Democratic Socialist Republic of Sri Lanka

Civil Aviation Authority of Sri Lanka

Implementing Standards

(Issued under Sec. 120, Civil Aviation Act No. 14 of 2010)

Title: ICAO Annex- 6 Part (I) – Operation of Aircraft International Commercial Air Transport – Aeroplanes

Reference No. : **IS 6-(I)-All** **SLCAIS: 058** D**ate**: 01 May 2017

Pursuant to Sec.120 of the Civil Aviation Act No.14 of 2010 which is hereinafter referred to as the Civil Aviation (CA) Act, Director General of Civil Aviation shall have the power to issue, whenever he considers it necessary or appropriate to do so, such Implementing Standards for the Purpose of giving effect to any provision in the CA Act, Regulations or Rules made thereunder including the Articles of the Convention on International Civil Aviation specified in the Schedule to the CA Act.

Accordingly, I, being the Director General of Civil Aviation do hereby issue the Implementing Standards of "ICAO Annex 6 - Part I as mentioned in the attachment hereto IS-6-(I)-All which sets the requirements that shall be complied with aircraft that are coming under the jurisdiction and operated for commercial services.

This implementing Standard shall be applicable to holders of Air Operator Certificate, Foreign Air Operator Certificate and any applicant seeking on Air Operator Certificate of Foreign Air Operator Certificate issued by Director General of Civil Aviation.

Attention is also drawn to Sec. 103 of the Act, which states inter alia that failure to comply with Implementing Standard is an offence.

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Enclosure: Attachment - IS 6-(I)-All

Implementing Standards

SLCAIS - : ICAO Annex- 6 Part (I) – Operation of Aircraft International Commercial Air Transport – Aeroplanes

GENERAL

I. Contents in this document are based on the amendment 41 of ICAO Annex 6 Part (I) "Operation of Aircraft" International Commercial Air Transport - Aeroplanes

II. This document is made up of the following component parts, which have the status indicated.

1. Material comprising the document proper consisting of the following, which are considered mandatory requirements

   a) ICAO Standards and Recommended Practices adopted by the Council under the provisions of the Convention.
   b) Appendices comprising material grouped separately for convenience but forming part of the Standards and Recommended Practices adopted by the Council.
   c) Definitions of terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have an independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.
   d) Tables and Figures which add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

2. Material approved by the Council for publication in association with the Standards and Recommended Practices

   a) Introductions comprising explanatory material introduced at the beginning of parts, chapters or sections of the document to assist in the understanding of the application of the text;
   b) Notes included in the text, where appropriate, to give factual information or references bearing on the Standards or Recommended Practices in question but not constituting part of the Standards or Recommended Practices;
   c) Attachments comprising material supplementary to the Standards and Recommended Practices or included as a guide to their application.

III. The mandatory requirements contained in this document are applicable to person/organizations holding an air operator certificate issued by Director-General of Civil Aviation, Sri Lanka for commercial air transportation regardless of the place of operations and prospective applicants for air operator certificate for commercial air transportation.

IV. Holders of Air Operator Certificate issued by the DGCA for commercial air transportation shall comply with the requirements published in this document and are hereby instructed to forward to the DGCA a "Declaration of Conformance" which indicates the degree of compliance with each item detailed in this document.

V. This document may be amended from time to time and the amendments will be reflected with the vertical line on the right side of the text.

VI. This edition of Implementing Standards (IS) is published in compliance to ICAO annex 6 Part (I).

Implementing Standards

Compliance to ICAO Annex- 6 Part (I)

Operation of Aircraft

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ABBREVIATIONS AND SYMBOLS
(Used in this Implementing Standards 6-(I)-All)
Abbreviations

AC	Alternating current
ACAS	Airborne collision avoidance system
ADRS	Aircraft data recording system
ADS	Automatic dependent surveillance
ADS-C	Automatic dependent surveillance — contract AEO All engines operative
AFCS	Automatic flight control system
AGA	Aerodromes, air routes and ground aids
AIG	Accident investigation and prevention
AIR	Airborne image recorder
AIRS	Airborne image recording system
AOC	Air operator certificate
APCH	Approach
APU	Auxiliary power unit
AR	Authorization required
ARINC	Aeronautical Radio, Incorporated
ASDA	Accelerate stop distance available
ASE	Altimetry system error
ASIA/PAC	Asia/Pacific
ATC	Air traffic control
ATM	Air traffic management
ATN	Aeronautical telecommunication network
ATS	Air traffic services
CARS	Cockpit audio recording system
CAS	Calibrated airspeed
CAT I	Category I
CAT II	Category II
CAT III	Category III
CAT IIIA	Category IIIA
CAT IIIB	Category IIIB
CAT IIIC	Category IIIC
CDL	Configuration deviation list
CFIT	Controlled flight into terrain
cm	Centimeter
COMAT	Operator material
CPDLC	Controller-pilot data link communications
CVR	Cockpit voice recorder
CVS	Combined vision system
DA	Decision altitude
DA/H	Decision altitude/height
DC	Direct current
D-FIS	Data link-flight information services
DH	Decision height
DLR	Data link recorder
DLRS	Data link recording system
DME	Distance measuring equipment
DSTRK	Desired track

EDTO	Extended diversion time operations
EFB	Electronic flight bag
EFIS	Electronic flight instrument system
EGT	Exhaust gas temperature
ELT	Emergency locator transmitter
ELT (AD)	Automatic deployable
ELT (AF)	Automatic fixed ELT
ELT (AP)	Automatic portable ELT
ELT(S)	Survival ELT
EPR	Engine pressure ratio
EUROCAE	European Organization for Civil Aviation Equipment
EVS	Enhanced vision system
FANS	Future air navigation system
FDAP	Flight data analysis programmes
FDR	Flight data recorder
FL	Flight level
FM	Frequency modulation
ft	Foot
ft/min	Feet per minute
g	Normal acceleration
GCAS	Ground collision avoidance system
GNSS	Global navigation satellite system
GPWS	Ground proximity warning system
hPa	Hectopascal
HUD	Head-up display
IFR	Instrument flight rules
ILS	Instrument landing system
IMC	Instrument meteorological conditions
inHg	Inch of mercury
INS	Inertial navigation system
ISA	International standard atmosphere
kg	Kilogram
kg/m2	Kilogram per Metre squared
km	Kilometer
km/h	Kilometer per hour
kt	Knot
kt/s	Knots per second
lb	Pound
lbf	Pound-force
LDA	Landing distance available
LED	Light emitting diode
m	Metre
mb	Millibar
MDA	Minimum descent altitude MDA/H Minimum descent altitude/height
MDH	Minimum descent height
MEL	Minimum equipment list
MHz	Megahertz
MLS	Microwave landing system
MMEL	Master minimum equipment list
MNPS	Minimum navigation performance specification

MOPS	Minimum operational performance specification
m/s	Metres per second
m/s2	Metres per second squared
N	Newton
N1	Low pressure compressor speed (two-stage compressor); fan speed (three-stage compressor)
N2	High pressure compressor speed (two-stage compressor); intermediate pressure compressor speed (three-stage compressor)
N3	High pressure compressor speed (three stage compressor)
NAV	Navigation
NM	Nautical mile
NVIS	Night vision imaging systems
OCA	Obstacle clearance altitude OCA/H Obstacle clearance altitude/height
OCH	Obstacle clearance height
OEI	One engine inoperative
PANS	Procedures for Air Navigation Services
PBC	Performance-based communication
PBN	Performance-based navigation
PBS	Performance-based surveillance
RCP	Required communication performance
RNAV	Area navigation
RNP	Required navigation performance
RSP	Required surveillance performance
RTCA	Radio Technical Commission for Aeronautics RVR Runway visual range
RVSM	Reduced vertical separation minima
SOP	Standard operating procedure
SST	Supersonic transport
STOL	Short take-off and landing
SVS	Synthetic vision system
TAS	True airspeed
TAWS	Terrain awareness warning system
TCAS	Traffic alert and collision avoidance system TLA Thrust lever angle
TLS	Target level of safety
TVE	Total vertical error
UTC	Coordinated universal time
VD	Design diving speed
VFR	Visual flight rules
VMC	Visual meteorological conditions
VMC	Minimum control speed with the critical engine inoperative
VOR	VHF omnidirectional radio range
VO	Stalling speed or the minimum steady flight speed in the landing configuration
VI	Stalling speed or the minimum steady flight speed in a specified configuration
VTOL	Vertical take-off and landing
WXR	Weather

Symbols

°C	Degrees Celsius
%	Per cent

CHAPTER 1 DEFINITIONS:

When the following definitions are used by the DGCA for operation of aircraft in commercial air transport, they have the following meanings:

1. **Accelerate-stop distance available (ASDA).**
   The length of the take-off run available plus the length of stop way, if provided.

2. **Aerial work**.
   An aircraft operation in which an aircraft is used for specialized services such as agriculture, construction, photography, surveying, observation and patrol, search and rescue, aerial advertisement, etc.

3. **Aerodrome.**
   A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

4. **Aerodrome operating minima**.
   The limits of usability of an aerodrome for:

   a) take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;

   b) landing in 2D instrument approach operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions; and

   c) Landing in 3D instrument approach operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the type and/or category of the operation.

5. **Aeroplane**.
   A power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

6. **Aircraft**.
   Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

7. **Aircraft operating manual**.
   A manual, acceptable to the DGCA, containing normal, abnormal and emergency procedures, checklists, limitations, performance information, details of the aircraft systems and other material relevant to the operation of the aircraft.

   Note. — The aircraft operating manual is part of the operations manual.

8. **Aircraft Tracking**
   A process, established by the operator, that maintains and updates, at standardized intervals, a ground-based record of the four dimensional position of individual aircraft in flight

9. Air operator certificate (AOC).
A certificate authorizing an operator to carry out specified commercial air transport operations.

10. Air Traffic Services (ATS)
A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service or aerodrome control service).

11. Airworthy.
The status of an aircraft, engine, propeller or part when it conforms to its approved design and is in a condition for safe operation.

12. Alternate aerodrome
An aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing where the necessary services and facilities are available, where aircraft performance requirements can be met and which is operational at the expected time of use. Alternate aerodromes include the following:

Take-off alternate. An alternate aerodrome at which an aircraft would be able to land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure.

En-route alternate. An alternate aerodrome at which an aircraft would be able to land in the event that a diversion becomes necessary while En route.

Destination alternate. An alternate aerodrome at which an aircraft would be able to land should it become either impossible or inadvisable to land at the aerodrome of intended landing.
Note: *— the aerodrome from which a flight departs may also be an En-route or a destination alternate aerodrome for that flight.*

13. Altimetry system error (ASE).
The difference between the altitude indicated by the altimeter display, assuming a correct altimeter barometric setting, and the pressure altitude corresponding to the undisturbed ambient pressure

14. Area Navigation (RNAV).
A method of navigation which permits aircraft operation on any desired flight path within the coverage of ground or space-based navigation aids or within the limits of the capability of self- contained aids, or a combination of these.
Note: *— Area navigation includes performance-based navigation as well as other operations that do not meet the definition of performance-based navigation.*

15. Cabin crew member.
A crew member who performs, in the interest of safety of passengers, duties assigned by the operator or the pilot-in-command of the aircraft, but who shall not act as a flight crew member.

16. Child (Chd)
A person who is older than two years up to twelve years of age

17. COMAT.
Operator material carried on an operator's aircraft for the operator's own purposes

18. Combined vision system (CVS).
A system to display images from a combination of an enhanced vision system (EVS) and a synthetic vision system (SVS).

19. Commercial air transport operation.
An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire.

20. Configuration deviation list (CDL).
A list established by the organization responsible for the type design with the approval of the State of Design which identifies any external parts of an aircraft type which may be missing at the commencement of a flight, and which contains, where necessary, any information on associated operating limitations and performance correction.

21. Contaminated runway (Effective 05.11.2020)
A runway is contaminated when a significant portion of the runway surface area (whether in isolated areas or not) within the length and width being used is covered by one or more of the substances listed in the runway surface condition descriptors.

Note. — Further information on runway surface condition descriptors can be found in the ICAO Annex 14, Volume 1 – Definitions

22. Continuing airworthiness.
The set of processes by which all aircraft comply with the applicable airworthiness requirements and remain in a condition for safe operation throughout their operating life.

23. Continuous descent final approach (CDFA).
A technique, consistent with stabilized approach procedures, 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 ft) above the landing runway threshold or the point where the flare maneuver should begin for the type of aircraft flown.

24. Crew member.
A person assigned by an operator to duty on an aircraft during a flight duty period.

25. Cruise relief pilot.
A flight crew member who is assigned to perform pilot tasks during cruise flight, to allow the pilot-in-command or a co-pilot to obtain planned rest.

26. Cruising level.
A level maintained during a significant portion of a flight

27. Dangerous goods.
Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Instructions.
Note. — Dangerous Goods are classified in ICAO Annex 18 Chapter 3

28. ***Decision altitude (DA)*** or ***decision height (DH).*** A specified altitude or height in a 3D instrument approach operation at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.

Note 1. — Decision altitude (DA) is referenced to mean sea level and decision height (DH) is referenced to the threshold elevation.

Note 2. — The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In Category III operations with a decision height the required visual reference is that specified for the particular procedure and operation.

Note 3. — For convenience where both expressions are used they may be written in the form "decision altitude/height "and abbreviated "DA/H".

29. Dry Runway (Effective 05.11.2020)

A runway considered dry if its surface is free of visible moisture and not contaminated within the area intended to be used.

30. Duty.

Any task that flight or cabin crew members are required by the operator to perform, including, for example, flight duty, administrative work, training , positioning and standby when it is likely to induce fatigue.

31. Duty period.

A period which starts when a flight or cabin crew member is required by an operator to report for or to commence a duty and ends when that person is free from all duties.

32 EDTO critical fuel.

The fuel quantity necessary to fly to an en-route alternate aerodrome considering, at the most critical point on the route, the most limiting system failure.

33. EDTO-significant system.

An aeroplane system whose failure or degradation could adversely affect the safety particular to an EDTO flight, or whose continued functioning is specifically important to the safe flight and landing of an aeroplane during an EDTO diversion.

34. Electronic flight bag (EFB).

An electronic information system, comprised of equipment and applications for flight crew, which allows for the storing, updating, displaying and processing of EFB functions to support flight operations or duties.

35. Emergency locator transmitter (ELT).

A generic term describing equipment which broadcast distinctive signals on designated frequencies and, depending on application, may be automatically activated by impact or be manually activated. An ELT may be any of the following:

Automatic fixed ELT (ELT (AF)). An automatically activated ELT which is permanently attached to an aircraft.

Automatic portable ELT (ELT (AP)). An automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft.

Automatic deployable ELT (ELT (AD)). An ELT which is rigidly attached to an aircraft and which is automatically deployed and activated by impact, and, in some cases, also by hydrostatic sensors. Manual deployment is also provided.

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

36. Engine.
A unit used or intended to be used for aircraft propulsion. It consists of at least those components and equipment necessary for functioning and control, but excludes the propeller/rotors (if applicable).

37. Enhanced vision system (EVS).
A system to display electronic real-time images of the external scene achieved through the use of image sensors.
Note. — EVS does not include vision imaging systems (NVIS)

38. Extended diversion time operations (EDTO).
Any operation by an aeroplane with two or more turbine engines where the diversion time to an En-route alternate aerodrome is greater than the threshold time established by the DGCA.

39. Fatigue.
A physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical activity) that can impair a person's alertness and ability to perform safety-related operational duties.

40. Fatigue risk management system (FRMS).
A data-driven means of continuously monitoring and managing fatigue-related safety risks, based upon scientific principles and knowledge as well as operational experience that aims to ensure relevant personnel are performing at adequate levels of alertness.

41. Final approach segment (FAS).
That segment of an instrument approach procedure in which alignment and descent for landing are accomplished.

42. Flight crew member.
A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

43. Flight Data Analysis.
A process of analyzing recorded flight data in order to improve the safety of flight operations.

44. Flight duty period.
A period which commences when a flight or cabin crew member is required to report for duty that includes a flight or a series of flights and which finishes when the aeroplane finally comes to rest and the engines are shut down at the end of the last flight on which he/she is a crew member

45. Flight Manual

A manual, associated with the certificate of airworthiness, containing limitations within which the aircraft is to be considered airworthy, and instructions and information necessary to the flight crew members for the safe operation of the aircraft.

46. Flight Operations Officer/ Flight dispatcher.

A Person designated by the operator to engage in the control and supervision of flight operations, whether licensed or not, suitably qualified in accordance with ICAO Annex 1, who supports, briefs and/or assists the pilot-in-command in the safe conduct of the flight.

47. Flight plan.

Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft.

48. Flight recorder

Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation.

Automatic deployable flight recorder (ADFR). A combination flight recorder installed on the aircraft which is capable of automatically deploying from the aircraft.

49. Flight safety documents system.

A set of inter-related documentation established by the operator, compiling and organizing information necessary for flight and ground operations, and comprising, as a minimum, the operations manual and the operator's maintenance control manual.

50. Flight simulation training device.

Any one of the following three types of apparatus in which flight conditions are simulated on the ground;

A flight simulator, which provides an accurate representation of the flight deck of a particular aircraft type to the extent that the mechanical, electrical, electronic, etc. aircraft systems control functions, the normal environment of flight crew members, and the performance and flight characteristics of that type of aircraft are realistically simulated;

A flight procedures trainer, which provides a realistic flight deck environment, and which simulates instrument responses, simple control functions of mechanical, electrical, electronic, etc. aircraft systems, and the performance and flight characteristics of aircraft of a particular class;

A basic instrument flight trainer, which is equipped with appropriate instruments, and which simulates the flight deck environment of an aircraft in flight in instrument flight conditions.

51. Flight time — aeroplanes.

The total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.

Note.— Flight time as here defined is synonymous with the term "block to block" time or "chock to chock" time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight.

52. General aviation operation.

An aircraft operation other than a commercial air transport operation or an aerial work operation.

53. Ground handling.

Services necessary for an aircraft's arrival at, and departure from, an airport, other than air traffic services

54. Head-up display (HUD).

A display system that presents flight information into the pilot's forward external field of view.

55. Human Factors principles.

Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

56. Human performance.

Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

57. Infant (Inf)

Is a person who has not attended two years of age

57. Instrument approach operations.

An approach and landing using instruments for navigation guidance based on an instrument approach procedure. There are two methods for executing instrument approach operations:

a. a two-dimensional (2D) instrument approach operation, using lateral navigation guidance only; and
b. a three-dimensional (3D) instrument approach operation, using both lateral and vertical navigation guidance.

Note. — Lateral and vertical navigation guidance refers to the guidance provided either by:

c. a ground-based radio navigation aid; or
d. computer-generated navigation data from ground-based, space-based, self-contained navigation aids or a combination of these.

58. Instrument approach procedure (IAP).

A series of predetermined maneuvers by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or En-route obstacle clearance criteria apply. Instrument approach procedures are classified as follows: Non-precision approach (NPA) procedure. An instrument approach procedure designed for 2D instrument approach operations Type A.

Note. — Non-precision approach procedures may be flown using a continuous descent final approach (CDFA) technique. CDFAs with advisory VNAV guidance calculated by on-board equipment (see PANS-OPS (Doc 8168), Volume I, Part I, Section 4, Chapter 1, paragraph 1.8.1) are considered 3D instrument approach operations.

CDFAs with manual calculation of the required rate of descent are considered 2D instrument approach operations. For more information on CDFAs, refer to PANS-OPS (Doc 8168), Volume I, Part I, Section 4, Chapter 1, paragraphs

1.7 And 1.8. Approach procedure with vertical guidance (APV). A performance-based navigation (PBN) instrument approach procedure designed for 3D instrument approach operations Type A.

Precision approach (PA) procedure. An instrument approach procedure based on navigation systems (ILS, MLS, GLS and SBAS CAT I) designed for 3D instrument approach operations Type A or B.

Note. — Refer to 4.2.8.3 for instrument approach operation types.

59. **Instrument Meteorological Conditions (IMC)**
Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minima specified for visual meteorological conditions.
Note. — The specified minima for visual meteorological conditions are contained in Chapter 4 of ICAO Annex 2.

60. Isolated aerodrome.
A destination aerodrome for which there is no destination alternate aerodrome suitable for a given aeroplane type.

61. Landing distance available (LDA).
The length of runway which is declared available and suitable for the ground run of an aeroplane landing.

62. Large aeroplane.
An aeroplane of a maximum certificated take-off mass of over 5 700 kg.

63. Maintenance.
The performance of tasks required to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair.

64. Maintenance organization's procedures manual.
A document endorsed by the head of the maintenance organization which details the maintenance organization's structure and management responsibilities, scope of work, description of facilities, maintenance procedures and quality assurance or inspection systems.

65. Maintenance programme.
A document which describes the specific scheduled maintenance tasks and their frequency of completion and related procedures, such as a reliability programme, necessary for the safe operation of those aircraft to which it applies.

66. Maintenance release.
A document which contains a certification confirming that the maintenance work to which it relates has been completed in a satisfactory manner, either in accordance with the approved data and the procedures described in the maintenance organization's procedures manual or under an equivalent system.

67. Master minimum equipment list (MMEL).
A list established for a particular aircraft type by the organization responsible for the type design with the approval of the State of Design containing items, one or more of which is permitted to be unserviceable at the commencement of a flight. The MMEL may be associated with special operating conditions, limitations or procedures.

68. Maximum diversion time.
Maximum allowable range, expressed in time from a point on a route to an En-route alternate aerodrome.

69. Maximum mass.
Maximum certificated take-off mass.

70. Minimum descent altitude (MDA) or minimum descent height (MDH).
A specified altitude or height in a 2D instrument approach operation or circling approach below which descent must not be made without the required visual reference.

Note 1.— Minimum descent altitude (MDA) is referenced to mean sea level and minimum descent height (MDH) is referenced to the aerodrome elevation or to the threshold elevation if that is more than 2 m (7 ft.) below the aerodrome elevation. A minimum descent height for a circling approach is referenced to the aerodrome elevation.

Note 2. — The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In the case of a circling approach the required visual reference is the runway environment.

Note 3. — For convenience when both expressions are used they may be written in the form "minimum descent altitude/height" and abbreviated "MDA/H".

71. Minimum equipment list (MEL).
A list which provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the MMEL established for the aircraft type.

72. Navigation Specification.
A set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace. There are two kinds of navigation specification;

Required Navigation Procedure (RNP) Specification. A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP. E.g. RNP 4, RNP APCH

Area Navigation (RNAV) specification. A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.

Note 1. — The Performance-based Navigation Manual (Doc 9613, Volume II contains detailed guidance on navigation specifications.

Note 2. — The term RNP, previously defined as "a statement of the navigation performance necessary for operation within a defined airspace", has been removed from this IS as the concept of RNP has been overtaken by the concept of PBN.
The term RNP in this IS is now solely used in the context of navigation specifications that require performance monitoring and alerting, e.g. RNP 4 refers to the aircraft and

operating requirements, including a 4 NM lateral performance with on-board performance monitoring and alerting that are detailed in Doc 9613.

73. 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.

Note. — Civil twilight ends in the evening when the center of the sun's disc is 6 degrees below the horizon and begins in the morning when the center of the sun's disc is 6 degrees below the horizon.

74. Obstacle clearance altitude (OCA) or obstacle clearance height (OCH).

The lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

Note. 1 — Obstacle clearance altitude is referenced to mean sea level and obstacle clearance height is referenced to the threshold elevation or in the case of non-precision approaches to the aerodrome elevation or the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. An obstacle clearance height for a circling approach is referenced to the aerodrome elevation.

