 1.175(i). A description of their function and responsibilities must be included.

1.3 *Responsibilities and duties of operations management personnel.* A description of the duties, responsibilities and AUTHORITY of operations management personnel pertaining to the safety of flight operations and the compliance with the applicable regulations.

1.4 *AUTHORITY, duties and responsibilities of the commander.* A statement defining the 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.* A description of the system for supervision

of the operation by the operator (See CAR–OPS 1.175(g)). This must show how the safety of flight operations and the qualifications of personnel are supervised. In particular, the procedures related to the following items must be described:

- (a) Licence and qualification validity;
- (b) Competence of operations personnel; and
- (c) Control, analysis and storage of records, flight documents, additional information and data.

2.2 *System of promulgation of additional operational instructions and information.* A description of any system for promulgating information which may be of an operational nature but is supplementary to that in the Operations Manual. The applicability of this information and the responsibilities for its promulgation must be included.

2.3 *Accident prevention and flight safety programme.* A description of the main aspects of the flight safety programme.

2.4 *Operational control.* A description of the procedures and responsibilities necessary to exercise operational control with respect to flight safety.

2.5 *Powers of the AUTHORITY.* A description of the powers of the AUTHORITY and guidance to staff on how to facilitate inspections by AUTHORITY personnel.

3 QUALITY SYSTEM

A description of the quality system adopted including at least:

- (a) Quality policy;
- (b) A description of the organisation of the Quality System; and
- (c) Allocation of duties and responsibilities.

4 CREW COMPOSITION

4.1 *Crew Composition.* An explanation of the method for determining crew compositions taking account of the following:

- (a) The type of aeroplane being used;
- (b) The area and type of operation being undertaken;
- (c) The phase of the flight;
- (d) The minimum crew requirement and flight duty period planned;
- (e) Experience (total and on type), recency and qualification of the crew members; and
- (f) The designation of the commander and, if necessitated by the duration of the flight, the procedures for the relief of the commander or other members of the flight crew. (See Appendix 1 to CAR–OPS 1.940.)
- (g) The designation of the senior cabin crew member and, if necessitated by the duration of the flight, the procedures for the relief of the senior cabin crew member and any other member of the cabin crew.

4.2 *Designation of the commander.* The rules applicable to the designation of the commander.

4.3 *Flight crew incapacitation.* Instructions on the succession of command in the event of flight crew incapacitation.

4.4 *Operation on more than one type.* A statement indicating which aeroplanes are considered as one type for the purpose of:

- (a) Flight crew scheduling; and
- (b) Cabin crew scheduling.

5 QUALIFICATION REQUIREMENTS

5.1 A description of the required licence, rating(s), qualification/competency (e.g. for routes and aerodromes), experience, training, checking and recency for operations personnel to conduct their duties. Consideration must be given to the aeroplane type, kind of operation and composition of the crew.

5.2 *Flight crew*

- (a) Commander.
- (b) Pilot relieving the commander.
- (c) Co-pilot.
- (d) Pilot under supervision.
- (e) System panel operator.
- (f) Operation on more than one type or variant.

5.3 *Cabin crew.*

- (a) Senior cabin crew member.
- (b) Cabin crew member.
 - (i) Required cabin crew member.
 - (ii) Additional cabin crew member and cabin crew member during familiarisation flights.
- (c) Operation on more than one type or variant.

5.4 *Training, checking and supervision personnel.*

- (a) For flight crew.
- (b) For cabin crew.

5.5 *Other operations personnel*

6 CREW HEALTH PRECAUTIONS

6.1 *Crew health precautions.* The relevant regulations and guidance to crew members concerning health including:

- (a) Alcohol and other intoxicating liquor;
- (b) Narcotics;
- (c) Drugs;
- (d) Sleeping tablets;
- (e) Pharmaceutical preparations;
- (f) Immunisation;
- (g) Deep diving;
- (h) Blood donation;
- (i) Meal precautions prior to and during flight;
- (j) Sleep and rest; and
- (k) Surgical operations.

7 FLIGHT TIME LIMITATIONS

7.1 *Flight and Duty Time Limitations and Rest Requirements.* The scheme developed by the operator in accordance with Subpart Q (or existing national requirements until such time as Subpart Q has been adopted).

7.2 *Exceedances of flight and duty time limitations and/or reductions of rest periods.* Conditions under which flight and duty time may be exceeded or rest periods may be reduced and the procedures used to report these modifications.

8 OPERATING PROCEDURES

8.1 *Flight Preparation Instructions.* As applicable to the operation:

8.1.1 *Minimum Flight Altitudes.* A description of the method of determination and application of minimum altitudes including:

- (a) A procedure to establish the minimum altitudes/flight levels for VFR flights; and
- (b) A procedure to establish the minimum altitudes/flight levels for IFR flights.

8.1.2 *Criteria for determining the usability of aerodromes*

8.1.3 *Methods for establishing aerodrome operating minima.* The method for establishing aerodrome operating minima for IFR flights in accordance with CAR-OPS 1 Subpart E. Reference must be made to procedures for the determination of the visibility and/or runway visual range and for the applicability of the actual visibility observed by the pilots, the reported visibility and the reported runway visual range.

8.1.4 *En-route Operating Minima for VFR Flights or VFR portions of a flight and, where single engined aeroplanes are used, instructions for route selection with respect to the availability of surfaces which permit a safe forced landing.*

8.1.5 *Presentation and Application of Aerodrome and En-route Operating Minima*

8.1.6 *Interpretation of meteorological information.* Explanatory material on the decoding of MET forecasts and MET reports relevant to the area of operations, including the interpretation of conditional expressions.

8.1.7 *Determination of the quantities of fuel, oil and water methanol carried.* The methods by which the quantities of fuel, oil and water methanol to be carried are determined and monitored in flight. This section must also include instructions on the measurement and distribution of the fluid carried on board. Such instructions must take account of all circumstances likely to be encountered on the flight, including the possibility of in-flight replanning and of failure of one or more of the aeroplane's power plants. The system for maintaining fuel and oil records must also be described.

8.1.8 *Mass and Centre of Gravity.* The general principles of mass and centre of gravity including:

- (a) Definitions;
- (b) Methods, procedures and responsibilities for preparation and acceptance of mass and centre of gravity calculations;
- (c) The policy for using standard and/or actual masses;
- (d) The method for determining the applicable passenger, baggage and cargo mass;
- (e) The applicable passenger and baggage masses for various types of operations and aeroplane type;
- (f) General instruction and information necessary for verification of the various types of mass and balance documentation in use;
- (g) Last Minute Changes procedures;

- (h) Specific gravity of fuel, oil and water methanol; and
- (i) Seating policy/procedures.

8.1.9 *ATS Flight Plan.* Procedures and responsibilities for the preparation and submission of the air traffic services flight plan. Factors to be considered include the means of submission for both individual and repetitive flight plans.

8.1.10 *Operational Flight Plan.* Procedures and responsibilities for the preparation and acceptance of the operational flight plan. The use of the operational flight plan must be described including samples of the operational flight plan formats in use.

8.1.11 *Operator's Aeroplane Technical Log.* The responsibilities and the use of the operator's Aeroplane Technical Log must be described, including samples of the format used.

8.1.12 *List of documents, forms and additional information to be carried.*

8.2 *Ground Handling Instructions*

8.2.1 *Fuelling procedures.* A description of fuelling procedures, including:

- (a) Safety precautions during refuelling and defuelling including when an APU is in operation or when a turbine engine is running and the prop-brakes are on;
- (b) Refuelling and defuelling when passengers are embarking, on board or disembarking; and
- (c) Precautions to be taken to avoid mixing fuels.

8.2.2 *Aeroplane, passengers and cargo handling procedures related to safety.* A description of the handling procedures to be used when allocating seats and embarking and disembarking passengers and when loading and unloading the aeroplane. Further procedures, aimed at achieving safety whilst the aeroplane is on the ramp, must also be given. Handling procedures must include:

- (a) Children/infants, sick passengers and Persons with Reduced Mobility;
- (b) Transportation of inadmissible passengers, deportees or persons in custody;
- (c) Permissible size and weight of hand baggage;
- (d) Loading and securing of items in the aeroplane;
- (e) Special loads and classification of load compartments;
- (f) Positioning of ground equipment;
- (g) Operation of aeroplane doors;
- (g) Safety on the ramp, including fire prevention, blast and suction areas;
- (i) Start-up, ramp departure and arrival procedures;
- (j) Servicing of aeroplanes;
- (k) Documents and forms for aeroplane handling; and
- (l) Multiple occupancy of aeroplane seats.

8.2.3 *Procedures for the refusal of embarkation.* Procedures to ensure that persons who appear to be intoxicated or who demonstrate by manner or physical indications that they are under the influence of drugs, are refused embarkation. This does not apply to medical patients under proper care.

8.2.4 *De-icing and Anti-icing on the ground.* A description of the de-icing and anti-icing policy and procedures for aeroplanes on the ground. These shall include descriptions of the types and effects of icing and other contaminants on aeroplanes whilst stationary, during ground movements and during take-off. In addition, a description of the fluid types used must be given including:

- (a) Proprietary or commercial names;
- (b) Characteristics;
- (c) Effects on aeroplane performance;
- (d) Hold-over times; and
- (e) Precautions during usage.

8.3 *Flight Procedures*

8.3.1 *VFR/IFR Policy.* A description of the policy for allowing flights to be made under VFR, or of requiring flights to be made under IFR, or of changing from one to the other.

8.3.2 *Navigation Procedures.* A description of all navigation procedures relevant to the type(s) and area(s) of operation. Consideration must be given to:

- (a) Standard navigational procedures including policy for carrying out independent cross-checks of keyboard entries where these affect the flight path to be followed by the aeroplane;
- (b) MNPS and POLAR navigation and navigation in other designated areas;
- (c) RNAV;
- (d) In-flight replanning;
- (e) Procedures in the event of system degradation; and
- (f) RVSM.

8.3.3 *Altimeter setting procedures*

8.3.4 *Altitude alerting system procedures*

8.3.5 *Ground Proximity Warning System procedures*

8.3.6 *Policy and procedures for the use of TCAS/ACAS*

8.3.7 *Policy and procedures for in-flight fuel management*

8.3.8 *Adverse and potentially hazardous atmospheric conditions.* Procedures for operating in, and/or avoiding, adverse and potentially hazardous atmospheric conditions including:

- (a) Thunderstorms;
- (b) Icing conditions;
- (c) Turbulence;
- (d) Windshear;
- (e) Jetstream;
- (f) Volcanic ash clouds;
- (g) Heavy precipitation;
- (h) Sand storms;
- (i) Mountain waves; and
- (j) Significant Temperature inversions.

8.3.9 *Wake Turbulence.* Wake turbulence separation criteria, taking into account aeroplane types, wind conditions and runway location.

8.3.10 *Crew members at their stations.* The requirements for crew members to occupy their assigned stations or seats during the different phases of flight or whenever deemed necessary in the interest of safety.

8.3.11 *Use of safety belts for crew and passengers.* The requirements for crew members and passengers to use safety belts and/or harnesses during the different phases of flight or whenever deemed necessary in the interest of safety.

8.3.12 *Admission to Flight Deck.* The conditions for the admission to the flight deck of persons other than the flight crew. The policy regarding the admission of Inspectors from the AUTHORITY must also be included.

8.3.13 *Use of vacant crew seats.* The conditions and procedures for the use of vacant crew seats.

8.3.14 *Incapacitation of crew members.* Procedures to be followed in the event of incapacitation of crew members in flight. Examples of the types of incapacitation and the means for recognising them must be included.

8.3.15 *Cabin Safety Requirements.* Procedures covering:

- (a) Cabin preparation for flight, in-flight requirements and preparation for landing including procedures for securing the cabin and galleys;
- (b) Procedures to ensure that passengers are seated where, in the event that an emergency evacuation is required, they may best assist and not hinder evacuation from the aeroplane;
- (c) Procedures to be followed during passenger embarkation and disembarkation; and
- (d) Procedures when refuelling/defuelling with passengers embarking, on board or disembarking.
- (e) Smoking on board.

8.3.16 *Passenger briefing procedures.* The contents, means and timing of passenger briefing in accordance with CAR-OPS 1.285.

8.3.17 *Procedures for aeroplanes operated whenever required cosmic or solar radiation detection equipment is carried.* Procedures for the use of cosmic or solar radiation detection equipment and for recording its readings including actions to be taken in the event that limit values specified in the Operations Manual are exceeded. In addition, the procedures, including ATS procedures, to be followed in the event that a decision to descend or re-route is taken.

8.4 *AWO.* A description of the operational procedures associated with All Weather Operations. (See also CAR-OPS Subparts D & E).

8.5 *ETOPS.* A description of the ETOPS operational procedures. (See AMC 20-xxx).

8.6 *Use of the Minimum Equipment and Configuration Deviation List(s)*

8.7 *Non revenue flights.* Procedures and limitations for:

- (a) Training flights;
- (b) Test flights;
- (c) Delivery flights;
- (d) Ferry flights;
- (e) Demonstration flights; and
- (f) Positioning flights, including the kind of persons who may be carried on such flights.

8.8 *Oxygen Requirements*

8.8.1 An explanation of the conditions under which oxygen must be provided and used.

8.8.2 The oxygen requirements specified for:

- (a) Flight crew;
- (b) Cabin crew; and
- (c) Passengers.

9 DANGEROUS GOODS AND WEAPONS

9.1 Information, instructions and general guidance on the transport of dangerous goods including:

- (a) Operator's policy on the transport of dangerous goods;
- (b) Guidance on the requirements for acceptance, labelling, handling, stowage and segregation of dangerous goods;
- (c) Procedures for responding to emergency situations involving dangerous goods;
- (d) Duties of all personnel involved as per CAR-OPS 1.1215; and
- (e) Instructions on the carriage of the operator's employees.

9.2 The conditions under which weapons, munitions of war and sporting weapons may be carried.

10 SECURITY

10.1 Security instructions and guidance of a non-confidential nature which must include the AUTHORITY and responsibilities of operations personnel. Policies and procedures for handling and reporting crime on board such as unlawful interference, sabotage, bomb threats, and hijacking must also be included.

10.2 A description of preventative security measures and training.

Note: Parts of the security instructions and guidance may be kept confidential.

11 HANDLING, NOTIFYING AND REPORTING OCCURRENCES

Procedures for the handling, notifying and reporting occurrences. This section must include:

- (a) Definition of occurrences and of the relevant responsibilities of all persons involved;
- (b) Illustrations of forms used for reporting all types of occurrences (or copies of the forms themselves), instructions on how they are to be completed, the addresses to which they should be sent and the time allowed for this to be done;
- (c) In the event of an accident, descriptions of which company departments, Authorities and other organisations that have to be notified, how this will be done and in what sequence;
- (d) Procedures for verbal notification to air traffic service units of incidents involving ACAS RAs, bird hazards, dangerous goods and hazardous conditions;
- (e) Procedures for submitting written reports on air traffic incidents, ACAS RAs, bird strikes, dangerous goods incidents or accidents, and unlawful interference;
- (f) Reporting procedures to ensure compliance with CAR-OPS 1.085(b) and 1.420. These procedures must include internal safety related reporting procedures to be followed by crew members, designed to ensure that the commander is informed immediately of any incident that has endangered, or may have endangered, safety during flight and that he is provided with all relevant information.

12 RULES OF THE AIR

Rules of the Air including:

- (a) Visual and instrument flight rules;

- (b) Territorial application of the Rules of the Air;
- (c) Communication procedures including COM-failure procedures;
- (d) Information and instructions relating to the interception of civil aeroplanes;
- (e) The circumstances in which a radio listening watch is to be maintained;
- (f) Signals;
- (g) Time system used in operation;
- (h) ATC clearances, adherence to flight plan and position reports;
- (i) Visual signals used to warn an unauthorised aeroplane flying in or about to enter a restricted, prohibited or danger area;
- (j) Procedures for pilots observing an accident or receiving a distress transmission;
- (k) The ground/air visual codes for use by survivors, description and use of signal aids; and
- (l) Distress and urgency signals.

13 LEASING

A description of the operational arrangements for leasing, associated procedures and management responsibilities.

B AEROPLANE OPERATING MATTERS – TYPE RELATED

Taking account of the differences between types, and variants of types, under the following headings:

0 GENERAL INFORMATION AND UNITS OF MEASUREMENT

0.1 General Information (e.g. aeroplane dimensions), including a description of the units of measurement used for the operation of the aeroplane type concerned and conversion tables.

1 LIMITATIONS

1.1 A description of the certified limitations and the applicable operational limitations including:

- (a) Certification status (eg. JAR–23, JAR–25, ICAO Annex 16 (JAR–36 and JAR–34) etc);
- (b) Passenger seating configuration for each aeroplane type including a pictorial presentation;
- (c) Types of operation that are approved (e.g. VFR/IFR, CAT II/III, RNP Type, flights in known icing conditions etc.);
- (d) Crew composition;
- (e) Mass and centre of gravity;
- (f) Speed limitations;
- (g) Flight envelope(s);
- (h) Wind limits including operations on contaminated runways;
- (i) Performance limitations for applicable configurations;
- (j) Runway slope;
- (k) Limitations on wet or contaminated runways;
- (l) Airframe contamination; and
- (m) System limitations.

2 NORMAL PROCEDURES

2.1 The normal procedures and duties assigned to the crew, the appropriate check-lists, the system for use of the check-lists and a statement covering the necessary coordination procedures between flight and cabin crew. The following normal procedures and duties must be included:

- (a) Pre-flight;
- (b) Pre-departure;
- (c) Altimeter setting and checking;
- (d) Taxi, Take-Off and Climb;
- (e) Noise abatement;
- (f) Cruise and descent;
- (g) Approach, Landing preparation and briefing;
- (h) VFR Approach;
- (i) Instrument approach;
- (j) Visual Approach and circling;
- (k) Missed Approach;
- (l) Normal Landing;
- (m) Post Landing; and
- (n) Operation on wet and contaminated runways.

3 ABNORMAL AND EMERGENCY PROCEDURES

3.1 The abnormal and emergency procedures and duties assigned to the crew, the appropriate check-lists, the system for use of the check-lists and a statement covering the necessary coordination procedures between flight and cabin crew. The following abnormal and emergency procedures and duties must be included:

- (a) Crew Incapacitation;
- (b) Fire and Smoke Drills;
- (c) Unpressurised and partially pressurised flight;
- (d) Exceeding structural limits such as overweight landing;
- (e) Exceeding cosmic radiation limits;
- (f) Lightning Strikes;
- (g) Distress Communications and alerting ATC to Emergencies;
- (h) Engine failure;
- (i) System failures;
- (j) Guidance for Diversion in case of Serious Technical Failure;
- (k) Ground Proximity Warning;
- (l) TCAS Warning;
- (m) Windshear; and
- (n) Emergency Landing/Ditching.

4 PERFORMANCE

4.0 Performance data must be provided in a form in which it can be used without difficulty.

4.1 *Performance data.* Performance material which provides the necessary data for compliance with the performance requirements prescribed in CAR-OPS 1 Subparts F, G, H and I must be included to allow the determination of:

- (a) Take-off climb limits – Mass, Altitude, Temperature;
- (b) Take-off field length (dry, wet, contaminated);
- (c) Net flight path data for obstacle clearance calculation or, where applicable, take-off flight path;
- (d) The gradient losses for banked climbouts;
- (e) En-route climb limits;
- (f) Approach climb limits;
- (g) Landing climb limits;
- (h) Landing field length (dry, wet, contaminated) including the effects of an in-flight failure of a system or device, if it affects the landing distance;
- (i) Brake energy limits; and
- (j) Speeds applicable for the various flight stages (also considering wet or contaminated runways).

4.1.1. *Supplementary data covering flights in icing conditions.* Any certificated performance related to an allowable configuration, or configuration deviation, such as anti-skid inoperative, must be included.

4.1.2. If performance Data, as required for the appropriate performance class, is not available in the approved AFM, then other data acceptable to the AUTHORITY must be included. Alternatively, the Operations Manual may contain cross-reference to the approved Data contained in the AFM where such Data is not likely to be used often or in an emergency.

4.2 *Additional Performance Data.* Additional performance data where applicable including:

- (a) All engine climb gradients;
- (b) Drift-down data;
- (c) Effect of de-icing/anti-icing fluids;
- (d) Flight with landing gear down;
- (e) For aeroplanes with 3 or more engines, one engine inoperative ferry flights; and
- (f) Flights conducted under the provisions of the CDL.

5 FLIGHT PLANNING

5.1 Data and instructions necessary for pre-flight and in-flight planning including factors such as speed schedules and power settings. Where applicable, procedures for engine(s)-out operations, ETOPS (particularly the one-engine-inoperative cruise speed and maximum distance to an adequate aerodrome determined in accordance with CAR-OPS 1.245) and flights to isolated aerodromes must be included.

5.2 The method for calculating fuel needed for the various stages of flight, in accordance with CAR-OPS 1.255.

6 MASS AND BALANCE

Instructions and data for the calculation of the mass and balance including:

- (a) Calculation system (e.g. Index system);
- (b) Information and instructions for completion of mass and balance documentation, including manual and computer generated types;

- (c) Limiting masses and centre of gravity for the types, variants or individual aeroplanes used by the operator; and
- (d) Dry Operating mass and corresponding centre of gravity or index.

7 LOADING

Procedures and provisions for loading and securing the load in the aeroplane.

8 CONFIGURATION DEVIATION LIST

The Configuration Deviation List(s) (CDL), if provided by the manufacturer, taking account of the aeroplane types and variants operated including procedures to be followed when an aeroplane is being despatched under the terms of its CDL.

9 MINIMUM EQUIPMENT LIST

The Minimum Equipment List (MEL) taking account of the aeroplane types and variants operated and the type(s)/area(s) of operation. The MEL must include the navigational equipment and take into account the required navigation performance for the route and area of operation.

10 SURVIVAL AND EMERGENCY EQUIPMENT INCLUDING OXYGEN

10.1 A list of the survival equipment to be carried for the routes to be flown and the procedures for checking the serviceability of this equipment prior to take-off. Instructions regarding the location, accessibility and use of survival and emergency equipment and its associated check list(s) must also be included.

10.2 The procedure for determining the amount of oxygen required and the quantity that is available. The flight profile, number of occupants and possible cabin decompression must be considered. The information provided must be in a form in which it can be used without difficulty.

11 EMERGENCY EVACUATION PROCEDURES

11.1 *Instructions for preparation for emergency evacuation including crew co-ordination and emergency station assignment.*

11.2 *Emergency evacuation procedures.* A description of the duties of all members of the crew for the rapid evacuation of an aeroplane and the handling of the passengers in the event of a forced landing, ditching or other emergency.

12 AEROPLANE SYSTEMS

A description of the aeroplane systems, related controls and indications and operating instructions. (See IEM to Appendix 1 to CAR-OPS 1.1045.)

C ROUTE AND AERODROME INSTRUCTIONS AND INFORMATION

1 Instructions and information relating to communications, navigation and aerodromes including minimum flight levels and altitudes for each route to be flown and operating minima for each aerodrome planned to be used, including:

- (a) Minimum flight level/altitude;
- (b) Operating minima for departure, destination and alternate aerodromes;
- (c) Communication facilities and navigation aids;
- (d) Runway data and aerodrome facilities;
- (e) Approach, missed approach and departure procedures including noise abatement procedures;

- (f) COM-failure procedures;
- (g) Search and rescue facilities in the area over which the aeroplane is to be flown;
- (h) A description of the aeronautical charts that must be carried on board in relation to the type of flight and the route to be flown, including the method to check their validity;
- (i) Availability of aeronautical information and MET services;
- (i) En-route COM/NAV procedures;
- (k) Aerodrome categorisation for flight crew competence qualification (See AMC OPS 1.975); and
- (l) Special aerodrome limitations (performance limitations and operating procedures etc.).

D TRAINING

1 Training syllabi and checking programmes for all operations personnel assigned to operational duties in connection with the preparation and/or conduct of a flight.

2 Training syllabi and checking programmes must include:

2.1 *For flight crew.* All relevant items prescribed in Subparts E and N;

2.2 *For cabin crew.* All relevant items prescribed in Subpart O;

2.3 *For operations personnel concerned, including crew members:*

- (a) All relevant items prescribed in Subpart R (Transport of Dangerous Goods by Air); and
- (b) All relevant items prescribed in Subpart S (Security).

2.4 *For operations personnel other than crew members (e.g. despatcher, handling personnel etc.).* All other relevant items prescribed in CAR-OPS pertaining to their duties.

3 *Procedures*

3.1 Procedures for training and checking.

3.2 Procedures to be applied in the event that personnel do not achieve or maintain the required standards.

3.3 Procedures to ensure that abnormal or emergency situations requiring the application of part or all of abnormal or emergency procedures and simulation of IMC by artificial means, are not simulated during commercial air transportation flights.

4 Description of documentation to be stored and storage periods. (See Appendix 1 to CAR-OPS 1.1065.)

Appendix 1 to CAR–OPS 1.1065 Document storage periods

An operator shall ensure that the following information/documentation is stored in an acceptable form, accessible to the AUTHORITY, for the periods shown in the Tables below.

Note: Additional information relating to maintenance records is prescribed in CAR M.

Table 1 – Information used for the preparation and execution of a flight

Information used for the preparation and execution of the flight as described in CAR–OPS 1.135	
Operational flight plan	3 months
Aeroplane Technical log	24 months after the date of the last entry
Route specific NOTAM/AIS briefing documentation if edited by the operator	3 months
Mass and balance documentation	3 months
Notification of special loads including written information to the commander about dangerous goods	3 months

Table 2 – Reports

Reports	
Journey log	3 months
Flight report(s) for recording details of any occurrence, as prescribed in CAR–OPS 1.420, or any event which the commander deems necessary to report/record	3 months
Reports on exceedances of duty and/or reducing rest periods	3 months

Table 3 – Flight crew records

Flight Crew Records	
Flight, Duty and Rest time	15 months
Licence	As long as the flight crew member is exercising the privileges of the licence for the operator
Conversion training and checking	3 years
Command course (including checking)	3 years
Recurrent training and checking	3 years
Training and checking to operate in either pilot's seat	3 years
Recent experience (CAR-OPS 1.970 refers)	15 months
Route and aerodrome competence (CAR-OPS 1.975 refers)	3 years
Training and qualification for specific operations when required by CAR-OPS (e.g. ETOPS CATII/III operations)	3 years
Dangerous Goods training as appropriate	3 years

Table 4 – Cabin crew records

Cabin Crew Records	
Flight, Duty and Rest Time	15 months
Initial training, conversion and differences training (including checking)	As long as the cabin crew member is employed by the operator
Recurrent training and refresher (including checking)	Until 12 months after the cabin crew member has left the employ of the operator
Dangerous Goods training as appropriate	3 years

Table 5 – Records for other operations personnel

Records for other operations personnel	
Training/qualification records of other personnel for whom an approved training programme is required by CAR-OPS	Last 2 training records

Table 6 – Other records

Other Records	
Records on cosmic and solar radiation dosage	Until 12 months after the crew member has left the employ of the operator
Quality System records	5 years
Dangerous Goods Transport Document	3 months after completion of the flight
Dangerous Goods Acceptance Checklist	3 months after completion of the flight

SUBPART Q – FLIGHT and DUTY TIME LIMITATIONS and REST REQUIREMENTS***CAR-OPS 1.1085 General***

(a) Each operator shall establish a flight and duty time limitations and rest scheme for crewmembers.

(b) Each operator shall ensure that:

- (1) The flight and duty time limitations and rest scheme is in accordance with the provisions of this Subpart;
- (2) Flights are planned to be completed within the allowable flight duty period taking into account the time necessary for pre-flight duties, the flight and the turn around times, and the nature of operation; and
- (3) Duty rosters are prepared and published in advance and in accordance with the AUTHORITY Approved Operator's Operations Manual.

(c) Each operator may chose a flight and duty time scheme which give variations to the basic requirements for specific types of operation. Each operator shall ensure that, whichever option is chosen, the AUTHORITY approved scheme is applied in its entirety.

(d) A crew member shall not operate on an aircraft if he knows or suspects that he is suffering from or is likely to suffer from fatigue, or feels unfit to the extent that the flight may be endangered.

(e) Each operator shall nominate a home base for each crew member.

(f) Each operator shall nominate months or roster periods as the method for determining all flight and duty time limitations in this subpart, but in no case, mix the two methods.

CAR-OPS 1.1090 Terminology

For the purpose of this Subpart:

Actual flight operation - Actual flight operation starts at the reporting time and ends when the crew goes off duty.

Adequate facilities - A quiet and comfortable place not open to the public.

Augmented flight crew - A flight crew which comprises more than the minimum number required for the operation of the aircraft and in which each flight crew member can leave his post and be replaced by another appropriately qualified flight crew member.

Block time - The time between the time an aircraft first moves from its parking place for the purpose of taking off until it comes to rest on the designated parking position or until all engines are stopped.

Break - A period free of all duties, which counts as duty, being less than a rest period.

Duty - Any task that a crewmember is required to carry out and which is associated with the business of an AOC holder.

Duty period - A period which starts when the crewmember is required by an operator to report for a duty and ends when the crew member is free from all duties. For simulators, the duty period starts at the beginning of the Pre-briefing and ends at the end of the De-briefing.

Flight duty period (FDP) - A period which commences when an operating crewmember is required to report for a duty period that includes a flight and which finishes at the end of the block time on the final flight on which the crew member is an operating crew member.

flight relief facility - seat - means a comfortable, fully reclining seat, separated and screened from the passengers and flight deck, equipped with a call device, sleep restraint, portable oxygen, and not subject to distraction from noise generated in the cabin.

Home base - The place nominated by the operator to the crewmember from where the crewmember normally starts and ends a duty period or a series of duty periods. Home Base shall not be arbitrary, nor shall Home Base be changed without prior AUTHORITY approval.

[*Local day* - : A 24 hour period commencing at 00.00 local time.]

Local day off - A period of time notified in advance for recreation and leisure and free of all duties. A local day off (single day off) is at least 36 consecutive hours which shall contain 2 local nights; any consecutive additional local days off are 24 hours duration. A local day off can only be assigned at Home base.

Local night - A period of 8 hours falling between 2200 hrs and 0800 hrs local time.

Notification time - The period of time that an operator allows between the time a crew member on standby receives a call requiring him to report for duty and the time he is required to report for that duty.

Operating crewmember - A crewmember who carries out his duties in an aircraft during the flight or during any part of the flight.

Operational delay – Delays that are beyond the control of the operator such as those that would be caused by weather, aircraft equipment malfunction, and air traffic control delays. It would not include late arriving passengers, late food service, late fuel trucks, delays in loading baggage-freight-mail, or similar events.

Positioning - The transferring of a crewmember from place to place, excluding “travelling” as defined below, at the behest of an operator.

Reporting time - The time at which a crewmember is required by an operator to report to the flight dispatch point, which includes any positioning time to the dispatch point before the flight.

Rest period - An uninterrupted and defined period of time during which a crewmember is free of all duties and/or standby.

Split duty - A flight duty period, which consists of two duties separated by a break.

Standby - A defined period of time during which a crewmember has not been assigned to any duty, but during which he is required by the operator to be available to receive an assignment for duty without an intervening rest period.

Suitable accommodation - A suitably furnished bedroom, with single occupancy if required by the crew member, which is subject to minimum noise, is well ventilated and should have the facility to control the levels of light and temperature.

Time difference - The number of hours separating local standard time at two locations (disregarding 'daylight saving time').

Travelling - All reasonable planned travelling time spent by a crew member in transit between his place of rest provided by the operator and the place of duty and vice versa.

Rev. 2

CAR-OPS 1.1095 Limitations - Flight Crew

(a) Block times

- (1) Each operator shall ensure that the total block times of the flights on which an individual flight crewmember is assigned as an operating crewmember do not exceed:
- (i) 1000 hours in any period of 365 consecutive days; and
 - (ii) 100 hours in any period of 28 consecutive days.
- (2) The total uninterrupted block time to which a flight crew of two is assigned in one flight duty period shall not exceed the following (reporting time expressed in local time at the reporting place):

Table 1 - Maximum uninterrupted block times - Flight crew of 2.

Reporting Time Between	Maximum Uninterrupted Block Time
0700 - 1359 hrs	11 hours
1400 - 1759 hrs	10 hours
1800 - 0459 hrs	9 hours
0500 - 0659 hrs	10 hours

(b) Duty periods

- (1) Each operator shall ensure that the total duty periods to which a flight crewmember is assigned do not exceed:
- (i) 1800 hours in any period of 365 consecutive days
 - (ii) 190 hours in any period of 28 consecutive days.
 - (iii) 55 hours in any 7 consecutive days. However, this figure can be increased to 58 hours when a rostered duty consisting of a series of duty periods has commenced and is subject to unforeseen operational delays. A crew member may not start any duty period knowing 55 hours will be exceeded in any consecutive 7 days.

- (2) Crew members not primarily engaged on flying duties are exempt from the limitations prescribed in paragraph (b)(1) of this section other than for the 7 days prior to and during an FDP or series of FDPs. All duty performed by crew members will be applied to the 7 day calculation.

(c) Flight duty periods

- (1) The allowable flight duty period, depending on the reporting time and the number of landings, is given in the following Tables. The reporting time is expressed in the local time at the reporting place.

Table 2 - Allowable flight duty periods - Multi-pilot operations

Reporting Time	Number of Landings as Operating Flight Crew Member						
	1-2	3	4	5	6	7	8
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
0700 – 1159	1400	1315	1230	1145	1100	1015	0930
1200 – 1359	1330	1245	1200	1115	1030	0945	0900
1400 – 1559	1300	1215	1130	1045	1000	0915	0900
1600 – 1759	1230	1145	1100	1015	0930	0900	0900
1800 – 0359	1200	1115	1030	0945	0900	0900	0900
0400 – 0459	1230	1145	1100	1015	0930	0900	0900
0500 – 0559	1300	1215	1130	1045	1000	0915	0900
0600 – 0659	1330	1245	1200	1115	1030	0945	0900

Table 3 - Allowable flight duty periods - Single pilot operations

Reporting Time	Number of Landings as Operating Flight Crew Member			
	1-4	5	6	7
	(a)	(b)	(c)	(d)
0700 – 1159	1000	0915	0830	0800
1200 – 1359	0930	0845	0800	0800
1400 – 1559	0930	0815	0800	0800
1600 – 1759	0830	0800	0800	0800
1800 – 0359	0800	0800	0800	0800
0400 – 0459	0830	0800	0800	0800
0500 – 0559	0900	0815	0800	0800
0600 – 0659	0930	0845	0800	0800

- (2) The reporting times in Tables 2 and 3 may be shifted, as a whole, earlier or later by one whole hour at the option of the AUTHORITY.
- (3) At the option of the AUTHORITY, a third landing may be permitted within the flight duty period calculated in accordance with column (a) of Table 2 subject to a maximum of two occasions within any 7 consecutive days.
- (4) The figures derived from Table 2 may be increased by the use of either:
- (i) Split duty as prescribed in CAR-OPS 1.115 of this Subpart; or
 - (ii) Augmented flight crew as prescribed in paragraph (e) of this section.

- (5) The figures derived from Table 3 may be increased by the use of split duty.
- (6) For flights operated by a single pilot and conducted wholly under VFR, allowable flight duty periods must be derived from column (a) of Table 3 although, in this case, there is no limit to the number of landings. However, where the number of landings exceeds an average of 4 per hour a break of at least 30 minutes must be taken within any period of 3 consecutive hours.
- (7) If the total travelling time in both directions between the place of duty and suitable accommodation provided by the operator exceeds 2 hours, then any excess is added to the flight duty period that follows the rest period at the suitable accommodation.

(d) Mixed flying/types of operation.

- (1) Airplanes and helicopters - When flight crews member operates on both airplanes and helicopters, an operator must submit a flight and duty time limitation and rest scheme based upon this Subpart to CAR-OPS 1.
- (2) Simulator and Aircraft Flight Training - Each operator shall ensure that where a flight crew member carries out either simulator or aircraft flight training prior to a commercial air transportation flight within the same flight duty period, then the duration of flight simulator or training flights must be doubled for the purpose of calculating flight duty period limits in accordance with paragraph (c) of this section. The number of landings during flight simulator and training flights need not be taken into account.
- (3) Single pilot/multi pilot operations - Where a pilot flies both a single pilot operation and a multi-pilot operation in one flight duty period then the more restrictive limits in Tables 2 or 3 of this Subpart apply.

(e) Augmented Flight Crew :

- (1) Irrespective of the reporting time, if a flight crew comprising at least 2 pilots is augmented by the addition of at least one fully qualified flight crew member, in order to increase the flight duty period derived from Table 2 of this Subpart,

-where the additional flight crew member occupies a flight deck observer seat during take-offs and landing, the flight duty time may be extended to 15 consecutive hours provided:

- (i) The sharing of time away from controls between those flight crew members leaving their posts is kept in balance.

(ii) The subsequent minimum rest period is increased by at least 2 hours.

- (2) Irrespective of the reporting time, if a flight crew comprising at least 2 pilots is augmented by the addition of at least one fully qualified flight crew member, in order to increase the flight duty period derived from Table 2 of this Subpart,

-where a flight relief facility seat is provided, the flight duty time may be extended to 17 consecutive hours, in which case the maximum flight deck duty time for any flight crew member shall be 12 hours;

-where a flight relief facility bunk is provided, the flight duty time may be extended to 20 consecutive hours, in which case the maximum flight deck duty time for any flight crew member shall be 14 hours, provided:

- (i) The sharing of time away from controls between those flight crew members leaving their posts is kept in balance.

- (ii) the subsequent minimum rest period is at least equal to the length of the preceding flight duty time; and
- (iii) The augmented flight crew is scheduled to carry out no more than 2 landings within a flight duty period or, at the option of the AUTHORITY, 3 landings, provided the block time for one sector is 2 hours or less.

Rev. 1

CAR-OPS 1.1100 Limitations - Cabin Crew

(a) Duty periods.

- (1) Each operator shall ensure that the total duty periods to which a flight crewmember is assigned do not exceed:
 - (i) 1800 hours in any [period of 365 consecutive days]
 - (ii) 190 hours in [any period of 28 consecutive days].
 - (iii) [60] hours in any 7 consecutive days. However, this figure can be increased to 63 hours when a rostered duty consisting of a series of duty periods has commenced and is subject to unforeseen operational delays. A crew member may not start any duty period knowing [60] hours will be exceeded in any consecutive 7 days.
- (2) Crew members not primarily engaged on flying duties are exempt from the limitations prescribed in paragraph (b)(1) of this section other than for the 7 days prior to and during an FDP or series of FDPs. All duty performed by crew members will be applied to the 7 day calculation.

(b) Flight duty periods.

- (1) The allowable flight duty period, depending on the reporting time and the number of landings, is given in the following Table. The reporting time is expressed in the local time at the reporting place.

Table 4 - Allowable flight duty periods - Cabin crew

Reporting Time	Number of Landings as Operating Cabin Crew Member						
	1-2	3	4	5	6	7	8
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
0700 – 1159	1400	1315	1230	1145	1100	1015	0930
1200 – 1359	1330	1245	1200	1115	1030	0945	0900
1400 – 1559	1300	1215	1130	1045	1000	0915	0900
1600 – 1759	1230	1145	1100	1015	0930	0900	0900
1800 – 0359	1200	1115	1030	0945	0900	0900	0900
0400 – 0459	1230	1145	1100	1015	0930	0900	0900
0500 – 0559	1300	1215	1130	1045	1000	0915	0900
0600 – 0659	1330	1245	1200	1115	1030	0945	0900

- (2) The reporting times in Table 4 may be shifted, as a whole, earlier or later by one whole hour at the option of the AUTHORITY.
- (3) At the option of the AUTHORITY, a third landing may be permitted within the flight duty period calculated in accordance with Column (a) of Table 4 subject to a maximum of two occasions within and 7 consecutive days.
- (4) The figures derived from Table 4 may be increased by the use of either:
 - (i) Split duty as prescribed in CAR-OPS 1.115 of this Subpart; or
 - (ii) Extension of the allowable flight duty period as prescribed in paragraph (c) of this section.
- (5) If the reporting time for the cabin crew is up to one hour earlier than that for flight crewmembers assigned to the same flight or series of flights within the same flight duty period, the operator may base the allowable flight duty period and subsequent rest period upon the flight crew's reporting time.
- (6) If the difference between the reporting time for a cabin crew member and a flight crew member starting a flight duty period for the same flight is more than one hour, the flight duty period must be based upon the cabin crew member's reporting time and calculated in accordance with Table 4 above.
- (7) If the total travelling time in both directions between the place of duty and suitable accommodation provided by the operator exceeds 2 hours, then any excess is added to the flight duty period that follows the rest period at the suitable accommodation.

(c) Extension of allowable Flight Duty Periods - Each operator shall ensure that if extending the allowable flight duty periods for cabin crew, irrespective of the reporting time, the flight duty period shall not exceed 18 hours, provided that no more than 2 landings are carried out within a flight duty period, or, at the option of the AUTHORITY, 3 landings.

- (1) When allocating flight duty periods above 16 hours for cabin crewmembers, an operator should ensure that the following conditions are met:

- (i) Each cabin crew member is free of duties for a period of time equal to one third of the period calculated by subtracting one hour for each landing from the total block time in the flight duty period; and
 - (ii) For at least one third of the number of cabin crewmembers, bunks for the resting cabin crewmembers, separated and screened from the flight deck and the passengers, are available.
- (2) When allocating flight duty periods above 14 hours, but not exceeding 16 hours, for cabin crewmembers, an operator should ensure that the following conditions are met:
- (i) Each cabin crew member is free of duties for a period of time equal to one quarter of the period calculated by subtracting one hour for each landing from the total block time in the flight duty period; and
 - (ii) For at least one quarter of the number of cabin crewmembers, comfortable reclining seats for the resting cabin crewmembers, separated from the flight deck and screened from the passengers, are available.
- (3) In exceptional circumstance, when allocating flight duty periods for cabin crewmembers, which are above the maximum flight duty periods prescribed in CAR-OPS 1.100 of this Subpart, but not exceeding 14 hours, an operation should ensure that each cabin crew member is free of duty for one hour during the flight.
- (4) The periods free of duty should preferably be consecutive.

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CAR-OPS 1.1105 Positioning

Each operator shall ensure that all time spent on positioning is counted as duty.