Note. 2 — For convenience when both expressions are used they may be written in the form "obstacle clearance altitude/height" and abbreviated "OCA/H".

75. Operational control.

The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight.

76. Operational flight plan.

The operator's plan for the safe conduct of the flight based on considerations of aeroplane performance, other operating limitations and relevant expected conditions on the route to be followed and at the aerodromes concerned.

77. Operations manual.

A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

78. Operations Specifications. The authorizations, conditions and limitations associated with the air operator certificate and subject to the conditions in the operations manual.

79. Operator.

A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

80. Operator's maintenance control manual.

A document which describes the operator's procedures necessary to ensure that all scheduled and unscheduled maintenance is performed on the operator's aircraft on time and in a controlled and satisfactory manner.

81. Passenger with Reduced Mobility (PRM)

A Person with Reduced Mobility is any person whose mobility when using transport is reduced due to any physical disability (sensory or motor, permanent or temporary) intellectual disability or impairment, or age or any other cause of disability that requires special attention and the adaptation to his or her particular needs of the services which are made available to all passengers.

82. Performance-based communication (PBC). Communication based on performance specifications applied to the provision of air traffic services.

*Note.— An RCP specification includes communication performance requirements that are allocated to system components in terms of the communication to be provided and associated transaction time, continuity, availability, integrity, safety and functio*nality needed for the proposed operation in the context of a particular airspace concept.

83. Performance-based navigation (PBN).
Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.
Note.— An RCP specification includes communication performance requirements that are allocated to system components in terms of the communication to be provided and associated transaction time, continuity, availability, integrity, safety and functionality needed for the proposed operation in the context of a particular airspace concept.

84. Performance-based surveillance (PBS). Surveillance based on performance specifications applied to the provision of air traffic services.

Note.— An RSP specification includes surveillance performance requirements that are allocated to system components in terms of the surveillance to be provided and associated data delivery time, continuity, availability, integrity, accuracy of the surveillance data, safety and functionality needed for the proposed operation in the context of a particular airspace concept

85. Pilot-in-command.
The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

86. Point of no return.
The last possible geographic point at which an aeroplane can proceed to the destination aerodrome as well as to an available en route alternate aerodrome for a given flight.

87. Pressure-altitude.
An atmospheric pressure expressed in terms of altitude which corresponds to that pressure in the Standard Atmosphere.

88. Psychoactive substances.
Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psych stimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

89. Repair.
The restoration of an aeronautical product to an airworthy condition to ensure that the aircraft continues to comply with the design aspects of the appropriate airworthiness

Requirements used for the issuance of the type certificate for the respective aircraft type, after it has been damaged or subjected to wear.

90. Required communication performance (RCP).
A set of requirements for air traffic service provision and associated ground equipment, aircraft capability and operations needed to support performance-based communication.

91. Required communication performance type (RCP type).
A set of requirements for air traffic service provision and associated ground equipment, aircraft capability and operations needed to support performance-based surveillance.

92. Required surveillance performance (RSP) specification.
A set of requirements for air traffic service provision and associated ground equipment, aircraft capability, and operations needed to support performance-based surveillance.

93. Rest period.
A continuous and defined period of time, subsequent to and/or prior to duty during which flight or cabin crew members are free of all duties.

94. Runway visual range (RVR).
The range over which the pilot of an aircraft on the center line of a runway can see the runway surface markings or the lights delineating the runway or identifying its center line.

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

96. Safety Management Systems.
A systematic approach to managing safety, including the necessary organizational structure s, accountabilities, policies and procedures.

97. Small aeroplane.
An aeroplane of a maximum certificated take-off mass of 5 700 kg or less.

98. State of the Aerodrome.
The State in whose territory the aerodrome is located.

99. State of Registry.
The State on whose register the aircraft is entered.
Note. *— In the case of the registration of aircraft of an international operating agency on other than a national basis, the States constituting the agency are jointly and severally bound to assume the obligations which, under the Chicago Convention, attach to a State of Registry. See, in this regard, the Council Resolution of 14 December 1967 on Nationality and Registration of Aircraft Operated by International Operating Agencies Which can be found in Policy and Guidance Material on the Economic Regulation of International Air Transport (Doc 9587).*

100. State of the Aerodrome.
The State in whose territory the aerodrome is located.

101. State of the Operator.

The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

102. Synthetic vision system (SVS). A system to display data-derived synthetic images of the external scene from the perspective of the flight deck.

103. Target level of safety (TLS).
A generic term representing the level of risk which is considered acceptable in particular circumstances.

104. Threshold time.
The range, expressed in time established by the DGCA to an En-route alternate aerodrome, whereby any time beyond requires an EDTO approval from the DGCA.

105. Total vertical error (TVE).

The vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level).

106. Unaccompanied Minor (UM)
a person of 5 years up to 12 years who is permitted to travel alone with the responsibility of he airline operator.

107. Visual meteorological conditions (VMC).
Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.

Note. — The specified minima are contained in Chapter 4 of ICAO Annex 2

108. Wet Runway (Effective 05.11.2020)
The runway surface is covered by any visible dampness or water up to and including 3 mm deep within the intended area of use.

CHAPTER 2. APPLICABILITY

The Standards and Recommended Practices contained in this Implementing Standards (IS) 6-(I)-All is in compliance with ICAO Annex 6, Part I, and shall be applicable to the operation of aeroplanes by operators authorized to conduct international and domestic commercial air transport operations.

Note 1. — Standards and Recommended Practices applicable to international general aviation operations with aeroplanes are to be found in Implementing Standards (IS) 6-(II)-All, which is in Compliance with ICAO Annex 6 Part (II)

Note 2. — Standards and Recommended Practices applicable to international commercial air transport operations or international and domestic general aviation operations with helicopters are to be found in Implementing Standards (IS) 6-(III)-All, which is in Compliance with ICAO Annex 6 Part (III)

Note 3. — Chapter 3, 3.5, is applicable on and after 8 November 2018.

CHAPTER 3. GENERAL

Note 1.— Although the Convention on International Civil Aviation allocates to the State of Registry certain functions which that State is entitled to discharge, or obligated to discharge, as the case may be, the Assembly recognized, in Resolution A23-13 that the State of Registry may be unable to fulfil its responsibilities adequately in instances where aircraft are leased, chartered or interchanged — in particular without crew — by the operator of another State and that the Convention may not adequately specify the rights and obligations of the State of the operator in such instances until such time as Article 83 bis of the Convention enters into force. Accordingly, the Council urged that if, in the above-mentioned instances, the State of Registry finds itself unable to discharge adequately the functions allocated to it by the Convention, it delegate to the State of the Operator, subject to acceptance by the latter State, those functions of the State of Registry that can more adequately be discharged by the State of the Operator. It was understood that pending entry into force of Article 83 bis of the Convention the foregoing action would only be a matter of practical convenience and would not affect either the provisions of the Chicago Convention prescribing the duties of the State of Registry or any third State. However, as Article 83 bis of the Convention entered into force on 20 June 1997, such transfer agreements will have effect in respect of Contracting States which have ratified the related Protocol (Doc 9318) upon fulfilment of the conditions established in Article 83 bis.

Note 2.— In the case of international operations effected jointly with aeroplanes not all of which are registered in the same Contracting State, nothing in this Part prevents the DGCA concerned entering into an agreement for the joint exercise of the functions placed upon the State of Registry by the provisions of the relevant Annexes.

3.1 COMPLIANCE WITH LAWS, REGULATIONS AND PROCEDURES

3.1.1 The operator shall ensure that all employees when abroad know that they must comply with the laws, regulations and procedures of those States in which operations are conducted.

3.1.2 The operator shall ensure that all pilots are familiar with the laws, regulations and procedures, pertinent to the performance of their duties, prescribed for the areas to be traversed, the aerodromes to be used and the air navigation facilities relating thereto. The operator shall ensure that other members of the flight crew are familiar with such of these laws, regulations and procedures as are pertinent to the performance of their respective duties in the operation of the aeroplane.

Note.— Information for pilots and flight operations personnel on flight procedure parameters and operational procedures is contained in PANS-OPS (Doc 8168), Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (Doc 8168), Volume II. Obstacle clearance criteria and procedures used in certain States may differ from PANS-OPS, and knowledge of these differences is important for safety reasons.

3.1.3 The operator or a designated representative shall have responsibility for operational control.

Note. — The rights and obligations of a State in respect to the operation of aeroplanes registered in that State are not affected by this provision.

3.1.4 Responsibility for operational control shall be delegated only to the pilot-in-command and to a flight operations officer/flight dispatcher if the operator's approved method of control

and supervision of flight operations requires the use of flight operations officer/flight dispatcher personnel.

Note. — Guidance on the operational control organization and the role of the flight operations officer/flight dispatcher is contained in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335). Detailed guidance on the authorization, duties and responsibilities of the flight operations officer/flight dispatcher is contained in the Preparation of an Operations Manual (Doc 9376). The requirements for age, skill, knowledge and experience for licensed flight operations officers/flight dispatchers are contained in ICAO Annex 1.

3.1.5 If an emergency situation which endangers the safety of the aeroplane or persons becomes known first to the flight operations officer/flight dispatcher, action by that person in accordance with 4.6.2 shall include, where necessary, notification to the appropriate authorities of the nature of the situation without delay, and requests for assistance if required.

3.1.6 If an emergency situation which endangers the safety of the aeroplane or persons necessitates the taking of action which involves a violation of local regulations or procedures, the pilot-in-command shall notify the appropriate local authority without delay. If required by the state in which the incident occurs, the pilot-in-command shall submit a report on any such violation to the appropriate authority of such State; in that event, the pilot-in-command shall also submit a copy of it to the DGCA. Such reports shall be submitted as soon as possible and normally within ten days.

3.1.7 Operators shall ensure that pilots-in-command have available on board the aeroplane all the essential information concerning the search and rescue services in the area over which the aeroplane will be flown.

Note. — This information may be made available to the pilot by means of the operations manual or such other means as is considered appropriate.

3.1.8 Operators shall ensure that flight crew members demonstrate the ability to speak and understand the language used for radiotelephony communications as specified in ICAO Annex 1.

3.2 COMPLIANCE BY A FOREIGN OPERATOR WITH LAWS, REGULATIONS AND PROCEDURES OF A DGCA

3.2.1 When DGCA identifies a case of non-compliance or suspected non-compliance by a foreign operator with laws, regulations and procedures applicable within Sri Lanka, or a similar serious safety issue with that operator, DGCA shall immediately notify the operator and, if the issue warrants it, the State of the Operator. Where the State of the Operator and the State of Registry are different, such notification shall also be made to the State of Registry, if the issue falls within the responsibilities of that State and warrants a notification.

3.2.2 In the case of notification to States as specified in 3.2.1, if the issue and its resolution warrant it, DGCA shall engage in consultations with the State of the Operator and the State of Registry, as applicable, concerning the safety standards maintained by the operator.

Note. — The Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335) provides guidance on the surveillance of operations by foreign operators.

The manual also contains guidance on the consultations and related activities, as specified in 3.2.2, including the ICAO model clause on aviation safety, which, if included in a bilateral or multilateral agreement, provides for consultations among States, when safety issues are identified by any of the parties to a bilateral or multilateral agreement on air services.

3.3 SAFETY MANAGEMENT

Note. — ICAO Annex 19 includes safety management provisions for air operators. Further guidance is contained in the Safety Management Manual (SMM) (Doc 9859), and State Safety Program SLCAP 2600

3.3.1 **Recommendation.—** *The operator of an aeroplane of a certificated take-off mass in excess of 20 000 kg should establish and maintain a flight data analysis programme as part of its safety management system.*

3.3.2 The operator of an aeroplane of a maximum certificated take-off mass in excess of 27 000 kg shall establish and maintain a flight data analysis programme as part of its safety management system.

Note. — The operator may contract the operation of a flight data analysis programme to another party while retaining overall responsibility for the maintenance of such a programme.

3.3.3 A flight data analysis programme shall be non-punitive and contain adequate safeguards to protect the source(s) of the data.

Note 1. — Guidance on the establishment of flight data analysis programmes is included in the Manual on Flight Data Analysis Programmes (FDAP) (Doc 10000).

Note 2. — Legal guidance for the protection of information from safety data collection and processing systems is contained in Appendix 3 to ICAO Annex 19.

3.3.4 The operator shall establish a flight safety documents system, for the use and guidance of operational personnel, as part of its safety management system.

Note. — Guidance on the development and organization of a flight safety documents system is provided in Attachment F which form part of this IS.

3.4 USE OF PSYCHOACTIVE SUBSTANCES

Note. — Provisions concerning the use of psychoactive substances are contained in ICAO Annex 1, 1.2.7 and ICAO Annex 2, 2.5. and SLCAIS 035

3.5 AIRCRAFT TRACKING

(Applicable on and after 8 November 2018)

3.5.1 The operator shall establish an aircraft tracking capability to track aeroplanes throughout its area of operations.

Note. — Guidance on aircraft tracking capabilities is contained in the Normal Aircraft Tracking Implementation Guidelines *(Cir 347).*

3.5.2 **Recommendation.**— *The operator should track the position of an aeroplane through automated reporting at least every 15 minutes for the portion(s) of the in-flight operation(s) under the following conditions:*

a) The aeroplane has a maximum certificated take-off mass of over 27 000 kg and a seating capacity greater than 19; and

b) Where an ATS unit obtains aeroplane position information at greater than 15 minute intervals.

Note. — See ICAO Annex 11, Chapter 2, for coordination between the operator and air traffic services providers regarding position report messages.

CHAPTER 4. FLIGHT OPERATIONS

4.1 OPERATING FACILITIES

4.1.1 The operator shall ensure that a flight will not be commenced unless it has been ascertained by every reasonable means available that the ground and/or water facilities available and directly required on such flight, for the safe operation of the aeroplane and the protection of the passengers, are adequate for the type of operation under which the flight is to be conducted and are adequately operated for this purpose.

Note.2 — "Reasonable means" in this Standard is intended to denote the use, at the point of departure, of information available to the operator either through official information published by the aeronautical information services or readily obtainable from other sources.

4.1.2 The operator shall ensure that any inadequacy of facilities observed in the course of operations is reported to the authority responsible for them, without undue delay.

4.1.3 Subject to their published conditions of use, aerodromes and their facilities shall be kept continuously available for flight operations during their published hours of operations, irrespective of weather conditions.

4.1.4 The operator shall, as part of its safety management system, assess the level of rescue and firefighting service (RFFS) protection available at any aerodrome intended to be specified in the operational flight plan in order to ensure that an acceptable level of protection is available for the aeroplane intended to be used.

Note. — ICAO Annex 19 includes safety management provisions for air operators. Further guidance is contained in the Safety Management Manual (SMM) *(Doc 9859), and State Safety Program SLCAP 2600*

4.1.5 Information related to the level of RFFS protection that is deemed acceptable by the operator shall be contained in the operations manual.

Note 1. — Attachment I of this IS contains guidance on assessing an acceptable level of RFFS protection at aerodromes.

Note 2. — It is not intended that this guidance limit or regulate the operation of an aerodrome. The assessment performed by the operator does not in any way affect the RFFS requirements of ICAO Annex 14, Volume I, for aerodromes.

4.2 OPERATIONAL CERTIFICATION AND SUPERVISION

4.2.1 The air operator certificate-

4.2.1.1 The operator shall not engage in commercial air transport operations unless in possession of a valid air operator certificate issued by the DGCA.

4.2.1.2 The air operator certificate shall authorize the operator to conduct commercial air transport operations in accordance with the operations specifications.

Note. — Provisions for the content of the air operator certificate and its associated operations specifications are contained in 4.2.1.5 and 4.2.1.6.

4.2.1.3 The issue of an air operator certificate by the DGCA shall be dependent upon the operator demonstrating an adequate organization, method of control and supervision of flight operations, training programme as well as ground handling and maintenance arrangements consistent with the nature and extent of the operations specified.

Note.1 — Attachment D of this IS contains guidance on the issue of an air operator certificate, and is also contained in Air Operator Certification Manual SLCAP 4100, and Foreign Air Operator Certification Manual SLCAP 4105

4.2.1.3.1 The operator shall develop policies and procedures for third parties that perform work on its behalf.

4.2.1.4 The continued validity of an air operator certificate shall depend upon the operator maintaining the requirements of 4.2.1.3 under the supervision of the DGCA.

4.2.1.5 The air operator certificate shall contain at least the following information and shall follow the layout of Appendix 6, paragraph 2 of this IS:

a) The DGCA and the issuing authority;
b) The air operator certificate number and its expiration date;
c) The operator name, trading name (if different) and address of the principal place of business;
d) The date of issue and the name, signature and title of the authority representative; and
e) The location, in a controlled document carried on board, where the contact details of operational management can be found.

4.2.1.6 The operations specifications associated with the air operator certificate shall contain at least the information listed in Appendix 6, paragraph 3 of this IS, and shall follow the layout of Appendix 6, paragraph 3 of this IS.

Note. — Attachment D, paragraph 3.2.2, of this IS contains additional information that may be listed in the operations specifications associated with the air operator certificate.

4.2.1.7 Air operator certificates and their associated operations specifications first issued from 20 November 2008 shall follow the layouts of Appendix 6, paragraphs 2 and 3 of this IS.

4.2.1.8 The DGCA shall establish a system for both the certification and the continued surveillance of the operator in accordance with Appendix 5 to this IS, and Appendix 1 to ICAO Annex 19 to ensure that the required standards of operations established in 4.2 are maintained.

4.2.2 Surveillance of operations by a foreign operator

4.2.2.1 DGCA shall recognize as valid an air operator certificate issued by another Contracting State, provided that the requirements under which the certificate was issued are at least equal to the applicable Standards specified in this IS and in ICAO Annex 19.

4.2.2.2 DGCA shall establish a programme with procedures for the surveillance of operations in their territory by a foreign operator and for taking appropriate action when necessary to preserve safety.

4.2.2.3 The operator shall meet and maintain the requirements established by the DGCA in which the operation

Note. — Guidance on the surveillance of operations by foreign operators may be found in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance *(Doc 8335), and SLCAP Operations Inspectors Handbook SLCAP 4200*

4.2.3 Operations manual

4.2.3.1 The operator shall provide, for the use and guidance of operations personnel concerned, an operations manual in accordance with Appendix 2 of this IS. The operations manual shall be amended or revised as is necessary to ensure that the information contained therein is kept up to date. All such amendments or revisions shall be issued to all personnel that are required to use this manual.

4.2.3.2 The DGCA shall establish a requirement for the operator to provide a copy of the operations manual together with all amendments and/or revisions, for review and acceptance and, where required, approval. The operator shall incorporate in the operations manual such mandatory material as the DGCA may require.

Note 1. — Requirements for the organization and content of an operations manual are provided in Appendix 2 of this IS, and Preparation & Certification of Operations Manual SLCAP 4500

Note 2.— Specific items in the operations manual require the approval of the DGCA in accordance with the Standards in 4.2.8, 6.1.3, 9.3.1, 12.4 and 13.4.1.

4.2.4 Operating instructions — general

4.2.4.1 The operator shall ensure that all operations personnel are properly instructed in their particular duties and responsibilities and the relationship of such duties to the operation as a whole.

4.2.4.2 An aeroplane shall not be taxied on the movement area of an aerodrome unless the person at the controls:

a) has been duly authorized by the operator or a designated agent;

b) is fully competent to taxi the aeroplane;

c) is qualified to use the radiotelephone; and

d) has received instruction from a competent person in respect of aerodrome layout, routes, signs, marking, lights, air traffic control (ATC) signals and instructions, phraseology and procedures, and is able to conform to the operational standards required for safe aeroplane movement at the aerodrome.

4.2.4.3 **Recommendation. —** *The operator should issue operating instructions and provide information on aeroplane climb performance with all engines operating to enable the pilot-in-command to determine the climb gradient that can be achieved during the departure phase for the existing take-off conditions and intended take-off technique. This information should be included in the operations manual.*

4.2.5 In-flight simulation of emergency situations

The operator shall ensure that when passengers or cargo are being carried, no emergency or abnormal situations shall be simulated.

4.2.6 Checklists

The checklists provided in accordance with 6.1.4 shall be used by flight crews prior to, during and after all phases of operations, and in emergency, to ensure compliance with the operating procedures contained in the aircraft operating manual and the aeroplane flight manual or other documents associated with the certificate of airworthiness and otherwise in the operations manual. The design and utilization of checklists shall observe Human Factors principles.

Note. — Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual *(Doc 9683)*.

4.2.7 Minimum flight altitudes

4.2.7.1 The operator shall be permitted to establish minimum flight altitudes for those routes flown for which minimum flight altitudes have been established by the State flown over or the responsible DGCA, provided that they shall not be less than those established by that State.

4.2.7.2 The operator shall specify the method by which it is intended to determine minimum flight altitudes for operations conducted over routes for which minimum flight altitudes have not been established by the flown over or the responsible DGCA, and shall include this method in the operations manual. The minimum flight altitudes determined in accordance with the above method shall not be lower than specified in ICAO Annex 2.

4.2.7.3 **Recommendation. —** *The method for establishing the minimum flight altitudes should be approved by the DGCA.*

4.2.7.4 **Recommendation.—** *The DGCA should approve such method only after careful consideration of the probable effects of the following factors on the safety of the operation in question:*

a) The accuracy and reliability with which the position of the aeroplane can be determined;

b) The inaccuracies in the indications of the altimeters used;

c) The characteristics of the terrain (e.g. sudden changes in the elevation);

d) The probability of encountering unfavorable meteorological conditions (e.g. severe turbulence and descending air currents);

e) Possible inaccuracies in aeronautical charts; and

f) Airspace restrictions.

4.2.8 Aerodrome operating minima

4.2.8.1 The DGCA shall require that the operator establish aerodrome operating minima for each aerodrome to be used in operations and shall approve the method of determination of such minima. Such minima shall not be lower than any that may be established for such aerodromes by the State of the Aerodrome, except when specifically approved by that State.

Note. — This Standard does not require the State of the Aerodrome to establish aerodrome operating minimum

4.2.8.1.1 The DGCA may approve operational credit(s) for operations with aeroplanes equipped with automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS. Such approvals shall not affect the classification of the instrument approach procedure.

Note 1. — Operational credit includes:

a) For the purposes of an approach ban (4.4.1.2), a minima below the aerodrome operating minima;

b) Reducing or satisfying the visibility requirements; or

c) Requiring fewer ground facilities as compensated for by airborne capabilities.

Note 2.— Guidance on operational credit for aircraft equipped with automatic landing systems, a HUD or equivalent displays, EVS, SVS and CVS is contained in Attachment H of this IS and in the Manual of All-Weather Operations (Doc 9365).

Note 3. — Information regarding a HUD or equivalent displays, including references to RTCA and EUROCAE documents, is contained in the Manual of All-Weather Operations (Doc 9365).

4.2.8.2 The DGCA shall require that in establishing the aerodrome operating minima which will apply to any particular operation, full account shall be taken of:

a) The type, performance and handling characteristics of the aeroplane;

b) The composition of the flight crew, their competence and experience;

c) The dimensions and characteristics of the runways which may be selected for use;

d) The adequacy and performance of the available visual and non-visual ground aids;

e) The equipment available on the aeroplane for the purpose of navigation, acquisition of visual references and/or control of the flight path during the approach, landing and the missed approach;

f) The obstacles in the approach and missed approach areas and the obstacle clearance altitude/height for the instrument approach procedures;

g) The means used to determine and report meteorological conditions; and

h) The obstacles in the climb-out areas and necessary clearance margins.

Note. — Guidance on the establishment of aerodrome operating minima is contained in the Manual of All-Weather Operations (Doc 9365).

4.2.8.3 Instrument approach operations shall be classified based on the designed lowest operating minima below which an approach operation shall only be continued with the required visual reference as follows:

a) Type A: a minimum descent height or decision height at or above 75 m (250 ft); and

b) Type B: a decision height below 75 m (250 ft). Type B instrument approach operations are categorized as:

1) Category I (CAT I): a decision height not lower than 60 m (200 ft) and with either a visibility not less than 800 m or a runway visual range not less than 550 m;

2) Category II (CAT II): a decision height lower than 60 m (200 ft) but not lower than 30 m (100 ft) and a runway visual range not less than 300 m;

3) Category IIIA (CAT IIIA): a decision height lower than 30 m (100 ft) or no decision height and a runway visual range not less than 175 m;

4) Category IIIB (CAT IIIB): a decision height lower than 15 m (50 ft) or no decision height and a runway visual range less than 175 m but not less than 50 m; and

5) Category IIIC (CAT IIIC): no decision height and no runway visual range limitations.

Note 1.— Where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach operation would be conducted in accordance with the requirements of the most demanding category (e.g. an operation with a DH in the range of CAT IIIA but with an RVR in the range of CAT IIIB would be considered a CAT IIIB operation or an operation with a DH in the range of CAT II but with an RVR in the range of CAT I would be considered a CAT II operation).

Note 2. — The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In the case of a circling approach operation, the required visual reference is the runway environment.

Note 3.— Guidance on approach classification as it relates to instrument approach operations, procedures, runways and navigation systems is contained in the Manual of All-Weather Operations (Doc 9365).

4.2.8.4 Category II and Category III instrument approach operations shall not be authorized unless RVR information is provided.

4.2.8.5 **Recommendation.** — *For instrument approach operations, aerodrome operating minima below 800 m visibility should not be authorized unless RVR information is provided.*

4.2.8.6 The operating minima for 2D instrument approach operations using instrument approach procedures shall be determined by establishing a minimum descent altitude (MDA) or minimum descent height (MDH), minimum visibility and, if necessary, cloud conditions.

Note.— For guidance on applying a continuous descent final approach (CDFA) flight technique on non-precision approach procedures, refer to PANS-OPS (Doc 8168), Volume I, Part I, Section 4, Chapter 1, 1.7.

4.2.8.7 The operating minima for 3D instrument approach operations using instrument approach procedures shall be determined by establishing a decision altitude (DA) or decision height (DH) and the minimum visibility or RVR.

4.2.9 Threshold crossing height for 3D instrument approach operations

The operator shall establish operational procedures designed to ensure that an aeroplane being used to conduct 3D instrument approach operations crosses the threshold by a safe margin, with the aeroplane in the landing configuration and attitude.

4.2.10 Fuel and oil records

4.2.10.1 The operator shall maintain fuel records to enable the DGCA to ascertain that, for each flight, the requirements of 4.3.6 and 4.3.7.1 have been complied with.

4.2.10.2 The operator shall maintain oil records to enable the DGCA to ascertain that trends for oil consumption are such that an aeroplane has sufficient oil to complete each flight.

4.2.10.3 Fuel and oil records shall be retained by the operator for a period of three months.

4.2.11 Crew

4.2.11.1 Pilot-in-command. for each flight, the operator shall designate one pilot to act as pilot-in-command.

4.2.11.2 For each flight of an aeroplane above 15 000 m (49 000 ft), the operator shall maintain records so that the total cosmic radiation dose received by each crew member over a period of 12 consecutive months can be determined.

Note. — Guidance on the maintenance of cumulative radiation records is given in Circular 126 — Guidance Material on SST Aircraft Operations.

4.2.12 Passengers

4.2.12.1 The operator shall ensure that passengers are made familiar with the location and use of:

a) Seat belts;
b) Emergency exits;

c) Life jackets, if the carriage of life jackets is prescribed;

d) Oxygen dispensing equipment, if the provision of oxygen for the use of passengers is prescribed; and

e) Other emergency equipment provided for individual use, including passenger emergency briefing cards.

4.2.12.2 The operator shall inform the passengers of the location and general manner of use of the principal emergency equipment carried for collective use.

4.2.12.3 The operator shall ensure that in an emergency during flight, passengers are instructed in such emergency action as may be appropriate to the circumstances.

4.2.12.4 The operator shall ensure that, during take-off and landing and whenever considered necessary by reason of turbulence or any emergency occurring during flight, all passengers on board an aeroplane shall be secured in their seats by means of the seat belts or harnesses provided.

4.3 FLIGHT PREPARATION

4.3.1 A flight shall not be commenced until flight preparation forms have been completed certifying that the pilot-in- command is satisfied that:

a) The aeroplane is airworthy and the appropriate certificates (i.e. airworthiness, registration) are on board the aeroplane;

b) The instruments and equipment prescribed in Chapter 6, for the particular type of operation to be undertaken, are installed and are sufficient for the flight;

c) A maintenance release as prescribed in 8.8 has been issued in respect of the aeroplane;

d) The mass of the aeroplane and centre of gravity location are such that the flight can be conducted safely, taking into account the flight conditions expected;

e) Any load carried is properly distributed and safely secured;

f) A check has been completed indicating that the operating limitations of Chapter 5 can be complied with for the flight to be undertaken; and

g) The Standards of 4.3.3 relating to operational flight planning have been complied with.

4.3.2 Completed flight preparation forms shall be kept by the operator for a period of three months.

4.3.3 Operational flight planning

4.3.3.1 An operational flight plan shall be completed for every intended flight. The operational flight plan shall be approved and signed by the pilot-in-command and, where applicable, signed by the flight operations officer/flight dispatcher, and a copy shall be filed with the operator or a designated agent, or, if these procedures are not possible, it shall be left with the aerodrome authority or on record in a suitable place at the point of departure.

Note. — The duties of a flight operations officer/flight dispatcher are contained in 4.6.

4.3.3.2 The operations manual must describe the content and use of the operational flight plan.

4.3.4 Alternate aerodromes

4.3.4.1 Take-off alternate aerodrome

4.3.4.1.1 A take-off alternate aerodrome shall be selected and specified in the operational flight plan if either the meteorological conditions at the aerodrome of departure are below the operator's established aerodrome landing minima for that operation or if it would not be possible to return to the aerodrome of departure for other reasons.

4.3.4.1.2 The take-off alternate aerodrome shall be located within the following flight time from the aerodrome of departure:

a) For aeroplanes with two engines, one hour of flight time at a one-engine-inoperative cruising speed, determined from the aircraft operating manual, calculated in ISA and still-air conditions using the actual take-off mass; or

b) For aeroplanes with three or more engines, two hours of flight time at an all engines operating cruising speed, determined from the aircraft operating manual, calculated in ISA and still-air conditions using the actual take-off mass; or

c) For aeroplanes engaged in extended diversion time operations (EDTO) where an alternate aerodrome meeting the distance criteria of a) or b) is not available, the first available alternate aerodrome located within the distance of the operator's approved maximum diversion time considering the actual take-off mass.

4.3.4.1.3 For an aerodrome to be selected as a take-off alternate the available information shall indicate that, at the estimated time of use, the conditions will be at or above the operator's established aerodrome operating minima for that operation.

4.3.4.2 En-route alternate aerodromes

En-route alternate aerodromes, required by 4.7 for extended diversion time operations by aeroplanes with two turbine engines, shall be selected and specified in the operational and air traffic services (ATS) flight plans.

4.3.4.3 Destination alternate aerodromes

4.3.4.3.1 For a flight to be conducted in accordance with the instrument flight rules, at least one destination alternate aerodrome shall be selected and specified in the operational and ATS flight plans, unless:

a) The duration of the flight from the departure aerodrome, or from the point of in-flight re-planning, to the destination aerodrome is such that, taking into account all meteorological conditions and operational information relevant to the flight, at the estimated time of use, a reasonable certainty exists that:

1) The approach and landing may be made under visual meteorological conditions; and

2) Separate runways are usable at the estimated time of use of the destination aerodrome with at least one runway having an operational instrument approach procedure; or

b) The aerodrome is isolated. Operations into isolated aerodromes do not require the selection of a destination alternate aerodrome(s) and shall be planned in accordance with 4.3.6.3 d) 4);

1) For each flight into an isolated aerodrome a point of no return shall be determined; and

2) A flight to be conducted to an isolated aerodrome shall not be continued past the point of no return unless a current assessment of meteorological conditions, traffic and other operational conditions indicate that a safe landing can be made at the estimated time of use.

Note 1. — Separate runways are two or more runways at the same aerodrome configured such that if one runway is closed, operations to the other runway(s) can be conducted.

Note 2. — Guidance on planning operations to isolated aerodromes is contained in the Flight Planning and Fuel Management (FPFM) Manual (Doc 9976).

4.3.4.3.2 Two destination alternate aerodromes shall be selected and specified in the operational and ATS flight plans when, for the destination aerodrome:

a) Meteorological conditions at the estimated time of use will be below the operator's established aerodrome operating minima for that operation; or

b) Meteorological information is not available.

4.3.4.4 Notwithstanding the provisions in 4.3.4.1, 4.3.4.2 and 4.3.4.3, the DGCA may, based on the results of a specific safety risk assessment conducted by the operator which demonstrates how an equivalent level of safety will be maintained, approve operational variations to alternate aerodrome selection criteria. The specific safety risk assessment shall include at least the:

a) Capabilities of the operator;

b) Overall capability of the aeroplane and its systems;

c) Available aerodrome technologies, capabilities and infrastructure;

d) Quality and reliability of meteorological information;

e) Identified hazards and safety risks associated with each alternate aerodrome variation; and

f) Specific mitigation measures.

Note.— Guidance on performing a safety risk assessment and on determining variations, including examples of variations, is contained in the Flight Planning and Fuel Management (FPFM) Manual (Doc 9976) and the Safety Management Manual (SMM) (Doc 9859).

4.3.5 Meteorological conditions

4.3.5.1 A flight to be conducted in accordance with VFR shall not be commenced 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 enable compliance with these rules.

4.3.5.2 A flight to be conducted in accordance with the instrument flight rules shall not:

a) take off from the departure aerodrome unless the meteorological conditions, at the time of use, are at or above the operator's established aerodrome operating minima for that operation; and

b) take off or continue beyond the point of in-flight re-planning unless at the aerodrome of intended landing or at each alternate aerodrome to be selected in compliance with 4.3.4, current meteorological reports or a combination of current reports and forecasts indicate that the meteorological conditions will be, at the estimated time of use, at or above the operator's established aerodrome operating minima for that operation.

4.3.5.3 To ensure that an adequate margin of safety is observed in determining whether or not an approach and landing can be safely carried out at each alternate aerodrome, the operator shall specify appropriate incremental values for height of cloud base and visibility, acceptable to the DGCA, to be added to the operator's established aerodrome operating minima.

Note. — Guidance on the selection of these incremental values is contained in the Flight Planning and Fuel Management (FPFM) Manual (Doc 9976).

4.3.5.4 The DGCA shall approve a margin of time established by the operator for the estimated time of use of an aerodrome.

Note. — Guidance on establishing an appropriate margin of time for the estimated time of use of an aerodrome is contained in the Flight Planning and Fuel Management (FPFM) Manual (Doc 9976).

4.3.5.5 A flight to be operated in known or expected icing conditions shall not be commenced unless the aeroplane is certificated and equipped to cope with such conditions.

4.3.5.6 A flight to be planned or expected to operate in suspected or known ground icing conditions shall not take off unless the aeroplane has been inspected for icing and, if necessary, has been given appropriate de-icing/anti-icing treatment.
Accumulation of ice or other naturally occurring contaminants shall be removed so that the aeroplane is kept in an airworthy condition prior to take-off.

Note. — Guidance material is given in the Manual of Aircraft Ground De-icing/Anti-icing Operations (Doc 9640).

4.3.6 Fuel requirements

4.3.6.1 An aeroplane shall carry a sufficient amount of usable fuel to complete the planned flight safely and to allow for deviations from the planned operation.

4.3.6.2 The amount of usable fuel to be carried shall, as a minimum, be based on:

a) The following data:

1) Current aeroplane-specific data derived from a fuel consumption monitoring system, if available; or

2) If current aeroplane-specific data are not available, data provided by the aeroplane manufacturer; and

b) The operating conditions for the planned flight including:

1) Anticipated aeroplane mass;

2) Notices to Airmen;

3) Current meteorological reports or a combination of current reports and forecasts;

4) Air traffic services procedures, restrictions and anticipated delays; and

5) The effects of deferred maintenance items and/or configuration deviations.

4.3.6.3 The pre-flight calculation of usable fuel required shall include:

a) Taxi fuel, which shall be the amount of fuel expected to be consumed before take-off, taking into account local conditions at the departure aerodrome and auxiliary power unit (APU) fuel consumption;

b) trip fuel, which shall be the amount of fuel required to enable the aeroplane to fly from take-off, or the point of in- flight re-planning, until landing at the destination aerodrome taking into account the operating conditions of 4.3.6.2 b);

c) Contingency fuel, which shall be the amount of fuel required to compensate for unforeseen factors. It shall be five per cent of the planned trip fuel or of the fuel required from the point of in-flight re-planning based on the consumption rate used to plan the trip fuel but, in any case, shall not be lower than the amount required to fly for five minutes at holding speed at 450 m (1 500 ft) above the destination aerodrome in standard conditions;

Note.— Unforeseen factors are those 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, extended delays and deviations from planned routings and/or cruising levels.

d) Destination alternate fuel, which shall be:

1) Where a destination alternate aerodrome is required, the amount of fuel required to enable the aeroplane to:

i) Perform a missed approach at the destination aerodrome;

ii) Climb to the expected cruising altitude;

iii) Fly the expected routing;

iv) Descend to the point where the expected approach is initiated; and

v) Conduct the approach and landing at the destination alternate aerodrome; or

2) where two destination alternate aerodromes are required, the amount of fuel, as calculated in 4.3.6.3 d) 1), required to enable the aeroplane to proceed to the destination alternate aerodrome which requires the greater amount of alternate fuel; or

3) where a flight is operated without a destination alternate aerodrome, the amount of fuel required to enable the aeroplane to fly for 15 minutes at holding speed at 450 m (1 500 ft) above destination aerodrome elevation in standard conditions; or

4) Where the aerodrome of intended landing is an isolated aerodrome:

i) For a reciprocating engine aeroplane, the amount of fuel required to fly for 45 minutes plus 15 per cent of the flight time planned to be spent at cruising level, including final reserve fuel, or two hours, whichever is less; or

ii) For a turbine-engined aeroplane, the amount of fuel required to fly for two hours at normal cruise consumption above the destination aerodrome, including final reserve fuel;

e) Final reserve fuel, which shall be the amount of fuel calculated using the estimated mass on arrival at the destination alternate aerodrome, or the destination aerodrome when no destination alternate aerodrome is required:

1) For a reciprocating engine aeroplane, the amount of fuel required to fly for 45 minutes, under speed and altitude conditions specified by the DGCA; or

2) For a turbine-engined aeroplane, the amount of fuel required to fly for 30 minutes at holding speed at 450 m (1 500 ft) above aerodrome elevation in standard conditions;

f) Additional fuel, which shall be the supplementary amount of fuel required if the minimum fuel calculated in accordance with 4.3.6.3 b), c), d) and e) is not sufficient to:

1) Allow the aeroplane to descend as necessary and proceed to an alternate aerodrome in the event of engine failure or loss of pressurization, whichever requires the greater amount of fuel based on the assumption that such a failure occurs at the most critical point along the route;

i) Fly for 15 minutes at holding speed at 450 m (1 500 ft) above aerodrome elevation in standard conditions; and

ii) Make an approach and landing;

2) Allow an aeroplane engaged in EDTO to comply with the EDTO critical fuel scenario as established by the DGCA;

3) Meet additional requirements not covered above;

Note 1. — Fuel planning for a failure that occurs at the most critical point along a route (4.3.6.3 f) 1)) may place the aeroplane in a fuel emergency situation based on 4.3.7.2.

Note 2. — Guidance on EDTO critical fuel scenarios is contained in Attachment C of this IS;

g) Discretionary fuel, which shall be the extra amount of fuel to be carried at the discretion of the pilot-in-command.

4.3.6.4 **Recommendation**. — *Operators should determine one final reserve fuel value for each aeroplane type and variant in their fleet rounded up to an easily recalled figure.*

4.3.6.5 A flight shall not commence unless the usable fuel on board meets the requirements in 4.3.6.3 a), b), c), d), e) and f) if required and shall not continue from the point of in-flight re-planning unless the usable fuel on board meets the requirements in 4.3.6.3 b), c), d), e) and f) if required.

4.3.6.6 Notwithstanding the provisions in 4.3.6.3 a), b), c), d) and f), the DGCA may, based on the results of a specific safety risk assessment conducted by the operator which demonstrates how an equivalent level of safety will be maintained, approve variations to the pre-flight fuel calculation of taxi fuel, trip fuel, contingency fuel, destination alternate fuel, and additional fuel. The specific safety risk assessment shall include at least the:

a) Flight fuel calculations;

b) Capabilities of the operator to include:

i) A data-driven method that includes a fuel consumption monitoring programme; and/or

ii) The advanced use of alternate aerodromes; and

c) Specific mitigation measures.

Note.— Guidance on the specific safety risk assessment, fuel consumption monitoring programmes and the advanced use of alternate aerodromes is contained in the Flight Planning and Fuel Management (FPFM) Manual (Doc 9976).

4.3.6.7 The use of fuel after flight commencement for purposes other than originally intended during pre-flight planning shall require a re-analysis and, if applicable, adjustment of the planned operation.

Note.— Guidance on procedures for in-flight fuel management including re-analysis, adjustment and/or re-planning considerations when a flight begins to consume contingency fuel before take-off is contained in the Flight Planning and Fuel Management (FPFM) Manual (Doc 9976).

4.3.7 In-flight fuel management

4.3.7.1 The operator shall establish policies and procedures, approved by the DGCA, to ensure that in- flight fuel checks and fuel management are performed.

4.3.7.2 The pilot-in-command shall continually ensure that the amount of usable fuel remaining on board is not less than the fuel required to proceed to an aerodrome where a safe landing can be made with the planned final reserve fuel remaining upon landing.

Note. — The protection of final reserve fuel is intended to ensure a safe landing at any aerodrome when unforeseen occurrences may not permit safe completion of an operation as originally planned. Guidance on flight planning, including the circumstances that may require re-analysis,

adjustment and/or re-planning of the planned operation before take-off or en-route, is contained in the Flight Planning and Fuel Management (FPFM) Manual (Doc 9976).

4.3.7.2.1 The pilot-in-command shall request delay information from ATC when unanticipated circumstances may result in landing at the destination aerodrome with less than the final reserve fuel plus any fuel required to proceed to an alternate aerodrome or the fuel required to operate to an isolated aerodrome.

4.3.7.2.2 The pilot-in-command shall advise ATC of a minimum fuel state by declaring MINIMUM FUEL when, having committed to land at a specific aerodrome, the pilot calculates that any change to the existing clearance to that aerodrome may result in landing with less than the planned final reserve fuel.

Note 1. — The declaration of MINIMUM FUEL informs ATC that all planned aerodrome options have been reduced to a specific aerodrome of intended landing and any change to the existing clearance may result in landing with less than the planned final reserve fuel. This is not an emergency situation but an indication that an emergency situation is possible should any additional delay occur.

Note 2. — Guidance on declaring minimum fuel is contained in the Flight Planning and Fuel Management (FPFM) Manual (Doc 9976).

4.3.7.2.3 The pilot-in-command shall declare a situation of fuel emergency by broadcasting MAYDAY MAYDAY MAYDAY FUEL, when the calculated usable fuel predicted to be available upon landing at the nearest aerodrome where a safe landing can be made is less than the planned final reserve fuel.

Note 1. — The planned final reserve fuel refers to the value calculated in 4.3.6.3 e) 1) or 2) and is the minimum amount of fuel required upon landing at any aerodrome.

Note 2. — The words "MAYDAY FUEL" describe the nature of the distress conditions as required in Annex 10, Volume II, 5.3.2.1.1 b) 3.

Note 3. — Guidance on procedures for in-flight fuel management is contained in the Flight Planning and Fuel Management (FPFM) Manual (Doc 9976).

4.3.8 Refueling with passengers on board

4.3.8.1 An aeroplane shall not be refueled when passengers are embarking, on board or disembarking unless it is properly attended by qualified personnel ready to initiate and direct an evacuation of the aeroplane by the most practical and expeditious means available.

4.3.8.2 When refueling with passengers embarking, on board or disembarking, two-way communication shall be maintained by the aeroplane's inter-communication system or other suitable means between the ground crew supervising the refueling and the qualified personnel on board the aeroplane.

Note 1. — The provisions of 4.3.8.1 do not necessarily require the deployment of integral aeroplane stairs or the opening of emergency exits as a prerequisite to refueling.

Note 2. — Provisions concerning aircraft refueling are contained in ICAO Annex 14, Volume I, and guidance on safe refueling practices is contained in the Airport Services Manual, (Doc 9137), Parts 1 and 8.

Note 3. — Additional precautions are required when refueling with fuels other than aviation kerosene or when refueling results in a mixture of aviation kerosene with other aviation turbine fuels, or when an open line is used.

4.3.9 Oxygen supply

Note. — Approximate altitudes in the Standard Atmosphere corresponding to the values of absolute pressure used in the text are as follows:

Absolute pressure	Metres	Feet
700 hPa	3 000	10 000
620 hPa	4 000	13 000
376 hPa	7 600	25 000

4.3.9.1 A flight to be operated at flight altitudes at which the atmospheric pressure in personnel compartments will be less than 700 hPa shall not be commenced unless sufficient stored breathing oxygen is carried to supply:

a) All crew members and 10 per cent of the passengers for any period in excess of 30 minutes that the pressure in compartments occupied by them will be between 700 hPa and 620 hPa; and

b) The crew and passengers for any period that the atmospheric pressure in compartments occupied by them will be less than 620 hPa.

4.3.9.2 A flight to be operated with a pressurized aeroplane shall not be commenced unless a sufficient quantity of stored breathing oxygen is carried to supply all the crew members and passengers, as is appropriate to the circumstances of the flight being undertaken, in the event of loss of pressurization, for any period that the atmospheric pressure in any compartment occupied by them would be less than 700 hPa.

In addition, when an aeroplane is operated at flight altitudes at which the atmospheric pressure is less than 376 hPa, or which, if operated at flight altitudes at which the atmospheric pressure is more than 376 hPa and cannot descend safely within four minutes to a flight altitude at which the atmospheric pressure is equal to 620 hPa, there shall be no less than a 10-minute supply for the occupants of the passenger compartment.

4.3.10 Time capability of cargo compartment fire suppression system

4.3.10.1 **Recommendation.** — All flights should be planned so that the diversion time to an aerodrome where a safe landing could be made does not exceed the cargo compartment fire suppression time capability of the aeroplane, when one is identified in the relevant aeroplane documentation, reduced by an operational safety margin specified by the DGCA.

Note 1. — Cargo compartment fire suppression time capabilities will be identified in the relevant aeroplane documentation when they are to be considered for the operation.

Note 2. — Fifteen minutes is an operational safety margin commonly retained for that purpose.

Note 3. — Refer to Chapter 4, 4.7 and Attachment B of this IS for considerations of time capability of cargo compartment fire suppression systems for aeroplanes engaged in EDTO.