CAR-OPS 1.1110 Reporting time

Each operator shall specify reporting times that realistically reflect the time required for pre-flight duties of not less than 60 minutes prior to the beginning of the planned block time unless otherwise approved by the AUTHORITY.

CAR-OPS 1.1115 Split duty

(a) When a flight duty period consists of 2 duties separated by a break defined and notified to the crew member before the applicable flight duty period starts, an operator may increase the allowable planned flight duty period prescribed in Tables 2 and 3 or in Table 4, as appropriate, in accordance with Table 5 below, subject to the conditions prescribed in paragraphs (b), (c), and (d) of this section.

Table 5 - Split duty credit

Consecutive Hours Break (a)	Increase in FDP (b)
0 -2 hrs 59 mins	Nil
3 hrs - 6 hrs 59 mins	1/2 length of break
7 hrs - 10 hrs 59 mins	2/3 length of break or 1 1/2 length of break if at least 7 hours of the break fall between 2000-0800 local time where the break occurs.

(b) Each operator shall ensure that the parts of the flight duty period before and after the break do not exceed 10 hours, and the total flight duty period, as increased in accordance with Table 5 above, does not exceed 20 hours.

(c) Each operator shall ensure that split duty is not combined with augmented flight crew or, for cabin crew, extension of the allowable flight duty period.

(d) Each operator shall ensure that:

- (1) If the break is 6 hours or more, or covers 3 hours or more of the period 2200 - 0600 local time at the place where it occurs, suitable accommodation is provided. In all other circumstances adequate facilities must be provided;
- (2) With regard to the cumulative duty periods prescribed in CAR-OPS 1.095 and CAR-OPS 1.100 of this Subpart, if the break is less than 8 hours, the full period of the break is accountable. If the break is 8 hours or more, 50% off the period of the break is accountable;
- (3) Only one break is used within one flight duty period;
- (4) If the total travelling time in both directions between the place of duty and the adequate facilities or suitable accommodation exceeds one hour, any travelling time in excess of the one hour total is deducted from the break for the purposes of calculating the increased flight duty period; and
- (5) The time difference between the place of the beginning of the duty and the place at which the break is taken is not greater than three hours.

CAR-OPS 1.1120 Rest requirements

(b) Each operator shall ensure that:

- (1) Before the start of a flight duty period a crewmember has completed a rest period at least as long as the preceding duty period, or 11 hours, whichever is the greater. Crewmembers must make optimum use of the opportunities and facilities for rest provided, and plan and use their rest periods properly.

- (2) The minimum rest period following a flight duty period in which split duty credit has been used is at least as long as the total flight duty period including the break, except that, if suitable accommodation was provided, the duration of the break need not be included in the rest period calculation.
- (3) If the rest period is followed by a positioning flight, the minimum rest period required by (a)(1) can be reduced to 10 hours.

(b) Each operator may reduce the rest period calculated in accordance with paragraph (a)(1) of this section by not more than 3 hours but to not less than 11 hours except as provided for in paragraph (f) of this section, subject to the following conditions:

- (1) The previous rest period must have been completed in accordance with paragraph (a)(1) of this section;
- (2) The amount by which the rest period is reduced must be added to the next rest period; that is, the reduced rest is added to the time calculated in (a)(1), which total cannot be reduced;
- (3) The amount of time by which the rest period is reduced must be deducted from the subsequent allowable Flight Duty Period; and
- (4) Reduced rest must not be used prior to or following split duty.
- (5) While a crew member is in scheduled rest at home base, he cannot be required by the operator to contact the operator, answer the phone, carry a beeper, remain at a specific location, or in any other way be responsible to the operator. This does not prohibit the operator from contacting the crew member after minimum crew rest is fulfilled. If the contacted crew member is required to report earlier than scheduled report time for a duty period or standby, the operator shall not require the crew member to report earlier unless the crew member accepts the earlier reporting time.

(c) Each operator shall ensure that the minimum rest periods prescribed in paragraph (a) and (b) of this section are increased to at least one 36 hour period which falls within 7 consecutive days to include 2 local nights.

The 7 consecutive days (168 hour) period in (c) of this paragraph starts when a crew member reports for duty having completed a rest period of at least 36 hours to include 2 local nights.

(d) Each operator shall ensure that a crewmember is given days free of all duty and standby, which are notified in advance, as follows:

- (1) At least 7 local days off in each calendar month or one (28 day) roster period which may include required rest periods; and
- (2) At least 24 local days off in each calendar quarter or 3 (28 day) consecutive roster periods which may include required rest periods.

(e) Each operator shall provide suitable accommodation when rest periods are required away from the home base.

(f) Each operator shall ensure that:

- (1) If the total travelling time between duty periods; in both directions between the place of duty and suitable accommodation provided by the operator exceeds 2 hours, then any excess is added to the minimum rest period; or

- (2) If the total travelling time between duty periods; in both directions between the place of duty and suitable accommodation provided by the operator is less than 11/2 hours, then the time difference may be deducted from the minimum rest period but the time at the accommodation shall not be less than 10 hours.
- (g) Each operator shall ensure that if, during any period of 7 consecutive days:
- (1) Any part of three or more planned duty periods falls within 0100 - 0659 local time at the reporting place, which at the option of the AUTHORITY may be shifted earlier by one whole hour; and
 - (2) The time difference between any two places at which crew rest was taken is less than 4 hours,

The 36 hour rest period option prescribed in paragraph (c) of this section is increased to 48 hours although the additional 12 hours which increases the rest period to 48 hours need not fall within the 7 day period.

CAR-OPS 1.1125 Intentionally blank

CAR-OPS 1.1130 Time difference

(a) When the time difference between the places where a duty period begins and ends is 4 hours or more, an operator shall take into account the effects this may have on crewmembers by specifying increased rest.

- (1) If the time difference between the places at which a FDP begins and ends is 6 hours or less, the subsequent rest period is at least as long as the preceding duty period or 14 hours, whichever is the greater; or
- (2) If the time difference between the places at which a FDP begins and ends is more than 6 hours, the subsequent rest period is at least as long as the preceding duty period or 16 hours, whichever is the greater.

(b) Flight duty periods that cross 4 or more time zones, and involve 48 hours or more away from home base time zone, a minimum of 48 hours of crew rest will be provided at home base.

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CAR-OPS 1.1135 Standby

- (a) When an operator elects to place crews on standby, he shall:
- (1) Apply the following limits on standby periods for crewmembers;

Table 6 - Standby limits

Notification time (a)	Maximum standby time (b)
0 - 5 hrs 59 mins	12 hours
6 hrs or more	18 hours

- (2) Ensure that suitable accommodation is provided if:
 - (i) A crew member is required to be on standby away from the home base; or
 - (ii) Standby is undertaken at an airport;
- (3) Notify the crewmember of the time of start and end of standby period, and the minimum notification time;
- (4) Ensure that the following are counted towards the total duty periods prescribed in CAR-OPS 1.095 and CAR-OPS 1.100 of this Subpart, as appropriate:
 - (i) 50% of the amounts of standby undertaken by each crew member (excluding the first 4 hours of any standby undertaken at home); and
 - (ii) If notified for duty, 50% of any notification time of less than 10 hours;
- (5) Ensure that if a crewmember is assigned standby immediately after a duty period and without intervening rest, the duty and the subsequent time on standby are totalled and are included in:
 - (i) Any immediately subsequent flight duty period; or
 - (ii) Any immediately subsequent duty period; and
- (6) Ensure that when a crewmember completes standby without being called for duty he completes a rest period of at least 10 hours before commencing a subsequent duty or standby period.
 - (b) Each operator shall ensure that if a flight is delayed on the day of operation before a crew member leaves his place of rest, the crew member is considered to be on standby from the originally scheduled reporting time. In such an event, the operator must specify a notification time.

CAR-OPS 1.1140 Operational delay due to unforeseen circumstances in actual flight operations

(a) During the actual flight operation, which starts at the reporting time, the limits on flight duty, duty and rest periods prescribed in this Subpart may be modified in the event of operational delays. Any such modifications must be acceptable to the commander after consultation with all other crewmembers. No crew member shall be forced to accept such modification if they cannot comply with CAR-OPS 1.085(d) of this Subpart. In all circumstances, the following must be complied with:

- (1) The allowable flight duty period may not be increased by more than 2 hours unless:

- (i) The flight crew has been augmented, in which case the allowable flight duty period may be increased by not more than 3 hours; or
 - (ii) For cabin crew, the allowable flight duty period has been extended in accordance with CAR-OPS 1.100 (c) of this Subpart, in which case the allowable flight duty period may be extended by not more than 3 hours;
- (2) If on the final sector within a flight duty period, an operational delay occurs after take-off that will result in the permitted increase being exceeded, the flight may continue to the planned destination or alternate; and
 - (3) The minimum required rest period may be reduced by a maximum of 2 hours but to not less than 10 hours provided that a crew member's previous rest period was not reduced or the previous flight duty period was not increased.
 - (4) The amount by which the rest period is reduced must be added to the next rest period; that is, the reduced rest is added to the time calculated in CAR-OPS 1.120 (a)(1), which total cannot be reduced;
- (b) If after the start of a flight duty period an unforeseen situation arises, as a result of which the operator requires a crew member to take a break, the crew member(s) involved must be informed before the break commences and the split duty requirements prescribed in CAR-OPS 1.115 applied accordingly.
- (c) Each operator shall ensure that when, due to unforeseen circumstances, a duty period which was planned outside the period 0100 - 0659 local time at the reporting place falls more than one hour within that period, the requirements prescribed in CAR-OPS 1.120 (g) and (h) are applied accordingly.
- (d) Each operator shall ensure that:
- (1) The commander submits a report to the operator whenever a flight duty period is increased or when a rest period is reduced in actual flight operation; and
 - (2) Where the increase of a flight duty period or reduction of a rest period exceeds one hour, a copy of the report, to which the operator must add his comments, is sent to the AUTHORITY no later than 28 days after the event.

CAR-OPS 1.1145 Flight duty, duty and rest period records

- (a) Each operator shall ensure that sufficiently detailed records of crew member's:
- (1) Block times;
 - (2) Flight duty periods;
 - (3) Duty periods; and
 - (4) Rest periods and local days off, free of all duties,

are maintained to ensure compliance with the requirements of this Subpart to CAR-OPS 1.

(b) A crewmember who is self-employed and/or working on a freelance or private basis shall maintain an individual record, as appropriate, of his:

- (1) Block times;
- (2) Flight duty periods;

- (3) Duty periods; and
- (4) Rest periods and local days off, free of all duties,

which must be presented to any operator who employs his services before he commences a flight duty period.

SUBPART R – TRANSPORT OF DANGEROUS GOODS BY AIR**CAR–OPS 1.1150 Terminology**

- (a) Terms used in this Subpart have the following meanings:
- (1) *Acceptance Check List*. A document used to assist in carrying out a check on the external appearance of packages of dangerous goods and their associated documents to determine that all appropriate requirements have been met.
 - (2) *Cargo Aircraft*. Any aircraft which is carrying goods or property but not passengers. In this context the following are not considered to be passengers:
 - (i) A crew member;
 - (ii) An operator's employee permitted by, and carried in accordance with, the instructions contained in the Operations Manual;
 - (iii) An authorised representative of an AUTHORITY; or
 - (iv) A person with duties in respect of a particular shipment on board.
 - (3) *Dangerous Goods Accident*. An occurrence associated with and related to the transport of dangerous goods which results in fatal or serious injury to a person or major property damage. (See IEM OPS 1.1150(a)(3) & (a)(4).)
 - (4) *Dangerous Goods Incident*. An occurrence, other than a dangerous goods accident, associated with and related to the transport of dangerous goods, not necessarily occurring on board an aircraft, which results in injury to a person, property damage, fire, breakage, spillage, leakage of fluid or radiation or other evidence that the integrity of the packaging has not been maintained. Any occurrence relating to the transport of dangerous goods which seriously jeopardises the aircraft or its occupants is also deemed to constitute a dangerous goods incident. (See IEM OPS 1.1150(a)(3) & (a)(4).)
 - (5) *Dangerous Goods Transport Document*. A document which is specified by the Technical Instructions. It is completed by the person who offers dangerous goods for air transport and contains information about those dangerous goods. The document bears a signed declaration indicating that the dangerous goods are fully and accurately described by their proper shipping names and UN/ID numbers and that they are correctly classified, packed, marked, labelled and in a proper condition for transport.
 - (6) *Freight Container*. A freight container is an article of transport equipment for radioactive materials, designed to facilitate the transport of such materials, either packaged or unpackaged, by one or more modes of transport. (Note: see Unit Load Device where the dangerous goods are not radioactive materials.)
 - (7) *Handling Agent*. An agency which performs on behalf of the operator some or all of the latter's functions including receiving, loading, unloading, transferring or other processing of passengers or cargo.
 - (8) *ID number*. A temporary identification number for an item of dangerous goods which has not been assigned a UN number.
 - (9) *Overpack*. An enclosure used by a single shipper to contain one or more packages and to form one handling unit for convenience of handling and stowage. (Note: a unit load device is not included in this definition.)
 - (10) *Package*. The complete product of the packing operation consisting of the packaging and its contents prepared for transport.

- (11) *Packaging*. Receptacles and any other components or materials necessary for the receptacle to perform its containment function and to ensure compliance with the packing requirements.
- (12) *Proper Shipping Name*. The name to be used to describe a particular article or substance in all shipping documents and notifications and, where appropriate, on packagings.
- (13) *Serious Injury*. An injury which is sustained by a person in an accident and which:
 - (i) Requires hospitalisation for more than 48 hours, commencing within seven days from the date the injury was received; or
 - (ii) Results in a fracture of any bone (except simple fractures of fingers, toes or nose); or
 - (iii) Involves lacerations which cause severe haemorrhage, nerve, muscle or tendon damage; or
 - (iv) Involves injury to any internal organ; or
 - (v) Involves second or third degree burns, or any burns affecting more than 5% of the body surface; or
 - (vi) Involves verified exposure to infectious substances or injurious radiation.
- (14) *State of Origin*. The Authority in whose territory the dangerous goods were first loaded on an aircraft.
- (15) *Technical Instructions*. The latest effective edition of the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284-AN/905), including the Supplement and any Addendum, approved and published by decision of the Council of the International Civil Aviation Organization.
- (16) *UN Number*. The four-digit number assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods to identify a substance or a particular group of substances.
- (17) *Unit Load Device*. Any type of aircraft container, aircraft pallet with a net, or aircraft pallet with a net over an igloo. (Note: an overpack is not included in this definition; for a container containing radioactive materials see the definition for freight container.)

CAR-OPS 1.1155 Approval to Transport Dangerous Goods

(See IEM OPS 1.1155)

An operator shall not transport dangerous goods unless approved to do so by the AUTHORITY.

CAR-OPS 1.1160 Scope

(a) An operator shall comply with the provisions contained in the Technical Instructions on all occasions when dangerous goods are carried, irrespective of whether the flight is wholly or partly within or wholly outside the territory of a State.

(b) Articles and substances which would otherwise be classed as dangerous goods are excluded from the provisions of this Subpart, to the extent specified in the Technical Instructions, provided:

- (1) They are required to be aboard the aeroplane in accordance with the relevant CARs or for operating reasons (See IEM OPS 1.1160(b)(1));
- (2) They are carried as catering or cabin service supplies;

- (3) They are carried for use in flight as veterinary aid or as a humane killer for an animal See IEM OPS 1.1160(b)(3));
- (4) They are carried for use in flight for medical aid for a patient, provided that (See IEM OPS 1.1160(b)(4)):
 - (i) Gas cylinders have been manufactured specifically for the purpose of containing and transporting that particular gas;
 - (ii) Drugs, medicines and other medical matter are under the control of trained personnel during the time when they are in use in the aeroplane;
 - (iii) Equipment containing wet cell batteries is kept and, when necessary secured, in an upright position to prevent spillage of the electrolyte; and
 - (iv) Proper provision is made to stow and secure all the equipment during take-off and landing and at all other times when deemed necessary by the commander in the interests of safety; or
- (5) They are carried by passengers or crew members. (See IEM OPS 1.1160(b)(5).)

(c) Articles and substances intended as replacements for those in (b)(1) and (b)(2) above shall be transported on an aeroplane as specified in the Technical Instructions.

CAR–OPS 1.1165 Limitations on the Transport of Dangerous Goods

(a) An operator shall take all reasonable measures to ensure that articles and substances that are specifically identified by name or generic description in the Technical Instructions as being forbidden for transport under any circumstances are not carried on any aeroplane.

(b) An operator shall take all reasonable measures to ensure that articles and substances or other goods that are identified in the Technical Instructions as being forbidden for transport in normal circumstances are only transported when:

- (1) They are exempted by the States concerned under the provisions of the Technical Instructions (see IEM OPS 1.1165(b)(1)); or
- (2) The Technical Instructions indicate they may be transported under an approval issued by the State of Origin.

CAR–OPS 1.1170 Classification

An operator shall take all reasonable measures to ensure that articles and substances are classified as dangerous goods as specified in the Technical Instructions.

CAR–OPS 1.1175 Packing

An operator shall take all reasonable measures to ensure that dangerous goods are packed as specified in the Technical Instructions.

CAR–OPS 1.1180 Labelling and Marking

(a) An operator shall take all reasonable measures to ensure that packages, overpacks and freight containers are labelled and marked as specified in the Technical Instructions.

(b) Where dangerous goods are carried on a flight which takes place wholly or partly outside the territory of a State, labelling and marking must be in the English language in addition to any other language requirements.

CAR–OPS 1.1185 Dangerous Goods Transport Document

(a) An operator shall ensure that, except when otherwise specified in the Technical Instructions, dangerous goods are accompanied by a dangerous goods transport document.

(b) Where dangerous goods are carried on a flight which takes place wholly or partly outside the territory of a State, the English language must be used for the dangerous goods transport document in addition to any other language requirements.

CAR–OPS 1.1190 Intentionally blank**CAR–OPS 1.1195 Acceptance of Dangerous Goods**

(a) An operator shall not accept dangerous goods for transport until the package, overpack or freight container has been inspected in accordance with the acceptance procedures in the Technical Instructions.

(b) An operator or his handling agent shall use an acceptance check list. The acceptance check list shall allow for all relevant details to be checked and shall be in such form as will allow for the recording of the results of the acceptance check by manual, mechanical or computerised means.

CAR–OPS 1.1200 Inspection for Damage, Leakage or Contamination

(a) An operator shall ensure that:

- (1) Packages, overpacks and freight containers are inspected for evidence of leakage or damage immediately prior to loading on an aeroplane or into a unit load device, as specified in the Technical Instructions;
- (2) A unit load device is not loaded on an aeroplane unless it has been inspected as required by the Technical Instructions and found free from any evidence of leakage from, or damage to, the dangerous goods contained therein;
- (3) Leaking or damaged packages, overpacks or freight containers are not loaded on an aeroplane;
- (4) Any package of dangerous goods found on an aeroplane and which appears to be damaged or leaking is removed or arrangements made for its removal by an appropriate AUTHORITY or organisation. In this case the remainder of the consignment shall be inspected to ensure it is in a proper condition for transport and that no damage or contamination has occurred to the aeroplane or its load; and
- (5) Packages, overpacks and freight containers are inspected for signs of damage or leakage upon unloading from an aeroplane or from a unit load device and, if there is evidence of damage or leakage, the area where the dangerous goods were stowed is inspected for damage or contamination.

CAR-OPS 1.1205 Removal of Contamination

- (a) An operator shall ensure that:
- (1) Any contamination found as a result of the leakage or damage of dangerous goods is removed without delay; and
 - (2) An aeroplane which has been contaminated by radioactive materials is immediately taken out of service and not returned until the radiation level at any accessible surface and the non-fixed contamination are not more than the values specified in the Technical Instructions.

CAR-OPS 1.1210 Loading Restrictions

- (a) *Passenger Cabin and Flight Deck.* An operator shall ensure that dangerous goods are not carried in an aeroplane cabin occupied by passengers or on the flight deck, unless otherwise specified in the Technical Instructions.
- (b) *Cargo Compartments.* An operator shall ensure that dangerous goods are loaded, segregated, stowed and secured on an aeroplane as specified in the Technical Instructions.
- (c) *Dangerous Goods Designated for Carriage Only on Cargo Aircraft.* An operator shall ensure that packages of dangerous goods bearing the 'Cargo Aircraft Only' label are carried on a cargo aircraft and loaded as specified in the Technical Instructions.

CAR-OPS 1.1215 Provision of Information

- (a) *Information to Ground Staff.* An operator shall ensure that:
- (1) Information is provided to enable ground staff to carry out their duties with regard to the transport of dangerous goods, including the actions to be taken in the event of incidents and accidents involving dangerous goods; and
 - (2) Where applicable, the information referred to in sub-paragraph (a)(1) above is also provided to his handling agent.
- (b) *Information to Passengers and Other Persons* (See AMC OPS 1.1215(b).)
- (1) An operator shall ensure that information is promulgated as required by the Technical Instructions so that passengers are warned as to the types of goods which they are forbidden from transporting aboard an aeroplane; and
 - (2) An operator and, where applicable, his handling agent shall ensure that notices are provided at acceptance points for cargo giving information about the transport of dangerous goods.
- (c) *Information to Crew Members.* An operator shall ensure that information is provided in the Operations Manual to enable crew members to carry out their responsibilities in regard to the transport of dangerous goods, including the actions to be taken in the event of emergencies arising involving dangerous goods.
- (d) *Information to the Commander.* An operator shall ensure that the commander is provided with written information, as specified in the Technical Instructions (See Table 1 of Appendix 1 to CAR-OPS 1.1065 for the document storage period).
- (e) *Information in the Event of an Aeroplane Incident or Accident* (See AMC OPS 1.1215(e).)

- (1) The operator of an aeroplane which is involved in an aeroplane incident shall, on request, provide any information required to minimise the hazards created by any dangerous goods carried.
- (2) The operator of an aeroplane which is involved in an aeroplane accident shall, as soon as possible, inform the appropriate Authority of the State in which the aeroplane accident occurred of any dangerous goods carried.

CAR-OPS 1.1220 Training programmes

(See AMC OPS 1.1220)

(See IEM OPS 1.1220)

(a) An operator shall establish and maintain staff training programmes, as required by the Technical Instructions, which shall be approved by the AUTHORITY.

(b) *Operators not holding a permanent approval to carry dangerous goods.* An operator shall ensure that:

- (1) Staff who are engaged in general cargo and baggage handling have received training to carry out their duties in respect of dangerous goods. As a minimum this training must cover the areas identified in Column 1 of Table 1 and be to a depth sufficient to ensure that an awareness is gained of the hazards associated with dangerous goods, how to identify them and what requirements apply to the carriage of such goods by passengers; and
- (2) The following personnel:
 - (i) Crew members;
 - (ii) Passenger handling staff; and
 - (iii) Security staff employed by the operator who deal with the screening of passengers and their baggage, have received training which, as a minimum, must cover the areas identified in Column 2 of Table 1 and be to a depth sufficient to ensure that an awareness is gained of the hazards associated with dangerous goods, how to identify them and what requirements apply to the carriage of such goods by passengers.

Table 1

AREAS OF TRAINING	1	2
General philosophy	X	X
Limitations on Dangerous Goods in air transport		X
Package marking and labelling	X	X
Dangerous Goods in passengers baggage	X	X
Emergency procedures	X	X

Note: 'X' indicates an area to be covered.

(c) Operators holding a permanent approval to carry dangerous goods. An operator shall ensure that:

- (1) Staff who are engaged in the acceptance of dangerous goods have received training and are qualified to carry out their duties. As a minimum this training must cover the areas identified in Column 1 of Table 2 and be to a depth sufficient to ensure the staff can take decisions on the acceptance or refusal of dangerous goods offered for carriage by air;
- (2) Staff who are engaged in ground handling, storage and loading of dangerous goods have received training to enable them to carry out their duties in respect of dangerous goods. As a minimum this training must cover the areas identified in Column 2 of Table 2 and be to a depth sufficient to ensure that an awareness is gained of the hazards associated with dangerous goods, how to identify such goods and how to handle and load them;
- (3) Staff who are engaged in general cargo and baggage handling have received training to enable them to carry out their duties in respect of dangerous goods. As a minimum this training must cover the areas identified in Column 3 of Table 2 and be to a depth sufficient to ensure that an awareness is gained of the hazards associated with dangerous goods, how to identify such goods, how to handle and load them and what requirements apply to the carriage of such goods by passengers;
- (4) Flight crew members have received training which, as a minimum, must cover the areas identified in Column 4 of Table 2. Training must be to a depth sufficient to ensure that an awareness is gained of the hazards associated with dangerous goods and how they should be carried on an aeroplane; and
- (5) The following personnel:
 - (i) Passenger handling staff;
 - (ii) Security staff employed by the operator who deal with the screening of passengers and their baggage; and
 - (iii) Crew members other than flight crew members, have received training which, as a minimum, must cover the areas identified in Column 5 of Table 2. Training must be to a depth sufficient to ensure that an awareness is gained of the hazards associated with dangerous goods and what requirements apply to the carriage of such goods by passengers or, more generally, their carriage on an aeroplane.

(d) An operator shall ensure that all staff who receive training undertake a test to verify understanding of their responsibilities.

(e) An operator shall ensure that all staff who require dangerous goods training receive recurrent training at intervals of not longer than 2 years.

(f) An operator shall ensure that records of dangerous goods training are maintained for all staff as required by the Technical Instructions.

(g) An operator shall ensure that his handling agent's staff are trained in accordance with the applicable column of Table 1 or Table 2.

Table 2

AREAS OF TRAINING	1	2	3	4	5
General Philosophy	X	X	X	X	X
Limitations on Dangerous Goods in air transport	X	X		X	X
Classification of Dangerous Goods	X				
List of Dangerous Goods	X	X		X	
General packing requirements and Packing instructions	X				
Packaging specifications and markings	X				
Package marking and labelling	X	X	X	X	X
Documentation from the shipper	X				
Acceptance of Dangerous Goods, including the use of a checklist	X				
Storage and loading procedures	X	X	X	X	
Inspections for damage or leakage and decontamination procedures	X	X			
Provision of information to commander	X	X		X	
Dangerous Goods in passengers' baggage	X	X	X	X	X
Emergency procedures	X	X	X	X	X

Note: 'x' indicates an area to be covered.

CAR–OPS 1.1225 Dangerous Goods Incident and Accident Reports

(See AMC OPS 1.1225)

(a) An operator shall report dangerous goods incidents and accidents to the AUTHORITY. An initial report shall be despatched within 72 hours of the event unless exceptional circumstances prevent this.

(b) An operator shall also report to the AUTHORITY undeclared or misdeclared dangerous goods discovered in cargo or passengers' baggage. An initial report shall be despatched within 72 hours of the discovery unless exceptional circumstances prevent this.

CAR–OPS 1.1230 *Intentionally blank*

SUBPART S – SECURITY**CAR-OPS 1.1235 Security requirements**

An operator shall ensure that all appropriate personnel are familiar, and comply, with the relevant requirements of the national security programmes of the Sultanate of Oman.

Rev. 1

CAR-OPS 1.1240 Training programmes

(See AC OPS 1.1240)

An operator shall establish, maintain and conduct approved training programmes which enable the operator's crew members to take appropriate action to prevent acts of unlawful interference, such as sabotage or unlawful seizure of aeroplanes and to minimise the consequences of such events, should they occur. The training programme shall be compatible with the National Aviation Security programme. Individual crew member shall have knowledge and competence of all relevant elements of the training programme.

Rev. 1

CAR-OPS 1.1245 Reporting acts of unlawful interference

Following an act of unlawful interference on board an aeroplane the commander or, in his absence the operator, shall submit, without delay, a report of such an act to the designated local Authority and the Authority in the Sultanate of Oman.

Rev. 1

CAR-OPS 1.1250 Aeroplane search procedure checklist

An operator shall ensure that there is on board a checklist of the procedures to be followed in search of a bomb or Improvised Explosive Device (IED) in case of suspected sabotage and for inspecting aeroplanes for concealed weapons, explosives or other dangerous devices where a well founded suspicion exists that the aeroplane may be the object of an act of unlawful interference. The checklist shall be supported by guidance on the appropriate course of action to be taken should a bomb or suspicious object be found and information on the least-risk bomb location specific to the aeroplane where provided by the Type Certificate holder.

Rev. 1

CAR-OPS 1.1255 Flight crew compartment security

(a) In all aeroplanes which are equipped with a flight crew compartment door, this door shall be capable of being locked, and means or procedures acceptable to the AUTHORITY shall be provided or established by which the cabin crew can notify the flight crew in the event of suspicious activity or security breaches in the cabin.

(b) From 1 November 2010, a 11 passenger-carrying aeroplanes of a maximum certificated take-off mass in excess of 45 500 kg or with a Maximum Approved Passenger Seating Configuration greater than 60 shall be equipped with an approved flight crew compartment door that is capable of

being locked and unlocked from each pilot's station and designed to meet the requirements of JAR 26.260. The design of this door shall not hinder emergency operations, as required in JAR- 26.250.

(c) In all aeroplanes which are equipped with a flight crew compartment door in accordance with sub-paragraph (b):

- (1) This door shall be closed prior to engine start for take-off and will be locked when required by security procedure or the Commander, until engine shut down after landing, except when deemed necessary for authorised persons to access or egress in compliance with National Aviation Security Programme;
- (2) Means shall be provided for monitoring from either pilot's station the area outside the flight crew compartment to the extent necessary to identify persons requesting entry to the flight crew compartment and to detect suspicious behaviour or potential threat.

Rev. 1

SECTION 2

ADVISORY CIRCULARS, ACCEPTABLE MEANS OF COMPLIANCE AND INTERPRETATIVE/
EXPLANATORY MATERIAL (AMC & IEM)

AC/AMC/IEM B – GENERAL

AC to Appendix 1 to CAR OPS 1.005 (a) Operations of performance class B aeroplanes

See Appendix 1 to CAR OPS 1.005(a)

- 1 CAR OPS 1.037; Safety Management System.
For operations of performance class B aeroplanes, a simplified programme is sufficient which may consist of the following.
Collecting case based material (such as accident reports relating to the type of operation) and submit/distribute that information material to the crew members concerned; or
Collection and use of information from flight safety seminars (such as AOPA flight safety seminars etc.)
- 2 Appendix 2 to CAR OPS 1.175; The management and organisation of an AOC holder
Supervision - The supervision of personnel may be undertaken by the appropriate nominated postholder(s) subject to time available.
- 3 CAR OPS 1.1070; MME – Maintenance Management Exposition:
The MME can be simplified as relevant to the operation to be conducted.
- 4 Subpart R; Transport of Dangerous goods by air
CAR OPS 1.1145, 1.1155, 1.1160, 1.1165, 1.1215, 1.1220 and 1.1225 are applicable to all operators. The requirement in CAR OPS 1.1165 may be fulfilled by the use of information pamphlets. The remainder of this Subpart applies only when the operator seeks or holds an approval to carry dangerous goods.

The requirement in CAR OPS 1.1165 may be fulfilled by the use of information pamphlets
- 5 Subpart S; Security
CAR OPS 1.1235 - Security requirements are applicable when operating in states where the national security programme applies to the operations covered in this Appendix.
CAR OPS 1.1240 - Training programmes shall be adapted to the kind of operations performed. A self-study training programme may be acceptable for VFR operations.
- 6 Appendix 1 to CAR OPS 1.005(a), subparagraph (a)(3)
Civil twilight ends in the evening when the centre of the sun's disc is 6 degrees below the horizon and begins in the morning when the centre of the sun's disc is 6 degrees below the horizon.
- 7 CAR OPS 1.290(b)(2)
Where a Configuration Deviation List (CDL) is provided for aeroplanes of this size, it is included in the Aeroplane Flight Manual (AFM) or an equivalent document.

AMC OPS 1.035 Quality System

See CAR OPS 1.035

1 Introduction

1.1 In order to show compliance with CAR OPS 1.035, an operator should establish his Quality System in accordance with the instructions and information contained in the following 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 corrective 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 CAR OPS 1 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 organisation. With regard to the text in CAR OPS 1.175 (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 Accountable Manager will have overall responsibility for the AOC holder's 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 CAR OPS 1, the Operations Manual, the Operator's 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 aeroplanes, as required by CAR OPS 1.035(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 and, as necessary, any sub-contractor'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 operational 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 CAR-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;
 - 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 corrective action is not completed within an appropriate timescale.
 - 3.3 Relevant Documentation
 - 3.3.1 Relevant documentation includes the relevant part 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. Operational procedures to ensure regulatory compliance;
 - g. Accident Prevention and Flight Safety Programme;
 - h. The Quality Assurance Programme, reflecting;
 - i. Schedule of the monitoring process;
 - ii. Audit procedures;

- iii. Reporting procedures;
 - iv. Follow-up and corrective action procedures;
 - v. Recording system;
 - i. The training syllabus; and
 - j. Document control.
- 4 Quality Assurance Programme (See CAR OPS 1.035(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 operational 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 operational 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 operations;
 - b. Ground De-icing/Anti-icing;
 - 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 operational procedures say it should be conducted.
- 4.3.2 Audits should include at least the following quality 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 operational 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. Aircraft Performance;
 - h. All Weather Operations;
 - i. Communications and Navigational Equipment and Practices;
 - j. Mass, Balance and Aircraft Loading;
 - k. Instruments and Safety Equipment;
 - l. Manuals, Logs, and Records;
 - m. Flight and Duty Time Limitations, Rest Requirements, and Scheduling;
 - n. Aircraft 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;
- v. Dangerous Goods;
- w. Security;
- 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 an interval between audits 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 quality 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 quality 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;
 - 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 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 by the management of the quality system, operational policies and procedures, and should consider:

- a. The results of quality inspections, audits and any other indicators;
- 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.

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

- a. Audit Schedules;
- b. Quality 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;
- f. Manual preparation.

- 5.1.2 The ultimate responsibility for the product or service provided by the sub-contractor always remains with the operator. A written agreement should exist between the operator and the sub-contractor clearly defining the safety related services and quality to be provided. The sub-contractor's safety related 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 briefing for all personnel.
- 6.1.2 Those responsible for managing the Quality System should receive training covering:
- An introduction to the concept of the Quality System;
 - Quality management;
 - The concept of Quality Assurance;
 - Quality manuals;
 - Audit techniques;
 - Reporting and recording; and
 - 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 20 seats) and by mass (greater or less than 10 tonnes Maximum Take-Off Mass). 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 quality 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

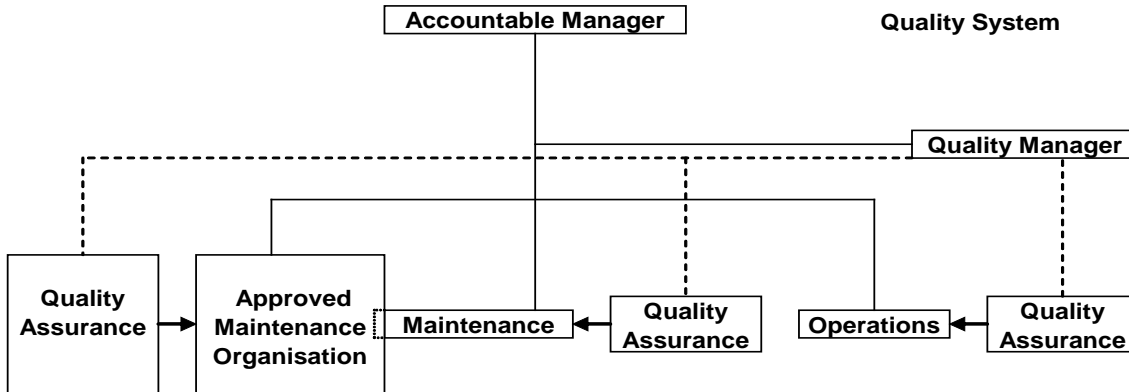
- 7.3.1 For small and very small operators it may be appropriate to develop a Quality Assurance Programme that employs a checklist. The checklist should have a supporting schedule that requires completion of all checklist items within a specified timescale, together with a statement acknowledging completion 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 use internal or external auditors or a combination of the two. In these circumstances it would be acceptable for external specialists and or qualified organisations to perform the quality audits on behalf of the Quality Manager.
- 7.3.3 If the independent quality audit function is being conducted by external auditors, the audit schedule should be shown in the relevant documentation.
- 7.3.4 Whatever arrangements are made, the operator retains the ultimate responsibility for the quality system and especially the completion and follow-up of corrective actions.

IEM OPS 1.035 Quality System – Organisation examples

See CAR OPS 1.035

The following diagrams illustrate two typical examples of Quality organisations.

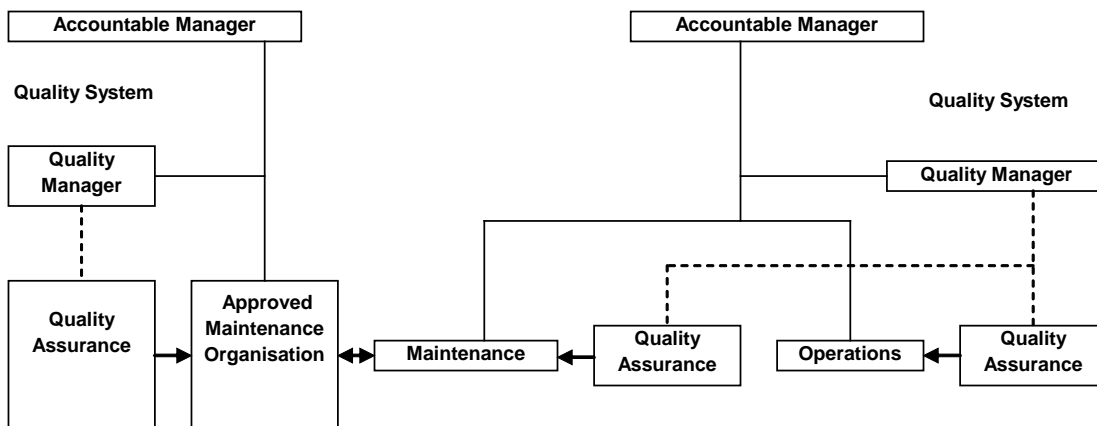
1. Quality System within the AOC holder’s organisation when the AOC holder also holds a AMO approval.



2. Quality Systems related to an AOC holder’s organisation where aircraft maintenance is contracted out to a approved organisation which is not integrated with the AOC/Authorisation holder:

Approved Maintenance Organisation

AOC Holder Organisation



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

AC OPS 1.037(a)(2) Occurrence Reporting Scheme

See CAR OPS 1.037(a)(2)

1. The overall objective of the scheme described in CAR OPS 1.037(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 CAR OPS 1.420.)
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.

AC OPS 1.037(a)(4) Flight Data Monitoring Programme

See CAR OPS 1.037(a)(4)

1. Flight Data Monitoring (FDM) is the pro-active and non-punitive use of digital flight data from routine operations to improve aviation safety.
2. The manager of the accident prevention and flight safety programme, which includes the FDM programme, is accountable for the discovery of issues and the transmission of these to the relevant manager(s) responsible for the process(es) concerned. The latter are accountable for taking appropriate and practicable safety action within a reasonable period of time that reflects the severity of the issue.

Note: While an operator may contract the operation of a flight data analysis programme to another party the overall responsibility remains with the operator's accident prevention and flight safety programme manager.

3. An FDM programme will allow an operator to:
 - 3.1 Identify areas of operational risk and quantify current safety margins.
 - 3.2 Identify and quantify operational risks by highlighting when non-standard, unusual or unsafe circumstances occur.
 - 3.3 Use the FDM information on the frequency of occurrence, combined with an estimation of the level of severity, to assess the safety risks and to determine which may become unacceptable if the discovered trend continues.
 - 3.4 Put in place appropriate procedures for remedial action once an unacceptable risk, either actually present or predicted by trending, has been identified.
 - 3.5 Confirm the effectiveness of any remedial action by continued monitoring.
4. Flight Data Monitoring Analysis Techniques:
 - 4.1 Exceedence Detection: This looks for deviations from flight manual limits, and standard operating procedures. A set of core events should be selected to cover the main areas of interest to the operator. A sample list is in the Appendix. The event detection limits should be continuously reviewed to reflect the operator's current operating procedures.
 - 4.2 All Flights Measurement: A system that defines what is normal practice. This may be accomplished by retaining various snapshots of information from each flight.
 - 4.3 Statistics: A series of measures collected to support the analysis process. These would be expected to include the numbers of flights flown and analysed, aircraft and sector details sufficient to generate rate and trend information.
5. Flight Data Monitoring Analysis, Assessment and Process Control Tools: The effective assessment of information obtained from digital flight data is dependant on the provision of appropriate information technology tool sets. A programme suite may include: Annotated data trace displays, engineering unit listings, visualisation for the most significant incidents, access to interpretative material, links to other safety information, and statistical presentations.

6. Education and Publication: Sharing safety information is a fundamental principle of aviation safety in helping to reduce accident rates. The operator should pass on the lessons learnt to all relevant personnel and, where appropriate, industry. Similar media to air safety systems may be used. These may include: Newsletters, flight safety magazines, highlighting examples in training and simulator exercises, periodic reports to industry and the regulatory Authority.
7. Accident and incident data requirements specified in CAR OPS 1.160 take precedence over the requirements of an FDM programme. In these cases the FDR data should be retained as part of the investigation data and may fall outside the de-identification agreements.
8. Every crew member has a responsibility to report events described in CAR OPS 1.085(b) using the company occurrence reporting scheme detailed in CAR OPS 1.037(a)(2). Mandatory Occurrence Reporting is a requirement under CAR OPS 1.420. Significant risk-bearing incidents detected by FDM will therefore normally be the subject of mandatory occurrence reporting by the crew. If this is not the case then they should submit a retrospective report that will be included under the normal accident prevention and flight safety process without prejudice.
9. The data recovery strategy should ensure a sufficiently representative capture of flight information to maintain an overview of operations. Data analysis should be performed sufficiently frequently to enable action to be taken on significant safety issues.
10. The data retention strategy should aim to provide the greatest safety benefits practicable from the available data. A full data set should be retained until the action and review processes are complete; thereafter, a reduced data set relating to closed issues can be maintained for longer term trend analysis. Programme managers may wish to retain samples of de-identified full-flight data for various safety purposes (detailed analysis, training, benchmarking etc.).
11. Data Access and Security policy should restrict information access to authorised persons. When data access is required for airworthiness and maintenance purposes, a procedure should be in place to prevent disclosure of crew identity.
12. Procedure Document; this document signed by all parties (airline management, flight crew member representatives nominated either by the union or the flight crew themselves) will, as a minimum, define:
 - a) The aim of the FDM programme.
 - b) A data access and security policy that should restrict access to information to specifically authorised persons identified by their position.
 - c) The method to obtain de-identified crew feedback on those occasions that require specific flight follow-up for contextual information; where such crew contact is required the authorised person(s) need not necessarily be the programme manager, or safety manager, but could be a third party (broker) mutually acceptable to unions or staff and management.
 - d) The data retention policy and accountability including the measures taken to ensure the security of the data.
 - e) The conditions under which, on rare occasions, advisory briefing or remedial training should take place; this should always be carried out in a constructive and non-punitive manner.
 - f) The conditions under which the confidentiality may be withdrawn for reasons of gross negligence or significant continuing safety concern.
 - g) The participation of flight crew member representative(s) in the assessment of the data, the action and review process and the consideration of recommendations.
 - h) The policy for publishing the findings resulting from FDM.
13. Airborne systems and equipment used to obtain FDM data will range from an already installed full Quick Access Recorder, in a modern aircraft with digital systems, to a basic crash protected recorder

in an older or less sophisticated aircraft. The analysis potential of the reduced data set available in the latter case may reduce the safety benefits obtainable. The operator shall ensure that FDM use does not adversely affect the serviceability of equipment required for accident investigation.