4.4 IN-FLIGHT PROCEDURES

4.4.1 Aerodrome operating minima

4.4.1.1 A flight shall not be continued towards the aerodrome of intended landing, unless the latest available information indicates that at the expected time of arrival, a landing can be effected at that aerodrome or at least one destination alternate aerodrome, in compliance with the operating minima established in accordance with 4.2.8.1.

4.4.1.2 An instrument approach shall not be continued below 300 m (1 000 ft) above the aerodrome elevation or into the final approach segment unless the reported visibility or controlling RVR is at or above the aerodrome operating minima.

Note. — Criteria for the final approach segment is contained in PANS-OPS (Doc 8168), Volume II.

4.4.1.3 If, after entering the final approach segment or after descending below 300 m (1 000 ft) above the aerodrome elevation, the reported visibility or controlling RVR falls below the specified minimum, the approach may be continued to DA/H or MDA/H. In any case, an aeroplane shall not continue its approach-to-land at any aerodrome beyond a point at which the limits of the operating minima specified for that aerodrome would be infringed.

Note. — Controlling RVR means the reported values of one or more RVR reporting locations (touchdown, mid-point and stop-end) used to determine whether operating minima are or are not met. Where RVR is used, the controlling RVR is the touchdown RVR, unless otherwise specified by State criteria.

4.4.2 Meteorological observations

Note.— The procedures for making meteorological observations on board aircraft in flight and for recording and reporting them are contained in ICAO Annex 3, the PANS-ATM (Doc 4444) and the appropriate Regional Supplementary Procedures (Doc 7030).

4.4.3 Hazardous flight conditions

Hazardous flight conditions encountered, other than those associated with meteorological conditions, shall be reported to the appropriate aeronautical station as soon as possible. The reports so rendered shall give such details as may be pertinent to the safety of other aircraft.

4.4.4 Flight crew members at duty stations

4.4.4.1 Take-off and landing. All flight crew members required to be on flight deck duty shall be at their stations.

4.4.4.2 En route. All flight crew members required to be on flight deck duty shall remain at their stations except when their absence is necessary for the performance of duties in connection with the operation of the aeroplane or for physiological needs.

4.4.4.3 Seat belts. All flight crew members shall keep their seat belts fastened when at their stations.

4.4.4.4 Safety harness. Any flight crew member occupying a pilot's seat shall keep the safety harness fastened during the take-off and landing phases; all other flight crew members shall keep their safety harnesses fastened during the take-off and landing phases unless the

shoulder straps interfere with the performance of their duties, in which case the shoulder straps may be unfastened but the seat belt must remain fastened.

Note. — Safety harness includes shoulder straps and a seat belt which may be used independently.

4.4.5 Use of oxygen

4.4.5.1 All flight crew members, when engaged in performing duties essential to the safe operation of an aeroplane in flight, shall use breathing oxygen continuously whenever the circumstances prevail for which its supply has been required in 4.3.9.1 or 4.3.9.2.

4.4.5.2 All flight crew members of pressurized aeroplanes operating above an altitude where the atmospheric pressure is less than 376 hPa shall have available at the flight duty station a quick-donning type of oxygen mask which will readily supply oxygen upon demand.

4.4.6 Safeguarding of cabin crew and passengers in pressurized aeroplanes in the event of loss of pressurization

Recommendation.— *Cabin crew should be safeguarded so as to ensure reasonable probability of their retaining consciousness during any emergency descent which may be necessary in the event of loss of pressurization and, in addition, they should have such means of protection as will enable them to administer first aid to passengers during stabilized flight following the emergency. Passengers should be safeguarded by such devices or operational procedures as will ensure reasonable probability of their surviving the effects of hypoxia in the event of loss of pressurization.*

Note. — It is not envisaged that cabin crew will always be able to provide assistance to passengers during emergency descent procedures which may be required in the event of loss of pressurization.

4.4.7 In-flight operational instructions

Operational instructions involving a change in the ATS flight plan shall, when practicable, be coordinated with the appropriate ATS unit before transmission to the aeroplane.

Note. — When the above coordination has not been possible, operational instructions do not relieve a pilot of the responsibility for obtaining an appropriate clearance from an ATS unit, if applicable, before making a change in flight plan.

4.4.8 Instrument flight procedures

4.4.8.1 One or more instrument approach procedures designed to support instrument approach operations shall be approved and promulgated by the DGCA in which the aerodrome is located to serve each instrument runway or aerodrome utilized for instrument flight operations.

4.4.8.2 All aeroplanes operated in accordance with instrument flight rules shall comply with the instrument flight procedures approved by the DGCA in which the aerodrome is located.

Note 1. — See 4.2.8.3 for instrument approach operation classifications.

Note 2. — Information for pilots on flight procedure parameters and operational procedures is contained in PANS-OPS (Doc 8168), Volume I. Criteria for the construction of instrument flight procedures for the guidance of procedure specialists are provided in PANS-OPS (Doc 8168), Volume II. Obstacle clearance criteria and procedures used in certain States may differ from PANS-OPS, and knowledge of these differences is important for safety reasons (see Chapter 3, 3.1.1).

4.4.9 Aeroplane operating procedures for noise abatement

4.4.9.1 **Recommendation.** — *Aeroplane operating procedures for noise abatement should comply with the provisions of PANS-OPS (Doc 8168), Volume I.*

4.4.9.2 **Recommendation.** — *Noise abatement procedures specified by the operator for any one aeroplane type should be the same for all aerodromes.*

Note. — A single procedure may not satisfy the requirements at some aerodromes.

4.4.10 Aeroplane operating procedures for rates of climb and descent

Recommendation.— Unless otherwise specified in an air traffic control instruction, to avoid unnecessary airborne collision avoidance system (ACAS II) resolution advisories in aircraft at or approaching adjacent altitudes or flight levels, operators should specify procedures by which an aeroplane climbing or descending to an assigned altitude or flight level, especially with an autopilot engaged, may do so at a rate less than 8 m/sec or 1 500 ft/min (depending on the instrumentation available) throughout the last 300 m (1 000 ft) of climb or descent to the assigned level when the pilot is made aware of another aircraft at or approaching an adjacent altitude or flight level.

Note. — Material concerning the development of these procedures is contained in the PANS-OPS (Doc 8168) Volume I, Part III, Section 3, and Chapter 3.

4.5 DUTIES OF PILOT-IN-COMMAND

4.5.1 The pilot-in-command shall be responsible for the safety of all crew members, passengers and cargo on board when the doors are closed. The pilot-in-command shall also be responsible for the operation and safety of the aeroplane from the moment the aeroplane is ready to move for the purpose of taking 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.

4.5.2 The pilot-in-command shall ensure that the checklists specified in 4.2.6 are complied with in detail.

4.5.3 The pilot-in-command shall be responsible for notifying the nearest appropriate authority by the quickest available means of any accident involving the aeroplane, resulting in serious injury or death of any person or substantial damage to the aeroplane or property.

Note. — A definition of the term "serious injury" is contained in ICAO Annex 13.

4.5.4 The pilot-in-command shall be responsible for reporting all known or suspected defects in the aeroplane, to the operator, at the termination of the flight.

4.5.5 The pilot-in-command shall be responsible for the journey log book or the general declaration containing the information listed in 11.4.1.

Note. — By virtue of Resolution A10-36 of the Tenth Session of the Assembly (Caracas, June–July 1956) "the General Declaration, [described in ICAO Annex 9] when prepared so as to contain all the information required by Article 34 [of the Convention on International Civil Aviation] with respect to the journey log book, may be considered by DGCA to be an acceptable form of journey log book".

4.6 DUTIES OF FLIGHT OPERATIONS OFFICER/FLIGHT DISPATCHER

4.6.1 A flight operations officer/flight dispatcher in conjunction with a method of control and supervision of flight operations in accordance with 4.2.1.3 shall:

a) Assist the pilot-in-command in flight preparation and provide the relevant information;

b) Assist the pilot-in-command in preparing the operational and ATS flight plans, sign when applicable and file the ATS flight plan with the appropriate ATS unit;

c) Furnish the pilot-in-command while in flight, by appropriate means, with information which may be necessary for the safe conduct of the flight; and

d) Notify the appropriate ATS unit when the position of the aeroplane cannot be determined by an aircraft tracking capability, and attempts to establish communication are unsuccessful.

4.6.2 In the event of an emergency, a flight operations officer/flight dispatcher shall:

a) initiate such procedures as outlined in the operations manual while avoiding taking any action that would conflict with ATC procedures; and

b) Convey safety-related information to the pilot-in-command that may be necessary for the safe conduct of the flight, including information related to any amendments to the flight plan that become necessary in the course of the flight.

Note. — It is equally important that the pilot-in-command also convey similar information to the flight operations officer/ flight dispatcher during the course of the flight, particularly in the context of emergency situations.

4.7 ADDITIONAL REQUIREMENTS FOR OPERATIONS BY AEROPLANES WITH TURBINE ENGINES BEYOND 60 MINUTES TO AN EN-ROUTE ALTERNATE AERODROME INCLUDING EXTENDED DIVERSION TIME OPERATIONS (EDTO)

4.7.1 Requirements for operations beyond 60 minutes to an en-route alternate aerodrome

4.7.1.1 Operators conducting operations beyond 60 minutes from a point on a route to an en-route alternate aerodrome shall ensure that:

a) For all aeroplanes:

1) En-route alternate aerodromes are identified; and
2) The most up-to-date information is provided to the flight crew on identified en-route alternate aerodromes, including operational status and meteorological conditions;

b) For aeroplanes with two turbine engines, the most up-to-date information provided to the flight crew indicates that conditions at identified en-route alternate aerodromes will be at or above the operator's established aerodrome operating minima for the operation at the estimated time of use.

Note. — Guidance on compliance with the requirements of these provisions is contained in Attachment C of this IS, and ETDO SLCAP 4525

4.7.1.2 In addition to the requirements in 4.7.1.1, all operators shall ensure that the following are taken into account and provide the overall level of safety intended by the provisions of ICAO Annex 6, Part I:

a) Operational control and flight dispatch procedures;
b) Operating procedures; and
c) Training programmes.

4.7.2 Requirements for extended diversion time operations (EDTO)

4.7.2.1 Unless the operation has been specifically approved by the DGCA, an aeroplane with two or more turbine engines shall not be operated on a route where the diversion time to an en-route alternate aerodrome from any point on the route, calculated in ISA and still-air conditions at the one-engine-inoperative cruise speed for aeroplanes with two turbine engines and at the all engines operating cruise speed for aeroplanes with more than two turbine engines, exceeds a threshold time established for such operations by that DGCA.

Note 1. — When the diversion time exceeds the threshold time, the operation is considered to be an extended diversion time operation (EDTO).

Note 2. — Guidance on the establishment of an appropriate threshold time and on approval of extended diversion time operations is contained in Attachment C of this IS.

Note 3. — For the purpose of EDTO, the take-off and/or destination aerodromes may be considered en-route alternate aerodromes.

4.7.2.2 The maximum diversion time for the operator of a particular aeroplane type engaged in extended diversion time operations shall be approved by the DGCA.

Note. — Guidance on the conditions to be used when converting diversion times to distances is contained in Attachment C of this IS.

4.7.2.3 When approving the appropriate maximum diversion time for the operator of a particular aeroplane type engaged in extended diversion time operations, the DGCA shall ensure that:

a) For all aeroplanes: the most limiting EDTO significant system time limitation, if any, indicated in the aeroplane flight manual (directly or by reference) and relevant to that particular operation is not exceeded; and

b) For aeroplanes with two turbine engines: the aeroplane is EDTO certified.

Note 1. — EDTO may be referred to as ETOPS in some documents.

Note 2. — Guidance on compliance with the requirements of this provision is contained in Attachment C of this IS.

4.7.2.3.1 Notwithstanding the provisions in 4.7.2.3 a), the DGCA may, based on the results of a specific safety risk assessment conducted by the operator which demonstrates how an equivalent level of safety will be maintained, approve operations beyond the time limits of the most time-limited system. The specific safety risk assessment shall include at least the:

a) Capabilities of the operator;

b) Overall reliability of the aeroplane;

c) Reliability of each time-limited system;

d) Relevant information from the aeroplane manufacturer; and

e) Specific mitigation measures.

Note. — Guidance on the specific safety risk assessment is contained in Attachment C of this IS.

4.7.2.4 For aeroplanes engaged in EDTO, the additional fuel required by 4.3.6.3 f) 2) shall include he fuel necessary to comply with the EDTO critical fuel scenario as established by the DGCA.

Note. — Guidance on compliance with the requirements of this provision is in Attachment C of this IS.

4.7.2.5 A flight shall not proceed beyond the threshold time in accordance with 4.7.2.1 unless the identified en-route alternate aerodromes have been re-evaluated for availability and the most up-to-date information indicates that, during the estimated time of use, conditions at those aerodromes will be at or above the operator's established aerodrome operating minima for the operation. If any conditions are identified that would preclude a safe approach and landing at that aerodrome during the estimated time of use, an alternative course of action shall be determined.

4.7.2.6 The DGCA shall, when approving maximum diversion times for aeroplanes with two turbine engines, ensure that the following are taken into account in providing the overall level of safety intended by the provisions of ICAO Annex 8:

a) Reliability of the propulsion system;

b) Airworthiness certification for EDTO of the aeroplane type; and

c) EDTO maintenance programme.

Note 1. — EDTO may be referred to as ETOPS in some documents.

Note 2. — The Airworthiness Manual (Doc 9760) contains guidance on the level of performance and reliability of aeroplane systems intended by 4.7.2.6, as well as guidance on continuing airworthiness aspects of the requirements of 4.7.2.6.

4.7.2.7 **Recommendation.** — *The DGCA of an aeroplane type with two turbine engines which, prior to 25 March 1986, was authorized and operating on a route where the flight time at one-engine-inoperative cruise speed to an en-route alternate aerodrome exceeded the threshold time established for such operations in accordance with 4.7.2.1 should give consideration to permitting such an operation to continue on that route after that date.*

4.8 CARRY-ON BAGGAGE

The operator shall ensure that all baggage carried onto an aeroplane and taken into the passenger cabin is adequately and securely stowed.

4.9 ADDITIONAL REQUIREMENTS FOR SINGLE PILOT OPERATIONS UNDER THE INSTRUMENT FLIGHT RULES (IFR) OR AT NIGHT

4.9.1 An aeroplane shall not be operated under the IFR or at night by a single pilot unless approved by the DGCA.

4.9.2 An aeroplane shall not be operated under the IFR or at night by a single pilot unless:

a) The flight manual does not require a flight crew of more than one;

b) The aeroplane is propeller-driven;

c) The maximum approved passenger seating configuration is not more than nine;

d) The maximum certificated take-off mass does not exceed 5 700 kg;

e) The aeroplane is equipped as described in 6.23; and

f) The pilot-in-command has satisfied requirements of experience, training, checking and recency described in 9.4.5.

4.10 FATIGUE MANAGEMENT

Note. — Guidance on the development and implementation of fatigue management regulations is contained in the Manual for the Oversight of Fatigue Management Approaches (Doc 9966), and SLCA General Directive 006

4.10.1 The DGCA shall establish regulations for the purpose of managing fatigue. These regulations shall be based upon scientific principles, knowledge and operational experience with the aim of ensuring that flight and cabin crew members are performing at an adequate level of alertness. Accordingly, the DGCA shall establish:

a) Regulations for flight time, flight duty period, duty period and rest period limitations; and

b) Where authorizing the operator to use a Fatigue Risk Management System (FRMS) to manage fatigue, FRMS regulations.

4.10.2 The DGCA shall require that the operator, in compliance with 4.10.1 and for the purposes of managing its fatigue-related safety risks, establish either:

a) Flight time, flight duty period, duty period and rest period limitations that are within the prescriptive fatigue management regulations established by the DGCA; or

b) A Fatigue Risk Management System (FRMS) in compliance with 4.10.6 for all operations; or

c) An FRMS in compliance with 4.10.6 for part of its operations and the requirements of 4.10.2 a) for the remainder of its operations.

4.10.3 Where the operator adopts prescriptive fatigue management regulations for part or all of its operations, the DGCA may approve, in exceptional circumstances, variations to these regulations on the basis of a risk assessment provided by the operator. Approved variations shall provide a level of safety equivalent to, or better than that achieved through the prescriptive fatigue management regulations.

4.10.4 The DGCA shall approve the operator's FRMS before it may take the place of any or all of the prescriptive fatigue management regulations. An approved FRMS shall provide a level of safety equivalent to, or better than, the prescriptive fatigue management regulations.

4.10.5 DGCA that approve the operator's FRMS shall establish a process to ensure that an FRMS provides a level of safety equivalent to, or better than, the prescriptive fatigue management regulations. As part of this process, the DGCA shall:

a) Require that the operator establish maximum values for flight times and/or flight duty periods(s) and duty period(s), and minimum values for rest periods. These values shall be based upon scientific principles and knowledge, subject to safety assurance processes, and acceptable to the DGCA;

b) Mandate a decrease in maximum values and an increase in minimum values in the event that the operator's data indicates these values are too high or too low, respectively; and

c) Approve any increase in maximum values or decrease in minimum values only after evaluating the operator's justification for such changes, based on accumulated FRMS experience and fatigue-related data.

Note. — Safety assurance processes are described in Appendix 7 of this IS.

4.10.6 Where the operator implements an FRMS to manage fatigue-related safety risks, the operator shall, as a minimum:

a) Incorporate scientific principles and knowledge within the FRMS;

b) Identify fatigue-related safety hazards and the resulting risks on an ongoing basis;

c) Ensure that remedial actions, necessary to effectively mitigate the risks associated with the hazards, are implemented promptly;

d) Provide for continuous monitoring and regular assessment of the mitigation of fatigue risks achieved by such actions; and

e) Provide for continuous improvement to the overall performance of the FRMS.

Note. — Detailed requirements for an FRMS are in Appendix 7 of this IS.
Note. — Provision on the Protection of safety data, safety information and related sources are contained in Appendix 3 of ICAO Annex 19

4.10.7 **Recommendation**. *— DGCA should require that, where the operator has an FRMS, it is integrated with the operator's SMS.*

Note. — The integration of FRMS and SMS is described in the Manual for the Oversight of Fatigue Management Approaches (Doc 9966).

4.10.8 The operator shall maintain records for all its flight and cabin crew members of flight time, flight duty periods, duty periods, and rest periods for a period of time specified by the DGCA.

CHAPTER 5. AEROPLANE PERFORMANCE OPERATING LIMITATIONS

5.1 GENERAL

5.1.1 Aeroplanes shall be operated in accordance with a comprehensive and detailed code of performance established by the DGCA in compliance with the applicable Standards of this chapter.

5.1.2 Except as provided in 5.4, single-engine aeroplanes shall only be operated in conditions of weather and light, and over such routes and diversions therefrom, that permit a safe forced landing to be executed in the event of engine failure.

5.1.3 **Recommendation. —** *For aeroplanes for which Parts IIIA and IIIB of ICAO Annex 8 are not applicable because of the exemption provided for in Article 41 of the Convention, the DGCA should ensure that the level of performance specified in 5.2 should be met as far as practicable.*

5.2 APPLICABLE TO AEROPLANES CERTIFICATED IN ACCORDANCE WITH PARTS IIIA AND IIIB OF ICAO ANNEX 8

5.2.1 The Standards contained in 5.2.2 to 5.2.11 inclusive are applicable to the large aeroplanes to which Parts IIIA and IIIB of ICAO Annex 8 are applicable.

Note. — The following Standards do not include quantitative specifications comparable to those found in national airworthiness codes. In accordance with 5.1.1, they are to be supplemented by national requirements prepared by DGCA guidance of which is contained in Aircraft Performance Code SLCAP 4515

5.2.2 The level of performance defined by the appropriate parts of the comprehensive and detailed national code referred to in 5.1.1 for the aeroplanes designated in 5.2.1 shall be at least substantially equivalent to the overall level embodied in the Standards of this chapter.

Note. — ICAO Annex 6 Part I, Attachment B which forms part of this IS contains guidance material which indicates the level of performance intended by the Standards and Recommended Practices of this chapter.

5.2.3 An aeroplane shall be operated in compliance with the terms of its certificate of airworthiness and within the approved operating limitations contained in its flight manual.

5.2.4 The DGCA shall take such precautions as are reasonably possible to ensure that the general level of safety contemplated by these provisions is maintained under all expected operating conditions, including those not covered specifically by the provisions of this chapter.

5.2.5 A flight shall not be commenced unless the performance information provided in the flight manual, supplemented as necessary with other data acceptable to the DGCA, indicates that the Standards of 5.2.6 to 5.2.11 can be complied with for the flight to be undertaken.

5.2.6 In applying the Standards of this chapter, account shall be taken of all factors that significantly affect the performance of the aeroplane, including but not limited to: the mass of the aeroplane, the operating procedures, the pressure-altitude appropriate to the elevation of the aerodrome, the ambient temperature, the wind, the runway slope, and surface conditions of the runway i.e., presence of snow, slush, water, and/or ice for landplanes, water surface condition for seaplanes.

Such factors shall be taken into account directly as operational parameters or indirectly by means of allowances or margins, which may be provided in the scheduling of performance data or in the comprehensive and detailed code of performance in accordance with which the aeroplane is being operated.

5.2.7 Mass limitations

a) The mass of the aeroplane at the start of take-off shall not exceed the mass at which 5.2.8 is complied with, or the mass at which 5.2.9, 5.2.10 and 5.2.11 are complied with, allowing for expected reductions in mass as the flight proceeds, and for such fuel jettisoning as is envisaged in applying 5.2.9 and 5.2.10 and, in respect of alternate aerodromes, 5.2.7 c) and 5.2.11.

b) In no case shall the mass at the start of take-off exceed the maximum take-off mass specified in the flight manual for the pressure-altitude appropriate to the elevation of the aerodrome, and, if used as a parameter to determine the maximum take-off mass, any other local atmospheric condition.

c) In no case shall the estimated mass for the expected time of landing at the aerodrome of intended landing and at any destination alternate aerodrome, exceed the maximum landing mass specified in the flight manual for the pressure-altitude appropriate to the elevation of those aerodromes, and if used as a parameter to determine the maximum landing mass, any other local atmospheric condition.

d) In no case shall the mass at the start of take-off, or at the expected time of landing at the aerodrome of intended landing and at any destination alternate aerodrome, exceed the relevant maximum masses at which compliance has been demonstrated with the applicable noise certification Standards in ICAO Annex 16, Volume I, unless otherwise authorized in exceptional circumstances for a certain aerodrome or a runway where there is no noise disturbance problem, by the competent authority of the State in which the aerodrome is situated.

5.2.8 Take-off.

The aeroplane shall be able, in the event of a critical engine failing, or for other reasons, at any point in the take-off, either to discontinue the take-off and stop within the accelerate-stop distance available, or to continue the take- off and clear all obstacles along the flight path by an adequate vertical or horizontal distance until the aeroplane is in a position to comply with 5.2.9.

When determining the resulting take-off obstacle accountability area, the operating conditions, such as the crosswind component and navigation accuracy, must be taken into account.

Note. — ICAO Annex Part I, Attachment B which forms part of this IS contains guidance on the vertical and horizontal distances that are considered adequate to show compliance with this Standard.(

Note. — The Aeroplane Performance Manual (Doc 10064) contains guidance on the vertical and horizontal distances that are considered adequate to show compliance with this Standard. ***(Effective 05.11.2020)***

5.2.8.1 In determining the length of the runway available, account shall be taken of the loss, if any, of runway length due to alignment of the aeroplane prior to take-off.

5.2.9 En route — one engine inoperative.

The aeroplane shall be able, in the event of the critical engine becoming inoperative at any point along the route or planned diversions therefrom, to continue the flight to an aerodrome at which the Standard of 5.2.11 can be met, without flying below the minimum flight altitude at any point.

5.2.10 En route — two engines inoperative.

In the case of aeroplanes having three or more engines, on any part of a route where the location of en-route alternate aerodromes and the total duration of the flight are such that the probability of a second engine becoming inoperative must be allowed for if the general level of safety implied by the Standards of this chapter is to be maintained, the aeroplane shall be able, in the event of any two engines becoming inoperative, to continue the flight to an en-route alternate aerodrome and land.

5.2.11 Landing.

The aeroplane shall, at the aerodrome of intended landing and at any alternate aerodrome, after clearing all obstacles in the approach path by a safe margin, be able to land, with assurance that it can come to a stop or, for a seaplane, to a satisfactorily low speed, within the landing distance available. Allowance shall be made for expected variations in the approach and landing techniques, if such allowance has not been made in the scheduling of performance data.

Note.— Guidelines on appropriate margins for the "at time of landing" distance assessment is contained in the Aeroplane Performance Manual (Doc 10064). ***(Effective 05.11.2020)***

5.3 OBSTACLE DATA

5.3.1 Obstacle data shall be provided to enable the operator to develop procedures to comply with 5.2.8.

Note. — See ICAO Annex 4 and ICAO Annex 15 for methods of presentation of certain obstacle data.

5.3.2 The operator shall take account of charting accuracy when assessing compliance with 5.2.8.

5.4 ADDITIONAL REQUIREMENTS FOR OPERATIONS OF SINGLE-ENGINE TURBINE-POWERED AEROPLANES AT NIGHT AND/OR IN INSTRUMENT METEOROLOGICAL CONDITIONS (IMC)

5.4.1 In approving operations by single-engine turbine-powered aeroplanes at night and/or in IMC, the DGCA shall ensure that the airworthiness certification of the aeroplane is appropriate and that the overall level of safety intended by the provisions of ICAO Annexes 6 and 8 is provided by:

a) The reliability of the turbine engine;
b) The operator's maintenance procedures, operating practices, flight dispatch procedures and crew training programmes; and
c) Equipment and other requirements provided in accordance with ICAO Annex 6 Part I, Appendix 3, which forms part of this IS

5.4.2 All single-engine turbine-powered aeroplanes operated at night and/or in IMC shall have an engine trend monitoring system, and those aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 2005 shall have an automatic trend monitoring system.

CHAPTER 6. AEROPLANE INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENTS

Note. — Specifications for the provision of aeroplane communication and navigation equipment are contained in Chapter 7.

6.1 GENERAL

6.1.1 In addition to the minimum equipment necessary for the issuance of a certificate of airworthiness, the instruments, equipment and flight documents prescribed in the following paragraphs shall be installed or carried, as appropriate, in aeroplanes according to the aeroplane used and to the circumstances under which the flight is to be conducted. The prescribed instruments and equipment, including their installation, shall be approved or accepted by the DGCA.

6.1.2 An aeroplane shall carry a certified true copy of the air operator certificate specified in Chapter 4, 4.2.1, and a copy of the operations specifications relevant to the aeroplane type, issued in conjunction with the certificate. When the certificate and the associated operations specifications are issued by the DGCA in a language other than English, an English translation shall be included.

Note. — Provisions for the content of the air operator certificate and its associated operations specifications are contained in 4.2.1.5 and 4.2.1.6.

6.1.3 The operator shall include in the operations manual a minimum equipment list (MEL), approved by the DGCA which will enable the pilot-in-command to determine whether a flight may be commenced or continued from any intermediate stop should any instrument, equipment or systems become inoperative. The operator shall follow the procedures contained in SLCAP 4215 "MMEL/MEL Procedures Manual" published by the Civil Aviation Authority of Sri Lanka when preparing the operators Minimum Equipment List (MEL) for the approval of DGCA. SLCAP 4215 is available on the CAASL website. In respect of aeroplanes that are not registered in Sri Lanka but operated in Sri Lanka, the DGCA shall ensure that the MEL does not affect the aeroplane's compliance with the airworthiness requirements applicable in the State of Registry.

Note. — ICAO Annex 6 Part I, Attachment E, which forms part of this IS contains guidance on the minimum equipment list.

6.1.4 The operator shall provide operations staff and flight crew with an aircraft operating manual, for each aircraft type operated, containing the normal, abnormal and emergency procedures relating to the operation of the aircraft. The manual shall include details of the aircraft systems and of the checklists to be used. The design of the manual shall observe Human Factors principles. The manual shall be easily accessible to the flight crew during all flight operations.

Note. — Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual (Doc 9683).

6.1.5 The operator shall carry the following documents and any other documents as prescribed by DGCA

a. Certificate of Registration
b. Certificate of Airworthiness
c. Duly completed copy of lease agreement in respect of lease aircraft
d. Certificate of Insurance
e. Airplane Flight Manual (AFM)
f. Copy of the AOC, Certified true by the DGCA

g. Minimum Equipment List (MEL)/ Configuration Deviation List (CDL)
h. Weight & Balance Manual
i. Flight Operations Manual (FOM)
j. Journey Logbook
k. Technical Log
l. Radio Licence
m. Noise Certificate
n. DG Emergency Response Guide

6.2 ALL AEROPLANES ON ALL FLIGHTS

6.2.1 An aeroplane shall be equipped with instruments which will enable the flight crew to control the flight path of the aeroplane, carry out any required procedural maneuvers and observe the operating limitations of the aeroplane in the expected operating conditions.

6.2.2 An aeroplane shall be equipped with:

a) Accessible and adequate medical supplies;

Recommendation. — *Medical supplies should comprise:*

1) One or more first-aid kits for the use of cabin crew in managing incidents of ill health; and

2) For aeroplanes required to carry cabin crew as part of the operating crew, one universal precaution kit (two for aeroplanes authorized to carry more than 250 passengers) for the use of cabin crew members in managing incidents of ill health associated with a case of suspected communicable disease, or in the case of illness involving contact with body fluids; and

3) For aeroplanes authorized to carry more than 100 passengers, on a sector length of more than two hours, a medical kit, for the use of medical doctors or other qualified persons in treating in-flight medical emergencies.

Note. — Guidance on the types, number, location and contents of the medical supplies is given in ICAO Annex 6 Part I, Attachment A, which forms part of this IS.

b) Portable fire extinguishers of a type which, when discharged, will not cause dangerous contamination of the air within the aeroplane. At least one shall be located in:

1) The pilot's compartment; and

2) Each passenger compartment that is separate from the pilot's compartment and that is not readily accessible to the flight crew, the number of fire extinguishers required shall be as follows;

Note 1.— Any portable fire extinguisher so fitted in accordance with the certificate of airworthiness of the aeroplane may count as one prescribed.

Note 2. — Refer to 6.2.2.1 for fire extinguishing agents.

Maximum approved passenger seating configuration	Number of Extinguishers required
7-30	1
31-60	2
61-200	3
201-300	4
301-400	5
401-500	6
501-600	7
601 or more	8

3) at least one of the fire extinguishers located in the flight deck and in the passenger compartment shall contain Halon 1211 (Bromochloro difluoro methane, CBrCIF2) or equivalent as the extinguishing agent.

4) At least one readily accessible 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 inflight.

c) 1) A seat or berth for each person who is aged two years or more;

2) A seat belt for each seat and restraining belts for each berth; and

3) A safety supplementary loop belt (kangaroo belt) or other restrain device for each infant.

4) A safety harness for each flight crew seat. The safety harness for each pilot seat shall incorporate a device which will automatically restrain the occupant's torso in the event of rapid deceleration;

5) A seat belt with shoulder harness for each cabin crew seat and observer seat.

6) All seat belts with shoulder harness shall have a single point release.

Recommendation. — *The safety harness for each pilot seat should incorporate a device to prevent a suddenly incapacitated pilot from interfering with the flight controls.*

Note. — Safety harness includes shoulder straps and a seat belt which may be used independently.

d) Means of ensuring that the following information and instructions are conveyed to passengers through a safety briefing card in each passenger seat pocket and an oral safety briefing announcement prior to each take off:

1) When and how seat belts are to be fastened including child restrain devices;

2) When and how oxygen equipment is to be used if the carriage of oxygen is required;

3) Restrictions on smoking;

4) Location and use of life jackets or equivalent individual flotation devices where their carriage is required; and
5) Location and method of opening emergency exits; and
6) Emergency exit path lighting system;
7) When and where baggage must be stowed; and
8) Correct positioning of seat backs and chair table for take-off and landing.

Note. — Any instructions used for passenger information shall be in English language as well.

e) Spare electrical fuses of appropriate ratings for replacement of those accessible in flight.

f. One crash axe or crowbar shall be located in the flight deck. If the maximum approved passenger seats are more than 200 an additional crash axe or crowbar shall be carried and located in or near the most rearward galley area. Crash axes and crowbar located in the passenger compartment shall not be visible to passengers.

g. Mega phones to be carried as follows;

Passenger seating configuration	No. of mega phones required
61-99	1
100 or more	2

h. An operator shall not operate an aeroplane unless it has equipment to protect the eyes nose and mouth or each flight crew member while on flight deck duty and to provide oxygen for a period of not less than 15 minutes. In addition when the flight crew is more than one and a cabin crew member is not carried portable breathing equipment (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.

It has sufficient portable PBE to protect the eyes, nose and mouth of all required cabin crew member and to provide breathing gas for a period of not less than 15 minutes.

PBE intended of flight crew used 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.

PBE intended for cabin crew used must be installed adjacent to each required cabin crew member duty station.

PBE while in use must not prevent communication where required.

6.2.2.1 Any agent used in a built-in fire extinguisher for each lavatory disposal receptacle for towels, paper or waste in an aeroplane for which the individual certificate of airworthiness is first issued on or after 31 December 2011 and any extinguishing agent used in a portable fire extinguisher in an aeroplane for which the individual certificate of airworthiness is first issued on or after 31 December 2018 shall:

a) Meet the applicable minimum performance requirements of the DGCA. The type and quantity of extinguishing agent must be suitable for the kinds of fire likely to occur in the compartment where the extinguisher to be intended to be used for personnel compartments must minimize the hazard of toxic gas concentration; and

b) Not be of a type listed in the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer as it appears in the Eighth Edition of the Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer, ICAO Annex A, Group II.

Note. — Information concerning extinguishing agents is contained in the UNEP Halons Technical Options Committee Technical Note No. 1 – New Technology Halon Alternatives and FAA Report No. DOT/FAA/AR-99-63, Options to the Use of Halons for Aircraft Fire Suppression Systems.

6.2.3 An aeroplane shall carry:

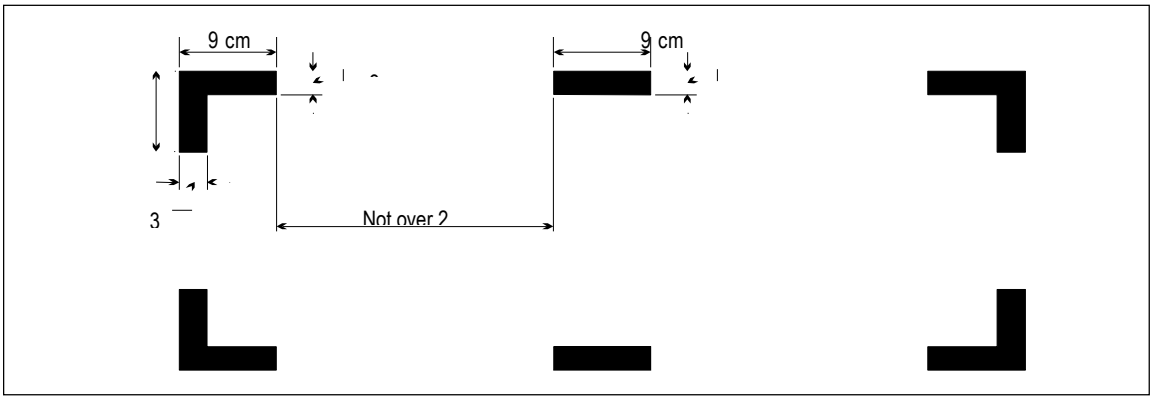
a) The operations manual prescribed in Chapter 4, 4.2.3, or those parts of it that pertain to flight operations;
b) The flight manual for the aeroplane, or other documents containing performance data required for the application of Chapter 5 and any other information necessary for the operation of the aeroplane within the terms of its certificate of airworthiness, unless these data are available in the operations manual; and
c) Current and suitable charts to cover the route of the proposed flight and any route along which it is reasonable to expect that the flight may be diverted.

6.2.4 Marking of break-in points

6.2.4.1 If areas of the fuselage suitable for break-in by rescue crews in an emergency are marked on an aeroplane, such areas shall be marked as shown below (see figure following).
The color of the markings shall be red or yellow, and if necessary they shall be outlined in white to contrast with the background.

6.2.4.2 If the corner markings are more than 2 m apart, intermediate lines 9 cm × 3 cm shall be inserted so that there is no more than 2 m between adjacent markings.

Note. — This Standard does not require any aeroplane to have break-in areas.



MARKING OF BREAK-IN POINTS (see 6.2.4)

6.3 FLIGHT RECORDERS

Note 1. — Crash protected flight recorders comprise one or more of the following systems: a flight data recorder (FDR), a cockpit voice recorder (CVR), an airborne image recorder (AIR) and/or

a data link recorder (DLR). Image and data link information may be recorded on either the CVR or the FDR.

Note 2.— Lightweight flight recorders comprise one or more of the following systems: an aircraft data recording system (ADRS), a cockpit audio recording system (CARS), an airborne image recording system (AIRS) and/or a data link recording system (DLRS). Image and data link information may be recorded on either the CARS or the ADRS.

Note 3. — Detailed guidance on flight recorders is contained in ICAO Annex 6 Part I, Appendix 8 which forms part of this IS.

Note 4. — For aeroplanes for which the application for type certification is submitted to a Contracting State before 1 January 2016, specifications applicable to flight recorders may be found in EUROCAE ED-112, ED-56A, ED-55, Minimum Operational Performance Specifications (MOPS), or earlier equivalent documents.

Note 5. — For aeroplanes for which the application for type certification is submitted to a Contracting State on or after 1 January 2016, specifications applicable to flight recorders may be found in EUROCAE ED-112A, Minimum Operational Performance Specification (MOPS), or equivalent documents.

Note 6. — Specifications applicable to lightweight flight recorders may be found in EUROCAE ED-155, Minimum Operational Performance Specification (MOPS), or equivalent documents.

Note 7. — Chapter 3 contains requirements for DGCA regarding the use of voice, image and/or data recordings and transcripts. ***(Effective 07.11.2019)***

6.3.1 Flight data recorders and aircraft data recording systems

Note.—Parameters to be recorded are listed in Tables A8-1 and A8-3 of ICAO Annex 6 Part I, Appendix 8, which forms part of this IS.

6.3.1.1 Types

6.3.1.1.1 Types I and IA FDR shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power, configuration and operation.

6.3.1.1.2 Types II and IIA FDRs shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power and configuration of lift and drag devices.

6.3.1.2 Operation

6.3.1.2.1 All turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less for which the application for type certification is submitted to a Contracting State on or after 1 January 2016 shall be equipped with:

a) A Type II FDR; or
b) A Class C AIR or AIRS capable of recording flight path and speed parameters displayed to the pilot(s); or
c) An ADRS capable of recording the essential parameters defined in Table A8-3 of ICAO Annex 6 Part I, Appendix 8 which forms part of this IS.

Note 1. — "The application for type certification is submitted to a DGCA" refers to the date of application of the original "Type Certificate" for the aeroplane type, not the date of certification of particular aeroplane variants or derivative models.

Note 2. — AIR or AIRS classification is defined in 5.1 of ICAO Annex 6 Part I, Appendix 8, which forms part of this IS.

6.3.1.2.2 **Recommendation.**— *All turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 2016 should be equipped with:*

a) A Type II FDR; or

b) A Class C AIR or AIRS capable of recording flight path and speed parameters displayed to the pilot(s); or

c) An ADRS capable of recording the essential parameters defined in Table A8-3 of ICAO Annex 6 Part I, Appendix 8, which forms part of this IS.

6.3.1.2.3 All aeroplanes of a maximum certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 1989 shall be equipped with a Type I FDR.

6.3.1.2.4 All aeroplanes of a maximum certificated take-off mass of over 5 700 kg, up to and including 27 000 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1989, shall be equipped with a Type II FDR.

6.3.1.2.5 **Recommendation**.— *All multi-engined turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 1990 should be equipped with a Type IIA FDR.*

6.3.1.2.6 All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued on or after 1 January 1987 but before 1 January 1989, with a maximum certificated take-off mass of over 5 700 kg, except those in 6.3.1.2.8, shall be equipped with an FDR which shall record time, altitude, airspeed, normal acceleration and heading.

6.3.1.2.7 **Recommendation.**— *All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued on or after 1 January 1987 but before 1 January 1989, with a maximum certificated take-off mass of over 5 700 kg, except those in 6.3.1.2.8, should be equipped with an FDR which shall record time, altitude, airspeed, normal acceleration, heading and such additional parameters as are necessary to determine pitch attitude, roll attitude, radio transmission keying and power on each engine.*

6.3.1.2.8 All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued on or after 1 January 1987 but before 1 January 1989, with a maximum certificated take-off mass of over 27 000 kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 shall be equipped with a Type II FDR.

6.3.1.2.9 All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987, with a maximum certificated take-off mass of over 5 700 kg shall be equipped with an FDR which shall record time, altitude, airspeed, normal acceleration and heading.

6.3.1.2.10 **Recommendation.**— *All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987, with a maximum certificated take-off mass of over 27 000 kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 should be equipped with an FDR which should record, in addition to time, altitude, airspeed, normal acceleration and heading, such additional parameters as are necessary to meet the objectives of determining:*

a) The attitude of the aeroplane in achieving its flight path; and

b) The basic forces acting upon the aeroplane resulting in the achieved flight path and the origin of such basic forces.

6.3.1.2.11 All aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the individual certificate of airworthiness is first issued after 1 January 2005 shall be equipped with a Type IA FDR.

6.3.1.2.12 All aeroplanes which are required to record normal acceleration, lateral acceleration and longitudinal acceleration for which the application for type certification is submitted to a Contracting State on or after 1 January 2016 and which are required to be fitted with an FDR shall record those parameters at a maximum sampling and recording interval of 0.0625 seconds.

6.3.1.2.13 All aeroplanes which are required to record pilot input and/or control surface position of primary controls (pitch, roll, yaw) for which the application for type certification is submitted to a Contracting State on or after 1 January 2016 and which are required to be fitted with an FDR shall record those parameters at a maximum sampling and recording interval of 0.125 seconds.

Note. — For aeroplanes with control systems in which movement of a control surface will back drive the pilot's control, "or" applies. For aeroplanes with control systems in which movement of a control surface will not back drive the pilot's control, "and" applies. In aeroplanes with independent moveable surfaces, each surface needs to be recorded separately. In aeroplanes with independent pilot input on primary controls, each pilot input on primary controls needs to be recorded separately.

6.3.1.3 **Discontinuation**

6.3.1.3.1 The use of engraving metal foil FDRs shall be discontinued.

6.3.1.3.2 The use of analogue FDRs using frequency modulation (FM) shall be discontinued.

6.3.1.3.3 The use of photographic film FDRs shall be discontinued.

6.3.1.3.4 **Recommendation**. — *The use of magnetic tape FDRs should be discontinued.*

6.3.1.3.5 The use of magnetic tape FDRs shall be discontinued by 1 January 2016.

6.3.1.4 Duration

All FDRs shall be capable of retaining the information recorded during at least the last 25 hours of their operation, except for the Type IIA FDR which shall be capable of retaining the information recorded during at least the last 30 minutes of its operation.

6.3.2 Cockpit voice recorders and cockpit audio recording systems

6.3.2.1 Operation

6.3.2.1.1 All turbine-engined aeroplanes of a maximum certificated take-off mass of over 2 250 kg, up to and including 5 700 kg, for which the application for type certification is submitted to a Contracting State on or after 1 January 2016 and required to be operated by more than one pilot shall be equipped with either a CVR or a CARS.

6.3.2.1.2 **Recommendation.**— *All turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 2016 and required to be operated by more than one pilot should be equipped with either a CVR or a CARS.*

6.3.2.1.3 All aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2003 shall be equipped with a CVR capable of retaining the information recorded during at least the last two hours of its operation.

6.3.2.1.4 All aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the individual certificate of airworthiness is first issued on or after 1 January 1987 shall be equipped with a CVR.

6.3.2.1.5 All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987, with a maximum certificated take-off mass of over 27 000 kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 shall be equipped with a CVR.

6.3.2.1.6 **Recommendation.** — *All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987, with a maximum certificated take-off mass of over 5 700 kg up to and including 27 000 kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 should be equipped with a CVR.*

6.3.2.2 Discontinuation

6.3.2.2.1 The use of magnetic tape and wire CVRs shall be discontinued by 1 January 2016.

6.3.2.2.2 **Recommendation.** — *The use of magnetic tape and wire CVRs should be discontinued.*

6.3.2.3 Duration

6.3.2.3.1 All CVRs shall be capable of retaining the information recorded during at least the last 30 minutes of their operation.

6.3.2.3.2 From 1 January 2016, all CVRs shall be capable of retaining the information recorded during at least the last two hours of their operation.

6.3.2.3.3 **Recommendation**.— *All aeroplanes, for which the individual certificate of airworthiness is first issued on or after 1 January 1990, and that are required to be equipped with a CVR, should have a CVR capable of retaining the information recorded during at least the last two hours of their operation.*

6.3.2.3.4 All aeroplanes of a maximum certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2021 shall be equipped with a CVR capable of retaining the information recorded during at least the last twenty-five hours of its operation.

6.3.2.4 Cockpit voice recorder alternate power

6.3.2.4.1 An alternate power source shall automatically engage and provide ten minutes, plus or minus one minute, of operation whenever aeroplane power to the recorder ceases, either by normal shutdown or by any other loss of power. The alternate power source shall power the CVR and its associated cockpit area microphone components. The CVR shall be located as close as practicable to the alternate power source.

Note 1. — "Alternate" means separate from the power source that normally provides power to the CVR. The use of aeroplane batteries or other power sources is acceptable provided that the requirements above are met and electrical power to essential and critical loads is not compromised.

Note 2. — When the CVR function is combined with other recording functions within the same unit, powering the other functions is allowed.

6.3.2.4.2 All aeroplanes of a maximum certificated take-off mass of over 27 000 kg for which the application for type certification is submitted to a Contracting State on or after 1 January 2018 shall be provided with an alternate power source, as defined in 6.3.2.4.1 that powers the forward CVR in the case of combination recorders.

6.3.2.4.3 **Recommendation.** — *All aeroplanes of a maximum certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2018 should be provided with an alternate power source, as defined in 6.3.2.4.1 that powers at least one CVR.*

6.3.3 Data link recorders

6.3.3.1 Applicability

6.3.3.1.1 All aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which utilize any of the data link communications applications listed in 6.1.2 of ICAO Annex 6 Part I, Appendix 8, which forms part of this IS, and are required to carry a CVR, shall record on a flight recorder the data link communications messages.