IEM OPS 1.065 Carriage of weapons of war and munitions of war

See CAR OPS 1.065

- 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 OPS 1.070.)

IEM OPS 1.070 Carriage of sporting weapons

See CAR OPS 1.070

- 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 OPS 1.065). 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 OPS 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 an aeroplane.
- 5 Other procedures for the carriage of sporting weapons may need to be considered if the aeroplane 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 CAR OPS 1.070(b)(1) are applied, the commander should be notified accordingly.

AC OPS 1.085(e)(3) Crew responsibilities

See CAR OPS 1.085(e)(3)

Information on the effects of medication, drugs, other treatments and alcohol, is to be found in CAR FCL Part 3 Medical, IEM FCL 3.040.

AMC OPS 1.130 Manuals to be carried

See CAR OPS 1.130 (a) (1)

The carriage of an approved electronic version of the Operations Manual is acceptable.

AC OPS 1.160(a)(1) and (2) Preservation of Recordings

See CAR OPS 1.060(a)(1) and (2)

In CAR OPS 1.160(a)(1) and (2), 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 aeroplane may have been despatched with unserviceable recording equipment as permitted by the MEL Policy.

Appendix to AC OPS 1.037 (a)(4)

The following table provides examples of FDM events that may be further developed using operator and aeroplane specific limits. The table is considered illustrative and not exhaustive.

Event Group	Description
Rejected take-Off	High Speed Rejected take-off
Take-off Pitch	Pitch rate high on take-off Pitch attitude high during take-off
Unstick Speeds	Unstick speed high Unstick speed low
Height Loss in Climb-out	Initial climb height loss 20 ft AGL to 400 ft AAL Initial climb height loss 400 ft to 1 500 ft AAL
Slow Climb-out	Excessive time to 1 000 ft AAL after take-off
Climb-out Speeds	Climb out speed high below 400 ft AAL Climb out speed high 400 ft AAL to 1 000 ft AAL Climb out speed low 35 ft AGL to 400 ft AAL Climb out speed low 400 ft AAL to 1 500 ft AAL
High Rate of Descent	High rate of descent below 2 000 ft AGL
Go-around	Go-around below 1 000 ft AAL Go-around above 1 000 ft AAL
Low Approach	Low on approach
Glideslope	Deviation under glideslope Deviation above glideslope (below 600 ft AGL)
Approach Power	Low power on approach
Approach Speeds	Approach speed high within 90 sec of touchdown Approach speed high below 500 ft AAL Approach speed high below 50 ft AGL Approach speed low within 2 minutes of touchdown
Landing Flap	Late land flap (not in position below 500 ft AAL) Reduced flap landing
Landing Pitch	Flap load relief system operation Pitch attitude high on landing Pitch attitude low on landing
Bank Angles	Excessive bank below 100 ft AGL Excessive bank 100 ft AGL to 500 ft AAL Excessive bank above 500 ft AGL Excessive bank near ground (below 20 ft AGL)
Normal Acceleration	High normal acceleration on ground

	High normal acceleration in flight flaps up (+/- increment)
	High normal acceleration in flight flaps down(+/- increment)
Abnormal Configuration	High normal acceleration at landing
	Take-off configuration warning
	Early configuration change after take-off (flap)
	Speed brake with flap
	Speedbrake on approach below 800 ft AAL
Ground Proximity Warning	Speedbrake not armed below 800 ft AAL
	GPWS operation - hard warning
	GPWS operation - soft warning
	GPWS operation - windshear warning
	GPWS operation - false warning
TCAS Warning	TCAS operation – Resolution Advisory
Margin to Stall/Buffer	Stickshake
	False stickshake
	Reduced lift margin except near ground
	Reduced lift margin at take-off
	Low buffet margin (above 20 000 ft)
Flight Manual Limitations	Vmo exceedence
	Mmo exceedence
	Flap placard speed exceedence
	Gear down speed exceedence
	Gear selection up/down speed exceedence
	Flap/ Slat altitude exceedence
	Maximum operating altitude exceedence

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AC/AMC/IEM C – OPERATOR CERTIFICATION & SUPERVISION**IEM OPS 1.175 The management organisation of an AOC/Authorisation holder**

See CAR OPS 1.175(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 OPS Part 1 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 OPS 1.175(c)(2) Principal place of business

See CAR OPS 1.175(c)(2)

- 1 CAR OPS 1.175(c)(2) requires an operator to have his principal place of business located in Oman.
- 2 In order to ensure proper jurisdiction over the operator, the term 'principal place of business' is interpreted as meaning the State in which the administrative headquarters and the operator's financial, operational and maintenance management are based.

AC OPS 1.175(i) Nominated Postholders – Competence

See CAR OPS 1.175(i)

1. General. Nominated Postholders should, in the normal way, be expected to satisfy the Authority that they possess the appropriate experience and licensing requirements which are listed in paragraphs 2 to 6 below. In particular cases, and exceptionally, the Authority may accept a nomination which does not meet the requirements in full but, in this circumstance, the nominee should be able to demonstrate experience which the Authority will accept as being comparable and also the ability to perform effectively the functions associated with the post and with the scale of the operation.
2. Nominated postholders should have:
 - 2.1 Practical experience and expertise in the application of aviation safety standards and safe operating practices;
 - 2.2 Comprehensive knowledge of:
 - a. OPS 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;
 - 2.3 Familiarity with Quality Systems;

- 2.4 Appropriate management experience in a comparable organisation; and
- 2.5 Five years relevant work experience of which at least two years should be from the aeronautical industry in an appropriate position.
3. Flight Operations. The nominated postholder or his deputy should hold a valid Flight Crew Licence appropriate to the type of operation conducted under the AOC in accordance with the following:
 - 3.1 If the AOC/Authorisation includes aeroplanes certificated for a minimum crew of 2 pilots - An Airline Transport Pilot's Licence issued or validated by the Authority:
 - 3.2 If the AOC/Authorisation is limited to aeroplanes certificated for a minimum crew of 1 pilot - A Commercial Pilot's Licence, and if appropriate to the operation, an Instrument Rating issued or validated by the Authority.
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 aircraft.
 - 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/class operated under the AOC/Authorisation.
 - 5.1 The nominated Postholder should have a thorough knowledge of the AOC/Authorisation 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/Authorisation holder's ground operations concept.
7. Security. The nominated postholder should have a thorough knowledge of the National Civil Aviation Security Programme, the operator's security programme, security training requirements and threat assessment.

AC OPS 1.175(j) Combination of nominated postholder's responsibilities

See CAR OPS 1.175(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 CAR OPS 1.175 is neither to prescribe any specific organisational hierarchy within the operator's organisation nor to prevent an Authority from requiring a certain hierarchy before it is satisfied that the management organisation is suitable.

AC OPS 1.175(j) & (k) Employment of staff

See CAR OPS 1.175(j) & (k)

In the context of CAR OPS 1.175(j) & (k), the expression "full-time staff" means members of staff who are employed for not less than 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 OPS 1.185(b) Maintenance Management Exposition details

See CAR OPS 1.185(b)

- 1 The organisation's Maintenance Management Exposition should reflect the details of any sub-contract(s).
- 2 A change of aeroplane type or of the approved maintenance organisation may require the submission of an acceptable amendment to the Maintenance Management Exposition.

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AC/AMC/IEM D – OPERATIONAL PROCEDURES**AC OPS 1.195 Operational Control**

See CAR OPS 1.195

- 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.
- 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.

AC OPS 1.205 Competence of Operations personnel

See CAR OPS 1.205

If an operator employs Flight Operations Officers in conjunction with a method of Operational Control as defined in CAR OPS 1.195, training for these personnel should be based on relevant parts of ICAO Doc 7192 D3. This training should be described in Subpart D of the Operations Manual.

AMC OPS 1.210(a) Establishment of procedures

See CAR OPS 1.210(a)

- 1 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.
- 2 An operator should specify procedures to be followed by cabin crew with respect to:
 - a. Arming and disarming of slides;
 - b. The operation of cabin lights, including emergency lighting;
 - c. The prevention and detection of cabin, oven and toilet fires;
 - d. Action to be taken when turbulence is encountered; and
 - e. Actions to be taken in the event of an emergency and/or an evacuation.

IEM OPS 1.210(b) Establishment of procedures

See CAR OPS 1.210(b)

When an operator establishes procedures and a checklist system for use by cabin crew with respect to the aeroplane 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.	X			
3. Security checks as required by Subpart S (CAR OPS 1.1250).	X			X
4. Supervision of passenger embarkation and disembarkation (CAR OPS 1.075; CAR OPS 1.105; CAR OPS 1.270; CAR OPS 1.280; CAR OPS 1.305).	X			X
5. Securing of passenger cabin (e.g. seat belts, cabin cargo/baggage etc.(CAR OPS 1.280; CAR OPS 1.285; CAR OPS 1.310).	X		X	
6. Securing of galleys and stowage of equipment (CAR OPS 1.325).	X		X	
7. Arming of door slides.	X		X	
8. Safety information to passengers (CAR OPS 1.285).	X	X	X	X
9. 'Cabin secure' report to flight crew.	X	if required	X	
10. Operation of cabin lights.	X	if required	X	
11. Cabin crew at crew stations for take-off and landing.(CAR OPS 1.310, CAR OPS 1.210(c)/IEM OPS 1.210(c)).	X		X	X
12. Surveillance of passenger cabin.	X	X	X	X
13. Prevention and detection of fire in the cabin (including the combi-cargo area), crew rest areas, galleys and toilets and instructions for actions to be taken.	X	X	X	X
14. Action to be taken when turbulence is encountered or in-flight incidents (pressurisation failure, medical emergency etc.). (See also CAR OPS 1.320 and CAR OPS 1.325).		X		
15. Disarming of door slides.				X
16. Reporting of any deficiency and/or unserviceability of equipment and/or any incident (See also CAR OPS 1.420).	X	X	X	X

AC OPS 1.216 In-flight Operational Instructions

See CAR OPS 1.216

When co-ordination with an appropriate Air Traffic Service unit has not been possible, in-flight operational instructions do not relieve a commander of responsibility for obtaining an appropriate clearance from an Air Traffic Service unit, if applicable, before making a change in flight plan.

AC OPS 1.243 Operations in areas with specified navigation performance requirements

See CAR OPS 1.243

The equipment carriage requirements, operational and contingency procedures and operator approval requirements relating to areas, portions of airspace or on routes where navigation performance requirements have so far been specified can be found in the following documentation:

- a. For the North Atlantic MNPS - ICAO document Doc 7030/4 Regional Supplementary Procedures (NAT Supps)
- b. For RVSM in the North Atlantic and Europe (ECAC States) - Doc 7030/4 (NAT and EUR Supps)
- c. For General Guidance on Required Navigation Performance (RNP) Operations - ICAO Doc 9613
- d. For European RNAV (ECAC States) - Doc 7030/4 (EUR Supps)
- e. JAA TGL 2 (*Note this is now in the GAI 20 Series as AMC 20-4*) – B-RNAV (ECAC States)
- f. JAA TGL 10 – P-RNAV (ECAC States)
- g. JAA GAI 20 - AMJ 20X9 "Recognition of FAA Order 8400.12A for RNP 10 Operations"
- h. Eurocontrol Standard Document 009-93 (RNAV Operations)

[PERFORMANCE BASED NAVIGATION (RNAV and RNP Navigation specifications and operations)**1 Introduction**

- 1.1 In recent years there have been a number of developments in the use of aircraft RNAV systems either requiring or not requiring on board monitoring and alerting. In particular these applications have been used for departure, arrival and final approach to landing. In response to these developments THE AUTHORITY is producing guidance material for operators engaged in any form of ICAO Performance Based Navigation (RNAV and RNP Navigation Specifications).
- 1.2 The purpose of this Directive is to direct the attention of AOC holders to guidance material which covers training, operational issues and operational approval requirements for RNAV or RNP operations and similar Flight Management System (FMS) managed navigation procedures.
- 1.3 Currently no Omani operators have experience in Performance Based Navigation operations, especially those of RNP requiring the use of onboard monitoring and alerting. It is therefore essential that any operator intending to introduce these operations contact THE AUTHORITY at the earliest opportunity.
- 1.4 Operators are reminded that CAR OPS 1.243 (Operations in areas with specified navigation performance requirements) requires that the operator holds operational approvals. When issued, these will form part of the operators Air Operator's Certificate under Operations Specifications.

2 Issue

- 2.1 The document provides guidance on flight crew training, operational issues (e.g. MEL / operational requirements) and operational approval requirements for Performance Based Navigation operations. It provides a clear statement of the terminology related to RNAV. It addresses en-route continental airspace and terminal area operations as well the use of RNAV systems to fly procedures based on conventional ground navigational aids (overlays). It does not cover long-range navigation, RNAV 10 (RNP-10), RNP 4 or North Atlantic Minimum Navigation Performance Specification (MNPS) operations.

3 Performance Based Navigation (PBN) Operations

- 3.1 The ICAO Resolution at the 36th Assembly and the publication of ICAO's PBN Concept in 2008 effectively triggered the launch of PBN. The ICAO Resolution was a significant step in that it reflects international concordance as to high-level goals and ambitions for global uptake of PBN. It reads as follows:
- a. where RNAV operations are required, **enroute** (oceanic and continental) and **terminal** ATS routes should be implemented according to PBN by 2016, with intermediate milestones as follows:
 1. **enroute** oceanic and remote continental airspace (RNAV10 or RNP 4): 100 per cent implementation
 2. by 2010;
 3. **enroute** continental airspace (RNAV 5, 2 and 1): 70 per cent by 2010, 100 per cent by 2014; and
 4. **terminal** area (RNAV 2 and 1, and Basic RNP 1): 30 per cent by 2010, 60 per cent by 2014, 100 per cent by 2016; and
 - b. all instrument runway ends should have an approach procedure with vertical guidance (APV), either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014.
- 3.2 All operators wishing to conduct any Performance Based Navigation operations involving Navigation Specifications (NS) discussed in this AC, including managed non-precision approach procedures shall:
- A. Contact the Authority for approval prior to such commencement;
 - B. Review their current documentation and procedures to ensure the correct use of PBN terminology;
 - C. Review current RNAV procedures and training requirements, together with their operations manual or other guidance texts, to ensure that they conform to the advice contained in the guidance material;
 - D. Follow the guidelines contained in the guidance material when developing procedures and training requirements, and when developing operations manual and other guidance; and
 - E. Consult with the aircraft manufacturer and review of manufacturer guidance material and operational procedures associated with such operations.

Appendix A

PERFORMANCE BASED NAVIGATION - GUIDANCE MATERIAL

1 Introduction

- 1.1 The purpose of this document is to provide guidance to operators on training, operational issues and operational approval requirements for area navigation (RNAV) operations and similar Flight Management Systems (FMS) managed navigation procedures. A further aim is to provide a clear statement of the terminology related to RNAV. A Glossary of Terms can be found in the **ICAO PBN Manual** (ICAO Doc 9613) available at www.icao.int/pbn.

2 Scope

- 2.1 This document provides guidance on flight crew training, operational issues and operational approval requirements for RNAV and RNP operations. It addresses en-route (RNAV 5, 2 and 1) and terminal (RNAV 2, 1 and Basic RNP 1) and final approach operations (RNP APCH and RNP AR), as well as the use of RNAV systems to fly procedures based on conventional ground navigational aids (overlays). It does not cover long-range navigation, e.g. RNAV 10 (RNP-10), RNP 4 or North Atlantic Minimum Navigation Performance Specification (MNPS) operations.

3 Performance Based Navigation (PBN) Concepts

- 3.1 Over the last 10 to 15 years the regional implementation of RNAV has led to a proliferation of area navigation descriptions, approval requirements and terms. This has resulted in confusion and has drawn criticism from aircraft manufacturers and operators alike. In 2004, the International Civil Aviation Organization (ICAO) recognized that the RNAV concepts envisaged in the mid 1980s and early 1990s were outdated and that the current global guidance material provided in the Required Navigation Performance (RNP) Manual (ICAO Document 9613) needed to be revised. ICAO published a PBN Manual in 2009 which is available at www.icao.int/pbn. This manual deals comprehensively with all PBN matters and goes a long way to rectifying existing confusion. Aircraft navigation will for the first time be harmonized globally and a process put in place for the future design of airspace based around the PBN concept.
- 3.2 Aircraft navigation has already evolved to the point where realizable benefits can be gained from PBN in the en-route, terminal airspace and final approach flight phases. The lateral performance available from modern navigation sensors (including GNSS) means that reduced separation and obstacle clearance can bring about increased capacity and greater access. The functionality of RNAV systems, some with built-in performance monitoring and alerting algorithms, enables trajectories with predictable, repeatable path definition to be flown, providing environmental relief (reduced noise and emissions) together with fuel savings from direct routings.
- 3.3 In the longer term, there is likely to be an increased dependence upon advanced PBN operations. With the continuing growth in traffic and the need to mitigate environmental impact to the greatest extent possible, PBN, together with a transition to a GNSS-based navigation environment, is the key to delivering the benefits being sought. The capability of aircraft navigation systems will evolve to meet new and developing requirements. RNP is seen as the likely enabler in the future European Air Traffic Management (ATM) concept and work is already under way to identify functional and operational requirements for both airborne systems and air traffic control system tools necessary to support this future. Within Omani terminal airspace, the goals include

evolving from today's arrival and departure procedures which just specify a lateral (2-D) accuracy requirement to a system of navigation having vertical performance (3-D) and eventually Required Time of Arrival (4-D) performance.

- 3.4 In parallel with airborne systems development, the Air Navigation Service Providers (ANSP) and their regulators are looking at the infrastructure necessary to support future CNS and ATM concepts. Further rationalization of the traditional ground-based navigation infrastructure is anticipated, leading to a navigation architecture based on GPS and Galileo GNSS constellations with Distance Measuring Equipment (DME) as a back-up.
- 3.5 At the international level, as new navigation specifications are developed they will be ratified by ICAO and then included within the PBN Manual enabling adoption as world-wide, harmonized standards.

4 Operational approval requirements for PBN operations

- 4.1 It is not always apparent to airspace users how navigation specifications fit into the overall safe and efficient use of the airspace. In particular, attention is often focused on the aircraft system accuracy requirements, whereas for the ANSP the separation standards, integrity of navigation and repeatability of adherence to the flight paths can be an equally important part of the overall safety management of the airspace. The granting of an approval to an operator provides an assurance to the ANSP that all of the navigation concept assumptions of accuracy, integrity and interoperability are met. Consequently, it may be necessary to provide additional training and oversight to meet the required level of assurance.
- 4.2 The operator will need to demonstrate that they have robust training and procedures in place to ensure compliance with the navigation specification (e.g. Basic RNP 1, RNP APCH etc.). This may require a demonstration or trial in the simulator or aircraft to the satisfaction of the Authority.

5 Aircraft eligibility

- 5.1 The on-board RNAV systems must be fit for the intended purpose. Operators must be satisfied that a particular operation is supported by an airworthiness approval reflected in the flight manual or other approved manufacturer's documentation, such as flight crew operating manual or pilot operating handbook. When approving an operator for any new PBN operation the Authority will need to be shown the evidence of airworthiness suitability.

6 Specific Approval Processes

- 6.1 Below is a brief summary of the approval requirements for specific PBN Navigation Specifications. All operators requiring a PBN NS approval shall apply to THE AUTHORITY using the special "THE AUTHORITY PBN NS Application Form". THE AUTHORITY uses the latest editions of the COSCAP PBN OPS APPROVAL HANDBOOK as a guideline in their approval process.

a) RNAV 5

Approval is required under CAR-OPS 1/2/3/4.243, conferred by an entry in the Operations Specification. Procedures and a training syllabus must be included in the Operations Manual (OM) and have been accepted by THE AUTHORITY.

b) RNAV 2/1

Approval is required under CAR-OPS 1/2/3/4.243, conferred by an entry in the Operations Specification (AOC holders only).

c) RNAV Overlays of Conventional non-precision approaches, SIDs and STARs

Use of RNAV systems to fly conventional non-precision approaches, i.e. overlays of conventional non-precision approaches and overlays of Standard Instrument Departures (SID) and Standard Arrivals (STARs).

These overlay approaches, SIDs and STARs require the conventional navigation aids, on which they are based, to be available. Unless provided for otherwise (radar monitoring etc.). Operational procedures must cover for monitoring of flight path tracking by making use of 'raw data'. In their operational procedures Operators are required to make a clear distinction between this kind of RNAV operation in relation to PBN whereby continuous 'raw data' monitoring is not required anymore..

d) Basic RNP 1

This procedure and the ones below, as mentioned under e) through f), are designed for RNAV systems with Required Navigation Performance (RNP) capability requiring onboard monitoring and alerting functions. In addition to the requirements in the reference documents mentioned under point 11, prior to using a SID based on this Navigation Specification, THE AUTHORITY must have signified acceptance of relevant engine failure procedures below MSA in a non-surveillance (radar) environment.

e) RNP APCH (RNAV (GNSS) approach operations)

Note that RNAV (GNSS) procedures have been categorized as a RNP APCH Navigation Specification (NS) under the ICAO PBN category. Conducting (GNSS) approach operations requires the Operator to have been issued with the RNP APCH NS on their Operations Specification. Approval depends on the detail of the changes to operational procedures, operations manual entries, Minimum Equipment List (MEL) and the training syllabus, together with a plan for identification of hazards and the management of the risks associated with the introduction of the new approach type. The NS RNP APCH will also indicate the lowest final approach minimum allowed for (LNAV - LNAV/VNAV (Baro-VNAV) or LPV).

f) RNP Authorization Required (RNP AR)

Flight crews operating on these procedures will require additional training over and above that required for RNAV (GNSS). In the United States these procedures are referred to as Special Aircraft and Aircrew Authorization Required (SAAAR) (see FAA AC 90-101).

An operator wishing to fly these approaches shall make a submission to the Authority. This submission should detail the changes to operational procedures, operations manual entries, MEL and the training syllabus, together with a plan for identification of hazards and the management of the risks associated with the introduction of the new approach type. The Operations Specification will be annotated to include RNP AR.

Note: Currently no Omani operators have experience with PBN operations requiring NSs based on RNP. It is therefore essential that any operator intending to introduce these operations contact THE AUTHORITY, at the

earliest opportunity.

7 Implementation considerations

- 7.1 When producing documents and procedures to support the introduction of PBN operations the following list may prove useful to an operator. The list is not exhaustive.
- a. Introduction – examining the application of differing navigation procedures.
 - b. Definitions – an explanation of RNAV terms, relating them to the standard terms, and how they are used as part of the operating procedures. The ICAO PBN Manual has an extensive list of definitions and terminology.
 - c. Hazard analysis leading to a plan for the management of risks associated with the introduction of the new navigation procedures.
 - d. Aircraft installation – overview of the systems incorporated within the aircraft.
 - e. Aircraft navigation – explanation of the aircraft navigation systems.
 - f. GPS/FMS – general overview of the on-board navigation system and satellite constellation (if used) or general reference to aircraft systems for maintaining accuracy. Where applicable, implications of the availability of the satellite navigation constellation on navigation accuracy should be detailed.
 - g. MEL – dispatch requirements and the effects on navigation due to system failures.
 - h. Navigation database production – requirements for Letter of Acceptance from database supplier and quality assurance requirements.
 - i. Feedback procedures for reporting RNAV deficiencies to the operator’s department responsible for navigation database and, if appropriate, onwards transmission to database supplier.
 - j. PBN operational procedures – Manufacturer’s Standard Operating Procedures (SOPs) or approved operator defined procedures.
 - k. Briefing of the procedure prior to commencement – particularly important with respect to approach operations.
 - l. Charting/FMS database consistency – procedures to detect potential discrepancies.
 - m. ATC and R/T phraseology – introduction to the ATC environment and R/T procedures (see ICAO Doc 7030 ICAO Regional Supplementary Procedures).
 - n. Abnormal procedures – contingency identification and actions to be taken.
 - o. Procedures for the application of PBN aerodrome operating minima.
 - p. Flight crew training – training requirements for all types of PBN operation.

8 Equipment Requirements

- 8.1 A generic guide for PBN equipment requirements can be found in **Appendix B**. This list gives guidelines on minimum equipment considered necessary for specific PBN operational procedures / Navigation Specifications, including dispatch. This list has been derived from the reference material mentioned under point 11.

9 Navigation Database

- 9.1 The correct coding of the navigation database is fundamental to all RNAV operations. The use of a coded flight procedure must enable the aircraft to follow the published profile with the required integrity and accuracy without an increase in pilot workload.
- 9.2 Listed below are a number of points to help ensure the adequacy of the navigation database. The list is not exhaustive, nor is it expected that all of the items must be achieved for all RNAV operations. However, where the consequence of the aircraft not adhering to the flight procedure poses a greater risk to the aircraft, such as RNAV final approach, then all five elements should be considered:

- a. The navigation database should be supplied from an ED-76/DO-200A qualified entity;
- b. The operator should apply the quality process required by JAR-OPS 1/3.035 in relation to the navigation database supplier;
- c. The operator should perform spot checks of the navigation database against the published procedures, concentrating on higher risk elements and changes. Use can be made of software tools;
- d. PBN navigation procedures, when identified as novel, complex or in close proximity to mountainous terrain, should be flown in the simulator and trialed in the aircraft to ensure that the operator's aircraft can adhere to the procedure;
- e. There should be a feedback system in place, which includes the database supplier, to ensure that anomalies are reported swiftly and erroneous procedures withdrawn.

Note: The JAA has recently completed a public consultation proposing to include specific rule material in JAR-OPS 1/EU-OPS relating to the management of electronic navigation data for all airborne navigation applications. These proposed rules mirror ICAO Standards and Recommended Practices. Future updates to this document will include these proposals.

10 Training

- 10.1 In addition to the reference material mentioned under point 11 a modular guide for PBN training can be found in **Appendix C**. These details the minimum training the Authority considers necessary for specific PBN operational procedures / Navigation Specifications.
- 10.2 The guide includes a basic package of training applicable to all PBN operations. There are then four additional training modules for the various types of PBN operation considered. Initially, the basic training package must be completed along with one other individual module. Thereafter additional modules can be added as necessary. It should be noted that pilots previously experienced in RNAV operations with a JAA operator can be considered to have met the training requirement for RNAV 5.
- 10.3 The training in the use of RNAV systems to fly conventional non-precision approaches (NDB, VOR, etc.) referred to as overlay procedures is specified separately. However, because this method of flying contains elements identical to that of flying an PBN final approach, credit can be taken when both these operations are trained together, or sequentially. If credit for training in both of these operations is taken, operators should ensure that, where feasible, procedures for using RNAV equipment to fly conventional non-precision approaches mirror those used for PBN final approaches.
- 10.4 In addition to specific flight crew training (as mentioned above), training packages should emphasize any relevant airspace management issues, e.g. compliance with relevant speed and altitude constraints associated with a procedure (see paragraphs 3.2 and 3.3 above). Specific instructions may be necessary for configuration of the aircraft under either manual or automatic control to ensure adherence to the nominal path, e.g. departure procedure turns. Finally, consideration should be given within flight crew SOPs for handling potential last minute runway changes.
- 10.5 PBN training may be integrated into initial aircraft conversion training programs. The requirements for RNP AR training will be added at a later date.

11 Reference Material

- 11.1 The Authority uses the following documents as a reference in their PBN approval process;
 1. ICAO Doc 9613 (PBN Manual)

2. COSCAP PBN OPS APPROVAL HANDBOOK
3. JAA AMC 20-27 RNP APCH including Baro-VNAV
4. IATA Guidelines for PBN Operational Approval

Appendix B

MINIMUM EQUIPMENT/FUNCTIONS REQUIRED FOR AREA NAVIGATION (RNAV) WITH FMS EQUIPT AIRCRAFT IN CONFORMANCE TO THE APPLICABLE NAVIGATION SPECIFICATION (NS) AS DEPICTED IN ICAO DOC. 9613 (PBN MANUAL)

PBN NAVSPEC	RNP APCH	Basic RNP 1	RNAV 1 & 2	RNAV 5	RNP 4	RNAV 10 (RNP 10)
LRN	-	-	-	-	2 ²	2 ²
RNAV system FMS, FMC(S) etc.	1 ¹	1 ¹	1 ^{1,4}	1 ^{1,4}	- ¹	- ¹
(M)CDU	1 ^{1,3}	1 ^{1,3}	1 ³	1	2	2
GNSS receiver	1 ¹	1 ¹	- ⁴	- ⁴	1 ¹	- ²
GNSS FDE Function	1 ⁹	1 ⁹	-	-	1 ⁹	1 ⁹
GNSS Integrity Alert Function	Required ⁹	Required ⁹	-	-	Required ⁹	-
IRU	1 ¹	1 ¹	- ⁴	- ^{4,6}	2	2 ^{2,7}
DME Receiver	- ¹	- ¹	- ⁴	- ⁴	- ¹	-
FMC(S) Navigation Database	Must be current	Must be current	Must be current	- ⁵	Must be current	- ⁵
AP / FD	1 ³	1 ³	1 ³	-	1	-
RNAV System FAIL Indication	1 ¹	1 ¹	1 ¹	1 ¹	-	-
ND MAP Mode	2	2	-	-	-	-

- Means no minimum number specified. Other (NS) or MEL requirements may be applicable for same flight.

- ¹ RNAV primary means of navigation requires 2 FMC's, 2 CDU's, 2 IRU's in NAV mode and multi sensor system input from IRU, radio or GNSS systems. Where multi sensor system input from a radio system is not available, sensor system input from 2 IRU or GNSS systems is required (see also ⁷).

Remark: RNAV primary means of navigation requirements are applicable to operations in oceanic airspace, remote continental airspace and (parts of) those routes where radio navigational aids coverage is not available as well when flying a PBN navigation application procedure under IFR in a non-radar environment below MSA.

Remark: If for RNP APCH the effect of radio updating in a reversionary mode cannot be established, radio updating should be selected off or disabled.

- ² LRN (Long Range Navigation) equipment can consist of either an;
- INS,
 - IRS in NAV mode,
 - GNSS or GNSS/IRS (IRS updated by GNSS).

See also ⁷.

Remark: RNAV primary means of navigation complies with the requirement of 2 LRN's.

- ³ Unless part of the primary field of view, numeric x-track deviation indication may be provided by the CDU (-.- - NM) provided AP is engaged or FD is used.

- ⁴ The RNAV system sensor input may be based on either one of the below, or a combination thereof:
- DME/DME
 - DME/DME/IRU
 - GNSS (including GNSS/IRU)

Remark: RNAV 5 may also use VOR/DME sensor input

- ⁵ Manual entries of waypoints is permitted / Storage of a minimum of 4 waypoints is required / If not current, operations are limited to not below the minimum obstacle clearance altitude.

- ⁶ With INS/IRS only, max 2 hrs from last ground position update.

- ⁷ With IRU system sensor input only, max 6.2 hrs from last ground alignment position update, 5.9 hrs from last DME/DME update or 5.7 hrs since last VOR/DME radio update.

- ⁸ FDE (Fault Detection and Exclusion) function is not required in case of FMC(S) multi sensor system input, see also ⁷.

- ⁹ **GNSS FDE Function:**

GNSS only or GNSS/IRS operation without FDE (Fault Detection and Exclusion), is limited to 34 min.

GNSS Integrity Alert Function:

In some RNP systems, the required level of performance is able to be maintained for some time after the loss of the GNSS signal, (normally with IRS coasting) and an alert is not annunciated until the performance is computed to have reached the relevant limit. Advanced hybrid (IRS/GNSS) integrity monitoring systems are able to provide GNSS position with integrity for long periods (e.g. 45 minutes) after a loss of the GNSS signal.

Appendix C

TYPE OF OPERATION	TRAINING REQUIRED	TRAINING METHODS	CHECKING and CURRENCY
RNAV 5	Basic PBN Concept Training; and training in the following topics: <ul style="list-style-type: none"> • Airspace where RNAV 5 is required; • Changes to charting and documents to reflect RNAV 5; • Navigational equipment required to be operational for flight in designated RNAV 5 airspace, and the limitations associated with RNAV equipment; • Use of lateral navigation mode and associated lateral control techniques; Flight planning requirements; Contingency procedures. 	Some or all of: Operations Manual content; Handouts (paper or electronic) CBT; Classroom; and Line Training.	RNAV 5 procedures to be covered by briefing or during line checks.

Note: Credit may be given/taken for previous Basic PBN Concept Training when adding a qualification for RNAV 5 operations.

TYPE OF OPERATION	TRAINING REQUIRED	TRAINING METHODS	CHECKING and CURRENCY
RNAV 2 or 1	Basic PBN Concept Training; and training in the following topics: <ul style="list-style-type: none"> • Airspace where RNAV 2 or 1 is required; • Navigational equipment required to be operational for flight in designated RNAV 2 or 1 airspace, and the limitations associated with PBN equipment including MEL issues; • Flight Planning requirements; • Charting, database and avionics issues including RNAV path terminator concepts especially: a) Use of the 'CF' path terminator; b) Use of the 'TF' path terminator; • Use of RNAV equipment including: a) Retrieving a procedure from the database, briefing the procedure, comparing it with the charted procedure and action to be taken if discrepancies are noted; b) Using the autopilot, flight director and auto throttle at different stages of the procedure; c) Flight mode annunciations; • Flying the procedure including: a) Use of lateral navigation mode and associated lateral control techniques; b) Use of vertical navigation mode and associated vertical control techniques; • Contingency procedures. 	Some or all of: Operations Manual content; Handouts (paper or electronic); CBT; Classroom; and Flight Simulator Training including: <ul style="list-style-type: none"> a) At least three RNAV 2 or 1 procedures flown by each crew to include departure and arrival; b) Failures such as map shift, sensor failure etc. 	Initial operator conversion training as per column 3. For currency Operator Proficiency Check (OPC) to include RNAV 2 or 1 arrival with abnormality (see overlay procedures).

Note: Credit may be given/taken for previous Basic PBN Concept Training when adding a qualification for RNAV 2 or 1 operations.

TYPE OF OPERATION	TRAINING REQUIRED	TRAINING METHODS	CHECKING and CURRENCY
OVERLAY	<ul style="list-style-type: none"> • Basic RNAV Concept Training; and training in the following topics: <ul style="list-style-type: none"> • Definition and concept of overlay procedures; • Limitations on using overlay procedures; • Precedence of raw data; • Display management; • Required navigation equipment for overlay procedures including MEL issues; • Limitations on the use of vertical navigation modes; • Retrieving a conventional approach procedure from the database, briefing the procedure, comparing it with the charted procedure and action to be taken if discrepancies are noted; • Flying the procedure: a) Use of autopilot, auto throttle and flight director; b) AFDS mode behavior; c) Lateral and vertical path management; d) Adherence to speed and/or altitude constraints; e) The use of other aircraft navigation equipment to support track monitoring, weather and obstacle avoidance; • Contingency procedures; • Missed approach procedures. 	Some or all of: Operations Manual content; Handouts (paper or electronic); CBT; Classroom; and Flight Simulator Training (FST) including: <ul style="list-style-type: none"> a) Training to proficiency for each crew member in both PF and PNF roles according to operator procedures; b) Failures such as map shift, sensor failure etc.; c) Go-around from DH and/or an intermediate position. 	One approach with system/sensor failure as part of OPC/FST. Failure may be in either RNAV 2 or 1 arrival or overlay procedure.

Note: Credit may be given/taken for previous Basic PBN Concept Training when adding a qualification for Overlay Procedure operations.

TYPE OF OPERATION	TRAINING REQUIRED	TRAINING METHODS	CHECKING and CURRENCY
Basic RNP 1	As for RNAV 2 or 1 except with additionally an engine failure when flying a SID for which Basic RNP 1 is required.	Some or all of: Operations Manual content; •Handouts (paper or electronic); CBT; Classroom; and • Flight Simulator Training including at least one Basic RNP 1 departure procedure flown with an engine failure.	Recency: flying of at least one SID with an engine failure to which the performance requirements of Basic RNP 1 are applied.
Note: Credit may be given/taken for previous Basic PBN Concept Training when adding a qualification for Overlay Procedure operations.			

TYPE OF OPERATION	TRAINING REQUIRED	TRAINING METHODS	CHECKING and CURRENCY
RNP APCH inclusive Baro-VNAV RNAV (GNSS) APPROACH	<ul style="list-style-type: none"> • Basic PBN Concept Training; and training in the following topics: • Definition of RNAV (GNSS) approach operations; • Regulatory requirements for RNAV (GNSS) operations; • Required navigation equipment for RNAV (GNSS) approach operations: a) GPS concepts and characteristics; b) RNP/ANP requirements; c) RAIM; d) MEL; • Limitations on the use of vertical navigation modes; • Procedure characteristics: a) Chart depiction; b) Aircraft display depiction; c) Minima; • Retrieving an RNAV (GNSS) approach procedure from the database, briefing the procedure, comparing it with the charted procedure and action to be taken if discrepancies are noted; • Flying the procedure: a) Use of autopilot, auto throttle and flight director; b) AFDS mode behavior; c) Lateral and vertical path management; d) Adherence to speed and/or altitude constraints; e) The use of other aircraft equipment to support track monitoring, weather and obstacle avoidance; • The effect of temperature deviation and its compensation; • ATC procedures; • Contingency procedures; • Missed Approach procedures; <p>Baro-VNAV concept including:</p> <ol style="list-style-type: none"> 1. Altimeter setting requirements 2. Procedures for use of current QNH setting 3. SOPs for monitoring of lateral and vertical tracking with associated limits 4. High / Low temperature effects 5. Determination for use of LNAV or LNAV/VNAV minima. 6. Use of MDA minima as a decision altitude (DA) 	<p>Some or all of: Operations Manual content; Handouts (paper or electronic); CBT; Classroom; and Flight Simulator Training including:</p> <ol style="list-style-type: none"> 1. When pilot is current in flying overlay procedures: <ol style="list-style-type: none"> a) At least three RNAV (GNSS) procedures flown by each crew according to operator procedures; b) System failure leading to a go-around; 2. When pilot is not currently flying overlay procedures: <ol style="list-style-type: none"> a) At least four RNAV (GNSS) procedures flown with at least one approach each as PF and PNF; b) System failure leading to a go-around. 	<p>Recency: three approaches, one of which may be in the aircraft.</p> <p>OPC to include at least two approaches, one with system failure.</p>
Note: Credit may be given/taken for previous Basic PBN Concept Training when adding a qualification for RNP APCH (RNAV (GNSS)) operations.			

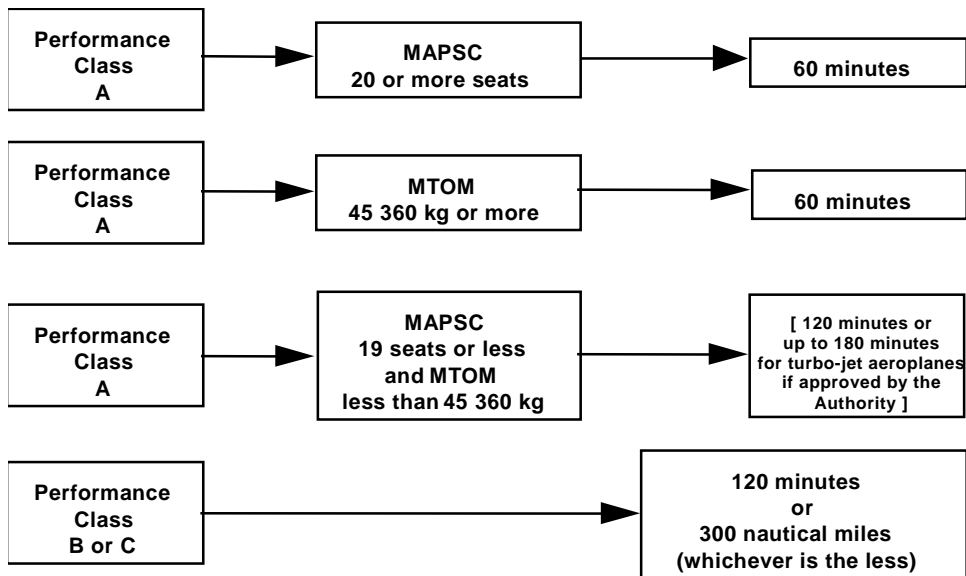
TYPE OF OPERATION	TRAINING REQUIRED	TRAINING METHODS	CHECKING and CURRENCY
RNP AR APCH	Reserved	Reserved	Reserved
<i>Note: Consult ICAO PBN Manual and JAA AMC 20</i>			

IEM OPS 1.245(a) Maximum distance from an adequate aerodrome for two-engined aeroplanes without ETOPS Approval

See CAR OPS 1.245

Notes:

1. MAPSC - Maximum Approved Passenger Seating Configuration
2. MTOM - Maximum Take-Off Mass



AMC OPS 1.245(a)(2) Operation of non-ETOPS compliant twin turbojet aeroplanes between 120 and 180 minutes from an adequate aerodrome

See CAR OPS 1.245(a)(2)

1. As prescribed in CAR OPS 1.245(a)(2), an operator may not operate a twin turbo-jet powered aeroplane having a maximum approved passenger seating configuration of 19 or less and a MTOM less than 45360Kg beyond 120 minutes from an adequate aerodrome at the one engine inoperative cruise speed calculated in accordance with CAR OPS 1.245(b) unless approved by the Authority. This 120 minute threshold may be exceeded by no more than 60 minutes. In order for operations between 120 and 180 minutes to be approved, due account should be taken of the aeroplane's design and capabilities (as outlined below) and an operator's experience related to such operations. An operator should ensure that the following items are addressed. Where necessary, information should be included in the Operations Manual and the Operator's Maintenance Management Exposition.