6.3.3.1.2 All aeroplanes which are modified on or after 1 January 2016 to install and utilize any of the data link communications applications listed in 6.1.2 of ICAO Annex 6 Part I, Appendix 8, which forms part of this IS and are required to carry a CVR shall record on a flight recorder the data link communications messages.

Note 1. — Data link communications are currently conducted by either ATN-based or FANS 1/A-equipped aircraft.

Note 2.— A Class B AIR could be a means for recording data link communications applications messages to and from the aeroplanes where it is not practical or is prohibitively expensive to record those data link communications applications messages on FDR or CVR.

6.3.3.2 Duration

The minimum recording duration shall be equal to the duration of the CVR.

6.3.3.3 Correlation

Data link recording shall be able to be correlated to the recorded cockpit audio.

6.3.4 Flight recorders — general

6.3.4.1 Construction and installation

Flight recorders shall be constructed, located and installed so as to provide maximum practical protection for the recordings in order that the recorded information may be preserved, recovered and transcribed. Flight recorders shall meet the prescribed crashworthiness and fire protection specifications.

6.3.4.2 Operation

6.3.4.2.1 Flight recorders shall not be switched off during flight time.

6.3.4.2.2 To preserve flight recorder records, flight recorders shall be deactivated upon completion of flight time following an accident or incident. The flight recorders shall not be reactivated before their disposition as determined in accordance with ICAO Annex 13.

Note 1. — The need for removal of the flight recorder records from the aircraft will be determined by the investigation authority in the State conducting the investigation with due regard to the seriousness of an occurrence and the circumstances, including the impact on the operation.

Note 2. — The operator's responsibilities regarding the retention of flight recorder records are contained in 11.6.

6.3.4.3 Continued serviceability

Operational checks and evaluations of recordings from the flight recorder systems shall be conducted to ensure the continued serviceability of the recorders.

Note. — Procedures for the inspections of the flight recorder systems are given in ICAO Annex 6 Part I, Appendix 8, which forms part of this IS.

6.3.4.4 Flight recorder electronic documentation

Recommendation. — The documentation requirement concerning FDR and ADRS parameters provided by operators to accident investigation authorities should be in electronic format and take account of industry specifications.

Note. — Industry specification for documentation concerning flight recorder parameters may be found in the ARINC 647A, Flight Recorder Electronic Documentation, or equivalent document.

6.3.4.5 Combination recorders

6.3.4.5.1 **Recommendation.**— *All aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the application for type certification is submitted to a Contracting State on or after 1 January 2016, and which are required to be equipped with both a CVR and an FDR, should be equipped with two combination recorders (FDR/CVR).*

6.3.4.5.2 All aeroplanes of a maximum certificated take-off mass of over 15 000 kg for which the application for type certification is submitted to a Contracting State on or after 1 January 2016, and which are required to be equipped with both a CVR and an FDR, shall be equipped with two combination recorders (FDR/CVR).
One recorder shall be located as close to the cockpit as practicable and the other recorder located as far aft as practicable.

6.3.4.5.3 **Recommendation.** — *All aeroplanes of a maximum certificated take-off mass over 5 700 kg, required to be equipped with an FDR and a CVR, may alternatively be equipped with two combination recorders (FDR/CVR).*

Note.— The requirement of 6.3.4.5 may be satisfied by equipping the aeroplanes with two combination recorders (one forward and one aft) or separate devices.

6.3.4.5.4 **Recommendation.** — *All multi-engined turbine-powered aeroplanes of a maximum certificated take-off mass of 5 700 kg or less, required to be equipped with an FDR and/or a CVR, may alternatively be equipped with one combination recorder (FDR/CVR).*

6.3.5 Flight recorder data recovery

6.3.5.1 All aeroplanes of a maximum certificated take-off mass of over 27 000 kg and authorized to carry more than nineteen passengers for which the application for type certification is submitted to a Contracting State on or after 1 January 2021, shall be equipped with a means approved by the DGCA, to recover flight recorder data and make it available in a timely manner.

6.3.5.2 In approving the means to make flight recorder data available in a timely manner, the DGCA shall take into account the following:

a) The capabilities of the operator;

b) Overall capability of the aeroplane and its systems as certified by the State of Design;

c) The reliability of the means to recover the appropriate CVR channels and appropriate FDR data; and

d) Specific mitigation measures.

Note. — Guidance on approving the means to make flight recorder data available in a timely manner is contained in the Manual on Location of Aircraft in Distress and Flight Recorder Data Recovery (Doc 10054).

6.4 ALL AEROPLANES OPERATED AS VFR FLIGHTS

6.4.1 All aeroplanes when operated as VFR flights shall be equipped with:

a) A magnetic compass;

b) An accurate timepiece indicating the time in hours, minutes and seconds;

c) a sensitive pressure altimeter;

d) An airspeed indicator; and

e) Such additional instruments or equipment as may be prescribed by the appropriate authority.

6.4.2 VFR flights which are operated as controlled flights shall be equipped in accordance with 6.9.

6.5 ALL AEROPLANES ON FLIGHTS OVER WATER

6.5.1 Seaplanes

All seaplanes for all flights shall be equipped with:

a) One life jacket, or equivalent individual flotation device, for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided;

b) Equipment for making the sound signals prescribed in the International Regulations for Preventing Collisions at Sea, where applicable; and

c) One sea anchor (drogue).

Note. — "Seaplanes" includes amphibians operated as seaplanes.

6.5.2 Landplanes

6.5.2.1 Landplanes shall carry the equipment prescribed in 6.5.2.2:

a) When flying over water and at a distance of more than 93 km (50 NM) away from the shore, in the case of landplanes operated in accordance with 5.2.9 or 5.2.10;

b) When flying en route over water beyond gliding distance from the shore, in the case of all other landplanes; and

c) When taking off or landing at an aerodrome where, in the opinion of the DGCA, 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.

6.5.2.2 The equipment referred to in 6.5.2.1 shall comprise one life jacket or equivalent individual flotation device for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided.

Note. — "Landplanes" includes amphibians operated as landplanes.

6.5.3 All aeroplanes on long-range over-water flights

6.5.3.1 In addition to the equipment prescribed in 6.5.1 or 6.5.2 whichever is applicable, the following equipment shall be installed in all aeroplanes when used over routes on which the aeroplane may be over water and at more than a distance corresponding to 120 minutes at cruising speed or 740 km (400 NM), whichever is the lesser, away from land suitable for making an emergency landing in the case of aircraft operated in accordance with 5.2.9 or 5.2.10, and 30 minutes or 185 km (100 NM), whichever is the lesser, for all other aeroplanes:

a) Life-saving rafts in sufficient numbers to carry all persons on board, stowed so as to facilitate their ready use in emergency, provided with such life-saving equipment including means of sustaining life as is appropriate to the flight to be undertaken;

b) Equipment for making the pyrotechnical distress signals described in ICAO Annex 2; and

c) At the earliest practicable date, but not later than 1 January 2018, on all aeroplanes of a maximum certificated take- off mass of over 27 000 kg, a securely attached underwater locating device operating at a frequency of 8.8 kHz. This automatically activated underwater locating device shall operate for a minimum of 30 days and shall not be installed in wings or empennage.

Note.— Underwater locator beacon (ULB) performance requirements are as contained in the SAE AS6254, Minimum Performance Standard for Low Frequency Underwater Locating Devices (Acoustic) (Self-Powered), or equivalent documents.

6.5.3.2 Each life jacket and equivalent individual flotation device, when carried in accordance with 6.5.1 a), 6.5.2.1 and 6.5.2.2, shall be equipped with a means of electric illumination for the purpose of facilitating the location of persons, except where the requirement of 6.5.2.1 c) is met by the provision of individual flotation devices other than life jackets.

6.6 ALL AEROPLANES ON FLIGHTS OVER DESIGNATED LAND AREAS

Aeroplanes, when operated across land areas which have been designated by the State concerned as areas in which search and rescue would be especially difficult, shall be equipped with such signaling devices and life-saving equipment (including means of sustaining life) as may be appropriate to the area overflown.

6.7 ALL AEROPLANES ON HIGH ALTITUDE FLIGHTS

Note. — Approximate altitude in the Standard Atmosphere corresponding to the value of absolute pressure used in this text is as follows:

Absolute pressure	Metres	Feet
700 hPa	3 000	10 000
620 hPa	4 000	13 000
376 hPa	7 600	25 000

6.7.1 An aeroplane intended to be operated at flight altitudes at which the atmospheric pressure is less than 700 hPa in personnel compartments shall be equipped with oxygen storage and dispensing apparatus capable of storing and dispensing the oxygen supplies required in 4.3.9.1.

6.7.2 An aeroplane intended to be operated at flight altitudes at which the atmospheric pressure is less than 700 hPa but which is provided with means of maintaining pressures greater than 700 hPa in personnel compartments shall be provided with oxygen storage and dispensing apparatus capable of storing and dispensing the oxygen supplies required in 4.3.9.2.

6.7.3 Pressurized aeroplanes newly introduced into service on or after 1 July 1962 and intended to be operated at flight altitudes at which the atmospheric pressure is less than 376 hPa shall be equipped with a device to provide positive warning to the flight crew of any dangerous loss of pressurization.

6.7.4 **Recommendation.** — *Pressurized aeroplanes introduced into service before 1 July 1962 and intended to be operated at flight altitudes at which the atmospheric pressure is less than 376 hPa should be equipped with a device to provide positive warning to the flight crew of any dangerous loss of pressurization.*

6.7.5 An aeroplane intended to be operated at flight altitudes at which the atmospheric pressure is less than 376 hPa, or which, if operated at flight altitudes at which the atmospheric pressure is more than 376 hPa, cannot descend safely within four minutes to a flight altitude at which the atmospheric pressure is equal to 620 hPa and for which the individual certificate of airworthiness is first issued on or after 9 November 1998, shall be provided with automatically deployable oxygen equipment to satisfy the requirements of 4.3.9.2. The total number of oxygen dispensing units shall exceed the number of passenger and cabin crew seats by at least 10 per cent.

6.7.6 **Recommendation**.— *An aeroplane intended to be operated at flight altitudes at which the atmospheric pressure is less than 376 hPa, or which, if operated at flight altitudes at which the atmospheric pressure is more than 376 hPa cannot descend safely within four minutes to a flight altitude at which the atmospheric pressure is equal to 620 hPa, and for which the individual certificate of airworthiness was first issued before 9 November 1998, should be provided with automatically deployable oxygen equipment to satisfy the requirements of 4.3.9.2. The total number of oxygen dispensing units should exceed the number of passenger and cabin crew seats by at least 10 per cent.*

6.8 ALL AEROPLANES IN ICING CONDITIONS

All aeroplanes shall be equipped with suitable de-icing and/or anti-icing devices when operated in circumstances in which icing conditions are reported to exist or are expected to be encountered.

6.9 ALL AEROPLANES OPERATED IN ACCORDANCE WITH INSTRUMENT FLIGHT RULES

6.9.1 All aeroplanes when operated in accordance with the instrument flight rules, or when the aeroplane cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with:

a) A magnetic compass;

b) An accurate timepiece indicating the time in hours, minutes and seconds;

c) Two sensitive pressure altimeters with counter drum-pointer or equivalent presentation;

Note. — Neither three-pointer nor drum-pointer altimeters satisfy the requirement in 6.9.1 c).

d) An airspeed indicating system with means of preventing malfunctioning due to either condensation or icing;

e) A turn and slip indicator;

f) An attitude indicator (artificial horizon);

g) A heading indicator (directional gyroscope);

Note. — The requirements of 6.9.1 e), f) and g) may be met by combinations of instruments or by integrated flight director systems provided that the safeguards against total failure, inherent in the three separate instruments, are retained.

h) A means of indicating whether the power supply to the gyroscopic instrument is adequate;

i) A means of indicating in the flight crew compartment the outside air temperature;

j) A rate-of-climb and descent indicator; and

k) Such additional instruments or equipment as may be prescribed by the appropriate authority.

6.9.2 All aeroplanes over 5 700 kg — Emergency power supply for electrically operated attitude indicating instruments

6.9.2.1 All aeroplanes of a maximum certificated take-off mass of over 5 700 kg newly introduced into service after 1 January 1975 shall be fitted with an emergency power supply, independent of the main electrical generating system, for the purpose of operating and illuminating, for a minimum period of 30 minutes, an attitude indicating instrument (artificial horizon), clearly visible to the pilot-in-command.
The emergency power supply shall be automatically operative after the total failure of the main electrical generating system and clear indication shall be given on the instrument panel that the attitude indicator(s) is being operated by emergency power.

6.9.2.2 Those instruments that are used by any one pilot shall be so arranged as to permit the pilot to see their indications readily from his or her station, with the minimum practicable

deviation from the position and line of vision normally assumed when looking forward along the flight path.

6.10 ALL AEROPLANES WHEN OPERATED AT NIGHT

All aeroplanes when operated at night shall be equipped with:

a) All equipment specified in 6.9;

b) The lights required by ICAO Annex 2 for aircraft in flight or operating on the movement area of an aerodrome;

Note. — Specifications for lights meeting the requirements of ICAO Annex 2 for navigation lights are contained in ICAO Annex 6 Part I, Appendix 1, which forms part of this IS. The general characteristics of lights are specified in ICAO Annex 8.

c) Two landing lights;

Note.— Aeroplanes not certificated in accordance with ICAO Annex 8 which are equipped with a single landing light having two separately energized filaments will be considered to have complied with 6.10 c).

d) Illumination for all instruments and equipment that are essential for the safe operation of the aeroplane that are used by the flight crew;

e) Lights in all passenger compartments; and

f) An independent portable light for each crew member station.

6.11 PRESSURIZED AEROPLANES WHEN CARRYING PASSENGERS — WEATHER RADAR

Recommendation. — *Pressurized aeroplanes when carrying passengers should be equipped with operative weather radar whenever such aeroplanes are being operated 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 either at night or under instrument meteorological conditions.*

6.12 ALL AEROPLANES OPERATED ABOVE 15 000 M (49 000 FT) — RADIATION INDICATOR

All aeroplanes intended to be operated above 15 000 m (49 000 ft) shall carry equipment 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. The display unit of the equipment shall be readily visible to a flight crew member.

Note. — The equipment is calibrated on the basis of assumptions acceptable to the appropriate national authorities.

6.13 ALL AEROPLANES COMPLYING WITH THE NOISE CERTIFICATION STANDARDS IN ICAO ANNEX 16, VOLUME I

An aeroplane shall carry a document attesting noise certification. When the document, or a suitable statement attesting noise certification as contained in another document approved by the State of Registry, is issued in a language other than English, it shall include an English translation.

Note. — The attestation may be contained in any document, carried on board, approved by the State of Registry.

6.14 MACH NUMBER INDICATOR

All aeroplanes with speed limitations expressed in terms of Mach number shall be equipped with a Mach number indicator.

Note. — This does not preclude the use of the airspeed indicator to derive Mach number for ATS purposes.

6.15 AEROPLANES REQUIRED TO BE EQUIPPED WITH GROUND PROXIMITY WARNING SYSTEMS (GPWS)

6.15.1 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system.

6.15.2 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 15 000 kg or authorized to carry more than 30 passengers shall be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.

6.15.3 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers, for which the individual certificate of airworthiness is first issued on or after 1 January 2004, shall be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.

6.15.4 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system which has a forward-looking terrain avoidance function.

6.15.5 **Recommendation**.— *All turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less and authorized to carry more than five but not more than nine passengers should be equipped with a ground proximity warning system which provides the warnings of 6.15.8 a) and c), warning of unsafe terrain clearance and a forward looking terrain avoidance function.*

6.15.6 All piston-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system which provides the warnings in 6.15.8 a) and c), warning of unsafe terrain clearance and a forward-looking terrain avoidance function.

6.15.7 A ground proximity warning system shall provide automatically a timely and distinctive warning to the flight crew when the aeroplane is in potentially hazardous proximity to the earth's surface.

6.15.8 A ground proximity warning system shall provide, unless otherwise specified herein, warnings of the following circumstances:

a) Excessive descent rate;

b) Excessive terrain closure rate;

c) Excessive altitude loss after take-off or go-around;

d) Unsafe terrain clearance while not in landing configuration:

1) Gear not locked down;

2) Flaps not in a landing position; and

e) Excessive descent below the instrument glide path.

6.16 AEROPLANES CARRYING PASSENGERS — CABIN CREW SEATS

6.16.1 Aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 1981

All aeroplanes shall be equipped with a forward or rearward facing (within 15 degrees of the longitudinal axis of the aeroplane) seat, fitted with a safety harness for the use of each cabin crew member required to satisfy the intent of 12.1 in respect of emergency evacuation.

6.16.2 Aeroplanes for which the individual certificate of airworthiness was first issued before 1 January 1981

Recommendation.— *All aeroplanes should be equipped with a forward or rearward facing (within 15 degrees of the longitudinal axis of the aeroplane) seat, fitted with a safety harness for the use of each cabin crew member required to satisfy the intent of 12.1 in respect of emergency evacuation.*

Note. — Safety harness includes shoulder straps and a seat belt which may be used independently.

6.16.3 Cabin crew seats provided in accordance with 6.16.1 and 6.16.2 shall be located near floor level and other emergency exits as required by the DGCA for emergency evacuation.

6.17 EMERGENCY LOCATOR TRANSMITTER (ELT)

6.17.1 **Recommendation.** — All aeroplanes should carry an automatic ELT.

6.17.2 Except as provided for in 6.17.3, all aeroplanes authorized to carry more than 19 passengers shall be equipped with at least one automatic ELT or two ELTs of any type.

6.17.3 All aeroplanes authorized to carry more than 19 passengers for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with either:

a) At least two ELTs, one of which shall be automatic; or

b) At least one ELT and a capability that meets the requirements of 6.18.

Note. — In the case where the requirements for 6.18 are met by another system no automatic ELT is required.

6.17.4 Except as provided for in 6.17.5, all aeroplanes authorized to carry 19 passengers or less shall be equipped with at least one ELT of any type.

6.17.5 All aeroplanes authorized to carry 19 passengers or less for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with at least one automatic ELT.

6.17.6 ELT equipment carried to satisfy the requirements of 6.17.1, 6.17.2, 6.17.3, 6.17.4 and 6.17.5 shall operate in accordance with the relevant provisions of ICAO Annex 10, Volume III.

Note. — The judicious choice of numbers of ELTs, their type and placement on aircraft and associated floatable life support systems will ensure the greatest chance of ELT activation in the event of an accident for aircraft operating over water or land, including areas especially difficult for search and rescue. Placement of transmitter units is a vital factor in ensuring optimal crash and fire protection. The placement of the control and switching devices (activation monitors) of automatic fixed ELTs and their associated operational procedures will also take into consideration the need for rapid detection of inadvertent activation and convenient manual switching by crew members.

6.18 LOCATION OF AN AEROPLANE IN DISTRESS

6.18.1 All aeroplanes of a maximum certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2021, shall autonomously transmit information from which a position can be determined by the operator at least once every minute, when in distress, in accordance with ICAO Annex 6 Part I, Appendix 9, which forms part of this IS.

6.18.2 **Recommendation.**— *All aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2021, should autonomously transmit information from which a position can be determined at least once every minute, when in distress, in accordance with ICAO Annex 6 Part I, Appendix 9.*

6.18.3 The operator shall make position information of a flight in distress available to the appropriate organizations, as established by the DGCA.

Note. — Refer to 4.2.1.3.1 for operator responsibilities when using third parties.

6.19 AEROPLANES REQUIRED TO BE EQUIPPED WITH AN AIRBORNE COLLISION AVOIDANCE SYSTEM (ACAS II)

6.19.1 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than 19 passengers shall be equipped with an airborne collision avoidance system (ACAS II).

6.19.2 **Recommendation.** — *All aeroplanes should be equipped with an airborne collision avoidance system (ACAS II).*

6.19.3 An airborne collision avoidance system shall operate in accordance with the relevant provisions of ICAO Annex 10, Volume IV.

6.20 REQUIREMENTS FOR PRESSURE-ALTITUDE REPORTING TRANSPONDERS

6.20.1 All aeroplanes shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of ICAO Annex 10, Volume IV.

6.20.2 All aeroplanes for which the individual certificate of airworthiness is first issued after 1 January 2009 shall be equipped with a data source that provides pressure-altitude information with a resolution of 7.62 m (25 ft.), or better.

6.20.3 All aeroplanes shall be equipped with a data source that provides pressure-altitude information with a resolution of 7.62 m (25 ft.), or better.

6.20.4 **Recommendation.** — *The Mode S transponder should be provided with the airborne/on-the-ground status if the aeroplane is equipped with an automatic means of detecting such status.*

Note 1. — These provisions will improve the effectiveness of airborne collision avoidance systems as well as air traffic services that employ Mode S radar. In particular, tracking processes are significantly enhanced with a resolution of 7.62 m (25 ft), or better.
Note 2.— Mode C replies of transponders always report pressure altitude in 30.50 m (100 ft) increments irrespective of the resolution of the data source.

6.21 MICROPHONES

All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones below the transition level/altitude.

6.22 TURBO-JET AEROPLANES — FORWARD-LOOKING WIND SHEAR WARNING SYSTEM

6.22.1 **Recommendation.**— *All turbo-jet aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers should be equipped with a forward-looking wind shear warning system.*

6.22.2 **Recommendation.** — *A forward-looking wind shear warning system should be capable of providing the pilot with a timely aural and visual warning of wind shear ahead of the aircraft, and the information required to permit the pilot to safely commence and continue a missed approach or go-around or to execute an escape maneuver if necessary. The system should also provide an indication to the pilot when the limits specified for the certification of automatic landing equipment are being approached, when such equipment is in use.*

6.23 ALL AEROPLANES OPERATED BY A SINGLE PILOT UNDER THE INSTRUMENT FLIGHT RULES (IFR) OR AT NIGHT

For approval in accordance with 4.9.1, all aeroplanes operated by a single pilot under the IFR or at night shall be equipped with:

a) A serviceable autopilot that has at least altitude hold and heading select modes;

b) A headset with a boom microphone or equivalent; and

c) Means of displaying charts that enables them to be readable in all ambient light conditions.

6.24 AEROPLANES EQUIPPED WITH AUTOMATIC LANDING SYSTEMS, A HEAD-UP DISPLAY (HUD) OR EQUIVALENT DISPLAYS, ENHANCED VISION SYSTEMS (EVS), SYNTHETIC VISION SYSTEMS (SVS) AND/OR COMBINED VISION SYSTEMS (CVS)

6.24.1 Where aeroplanes are equipped with automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, or any combination of those systems into a hybrid system, the use of such systems for the safe operation of an aeroplane shall be approved by the DGCA.

Note. — Information regarding a HUD or equivalent displays, including references to RTCA and EUROCAE documents, is contained in the Manual of All-Weather Operations (Doc 9365).

6.24.2 In approving the operational use of automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, the DGCA shall ensure that:

a) The equipment meets the appropriate airworthiness certification requirements;
b) The operator has carried out a safety risk assessment of the operations supported by the automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS;
c) The operator has established and documented the procedures for the use of, and training requirements for, automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS.

Note 1. — Guidance on safety risk assessments is contained in the Safety Management Manual (SMM) (Doc 9859).
Note 2. — Guidance on operational approvals is contained in ICAO Annex 6 Part I, Attachment H, which forms part of this IS

6.25 ELECTRONIC FLIGHT BAGS (EFBS)

Note. — Guidance on EFB equipment, functions and operational approval is contained in the Manual on Electronic Flight Bags (EFBs) (Doc 10020).

6.25.1 EFB equipment

Where portable EFBs are used on board an aeroplane, the operator shall ensure that they do not affect the performance of the aeroplane systems, equipment or the ability to operate the aeroplane.

6.25.2 EFB functions

6.25.2.1 Where EFBs are used on board an aeroplane the operator shall:

a) Assess the safety risk(s) associated with each EFB function;
b) Establish and document the procedures for the use of, and training requirements for, the device and each EFB function; and
c) Ensure that, in the event of an EFB failure, sufficient information is readily available to the flight crew for the flight to be conducted safely.

Note. — Guidance on safety risk assessments is contained in the Safety Management Manual (SMM) (Doc 9859).

6.25.2.2 The DGCA shall approve the operational use of EFB functions to be used for the safe operation of aeroplanes.

6.25.3 EFB operational approval

In approving the use of EFBs, the DGCA shall ensure that:

a) The EFB equipment and its associated installation hardware, including interaction with aeroplane systems if applicable, meet the appropriate airworthiness certification requirements;

b) The operator has assessed the safety risks associated with the operations supported by the EFB function(s);

c) The operator has established requirements for redundancy of the information (if appropriate) contained in and displayed by the EFB function(s);

d) The operator has established and documented procedures for the management of the EFB function(s) including any database it may use; and

e) The operator has established and documented the procedures for the use of, and training requirements for, the EFB and the EFB function(s).

Note. — Guidance on safety risk assessments is contained in the Safety Management Manual (SMM) (Doc 9859).

CHAPTER 7. AEROPLANE COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT

7.1 COMMUNICATION EQUIPMENT

7.1.1 An aeroplane shall be provided with radio communication equipment capable of:

a) Conducting two-way communication for aerodrome control purposes;

b) Receiving meteorological information at any time during flight; and

c) Conducting two-way communication at any time during flight with at least one aeronautical station and with such other aeronautical stations and on such frequencies as may be prescribed by the appropriate authority.

Note. — The requirements of 7.1.1 are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.

7.1.2 The radio communication equipment required in accordance with 7.1.1 shall provide for communications on the aeronautical emergency frequency 121.5 MHz

7.1.3 For operations where communication equipment is required to meet an RCP specification for performance-based communication (PBC), an aeroplane shall, in addition to the requirements specified in 7.1.1:

a) Be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP specification(s);

b) Have information relevant to the aeroplane RCP specification capabilities listed in the flight manual or other aeroplane documentation approved by the State of Design or State of Registry; and

c) Have information relevant to the aeroplane RCP specification capabilities included in the MEL.

Note. — Information on the performance-based communication and surveillance (PBCS) concept and guidance material on its implementation are contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869).

7.1.4 The DGCA shall, for operations where an RCP specification for PBC has been prescribed, ensure that the operator has established and documented:

a) Normal and abnormal procedures, including contingency procedures;

b) Flight crew qualification and proficiency requirements, in accordance with appropriate RCP specifications;

c) A training programme for relevant personnel consistent with the intended operations; and

d) Appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RCP specifications.

7.1.5 The DGCA shall ensure that, in respect of those aeroplanes mentioned in 7.1.3, adequate provisions exist for:

a) Receiving the reports of observed communication performance issued by monitoring programmes established in accordance with ICAO Annex 11, Chapter 3, 3.3.5.2; and

b) Taking immediate corrective action for individual aircraft, aircraft types or operators, identified in such reports as not complying with the RCP specification(s).

7.2 NAVIGATION EQUIPMENT

7.2.1 An aeroplane shall be provided with navigation equipment which will enable it to proceed:

a) In accordance with its operational flight plan; and

b) In accordance with the requirements of air traffic services;

Except when, if not so precluded by the appropriate authority, navigation for flights under VFR is accomplished by visual reference to landmarks.

7.2.2 For operations where a navigation specification for performance-based navigation (PBN) has been prescribed, an aeroplane shall, in addition to the requirements specified in 7.2.1:

a) Be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specification(s);

b) have information relevant to the aeroplane navigation specification capabilities listed in the flight manual or other aeroplane documentation approved by the State of the Design or DGCA ; and

c) Have information relevant to the aeroplane navigation specification capabilities included in the MEL.

Note. — Guidance on aeroplane documentation is contained in the Performance-based Navigation (PBN) Manual (Doc 9613).

7.2.3 The DGCA shall, for operations where a navigation specification for PBN has been prescribed, ensure that the operator has established and documented:

a) Normal and abnormal procedures including contingency procedures;

b) Flight crew qualification and proficiency requirements in accordance with the appropriate navigation specifications;

c) A training programme for relevant personnel consistent with the intended operations; and

d) Appropriate maintenance procedures to ensure continued airworthiness in accordance with the appropriate navigation specifications.

Note 1.— Guidance on safety risks and mitigations for PBN operations, in accordance with ICAO Annex 19, are contained in the Performance-based Navigation (PBN) Operational Approval Manual (Doc 9997).

Note 2. — Electronic navigation data management is an integral part of normal and abnormal procedures.

7.2.4 The DGCA shall issue a specific approval for operations based on PBN authorization required (AR) navigation specifications.

Note. — Guidance on specific approvals for PBN authorization required (AR) navigation specifications is contained in the Performance-based Navigation (PBN) Operational Approval Manual (Doc 9997).

7.2.5 For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, minimum navigation performance specifications (MNPS) are prescribed, an aeroplane shall be provided with navigation equipment which:

a) Continuously provides indications to the flight crew of adherence to or departure from track to the required degree of accuracy at any point along that track; and

b) Has been authorized by the DGCA for the MNPS operations concerned.

Note. — The prescribed minimum navigation performance specifications and the procedures governing their application are published in the Regional Supplementary Procedures (Doc 7030).

7.2.6 For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, a reduced vertical separation minimum (RVSM) of 300 m (1 000 ft) is applied between FL 290 and FL 410 inclusive, an aeroplane:

a) Shall be provided with equipment which is capable of:

1) Indicating to the flight crew the flight level being flown;

2) Automatically maintaining a selected flight level;

3) Providing an alert to the flight crew when a deviation occurs from the selected flight level. The threshold for the alert shall not exceed ± 90 m (300 ft); and

4) Automatically reporting pressure-altitude;

b) Shall be authorized by the DGCA for operation in the airspace concerned; and

c) Shall demonstrate a vertical navigation performance in accordance with Appendix 4 of this IS.

7.2.7 Prior to granting the RVSM approval required in accordance with 7.2.6 b), the DGCA shall be satisfied that:

a) The vertical navigation performance capability of the aeroplane satisfies the requirements specified in Appendix 4 of this IS;

b) The operator has instituted appropriate procedures in respect of continued airworthiness (maintenance and repair) practices and programmes; and

c) The operator has instituted appropriate flight crew procedures for operations in RVSM airspace.

Note. — An RVSM approval is valid globally on the understanding that any operating procedures specific to a given region will be stated in the operations manual or appropriate crew guidance.

7.2.8 The DGCA, in consultation with the State of Registry if appropriate, shall ensure that, in respect of those aeroplanes mentioned in 7.2.6, adequate provisions exist for:

a) Receiving the reports of height-keeping performance issued by the monitoring agencies established in accordance with ICAO Annex 11, 3.3.5.1; and

b) Taking immediate corrective action for individual aircraft, or aircraft type groups, identified in such reports as not complying with the height-keeping requirements for operation in airspace where RVSM is applied.

7.2.9 The DGCA that has issued an RVSM approval to the operator shall establish a requirement which ensures that a minimum of two aeroplanes of each aircraft type grouping of the operator have their height-keeping performance monitored, at least once every two years or within intervals of 1 000 flight hours per aeroplane, whichever period is longer. If the operator aircraft type grouping consists of a single aeroplane, monitoring of that aeroplane shall be accomplished within the specified period.

Note. — Monitoring data from any regional monitoring programme established in accordance with ICAO Annex 11, 3.3.5.2, may be used to satisfy the requirement.

7.2.10 DGCA is responsible for airspace where RVSM has been implemented, or that have issued RVSM approvals to operators within their State, shall establish provisions and procedures which ensure that appropriate action will be taken in respect of aircraft and operators found to be operating in RVSM airspace without a valid RVSM approval.

Note 1. — These provisions and procedures need to address both the situation where the aircraft in question is operating without approval in the airspace of the State, and the situation where the operator for which the State has regulatory oversight responsibility is found to be operating without the required approval in the airspace of another State.

Note 2. — Guidance material relating to the approval for operation in RVSM airspace is contained in the Manual on a 300 m (1 000 ft.) Vertical Separation Minimum between FL 290 and FL 410 Inclusive (Doc 9574).

7.2.11 The aeroplane shall be sufficiently provided with navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment will enable the aeroplane to navigate in accordance with 7.2.1 and, where applicable, 7.2.2, 7.2.5 and 7.2.6.

Note.— Guidance material relating to aircraft equipment necessary for flight in airspace where RVSM is applied is contained in the Manual on a 300 m (1 000 ft.) Vertical Separation Minimum between FL 290 and FL 410 Inclusive (Doc 9574).

7.2.12 On flights in which it is intended to land in instrument meteorological conditions, an aeroplane shall be provided with radio equipment capable of receiving signals providing guidance to a point from which a visual landing can be effected. This equipment shall be capable of providing such guidance for each aerodrome at which it is intended to land in instrument meteorological conditions and for any designated alternate aerodromes.

7.3 SURVEILLANCE EQUIPMENT

7.3.1 An aeroplane shall be provided with surveillance equipment which will enable it to operate in accordance with the requirements of air traffic services.

7.3.2 For operations where surveillance equipment is required to meet an RSP specification for performance-based surveillance (PBS), an aeroplane shall, in addition to the requirements specified in 7.3.1:

a) Be provided with surveillance equipment which will enable it to operate in accordance with the prescribed RSP specification(s);

b) have information relevant to the aeroplane RSP specification capabilities listed in the flight manual or other aeroplane documentation approved by the State of Design or State of Registry; and

c) Have information relevant to the aeroplane RSP specification capabilities included in the MEL.

Note 1. — Information on surveillance equipment is contained in the Aeronautical Surveillance Manual (Doc 9924).

Note 2. — Information on RSP specifications for performance-based surveillance is contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869).

7.3.3 The DGCA shall, for operations where an RSP specification for PBS has been prescribed, ensure that the operator has established and documented:

a) Normal and abnormal procedures, including contingency procedures;

b) Flight crew qualification and proficiency requirements, in accordance with appropriate RSP specifications;

c) A training programme for relevant personnel consistent with the intended operations; and

d) Appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RSP specifications.

7.3.4 The DGCA shall ensure that, in respect of those aeroplanes mentioned in 7.3.2, adequate provisions exist for:

a) Receiving the reports of observed surveillance performance issued by monitoring programmes established in accordance with ICAO Annex 11, Chapter 3, 3.3.5.2; and

b) Taking immediate corrective action for individual aircraft, aircraft types or operators, identified in such reports as not complying with the RSP specification(s).

7.4 INSTALLATION

The equipment installation shall be such that the failure of any single unit required for communication, navigation or surveillance purposes or any combination thereof will not result in the failure of another unit required for communication, navigation or surveillance purposes.

7.5 ELECTRONIC NAVIGATION DATA MANAGEMENT

7.5.1 The operator shall not employ electronic navigation data products that have been processed for application in the air and on the ground unless the DGCA has approved the operator's procedures for ensuring that the process applied and the products delivered have met acceptable standards of integrity and that the products are compatible with the intended function of the existing equipment. The DGCA shall ensure that the operator continues to monitor both the process and products.

Note. — Guidance relating to the processes that data suppliers may follow is contained in RTCA DO-200A/EUROCAE ED-76 and RTCA DO-201A/EUROCAE ED-77.

7.5.2 The operator shall implement procedures that ensure the timely distribution and insertion of current and unaltered electronic navigation data to all necessary aircraft.

CHAPTER 8. AEROPLANE MAINTENANCE

Note 1. — Compliance by operators to this chapter shall be in accordance with IS Part M on Aeroplane Maintenance.

Note 2. — For the purpose of this chapter, "aeroplane" includes: engines, propellers, components, accessories, instruments, equipment and apparatus including emergency equipment.

Note 3. — Reference is made throughout this chapter to the requirements of the DGCA. When the State of the Operator is not the same as the State of Registry, it may be necessary to consider any additional requirements of the State of the Operator.

Note4. — Guidance on continuing airworthiness requirements is contained in the Airworthiness Manual (Doc 9760).

Note. — ICAO Annex 19 includes safety management provisions for approved maintenance organizations. Further guidance is contained in the Safety Management Manual (SMM) (Doc 9859).

CHAPTER 9. AEROPLANE FLIGHT CREW

9.1 COMPOSITION OF THE FLIGHT CREW

9.1.1 The number and composition of the flight crew shall not be less than that specified in the operations manual. The flight crews shall include flight crew members in addition to the minimum numbers specified in the flight manual or other documents associated with the certificate of airworthiness, when necessitated by considerations related to the type of aeroplane used, the type of operation involved and the duration of flight between points where flight crews are changed.

9.1.2 Radio operator

The flight crew shall include at least one member who holds a valid licence, issued or rendered valid by the DGCA, authorizing operation of the type of radio transmitting equipment to be used.

9.1.3 Flight engineer

When a separate flight engineer's station is incorporated in the design of an aeroplane, the flight crew shall include at least one flight engineer especially assigned to that station, unless the duties associated with that station can be satisfactorily performed by another flight crew member, holding a flight engineer licence, without interference with regular duties.

9.1.4 Flight navigator

The flight crew shall include at least one member who holds a flight navigator licence in all operations where, as determined by the DGCA, navigation necessary for the safe conduct of the flight cannot be adequately accomplished by the pilots from the pilot station.

9.2 FLIGHT CREW MEMBER EMERGENCY DUTIES

The operator shall, for each type of aeroplane, assign to all flight crew members the necessary functions they are to perform in an emergency or in a situation requiring emergency evacuation. Annual training in accomplishing these functions shall be contained in the operator's training programme and shall include instruction in the use of all emergency and life-saving equipment required to be carried, and drills in the emergency evacuation of the aeroplane.

9.3 FLIGHT CREW MEMBER TRAINING PROGRAMMES

9.3.1 The operator shall establish and maintain a ground and flight training programme, approved by the DGCA, which ensures that all flight crew members are adequately trained to perform their assigned duties. The training programme shall:

a) Include ground and flight training facilities and properly qualified instructors as determined by the DGCA; for guidance please refer to SLCAGD007 on Approval of Instructors

b) Consist of ground and flight training in the type(s) of aeroplane on which the flight crew member serves;

c) Include proper flight crew coordination and training in all types of emergency and abnormal situations or procedures caused by engine, airframe or systems malfunctions, fire or other abnormalities;

d) Include upset prevention and recovery training;

e) Include training in knowledge and skills related to visual and instrument flight procedures for the intended area of operation, charting, and human performance including threat and error management and in the transport of dangerous goods;

f) ensure that all flight crew members know the functions for which they are responsible and the relation of these functions to the functions of other crew members, particularly in regard to abnormal or emergency procedures; and

g) Be given on a recurrent basis, as determined by the DGCA and shall include an assessment of competence.

Note 1. — Paragraph 4.2.5 prohibits the in-flight simulation of emergency or abnormal situations when passengers or cargo are being carried.

Note 2. — Flight training may, to the extent deemed appropriate by the DGCA, be given in flight simulation training devices approved by the DGCA for that purpose.

Note 3. — The scope of the recurrent training required by 9.2 and 9.3 may be varied and need not be as extensive as the initial training given in a particular type of aeroplane.

Note 4.— The use of correspondence courses and written examinations as well as other means may, to the extent deemed feasible by the DGCA, be utilized in meeting the requirements for periodic ground training.

Note 5. — For more information on dangerous goods operational requirements, see Chapter 14.

Note 6. — Guidance material to design training programmes to develop knowledge and skills in human performance can be found in the Human Factors Training Manual (Doc 9683).

Note 7.— Information for pilots and flight operations personnel on flight procedure parameters and operational procedures is contained in PANS-OPS (Doc 8168), Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (Doc 8168), Volume II. Obstacle clearance criteria and procedures used in certain States may differ from PANS-OPS, and knowledge of these differences is important for safety reasons.

Note 8. — Guidance material to design flight crew training programmes can be found in the Manual of Evidence-based Training (Doc 9995).

Note 9.— Guidance material on the different means used to assess competence can be found in the Attachment to Chapter 2 of the Procedures for Air Navigation Services — Training (PANS-TRG, Doc 9868).

Note 10.— Procedures for upset prevention and recovery training in a flight simulation training device are contained in the Procedures for Air Navigation Services — Training (PANS-TRG, Doc 9868).

Note 11. — Guidance on upset prevention and recovery training in a flight simulation training device is contained in the Manual on Aeroplane Upset Prevention and Recovery Training (Doc 10011).

9.3.2 The requirement for recurrent flight training in a particular type of aeroplane shall be considered fulfilled by:

a) The use, to the extent deemed feasible by the DGCA, of flight simulation training devices approved by the DGCA for that purpose; or

b) The completion within the appropriate period of the proficiency check required by 9.4.4 in that type of aeroplane.

9.4 QUALIFICATIONS

Note. — See the Manual of Procedures for Establishment and Management of a State's Personnel Licensing System
(Doc 9379) for guidance of a general nature on cross-crew qualification, mixed-fleet flying and cross-credit.

9.4.1 Recent experience — pilot-in-command and co-pilot

9.4.1.1 The operator shall not assign a pilot-in-command or a co-pilot to operate at the flight controls of a type or variant of a type of aeroplane during take-off and landing unless that pilot has operated the flight controls during at least three take-offs and landings within the preceding 90 days on the same type of aeroplane or in a flight simulator approved for the purpose.

9.4.1.2 When a pilot-in-command or a co-pilot is flying several variants of the same type of aeroplane or different types of aeroplanes with similar characteristics in terms of operating procedures, systems and handling, the DGCA shall decide under which conditions the requirements of 9.4.1.1 for each variant or each type of aeroplane can be combined.

9.4.2 Recent experience — cruise relief pilot

9.4.2.1 The operator shall not assign a pilot to act in the capacity of cruise relief pilot in a type or variant of a type of aeroplane unless, within the preceding 90 days that pilot has either:

a) Operated as a pilot-in-command, co-pilot or cruise relief pilot on the same type of aeroplane; or

b) Carried out flying skill refresher training including normal, abnormal and emergency procedures specific to cruise flight on the same type of aeroplane or in a flight simulator approved for the purpose, and has practiced approach and landing procedures, where the

approach and landing procedure practice may be performed as the pilot who is not flying the aeroplane.

9.4.2.2 When a cruise relief pilot is flying several variants of the same type of aeroplane or different types of aeroplanes with similar characteristics in terms of operating procedures, systems and handling, the DGCA shall decide under which conditions the requirements of 9.4.2.1 for each variant or each type of aeroplane can be combined.

9.4.3 Pilot-in-command area, route and aerodrome qualification

9.4.3.1 The operator shall not utilize a pilot as pilot-in-command of an aeroplane on a route or route segment for which that pilot is not currently qualified until such pilot has complied with 9.4.3.2 and 9.4.3.3.

9.4.3.2 Each such pilot shall demonstrate to the operator an adequate knowledge of:

a) The route to be flown, and the aerodromes which are to be used. This shall include knowledge of:

1) The terrain and minimum safe altitudes;

2) The seasonal meteorological conditions;

3) The meteorological, communication and air traffic facilities, services and procedures;

4) The search and rescue procedures; and

5) The navigational facilities and procedures, including any long-range navigation procedures, associated with the route along which the flight is to take place; and

b) Procedures applicable to flight paths over heavily populated areas and areas of high air traffic density, obstructions, physical layout, lighting, approach aids and arrival, departure, holding and instrument approach procedures, and applicable operating minima.

Note.— That portion of the demonstration relating to arrival, departure, holding and instrument approach procedures may be accomplished in an appropriate training device which is adequate for this purpose.

9.4.3.3 A pilot-in-command shall have made an actual approach into each aerodrome of landing on the route, accompanied by a pilot who is qualified for the aerodrome, as a member of the flight crew or as an observer on the flight deck, unless:

a) The approach to the aerodrome is not over difficult terrain and the instrument approach procedures and aids available are similar to those with which the pilot is familiar, and a margin to be approved by the DGCA is added to the normal operating minima, or there is reasonable certainty that approach and landing can be made in visual meteorological conditions; or

b) The descent from the initial approach altitude can be made by day in visual meteorological conditions; or

c) The operator qualifies the pilot-in-command to land at the aerodrome concerned by means of an adequate pictorial presentation; or

d) The aerodrome concerned is adjacent to another aerodrome at which the pilot-in-command is currently qualified to land.

9.4.3.4 The operator shall maintain a record, sufficient to satisfy the DGCA of the qualification of the pilot and of the manner in which such qualification has been achieved.

9.4.3.5 The operator shall not continue to utilize a pilot as a pilot-in-command on a route or within an area specified by the operator and approved by the DGCA unless, within the preceding 12 months, that pilot has made at least one trip as a pilot member of the flight crew, or as a check pilot, or as an observer in the flight crew compartment:

a) Within that specified area; and

b) If appropriate, on any route where procedures associated with that route or with any aerodromes intended to be used for take-off or landing require the application of special skills or knowledge.

9.4.3.6 In the event that more than 12 months elapse in which a pilot-in-command has not made such a trip on a route in close proximity and over similar terrain, within such a specified area, route or aerodrome, and has not practiced such procedures in a training device which is adequate for this purpose, prior to again serving as a pilot-in-command within that area or on that route, that pilot must requalify in accordance with 9.4.3.2 and 9.4.3.3.

9.4.4 Pilot proficiency checks

9.4.4.1 The operator shall ensure that piloting technique and the ability to execute emergency procedures is checked in such a way as to demonstrate the pilot's competence on each type or variant of a type of aeroplane. Where the operation may be conducted under instrument flight rules, the operator shall ensure that the pilot's competence to comply with such rules is demonstrated to either a check pilot of the operator or to a representative of the DGCA of the Operator. Such checks shall be performed twice within any period of one year. Any two such checks which are similar and which occur within a period of four consecutive months shall not alone satisfy this requirement.

Note 1. — Flight simulation training devices approved by the DGCA may be used for those parts of the checks for which they are specifically approved.

Note 2. — See the Manual of Criteria for the Qualification of Flight Simulation Training Devices (Doc 9625).

9.4.4.2 When the operator schedules flight crew on several variants of the same type of aeroplane or different types of aeroplanes with similar characteristics in terms of operating procedures, systems and handling, the DGCA shall decide under which conditions the requirements of 9.4.4.1 for each variant or each type of aeroplane can be combined.

9.4.5 Single pilot operations under the instrument flight rules (IFR) or at night

9.4.5.1 The DGCA shall prescribe requirements of experience, recency and training applicable to single pilot operations intended to be carried out under the IFR or at night.

9.4.5.2 **Recommendation.** — *The pilot-in-command should:*

a) *For operations under the IFR or at night, have accumulated at least 50 hours flight time on the class of aeroplane, of which at least 10 hours shall be as pilot-in-command;*

b) For operations under the IFR, have accumulated at least 25 hours flight time under the IFR on the class of aeroplane, which may form part of the 50 hours flight time in sub-paragraph a);

c) For operations at night, have accumulated at least 15 hours flight time at night, which may form part of the 50 hours flight time in sub-paragraph a);

d) For operations under the IFR, have acquired recent experience as a pilot engaged in a single pilot operation under the IFR of:

1) At least five IFR flights, including three instrument approaches carried out during the preceding 90 days on the class of aeroplane in the single pilot role; or

2) An IFR instrument approach check carried out on such an aeroplane during the preceding 90 days;

e) For operations at night, have made at least three take-offs and landings at night on the class of aeroplane in the single pilot role in the preceding 90 days; and

f) Have successfully completed training programmes that include, in addition to the requirements of 9.3, passenger briefing with respect to emergency evacuation, autopilot management, and the use of simplified in-flight documentation.