Note: Mention of "the aeroplane's design" in paragraph 1 above does not imply any additional Type Design Approval requirements (beyond the applicable original Type Certification requirements) before the Authority will permit operations beyond the 120 minute threshold.

2. **Systems capability** - Aeroplanes should be certificated to CS-25 as appropriate (or equivalent). With respect to the capability of the aeroplane systems, the objective is that the aeroplane is capable of a safe diversion from the maximum diversion distance with particular emphasis on operations with one engine inoperative or with degraded system capability. To this end, the operator should give consideration to the capability of the following systems to support such a diversion:
 - a. Propulsion systems - The aeroplane power plant should meet the applicable requirements prescribed in CS 25 and CS E or equivalents, concerning engine type certification, installation and system operation. In addition to the performance standards established by the Authority at the time of engine certification, the engines should comply with all subsequent mandatory safety standards specified by the Authority, including those necessary to maintain an acceptable level of reliability. In addition, consideration should be given to the effects of extended duration single engine operation (e.g. the effects of higher power demands such as bleed and electrical).
 - b. Airframe systems - With respect to electrical power, three or more reliable (as defined by CS-25 or equivalent) and independent electrical power sources should be available, each of which should be capable of providing power for all essential services (See Appendix 1). For single engine operations, the remaining power (electrical, hydraulic, pneumatic) should continue to be available at levels necessary to permit continued safe flight and landing, and to provide those services necessary for the overall safety of the passengers and crew. As a minimum, following the failure of any two of the three electrical power sources, the remaining source should be capable of providing power for all of the items necessary for the duration of any diversion. If one or more of the required electrical power sources are provided by an APU, hydraulic system or Air Driven Generator/Ram Air Turbine (ADG/RAT), the following criteria should apply as appropriate:
 - i. To ensure hydraulic power (Hydraulic Motor Generator) reliability, it may be necessary to provide two or more independent energy sources.
 - ii. The ADG/RAT, if fitted, should not require engine dependent power for deployment.
 - iii. The APU should meet the criteria in sub-paragraph c below.
 - c. APU - The APU, if required for extended range operations, should be Certificated as an essential APU and should meet the applicable CS 25 provisions or equivalent.
 - d. Fuel supply system - Consideration should include the capability of the fuel supply system to provide sufficient fuel for the entire diversion taking account of aspects such as fuel boost and fuel transfer.
3. Powerplant Events and corrective action.
 - a. All powerplant events and operating hours should be reported by the operator to the Airframe and Engine manufacturers as well as to the Authority in the State of the operator.

- b. These events should be evaluated by the operator in consultation with his Authority and with the engine and airframe manufacturers. The Authority may consult with the type design Authority to ensure that world wide data is evaluated.
- c. Where statistical assessment alone may not be applicable eg where the fleet size or accumulated flight hours are small, individual powerplant events should be reviewed on a case by case basis.
- d. The evaluation or statistical assessment, when available, may result in corrective action or the application of operational restrictions.

Note: Powerplant events could include engine shut downs, both on ground and inflight, (excluding normal training events) including flameout, occurrences where the intended thrust level was not achieved or where crew action was taken to reduce thrust below the normal level for whatever reason, and unscheduled removals.

4. Maintenance: The operator's maintenance requirements should address the following:
 - a. Release to service - A pre-departure check, additional to the pre-flight inspection required by CAR OPS 1.890(a)(1) should be reflected in the Operator's Maintenance Management Exposition. These checks should be conducted and certified by an organisation appropriately approved/accepted in accordance with CAR-145 or by an appropriately trained flight crew member prior to an extended range flight to ensure that all maintenance actions are complete and all fluid levels are at prescribed levels for the flight duration.
 - b. Engine oil consumption programmes - Such programmes are intended to support engine condition trend monitoring (see below).
 - c. Engine condition trend monitoring programme - A programme for each powerplant that monitors engine performance parameters and trends of degradation that provides for maintenance actions to be undertaken prior to significant performance loss or mechanical failure.
 - d. Arrangements to ensure that all corrective actions required by the type design Authority are implemented.
5. Flight Crew Training: Flight crew training for this type of operation should include, in addition to the requirements of CAR OPS 1 Sub part N, particular emphasis on the following:
 - a. Fuel management - Verifying required fuel on board prior to departure and monitoring fuel on board en-route including calculation of fuel remaining. Procedures should provide for an independent cross-check of fuel quantity indicators (e.g. fuel flow used to calculate fuel burned compared to indicated fuel remaining). Confirmation that the fuel remaining is sufficient to satisfy the critical fuel reserves.
 - b. Procedures for single and multiple failures in flight that may give rise to go/no-go and diversion decisions - Policy and guidelines to aid the flight crew in the diversion decision making process and the need for constant awareness of the closest suitable alternate aerodrome in terms of time.
 - c. One-engine inoperative performance data - Drift down procedures and one-engine inoperative service ceiling data.
 - d. Weather reports and flight requirements - METAR and TAF reports and obtaining in flight weather updates on en-route alternate, destination and destination alternate aerodromes. Consideration should also be given to forecast winds (including the accuracy of the forecast compared to actual wind experienced during flight) and meteorological conditions along the expected flight path at the one-engine inoperative cruising altitude and throughout the approach and landing.
 - e. Pre-departure check - Flight crew members who are responsible for the pre-departure check of an aeroplane (see paragraph 3.a above), should be fully trained and competent to do so. The training programme required, which should be approved by the Authority, should cover all relevant maintenance actions with particular emphasis on checking required fluid levels.
6. MEL - The MEL should take into account all items specified by the manufacturer relevant to operations in accordance with this AMC.
7. Dispatch/Flight Planning Requirements: The operator's dispatch requirements should address the following:

- a. Fuel and oil supply - An aeroplane should not be dispatched on an extended range flight unless it carries sufficient fuel and oil to comply with the applicable operational requirements and any additional reserves determined in accordance with sub-paragraphs (a)(i) (ii) and (iii) below.
- (i) Critical fuel scenario - The critical point is the furthest point from an alternate aerodrome assuming a simultaneous failure of an engine and the pressurisation system. For those aeroplanes that are type certificated to operate above Flight Level 450, the critical point is the furthest point from an alternate aerodrome assuming an engine failure. The operator should carry additional fuel for the worst case fuel burn condition (one engine vs two engines operating), if this is greater than the additional fuel calculated in accordance with AMC OPS 1.255 1.6 a and b, as follows:
- A. Fly from the critical point to an alternate aerodrome:
- At 10 000ft; or
 - At 25 000ft or the single-engine ceiling, whichever is lower, provided that all occupants can be supplied with and use supplemental oxygen for the time required to fly from the critical point to an alternate aerodrome; or
 - At the single-engine ceiling, provided that the aeroplane is type certificated to operate above Flight Level 450.
- B. Descend and hold at 1 500 feet for 15 minutes in ISA conditions;
- C. Descend to the applicable MDA/DH followed by a missed approach (taking into account the complete missed approach procedure); followed by
- D. A normal approach and landing.
- (ii) Ice protection - Additional fuel used when operating in icing conditions (e.g. operation of ice protection systems (engine/airframe as applicable)) and, when manufacturer's data is available, take account of ice accumulation on unprotected surfaces if icing conditions are likely to be encountered during a diversion;
- (iii) APU operation - If an APU has to be used to provide additional electrical power, consideration should be given to the additional fuel required.
- b. Communication facilities - The availability of communications facilities in order to allow reliable two-way voice communications between the aeroplane and the appropriate air traffic control unit at one-engine inoperative cruise altitudes.
- c. Aircraft Technical Log review to ensure proper MEL procedures, deferred items, and required maintenance checks completed.
- d. En-route alternate aerodrome(s) - Ensuring that en-route alternate aerodromes are available for the intended route, within 180 minutes based upon the one-engine inoperative cruise speed which is a speed within the certificated limits of the aeroplane, selected by the operator and approved by the regulatory Authority, and confirmation that, based on the available meteorological information, the weather conditions at en-route alternate aerodromes are at or above the applicable minima for the period of time during which the aerodrome(s) may be used. (See also CAR OPS 1.297).

Planning minima

Type of Approach	Planning Minima (RVR visibility required & ceiling if applicable)		
	Aerodrome with		
	at least 2 separate approach procedures based on 2 separate aids serving 2 separate runways (see IEM OPS 1.295 (c)(1)(ii))	at least 2 separate approach procedures based on 2 separate aids serving 1 runway	or at least 1 approach procedure based on 1 aid serving 1 runway
Precision Approach Cat II, III (ILS, MLS)	Precision Approach Cat I Minima	Non-Precision Approach Minima	
Precision Approach Cat I (ILS, MLS)	Non-Precision Approach Minima	Circling minima or, if not available, non- precision approach minima plus 200 ft / 1 000 m	
Non- Precision Approach	The lower of non-precision approach minima plus 200 ft / 1 000 m or circling minima	The higher of circling minima or non- precision approach minima plus 200 ft / 1 000 m	
Circling Approach	Circling minima		

IEM OPS 1.250 Establishment of Minimum Flight Altitudes

See CAR OPS 1.250

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 (see figure 1).

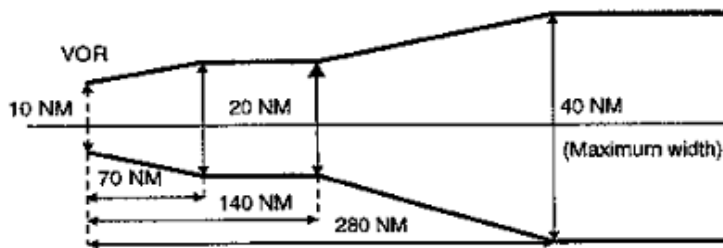


FIGURE 1

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 (see figure 2).

2.1.4 MOCA does not cover any overlapping of the corridor.

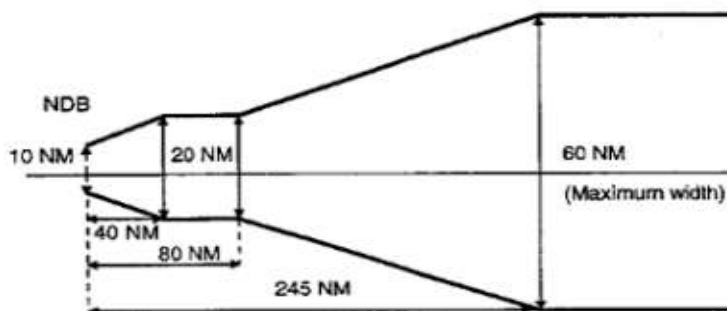


FIGURE 2

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 (see figure 3)

- 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. 9800a; 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.

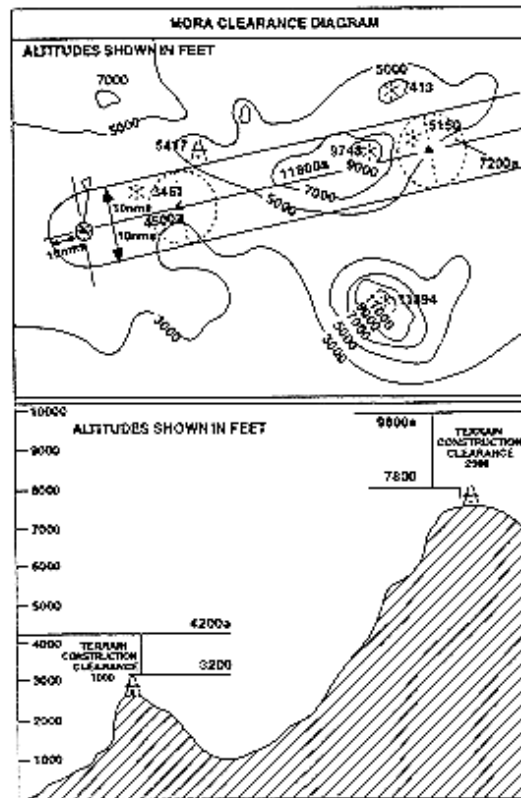


FIGURE 3

- 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.

IEM OPS 1.260 Carriage of persons with Reduced Mobility

See CAR OPS 1.260

- 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 OPS 1.270 Cargo carriage in the passenger cabin

See CAR OPS 1.270

1. In establishing procedures for the carriage of cargo in the passenger cabin of an aeroplane, an operator should observe the following:
 - a. That dangerous goods are not permitted (See also CAR OPS 1.1210(a));
 - b. That a mix of the passengers and live animals should not be permitted except for pets (weighing not more than 8 kg) and guide dogs;
 - c. That the weight of the cargo does not exceed the structural loading limit(s) of the cabin floor or seat(s);

- d. That the number/type of restraint devices and their attachment points should be capable of restraining the cargo in accordance with CS-25 or equivalent;
- e. 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.

AC OPS 1.280 Passenger Seating

See CAR OPS 1.280

See IEM OPS 1.280

- 1 An operator should establish procedures to ensure 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 aeroplane 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 allocation will, in due course, be made.

IEM OPS 1.280 Passenger Seating

See CAR OPS 1.280

- 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 prisoners 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.

AC OPS 1.297(b)(2) Planning Minima for Alternate Aerodromes

See CAR OPS 1.297(b)(2)

'Non precision minima' in CAR OPS 1.297, Table 1, means the next highest minimum that is available in the prevailing wind and serviceability conditions; Localiser Only approaches, if published, are considered to be 'non precision' in this context. It is recommended that operators wishing to publish Tables of planning minima choose values that are likely to be appropriate on the majority of occasions (e.g. regardless of wind direction). Unserviceabilities must, however, be fully taken into account.

AMC OPS 1.297 Application of aerodrome forecasts

See CAR OPS 1.297

APPLICATION OF AERODROME FORECASTS (TAF & TREND) TO PRE-FLIGHT PLANNING (ICAO Annex 3 refers)							
1. APPLICATION OF INITIAL PART OF TAF (For aerodrome planning minima see JAR-OPS 1.297)							
a) Applicable time period : From the start of the TAF validity period up to the time of applicability of the first subsequent 'FM...' or 'BECMG' or, if no 'FM' or 'BECMG' is given, up to the end of the validity period of the TAF.							
b) Application of forecast: The prevailing weather conditions forecast in the initial part of the TAF should be fully applied with the exception of the mean wind and gusts (and crosswind) which should be applied in accordance with the policy in the column 'BECMG AT and FM' in the table below. This may however be overruled temporarily by a 'TEMPO' or 'PROB***' if applicable acc. to the table below.							
2. APPLICATION OF FORECAST FOLLOWING CHANGE INDICATORS IN TAF AND TREND							
TAF or TREND for AERODROME PLANNED AS:	FM (alone) and BECMG AT:	BECMG (alone), BECMG FM, BECMG TL, BECMG FM ...* TL, in case of:	TEMPO (alone), TEMPO FM, TEMPO TL, TEMPO FM ... TL, PROB30/40 (alone)			PROB TEMPO	
	Deterioration and Improvement	Deterioration	Improvement	Deterioration		Improvement	Deterioration and Improvement
				Transient/Showery Conditions in connection with short-lived weather phenomena, e.g. thunderstorms, showers	Persistent Conditions in connection with e.g. haze, mist, fog, dust/sandstorm, continuous precipitation	In any case	
DESTINATION at ETA ± 1 HR	Applicable from the start of the change.	Applicable from the time of start of the change.	Applicable from the time of end of the change.	Not applicable	Applicable		
TAKE-OFF ALTERNATE at ETA ± 1 HR					Mean wind: Should be within required limits;		
DEST. ALTERNATE at ETA ± 1 HR	Mean wind: Should be within required limits;	Mean wind: Should be within required limits;	Mean wind: Should be within required limits;		Gusts: May be disregarded		Deterioration may be disregarded; Improvement should be disregarded including mean wind and gusts.
ENROUTE ALTERNATE at ETA ± 1 HR (See JAR-OPS AMC 1.255)	Gusts: May be disregarded.	Gusts: May be disregarded.	Gusts: May be disregarded.	Mean wind and gusts exceeding required limits may be disregarded.		Should be disregarded.	
ETOPS ENRT ALTN at earliest/latest ETA ± 1 HR	Applicable from the time of start of change; Mean wind: Should be within required limits; Gusts exceeding crosswind limits should be fully applied.	Applicable from the time of start of change; Mean wind: Should be within required limits; Gusts exceeding crosswind limits should be fully applied.	Applicable from the time of end of the change; Mean wind: Should be within required limits; Gusts exceeding crosswind limits should be fully applied.	Applicable if below applicable landing minima Mean wind: Should be within required limits; Gusts exceeding crosswind limits should be fully applied.	Applicable if below applicable landing minima Mean wind: Should be within required limits; Gusts exceeding crosswind limits should be fully applied.		
Note 1: "Required limits" are those contained in the Operations Manual.							
Note 2: If promulgated aerodrome forecasts do not comply with the requirements of ICAO Annex 3, operators should ensure that guidance in the application of these reports is provided.							
* The space following 'FM' should always include a time group e.g. 'FM1030'.							

AMC OPS 1.300 Submission of ATS Flight plan

See CAR OPS 1.300

- 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 aeroplane 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 OPS 1.305 Refuelling/Defuelling with passengers embarking, on board or disembarking

See CAR OPS 1.305

When re/defuelling with passengers on board, ground servicing activities and work inside the aeroplane, 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 OPS 1.307 Refuelling/Defuelling with wide-cut fuel

See CAR OPS 1.307

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 the 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 a 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 on fuelling flow rate is advisable. Reduced flow rate, as recommended by fuel suppliers and/or aeroplane manufacturers, 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 aeroplane fuelling distribution system. It is difficult, therefore, to quote

precise flow rates. Reduction in flow rate is advisable whether pressure fuelling or over-wing fuelling is employed.

7. With over-wing fuelling, splashing should be avoided by making sure that the delivery nozzle extends as far as practicable into the tank. Caution should be exercised to avoid damaging bag tanks with the nozzle.

AC OPS 1.308 Push Back and Towing

See CAR OPS 1.308

Towbarless towing should be based on the applicable SAE ARP (Aerospace Recommended Practices), i.e.4852B/4853B/5283/5284/5285 (as amended).

AC OPS 1.310(a)(3) Controlled rest on flight deck

See CAR OPS 1.310(a)(3)

Even though crew members should stay alert at all times during flight, unexpected fatigue can occur as a result of sleep disturbance and circadian disruption. To cover for this unexpected fatigue, and to regain a high level of alertness, a controlled rest procedure on the Flight Deck can be used. Moreover, the use of controlled rest has been shown to increase significantly levels of alertness during the later phases of flight, particularly after the top of descent, and is considered a good use of CRM principles. Controlled rest should be used in conjunction with other on board fatigue management countermeasures such as physical exercise, bright cockpit illumination at appropriate times, balanced eating and drinking, and intellectual activity. The maximum rest time has been chosen to limit deep sleep with consequent long recovery time (sleep inertia).

- 1 It is the responsibility of all crew members to be properly rested before flight (see CAR OPS 1.085).
- 2 This AC is concerned with controlled rest taken by the minimum certificated flight crew. It is not concerned with resting by members of an augmented crew.
- 3 Controlled rest means a period of time 'off task' some of which may include actual sleep.
- 4 Controlled rest may be used at the discretion of the commander to manage both sudden unexpected fatigue and fatigue which is expected to become more severe during higher workload periods later in the flight. It cannot be planned before flight.
- 5 Controlled rest should only take place during a low workload part of the flight.
- 6 Controlled rest periods should be agreed according to individual needs and the accepted principles of CRM; where the involvement of the cabin crew is required, consideration should be given to their workload.
- 7 Only one crew member at a time should take rest, at his station; the harness should be used and the seat positioned to minimise unintentional interference with the controls.
- 8 The commander should ensure that the other flight crew member(s) is (are) adequately briefed to carry out the duties of the resting crew member. One pilot must be fully able to exercise control of the aeroplane at all times. Any system intervention which would normally require a cross check according to multi crew principles should be avoided until the resting crew member resumes his duties.
- 9 Controlled rest may be taken according the following conditions:
 - a) The rest period should be no longer than 45 minutes (in order to limit any actual sleep to approximately 30 minutes).
 - b) After this 45-minute period, there should be a recovery period of 20 minutes during which sole control of the aeroplane should not be entrusted to the pilot who has completed his rest.
 - c) In the case of 2-crew operations, means should be established to ensure that the non-resting flight crew member remains alert. This may include:

- Appropriate alarm systems
 - Onboard systems to monitor crew activity
 - Frequent Cabin Crew checks; In this case, the commander should inform the senior cabin crewmember of the intention of the flight crew member to take controlled rest, and of the time of the end of that rest; Frequent contact should be established between the flight deck and the cabin crew by means of the interphone, and cabin crew should check that the resting crew member is again alert at the end of the period. The frequency of the contacts should be specified in the Ops Manual.
- 10 A minimum 20 minute period should be allowed between rest periods to overcome the effects of sleep inertia and allow for adequate briefing.
11. If necessary, a flight crew member may take more than one rest period if time permits on longer sectors, subject to the restrictions above.
- 12 Controlled rest periods should terminate at least 30 minutes before top of descent.

IEM OPS 1.310(b) Cabin crew seating positions

See CAR OPS 1.310(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.

AC OPS 1.345 Ice and other contaminants Procedures

1. General

- a. Any deposit of frost, ice, snow or slush on the external surfaces of an aeroplane may drastically affect its flying qualities because of reduced aerodynamic lift, increased drag, modified stability and control characteristics. Furthermore, freezing deposits may cause moving parts, such as elevators, ailerons, flap actuating mechanism etc., to jam and create a potentially hazardous condition. Propeller/engine/APU/ systems performance may deteriorate due to the presence of frozen contaminants to blades, intakes and components. Also, engine operation may be seriously affected by the ingestion of snow or ice, thereby causing engine stall or compressor damage. In addition, ice/frost may form on certain external surfaces (e.g. wing upper and lower surfaces, etc.) due to the effects of cold fuel/structures, even in ambient temperatures well above 0° C.
- b. The procedures established by the operator for de-icing and/or anti-icing in accordance with CAR OPS 1.345 are intended to ensure that the aeroplane is clear of contamination so that degradation of aerodynamic characteristics or mechanical interference will not occur and, following anti-icing, to maintain the airframe in that condition during the appropriate holdover time. The de-icing and/or anti-icing procedures should therefore include requirements, including type-specific, taking into account manufacturer's recommendations and cover:

(i) Contamination checks, including detection of clear ice and under-wing frost.

Note: limits on the thickness/area of contamination published in the AFM or other manufacturers' documentation should be followed;

- (ii) De-icing and/or anti-icing procedures including procedures to be followed if de-icing and/or antiicing procedures are interrupted or unsuccessful;
 - (iii) Post treatment checks;
 - (iv) Pre take-off checks;
 - (v) Pre take-off contamination checks;
 - (vi) The recording of any incidents relating to de-icing and/or anti-icing; and
 - (vii) The responsibilities of all personnel involved in de-icing and/or anti-icing.
- c. Under certain meteorological conditions de-icing and/or anti-icing procedures may be ineffective in providing sufficient protection for continued operations. Examples of these conditions are freezing rain, ice pellets and hail, heavy snow, high wind velocity, fast dropping OAT or any time when freezing precipitation with high water content is present. No Holdover Time Guidelines exist for these conditions.
- d. Material for establishing operational procedures can be found, for example, in:
- ICAO Annex 3, Meteorological Service for International Air Navigation;
 - ICAO Doc 9640-AN/940 "Manual of aircraft ground de-icing/anti-icing operations";
 - ISO 11075 (*) ISO Type I fluid;
 - ISO 11076 (*) Aircraft de-icing/anti-icing methods with fluids;
 - ISO 11077 (*) Self propelled de-icing/anti-icing vehicles-functional requirements;
 - ISO 11078 (*) ISO Type II fluid;
 - AEA "Recommendations for de-icing/anti-icing of aircraft on the ground";
 - AEA "Training recommendations and background information for de-icing/anti-icing of aircraft on the ground";
 - EUROCAE ED-104/SAE AS 5116 Minimum operational performance specification for ground ice detection systems;
 - SAE ARP 4737 Aircraft de-icing/anti-icing methods;
 - SAE AMS 1424 Type I fluids;
 - SAE AMS 1428 Type II, III and IV fluids;
 - SAE ARP 1971 Aircraft De-icing Vehicle, Self-Propelled, Large and Small Capacity;
 - SAE ARD 50102 Forced air or forced air/fluid equipment for removal of frozen contaminants;
 - SAE ARP 5149 Training Programme Guidelines for De-icing/Anti-icing of Aircraft on Ground.

(*) The revision cycle of ISO documents is infrequent and therefore the documents quoted may not reflect the latest industry standards.

2. Terminology

Terms used in the context of this AC have the following meanings. Explanations of other definitions may be found elsewhere in the documents listed in 1 d. In particular, meteorological definitions may be found in ICAO doc. 9640.

- a. Anti-icing. The procedure that provides protection against the formation of frost or ice and accumulation of snow on treated surfaces of the aeroplane for a limited period of time (holdover time).
- b. Anti-icing fluid. Anti-icing fluid includes but is not limited to the following:
 - (i) Type I fluid if heated to min 60° C at the nozzle;
 - (ii) Mixture of water and Type I fluid if heated to min 60°C at the nozzle;
 - (iii) Type II fluid;
 - (iv) Mixture of water and Type II fluid;
 - (v) Type III fluid;
 - (vi) Mixture of water and Type III fluid;
 - (vii) Type IV fluid;
 - (viii) Mixture of water and Type IV fluid.

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

- c. Clear ice. A coating of ice, generally clear and smooth, but with some air pockets. It forms on exposed objects, the temperature of which are at, below or slightly above the freezing temperature, by the freezing of super-cooled drizzle, droplets or raindrops.
- d. Conditions conducive to aeroplane icing on the ground. Freezing fog, freezing precipitation, frost, rain or high humidity (on cold soaked wings), mixed rain and snow and snow.
- e. Contamination. Contamination in this context is understood as all forms of frozen or semi-frozen moisture such as frost, snow, slush, or ice.
- f. Contamination check. Check of aeroplane for contamination to establish the need for de-icing.
- g. De-icing. The procedure by which frost, ice, snow or slush is removed from an aeroplane in order to provide uncontaminated surfaces.
- h. De-icing fluid. Such fluid includes, but is not limited to, the following:
 - (i) Heated water;
 - (ii) Type I fluid;
 - (iii) Mixture of water and Type I fluid;
 - (iv) Type II fluid;
 - (v) Mixture of water and Type II fluid;
 - (vi) Type III fluid;
 - (vii) Mixture of water and Type III fluid;
 - (viii) Type IV fluid;

(ix) Mixture of water and Type IV fluid.

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

- i. De-icing/anti-icing. This is the combination of de-icing and anti-icing performed in either one or two steps.
- j. Ground Ice Detection System (GIDS). System used during aeroplane ground operations to inform the ground crew and/or the flight crew about the presence of frost, ice, snow or slush on the aeroplane surfaces.
- k. Holdover time (HOT). The estimated period of time for which an anti-icing fluid is expected to prevent the formation of frost or ice and the accumulation of snow on the treated surfaces of an aeroplane on the ground in the prevailing ambient conditions.
- l. Lowest Operational Use Temperature (LOUT). The lowest temperature at which a fluid has been tested and certified as acceptable in accordance with the appropriate aerodynamic acceptance test whilst still maintaining a freezing point buffer of not less than:
 - 10° C for a type I de-icing/anti-icing fluid,
 - 7° C for type II, III or IV de-/anti-icing fluids.
- m. Post treatment check. An external check of the aeroplane after de-icing and/or anti-icing treatment accomplished from suitably elevated observation points (e.g. from the de-icing equipment itself or other elevated equipment) to ensure that the aeroplane is free from any frost, ice, snow, or slush.
- n. Pre-take-off check. An assessment, normally performed from within the flight deck, to validate the applied holdover time.
- o. Pre-take-off contamination check. A check of the treated surfaces for contamination, performed when the hold-over-time has been exceeded or if any doubt exists regarding the continued effectiveness of the applied anti-icing treatment. It is normally accomplished externally, just before the commencement of the take-off run.

3. Fluids

- a. Type I fluid. Due to its properties, Type I fluid forms a thin, liquid-wetting film on surfaces to which it is applied which, under certain weather conditions, gives a very limited holdover time. With this type of fluid, increasing the concentration of fluid in the fluid/water mix does not provide any extension in holdover time.
- b. Type II and type IV fluids contain thickeners which enable the fluid to form a thicker liquid-wetting film on surfaces to which it is applied. Generally, this fluid provides a longer holdover time than Type I fluids in similar conditions. With this type of fluid, the holdover time can be extended by increasing the ratio of fluid in the fluid/water mix.
- c. Type III fluid: a thickened fluid intended especially for use on aeroplanes with low rotation speeds.
- d. Fluids used for de-icing and/or anti-icing should be acceptable to the operator and the aeroplane manufacturer. These fluids normally conform to specifications such as SAE AMS 1424, 1428 or equivalent. Use of non-conforming fluids is not recommended due to their characteristics not being known.

Note: The anti-icing and aerodynamic properties of thickened fluids may be seriously degraded by, for example, inappropriate storage, treatment, application, application equipment and age.

4. Communications

4.1 Before aeroplane treatment.

When the aeroplane is to be treated with the flight crew on board, the flight and ground crews should confirm the fluid to be used, the extent of treatment required, and any aeroplane type specific procedure(s) to be used. Any other information needed to apply the HOT tables should be exchanged.

4.2 Anti-icing code

- a. The operator's procedures should include an anti-icing code, which indicates the treatment the aeroplane has received. This code provides the flight crew with the minimum details necessary to estimate a holdover time (see para 5 below) and confirms that the aeroplane is free of contamination.
- b. The procedures for releasing the aeroplane after the treatment should therefore provide the Commander with the anti-icing code.
- c. Anti-icing Codes to be used (examples):
 - (i) "Type I" at (start time) – To be used if anti-icing treatment has been performed with a Type I fluid;
 - (ii) "Type II/100" at (start time) – To be used if anti-icing treatment has been performed with undiluted Type II fluid;
 - (iii) "Type II/75" at (start time) – To be used if anti-icing treatment has been performed with a mixture of 75% Type II fluid and 25% water;
 - (iv) "Type IV/50" at (start time) – To be used if anti-icing treatment has been performed with a mixture of 50% Type IV fluid and 50% water.

Note 1: When a two-step de-icing/anti-icing operation has been carried out, the Anti-Icing Code is determined by the second step fluid. Fluid brand names may be included, if desired.

4.3 After Treatment

Before reconfiguring or moving the aeroplane, the flight crew should receive a confirmation from the ground crew that all de-icing and/or anti-icing operations are complete and that all personnel and equipment are clear of the aeroplane.

5. Holdover protection

- a. Holdover protection is achieved by a layer of anti-icing fluid remaining on and protecting aeroplane surfaces for a period of time. With a one-step de-icing/anti-icing procedure, the holdover time (HOT) begins at the commencement of de-icing/anti-icing. With a two-step procedure, the holdover time begins at the commencement of the second (anti-icing) step. The holdover protection runs out:
 - (i) At the commencement of take-off roll (due to aerodynamic shedding of fluid) or
 - (ii) When frozen deposits start to form or accumulate on treated aeroplane surfaces, thereby indicating the loss of effectiveness of the fluid.
- b. The duration of holdover protection may vary subject to the influence of factors other than those specified in the holdover time (HOT) tables. Guidance should be provided by the operator to take account of such factors which may include:
 - (i) Atmospheric conditions, e.g. exact type and rate of precipitation, wind direction and velocity, relative humidity and solar radiation and
 - (ii) The aeroplane and its surroundings, such as aeroplane component inclination angle, contour and surface roughness, surface temperature, operation in close proximity to other aeroplanes (jet or propeller blast) and ground equipment and structures.

- c. Holdover times are not meant to imply that flight is safe in the prevailing conditions if the specified holdover time has not been exceeded. Certain meteorological conditions, such as freezing drizzle or freezing rain, may be beyond the certification envelope of the aeroplane.
 - d. The operator should publish in the Operations Manual the holdover times in the form of a table or diagram to account for the various types of ground icing conditions and the different types and concentrations of fluids used. However, the times of protection shown in these tables are to be used as guidelines only and are normally used in conjunction with pre-take-off check.
 - e. References to usable HOT tables may be found in the 'AEA recommendations for de-/anti-icing aircraft on the ground'.
6. Procedures to be used. Operator's procedures should ensure that:
- a. When aeroplane surfaces are contaminated by ice, frost, slush or snow, they are de-iced prior to take-off; according to the prevailing conditions. Removal of contaminants may be performed with mechanical tools, fluids (including hot water), infra-red heat or forced air, taking account of aeroplane type specific requirements.
 - b. Account is taken of the wing skin temperature versus OAT, as this may affect:
 - (i) The need to carry out aeroplane de-icing and/or anti-icing; an
 - (ii) The performance of the de-icing/anti-icing fluids.
 - c. When freezing precipitation occurs or there is a risk of freezing precipitation occurring, which would contaminate the surfaces at the time of take-off, aeroplane surfaces should be anti-iced. If both de-icing and anti-icing are required, the procedure may be performed in a one or two-step process depending upon weather conditions, available equipment, available fluids and the desired holdover time. One-step deicing/ anti-icing means that de-icing and anti-icing are carried out at the same time using a mixture of deicing/ anti-icing fluid and water. Two-step de-icing/anti-icing means that de-icing and anti-icing are carried out in two separate steps. The aeroplane is first de-iced using heated water only or a heated mixture of deicing/anti-icing fluid and water. After completion of the de-icing operation a layer of a mixture of deicing/anti-icing fluid and water, or of de-icing/anti-icing fluid only, is to be sprayed over the aeroplane surfaces. The second step will be applied, before the first step fluid freezes, typically within three minutes and, if necessary, area by area.
 - d. When an aeroplane is anti-iced and a longer holdover time is needed/desired, the use of a less diluted Type II or Type IV fluid should be considered.
 - e. All restrictions relative to Outside Air Temperature (OAT) and fluid application (including, but not necessarily limited to temperature and pressure), published by the fluid manufacturer and/or aeroplane manufacturer, are followed. Procedures, limitations and recommendations to prevent the formation of fluid residues are followed.
 - f. During conditions conducive to aeroplane icing on the ground or after de-icing and/or anti-icing, an aeroplane is not dispatched for departure unless it has been given a contamination check or a post treatment check by a trained and qualified person. This check should cover all treated surfaces of the aeroplane and be performed from points offering sufficient accessibility to these parts. To ensure that there is no clear ice on suspect areas, it may be necessary to make a physical check (e.g. tactile).
 - g. The required entry is made in the Technical Log. (See AMC OPS 1.915, par. 2, Section 3.vi.).
 - h. The Commander continually monitors the environmental situation after the performed treatment. Prior to take-off he performs a pre-take-off check, which is an assessment whether the applied HOT is still appropriate. This pre-take-off check includes, but is not limited to, factors such as precipitation, wind and OAT.
 - i. If any doubt exists as to whether a deposit may adversely affect the aeroplane's performance and/or controllability characteristics, the Commander should require a pre-take-off contamination check to be performed in order to verify that the aeroplane's surfaces are free of contamination. Special methods

and/or equipment may be necessary to perform this check, especially at night time or in extremely adverse weather conditions. If this check cannot be performed just prior take-off, re-treatment should be applied.

- j. When re-treatment is necessary, any residue of the previous treatment should be removed and a completely new de-icing/anti-icing treatment applied.
- k. When a Ground Ice Detection System (GIDS) is used to perform an aeroplane surfaces check prior to and/or after a treatment, the use of GIDS by suitably trained personnel should be a part of the procedure.

7. Special operational considerations

- a. When using thickened de-icing/anti-icing fluids, the operator should consider a two-step deicing/anti-icing procedure, the first step preferably with hot water and/or non thickened fluids.
- b. The use of de-icing/anti-icing fluids has to be in accordance with the aeroplane manufacturer's documentation. This is particular true for thickened fluids to assure sufficient flow-off during take-off.
- c. The operator should comply with any type-specific operational requirement(s) such as an aeroplane mass decrease and/or a take-off speed increase associated with a fluid application.
- d. The operator should take into account any flight handling procedures (stick force, rotation speed and rate, take-off speed, aeroplane attitude etc.) laid down by the aeroplane manufacturer when associated with a fluid application.
- e. The limitations or handling procedures resulting from c and/or d above should be part of the flight crew pre take-off briefing.

8. Special maintenance considerations

a. General

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

b. Special considerations due to residues of dried fluids.

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

(i) Dried fluid residues.

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

(ii) Re-hydrated fluid residues.

Repetitive application of thickened de-icing/anti-icing fluids may lead to the subsequent formation/build up of a dried residue in aerodynamically quiet areas, such as cavities and gaps. This residue may re-hydrate if exposed to high humidity conditions, precipitation, washing, etc., and increase to many times its original size/volume. This residue will freeze if exposed to conditions at or below 0° C. This may cause moving parts such as elevators, ailerons, and flap actuating mechanisms to stiffen or jam in flight. Re-hydrated residues may also form on exterior surfaces, which can reduce lift, increase drag and stall speed. Re-hydrated residues may also collect inside control surface structures and cause clogging of drain holes or imbalances to flight controls. Residues may also collect in hidden areas: around flight control hinges, pulleys, grommets, on cables and in gaps;

- (iii) Operators are strongly recommended to request information about the fluid dry-out and rehydration characteristics from the fluid manufacturers and to select products with optimised characteristics;
 - (iv) Additional information should be obtained from fluid manufacturers for handling, storage, application and testing of their products.
9. Training
- a. An operator should establish appropriate initial and recurrent de-icing and/or anti-icing training programmes (including communication training) for flight crew and those of his ground crew who are involved in de-icing and/or anti-icing.
 - b. These de-icing and/or anti-icing training programmes should include additional training if any of the following will be introduced:
 - (i) A new method, procedure and/or technique;
 - (ii) A new type of fluid and/or equipment; and
 - (iii) A new type(s) of aeroplane.

10. Subcontracting (see AMC OPS 1.035 sections 4 and 5)

The operator should ensure that the subcontractor complies with the operator's quality and training/qualification requirements together with the special requirements in respect of:

- a. De-icing and/or anti-icing methods and procedures
- b. Fluids to be used, including precautions for storage and preparation for use;
- c. Specific aeroplane requirements (e.g. no-spray areas, propeller/engine de-icing, APU operation etc.);
- d. Checking and communications procedures.

AC OPS 1.346 Flight in expected or actual icing conditions

See CAR OPS 1.346

- 1 The procedures to be established by an operator should take account of the design, the equipment or the configuration of the aeroplane and also of the training which is needed. For these reasons, different aeroplane 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 Aeroplane Flight Manual (AFM) 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 CAR OPS 1.1045, A 8.3.8 and should be cross-referenced, where necessary, to supplementary, type-specific data under B 4.1.1.
- 3 *Technical content of the Procedures.* The operator should ensure that the procedures take account of the following:
 - a. CAR OPS 1.675;
 - 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 aeroplane'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 aeroplane;

- e. The means by which the Flight Crew detects, by visual cues or the use of the aeroplane’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 aeroplane, due to either:
 - i. the failure of the aeroplane’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, Cabin 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 the Cabin 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.

AC OPS 1.390(a)(1) Assessment of Cosmic Radiation

See CAR OPS 1.390(a)(1)

- 1 In order to show compliance with CAR OPS 1.390(a), an operator should assess the likely exposure for crew members so that he can determine whether or not action to comply with CAR OPS 1.390(a)(2), (3), (4) and (5) will be necessary.
 - a. Assessment of exposure level can be made by the method described below, or other method acceptable to the Authority:

Table 1 - Hours exposure for effective dose of 1 millisievert (mSv)

Altitude (feet)	Kilometre equivalent	Hours at latitude 60° N	Hours at equator
27 000	8.23	630	1330
30 000	9.14	440	980
33 000	10.06	320	750
36 000	10.97	250	600
39 000	11.89	200	490
42 000	12.80	160	420
45 000	13.72	140	380
48 000	14.63	120	350

Note: This table, published for illustration purposes, is based on the JARI-3 computer program; and may be superseded by updated versions, as approved by the Authority.

The uncertainty on these estimates is about ± 20%.A conservative conversion factor of 0.8 has been used to convert ambient dose equivalent to effective dose.

- b. Doses from cosmic radiation vary greatly with altitude and also with latitude and with the phase of the solar cycle. Table 1 gives an estimate of the number of flying hours at various altitudes in which a dose of 1 mSv would be accumulated for flights at 60° N and at the equator. Cosmic radiation dose rates change reasonably slowly with time at altitudes used by conventional jet aircraft (i.e. up to about 15 km / 49 000 ft).
- c. Table 1 can be used to identify circumstances in which it is unlikely that an annual dosage level of 1 mSv would be exceeded. If flights are limited to heights of less than 8 km (27 000 ft), it is unlikely that annual doses will exceed 1 mSv. No further controls are necessary for crew members whose annual dose can be shown to be less than 1 mSv.

AC OPS 1.390(a)(2) Working Schedules and Record Keeping

See CAR OPS 1.390(a)(2)

Where in-flight exposure of crew members to cosmic radiation is likely to exceed 1 mSv per year the operator should arrange working schedules, where practicable, to keep exposure below 6 mSv per year. For the purpose of this regulation crew members who are likely to be exposed to more than 6 mSv per year are considered highly exposed and individual records of exposure to cosmic radiation should be kept for each crew member concerned.

AC OPS 1.390(a)(3) Explanatory Information

See CAR OPS 1.390(a)(3)

Operators should explain the risks of occupational exposure to cosmic radiation to their crew members. Female crew members should know of the need to control doses during pregnancy, and the operator consequently notified so that the necessary dose control measures can be introduced.

AC OPS 1.398 Use of Airborne Collision Avoidance System (ACAS)

See CAR OPS 1.398

- 1 The ACAS operational procedures and training programmes established by the operator should take into account Temporary Guidance Leaflet 11 "Guidance for Operators on Training Programmes for the Use of ACAS". This TGL incorporates advice contained in:
 - a. ICAO Annex 10 Volume 4;
 - b. ICAO Doc 8168 PANS OPS Volume 1;
 - c. ICAO Doc 4444 PANS RAC Part X paragraph 3.1.2; and
 - d. ICAO guidance material "ACAS Performance - Based Training Objectives" (published under Attachment E to State letter AN 7/1.3.7.2-97/77.)

IEM OPS 1.400 Approach and Landing Conditions

See CAR OPS 1.400

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

IEM OPS 1.405(a) Commencement and continuation of approach – Equivalent position

See CAR OPS 1.405(a)

The 'equivalent position' mentioned in CAR OPS 1.405 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 aeroplane.

Appendix 1 to AMC OPS 1.245(a)(2) Power supply to essential services

1. Any one of the three electrical power sources referred to in sub-paragraph 2.b of AMC OPS 1.245(a)(2) should be capable of providing power for essential services which should normally include:
 - a. Sufficient instruments for the flight crew providing, as a minimum, attitude, heading, airspeed and altitude information;
 - b. Appropriate pitot heating;
 - c. Adequate navigation capability;
 - d. Adequate radio communication and intercommunication capability;
 - e. Adequate flight deck and instrument lighting and emergency lighting;
 - f. Adequate flight controls;
 - g. Adequate engine controls and restart capability with critical type fuel (from the stand-point of flame-out and restart capability) and with the aeroplane initially at the maximum relight altitude;
 - h. Adequate engine instrumentation;
 - i. Adequate fuel supply system capability including such fuel boost and fuel transfer functions that may be necessary for extended duration single or dual engine operation;
 - j. Such warnings, cautions and indications as are required for continued safe flight and landing;
 - k. Fire protection (engines and APU);
 - l. Adequate ice protection including windshield de-icing; and
 - m. Adequate control of the flight deck and cabin environment including heating and pressurisation.
2. The equipment (including avionics) necessary for extended diversion times should have the ability to operate acceptably following failures in the cooling system or electrical power systems.

AC/AMC/IEM E — ALL WEATHER OPERATIONS**IEM OPS 1.430 Documents containing information related to All Weather Operations**

See CAR OPS 1, Subpart E

- 1 The purpose of this IEM is to provide operators with a list of documents related to AWO.
 - a. ICAO Annex 2 / Rules of the Air;
 - b. ICAO Annex 6 / Operation of Aircraft, Part I;
 - c. ICAO Annex 10 / Telecommunications Vol 1;
 - d. ICAO Annex 14 / Aerodromes Vol 1;
 - e. ICAO Doc 8186 / PANS - OPS Aircraft Operations;
 - f. ICAO Doc 9365 / AWO Manual;
 - g. ICAO Doc 9476 / SMGCS Manual (Surface Movement Guidance And Control Systems);
 - h. ICAO Doc 9157 / Aerodrome Design Manual;
 - i. ICAO Doc 9328 / Manual for RVR Assessment;
 - j. ECAC Doc 17, Issue 3 (partly incorporated in CAR-OPS); and
 - k. CS-AWO (Airworthiness Certification).

IEM to Appendix 1 to CAR OPS 1.430, paragraph (f) Visual Manoeuvring (circling)

See Appendix 1 to CAR OPS 1.430,

- 1 The purpose of this IEM is to provide operators with supplemental information regarding the application of aerodrome operating minima in relation to circling approaches.
- 2 Conduct of flight - General
 - 2.1 For these procedures, the applicable visibility is the meteorological visibility (VIS).
 - 2.2 The MDA/H and OCA/H minimums included in the procedure are related to aerodrome elevation.
- 3 Missed approach
 - 3.1 If the decision to carry out a missed approach is taken when the aircraft is positioned on the approach axis (track) defined by radio-navigation aids, the published missed approach procedure must be followed. If visual reference is lost while circling to land from an instrument approach, the missed approach specified for that particular instrument approach must be followed. It is expected that the pilot will make an initial climbing turn toward the landing runway and overhead the aerodrome where he will establish the aeroplane in a climb on the missed approach track. Inasmuch as the circling manoeuvre may be accomplished in more than one direction, different patterns will be required to establish the aeroplane on the prescribed missed approach course depending on its position at the time visual reference is lost unless otherwise prescribed.
 - 3.2 If the instrument approach procedure is carried out with the aid of an ILS, the Missed Approach Point (MAPt) associated with an ILS procedure without glide path (GP out procedure) should be taken in account.
- 4 Instrument approach followed by visual manoeuvring (circling) without prescribed tracks
 - 4.1 Before visual reference is established, but not below MDA/H - The flight should follow the corresponding instrument approach procedure.

- 4.2 At the beginning of the level flight phase at or above the MDA/H - From the beginning of the level flight phase, the instrument approach track determined by radio navigation aids should be maintained until:
- a. The pilot estimates that, in all probability, visual contact with the runway or runway environment will be maintained during the entire procedure;
 - b. The pilot estimates that his aircraft is within the circling area before commencing circling; and
 - c. The pilot is able to determine his aircraft's position in relation to the runway with the aid of the external references.
- 4.3 If the conditions in paragraph 4.2 above are not met by the MAPt, a missed approach must be carried out in accordance with the instrument approach procedure.
- 4.4 After the aeroplane has left the track of the corresponding instrument approach procedure, the flight phase outbound from the runway should be limited to the distance which is required to align the aeroplane for the final approach. Flight manoeuvres should be conducted within the circling area and in such way that visual contact with the runway or runway environment is maintained at all times.
- 4.5 Flight manoeuvres should be carried out at an altitude/height which is not less than the circling minimum descent/altitude height (MDA/H).
- 4.6 Descent below MDA/H should not be initiated until the threshold of the runway to be used has been identified and the aeroplane is in a position to continue with a normal rate of descent and land within the touchdown zone.
- 5 Instrument approach followed by a visual manoeuvring (circling) with prescribed track
- 5.1 Before visual reference is established, but not below MDA/H - The flight should follow the corresponding instrument approach procedure.
 - 5.2 The aeroplane should be established in level flight at or above the MDA/H and the instrument approach track determined by the radio navigation aids maintained until visual contact can be achieved and maintained. At the divergence point, the aeroplane should leave the instrument approach track and the published routing and heights followed.
 - 5.3 If the divergence point is reached before the necessary visual reference is acquired, a missed approach procedure should be initiated not later than the MAPt and carried out in accordance with the instrument approach procedure.
 - 5.4 The instrument approach track determined by radio navigation aids should only be left at the prescribed divergence point when only the published routing and heights should be followed.
 - 5.5 Unless otherwise specified in the procedure, final descent should not be initiated until the threshold of the runway to be used has been identified and the aeroplane is in a position to continue with a normal rate of descent and land within the touchdown zone.

AC to Appendix 1 to CAR OPS 1.440 Operational Demonstrations

See Appendix 1 to CAR OPS 1.440

1. General
 - 1.1 Demonstrations may be conducted in line operations, or any other flight where the Operator's procedures are being used.
 - 1.2 In unique situations where the completion of 100 successful landings could take an unreasonably long period of time due to factors such as a small number of aeroplanes in the fleet, limited opportunity to use runways having Category II/III procedures, or inability to obtain ATS sensitive area protection during good weather conditions, and equivalent reliability assurance can be achieved, a reduction in the required number of landings may be considered on a case-by-case basis. Reduction of the number of landings to be demonstrated requires a justification for the reduction, and prior approval from Authority. However, at the operator's option, demonstrations may be made on other runways and facilities. Sufficient information should be collected to determine the cause of any unsatisfactory performance (e.g. sensitive area was not protected).

- 1.3 If an operator has different variants of the same type of aeroplane utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type/classes of aeroplane, the operator should show that the various variants have satisfactory performance, but the operator need not conduct a full operational demonstration for each variant.
- 1.4 Not more than 30% of the demonstration flights should be made on the same runway.
2. Data Collection For Operational Demonstrations
 - 2.1 Data should be collected whenever an approach and landing is attempted utilising the Category II/III system, regardless of whether the approach is abandoned, unsatisfactory, or is concluded successfully.
 - 2.2 The data should, as a minimum, include the following information:
 - a. Inability to initiate an Approach. Identify deficiencies related to airborne equipment which preclude initiation of a Category II/III approach.
 - b. Abandoned Approaches. Give the reasons and altitude above the runway at which approach was discontinued or the automatic landing system was disengaged.
 - c. Touchdown or Touchdown and Roll-out Performance. Describe whether or not the aircraft landed satisfactorily (within the desired touchdown area) with lateral velocity or cross track error which could be corrected by the pilot or automatic system so as to remain within the lateral confines of the runway without unusual pilot skill or technique. The approximate lateral and longitudinal position of the actual touchdown point in relation to the runway centreline and the runway threshold, respectively, should be indicated in the report. This report should also include any Category II/III system abnormalities which required manual intervention by the pilot to ensure a safe touchdown or touchdown and roll-out, as appropriate.
3. Data Analysis
 - 3.1 Unsuccessful approaches due to the following factors may be excluded from the analysis:
 - a. ATS Factors. Examples include situations in which a flight is vectored too close to the final approach fix/point for adequate localiser and glide slope capture, lack of protection of ILS sensitive areas, or ATS requests the flight to discontinue the approach.
 - b. Faulty Navaid Signals. Navaid (e.g. ILS localiser) irregularities, such as those caused by other aircraft taxiing, over-flying the navaid (antenna).
 - c. Other Factors. Any other specific factors that could affect the success of Category II/III operations that are clearly discernible to the flight crew should be reported.

IEM to Appendix 1 to CAR OPS 1.440, paragraph (b) Criteria for a successful CAT II/III approach and automatic landing

See Appendix 1 to CAR OPS 1.440, paragraph (b)

- 1 The purpose of this IEM is to provide operators with supplemental information regarding the criteria for a successful approach and landing to facilitate fulfilling the requirements prescribed in Appendix 1 to CAR OPS 1.440, paragraph (b).
- 2 An approach may be considered to be successful if:
 - 2.1 From 500 feet to start of flare:
 - a. Speed is maintained as specified in AC-AWO 231, paragraph 2 'Speed Control'; and
 - b. No relevant system failure occurs; and
 - 2.2 From 300 feet to DH:
 - a. No excess deviation occurs; and
 - b. No centralised warning gives a go-around command (if installed).
- 3 An automatic landing may be considered to be successful if:
 - a. No relevant system failure occurs;

- b. No flare failure occurs;
 - c. No de-crab failure occurs (if installed);
 - d. Longitudinal touchdown is beyond a point on the runway 60 metres after the threshold and before the end of the touchdown zone lighting (900 metres from the threshold);
 - e. Lateral touchdown with the outboard landing gear is not outside the touchdown zone lighting edge;
 - f. Sink rate is not excessive;
 - g. Bank angle does not exceed a bank angle limit; and
 - h. No roll-out failure or deviation (if installed) occurs.
- 4 More details can be found in CS-AWO.

IEM OPS 1.450(g)(1) Low Visibility Operations - Training & Qualifications

See Appendix 1 to CAR OPS 1.450

The number of approaches referred to in 1.450(g)(1) includes one approach and landing that may be conducted in the aeroplane using approved Category II/III procedures. This approach and landing may be conducted in normal line operation or as a training flight. It is assumed that such flights will only be conducted by pilots qualified in accordance CAR OPS 1.940 and qualified for the particular category of operation.

AC/AMC/IEM F - PERFORMANCE GENERAL**AMC OPS 1.475(b) Landing - Reverse Thrust Credit**

See CAR OPS 1.475(b)

Landing distance data included in the AFM (or POH etc.) with credit for reverse thrust can only be considered to be approved for the purpose of showing compliance with the applicable requirements if it contains a specific statement from the appropriate airworthiness Authority that it complies with a recognised airworthiness code (e.g. FAR 23/25, JAR 23/25, BCAR Section 'D'/'K').

IEM OPS 1.475(b) Factoring of Automatic Landing Distance Performance Data (Performance Class A Aeroplanes only)

See CAR OPS 1.475(b)

- 1 In those cases where the landing requires the use of an automatic landing system, and the distance published in the Aeroplane Flight Manual (AFM) includes safety margins equivalent to those contained in CAR OPS 1.515(a)(1) and CAR OPS 1.520, the landing mass of the aeroplane should be the lesser of:
 - a. The landing mass determined in accordance with CAR OPS 1.515(a)(1) or CAR OPS 1.520 as appropriate; or
 - b. The landing mass determined for the automatic landing distance for the appropriate surface condition as given in the AFM, or equivalent document. Increments due to system features such as beam location or elevations, or procedures such as use of overspeed, should also be included.

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AC/AMC/IEM G – PERFORMANCE CLASS A

IEM OPS 1.490(c)(3) Take-off – Runway surface condition

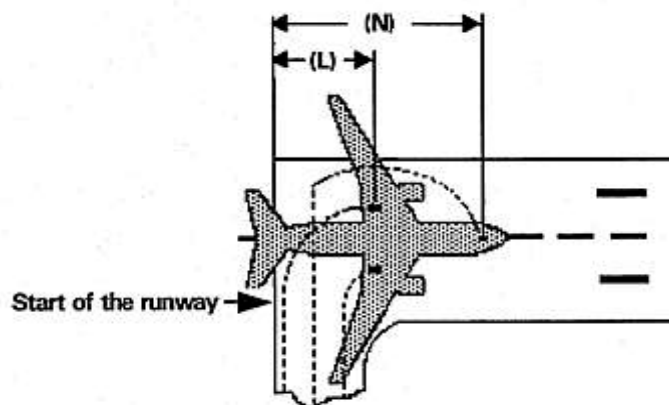
See CAR OPS 1.490(c)(3)

- 1 Operation on runways contaminated with water, slush, snow or ice implies uncertainties with regard to runway friction and contaminant drag and therefore to the achievable performance and control of the aeroplane during take-off, since the actual conditions may not completely match the assumptions on which the performance information is based. In the case of a contaminated runway, the first option for the commander is to wait until the runway is cleared. If this is impracticable, he may consider a take-off, provided that he has applied the applicable performance adjustments, and any further safety measures he considers justified under the prevailing conditions.
- 2 An adequate overall level of safety will only be maintained if operations in accordance with CS-25 are limited to rare occasions. Where the frequency of such operations on contaminated runways is not limited to rare occasions, operators should provide additional measures ensuring an equivalent level of safety. Such measures could include special crew training, additional distance factoring and more restrictive wind limitations.

IEM OPS 1.490(c)(6) Loss of runway length due to alignment

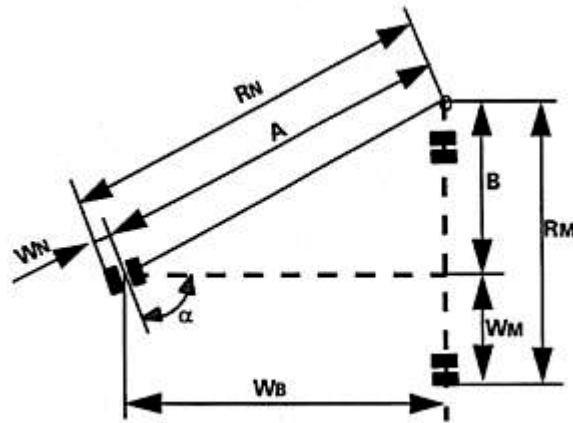
See CAR OPS 1.490(c)(6)

- 1 Introduction
 - 1.1 The length of the runway which is declared for the calculation of TODA, ASDA and TORA, does not account for line-up of the aeroplane in the direction of take-off on the runway in use. This alignment distance depends on the aeroplane geometry and access possibility to the runway in use. Accountability is usually required for a 90° taxiway entry to the runway and 180° turnaround on the runway. There are two distances to be considered:
 - a. The minimum distance of the mainwheels from the start of the runway for determining TODA and TORA, "L"; and
 - b. The minimum distance of the most forward wheel(s) from the start of the runway for determining ASDA, "N".



Where the aeroplane manufacturer does not provide the appropriate data, the calculation method given in paragraph 2 may be used to determine the alignment distance.

2. Alignment Distance Calculation



The distances mentioned in (a) and (b) of paragraph 1 above are:

	90° ENTRY	180° TURNAROUND
L=	$R_M + X$	$R_N + Y$
N=	$R_M + X + W_B$	$R_N + Y + W_B$

where:

$$R_N = A + W_N = \frac{WB}{\cos(90^\circ - \alpha)} + W_N$$

and

$$R_M = B + W_M = W_B \tan(90^\circ - \alpha) + W_M$$

X = Safety distance of outer main wheel during turn to the edge of the runway

Y = Safety distance of outer nose wheel during turn to the edge of the runway

NOTE: Minimum edge safety distances for X and Y are specified in FAA AC 150/5300-13 and ICAO Annex 14 paragraph 3.8.3

R_N = Radius of turn of outer nose wheel

R_M = Radius of turn of outer main wheel

W_N = Distance from aeroplane centre-line to outer nose wheel

W_M = Distance from aeroplane centre-line to outer main wheel

W_B = Wheel base

α = Steering angle

IEM OPS 1.495(a) Take-off obstacle clearance

See CAR OPS 1.495(a)

1 In accordance with the definitions used in preparing the take-off distance and take-off flight path Data provided in the Aeroplane Flight Manual:

- a. The net take-off flight path is considered to begin at a height of 35 ft above the runway or clearway at the end of the take-off distance determined for the aeroplane in accordance with sub-paragraph (b) below.
- b. The take-off distance is the longest of the following distances:
 - i. 115% of the distance with all engines operating from the start of the take-off to the point at which the aeroplane is 35 ft above the runway or clearway; or
 - ii. The distance from the start of the take-off to the point at which the aeroplane is 35 ft above the runway or clearway assuming failure of the critical engine occurs at the point corresponding to the decision speed (V_1) for a dry runway; or
 - iii. If the runway is wet or contaminated, the distance from the start of the take-off to the point at which the aeroplane is 15 ft above the runway or clearway assuming failure of the critical engine occurs at the point corresponding to the decision speed (V_1) for a wet or contaminated runway.

CAR OPS 1.495(a) specifies that the net take-off flight path, determined from the data provided in the Aeroplane Flight Manual in accordance with sub-paragraphs 1(a) and 1(b) above, must clear all relevant obstacles by a vertical distance of 35 ft. When taking off on a wet or contaminated runway and an engine failure occurs at the point corresponding to the decision speed (V_1) for a wet or contaminated runway, this implies that the aeroplane can initially be as much as 20 ft below the net take-off flight path in accordance with sub-paragraph 1 above and, therefore, may clear close-in obstacles by only 15 ft. When taking off on wet or contaminated runways, the operator should exercise special care with respect to obstacle assessment, especially if a take-off is obstacle limited and the obstacle density is high.

AMC OPS 1.495(c)(4) Take-off obstacle clearance

See CAR OPS 1.495(c)

- 1 The Aeroplane Flight Manual generally provides a climb gradient decrement for a 15° bank turn. For bank angles of less than 15°, a proportionate amount should be applied, unless the manufacturer or Aeroplane Flight Manual has provided other data.
- 2 Unless otherwise specified in the Aeroplane Flight Manual or other performance or operating manuals from the manufacturer, acceptable adjustments to assure adequate stall margins and gradient corrections are provided by the following:

BANK	SPEED	GRADIENT CORRECTION
15°	V_2	1 x Aeroplane Flight Manual 15° Gradient Loss
20°	$V_2 + 5$ kt	2 x Aeroplane Flight Manual 15° Gradient Loss
25°	$V_2 + 10$ kt	3 x Aeroplane Flight Manual 15° Gradient Loss

AMC OPS 1.495(d)(1) & (e)(1) Required Navigational Accuracy

See CAR OPS 1.495(d)(1) & (e)(1)

- 1 Flight-deck systems. The obstacle accountability semi-widths of 300 m (see CAR OPS 1.495(d)(1)) and 600 m (see CAR OPS 1.495(e)(1)) may be used if the navigation system under one-engine-inoperative conditions provides a two standard deviation (2 s) accuracy of 150 m and 300 m respectively.
- 2 Visual Course Guidance
 - 2.1 The obstacle accountability semi-widths of 300 m (see CAR OPS 1.495(d)(1)) and 600 m (see CAR OPS 1.495(e)(1)) may be used where navigational accuracy is ensured at all relevant points on the

flight path by use of external references. These references may be considered visible from the flight deck if they are situated more than 45° either side of the intended track and with a depression of not greater than 20° from the horizontal.

- 2.2 For visual course guidance navigation, an operator should ensure that the weather conditions prevailing at the time of operation, including ceiling and visibility, are such that the obstacle and/or ground reference points can be seen and identified. The Operations Manual should specify, for the aerodrome(s) concerned, the minimum weather conditions which enable the flight crew to continuously determine and maintain the correct flight path with respect to ground reference points, so as to provide a safe clearance with respect to obstructions and terrain as follows:
- a. The procedure should be well defined with respect to ground reference points so that the track to be flown can be analysed for obstacle clearance requirements;
 - b. The procedure should be within the capabilities of the aeroplane with respect to forward speed, bank angle and wind effects;
 - c. A written and/or pictorial description of the procedure should be provided for crew use;
 - d. The limiting environmental conditions (such as wind, the lowest cloud base, ceiling, visibility, day/night, ambient lighting, obstruction lighting) should be specified.

IEM OPS 1.495(f) Engine failure procedures

See CAR OPS 1.495(f)

If compliance with CAR OPS 1.495(f) is based on an engine failure route that differs from the all engine departure route or SID normal departure, a “deviation point” can be identified where the engine failure route deviates from the normal departure route. Adequate obstacle clearance along the normal departure with failure of the critical engine at the deviation point will normally be available. However, in certain situations the obstacle clearance along the normal departure route may be marginal and should be checked to ensure that, in case of an engine failure after the deviation point, a flight can safely proceed along the normal departure.

AMC OPS 1.500 En-Route – One Engine Inoperative

See CAR OPS 1.500

- 1 The high terrain or obstacle analysis required for showing compliance with CAR OPS 1.500 may be carried out in one of two ways, as explained in the following three paragraphs.
- 2 A detailed analysis of the route should be made using contour maps of the high terrain and plotting the highest points within the prescribed corridor’s width along the route. The next step is to determine whether it is possible to maintain level flight with one engine inoperative 1000 ft above the highest point of the crossing. If this is not possible, or if the associated weight penalties are unacceptable, a driftdown procedure should be worked out, based on engine failure at the most critical point and clearing critical obstacles during the driftdown by at least 2000 ft. The minimum cruise altitude is determined by the intersection of the two driftdown paths, taking into account allowances for decision making (see Figure 1). This method is time consuming and requires the availability of detailed terrain maps.
- 3 Alternatively, the published minimum flight altitudes (Minimum En route Altitude, MEA, or Minimum Off Route Altitude, MORA) may be used for determining whether one engine inoperative level flight is feasible at the minimum flight altitude or if it is necessary to use the published minimum flight altitudes as the basis for the driftdown construction (see Figure 1). This procedure avoids a detailed high terrain contour analysis but may be more penalising than taking the actual terrain profile into account as in paragraph 2.
- 4 In order to comply with CAR OPS 1.500(c), one means of compliance is the use of MORA and, with CAR OPS 1.500(d), MEA provided that the aeroplane meets the navigational equipment standard assumed in the definition of MEA.

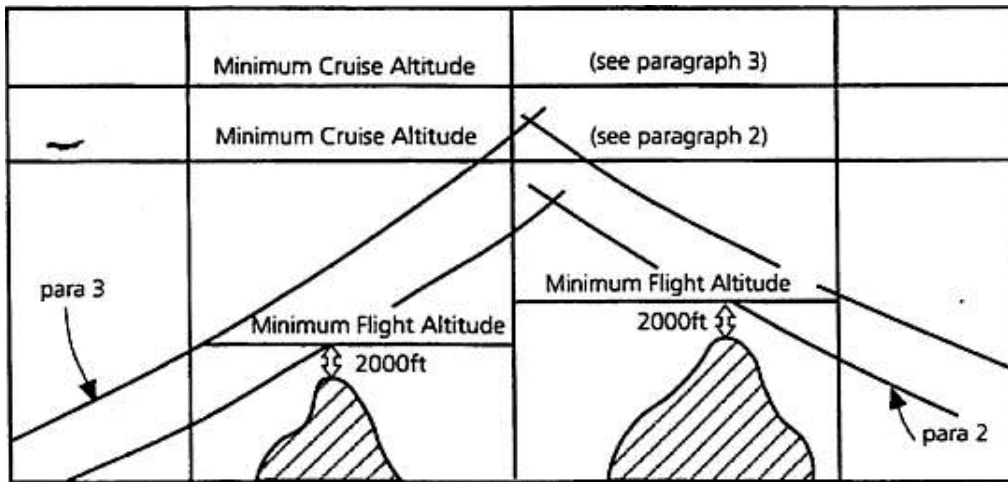


FIGURE 1

NOTE: MEA or MORA normally provide the required 2000 ft obstacle clearance for driftdown. However, at and below 6000 ft altitude, MEA and MORA cannot be used directly as only 1000 ft. clearance is ensured.

IEM OPS 1.510(b) and (c) Landing – Destination and Alternate Aerodromes

See CAR OPS 1.510(b) and (c)

The required missed approach gradient may not be achieved by all aeroplanes when operating at or near maximum certificated landing mass and in engine-out conditions. Operators of such aeroplanes should consider mass, altitude and temperature limitations and wind for the missed approach. As an alternative method, an increase in the decision altitude/height or minimum descent altitude/height and/or a contingency procedure (see CAR OPS 1.495(f)) providing a safe route and avoiding obstacles, can be approved.

AMC OPS 1.510 & 1.515 Landing – Destination and Alternate Aerodromes

See CAR OPS 1.510 & 1.515

In showing compliance with CAR OPS 1.510 and CAR OPS 1.515, the operator should use either pressure altitude or geometric altitude for his operation and this should be reflected in the Operations Manual.

IEM OPS 1.515(c) Landing – Dry runway

See CAR OPS 1.515(c)

- 1 CAR OPS 1.515(c) establishes two considerations in determining the maximum permissible landing mass at the destination and alternate aerodromes.
- 2 Firstly, the aeroplane mass will be such that on arrival the aeroplane can be landed within 60% or 70% (as applicable) of the landing distance available on the most favourable (normally the longest) runway in still air. Regardless of the wind conditions, the maximum landing mass for an aerodrome/aeroplane configuration at a particular aerodrome, cannot be exceeded.
- 3 Secondly, consideration should be given to anticipated conditions and circumstances. The expected wind, or ATC and noise abatement procedures, may indicate the use of a different runway. These factors may result in a lower landing mass than that permitted under paragraph 2 above, in which case, to show compliance with CAR OPS 1.515(a), despatch should be based on this lesser mass.
- 4 The expected wind referred to in paragraph 3 is the wind expected to exist at the time of arrival.

AMC/IEM H — PERFORMANCE CLASS B

AMC OPS 1.530(c)(4) Take-Off Performance Correction Factors

See CAR OPS 1.530(c)(4)

Unless otherwise specified in the Aeroplane Flight Manual or other performance or operating manuals from the manufacturers, the variables affecting the take-off performance and the associated factors that should be applied to the Aeroplane Flight Manual data are shown in the table below. They should be applied in addition to the operational factors as prescribed in CAR OPS 1.530(b).

SURFACE TYPE	CONDITION	FACTOR
Grass (on firm soil)	Dry	1.20
Up to 20 cm long	Wet	1.30
Paved	Wet	1.00

- Notes:*
1. *The soil is firm when there are wheel impressions but no rutting.*
 2. *When taking off on grass with a single engined aeroplane, care should be taken to assess the rate of acceleration and consequent distance increase.*
 3. *When making a rejected take-off on very short grass which is wet, and with a firm subsoil, the surface may be slippery, in which case the distances may increase significantly.*

IEM OPS 1.530(c)(4) Take-Off Performance Correction Factors

See CAR OPS 1.530(c)(4)

Due to the inherent risks, operations from contaminated runways are inadvisable, and should be avoided whenever possible. Therefore, it is advisable to delay the take-off until the runway is cleared. Where this is impracticable, the commander should also consider the excess runway length available including the criticality of the overrun area.

AMC OPS 1.530(c)(5) Runway Slope

See CAR OPS 1.530(c)(5)

Unless otherwise specified in the Aeroplane Flight Manual, or other performance or operating manuals from the manufacturers, the take-off distance should be increased by 5% for each 1% of upslope except that correction factors for runways with slopes in excess of 2% require the acceptance of the Authority.

IEM OPS 1.535 Obstacle Clearance in Limited Visibility

See CAR OPS 1.535

- 1 The intent of the complementary requirements CAR OPS 1.535 and Appendix 1 to CAR OPS 1.430 sub-paragraph (a)(3)(ii) is to enhance safe operation with Performance Class B aeroplanes in conditions of limited visibility. Unlike the Performance Class A Airworthiness requirements, those for Performance Class B do not necessarily provide for engine failure in all phases of flight. It is accepted

that performance accountability for engine failure need not be considered until a height of 300 ft is reached.

- 2 The weather minima given in Appendix 1 to CAR OPS 1.430 sub-paragraph (a)(3)(ii) up to and including 300 ft imply that if a take-off is undertaken with minima below 300 ft a one engine inoperative flight path must be plotted starting on the all-engine take-off flight path at the assumed engine failure height. This path must meet the vertical and lateral obstacle clearance specified in CAR OPS 1.535. Should engine failure occur below this height, the associated visibility is taken as being the minimum which would enable the pilot to make, if necessary, a forced landing broadly in the direction of the take-off. At or below 300 ft, a circle and land procedure is extremely inadvisable. Appendix 1 to CAR OPS 1.430 sub-paragraph (a)(3)(ii) specifies that, if the assumed engine failure height is more than 300 ft, the visibility must be at least 1500 m and, to allow for manoeuvring, the same minimum visibility should apply whenever the obstacle clearance criteria for a continued take-off cannot be met.

AMC OPS 1.535(a) Take-off Flight Path Construction

See CAR OPS 1.535(a)

- 1 Introduction. For demonstrating that an aeroplane clears all obstacles vertically, a flight path should be constructed consisting of an all-engine segment to the assumed engine failure height, followed by an engine-out segment. Where the Aeroplane Flight Manual does not contain the appropriate data, the approximation given in paragraph 2 below may be used for the all-engine segment for an assumed engine failure height of 200 ft, 300 ft, or higher.
- 2 Flight Path Construction
 - 2.1 All-Engines Segment (50 ft to 300 ft). The average all-engines gradient for the all-engines flight path segment starting at an altitude of 50 ft at the end of the take-off distance ending at or passing through the 300 ft point is given by the following formula:

$$Y_{300} = \frac{0.57(Y_{ERC})}{1 + (V_{ERC}^2 - V_2^2)/5647}$$

NOTE: The factor of 0.77 as required by CAR OPS 1.535(a)(4) is already included where:

- Y₃₀₀ = Average all-engines gradient from 50 ft to 300 ft
- Y_{ERC} = Scheduled all engines en-route gross climb gradient
- V_{ERC} = En-route climb speed, all engines knots TAS
- V₂ = Take-off speed at 50 ft, knots TAS

(See IEM OPS 1.535(a), Figure 1a for graphical presentation)

- 2.2 All-Engines Segment (50 ft to 200 ft). (May be used as an alternative to 2.1 where weather minima permits) The average all-engine gradient for the all-engine flight path segment starting at an altitude of 50 ft at the end of the take-off distance ending at or passing through the 200 ft point is given by the following formula:

$$Y_{200} = \frac{0.51(Y_{ERC})}{1 + (V_{ERC}^2 - V_2^2)/3388}$$

NOTE: The factor of 0.77 as required by CAR OPS 1.535(a)(4) is already included where:

- Y₂₀₀ = Average all-engines gradient from 50 ft to 200 ft
 Y_{ERC} = Scheduled all engines en-route gross climb gradient
 V_{ERC} = En-route climb speed, all engines, knots TAS
 V₂ = Take-off speed at 50 ft, knots TAS

(See IEM OPS 1.535(a), Figure 1b for graphical presentation)

- 2.3 All-Engines Segment (above 300 ft). The all-engines flight path segment continuing from an altitude of 300 ft is given by the AFM en-route gross climb gradient, multiplied by a factor of 0.77.
- 2.4 The One Engine Inoperative Flight Path. The one engine inoperative flight path is given by the one engine inoperative gradient chart contained in the AFM.
- 3 Worked examples of the method given above are contained in IEM OPS 1.535(a).

IEM OPS 1.535(a) Take-off flight path construction

See CAR OPS 1.535(a)

- 1 This IEM provides examples to illustrate the method of take-off flight path construction given in AMC OPS 1.535(a). The examples shown below are based on an aeroplane for which the Aeroplane Flight Manual shows, at a given mass, altitude, temperature and wind component the following performance data:

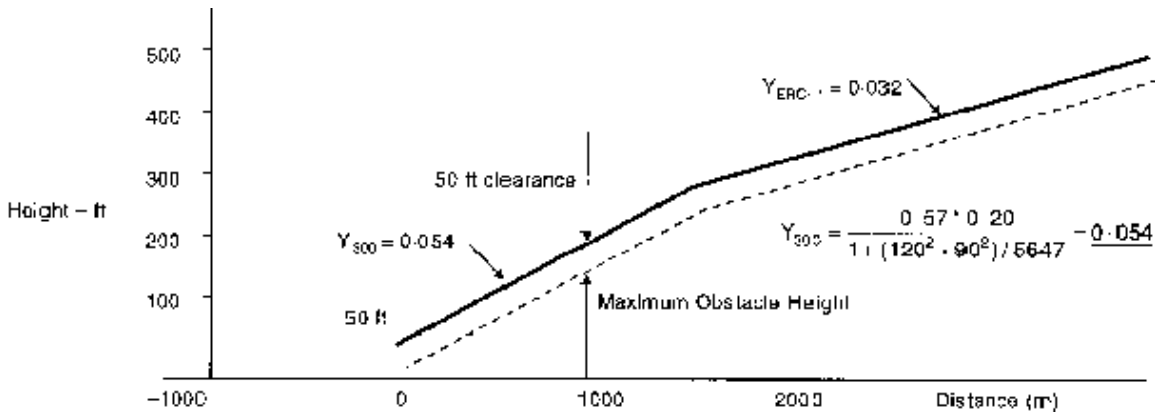
Factored take-off distance	–	1000 m
Take-off speed, V ₂	–	90 kt
En-route climb speed, V _{ERC}	–	120 kt
En-route all-engine climb gradient, Y _{ERC}	–	0.200
En-route one engine inoperative climb gradient, Y _{ERC-1}		0.032

- a. Assumed Engine Failure Height 300 ft. The average all-engine gradient from 50 ft to 300 ft may be read from Figure 1a (page 2-H-8) or calculated with the following formula:

$$Y_{200} = \frac{0.57(Y_{ERC})}{1 + (Y_{ERC}^2 - V_2^2)/5647}$$

NOTE: The factor of 0.77 as required by CAR OPS 1.535(a)(4) is already included where:

- Y₃₀₀ = Average all-engines gradient from 50 ft to 300 ft
 Y_{ERC} = Scheduled all engines en-route gross climb gradient
 V_{ERC} = En-route climb speed, all engines knots TAS
 V₂ = Take-off speed at 50 ft, knots TAS

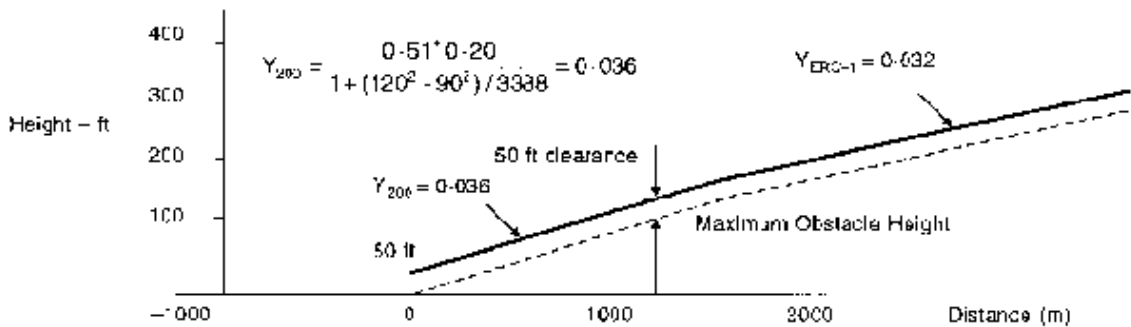


b. Assumed engine failure height 200 ft. The average all-engine gradient from 50 ft to 200 ft may be read from Figure 1b (page 2-H-9) or calculated with the following formula:

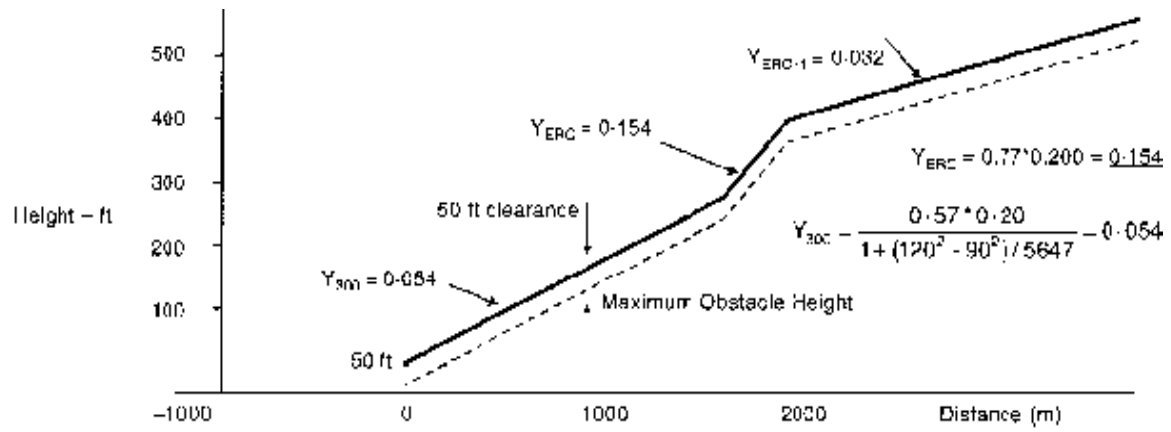
$$Y_{200} = \frac{0.51(Y_{ERC})}{1 + (V_{ERC}^2 - V_2^2) / 3388}$$

NOTE: The factor of 0.77 as required by CAR OPS 1.535(a)(4) is already included where:

- Y₂₀₀ = Average all-engines gradient from 50 ft to 200 ft
- Y_{ERC} = Scheduled all engines en-route gross gradient
- V_{ERC} = En-route climb speed, all engines, knots TAS
- V₂ = Take-off speed at 50 ft, knots TAS



- c. Assumed engine failure height less than 200 ft. Construction of a take-off flight path is only possible if the AFM contains the required flight path data.
- d. Assumed engine failure height more than 300 ft. The construction of a take-off flight path for an assumed engine failure height of 400 ft is illustrated below.



IEM OPS 1.540 En-Route

See CAR OPS 1.540

- 1 The altitude at which the rate of climb equals 300 ft per minute is not a restriction on the maximum cruising altitude at which the aeroplane can fly in practice, it is merely the maximum altitude from which the driftdown procedure can be planned to start.
- 2 Aeroplanes may be planned to clear en-route obstacles assuming a driftdown procedure, having first increased the scheduled en-route one engine inoperative descent data by 0.5% gradient.

IEM OPS 1.542 En-route – Single-engined Aeroplanes

See CAR OPS 1.542

- 1 In the event of an engine failure, single-engine aeroplanes have to rely on gliding to a point suitable for a safe forced landing. Such a procedure is clearly incompatible with flight above a cloud layer which extends below the relevant minimum safe altitude.
- 2 Operators should first increase the scheduled engine-inoperative gliding performance data by 0.5% gradient when verifying the en-route clearance of obstacles and the ability to reach a suitable place for a forced landing.
- 3 The altitude at which the rate of climb equals 300 ft per minute is not a restriction on the maximum cruising altitude at which the aeroplane can fly in practice, it is merely the maximum altitude from which the engine-inoperative procedure can be planned to start.

AMC OPS 1.542(a) En-Route - Single-engine aeroplanes

See CAR OPS 1.542(a)

CAR OPS 1.542(a) requires an operator to ensure that in the event of an engine failure, the aeroplane should be capable of reaching a point from which a successful forced landing can be made. Unless otherwise specified by the Authority, this point should be 1000ft above the intended landing area.

AMC OPS 1.545 & 1.550 Landing Destination and Alternate Aerodromes**Landing - Dry runway**

See CAR OPS 1.545 & 1.550

In showing compliance with CAR OPS 1.545 & CAR OPS 1.550, the operator should use either pressure altitude or geometric altitude for his operation and this should be reflected in the Operations Manual.

AMC OPS 1.550(b)(3) Landing Distance Correction Factors

See CAR OPS 1.550(b)(3)

Unless otherwise specified in the Aeroplane Flight Manual, or other performance or operating manuals from the manufacturers, the variable affecting the landing performance and the associated factor that should be applied to the Aeroplane Flight Manual data is shown in the table below. It should be applied in addition to the operational factors as prescribed in CAR OPS 1.550(a).

SURFACE TYPE	FACTOR
Grass (on firm soil up to 20 cm long)	1.15

NOTE: The soil is firm when there are wheel impressions but no rutting

AMC OPS 1.550(b)(4) Runway Slope

See CAR OPS 1.550(b)(4)

Unless otherwise specified in the Aeroplane Flight Manual, or other performance or operating manuals from the manufacturer, the landing distances required should be increased by 5% for each 1% of downslope except that correction factors for runways with slopes in excess of 2% need the acceptance of the Authority.

IEM OPS 1.550(c) Landing – Dry Runway

See CAR OPS 1.550(c)

- 1 CAR OPS 1.550(c) establishes two considerations in determining the maximum permissible landing mass at the destination and alternate aerodromes.
- 2 Firstly, the aeroplane mass will be such that on arrival the aeroplane can be landed within 70% of the landing distance available on the most favourable (normally the longest) runway in still air. Regardless of the wind conditions, the maximum landing mass for an aerodrome/aeroplane configuration at a particular aerodrome, cannot be exceeded.
- 3 Secondly, consideration should be given to anticipated conditions and circumstances. The expected wind, or ATC and noise abatement procedures, may indicate the use of a different runway. These factors may result in a lower landing mass than that permitted under paragraph 2 above, in which case, to show compliance with CAR OPS 1.550(a), despatch should be based on this lesser mass.
- 4 The expected wind referred to in paragraph 3 is the wind expected to exist at the time of arrival.

IEM OPS 1.555(a) Landing on Wet Grass Runways

See CAR OPS 1.555(a)

- 1 When landing on very short grass which is wet, and with a firm subsoil, the surface may be slippery, in which case the distances may increase by as much as 60% (1.60 factor).
- 2 As it may not be possible for a pilot to determine accurately the degree of wetness of the grass, particularly when airborne, in cases of doubt, the use of the wet factor (1.15) is recommended.

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AMC/IEM I — PERFORMANCE CLASS C**IEM OPS 1.565(d)(3) Take-off**

See CAR OPS 1.565(d)(3)

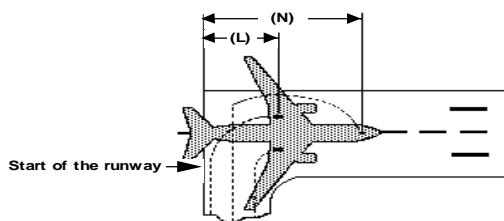
Operation on runways contaminated with water, slush, snow or ice implies uncertainties with regard to runway friction and contaminant drag and therefore to the achievable performance and control of the aeroplane during take-off, since the actual conditions may not completely match the assumptions on which the performance information is based. An adequate overall level of safety can, therefore, only be maintained if such operations are limited to rare occasions. In case of a contaminated runway the first option for the commander is to wait until the runway is cleared. If this is impracticable, he may consider a take-off, provided that he has applied the applicable performance adjustments, and any further safety measures he considers justified under the prevailing conditions.

IEM OPS 1.565(d)(6) Loss of runway length due to alignment

See CAR OPS 1.565(d)(6)

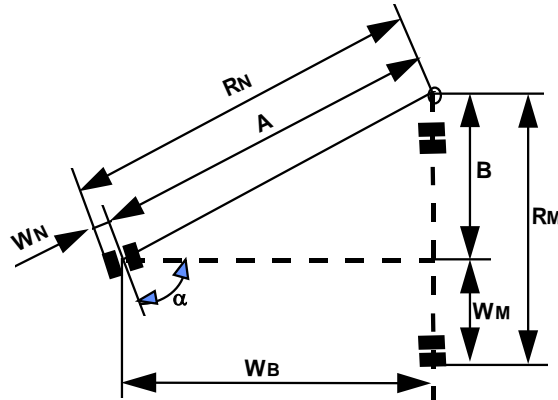
1 Introduction

- 1.1 The length of the runway which is declared for the calculation of TODA, ASDA and TORA, does not account for line-up of the aeroplane in the direction of take-off on the runway in use. This alignment distance depends on the aeroplane geometry and access possibility to the runway in use. Accountability is usually required for a 90° taxiway entry to the runway and 180° turnaround on the runway. There are two distances to be considered:
 - a. The minimum distance of the mainwheels from the start of the runway for determining TODA and TORA, “L”; and
 - b. The minimum distance of the most forward wheel(s) from the start of the runway for determining ASDA, “N”.



Where the aeroplane manufacturer does not provide the appropriate data, the calculation method given in paragraph 2 may be use to determine the alignment distance.

2. Alignment Distance Calculation



The distances mentioned in (a) and (b) of paragraph 1 above are:

	90° ENTRY	180°
TURNAROUND		
L =	$R_M + X$	$R_N + Y$
N =	$R_M + X + W_B$	$R_N + Y + W_B$

where:

$$R_N = A + W_N = \frac{W_B}{\cos(90^\circ - \alpha)} + W_N$$

and

$$R_M = B + W_M = W_B \tan(90^\circ - \alpha) + W_M$$

X = Safety distance of outer main wheel during turn to the edge of the runway

Y = Safety distance of outer nose wheel during turn to the edge of the runway

NOTE: Minimum edge safety distances for X and Y are specified in FAA AC 150/5300-13 and ICAO Annex 14 paragraph 3.8.3

R_N = Radius of turn of outer nose wheel

R_M = Radius of turn of outer main wheel

W_N = Distance from aeroplane centre-line to outer nose wheel

W_M = Distance from aeroplane centre-line to outer main wheel

W_B = Wheel base

a = Steering angle

AMC OPS 1.565(d)(4) Runway Slope

See CAR OPS 1.565(d)(4)

Unless otherwise specified in the Aeroplane Flight Manual, or other performance or operating manuals from the manufacturers, the take-off distance should be increased by 5% for each 1% of upslope except that correction factors for runways with slopes in excess of 2% need the acceptance of the Authority.

AMC OPS 1.570(d) Take-off Flight Path

See CAR OPS 1.570(d)

- 1 The Aeroplane Flight Manual generally provides a climb gradient decrement for a 15° bank turn. Unless otherwise specified in the Aeroplane Flight Manual or other performance or operating manuals from the manufacturer, acceptable adjustments to assure adequate stall margins and gradient corrections are provided by the following:

BANK	SPEED	GRADIENT CORRECTION
15°	V ₂	1 x Aeroplane Flight Manual 15° Gradient Loss
20°	V ₂ + 5 kt	2 x Aeroplane Flight Manual 15° Gradient Loss
25°	V ₂ + 10 kt	3 x Aeroplane Flight Manual 15° Gradient Loss

- 2 For bank angles of less than 15°, a proportionate amount may be applied, unless the manufacturer or Aeroplane Flight Manual has provided other data.

AMC OPS 1.570(e)(1) & (f)(1) Required navigational accuracy

See CAR OPS 1.570(e)(1) & (f)(1)

- 1 Flight-deck systems. The obstacle accountability semi-widths of 300 m (see CAR OPS 1.570(e)(1)) and 600 m (see CAR OPS 1.570(f)(1)) may be used if the navigation system under one-engine-inoperative conditions provides a two standard deviation (2 s) accuracy of 150 m and 300 m respectively.
- 2 Visual Course Guidance
 - 2.1 The obstacle accountability semi-widths of 300 m (see CAR OPS 1.570(e)(1)) and 600 m (see CAR OPS 1.570(f)(1)) may be used where navigational accuracy is ensured at all relevant points on the flight path by use of external references. These references may be considered visible from the flight deck if they are situated more than 45° either side of the intended track and with a depression of not greater than 20° from the horizontal.
 - 2.2 For visual course guidance navigation, an operator should ensure that the weather conditions prevailing at the time of operation, including ceiling and visibility, are such that the obstacle and/or ground reference points can be seen and identified. The Operations Manual should specify, for the aerodrome(s) concerned, the minimum weather conditions which enable the flight crew to continuously determine and maintain the correct flight path with respect to ground reference points, so as to provide a safe clearance with respect to obstructions and terrain as follows:

- a. The procedure should be well defined with respect to ground reference points so that the track to be flown can be analysed for obstacle clearance requirements;
- b. The procedure should be within the capabilities of the aeroplane with respect to forward speed, bank angle and wind effects;
- c. A written and/or pictorial description of the procedure should be provided for crew use;
- d. The limiting environmental conditions (such as wind, the lowest cloud base, ceiling, visibility, day/night, ambient lighting, obstruction lighting) should be specified.

AMC OPS 1.580 En-Route – One Engine Inoperative

See CAR OPS 1.580

The high terrain or obstacle analysis required for showing compliance with CAR OPS 1.580 can be carried out by making a detailed analysis of the route using contour maps of the high terrain, and plotting the highest points within the prescribed corridor width along the route. The next step is to determine whether it is possible to maintain level flight with one engine inoperative 1000 ft above the highest point of the crossing. If this is not possible, or if the associated weight penalties are unacceptable, a drift-down procedure must be evaluated, based on engine failure at the most critical point, and must show obstacle clearance during the drift-down by at least 2000 ft. The minimum cruise altitude is determined from the drift-down path, taking into account allowances for decision making, and the reduction in the scheduled rate of climb (See Figure 1).

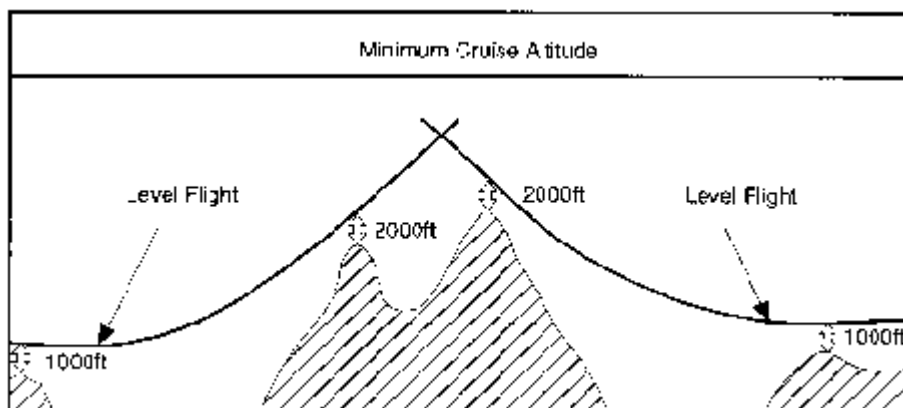


FIGURE 1

AMC OPS 1.590 & 1.595 Landing – Destination and Alternate Aerodromes

Landing – Dry Runways

See CAR OPS 1.590 & 1.595

In showing compliance with CAR OPS 1.590 and CAR OPS 1.595, the operator should use either pressure altitude or geometric altitude for his operation and this should be reflected in the Operations Manual.

AMC OPS 1.595(b)(3) Landing Distance Correction Factors

See CAR OPS 1.595(b)(3)

Unless otherwise specified in the Aeroplane Flight Manual or other performance or operating manuals from the manufacturers, the variables affecting the landing performance and the associated factors to

be applied to the Aeroplane Flight Manual data are shown in the table below. It should be applied in addition to the factor specified in CAR OPS 1.595(a).

SURFACE TYPE	FACTOR
Grass (on firm soil up to 13 cm long)	1.20

NOTE: The soil is firm when there are wheel impressions but no rutting.

AMC OPS 1.595(b)(4) Runway Slope

See CAR OPS 1.595(b)(4)

Unless otherwise specified in the Aeroplane Flight Manual, or other performance or operating manuals from the manufacturer, the landing distances required should be increased by 5% for each 1% of downslope.

IEM OPS 1.595(c) Landing Runway

See CAR OPS 1.595(c)

- 1 CAR OPS 1.595(c) establishes two considerations in determining the maximum permissible landing mass at the destination and alternate aerodromes.
- 2 Firstly, the aeroplane mass will be such that on arrival the aeroplane can be landed within 70% of the landing distance available on the most favourable (normally the longest) runway in still air. Regardless of the wind conditions, the maximum landing mass for an aerodrome/aeroplane configuration at a particular aerodrome, cannot be exceeded.
- 3 Secondly, consideration should be given to anticipated conditions and circumstances. The expected wind, or ATC and noise abatement procedures, may indicate the use of a different runway. These factors may result in a lower landing mass than that permitted under paragraph 2 above, in which case, to show compliance with CAR OPS 1.595(a), despatch should be based on this lesser mass.
- 4 The expected wind referred to in paragraph 3 is the wind expected to exist at the time of arrival.

AC/AMC/IEM J - MASS & BALANCE

IEM OPS 1.605(e) Fuel density

See CAR OPS 1.605(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 fuel JP 1 – 0.79
 - c. Jet fuel JP 4 – 0.76
 - d. Oil 0.88

AC OPS 1.605 Mass values

See CAR OPS 1.605

In accordance with ICAO Annex 5 and the International System of Units (SI), the actual and limiting masses of aeroplanes, the payload and its constituent elements, the fuel load etc, are expressed in CAR OPS 1 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 aeroplanes, its continued use in operational applications and publications is acceptable.

AMC to Appendix 1 to CAR OPS 1.605 Accuracy of weighing equipment

See Appendix 1 to CAR OPS 1.605, paragraph (a)(4)(iii)

- 1 The mass of the aeroplane 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 aeroplanes 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 CAR OPS 1.605 Centre of gravity limits

See Appendix 1 to CAR OPS 1.605, sub-paragraph (d)

- 1 In the Certificate Limitations section of the Aeroplane 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 and allow the proper trim setting for take-off. 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 gear and flap positions and 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, pCARY equipment and passengers.

Note: Large CG errors may occur when 'free seating' (freedom of passengers to select any seat when entering the aeroplane) 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 aeroplanes.

AMC OPS 1.620(a) Passenger mass established by use of a verbal statement

See CAR OPS 1.620(a)

- 1 When asking each passenger on aeroplanes with less than 10 passenger seats for his/her mass (weight), specific constants should be added to account for hand baggage and clothing. These constants should be determined by the operator on the basis of studies relevant to his particular routes, etc. and should not be less than:
 - a. For clothing - 4 kg; and
 - b. For hand baggage - 6 kg.
- 2 Personnel boarding passengers on this basis should assess the passenger's stated mass and the mass of passengers' clothing and hand baggage to check that they are reasonable. Such personnel should have received instruction on assessing these mass values. Where necessary, the stated mass and the specific constants should be increased so as to avoid gross inaccuracies.

IEM OPS 1.620(d)(2) Holiday Charter

See CAR OPS 1.620(d)(2)

A "charter flight solely intended as an element of a holiday travel package" is a flight where the entire passenger capacity is hired by one or more Charterer(s) for the carriage of passengers who are travelling, all or in part by air, on a round- or circle-trip basis for holiday purposes. Categories of passengers such as company personnel, tour operators' staff, representatives of the press, Authority officials etc. can be included within the 5% alleviation without negating the use of holiday charter mass values.

IEM OPS 1.620(g) Statistical evaluation of passenger and baggage mass data

See CAR OPS 1.620(g)

- 1 Sample size (see also Appendix 1 to CAR-OPS 1.620(g)).
 - 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{x}, s = the estimates for the current true values of μ and σ , calculated from the sample.

The sample size can then be calculated using the following formula:

$$n \geq \frac{(1.96 * \sigma' * 100)^2}{(e'_r * \mu')^2}$$

where:

n = number of passengers to be weighed (sample size)

e'_r = allowed relative confidence range (accuracy) for the estimate \bar{x} of μ by \bar{x} (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

where:

x_j = mass values of $\bar{x} = \frac{\sum_{j=1}^n x_j}{n}$ 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:

$$e_r = \frac{1.96 * s * 100}{\sqrt{n} * \bar{x}} (\%)$$

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:

4. Example of determination of the required sample size and average passenger mass

$$\bar{x} \pm \frac{1.96 * s}{\sqrt{n}}$$

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 wellversed 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

n	x _j (kg)	n	x _j	(x _j - x̄)	(x _j - x̄) ²
1	79.9	1	79.9	+9.3	86.49
2	68.1	2	68.1	-2.5	6.25
3	77.9	3	77.9	+7.3	53.29
4	74.5	4	74.5	+3.9	15.21
5	54.1	5	54.1	-16.5	272.25
6	62.2	6	62.2	-8.4	70.56
7	89.3	7	89.3	+18.7	349.69
8	108.7	8	108.7	+38.1	1 451.61
...
85	63.2	85	63.2	-7.4	54.76
86	75.4	86	75.4	-4.8	23.04
$\sum_{j=1}^{86}$		$\sum_{j=1}^{86}$			34 683.40
	6 071.6		6 071.6		

$$\mu' = \bar{x} = \frac{\sum x_j}{n} = \frac{6071.6}{86} = 70.6 \text{ kg}$$

$$\sigma' = \sqrt{\frac{\sum (x_j - \bar{x})^2}{n-1}} = \sqrt{\frac{34\,683.40}{86-1}} = 20.20 \text{ kg}$$

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.

$$n \geq \frac{(1.96 * \sigma' * 100)^2}{(e'_r * \mu')^2}$$

$$n \geq \frac{(1.96 * 20.20 * 100)^2}{(1 * 70.6)^2}$$

$$n \geq 3145$$

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 ≥ 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 CAR-OPS 1.620(g).

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.

$$n = 3180$$

$$\sum_{j=1}^{3180} X_j = 231186.2 \text{ kg}$$

$$\bar{x} = \frac{\sum x_j}{n} = \frac{231186.2}{3180} \text{ kg}$$

S1 $\bar{x} = 72.7 \text{ kg}$
S

Step 2: calculation of the standard deviation.

$$\sum (x_j - \bar{x})^2 = 745\,145 \cdot 20$$

$$s = \sqrt{\frac{\sum (x_j - \bar{x})^2}{n - 1}}$$

$$s = \sqrt{\frac{745\,145 \cdot 20}{3180 - 1}}$$

$$s = 15 \cdot 31 \text{ kg}$$

For calculating the standard deviation the method shown in paragraph 4.2 step 2 should be applied.

Step 4: calculation of the confidence range of the sample mean.

$$\bar{x} \pm \frac{1 \cdot 96 \cdot s}{\sqrt{n}}$$

$$\bar{x} \pm \frac{1 \cdot 96 \cdot 15 \cdot 31}{\sqrt{3180}} \text{ kg}$$

$$72 \cdot 7 \pm 0 \cdot 5 \text{ kg}$$

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.

IEM OPS 1.620(h) & (i) Adjustment of standard masses

See CAR OPS 1.620(h) & (i)

1. When standard mass values are used, CAR OPS 1.620 (h) and 1.620(i) 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 (eg. military personnel or sports teams); and
 - b. On small aeroplanes, 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.

AMC to Appendix 1 to CAR OPS 1.620(g) Guidance on passenger weighing surveys

See Appendix 1 to CAR OPS 1.620(g), sub-paragraph (c)(4)

- 1 Operators seeking approval to use standard passenger masses differing from those prescribed in CAR OPS 1.620, Tables 1 and 2, on similar routes or networks may pool their weighing surveys provided that:
 - a. The Authority has given prior approval for a joint survey;

- b. The survey procedures and the subsequent statistical analysis meet the criteria of Appendix 1 to CAR OPS 1.620(g); and
- c. In addition to the joint weighing survey results, results from individual operators participating in the joint survey should be separately indicated in order to validate the joint survey results.

IEM to Appendix 1 to CAR OPS 1.620(g) Guidance on passenger weighing surveys

See Appendix 1 to CAR OPS 1.620(g)

- 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 (CAR OPS 1.620(g) 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 (CAR OPS 1.620(g)).
 - 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 CAR OPS 1.620(g), sub-paragraph (a)(1)).
 - 3.3 The minimum number of passengers to be weighed is the highest of the following (See Appendix 1 to CAR OPS 1.620(g) 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 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 aeroplanes 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 OPS 1.620(g). 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 CAR OPS 1.620 Tables 1 and 2. As stated in Appendix 1 to CAR OPS 1.620(g), 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 aeroplanes 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 aeroplanes with less than 20 seats. This is the reason for passenger mass increments on small aeroplanes.
- 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 aeroplanes with 30 passenger seats or more.
- 6.3 As indicated in Appendix 1 to CAR OPS 1.620(g), 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 except holiday charters where a ratio of 50/50 applies. 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, airports, 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 to Appendix 1 to CAR OPS 1.625 Mass and balance documentation

See Appendix 1 to CAR OPS 1.625

For Performance Class B aeroplanes, the CG position need not be mentioned on the mass and balance documentation if, for example, the load distribution is in accordance with a precalculated balance table

or if it can be shown that for the planned operations a correct balance can be ensured, whatever the real load is.

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AC/AMC/IEM K – INSTRUMENTS AND EQUIPMENT**IEM OPS 1.630 Instruments and Equipment - Approval and Installation**

See CAR OPS 1.630

- 1 For Instruments and Equipment required by CAR OPS 1 Subpart K, “Approved” means that compliance with the applicable TSO design requirements and performance specifications, or equivalent, in force at the time of the equipment approval application, has been demonstrated. Where a TSO does not exist, the applicable airworthiness standards apply unless otherwise prescribed in CAR OPS 1 or CAR M.
- 2 “Installed” means that the installation of Instruments and Equipment has been demonstrated to comply with the applicable airworthiness requirements of EASA CS-23/CS-25, or the relevant code used for Type Certification, and any applicable requirement prescribed in CAR OPS 1.
- 3 Instruments and Equipment approved in accordance with design requirements and performance specifications other than TSOs, before the applicability dates prescribed in CAR OPS 1.001(b), are acceptable for use or installation on aeroplanes operated for the purpose of commercial air transportation provided that any relevant OPS requirement is complied with.
- 4 When a new version of a TSO (or of a specification other than a TSO) is issued, Instruments and Equipment approved in accordance with earlier requirements may be used or installed on aeroplanes 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 CAR OPS 1 or CAR M.

AMC OPS 1.650/1.652 Flight and Navigational Instruments and Associated Equipment

See CAR OPS 1.650/1.652

- 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 aeroplane for the intended kind of operation.

IEM OPS 1.650/1.652 Flight and Navigational Instruments and Associated Equipment

See CAR OPS 1.650/1.652

SERIAL		FLIGHTS UNDER VFR			FLIGHTS UNDER IFR OR AT NIGHT		
INSTRUMENT		SINGLE PILOT	TWO PILOTS REQUIRED	MAX T/O MASS AUTH>5700 kg OR MAX PASS>9 Pax	SINGLE PILOT	TWO PILOTS REQUIRED	MAX T/O MASS AUTH>5700 kg OR MAX PASS>9 Pax
(a)		(b)	(c)	(d)	(e)	(f)	(g)
1	Magnetic Compass	1	1	1	1	1	1
2	Accurate Time Piece	1	1	1	1	1	1
3	OAT Indicator	1	1	1	1	1	1
4	Sensitive Pressure Altimeter	1	2	2	2 Note (5)	2 Note (5)	2 Note (5)
5	Air Speed Indicator	1	2	2	1	2	2
6	Heated Pitot system			2	1	2	2
7	Pitot heat failure Indicator						2
8	Vertical Speed Indicator	1	2	2	1	2	2

	r						
9	Turn and slip Indicator OR Turn Co-ordinator	1 Note (1)	2 Notes(1) & (2)	2 Notes (1) & (2)	1 Note (4)	2 Note (4)	2 Note (4)
10	Attitude Indicator	1 Note (1)	2 Notes(1) &(2)	2 Notes (1) & (2)	1	2	2
11	Gyroscopic Direction Indicator	1 Note (1)	2 Notes(1) & (2)	2 Notes (1) & (2)	1	2	2
12	Standby Attitude Indicator						1
13	Mach Number Indicator	See Note (3) for all aeroplanes					

NOTES :

- (1) For local flights (A to A, 50 Nm radius, not more than 60 minutes duration) the instruments at Serials 9(b) 10(b) and 11 (b) may be replaced by EITHER a turn and slip indicator, OR a turn co-ordinator, OR both an attitude indicator and a slip indicator.
- (2) The substitute instruments permitted by Note (1) shall be provided at each pilot's station.
- (3) Serial 13 - A Mach number indicator is required for each pilot whenever compressibility limitations are not otherwise indicated by airspeed indicators.

- (4) *For IFR or at night, a Turn and Slip indicator, or a slip indicator and a third (standby) attitude indicator certificated according to CS 25 or equivalent, is required.*
- (5) *Neither Three pointers, nor drum pointer altimeters satisfy the requirement.*

AMC OPS 1.650(i) & 1.652(i) Flight and Navigational Instruments and Associated Equipment

See CAR OPS 1.650(i) & 1.652(i)

A means to indicate outside air temperature indicator may be an air temperature indicator which provides indications that are convertible to outside air temperature.

IEM OPS 1.650(p)/1.652(s) Headset, boom microphone and associated equipment

See CAR OPS 1.650(p)/1.652(s)

A headset, as required by CAR OPS 1.650(p) and CAR OPS 1.652(s), consists of a communication device which includes an earphone(s) to receive and a microphone to transmit audio signals to the aeroplane's communication system. To comply with the minimum performance requirements, the earphone(s) 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.

AMC OPS 1.652(d) & (k)(2) Flight and Navigational Instruments and Associated Equipment

See CAR OPS 1.652(d) & (k)(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.

IEM OPS 1.668 Airborne Collision Avoidance System

See CAR OPS 1.668

The minimum performance level for ACAS II is contained in ICAO Annex 10, Volume IV, Chapter 4.

AC OPS 1.680(a)(2) Quarterly Radiation Sampling

See CAR OPS 1.680(a)(2)

1. Compliance with CAR OPS 1.680(a)(2) may be shown by conducting quarterly radiation sampling during aeroplane operation using the following criteria:
 - a. The sampling should be carried out in conjunction with a Radiological Agency or similar organisation acceptable to the Authority;
 - b. Sixteen route sectors which include flight above 49 000 ft should be sampled every quarter (three months). Where less than sixteen route sectors which include flight above 49 000 ft are achieved each quarter, then all sectors above 49 000 ft should be sampled.;
 - c. The cosmic radiation recorded should include both the neutron and non-neutron components of the radiation field.
2. The results of the sampling, including a cumulative summary quarter on quarter, should be reported to the Authority under arrangements acceptable to the Authority.

AMC OPS 1.690(b)(6) d Crew member interphone system

See CAR OPS 1.690(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.

IEM OPS 1.690(b)(7) Crew member interphone system

See CAR OPS 1.690(b)(7)

At least one interphone system station for use by ground personnel should be, where practicable, so located that the personnel using the system may avoid detection from within the aeroplane.

AC OPS 1.700 Cockpit Voice Recorders

See CAR OPS 1.700

The operational performance requirements for Cockpit Voice Recorders should be those laid down in EUROCAE Document ED56A (Minimum Operational Performance Requirements For Cockpit Voice Recorder Systems) December 1993.

AC OPS 1.705/1.710 Cockpit Voice Recorders

See CAR OPS 1.705/1.710

Account should be taken of the operational performance requirements for Cockpit Voice Recorders as laid down in EUROCAE Documents ED56 or ED56A (Minimum Operational Performance Requirements For Cockpit Voice Recorder Systems) dated February 1988 and December 1993 respectively.

AC OPS 1.700, 1.705 and 1.710 Cockpit Voice Recorders

See CAR OPS 1.705 and 1.710

Summary table of applicable requirements

MCTOM	ALL AEROPLANES (See JAR-OPS 1.710 CVR-3)		ALL AEROPLANES (See JAR-OPS 1.700 CVR-1)
	NO REQUIREMENT	ALL MULTIENGINE TURBINE POWERED AEROPLANES with a MAPSC of more than 9 (applicability: 1 April 2000) (See JAR-OPS 1.705 CVR-2)	ALL MULTIENGINE TURBINE POWERED AEROPLANES with a MAPSC of more than 9 (See JAR-OPS 1.705 CVR-1)
5700 Kg			
	0	1.1.1990	1.4.1998
			DATE OF ISSUE OF THE FIRST INDIVIDUAL C. of A.

NOTE 1: MCTOM = Maximum Certificated Take Off Mass
MAPSC = Maximum Approved Passenger Seating Configuration

AC OPS 1.715 Flight Data Recorders

See CAR OPS 1.715

- 1 The operational performance requirements for Flight Data Recorders should be those laid down in EUROCAE Document ED55 (Minimum Operational Performance Specification For Flight Data Recorder Systems) dated May 1990.
- 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 aeroplanes with novel or unique design or operational characteristics, the additional parameters should be those required in accordance with CS 25 during type or supplemental type certification or validation.
- 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.

AC OPS 1.715(g) Extensive Modifications of Aeroplane Systems

See CAR OPS 1.715(g)

The alleviation policy included in CAR OPS 1.715(g) affects a small number of aeroplanes first issued with a C of A on or after 1st April 1998 that were either constructed prior to this date or to a specification in force just prior to this date. These aeroplanes may not comply fully with CAR OPS 1.715, but are able to comply with CAR OPS 1.720. In granting such an alleviation, the Authority should confirm that the above conditions have been met and that compliance with CAR OPS 1.715 would imply significant modifications to the aeroplane with a severe re-certification effort.

AC OPS 1.720 /1.725 Flight Data Recorders

See CAR OPS 1.720 /1.725

See Appendix 1 to AC OPS 1.720 /1.725

- 1 The parameters to be recorded should meet the performance specifications (designated ranges, recording intervals and accuracy limits) defined in Table 1 of Appendix 1 to AC-CAR OPS

1.720/1.725. Remarks in Table 1 of Appendix 1 to AC-CAR OPS 1.720/1.725 are acceptable means of compliance to the parameters requirements.

- 2 Flight data recorder systems, for which the recorded parameters do not comply with the performance specifications of Table 1 of Appendix 1 to AC-CAR OPS 1.720/1.725 (i.e. range, sampling intervals, accuracy limits and recommended resolution readout) may be acceptable to the Authority.
- 3 For all aeroplanes, so far as practicable, when further recording capacity is available, the recording of the following additional parameters should be considered:
 - a. Remaining parameters in Table B of Appendix 1 to CAR OPS 1.720 or CAR OPS 1.725 as applicable;
 - b. Any dedicated parameter relating to novel or unique design or operational characteristics of the aeroplane;
 - c. operational information from electronic display systems, such as EFIS, ECAM or EICAS, with the following order of priority:
 - i) parameters selected by the flight crew relating to the desired flight path, e.g. barometric pressure setting, selected altitude, selected airspeed, decision height, and autoflight system engagement and mode indications if not recorded from another source;
 - ii) display system selection/status, e.g. SECTOR, PLAN, ROSE, NAV, WXR, COMPOSITE, COPY, etc;
 - iii) warning and alerts;
 - iv) the identity of displayed pages from emergency procedures and checklists.
 - d. retardation information including brake application for use in the investigation of landing overruns or rejected take offs; and
 - e. additional engine parameters (EPR, N1, EGT, fuel flow, etc.)
4. For the purpose of CAR OPS 1.720(d), 1.720(e) and 1.725(c)(2), the alleviation should be acceptable only when adding the recording of missing parameters to the existing flight data recorder system would require a major upgrade of the system itself. Account should be taken of the following:
 - a. The extent of the modification required
 - b. The down-time period; and
 - c. Equipment software development.

5. For the purpose of CAR OPS 1.720(d), 1.720(e), 1.725(c)(2) and 1.725(c)(3) "capacity available" refers to the space on both Flight Data Acquisition Unit and the flight data recorder not allocated for recording the required parameters, or the parameters recorded for the purpose of CAR OPS 1.037 (Accident prevention and flight safety programme) as acceptable to the Authority.
6. For the purpose of CAR OPS 1.720(d)(1), 1.720(e)(1), 1.725(c)(2)(i) and 1.725(c)(3) a sensor is considered "readily available" when it is already available or can be easily incorporated.

AC OPS 1.715, 1.720 and 1.725 Flight Data Recorders

See CAR OPS 1.715, 1.720 and 1.725

Summary table of applicable requirements and parameters recorded

MCTOM	See Appendix 1 to CAR OPS 1.725	See Appendix 1 to CAR OPS 1.720	See Appendix 1 to CAR OPS 1.715
TURBINE POWERED AEROPLANES	TURBINE POWERED AEROPLANES	ALL AEROPLANES	ALL AEROPLANES
<ul style="list-style-type: none"> • Table A (1.725) param. 1 - 5; and • For aeroplanes of a type first type certificated after 30.09.69 Table B (1.725) param. 6 - 15b 	<ul style="list-style-type: none"> • Table A (1.725) param. 1 - 5; and • For aeroplanes of a type first type certificated after 30.09.69 Table B (1.725) param. 6 - 15b; and • If sufficient capacity is available on FDR system remaining Table B (1.725) parameters 	<ul style="list-style-type: none"> • Table A (1.720) param. 1 - 15b; and • Table B (1.720) param. 16 - 32 	<ul style="list-style-type: none"> • Table A1 (1.715) param. 1 - 17; and • Table B (1.715) param. 18 - 32; and • Table C (EFIS) param. 33 - 42; and • Param. relating to novel or unique design features

2700 0 kg	TURBINE POWERED AEROPLANES Table A (1.725) param. 1 - 5	TURBINE POWERED AEROPLANES • Table A (1.725) param. 1 - 5; and • If sufficient capacity is available on FDR system Table B (1.725) parameters 6 - 15b	ALL AEROPLANES Table A (1.720) param. 1 - 15b	ALL AEROPLANES • Table A1 (1.715) param. 1 - 17; and • Table C (EFIS) param. 33 - 42; and • Param. relating to novel or unique design features
5700 kg	No Requirement	No Requirement	No Requirement	MULTI-ENGINE TURBINE POWERED AEROPLANES MASPC > 9 • Table A2 (1.715) param. 1 - 17; and • Table C (EFIS) param. 33 - 42; and • Param.

Note 1: Alleviation not included in this table

Note 2: MCTOM = Maximum Certificated Take Off Mass

Note 3: MAPSC = Maximum Approved Passenger Seating Configuration

AC OPS 1.727 Combination recorders

(See CAR OPS 1.727)

When two combination recorders are installed, one should be located near the cockpit, in order to minimise the risk of a data loss due to the failure of the wiring that gather data to the recorder. The other should be located at the rear of the aeroplane in order to minimise the risk of a data loss due to recorder damage in the case of a crash.

AC OPS 1.730(a)(3) Seats, seat safety belts, harnesses and child restraint devices

(See CAR OPS 1.730(a)(3))

1. General

A child restraint device (CRD) is considered to be acceptable if:

- a) It is a 'supplementary loop belt' manufactured with the same techniques and the same materials of the approved safety belts; or
- b) It complies with paragraph 2.

2. Acceptable CRDs

Provided the CRD can be installed properly on the respective aircraft seat, the following CRDs are considered "acceptable":

2.1 Types of CRDs

- a) CRDs approved for use in aircraft only by any JAA Authority, the FAA or Transport Canada (on the basis of a national technical standard) and marked accordingly.
- b) CRDs approved for use in motor vehicles according to the UN standard ECE R 44, -03 or later series of Amendments; or
- c) CRDs approved for use in motor vehicles and aircraft according to Canadian CMVSS 213/213.1; or

- d) CRDs approved for use in motor vehicles and aircraft according to US FMVSS No 213 and are manufactured to these standards on or after February 26, 1985. US approved CRDs manufactured after this date must bear the following labels in red lettering:
- 1) “THIS CHILD RESTRAINT SYSTEM CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY STANDARDS“ and
 - 2) “THIS RESTRAINT IS CERTIFIED FOR USE IN MOTOR VEHICLES AND AIRCRAFT“.
- e) CRDs qualified for use in aircraft according to the German “Qualification Procedure for Child Restraint Systems for Use in Aircraft“ (TÜV Doc.: TÜV/958-01/2001).
- 2.2 Devices approved for use in cars manufactured and tested to standards equivalent to those listed in 2.1 (a) to (e) inclusive, which are acceptable to the Authority. The device must be marked with an associated qualification sign, which shows the name of the qualification organisation and a specific identification number, related to the associated qualification project.
- 2.3 The qualifying organization shall be a competent and independent organization that is acceptable to the Authority.
3. Location
- 3.1 Forward facing CRDs may be installed on both forward and rearward facing passenger seats but only when fitted in the same direction as the passenger seat on which it is positioned. Rearward facing CRDs can only be installed on forward facing passenger seats. A CRD may not be installed within the radius of action of an airbag, unless it is obvious that the airbag is de-activated or it can be demonstrated that there is no negative impact from the airbag.
- 3.2 A child in a restraint device should be located as near to a floor level exit as feasible.
- 3.3 A child in a restraint device should be seated in accordance with CAR OPS 1.280 and IEM OPS 1.280, “Passenger Seating“ so as to not hinder evacuation for any passenger.
- 3.4 A child in a restraint device should neither be located in the row leading to an emergency exit nor located in a row immediately forward or aft of an emergency exit. A window passenger seat is the preferred location. An aisle passenger seat or a cross aisle passenger seat is not recommended. Other locations may be acceptable provided the access of neighbour passengers to the nearest aisle is not obstructed by the CRD.

- 3.5 In general, only one CRD per row segment is recommended. More than one CRD per row segment is allowed if the children are from the same family or travelling group provided the children are accompanied by a responsible person sitting next to them.
- 3.6 A Row Segment is the fraction of a row separated by two aisles or by one aisle and the aircraft fuselage.
4. Installation
- 4.1 CRDs shall only be installed on a suitable aircraft seat with the type of connecting device they are approved or qualified for. E.g., CRDs to be connected by a three point harness only (most rearward facing baby CRDs currently available) shall not be attached to an aircraft seat with a lap belt only, a CRD designed to be attached to a vehicle seat by means of rigid bar lower anchorages (ISO-FIX or US equivalent) only, shall only be used on aircraft seats that are equipped with such connecting devices and shall not be attached by the aircraft seat lap belt. The method of connecting must be clearly shown in the manufacturer's instructions to be provided with each CRD.
- 4.2 All safety and installation instructions must be followed carefully by the responsible person accompanying the infant. Cabin crew should prohibit the use of any inadequately installed CRD or not qualified seat.
- 4.3 If a forward facing CRD with a rigid backrest is to be fastened by a lap belt, the restraint device should be fastened when the backrest of the passenger seat on which it rests is in a reclined position. Thereafter, the backrest is to be positioned upright. This procedure ensures better tightening of the CRD on the aircraft seat if the aircraft seat is reclinable.
- 4.4 The buckle of the adult safety belt must be easily accessible for both opening and closing, and must be in line with the seat belt halves (not canted) after tightening.
- 4.5 Forward facing restraint devices with an integral harness must not be installed such that the adult safety belt is secured over the child.
5. Operation
- 5.1 Each CRD shall remain secured to a passenger seat during all phases of flight, unless it is properly stowed when not in use.
- 5.2 Where a CRD is adjustable in recline it must be in an upright position for all occasions when passenger restraint devices are required to be used according to CAR OPS 1.320(b)(1).

IEM OPS 1.740 Placards

(See CAR OPS 1.740)

The markings required must:

- A be painted, or affixed by other equally permanent means;
- b be red in colour, and in any case in which the colour of the adjacent back-ground is such as to render red markings not readily visible, be outlined in white or some other contrasting colour in such a manner as to render them readily visible;
- c be kept at all times clean and un-obscured.

AMC OPS 1.745 First-Aid Kits

See CAR OPS 1.745

The following should be included in the First-Aid Kits:

Bandages (unspecified)
Burns dressings (unspecified)
Wound dressings, large and small
Adhesive tape, 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
Gastrointestinal Antacid +
Anti-diarrhoeal medication e.g. Loperamide +
Ground/Air visual signal code for use by survivors.
Disposable Gloves

A list of contents in 2 languages (English and Arabic). 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 aeroplanes with more than 9 passenger seats installed.

AMC OPS 1.755 Emergency Medical Kit

See CAR OPS 1.755

The following should be included in the emergency medical kit carried in the aeroplane:

Sphygmomanometer – non mercury
Stethoscope
Syringes and needles
Oropharyngeal airways (2 sizes)
Tourniquet
Coronary vasodilator e.g. nitro-glycerine
Anti-smasmodic e.g. hyascene
Epinephrine 1:1 000
Adrenocortical steroid e.g. hydrocortisone
Major analgesic e.g. nalbuphine
Diuretic e.g. furseimide
Antihistamine e.g. diphenhydramine hydrochloride
Sedative/anticonvulsant e.g. diazepam
Medication for Hypoglycaemia, hypertonic glucose and/or glucagon
Antiemetic e.g. metoclopramide
Atropine
Digoxin
Disposable Gloves
Bronchial Dilator –injectable and inhaled form
Needle Disposal Box
Catheter

A list of contents in 2 languages (English and Arabic). This should include information on the effects and side effects of drugs carried.

IEM OPS 1.760 First-aid Oxygen

See CAR OPS 1.760

- 1 First-aid oxygen is intended for those passengers who, having been provided with the supplemental oxygen required under CAR OPS 1.770, still need to breathe undiluted oxygen when the amount of supplemental oxygen has been exhausted.
- 2 When calculating the amount of first-aid oxygen, an operator should take into account the fact that, following a cabin depressurisation, supplemental oxygen as calculated in accordance with Appendix 1 to CAR OPS 1.770 should be sufficient to cope with hypoxic problems for:
 - a. all passengers when the cabin altitude is above 15 000 ft; and
 - b. a proportion of the passengers carried when the cabin altitude is between 10 000 ft and 15 000 ft.
- 3 For the above reasons, the amount of first-aid oxygen should be calculated for the part of the flight after cabin depressurisation during which the cabin altitude is between 8 000 ft and 15 000 ft, when supplemental oxygen may no longer be available.
- 4 Moreover, following cabin depressurisation an emergency descent should be carried out to the lowest altitude compatible with the safety of the flight. In addition, in these circumstances, the aeroplane should land at the first available aerodrome at the earliest opportunity.
- 5 The conditions above should reduce the period of time during which the first-aid oxygen may be required and consequently should limit the amount of first-aid oxygen to be carried on board.

IEM OPS 1.770 Supplemental Oxygen – Pressurised Aeroplanes

See CAR OPS 1.770

- 1 A quick donning mask is the type of mask that:
 - a. Can be placed on the face from its ready position, properly secured, sealed, and supplying oxygen upon demand, with one hand and within 5 seconds and will thereafter remain in position, both hands being free;
 - b. Can be put on without disturbing eye glasses and without delaying the flight crew member from proceeding with assigned emergency duties;
 - c. After being put on, does not prevent immediate communication between the flight crew members and other crew members over the aeroplane intercommunication system;
 - d. Does not inhibit radio communications.

- 2 In determining the supplemental oxygen for the routes to be flown, it is assumed that the aeroplane will descend in accordance with the emergency procedures specified in the Operations Manual, without exceeding its operating limitations, to a flight altitude that will allow the flight to be completed safely (ie. flight altitudes ensuring adequate terrain clearance, navigational accuracy, hazardous weather avoidance etc.)

AC OPS 1.770(b)(2)(v) Supplemental Oxygen - Pressurised Aeroplanes (Not certificated to fly above 25 000 ft)

See CAR OPS 1.770 (b)(2)(v)

- 1 With respect to CAR OPS 1.770(b)(2)(v) the maximum altitude up to which an aeroplane can operate, without a passenger oxygen system installed and capable of providing oxygen to each cabin occupant, should be established using an emergency descent profile which takes into account the following conditions:
- a. 17 seconds time delay for pilot's recognition and reaction including mask donning, for trouble shooting and configuring the aeroplane for the emergency descent;
 - b. maximum operational speed (V_{MO}) or the airspeed approved in the Aeroplane Flight Manual for emergency descent, whichever is the less;
 - c. all engines operative;
 - d. the estimated mass of the aeroplane at the top of climb.
- 1.1 Emergency descent data (charts) established by the aeroplane manufacturer and published in the Aeroplane Operating Manual and/or Aeroplane Flight Manual should be used to ensure uniform application of the rule.
- 2 On routes where the oxygen is necessary to be carried for 10% of the passengers for the flight time between 10 000ft and 13 000ft the oxygen may be provided either:
- a. by a plug-in or drop-out oxygen system with sufficient outlets and dispensing units uniformly distributed throughout the cabin so as to provide oxygen to each passenger at his own discretion when seated on his assigned seat; or
 - b. by portable bottles when a fully trained cabin crew member is carried on board of each such flight.

AMC OPS 1.790 Hand Fire Extinguishers

See CAR OPS 1.790

- 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 minimise 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 OPS 1.810 Megaphones

See CAR OPS 1.810

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.

AC OPS 1.820 Emergency Locator Transmitter (ELT)

See CAR OPS 1.820, CAR OPS 1.830(c) and CAR OPS 1.835(b)

1. An Emergency Locator Transmitter (ELT) is a generic term describing equipment which broadcasts distinctive signals on designated frequencies and, depending on application, may be activated by impact or be manually activated. An ELT is one of the following:
 - a. Automatic Fixed (ELT(AF)). An automatically activated ELT which is permanently attached to an aircraft;
 - b. Automatic Portable (ELT(AP)). An automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft;
 - c. Automatic Deployable (ELT(AD)). An ELT, which is rigidly attached to the aircraft and which is automatically deployed and activated by impact, and, in some cases, also by hydrostatic sensors. Manual deployment is also provided;
 - d. Survival ELT (ELT(S)). An ELT which is removable from an aircraft, stowed so as to facilitate its ready use in an emergency, and manually activated by survivors.
2. An automatic portable ELT, (ELT(AP)), as installed in accordance with JAR-CAR OPS 1.820, may be used to replace one ELT(S) provided that it meets the ELT(S) requirements. A water activated ELT(S) is not an ELT(AP).

IEM OPS 1.825 Life Jackets

See CAR OPS 1.825

For the purpose of CAR OPS 1.825, seat cushions are not considered to be flotation devices.

AMC OPS 1.830(b)(2) Life-rafts and ELT for extended overwater flights

See CAR OPS 1.830(b)(2)

- 1 The following should be readily available with each life-raft:
 - a. Means for maintaining buoyancy;
 - b. A sea anchor;
 - c. Life-lines, and means of attaching one life-raft to another;
 - d. Paddles for life-rafts with a capacity of 6 or less;
 - e. Means of protecting the occupants from the elements;

- f. A water resistant torch;
 - g. Signalling equipment to make the pyrotechnical distress signals described in ICAO Annex 2;
 - h. 100 g of glucose tablet for each 4, or fraction of 4, persons which the life-raft is designed to carry;
 - i. At least 2 litres of drinkable water provided in durable containers or means of making sea water drinkable or a combination of both; and
 - j. First-aid equipment.
- 2 As far as practicable, items listed above should be contained in a pack.

IEM OPS 1.835 Survival Equipment

See CAR OPS 1.835

- 1 The expression 'Areas in which search and rescue would be especially difficult' should be interpreted in the context of this CAR 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 OPS 1.835(c) Survival Equipment

See CAR OPS 1.835(c)

- 1 At least the following survival equipment should be carried when required:
 - a. 2 litres of drinkable water for each 50, or fraction of 50, persons on board provided in durable containers;
 - b. One knife;
 - c. One set of Air/Ground codes;

In addition, when polar conditions are expected, the following should be carried:

 - d. A means for melting snow;

- e. 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;
 - f. 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 aeroplane in accordance with another requirement, there is no need for this to be duplicated.

Appendix 1 to AC OPS 1.720/1.72 Parameters to be recorded

See AC OPS 1.720/1.725

TABLE 1 – Parameters Performance Specifications

Serial No.	Parameter	Range	Sampling Interval in seconds	Accuracy limits (sensor input compared to FDR readout)	Recommended Resolution in readout	Remarks
1	Time or relative time count	24 hours	4	$\pm 0.125\%$ per hour	1 second	UTC time preferred where available, otherwise elapsed time
2	Pressured altitude	-1 000 ft to maximum certificated altitude of aircraft +5000 ft	1	± 100 ft to ± 700 ft	5 ft	For altitude record error see CS TSO C124
3	Indicated airspeed	50 kt to max V_{SO} Max V_{SO} to $1.2 V_d$	1	$\pm 5\%$ $\pm 3\%$	1kt	V_{SO} stalling speed or minimum steady flight speed in the landing configuration V_{dF} design diving speed
4	Heading	360°	1	$\pm 2^\circ$	0.5°	

S e r i a l N o.	Parameter	Range	Sampling Interval in seconds	Accuracy limits (sensor input compared to FDR readout)	Recommended Resolution in readout	Remarks
5	Normal acceleration	-3 g to +6 g	0.125 ±	0.125 ±1% of maximum range excluding a datum error of ± 5%	0.004 g	
6	Pitch attitude	±75°	1	±2°	0.5°	
7	Roll attitude	±180°	1	±2°	0.5°	
8	Manual radio transmission keying	Discrete	1	-	-	On-off (one discrete). An FDR/CVR time synchronisa tion signal complying with EUROCAE Document ED55 dated May 1990 paragraph 4.2.1 is an acceptable alternative means of compliance

Serial No.	Parameter	Range	Sampling Interval in seconds	Accuracy limits (sensor input compared to FDR readout)	Recommended Resolution in readout	Remarks
9	Power on each engine	Full range	Each engine each second	±2%	0.2% of full range	Sufficient parameters e.g. EPR/N, or Torque/N _p as appropriate to the particular engine should be recorded to determine power
10	Trailing edge flap or cockpit control selection	Full range or each discrete position	2	±5% or as pilot's indicator	0.5% of full range	
11	Leading edge flap or cockpit control selection	Full range or each discrete position	2	-	0.5% of full range	
12	Thrust reverser position	Stowed, in transit, and reverse	Each reverser each second	±2% unless higher accuracy uniquely required	-	

S e r i a l N o.	Parameter	Range	Sampling Interval in seconds	Accuracy limits (sensor input compared to FDR readout)	Recommended Resolution in readout	Remarks
1 3	Ground spoiler and/or speed brake selection	Full range or each discrete position	1	$\pm 2^\circ$	0.2% of full range	
1 4	Outside air temperatures or Total air temperature	Sensor range	2	-	0.3°	
1 5 a 1 5 b	Autopilot engagement status Autopilot operating modes, autothrottle and AFCS systems engagement status and operating modes	A suitable combination of discretcs	1		-	
1 6	Longitudinal acceleration	± 1 g	0.25	$\pm 1.5\%$ of maximum range excluding a datum error of $\pm 5\%$	0.004 g	

S e r i a l N o.	Parameter	Range	Sampling Interval in seconds	Accuracy limits (sensor input compared to FDR readout)	Recommended Resolution in readout	Remarks
1 7	Lateral acceleration	± 1 g	0.25	$\pm 1.5\%$ of maximum range excluding a datum error of $\pm 5\%$	0.004 g	

S e r i a l N o.	Parameter	Range	Sampling Interval in seconds	Accuracy limits (sensor input compared to FDR readout)	Recommended Resolution in readout	Remarks
18	Primary flight controls. Control surface positions and/or pilot input (pitch, roll, yaw)	Full range	1	±2° unless higher accuracy uniquely required	0.2% of full range	For aeroplanes with conventional control systems 'or' applies For aeroplanes with non-mechanical control systems 'and' applies For aeroplanes with split surfaces a suitable combination of inputs is acceptable in lieu of recording each surface separately

S e r i a l N o.	Parameter	Range	Sampling Interval in seconds	Accuracy limits (sensor input compared to FDR readout)	Recommended Resolution in readout	Remarks
19	Pitch trim position	Full range	1	±3% unless higher accuracy uniquely required	0.3% of full range	
20	Radio altitude	-20 ft to +2500 ft	1	±2 ft or ±3% whichever is greater below 500 ft and ±5% above 500 ft	1 ft below 500 ft, 1 ft +5% of full range above 500 ft	As installed. Accuracy limits are recommended
21	Glide path deviation	Signal range	1	±3%	0.3% of full range	As installed. Accuracy limits are recommended
22	Localiser deviation	Signal range	1	±3%	0.3% of full range	As installed. Accuracy limits are recommended
23	Marker beacon passage	Discrete	1	–	–	A single discrete is acceptable for all markers
24	Master warning	Discrete	1	–	–	

S e r i a l N o.	Parameter	Range	Sampling Interval in seconds	Accuracy limits (sensor input compared to FDR readout)	Recommended Resolution in readout	Remarks
2 5	NAV 1 and 2 frequency selection	Full range	4	As installed	–	
2 6	DME 1 and 2 distance	0-200 nm	4	As installed	–	Recording of latitude and longitude from INS or other navigation system is a preferred alternative
2 7	Landing gear squat switch status	Discrete	1	–	–	
2 8	Ground proximity warning system (GPWS)	Discrete	1	–	–	
2 9	Angle of attack	Full range	0.5	As installed	0.3% of full range	
3 0	Hydraulics	Discrete(s)	2	–	–	
3 1	Navigation data	As installed	1	As installed	–	
3 2	Landing gear or gear selector position	Discrete	4	As installed	–	

TABLE B – Additional information to be considered

- (a) Operational information from electronic display systems, such as Electronic Flight Instruments Systems (EFIS), Electronic Centralised Aircraft Monitor (ECAM) and Engine Indications and Crew Alerting System (EICAS). Use the following order of priority:
 - 1. Parameters selected by the flight crew relating to the desired flight path, e.g. barometric pressure setting, selected altitude, selected airspeed, decision height, and autoflight system engagement and mode indications if not recorded from another source;
 - 2. Display system selection/status, e.g. SECTOR, PLAN, ROSE, NAV, WXR, COMPOSITE, COPY;
 - 3. Warnings and alerts;
 - 4. The identity of displayed pages for emergency procedures and checklists.
- (b) Retardation information including brake application for use in the investigation of landing over-runs and rejected take-offs; and
- (c) Additional engine parameters (EPR, N₁ EGT, fuel flow, etc.).

AC/AMC/IEM L — COMMUNICATION AND NAVIGATION EQUIPMENT***IEM OPS 1.845* Communication and Navigation Equipment - Approval and Installation**

See CAR OPS 1.845

- 1 For Communication and Navigation Equipment required by CAR OPS 1 Subpart L, “Approved” means that compliance with the applicable TSO design requirements and performance specifications, or equivalent, in force at the time of the equipment approval application, has been demonstrated. Where a TSO does not exist, the applicable airworthiness standards or equivalent apply unless otherwise prescribed in CAR OPS 1 or CAR M.
- 2 “Installed” means that the installation of Communication and Navigation Equipment has been demonstrated to comply with the applicable airworthiness requirements of CS-23/CS-25, or the relevant code used for Type Certification, and any applicable requirement prescribed in CAR OPS 1.
- 3 Communication and Navigation Equipment approved in accordance with design requirements and performance specifications other than TSOs, before the applicability dates prescribed in CAR OPS 1.001(b), are acceptable for use or installation on aeroplanes operated for the purpose of commercial air transportation provided that any relevant OPS requirement is complied with.
- 4 When a new version of a TSO (or of a specification other than a CS-TSO) is issued, Communication and Navigation Equipment approved in accordance with earlier requirements may be used or installed on aeroplanes 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 CAR OPS 1 or CAR M.

***AMC OPS 1.865* Combinations of Instruments and Integrated Flight Systems**

See CAR OPS 1.865

Individual requirements of CAR OPS 1.865 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 specified.

***AC OPS 1.865(c)(1)(i)* IFR operations without ADF system**

See CAR OPS 1.865(c)(1)(i)

- 1 To perform IFR operations without an ADF system installed, an operator should consider the following guidelines on equipment carriage, operational procedures and training criteria.
- 2 The removal/non installation of ADF equipment from an aeroplane may only be done where it is not essential for navigation, provided that alternative equipment giving equivalent or enhanced navigation capability is carried. This may be accomplished by the carriage of an additional VOR receiver or a GNSS receiver approved for IFR operations.
- 3 For IFR operations without ADF, an operator should ensure that:
 - a. route segments that rely solely on ADF for navigation are not flown;
 - b. a firm commitment is made not to fly any ADF/NDB procedures;
 - c. that the MEL has been amended to take account of the non-carriage of ADF;

- d. that the Operations Manual does not reference any procedures based on NDB signals for the aeroplanes concerned;
 - e. that flight planning and dispatch procedures are consistent with the above mentioned criteria.
- 4 The removal of ADF should be taken into account by the operator in the initial and recurrent training of flight crew.

AC OPS 1.865(e) FM Immunity Equipment Standards

See CAR OPS 1.865(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.

Note: Operations within the Oman FIR do not require FM Immunity.

AC OPS 1.870 Additional Navigation Equipment for operations in MNPS Airspace

See CAR OPS 1.870

- 1 A Long Range Navigation System may be one of the following:
 - a. One Inertial Navigation System (INS).
 - b. One Global Navigation Satellite System (GNSS).
 - c. One navigation system using inputs from one or more Inertial Reference Systems (IRS), or any other MNPS approved sensor system.
- 2 To conform to the Long range navigation System Specification, a GNSS and its operational use should be approved in accordance with the relevant requirements for MNPS airspace.
- 3. An integrated navigation system which offers equivalent functional availability, integrity and redundancy, when approved may, for the purpose of this requirement, be considered as two independent Long Range Navigation Systems.

AC/AMC/IEM M – AEROPLANE MAINTENANCE (WITHDRAWN)

This Subpart has been entirely withdrawn due to the implementation of CAR M

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AC/AMC/IEM N — FLIGHT CREW**AMC OPS 1.940(a)(4) Crewing of inexperienced flight crew members**

See CAR OPS 1.940(a)(4)

- 1 An operator should consider that a flight crew member is inexperienced, following completion of a Type Rating or command course, and the associated line flying under supervision, until he has achieved on the Type either:
 - a. 100 flying hours and flown 10 sectors within a consolidation period of 120 consecutive days; or
 - b. 150 flying hours and flown 20 sectors (no time limit).
- 2 A lesser number of flying hours or sectors, subject to any other conditions which the Authority may impose, may be acceptable to the Authority when:
 - a. A new operator is commencing operations; or
 - b. An operator introduces a new aeroplane type; or
 - c. Flight crew members have previously completed a type conversion course with the same operator; or
 - d. The aeroplane has a Maximum Take-off Mass below 10 tonnes or a Maximum Approved Passenger Seating Configuration of less than 20.

AMC OPS 1.945 Conversion Course Syllabus

See CAR OPS 1.945 and Appendix 1 to CAR OPS 1.945

- 1 General
 - 1.1 Type rating training when required may be conducted separately or as part of conversion training. When the type rating training is conducted as part of conversion training, the conversion training programme should include all the requirements of CAR-FCL.
- 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 aeroplane 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 as aeroplane systems, performance and flight planning, where applicable.
- 3 Emergency and safety equipment training and checking
 - 3.1 On the initial conversion course and on subsequent conversion courses as applicable, the following should be addressed:
 - a. Instruction on first aid in general (Initial conversion course only); Instruction on first aid as relevant to the aeroplane type of operation and crew complement including where no cabin crew are required to be carried (Initial and subsequent);
 - b. Aeromedical topics including:
 - i. Hypoxia;
 - ii. Hyperventilation;
 - iii. Contamination of the skin/eyes by aviation fuel or hydraulic or other fluids;
 - iv. Hygiene and food poisoning; and
 - v. Malaria;

- c. The effect of smoke in an enclosed area and actual use of all relevant equipment in a simulated smoke-filled environment;
 - d. The operational procedures of security, rescue and emergency services.
 - e. Survival information appropriate to their areas of operation (e.g. polar, desert, jungle or sea) and training in the use of any survival equipment required to be carried.
 - f. 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 lifejacket, together with a demonstration or film of the inflation of life-rafts and/or slide-rafts and associated equipment. This practice should, on an initial conversion course, 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.
 - g. 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 aeroplane (or a representative 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.
- 4 Aeroplane/STD training
- 4.1 Flying training should be structured and sufficiently comprehensive to familiarise the flight crew member thoroughly with all aspects of limitations and normal /abnormal and emergency procedures associated with the aeroplane and should be carried out by suitably qualified Type Rating Instructors and/or Type Rating Examiners. For specialised operations such as steep approaches, ETOPS All Weather Operations or QFE operations, additional training should be carried out.
 - 4.2 In planning aeroplane/STD training on aeroplanes with a flight crew of two or more, particular emphasis should be placed on the practice of Line Orientated Flying Training (LOFT) with emphasis on Crew Resource Management (CRM).
 - 4.3 Normally, the same training and practice in the flying of the aeroplane should be given to copilots as well as commanders. The 'flight handling' sections of the syllabus for commanders and copilots alike should include all the requirements of the operator proficiency check required by CAR OPS 1.965.
 - 4.4 Unless the type rating training programme has been carried out in a Flight Simulator usable for zero flight-time (ZFT) conversion, the training should include at least 3 takeoffs and landings in the aeroplane.
- 5 Line flying under supervision
- 5.1 Following completion of aeroplane/STD training and checking as part of the operator's conversion course, each flight crew member should operate a minimum number of sectors and/or flying hours under the supervision of a flight crew member nominated by the operator and acceptable to the Authority.
 - 5.2 The minimum sectors/hours should be specified in the Operations Manual and should be determined by the following:
 - a. Previous experience of the flight crew member;
 - b. Complexity of the aeroplane; and
 - c. The type and area of operation.
 - 5.3 A line check in accordance with CAR OPS 1.945(a)(8) should be completed upon completion of line flying under supervision.
- 6 System Panel Operator
- 6.1 Conversion training for system panel operators should approximate to that of pilots.
 - 6.2 If the flight crew includes a pilot with duties of a systems panel operator, he should, after training and the initial check in these duties, operate a minimum number of sectors under the supervision of a nominated additional 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 aeroplane and the experience of the flight crew member.

IEM OPS 1.945 Line Flying under Supervision

See CAR OPS 1.945

- 1 Introduction
 - 1.1 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 the ground and flying training of 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 crew member should be able to perform a safe and efficient flight conducted within the tasks of his crew member station.
 - 1.2 The following minimum figures for details to be flown under supervision are guidelines for operators to use when establishing their individual requirements.
- 2 Turbo jet aircraft
 - a. Co-pilot undertaking first conversion course:
 - i. Total accumulated 100 hours or minimum 40 sectors;
 - b. Co-pilot upgrading to commander:
 - i. Minimum 20 sectors when converting to a new type;
 - ii. Minimum 10 sectors when already qualified on the aeroplane type.

AC OPS (AMC) 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e) Crew Resource Management (CRM)

See CAR OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e)/1.965(a)(3)(iv)

See AC OPS (IEM) 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e)

- 1 General
 - 1.1 Crew Resource Management (CRM) is the effective utilisation of all available resources (e.g. crew members, aeroplane 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 programmes are designed to provide knowledge of, and familiarity with, human factors relevant to flight operations. The course duration should be a minimum of one day for single pilot operations and two days for all other types of operations. It should cover all elements in Table 1, column (a) to the level required by column (b) (Initial CRM training).
 - 2.2
 - a. A CRM trainer should possess group facilitation skills and should at least:
 - i. Have current commercial air transport experience as a flight crew member; and have either:
 - (A) Successfully passed the Human Performance and Limitations (HPL) examination whilst recently obtaining the ATPL (see the requirements applicable to the issue of Flight Crew Licences); or,
 - (B) If holding a Flight Crew Licence acceptable under CAR OPS 1.940(a)(3) prior to the introduction of HPL into the ATPL syllabus, followed a theoretical HPL course covering the whole syllabus of the HPL examination.
 - ii. Have completed initial CRM training; and
 - iii. Be supervised by suitably qualified CRM training personnel when conducting their first initial CRM training session; and
 - iv. Have received additional education in the fields of group management, group dynamics and personal awareness.

- b. Notwithstanding paragraph (a) above, and when acceptable to the Authority;
 - i. A flight crew member holding a recent qualification as a CRM trainer may continue to be a CRM trainer even after the cessation of active flying duties;
 - ii. An experienced non-flight crew CRM trainer having a knowledge of HPL, may also continue to be a CRM trainer;
 - iii. A former flight crew member having knowledge of HPL may become a CRM trainer if he maintains adequate knowledge of the operation and aeroplane type and meets the provisions of paragraphs 2.2a ii, iii and iv.
- 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 aeroplane type, all elements in Table 1, column (a) should be integrated into all appropriate phases of the operator's conversion course and covered to the level required by column (c) (conversion course when changing type), unless the two operators use the same CRM training provider.
- 3.2 If the flight crew member undergoes a conversion course with a change of operator, all elements in Table 1, column (a) should be integrated into all appropriate phases of the operator's conversion course and covered to the level required by column (d) (conversion course when changing operator).
- 3.3 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 all elements in Table 1, column (a) are integrated into the command course and covered to the level required by column (e) (command course).
- 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 An operator should ensure that :
- a. Elements of CRM are integrated into all appropriate phases of recurrent training every year; and that all elements in Table 1, column (a) are covered to the level required by column (f) (recurrent training); and that modular CRM training covers the same areas over a maximum period of 3 years.
 - b. Relevant modular CRM training is conducted by CRM trainers qualified according to paragraph 2.2.
- 5.2 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

Core Elements (a)	Initial CRM Training (b)	Operator's conversion course when changing type (c)	Operator's conversion course when changing operator (d)	Command course (e)	Recurrent training (f)
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	Indepth	
Stress, stress management , fatigue & vigilance			Not required		
Information acquisition and processing situation awareness, workload management		Overview	Not required	Overview	
Decision making					
Communication and co-ordination inside and outside the cockpit					
Leadership and team behaviour synergy		As required	In depth	In depth	
Automation, philosophy of the use of automation (if relevant to the type)					
Specific type-related differences	Not required				
Case based studies	In depth	In depth	In depth	In depth	As appropriate

7 Co-ordination between flight crew and cabin crew training

7.1 Operators should, as far as is practicable, provide combined training for flight crew and cabin crew including briefing and debriefing.

7.2 There should be an effective liaison between flight crew and cabin crew training departments. Provision should be made for flight and cabin crew instructors to observe and comment on each others training.

- 8 Assessment of CRM Skills (See AC OPS (IEM) 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e), paragraph 4)
- 8.1 Assessment of CRM skills should:
- a. Provide feedback to the individual and serve to identify retraining where needed; and
 - b. Be used to improve the CRM training system.
- 8.2 Prior to the introduction of CRM skills assessment, a detailed description of the CRM methodology including terminology used, acceptable to the Authority, should be published in the Operations Manual.
- 8.3 Operators should establish procedures including retraining, to be applied in the event that personnel do not achieve or maintain the required standards (Appendix 1 to 1.1045, Section D, paragraph 3.2 refers).
- 8.4 If the operator proficiency check is combined with the Type Rating revalidation/renewal check, the assessment of CRM skills will satisfy the Multi Crew Co-operation requirements of the Type Rating revalidation/renewal. This assessment will not affect the validity of the Type Rating.

IEM OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e) Crew Resource Management (CRM)

See CAR OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e)

See AMC-CAR OPS 1.943/1.945(a)(9)/1.955(b)(6)/1.965(e)

- 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 of CRM skills is the process of observing, recording, interpreting and evaluating debriefing crews' and crew member's, where appropriate, pilot performance and knowledge against a required standard using an acceptable methodology 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. In order to enhance the effectiveness of the programme this methodology should, where possible, be agreed with flight crew representatives.
 - 4.2 NOTECHS or other acceptable methods of CRM skills assessment should be used 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 t. The selection criteria and training requirements of the assessors and their relevant qualifications, knowledge and skills should be established.
 - 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: Methodology of CRM skills assessment:
 - 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. The assessment should be based on the following principles:

- i. only observable, repetitive behaviours are assessed,
 - ii. the assessment should positively reflect any CRM skills that result in enhanced safety,
 - iii. assessments should include behaviour which contributes to a technical failure, such technical failure being errors leading to an event which requires debriefing by the person conducting the line check,
 - iv. the crew and, where needed, the individual are orally debriefed.
- 4.4 De-identified summaries of all CRM assessments by the operator should be used to provide feedback to update and improve the operator's CRM training.
5. Levels of Training.
- 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.

AMC OPS 1.945(a)(9) Crew Resource Management - Use of Automation

See CAR OPS 1.945(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 OPS 1.965(c) Line checks

See CAR OPS 1.965(c)

- 1 Where a pilot is required to operate as pilot flying and pilot non-flying, he should be checked on one sector as pilot flying and on another sector as pilot non-flying.
- 2 However, where an operator's procedures require integrated flight preparation, integrated cockpit initialisation and that each pilot performs both flying and non-flying duties on the same sector, then the line check may be performed on a single sector.

AMC OPS 1.965(d) Emergency and Safety Equipment Training

See CAR OPS 1.965(d)

- 1 The successful resolution of aeroplane emergencies requires interaction between flight crew and cabin crew 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 aeroplane 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 cabin crew 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 cabin crew undergoing similar training with emphasis on co-ordinated procedures and two-way communication between the flight deck and the cabin.

IEM OPS 1.965 Recurrent training and checking

See CAR OPS 1.965

- 1 Line checks, route and aerodrome competency and recent experience requirements are intended to ensure the crew member's ability to operate efficiently under normal conditions, whereas other checks and emergency and safety equipment training are primarily intended to prepare the crew member for abnormal/emergency procedures.
- 2 The line check is performed in the aeroplane. All other training and checking should be performed in the aeroplane of the same type or an STD or, an approved flight simulator or, in the case of emergency and safety equipment training, in a representative training device. The type of equipment used for training and checking should be representative of the instrumentation, equipment and layout of the aeroplane type operated by the flight crew member.
- 3 Line Checks
 - 3.1 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. Line checks are a test of a flight crew member's ability to perform a complete line operation satisfactorily, including preflight and postflight procedures and use of the equipment provided, and an opportunity for an overall assessment of his 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. When weather conditions preclude a manual landing, an automatic landing is acceptable. The line check is not intended to determine competence on any particular route. The commander, or any pilot who may be required to relieve the commander, should also demonstrate his ability to 'manage' the operation and take appropriate command decisions.
- 4 Proficiency Training and Checking
 - 4.1 When an STD is used, the opportunity should be taken, where possible, to use Line Oriented Flying Training (LOFT).
 - 4.2 Proficiency training and checking for System Panel Operators should, where practicable, take place at the same time a pilot is undergoing proficiency training and checking.

AMC to Appendix 1 to CAR OPS 1.965 Pilot incapacitation training

See Appendix 1 to CAR OPS 1.965, paragraph (a)(1)

- 1 Procedures should be established to train flight crew to recognise and handle pilot incapacitation. This training should be conducted every year and can form part of other recurrent training. It should take the form of classroom instruction, discussion or video or other similar means.
- 2 If a Flight Simulator is available for the type of aeroplane operated, practical training on pilot incapacitation should be carried out at intervals not exceeding 3 years.

AMC OPS 1.970 Recency

See CAR OPS 1.970

When using a Flight Simulator for meeting the landing requirements in CAR OPS 1.970(a)(1) and (a)(2), complete visual traffic patterns or complete IFR procedures starting from the Initial Approach Fix should be flown.

IEM OPS 1.970(a)(2) Co-pilot proficiency

See CAR OPS 1.970(a)(2)

A co-pilot serving at the controls means that that pilot is either pilot flying or pilot non-flying. The only required take-off and landing proficiency for a co-pilot is the operator's and type-rating proficiency checks.

AMC OPS 1.975 Route and aerodrome competence qualification

See CAR OPS 1.975

- 1 Route competence
 - 1.1 Route 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; and
 - e. Navigational facilities associated with the route along which the flight is to take place.
 - 1.2 Depending on the complexity of the route, as assessed by the operator, the following methods of familiarisation should be used:
 - a. For the less complex routes, familiarisation by self-briefing with route documentation, or by means of programmed instruction; and
 - b. For the more complex routes, in addition to sub-paragraph 1.2.a above, inflight familiarisation as a commander, co-pilot or observers under supervision, or familiarisation in a Synthetic Training Device using a database appropriate to the route concerned.
- 2 Aerodrome competence
 - 2.1 The Operations Manual should specify a method of categorisation of aerodromes and specify the requirements necessary for each of these categories. If the least demanding aerodromes are Category A, Category B and C would be applied to progressively more demanding aerodromes. The Operations Manual should specify the parameters which qualify an aerodrome to be considered Category A and then provide a list of those aerodrome categorised as B or C.
 - 2.2 All aerodromes to which an operator operates should be categorised in one of these three categories. The operator's categorisation should be acceptable to the Authority.
- 3 Category A. An aerodrome which satisfies all of the following requirements:
 - a. An approved instrument approach procedure;
 - b. At least one runway with no performance limited procedure for take-off and/or landing;
 - c. Published circling minima not higher than 1 000 feet above aerodrome level; and
 - d. Night operations capability.
- 4 Category B. An aerodrome which does not satisfy the Category A requirements or which requires extra considerations such as:

- a. Non-standard approach aids and/or approach patterns; or
 - b. Unusual local weather conditions; or
 - c. Unusual characteristics or performance limitations; or
 - d. Any other relevant considerations including obstructions, physical layout, lighting etc.
- 4.1 Prior to operating to a Category B aerodrome, the commander should be briefed, or self-briefed by means of programmed instruction, on the Category B aerodrome(s) concerned and should certify that he has carried out these instructions.
- 5 Category C. An aerodrome, which requires additional considerations to a Category B aerodrome.
- 5.1 Prior to operating to a Category C aerodrome, the commander should be briefed and visit the aerodrome as an observer and/or undertake instruction in a Flight Simulator. This instruction should be certified by the operator.

AC OPS 1.978 Terminology

See CAR OPS 1.978 and Appendix 1 to CAR OPS 1.978

1 Terminology

- 1.1 Line Oriented Evaluation (LOE). LOE is an evaluation methodology used in the ATQP to evaluate trainee performance, and to validate trainee proficiency. LOEs consist of flight simulator scenarios that are developed by the operator in accordance with a methodology approved as part of the ATQP. The LOE should be realistic and include appropriate weather scenarios and in addition should fall within an acceptable range of difficulty. The LOE should include the use of validated event sets to provide the basis for event based assessment. See paragraph 1.4 below.
- 1.2 Line Oriented Quality Evaluation (LOQE). LOQE is one of the tools used to help evaluate the overall performance of an operation. LOQEs consist of line flights that are observed by appropriately qualified operator personnel to provide feedback to validate the ATQP. The LOQE should be designed to look at those elements of the operation that are unable to be monitored by FDM or Advanced FDM programmes.
- 1.3 Skill based training. Skill based training requires the identification of specific knowledge and skills. The required knowledge and skills are identified within an ATQP as part of a task analysis and are used to provide targeted training.
- 1.4 Event based Assessment. This is the assessment of flight crew to provide assurance that the required knowledge and skills have been acquired. This is achieved within an LOE. Feedback to the flight crew is an integral part of event based assessment.

AC to Appendix 1 to CAR OPS 1.978(b)(1) Requirements, Scope and Documentation of the Programme

See Appendix 1 to CAR OPS 1.978(b)(1)

- 1 The documentation should demonstrate how the operator should establish the scope and requirements of the programme. The documentation should include:
 - 1.1 How the ATQP should enable the operator to establish an alternative training programme that substitutes the requirements as listed in CAR OPS 1 E and N. The programme should demonstrate that the operator is able to improve the training and qualification standards of flight crew to a level that exceeds the standard prescribed in CAR OPS 1.
 - 1.2 The operator's training needs and established operational and training objectives.
 - 1.3 How the operator defines the process for designing of and gaining approval for the operator's flight crew qualification programmes. This should include quantified operational and training objectives identified by the operator's internal monitoring programmes. External sources may also be used.
 - 1.4 How the programme will:
 - a. Enhance safety;
 - b. Improve training and qualification standards of flight crew;
 - c. Establish attainable training objectives;
 - d. Integrate CRM in all aspects of training;
 - e. Develop a support and feedback process to form a self-correcting training system;
 - f. Institute a system of progressive evaluations of all training to enable consistent and uniform monitoring of the training undertaken by flight crew;
 - g. Enable the operator to be able to respond to the new aeroplane technologies and changes in the operational environment;
 - h. Foster the use of innovative training methods and technology for flight crew instruction and the evaluation of training systems;
 - i. Make efficient use of training resources, specifically to match the use of training media to the training needs.

AC to Appendix 1 to CAR OPS 1.978(b)(2) Task Analysis

See Appendix 1 to CAR OPS 1.978(b)(2)

- 1 For each aeroplane type/class to be included within the ATQP the operator should establish a systematic review that determines and defines the various tasks to be undertaken by the flight crew when operating that type(s)/class. Data from other types/class may also be used. The analysis should determine and describe the knowledge and skills required to complete the various tasks specific to the aeroplane type/class and/or type of operation. In addition the analysis should identify the appropriate behavioural markers that should be exhibited. The task analysis should be suitably validated in accordance with Appendix 1 to CAR OPS 1.978(c)(iii). The task analysis, in conjunction with the data gathering programme(s) permit the operator to establish a programme of targeted training together with the associated training objectives described in AC to Appendix 1 to CAR OPS 1.978(b)(3) paragraph (c) below.

AC to Appendix 1 to CAR OPS 1.978(b)(3) Training Programme

See Appendix 1 to CAR OPS 1.978(b)(3)

- 1 The training programme should have the following structure:
 - 1.1 Curriculum.
 - 1.2 Daily lesson plan.
- 2 The curriculum should specify the following elements:
 - 2.1 Entry requirements: A list of topics and content, describing what training level will be required before start or continuation of training.
 - 2.2 Topics: A description of what will be trained during the lesson;
 - 2.3 Targets/Objectives
 - a. Specific target or set of targets that have to be reached and fulfilled before the training course can be continued.
 - b. Each specified target should have an associated objective that is identifiable both by the flight crew and the trainers.
 - c. Each qualification event that is required by the programme should specify the training that is required to be undertaken and the required standard to be achieved. (See paragraph 1.4 below)
- 3 Each lesson/course/training or qualification event should have the same basic structure. The topics related to the lesson have to be listed and the lesson targets should be unambiguous.
- 4 Each lesson/course or training event whether classroom, CBT or simulator should specify the required topics with the relevant targets to be achieved.

AC to Appendix 1 to CAR OPS 1.978(b)(4) Training Personnel

See Appendix 1 to CAR OPS 1.978(b)(4)

- 1 Personnel who perform training and checking of flight crew in an operator's ATQP should receive the following additional training on:
 - 1.1 ATQP principles and goals;
 - 1.2 Knowledge/skills/behaviour as learned from task analysis;
 - 1.3 LOE/ LOFT Scenarios to include triggers / markers / event sets / observable behaviour;
 - 1.4 Qualification standards;
 - 1.5 Harmonisation of assessment standards;
 - 1.6 Behavioural markers and the systemic assessment of CRM;
 - 1.7 Event sets and the corresponding desired knowledge/skills and behaviour of the flight crew;
 - 1.8 The processes that the operator has implemented to validate the training and qualification standards and the instructors part in the ATQP quality control; and
 - 1.9 LOQE.

AC to Appendix 1 to CAR OPS 1.978(b)(5) Feedback Loop

See Appendix 1 to CAR OPS 1.978(b)(5)

- 1 The feedback should be used as a tool to validate that the curricula are implemented as specified by the ATQP; this enables substantiation of the curriculum, and that proficiency and training objectives have been met. The feedback loop should include data from operations flight data monitoring, advanced FDM programme and LOE/LOQE programmes. In addition the evaluation process shall describe whether the overall targets/objectives of training are being achieved and shall prescribe any corrective action that needs to be undertaken.
- 2 The programmes established quality control mechanisms should at least review the following:
 - 2.1 Procedures for approval of recurrent training;
 - 2.2 ATQP instructor training approvals;
 - 2.3 Approval of event set(s) for LOE/LOFT;
 - 2.4 Procedures for conducting LOE and LOQE.

AC to Appendix 1 to CAR OPS 1.978(b)(6) Crew Performance Measurement and Evaluation

See Appendix 1 to CAR OPS 1.978(b)(6)

- 1 The qualification and checking programmes should include at least the following elements:
 - 1.1 A specified structure;
 - 1.2 Elements to be tested/examined;
 - 1.3 Targets and/or standards to be attained;
 - 1.4 The specified technical and procedural knowledge and skills, and behavioural markers to be exhibited.
- 2 An LOE event should comprise of tasks and sub-tasks performed by the crew under a specified set of conditions. Each event has one or more specific training targets/objectives, which require the performance of a specific manoeuvre, the application of procedures, or the opportunity to practise cognitive, communication or other complex skills. For each event the proficiency that is required to be achieved should be established. Each event should include a range of circumstances under which the crews' performance is to be measured and evaluated. The conditions pertaining to each event should also be established and they may include the prevailing meteorological conditions (ceiling, visibility, wind, turbulence etc.); the operational environment (navigation aid inoperable etc.); and the operational contingencies (non-normal operation etc.).
- 3 The markers specified under the operator's ATQP should form one of the core elements in determining the required qualification standard. A typical set of markers are shown in the table below:

EVENT	MARKER
Awareness of Aeroplane Systems:	1 Monitors and reports changes in automation status. 2 Applies closed loop principle in all relevant situations. 3 Uses all channels for updates. 4 Is aware of remaining technical resources.
4	The topics / targets integrated into the curriculum have to be measurable and progression on any training/course is only allowed if the targets are fulfilled.

AC to Appendix 1 to CAR OPS 1.978(b)(9) Data Monitoring/Analysis Programme

See Appendix 1 to CAR OPS 1.978(b)(9)

- 1 The data analysis programme should consist of:
 - 1.1 A Flight Data Monitoring (FDM) programme: This programme should include systematic evaluation of operational data derived from equipment that is able to record the flight profile and relevant operational information during flights conducted by the operator's aeroplane. Data collection should reach a minimum of 60% of all relevant flights conducted by the operator before ATQP approval is granted. This proportion may be increased at the discretion of the Authority.
 - 1.2 An Advanced FDM when an extension to the ATQP is requested: An advanced FDM programme is determined by the level of integration with other safety initiatives implemented by the operator, such as the operator's Quality System. The programme should include both systematic evaluations of data from an FDM programme and flight crew training events for the relevant crews. Data collection should reach a minimum of 80% of all relevant flights and training conducted by the operator. This proportion may be varied at the discretion of the Authority.
- 2 The purpose of either an FDM or advanced FDM programme is to enable the operator to:
 - 2.1 Provide data to support the programme's implementation and justify any changes to the ATQP;
 - 2.2 Establish operational and training objectives based upon an analysis of the operational environment;
 - 2.3 Monitor the effectiveness of flight crew training and qualification.
- 3 Data Gathering.
 - 3.1 FDM programmes should include a system that captures flight data, and then transforms the data into an appropriate format for analysis. The programme should generate information to assist the operations safety personnel in analysing the data. The analysis should be made available to the ATQP postholder.
 - 3.2 The data gathered should:
 - a. Include all fleets that plan to operate under the ATQP;
 - b. Include all crews trained and qualified under the ATQP;
 - c. Be established during the implementation phase of ATQP; and
 - d. Continue throughout the life of the ATQP.

- 4 Data Handling.
 - 4.1 The operator should establish a process, which ensures the strict adherence to any data handling protocols, agreed with flight crew representative bodies, to ensure the confidentiality of individual flight crew members.
 - 4.2 The data handling protocol should define the maximum period of time that detailed FDM or advanced FDM programme data, including exceedences, should be retained. Trend data may be retained permanently.
- 5 An operator that has an acceptable operations flight data monitoring programme prior to the proposed introduction of ATQP may, with the approval of the Authority, use relevant data from other fleets not part of the proposed ATQP.

AC to Appendix 1 to CAR OPS 1.978(c)(1)(i) Safety Case

See Appendix 1 to CAR OPS 1.978(c)(1)(i)

- 1 Safety Case
 - 1.1 A documented body of evidence that provides a demonstrable and valid justification that the programme (ATQP) is adequately safe for the given type of operation. The safety case should encompass each phase of implementation of the programme and be applicable over the lifetime of the programme that is to be overseen.
 - 1.2 The safety case should:
 - a. Demonstrate the required level of safety;
 - b. Ensure the required safety is maintained throughout the lifetime of the programme;
 - c. Minimise risk during all phases of the programmes implementation and operation.
- 2 Elements of a Safety Case:
 - 2.1 Planning: Integrated and planned with the operation (ATQP) that is to be justified;
 - 2.2 Criteria: Develop the applicable criteria - see paragraph 3 below;
 - 2.3 Documentation: Safety related documentation – including a safety checklist;
 - 2.4 Programme of implementation: To include controls and validity checks;
 - 2.5 Oversight: Review and audits.
- 3 Criteria for the establishment of a Safety Case.
 - 3.1 The Safety Case should:
 - a. Be able to demonstrate that the required or equivalent level of safety is maintained throughout all phases of the programme, including as required by paragraph (c) below;
 - b. Be valid to the application and the proposed operation (ATQP);
 - c. Be adequately safe and ensure the required regulatory safety standards or approved equivalent safety standards are achieved;
 - d. Be applicable over the entire lifetime of the programme;

- e. Demonstrate Completeness and Credibility of the programme;
 - f. Be fully documented;
 - g. Ensure integrity of the operation and the maintenance of the operations and training infra-structure;
 - h. Ensure robustness to system change;
 - i. Address the impact of technological advance, obsolescence and change;
 - j. Address the impact of regulatory change.
- 4 In accordance with Appendix 1 to CAR OPS 1.978 paragraph (c) the operator may develop an equivalent method other than that specified above.

AMC OPS 1.980 Operation on more than one type or variant

See CAR OPS 1.980

- 1 Terminology
 - 1.1 The terms used in the context of the requirement for operation of more than one type or variant have the following meaning:
 - a. Base aeroplane. An aeroplane, or a group of aeroplanes, designated by an operator and used as a reference to compare differences with other aeroplane types/variants within an operator's fleet.
 - b. Aeroplane variant. An aeroplane, or a group of aeroplanes, with the same characteristics but which have differences from a base aeroplane which require additional flight crew knowledge, skills, and or abilities that affect flight safety.
 - c. Credit. The acceptance of training, checking or recent experience on one type or variant as being valid for another type or variant because of sufficient similarities between the two types or variants.
 - d. Differences training. See CAR OPS 1.950(a)(1).
 - e. Familiarisation training. See CAR OPS 1.950(a)(2).
 - f. Major change. A change, or changes, within an aeroplane type or related type, which significantly affect the flight crew interface with the aeroplane (e.g. flight characteristics, procedures, design/number of propulsion units, change in number of required flight crew).
 - g. Minor change. Any change other than a major change.
 - h. Operator Difference Requirements (ODRs). A formal description of differences between types or variants flown by a particular operator.
 - 1.2 Training and checking difference levels
 - a. Level A
 - i. Training. Level A training can be adequately addressed through self-instruction by a crew member through page revisions, bulletins or differences handouts. Level A introduces a different version of a system or component which the crew member has already shown the ability to use and understand. The differences result in no, or only minor, changes in procedures.
 - ii. Checking. A check related to differences is not required at the time of training. However, the crew member is responsible for acquiring the knowledge and may be checked during proficiency checking.
 - b. Level B
 - i. Training. Level B training can be adequately addressed through aided instruction such as slide/tape presentation, computer based instruction which may be interactive, video or classroom instruction. Such training is typically used for part-task systems requiring knowledge and training with, possibly, partial application of procedures (eg. fuel or hydraulic systems etc.).

- ii. Checking. A written or oral check is required for initial and recurrent differences training.
- c. Level C
 - i. Training. Level C training should be accomplished by use of “hands on” STDs qualified according to CAR-STD 2A, Level 1 or higher. The differences affect skills, abilities as well as knowledge but do not require the use of “real time” devices. Such training covers both normal and non-normal procedures (for example for flight management systems).
 - ii. Checking. An STD used for training level C or higher is used for a check of conversion and recurrent training. The check should utilise a “real time” flight environment such as the demonstration of the use of a flight management system. Manoeuvres not related to the specific task do not need to be tested.
- d. Level D
 - i. Training. Level D training addresses differences that affect knowledge, skills and abilities for which training will be given in a simulated flight environment involving, “real time” flight manoeuvres for which the use of an STD qualified according to CAR-STD 2A, Level 1 would not suffice, but for which motion and visual clues are not required. Such training would typically involve an STD as defined in CAR-STD 2A, Level 2.
 - ii. Checking. A proficiency check for each type or variant should be conducted following both initial and recurrent training. However, credit may be given for manoeuvres common to each type or variant and need not be repeated. Items trained to level D differences may be checked in STDs qualified according to CAR-STD 2A, Level 2. Level D checks will therefore comprise at least a full proficiency check on one type or variant and a partial check at this level on the other.
- e. Level E
 - i. Training. Level E provides a realistic and operationally oriented flight environment achieved only by the use of Level C or D Flight Simulators or the aeroplane itself. Level E training should be conducted for types and variants which are significantly different from the base aeroplane and/or for which there are significant differences in handling qualities.
 - ii. Checking. A proficiency check on each type or variant should be conducted in a level C or D Flight Simulator or the aeroplane itself. Either training or checking on each Level E type or variant should be conducted every 6 months. If training and checking are alternated, a check on one type or variant should be followed by training on the other so that a crew member receives at least one check every 6 months and at least one check on each type or variant every 12 months.

AMC OPS 1.980(b) Methodology - Use of Operator Difference Requirement (ODR) Tables

See CAR OPS 1.980(b)

See also IEM OPS 1.980(b)

- 1 General
 - 1.1 Use of the methodology described below is acceptable to the Authority as a means of evaluating aeroplane differences and similarities to justify the operation of more than one type or variant, and when credit is sought.
- 2 ODR Tables
 - 2.1 Before requiring flight crew members to operate more than one type or variant, operators should first nominate one aeroplane as the Base Aeroplane from which to show differences with the second aeroplane type or variant, the ‘difference aeroplane’, in terms of technology (systems), procedures, pilot handling and aeroplane management. These differences, known as Operator Difference Requirements (ODR), preferably presented in tabular format, constitute part of the justification for operating more than one type or variant and also the basis for the associated differences/familiarisation training for the flight crew.
- 3 The ODR Tables should be presented as follows:

3.1 Table 1 - ODR 1 – General

BASE AEROPLANE: DIFFERENCE AEROPLANE:				COMPLIANCE METHOD		
GENERAL	DIFFERENCES	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
General description of aircraft (dimensions weight, limitations, etc.)	Identification of the relevant differences between the base aeroplane and the difference aeroplane.	Impact on flight characteristics (performance and/or handling)	Impact on procedures (Yes or No)	Assessment of the difference levels according to Table 4		

3.2 Table 2 - ODR 2 - systems

BASE AEROPLANE: DIFFERENCE AEROPLANE:				COMPLIANCE METHOD		
SYSTEM	DIFFERENCES	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
Brief description of systems and subsystems classified according to the ATA 100 index.	list of differences for each relevant subsystem between the base aeroplane and the difference aeroplane.	Impact on flight characteristics (performance and/or handling)	Impact on procedures (Yes or No)	Assessment of the difference levels according to Table 4		

3.3 Table 3 - ODR 3 - manoeuvres

BASE AEROPLANE: DIFFERENCE AEROPLANE:				COMPLIANCE METHOD		
MANOEUVRES	DIFFERENCES	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
Described according to phase of flight (gate, taxi, flight, taxi, gate)	List of relevant differences for each manoeuvre between the base aeroplane and the difference aeroplane.	Impact on flight characteristics (performance and/or handling)	Impact on procedures (Yes or No)	Assessment of the difference levels according to Table 4		

4 Compilation of ODR Tables

4.1 ODR 1 - Aeroplane general

- a. The general characteristics of the difference aeroplane should be compared with the base aeroplane with regard to:

- i. General dimensions and aeroplane design;
 - ii. Flight deck general design;
 - iii. Cabin layout;
 - iv. Engines (number, type and position);
 - v. Limitations (flight envelope).
- 4.2 ODR 2 - Aeroplane systems
- a. Consideration should be given to differences in design between the difference aeroplane and the base aeroplane. This comparison should be completed using the ATA 100 index to establish system and subsystem classification and then an analysis performed for each index item with respect to main architectural, functional and/or operations elements, including controls and indications on the systems control panel.
- 4.3 ODR 3 - Aeroplane manoeuvres (operational differences)
- a. Operational differences encompass normal, abnormal and emergency situations and include any change in aeroplane handling and flight management. It is necessary to establish a list of operational items for consideration on which an analysis of differences can be made. The operational analysis should take the following into account:
 - i. Flight deck dimensions (e.g. size, cut-off angle and pilot eye height);
 - ii. Differences in controls (eg. design, shape, location, function);
 - iii. Additional or altered function (flight controls) in normal or abnormal conditions;
 - iv. Procedures;
 - v. Handling qualities (including inertia) in normal and abnormal configurations;
 - vi. Performance in manoeuvres;
 - vii. Aeroplane status following failure;
 - viii. Management (e.g. ECAM, EICAS, navaid selection, automatic checklists).
- 4.4 Once the differences for ODR 1, ODR 2 and ODR 3 have been established, the consequences of differences evaluated in terms of Flight Characteristics (FLT CHAR) and Change of Procedures (PROC CHNG) should be entered into the appropriate columns.
- 4.5 Difference Levels - crew training , checking and currency
- 4.5.1 The final stage of an operator's proposal to operate more than one type or variant is to establish crew training, checking and currency requirements. This may be established by applying the coded difference levels from Table 4 to the Compliance Method column of the ODR Tables.
- 5 Differences items identified in the ODR systems as impacting flight characteristics, and/or procedures, should be analysed in the corresponding ATA section of the ODR manoeuvres. Normal, abnormal and emergency situations should be addressed accordingly.

6

Table 4 - Difference Levels versus training

Difference Level	Method/Minimum Specification for Training Device
A: Represents knowledge requirement.	Self Instruction through operating bulletins or differences handouts
B: Aided instruction is required to ensure crew understanding, emphasise issues, aid retention of information, or : aided instruction with partial application of procedures	Aided instruction e.g. computer based training (CBT), class room instruction or video tapes. Interactive CBT
C: For variants having part task differences affecting skills or abilities as well as knowledge. Training device required to ensure attainment and retention of crew skills	STD (CAR-STD 2A, Level 1)
D: Full task differences affecting knowledge, skills and/or abilities using STDs capable of performing flight manoeuvres.	STD (CAR-STD 2A, Level 2)
E: Full tasks differences requiring high fidelity environment to attain and maintain knowledge skills and abilities.	STD (CAR-STD 1A, Level C)

Note: Levels A and B require familiarisation training, levels C, D and E require differences training. For Level E, the nature and extent of the differences may be such that it is not possible to fly both types or variants with a credit in accordance with Appendix 1 to CAR OPS 1.980, sub-paragraph (d)(7).

IEM OPS 1.980(b) Operation on more than one type or variant - Philosophy and Criteria

See CAR OPS 1.980(b)

- 1 Philosophy
 - 1.1 The concept of operating more than one type or variant depends upon the experience, knowledge and ability of the operator and the flight crew concerned.
 - 1.2 The first consideration is whether or not the two aeroplane types or variants are sufficiently similar to allow the safe operation of both.
 - 1.3 The second consideration is whether or not the types or variants are sufficiently similar for the training, checking and recent experience items completed on one type or variant to replace those required on the similar type or variant. If these aeroplanes are similar in these respects, then it is possible to have credit for training, checking and recent experience. Otherwise, all training, checking and recent experience requirements prescribed in Subpart N should be completed for each type or variant within the relevant period without any credit.
- 2 Differences between aeroplane types or variants
 - 2.1 The first stage in any operator's submission for crew multi-type or variant operations is to consider the differences between the types or variants. The principal differences are in the following three areas:
 - a. Level of technology. The level of technology of each aircraft type or variant under consideration encompasses at least the following design aspects :
 - i. Flight deck layout (e.g. design philosophy chosen by a manufacturer);
 - ii. Mechanical versus electronic instrumentation;
 - iii. Presence or absence of Flight Management System (FMS);
 - iv. Conventional flight controls (hydraulic, electric or manual controls) versus fly-by-wire;

- v. Side-stick versus conventional control column;
- vi. Pitch trim systems;
- vii. Engine type and technology level (e.g. jet/turboprop/piston, with or without automatic protection systems).
- b. Operational differences. Consideration of operational differences involves mainly the pilot machine interface, and the compatibility of the following:
 - i. Paper checklist versus automated display of checklists or messages (e.g. ECAM, EICAS) during all procedures;
 - ii. Manual versus automatic selection of nav aids;
 - iii. Navigation equipment;
 - iv. Aircraft weight and performance.
- c. Handling characteristics. Consideration of handling characteristics includes control response, crew perspective and handling techniques in all stages of operation. This encompasses flight and ground characteristics as well as performance influences (eg. number of engines). The capabilities of the autopilot and autothrust systems may affect handling characteristics as well as operational procedures.
- 3 Training, checking and crew management. Alternating training and proficiency checking may be permitted if the submission to operate more than one type or variant shows clearly that there are sufficient similarities in technology, operational procedures and handling characteristics.
- 4 An example of completed ODR tables for an operator’s proposal for flight crews to operate more than one type or variant may appear as follows:

Table 1 - ODR 1 - AEROPLANE GENERAL

BASE AEROPLANE: ‘X’ DIFFERENCE AEROPLANE: ‘Y’				COMPLIANCE METHOD		
GENERAL	DIFFERENCES	FLT CHAR	PROC CHN G	Trainin g	Checking	Recent Experience
Flight Deck	Same flight deck arrangement, 2 observers seats on ‘Y’	NO	NO	A	/	/
Cabin	‘Y’ max certificated passenger capacity: 335, ‘X’: 179	NO	NO	A	/	/

Table 2 - ODR 2 – SYSTEMS

BASE AEROPLANE: 'X' DIFFERENCE AEROPLANE: 'Y'				COMPLIANCE METHOD		
SYSTEMS	DIFFERENCES	FLT CHAR	PRO C CHNG	Trainin g	Checki ng	Recent Experienc e
21 Air Conditioning	- Trim air system - packs - cabin temperature	NO NO NO	YES NO YES	B	B	B
22 Auto flight	- FMGS architecture - FMGES functions - reversion modes	NO NO NO	NO YES YES	B C D	B C D	B B D
23 Communications						

Table 3 - ODR 3 - MANOEUVRES

BASIC AEROPLANE: 'X' DIFFERENCE AEROPLANE: 'Y'				COMPLIANCE METHOD		
MANOEUVRES	DIFFERENCES	FLT CHAR	PRO C CHNG	Trainin g	Checkin g	Recent Experienc e
Taxi	- Pilot eye height, turn radius, - two engine taxi (1&4)	YES	NO	D	D	/
		NO	NO	A	/	/
Take-off	Flight Characteristics in ground law	YES	NO	E	E	E
Rejected take-off	Reverser actuation logic	YES	NO	D	D	D
Take-off engine failure	- V ₁ /V _r split - Pitch attitude/lateral control	YES(P)* YES(H)*	NO NO	B E	B E	B

*P = Performance, H = Handling

IEM OPS 1.985 Training records

See CAR OPS 1.985

A summary of training should be maintained by the operator to show a flight crew member's completion of each stage of training and checking.

AC/AMC/IEM O — CABIN CREW**IEM OPS 1.990 Number and Composition of Cabin Crew**

See CAR OPS 1.990

- 1 The demonstration or analysis referred to in CAR OPS 1.990(b)(2) should be that which is the most applicable to the type, or variant of that type, and the seating configuration used by the operator.
- 2 With reference to CAR OPS 1.990(b), the Authority may require an increased number of cabin crew members in excess of the requirements of CAR OPS 1.990 on certain types of aeroplane or operations. Factors which should be taken into account include:
 - a. The number of exits;
 - b. The type of exits and their associated slides;
 - c. The location of exits in relation to cabin crew seats and the cabin layout;
 - d. The location of cabin crew seats taking into account cabin crew duties in an emergency evacuation including:
 - i. Opening floor level exits and initiating stair or slide deployment;
 - ii. Assisting passengers to pass through exits; and
 - iii. Directing passengers away from inoperative exits, crowd control and passenger flow management;
 - e. Actions required to be performed by cabin crew in ditchings, including the deployment of slide-rafts and the launching of life-rafts.
- 3 When the number of cabin crew is reduced below the minimum required by CAR OPS 1.990(b), for example in the event of incapacitation or non-availability of cabin crew, the procedures to be specified in the Operations Manual should result in consideration being given to at least the following:
 - a. Reduction of passenger numbers;
 - b. Re-seating of passengers with due regard to exits and other applicable aeroplane limitations; and
 - c. Relocation of cabin crew and any change of procedures.
- 4 When scheduling cabin crew for a flight, an operator should establish procedures which take account of the experience of each cabin crew member such that the required cabin crew includes some cabin crew members who have at least 3 months operating experience as a cabin crew member.

AC OPS 1.1005/1.1010/1.1015 Crew Resource Management Training

See CAR OPS 1.1005/1.1010/1.1015 and Appendix 2 to CAR OPS 1.1005/1.1010/1.1015

1 Introduction

- 1.1 Crew Resource Management (CRM) should be the effective utilisation of all available resources (e.g. crew members, aeroplane systems, and supporting facilities) to achieve safe and efficient operation.
- 1.2 The objective of CRM should be to enhance the communication and management skills of the crew member, as well as the importance of effective co-ordination and two-way communication between all crew members.
- 1.3 CRM training should reflect the culture of the operator, the scale and scope of the operation together with associated operating procedures and areas of operation which produce particular difficulties.

2 General Principles for CRM Training for Cabin Crew

- 2.1 Cabin crew CRM training should focus on issues related to cabin crew duties, and therefore, should be different from flight crew CRM training. However, the co-ordination of the tasks and functions of flight crew and cabin crew should be addressed.
- 2.2 Whenever it is practicable to do so, operators should provide combined training for flight crew and cabin crew, including feedback, as appropriate to Appendix 2 to CAR OPS 1.1005/1.1010/1.1015 Table 1, Columns (d), (e) and (f). This is of particular importance for senior cabin crew members.
- 2.3 Where appropriate, CRM principles should be integrated into relevant parts of cabin crew training.
- 2.4 CRM training should include group discussions and the review of accidents and incidents (case based studies).
- 2.5 Whenever it is practicable to do so, relevant parts of CRM training should form part of the training conducted in cabin mock-ups or aircraft.
- 2.6 CRM training should take into account the items listed in Appendix 2 to CAR OPS 1.1005/1.1010/1.1015 Table 1. CRM training courses should be conducted in a structured and realistic manner.
- 2.7 The operator should be responsible for the quality of all CRM training, including any training provided by sub-contractors/third parties (in accordance with CAR OPS 1.035 and AMC-CAR OPS 1.035, paragraph 5.1).
- 2.8 CRM training for cabin crew should include, an Introductory CRM Course, Operator's CRM Training, and Aeroplane Type Specific CRM, all of which may be combined.
- 2.9 There should be no assessment of CRM skills. Feedback from instructors or members of the group on individual performance should be given during training to the individuals concerned.

3 Introductory CRM Course

- 3.1 The Introductory CRM Course should provide cabin crew members with a basic knowledge of Human Factors relevant to the understanding of CRM.
- 3.2 Cabin crew members from different operators may attend the same Introductory CRM Course provided that operations are similar (see paragraph 1.3).

4 Operator's CRM Training

- 4.1 Operator's CRM training should be the application of the knowledge gained in the Introductory CRM Course to enhance communication and co-ordination skills of cabin crew members relevant to the operator's culture and type of operation.
- 5 Aeroplane Type Specific CRM
 - 5.1 Aeroplane Type Specific CRM should be integrated into all appropriate phases of the operator's conversion training on the specific aeroplane type.
 - 5.2 Aeroplane Type Specific CRM should be the application of the knowledge gained in previous CRM training on the specifics related to aircraft type, including, narrow/wide bodied aeroplanes, single/multi deck aeroplanes, and flight crew and cabin crew composition.
- 6 Annual Recurrent Training
 - 6.1 When a cabin crew member undergoes annual recurrent training, CRM training should be integrated into all appropriate phases of the recurrent training and may include stand-alone modules.
 - 6.2 When CRM elements are integrated into all appropriate phases of the recurrent training, the CRM elements should be clearly identified in the training syllabus.
 - 6.3 Annual Recurrent CRM Training should include realistic operational situations.
 - 6.4 Annual Recurrent CRM Training should include areas as identified by the operator's accident prevention and flight safety programme (see CAR OPS 1.037).
- 7 CRM Training for Senior Cabin Crew
 - 7.1 CRM training for Senior Cabin Crew Members should be the application of knowledge gained in previous CRM training and operational experience relevant to the specific duties and responsibilities of a Senior Cabin Crew Member.
 - 7.2 The senior cabin crew member should demonstrate ability to manage the operation and take appropriate leadership/management decisions.
- 8 CRM Instructor Qualifications
 - 8.1 The operator should ensure that all personnel conducting relevant training are suitably qualified to integrate elements of CRM into all appropriate training programmes.
 - 8.2 A training and standardisation programme for CRM instructors should be established.
 - 8.3 Cabin crew CRM instructors should:
 - a. Have suitable experience of commercial air transport as a cabin crew member; and
 - b. Have received instruction on Human Factors Performance Limitations (HPL); and
 - c. Have completed an Introductory CRM Course and the Operator's CRM training; and
 - d. Have received instructions in training skills in order to conduct CRM courses; and
 - e. Be supervised by suitably qualified CRM instructors when conducting their first CRM training course.
 - 8.4 An experienced non-cabin crew CRM instructor may continue to be a cabin crew CRM instructor, provided that the provisions of paragraph 8.3 b) to e) are satisfied and that a satisfactory knowledge has been demonstrated of the nature of the operation and the relevant specific aeroplane types. In such circumstances, the operator should be satisfied that the instructor has a suitable knowledge of the cabin crew working environment.

- 8.5 Instructors integrating elements of CRM into conversion, recurrent training, or Senior Cabin Crew Member training, should have acquired relevant knowledge of human factors and have completed appropriate CRM training.
- 9 Co-ordination between flight crew and cabin crew training departments
- 9.1 There should be an effective liaison between flight crew and cabin crew training departments. Provision should be made for flight and cabin crew instructors to observe and comment on each others training. Consideration should be given to creating flight deck scenarios on video for playback to all cabin crew during recurrent training, and to providing the opportunity for cabin crew, particularly senior cabin crew, to participate in Flight Crew LOFT exercises.

AMC OPS 1.1012 Familiarisation

See CAR OPS 1.1012

- 1 New entrant cabin crew
- 1.1 Each new entrant cabin crew member having no previous comparable operating experience should:
- Participate in a visit to the aeroplane to be operated; and
 - Participate in familiarisation flights as described in paragraph 3 below.
- 2 Cabin crew operating on a subsequent aeroplane type
- 2.1 A cabin crew member assigned to operate on a subsequent aeroplane type with the same operator should either:
- Participate in a familiarisation flight as described in paragraph 3 below; or
 - Participate in an aeroplane visit to the aeroplane to be operated.
- 3 Familiarisation Flights
- 3.1 During familiarisation flights, the cabin crew member should be additional to the minimum number of cabin crew required by CAR OPS 1.990.
- 3.2 Familiarisation flights should be conducted under the supervision of the senior cabin crew member.
- 3.3 Familiarisation flights should be structured and involve the cabin crew member in the participation of safety related pre-flight, in-flight and post-flight duties.
- 3.4 Familiarisation flights should be operated with the cabin crew member in the operator's uniform.
- 3.5 Familiarisation flights should form part of the training record for each cabin crew member.
- 4 Aeroplane visits
- 4.1 The purpose of aeroplane visits is to familiarise each cabin crew member with the aeroplane environment and its equipment. Accordingly, aeroplane visits should be conducted by suitably qualified persons and in accordance with a syllabus described in the Operations Manual, Part D. The aeroplane visit should provide an overview of the aeroplane's exterior, interior and systems including the following:
- Interphone and public address systems;
 - Evacuation alarm systems;
 - Emergency lighting;
 - Smoke detection systems;
 - Safety/emergency equipment;
 - Flight deck;

- g. Cabin crew stations;
 - h. Toilet compartments;
 - i. Galleys, galley security and water shut-off;
 - j. Cargo areas if accessible from the passenger compartment during flight;
 - k. Circuit breaker panels located in the passenger compartment;
 - l. Crew rest areas;
 - m. Exit location and its environment.
- 4.2 An aeroplane familiarisation visit may be combined with the conversion training required by CAR OPS 1.1010(c)(3).

AC OPS (IEM) 1.1005/1.1010/1.1015/1.1020 Representative Training Devices

See CAR OPS 1.1005/1.1010/1.1015/1.1020

- 1 A representative training device may be used for the training of cabin crew as an alternative to the use of the actual aeroplane or required equipment.
- 2 Only those items relevant to the training and testing intended to be given, should accurately represent the aeroplane in the following particulars:
 - a. Layout of the cabin in relation to exits, galley areas and safety equipment stowage;
 - b. Type and location of passenger and cabin crew seats;
 - c. Where practicable, exits in all modes of operation (particularly in relation to method of operation, their mass and balance and operating forces) including failure of power assist systems where fitted
 - d. Safety equipment of the type provided in the aeroplane (such equipment may be 'training use only' items and, for oxygen and protective breathing equipment, units charged with or without oxygen may be used).
- 3 When determining whether an exit can be considered to be a variant of another type, the following factors should be assessed:
 - a. Exit arming/disarming;
 - b. Direction of movement of the operating handle;
 - c. Direction of exit opening;
 - d. Power assist mechanisms;
 - e. Assist means, e.g. evacuation slides

AMC OPS 1.1020 Refresher Training

See CAR OPS 1.1020

In developing the content of any refresher training programme prescribed in CAR OPS 1.1020, operators should consider (in consultation with the Authority) whether, for aeroplanes with complex equipment or procedures, refresher training may be necessary for periods of absence that are less than the 6 months prescribed in CAR OPS 1.1020(a).

IEM OPS 1.1020(a) Refresher training

See CAR OPS 1.1020(a)

See AMC OPS 1.1020

An operator may substitute recurrent training for refresher training if the re-instatement of the cabin crew member's flying duties commences within the period of validity of the last recurrent training and checking. If the period of validity of the last recurrent training and checking has expired, conversion training is required.

AMC OPS 1.1025 Checking

See CAR OPS 1.1025

- 1 Elements of training which require individual practical participation should be combined with practical checks.
- 2 The checks required by CAR OPS 1.1025 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.

AC OPS 1.1030 Operation on more than one type or variant

See CAR OPS 1.1030

- 1 For the purposes of CAR OPS 1.1030(b)(1), when determining similarity of exit operation the following factors should be assessed to justify the finding of similarity:
 - a. Exit arming/disarming;
 - b. Direction of movement of the operating handle;
 - c. Direction of exit opening;
 - d. Power assist mechanisms;
 - e. Assist means, e.g. evacuation slides.
Self-help exits, for example Type III and Type IV exits, need not be included in this assessment.
- 2 For the purposes of CAR OPS 1.1030(a)(2) and (b)(2), when determining similarity of location and type of portable safety equipment the following factors should be assessed to justify the finding of similarity:
 - a. All portable safety equipment is stowed in the same, or in exceptional circumstances, in substantially the same location;
 - b. All portable safety equipment requires the same method of operation;
 - c. Portable safety equipment includes:
 - i. Fire fighting equipment;
 - ii. Protective Breathing Equipment (PBE);
 - iii. Oxygen equipment;
 - iv. Crew lifejackets;
 - v. Torches;
 - vi. Megaphones;
 - vii. First aid equipment;

- viii. Survival equipment and signalling equipment;
 - ix. Other safety equipment where applicable.
- 3 For the purposes of sub-paragraph of CAR OPS 1.1030(a)(2) and (b)(3), type specific emergency procedures include, but are not limited, to the following:
- a. Land and water evacuation;
 - b. In-flight fire;
 - c. Decompression;
 - d. Pilot incapacitation.
- 4 When changing aeroplane type or variant during a series of flights, the cabin crew safety briefing required by AMC OPS 1.210(a), should include a representative sample of type specific normal and emergency procedures and safety equipment applicable to the actual aeroplane type to be operated.

IEM OPS 1.1035 Training records

See CAR OPS 1.1035

An operator should maintain a summary of training to show a trainee's completion of every stage of training and checking.

IEM to Appendix 1 to CAR OPS 1.1005/1.1010/1.1015/1.1020 Crowd Control

See Appendix 1 to CAR OPS 1.1005/1.1010/1.1015/1.1020

- 1 Crowd control
- 1.1 Operators should provide training in the application of crowd control in various emergency situations. This training should include:
 - a. Communications between flight crew and cabin crew and use of all communications equipment, including the difficulties of co-ordination in a smoke-filled environment;
 - b. Verbal commands;
 - c. The physical contact that may be needed to encourage people out of an exit and onto a slide;
 - d. The re-direction of passengers away from unusable exits;
 - e. The marshalling of passengers away from the aeroplane;
 - f. The evacuation of disabled passengers; and
 - g. Authority and leadership.

IEM to Appendix 1 to CAR OPS 1.1005/1.1010/1.1015/1.1020 Training Methods

See Appendix 1 to CAR OPS 1.1005/1.1010/1.1015/1.1020

Training may include the use of mock-up facilities, video presentations, computer based training and other types of training. A reasonable balance between the different training methods should be achieved.

IEM to Appendix 1 to CAR OPS 1.1010/1.1015 Conversion and recurrent training

See Appendix 1 to CAR OPS 1.1010/1.1015

- 1 A review should be carried out of previous initial training given in accordance with CAR OPS 1.1005 in order to confirm that no item has been omitted. This is especially important for cabin crew members first transferring to aeroplanes fitted with life-rafts or other similar equipment.
- 2 Fire and smoke training requirements

Training requirement/interval	Required activity		
First conversion to aeroplane type (e.g. new entrant)	Actual fire fighting and handling equipment		(Note 1)
Every year during recurrent training		Handling equipment	
Every 3 years during recurrent training	Actual fire fighting and handling equipment		(Note 1)
Subsequent a/c conversion	(Note 1)	(Note 1)	(Notes 2 & 3)
New fire fighting equipment		Handling equipment	

NOTES:

1. *Actual fire fighting during training must include use of at least one fire extinguisher and extinguishing agent as used on the aeroplane type. An alternative extinguishing agent may be used in place of Halon.*
2. *Fire fighting equipment is required to be handled if it is different to that previously used.*
3. *Where the equipment between aeroplane types is the same, training is not required if within the validity of the 3 year check.*

AC/MC/IEM P – MANUALS, LOGS & RECORDS

IEM OPS 1.1040(b) Elements of the Operations Manual subject to approval

See CAR OPS 1.1040(b)

- 1 A number of the provisions of OPS 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 OPS in its entirety may be found in Appendix 6 of the Operations Joint Implementation Procedures (JAA Administration & Guidance Material Section 4, Part 2.)

Ops Manual Section (App. 1 to CAR OPS 1.1045)	Subject	OPS Reference
A 2.4	Operational Control	1.195
A 5.2(f)	Procedures for flight crew to operate on more than 1 type or variant	1.980
A 5.3(c)	Procedures for cabin crew to operate on four airplane types	1.1030(a)
A 8.1.1	Method of determination of minimum flight attitudes	1.250(b)
A 8.1.4	En-route single engine safe forced landing area for land planes	1.542(a)
A 8.1.8	(i) Standard mass values other than those specified in Subpart J	1.620(g)
Mass & balance:	(ii) Alternative documentation and related procedures	1.625(c)
	(iii) Omission of data from documentation	App. 1, 1.625, § (a)(1)(ii)
	(iv) Special standard masses for the traffic load	App. 1, 1.605, § (b)
	A 8.1.11	Tech Log
A 8.4	Cat II/III Operations	1.440(a)(3), (b) & App. 1 to CAR OPS 1.455, Note
A 8.5	ETOPS Approval	1.246
A 8.6	Use of MEL	1.030(a)
A 9	Dangerous Goods	1.1155
A 8.3.2(b)	MNPS	1.243
A 8.3.2(c)	RNAV (RNP)	1.243
A 8.3.2(f)	RVSM	1.241

B 1.1(b)	Max. approved passenger seating configuration	1.480(a)(6)
B 2(g)	Alternate method for verifying approach mass (DH < 200ft) - Performance Class A	1.510(b)
B 4.1(h)	Steep Approach Procedures and Short Landing Operations - Performance Class B	1.515(a)(3) & (a)(4) & 1.550(a)
B 6(b)	Use of on-board mass and balance systems	App. 1 to CAR OPS 1.625, § (c)
B 9	MEL	1.030(a)
D 2.1	Cat II/III Training syllabus flight crew	1.450(a)(2)
	Recurrent training programme flight crew	1.965(a)(2)
	Advanced qualification, programme	1.978(a)
D 2.2	Initial training cabin crew	1.1005
	Recurrent training programme cabin crew	1.1015(b)
D 2.3(a)	Dangerous Goods	1.1220(a)

IEM OPS 1.1040(c) Operations Manual - Language

See CAR OPS 1.1040(c)

- 1 CAR OPS 1.1040(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 AFM;
 - 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 OPS 1.104 Operations Manual Contents

See CAR OPS 1.1045

- 1 Appendix 1 to CAR OPS 1.1045 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 Aeroplane Flight Manual required by CAR OPS 1.1050 or, where such a document exists, by an Aeroplane Operating Manual produced by the manufacturer of the aeroplane. In the case of performance class B aeroplanes, it is acceptable that a "Pilot Operating Handbook" (POH) or equivalent document is used as Part B of the Operations Manual, provided that the POH covers the necessary items. 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. a Route Manual producer, an aeroplane manufacturer or a training organisation) as explained above, this does not absolve the operator from the responsibility of verifying the applicability and suitability of this material. (See CAR OPS 1.1040(k)). Any material received from an external source should be given its status by a statement in the Operations Manual.

IEM OPS 1.1045(c) Operations Manual Structure

See CAR OPS 1.1045(c) & Appendix 1 to CAR OPS 1.1045

- 1 CAR OPS 1.1045(a) prescribes the main structure of the Operations Manual as follows:

Part A – General/Basic;

Part B – Aeroplane Operating Matters – Type related;

Part C – Route and Aerodrome Instructions and Information;

Part D – Training.

- 2 CAR OPS 1.1045 (c) requires the operator to ensure that the detailed structure of the Operations Manual is acceptable to the Authority.
- 3 Appendix 1 to CAR OPS 1.1045 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 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 CAR OPS 1.1045 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 CAR OPS 1.1045. 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 Authority

3 QUALITY SYSTEM

4 CREW COMPOSITION

- 4.1 Crew Composition
- 4.2 Designation of the commander
- 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 requirements 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 Aerodrome 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 Aerodrome 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 Aeroplane 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 Aeroplane, 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 Altitude alerting system procedures
- 8.3.5 Ground Proximity Warning System procedures
- 8.3.6 Policy and procedures for the use of TCAS/ACAS
- 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
- 8.3.10 Crew members at their stations
- 8.3.11 Use of safety belts for crew and passengers
- 8.3.12 Admission to Flight Deck
- 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 Procedures for aeroplanes operated whenever required cosmic or solar radiation detection equipment is carried
- 8.4 All Weather Operations
- 8.5 ETOPS
- 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 AEROPLANE OPERATING MATTERS TYPE RELATED

- 0 GENERAL INFORMATION AND UNITS OF MEASUREMENT**
- 1 LIMITATIONS**
- 2 NORMAL PROCEDURES**
- 3 ABNORMAL AND EMERGENCY PROCEDURES**
- 4 PERFORMANCE**
 - 4.1 Performance data
 - 4.2 Additional performance data
- 5 FLIGHT PLANNING**
- 6 MASS AND BALANCE**
- 7 LOADING**
- 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 AEROPLANE SYSTEMS**

Part C ROUTE AND AERODROME INSTRUCTIONS AND INFORMATION

Part D TRAINING**1 TRAINING SYLLABI AND CHECKING PROGRAMMES – GENERAL****2 TRAINING SYLLABI AND CHECKING**

- 2.1 Flight Crew
- 2.2 Cabin Crew
- 2.3 Operations Personnel including Crew Members
- 2.4. Operations Personnel other than Crew Members

3 PROCEDURES

- 3.1 Procedures for training and checking
- 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 OPS 1.1055(a)(12) Signature or equivalent**

See CAR OPS 1.1055(a)(12)

- 1 CAR OPS 1.1055 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 OPS 1.1055(b) Journey log

See CAR OPS 1.1055(b)

The ‘other documentation’ referred to in this paragraph might include such items as the operational flight plan, the aeroplane technical log, flight report, crew lists etc.

IEM to Appendix 1 to CAR OPS 1.10 45 Operations Manual Contents

- 1 With reference to Operations Manual Section A, paragraph 8.3.17, on cosmic radiation, limit values

should be published in the Operations Manual only after the results of scientific research are available and internationally accepted.

- 2 With reference to Operations Manual Section B, paragraph 9 (Minimum Equipment List) and 12 (Aeroplane Systems) operators should give consideration to using the ATA number system when allocating chapters and numbers for aeroplane systems.

**AC/AMC/IEM Q — FLIGHT AND DUTY TIME LIMITATIONS AND REST
REQUIREMENTS**

RESERVED

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AC/AMC/IEM R — TRANSPORT OF DANGEROUS GOODS BY AIR**AC OPS (IEM) 1.1150(a)(5) & (a)(6) Terminology - Dangerous Goods Accident and Dangerous Goods Incident**

See CAR OPS 1.1150(a)(5) & (a)(6)

As a dangerous goods accident (See CAR OPS 1.1150(a)(5)) and dangerous goods incident (See CAR OPS 1.1150(a)(6)) may also constitute an aircraft accident, serious incident or incident the criteria for the reporting both types of occurrence should be satisfied.

AC OPS 1.1160(a) Medical Aid for a Patient

See CAR OPS 1.1160(a)

- 1 Gas cylinders, medications, 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 aeroplane.

AC OPS (IEM) 1.1160(b) Dangerous goods on an aeroplane in accordance with the relevant regulations or for operating reasons

See CAR OPS 1.1160(b)

- 1 Dangerous goods required to be on board an aeroplane in accordance with the relevant CARs or for operating reasons are those which are for:
 - a. The airworthiness of the aeroplane;
 - b. The safe operation of the aeroplane; 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.

AC OPS (IEM) 1.1160(c)(1) Scope – Dangerous goods carried by passengers or crew

See CAR OPS 1.1160(c)(1)

- 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. Release valves on aerosols must be protected by a cap or other suitable means to prevent inadvertent release. 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 the person. '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 cylinders of a gas of division 2.2 worn for the operation of mechanical limbs and spare cylinders of a 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 cylinders, or other suitable gas of division 2.2, fitted into a self-inflating life-jacket and not more than two spare cylinders;
- 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 aeroplane. 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 weapons, (UN0012 and UN0014 only) in Division 1.4S providing 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. Allowances for more than one person must not be combined into one or more packages.;

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;
 - p. With the approval of the operator(s), one avalanche rescue backpack per person equipped with a pyrotechnic trigger mechanism containing not more than 200 mg net of division 1.4S and not more than 250 mg of compressed gas in division 2.2. The backpack must be packed in such a manner that it cannot be accidentally activated. The airbags within the backpack must be fitted with pressure relief valves;
 - q. Consumer electronic devices (watches, calculating machines, cameras, cellphones, lap top computers, camcorders, etc.) containing lithium or lithium ion cells or batteries when carried by passengers or crew for personal use. Spare batteries must be individually protected so as to prevent short circuits and carried in carry on baggage only. In addition, each spare battery must not exceed the following quantities:
 - For lithium metal or lithium alloy batteries, lithium content of not more than 2 grams; or for lithium ion batteries, an aggregate equivalent lithium content of not more than 8 grams.
 - Lithium ion batteries with an aggregate equivalent lithium content of more than 8 grams but not more than 25 grams may be carried in carry on baggage if they are individually protected so as to prevent short circuits and are limited to two spare batteries per person.
2. The list in the Technical Instructions of items permitted for carriage by passengers or crew may be revised periodically and OPS may not always reflect the current list. Consequently the latest version of the Technical Instructions should also be consulted.

AC OPS (IEM) 1.1165(b) States concerned with exemptions

See CAR OPS 1.1165(b)

- 1 The Technical Instructions provide that in certain circumstances dangerous goods, which are normally forbidden on an aeroplane, 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. Although exemptions are most likely to be granted for the carriage of dangerous goods which are not permitted in normal circumstances, they may also be granted in other circumstances, such as when the packaging to be used is not provided for by the appropriate packing method or the quantity in the packaging is greater than that permitted. The Instructions also make provision for some dangerous goods to be carried when an approval has been granted only by the State of Origin, providing specific conditions, which are laid down in the Technical Instructions, are met.
- 2 The States concerned are those of origin, transit, overflight and destination of the consignment and that of the operator. However, the Technical Instructions allow for the State of overflight to consider an

application for exemption based solely on whether an equivalent level of safety has been achieved, if none of the other criteria for granting an exemption are relevant.

- 3 The Technical Instructions provide that exemptions and approvals are granted by the "appropriate national Authority", which is intended to be the Authority responsible for the particular aspect against which the exemption or approval is being sought. The Instructions do not specify who should seek exemptions and, depending on the legislation of the particular State, this may mean the operator, the shipper or an agent. If an exemption or approval has been granted to other than an operator, the operator should ensure a copy has been obtained before the relevant flight. The operator should ensure all relevant conditions on an exemption or approval are met.
- 3 The exemption or approval referred to in CAR OPS 1.1165(b) is in addition to the approval required by CAR OPS 1.1155.

AC OPS 1.1215(c)(1) Information to the Commander

See-CAR OPS 1.1215(c)(1)

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

AC OPS (AMC) 1.1215(e) Information in the Event of an Inflight Emergency

See CAR OPS 1.1215(e)

1. To assist the ground services in preparing for the landing of an aeroplane in an emergency situation, it is essential that adequate and accurate information about any dangerous goods carried on board as cargo 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 risks(s), the quantity and the location on board the aeroplane.
2. When it is not possible to include all the information, those parts thought most relevant in the circumstances should be given, such as the UN/ID numbers or classes/divisions and quantity or a summary of the quantities and class/division in each cargo compartment. As an alternative, a telephone number can be given from where a copy of the written information to the commander can be obtained during the flight.
3. It is accepted that due to the nature of the in-flight emergency, the situation may never permit the commander to inform the appropriate air traffic services unit of the dangerous goods carried as cargo on board the aeroplane..

AC OPS (AMC) 1.1220 Training

See CAR OPS 1.1220

- 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 an in-depth and detailed appreciation of the whole subject or particular aspects of it should be by formal training courses, which should include a written examination, the successful passing of which will result in the issue of the proof of qualification. 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 Aspects of training. The aspects of training specified in the Technical Instructions 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 aspect of training should be covered is dependent upon whether it is for general information or to give in-depth appreciation. Additional aspects not identified in the Technical Instructions may need to be covered, or some aspects omitted, depending on the responsibilities of the individual.
- 4 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.
- 5 How to Achieve Training
- 5.1 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'.
 - 5.2 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).
- 6 Training in Emergency Procedures.
- a. Except for crew members whose emergency procedures training is covered in sub-paragraphs 6b or 6c (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 CAR OPS 1.1215(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.
- 7 Recurrent training should cover the areas relevant to initial Dangerous Goods training unless the responsibility of the individual has changed.
- 8 Test to verify understanding. It is necessary to have some means of establishing that a person has gained an 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.

AC OPS (AMC) 1.1225 Dangerous Goods Incident and Accident Reports

See CAR OPS 1.1225

Use of a standard form for the reporting of dangerous goods incidents and accidents would assist the Authorities and enable them to establish quickly the essential details of an occurrence. The following form has been developed for such use and its correct and full completion means that all the details required by Appendix 1 to CAR OPS 1.1225 would have been covered. It may be sent to the relevant Authorities by any appropriate means including fax, mail, electronic mail, etc.

AC S – SECURITY

AC OPS 1.1240 Training programmes

See CAR OPS 1.1240

Individual crew member knowledge and competence should be based on the relevant elements described in ICAO doc 9811, “Manual of the implementation of the Security provisions of Annex 6” and ECAC DOC 30 part “Training for Cockpit and Cabin crew”.

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