9.4.5.3 The initial and recurrent flight training and proficiency checks indicated in 9.3.1 and 9.4.4 shall be performed by the pilot-in-command in the single pilot role on the class of aeroplane in an environment representative of the operation.

9.5 FLIGHT CREW EQUIPMENT

A flight crew member assessed as fit to exercise the privileges of a licence, subject to the use of suitable correcting lenses, shall have a spare set of the correcting lenses readily available when exercising those privileges.

CHAPTER 10. FLIGHT OPERATIONS OFFICER/ FLIGHT DISPATCHER

10.1 When the DGCA requires that a flight operations officer/flight dispatcher, employed in conjunction with an approved method of control and supervision of flight operations, be licensed, that flight operations officer/flight dispatcher shall be licensed in accordance with the provisions of ICAO Annex 1,

10.2 In accepting proof of qualifications other than the option of holding of a flight operations officer/flight dispatcher licence, the DGCA, in accordance with the approved method of control and supervision of flight operations, shall require that, as a minimum, such persons meet the requirements specified in ICAO Annex 1 for the flight operations officer/flight dispatcher licence,

10.3 A flight operations officer/flight dispatcher shall not be assigned to duty unless that person has:

a) Satisfactorily completed the operator-specific training course that addresses all the specific components of its approved method of control and supervision of flight operations specified in ICAO Annex 4, 4.2.1.3;

Note. — Guidance on the composition of such training syllabi is provided in the Training Manual (Doc 7192), Part D-3 — Flight Operations Officers/Flight Dispatchers.

b) Made, within the preceding 12 months, at least a one-way qualification flight in the flight crew compartment of an aeroplane over any area for which that individual is authorized to exercise flight supervision. The flight should include landings at as many aerodromes as practicable;

Note. — For the purpose of the qualification flight, the flight operations officer/flight dispatcher must be able to monitor the flight crew intercommunication system and radio communications, and be able to observe the actions of the flight crew.

c) Demonstrated to the operator a knowledge of:

1) The contents of the operations manual described in Appendix 2 of this IS;
2) The radio equipment in the aeroplanes used; and
3) The navigation equipment in the aeroplanes used;

d) Demonstrated to the operator a knowledge of the following details concerning operations for which the officer is responsible and areas in which that individual is authorized to exercise flight supervision:

1) The seasonal meteorological conditions and the sources of meteorological information;
2) The effects of meteorological conditions on radio reception in the aeroplanes used;
3) The peculiarities and limitations of each navigation system which is used by the operation; and
4) The aeroplane loading instructions;

e) Demonstrated to the operator knowledge and skills related to human performance relevant to dispatch duties; and

f) Demonstrated to the operator the ability to perform the duties specified in SLCAIS 13

10.4 **Recommendation.** — *A flight operations officer/flight dispatcher assigned to duty should maintain complete familiarization with all features of the operation which are pertinent to such duties, including knowledge and skills related to human performance. In order to achieve that, flight operations officers or flight dispatcher shall undergo a recurrent training once every three years and the recurrent training programme shall be prepared and approved in accordance with SLCAP 3100. Guidance to design training programmes to develop knowledge and skills*

Note. — Guidance material to design training programmes to develop knowledge and skills in human performance can be found in the Human Factors Training Manual (Doc 9683).

10.5 **Recommendation.**— *A flight operations officer/flight dispatcher should not be assigned to duty after 12 consecutive months of absence from such duty, unless the provisions of 10.3 are met.*

CHAPTER 11. MANUALS, LOGS AND RECORDS

Note. — The following additional manuals, logs and records are associated with this ICAO Annex but are not included in this chapter:

Fuel and oil records — see 6-(I)-All, 4.2.10
Maintenance records — see ASN 85 and IS Part M
Flight time records — see 6-(I)-All, 4.10.8
Flight preparation forms — see 6-(I)-All, 4.3
Operational flight plan — see 6-(I)-All, 4.3.3.1
Pilot-in-command route and airport qualification records — see 6-(I)-All, 9.4.3.4.

11.1 FLIGHT MANUAL

Note. — The flight manual contains the information specified in ICAO Annex 8, ASN 85 and IS Part M

The flight manual shall be updated by implementing changes made mandatory by the DGCA

11.2 OPERATOR'S MAINTENANCE ORGANISATION MANUAL or CONTINUING AIRWORTHINESS MANAGEMENT EXPOSITION (CAME)

The operator's maintenance organization manual or CAME, as applicable, provided in accordance with IS Part M which may be issued in separate parts, shall contain the following information:

a) A description of the procedures required by IS Part M including, when applicable:

   1) A description of the administrative arrangements between the operator and the approved maintenance organization;

   2) A description of the maintenance procedures and the procedures for completing and signing a maintenance release when maintenance is based on a system other than that of an approved maintenance organization.

b) Names and duties of the person or persons required by IS Part M

c) A reference to the maintenance programme required by and IS Part M

d) A description of the methods used for the completion and retention of the operator's maintenance records required by IS Part M

e) a description of the procedures for monitoring, assessing and reporting maintenance and operational experience required by IS Part M

f) a description of the procedures for complying with the service information reporting requirements of ICAO Annex 8, Part II, 4.2.3 f) and 4.2.4;

g) A description of procedures for assessing continuing airworthiness information and implementing any resulting actions, as required by IS Part M on Aeroplane Maintenance.

h) A description of the procedures for implementing action resulting from mandatory continuing airworthiness information;

i) A description of establishing and maintaining a system of analysis and continued monitoring of the performance and efficiency of the maintenance programme, in order to correct any deficiency in that programme;

j) A description of aircraft types and models to which the manual applies;

k) A description of procedures for ensuring that unserviceabilities affecting airworthiness are recorded and rectified; and

l) A description of the procedures for advising the DGCA of significant in-service occurrences.

11.3 MAINTENANCE PROGRAMME

11.3.1 A maintenance programme for each aeroplane as required by IS Part M shall contain the following information:

a) Maintenance tasks and the intervals at which these are to be performed, taking into account the anticipated utilization of the aeroplane;
b) When applicable, a continuing structural integrity programme;
c) Procedures for changing or deviating from a) and b) above; and
d) When applicable, condition monitoring and reliability programme descriptions for aircraft systems, components and engines.

11.3.2 Maintenance tasks and intervals that have been specified as mandatory in approval of the type design shall be identified as such.

11.3.3 **Recommendation.** — *The maintenance programme should be based on maintenance programme information made available by the State of Design or by the organization responsible for the type design, and any additional applicable experience.*

11.4 JOURNEY LOG BOOK

11.4.1 Recommendation. — The aeroplane journey log book should contain the following items and the corresponding roman numerals:

I — Aeroplane nationality and registration.
II — Date.
III — Names of crew members.
IV — Duty assignments of crew members.
V — Place of departure.
VI — Place of arrival.
VII — Time of departure.
VIII — Time of arrival.
IX — Hours of flight.
X — Nature of flight (private, aerial work, scheduled or non-scheduled).
XI — Incidents, observations, if any.

XII — Signature of person in charge.

11.4.2 **Recommendation**. — *Entries in the journey log book should be made currently and in ink or indelible pencil.*

11.4.3 **Recommendation.** — *Completed journey log book should be retained to provide a continuous record of the last six months' operations.*

11.5 RECORDS OF EMERGENCY AND SURVIVAL EQUIPMENT CARRIED

Operators shall at all times have available for immediate communication to rescue coordination centres, lists containing information on the emergency and survival equipment carried on board any of their aeroplanes engaged in international air navigation. The information shall include, as applicable, the number, color and type of life rafts and pyrotechnics, details of emergency medical supplies, water supplies and the type and frequencies of the emergency portable radio equipment.

11.6 FLIGHT RECORDER RECORDS

The operator shall ensure, to the extent possible, in the event the aeroplane becomes involved in an accident or incident, the preservation of all related flight recorder records and, if necessary, the associated flight recorders, and their retention in safe custody pending their disposition as determined in accordance with ICAO Annex 13.

APPENDIX to Chapter 11

Documents, equipment, number and description of the operating crew

1. Documents to be carried on Sri Lankan registered aircraft

No operator shall operate an aircraft registered in Sri Lanka within or outside the territory of Sri Lanka, unless the aircraft carries on board the following documents which are current.

a. Certificate of Registration
b. Certificate of Airworthiness
c. Duly certified copy of Lease Agreement in respect of Lease aircraft
d. Certificate of Insurance
e. Airplane Flight Manual (AFM)
f. Copy of the AOC & Ops Specs, Certified true by the DGCA
g. Minimum Equipment List (MEL) & Configuration Deviation List (CDL)
h. Weight & Balance Manual
i. Flight Operations Manual (FOM)
j. Journey Logbook
k. Technical Log
I. Radio Licence
m. Noise Certificate
n. DG Emergency Response Guide

2. Minimum Equipment to be carried in Sri Lanka registered aircraft

No operator shall operate an aircraft registered in Sri Lanka within or outside the territory of Sri Lanka unless the aircraft carries minimum equipment as listed in the Minimum Equipment List prepared in association with the Master Minimum

Equipment List and approved by the Director General of Civil Aviation subject to such terms and conditions as may be specified by him.

3. Minimum crew to be on Sri Lanka registered aircraft

No operator shall operate an aircraft registered in Sri Lanka within or outside the territory of Sri Lanka, unless the aircraft carries minimum crew as specified below.

a. Flight Crew

i. The composition of the flight crew and the number of flight crew members at designated crew stations are both in compliance with, and not be less than the minimum specified in, the Aeroplane Flight Manual (AFM);

ii. 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 Operator's Operations Manual approved by the Authority;

iii. Each flight crew member holds an applicable and valid license acceptable to the Authority and is suitable qualified and experienced, and competent to conduct the duties assigned to them and meets recency requirements;

iv. Procedures are established, acceptable to the Authority, to prevent the crewing together of inexperienced flight crew member;

v. One pilot amongst the flight crew, qualified as a pilot-in-command in accordance with licensing requirements specified by the Authority, is designated as the commander who may delegate the conduct of the flight to another suitably qualified pilot; and

vi. 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.

vii. When a dedicated Navigator is required by the AFM, the flight crew shall include one crewmember who holds a Navigator Licence.

viii. When a dedicated Radio Operator is required by the AFM, the flight crew shall include one crewmember who holds a Radio Operator Licence.

b. Cabin Crew

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.

When complying with the sub paragraph above the operator shall for each type of aircraft that it operates, comply with the following;

i. From 20 up to 50 passenger seats on board 01 minimum required cabin crewmember

ii. From 51 up to 100 passenger seats on board 02 minimum required cabin crewmembers.

iii. If more than 100 passenger seats 01 minimum required cabin crewmember for each floor level exit and

iv. In all aircraft with an upper deck 01 minimum required cabin crewmember for each exit in the upper deck cabin, unless otherwise specified by the DGCA.

The required number of cabin crew members shall be carried in order to effect a safe and expeditious evacuation of the aircraft and the necessary functions to be performed in an emergency or a situation requiring emergency evacuation. The operator shall assign these functions for each type of aircraft.

v. The DGCA may under exceptional circumstances require an operator to include in the crew, additional Cabin Crewmembers in the interest of safety of passengers.

vi. In unforeseen circumstances the required minimum number of cabin crewmember may be reduced provided that:

a. The number of passengers has been reduced in accordance with procedures specified in the Operations Manual; and

b. A report is submitted to the Authority after completion of the flight.

CHAPTER 12 Cabin Crew Members

12.1 Applicability

A. AOC holders employing Cabin Crewmembers.

B. Such operator shall ensure that all Cabin Crewmembers comply with the requirements of this Implementing Standard and any other safety requirements applicable to cabin crew published by the DGCA from time to time.

12.2. Definition

A. Cabin Crewmember means any crewmember, 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 pilot-in-command of the aircraft.

12.3 Identification

A. An operator shall ensure that all Cabin Crewmembers wear the operator's cabin crewmember uniform and are clearly identifiable to the passengers as a Cabin Crew Member.

B. Other personnel, such as

a) Interpreters,
b) Child minders,
c) Security staff,
d) Escorts,

Who undertake tasks in the cabin, shall not wear a similar uniform which might identify them to passengers as a Cabin Crewmember, unless they are in possession of a Cabin Crewmember certificate issued by the DGCA and any other applicable requirements of this Implementing Standard.

12.4 Minimum Requirements for the Issuance of a Cabin Crewmember Certificate

An operator shall ensure that each Cabin Crewmember:

A. Is at least 18 years of age.

B. Has passed a medical examination or assessment at regular intervals as specified by the Authority so as to check the medical fitness to discharge his/her duties.

C. The ability & the height to retrieve safety and emergency equipment and open and close overhead bins on the aircraft, from a standing position

D. Is competent to perform his/her duties in accordance with procedures specified in the Operations Manual and/or in Safety & Emergency Procedures manual.

E. Is able to understand, read, write & converse in English language, due to the nature of the job which entails effective communication with Flight & Cabin crew & international communities.

F. Has successfully completed initial training in accordance with SLCAP 4305 and holds a valid Cabin Crewmember certificate issued by the as specified below.

G. Shall undergo recurrent training in accordance with SLCAP 4305.

12.5 Training

12.5.1 An operator shall establish and maintain an approved training programme as specified in "Cabin Crewmember Training Standard" SLCAP 4305 issued by the DGCA. The training programme shall ensure that cabin crewmembers are competent to execute those safety duties and functions which the cabin crewmembers is assigned and be aware of other crewmembers assignments and functions in the event of an emergency so far as is necessary for the fulfillment of the cabin crewmember's own duties to perform in the event of an emergency or in a situation requiring emergency evacuation.

12.5.2 An operator shall comply with the requirements as specified in ICAO Doc 10002, when submitting cabin safety training programme for DGCA approval.

12.5.3 An operator shall ensure that each cabin crewmember successfully completes initial training before being assigned as a Cabin Crewmember and completes a recurrent training programme annually as specified in SLCAP 4305.

A. All operators shall have an approved training manual in compliance to SLCAP 4305.

B. All training shall be conducted as stipulated in the training manual & shall be guided by the procedures laid down in the approved Safety & Emergency Procedures Manual in accordance with SLCAP 4300.

C. Safety training for cabin crewmembers shall be conducted using only instructors approved by the DGCA. All safety training instructors shall comply with requirements published in paragraph 18 to this Implement Standard.

D. The question papers and / or question bank for evaluation shall have prior approval of the DGCA.

E. The operator shall keep the CAASL informed at least 30 days prior, with regard to commencement of a training programme.

F. Any amendment or revisions to the approved training Programme or evaluation methods shall have prior approval of the DGCA.

G. The operator is permitted to outsource safety training to organizations approved by the DGCA provided they use the training programme approved by the DGCA when conducting such training.

H. On successful completion of the required training, Line Indoctrination shall be carried out as specified.

I. All cabin crew members shall be in possession of a Cabin Crewmember Certificate issued by the DGCA when operating aircraft as a cabin crewmember.

J. All cabin crew members shall undergo recurrent training as specified by the SLCAP 4305.

Note: Guidance material to design training programmes to develop knowledge and skill in human performance can be found in the Human Factors Training Manual (Doc 9683)

12.6 Checking

12.6.1 The operator shall ensure that each cabin crew member undergoes 2 on board line checks every year covering the training received in order to verify his/her proficiency in carrying out normal and emergency safety duties. The personnel performing these checks shall be approved by the DGCA. The operator shall ensure that each cabin crew member undergoes checks as follows:

A. Initial safety
B. Recurrent training.

Note: Requirements for safety trainers & assessors is given below in para 19.

12.7 Training records

12.7.1 An operator shall maintain a training file for each cabin crewmember & all records of all training as follows;

A. All required safety training as specified in SLCAP 4305;
B. Records of medical examinations. And
C. Make the records of all initial, conversion and recurrent training and checking available on request, to the Civil Aviation Authority.

12.8 Cabin Crewmember Certificates

12.8.1 No person shall be on board an aircraft as a cabin Crewmember, unless the person has a Cabin Crewmember Certificate rendered valid by the DGCA. The guidance for the issuance of a Cabin Crewmember certificate is given in Annex A to this Implement Standard. The Cabin Safety Manager or a nominated post holder of the operator shall forward the application to the CAASL. The Cabin Crewmember Certificate is issued to a person employed by an airline and hence the validity lapses at the time the crewmember leaves the airline.

12.9 Assignments of Emergency Duties

A. An operator shall not operate an aircraft with a maximum approved passenger seating configuration of more than 19, unless at least one cabin crewmember is included in the crew, for the purpose of safe and expeditious evacuation of the aeroplane and the necessary functions to be performed in an emergency or a situation requiring emergency evacuation as specified in the operator's Operations Manual and/ or Safety and Emergency Procedures Manual.

B. The number and composition of the crew shall not be less than the number of Cabin Crewmembers who actively participated in the aeroplane cabin during the relevant emergency evacuation demonstration at the time of certification, or who were assumed to have taken part in the relevant analysis.

C. When complying with subparagraph (a) above, an operator shall ensure that the minimum number of Cabin Crewmember' is as per paragraph 10.

12.10 Number and composition of Cabin Crewmembers

A. the operator shall employ sufficient cabin crewmembers trained & checked as required for the planned operation.

B. From 20 up to 50 passenger seats on board 01 minimum required cabin crewmember

C. From 51 up to 100 passenger seats on board 02 minimum required cabin crewmembers.

D. If more than 100 passenger seats 01 minimum required cabin crewmember for each floor level exit and

E. In all aircraft with an upper deck 01 minimum required cabin crewmember for each exit in the upper deck cabin, unless otherwise specified by the DGCA.

F. The DGCA may under exceptional circumstances require an operator to include in the crew, additional Cabin Crewmembers in the interest of safety of passengers.

G. in unforeseen circumstances the required minimum number of cabin crewmember may be reduced provided that:

a) The number of passengers has been reduced in accordance with procedures specified in the Operations Manual; and

b) A report is submitted to the Authority after completion of the flight.

Note 1; The required number of cabin crewmembers shall be carried in order to effect a safe and expeditious evacuation of the aircraft and the necessary functions to be performed in an emergency or a situation requiring emergency evacuation. The operator shall assign these functions for each type of aircraft.

Note 2; Due to the nature of duties of a cabin crewmember in commercial airlines other than duties mentioned in paragraph 9 A the operator shall ensure that the number of cabin crew members for each type of aircraft in its fleet is more than the required number specified paragraph 10.

12.11 Cabin Crewmembers at Emergency Evacuation Stations

12.11.1 Operator shall ensure that each cabin crewmember assigned to emergency evacuation duties shall occupy a seat provided in accordance with Implementing Standard 015, during take-off and landing and whenever the pilot-in-command so directs.

Note: This does not preclude the pilot-in-command from directing the fastening of the seat belt only, at times other than during take-off and landing.

12.12 Protection of Cabin Crewmembers during Flight

12.12.1 Operator shall ensure that each cabin crew member shall be seated with seat belt or, when provided, safety harness fastened during take-off and landing and whenever the pilot-in command so directs.

Note: The foregoing does not preclude the Pilot-in-Command from directing the fastening of the seat belt only, at times other than during take-off & landing.

12.13 Fatigue Management

Please refer Implementing Standard 013 for the requirement for fatigue management.

12.14. Senior Cabin Crewmembers

(Further guidance is available in Chapter 13 of ICAO 10002)

A. An operator shall nominate a Senior Cabin Crewmember whenever more than one cabin crew member is assigned to be responsible to the commander.

B. The Senior Cabin Crewmember shall have responsibility to the commander for the conduct and coordination of normal and emergency procedure(s) specified in the Operations Manual and or Safety & Emergency Procedures Manual.

C. Where required to carry a Senior Cabin Crewmember, 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 Crewmember and has completed an appropriate course covering the following as a minimum:

a) Responsibility to the commander
b) Briefing of cabin crewmembers – normal, abnormal and emergency situations
c) Safety briefing of passengers
d) Accident & incident reporting
e) Documentation
f) Flight time, flight duty periods, duty periods & rest periods for Fatigue Risk Management Systems
g) Leadership
h) Decision Making
i) Individual & team responsibilities
j) Effective communication
k) CRM & Human factors

D. An operator shall establish procedures to select the next most suitably qualified cabin crew member to operate as Senior Cabin Crewmember in the event of the nominated Senior Cabin Crewmember becoming unable to operate.
Such procedures must be acceptable to the Authority and take account of a cabin crew member's operational experience.

12.15. Single Cabin Crewmember operations

15.1 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:

15.2 Training in addition to that required by 14c and shall include particular emphasis on the following to reflect single cabin crew member operations:

A. Responsibility to the commander for the conduct of cabin safety and
B. Emergency procedure(s) specified in the Operations Manual;
C. Importance of coordination and communication with the flight crew,
D. Management of unruly or disruptive passengers;

E. Review of operator's requirements and legal requirements; F. Documentation;
G. Accident and incident reporting;
H. Flight Time, Flight Duty Periods, Duty period and Rest Periods for Fatigue Risk Management System (FRMS).

12.16 Operation on more than one type or variant

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:

a) Non-type specific normal and emergency procedures are identical; and

b) Safety equipment and type specific normal and emergency procedures are similar.

B. For the purposes of subparagraph (a) above, variants of an aeroplane type are considered to be different types if they are not similar in all the following aspects:

a) Emergency exit operation;
b) Location and type of portable safety equipment; and
c) Type specific emergency

12.17 Cabin Safety Manager

12.17.1 The cabin safety manager in an airline is a nominated post holder of the CAASL & hence shall have the prior approval of the DGCA. The Cabin Safety Manager shall demonstrate a thorough understanding and knowledge of the administrative and practical responsibilities and procedures associated with the position.

Note: In Airlines which has less than 100 cabin crewmembers this post may be handled by a safety instructor approved by the DGCA.

12.17.2 Qualifications

A. Two years' experience in a reputed airline as a Manager in In-flight services section; or

B. Five years' experience as a Safety instructor approved by the DGCA handling cabin crew in an airline; or

C. Persons acceptable to the Authority with knowledge in related regulations pertaining to cabin crew members in commercial aviation.

12.17.3 Cabin Safety Manager shall:

A. Know-such of the contents of the air operator's operations manual, air operator certificate and operations specifications as are necessary for the performance of the assigned duties;

B. Know such of the provisions of the applicable regulations and Standards necessary for the performance of the assigned duties; and

C. Demonstrate to the DGCA that the person has the ability to fulfil the responsibilities of the position as specified below;

12.17.4 Responsibilities

A. Cabin Safety Manager is responsible to the DGCA through flight crew training manager for the conduct of safety training of cabin crew members in the airline.
B. Ensure a current and approved Safety & Emergency Procedures Manual is in place.
C. Ensure a current and approved Cabin Crewmember training program is in place.
D. Ensure training equipment and facilities meet the required standards approved by the DGCA
E. Responsible for the supervision of cabin safety instructors & assessors, shall observe & assess their performance on a recurrent basis & shall keep records of each individual trainer/ assessor.
F. Responsible for the issuance of safety directives and notices to the Cabin Crewmembers as required;
G. Submitting and distribution of accident, incident, and other occurrence reports. H. The processing and actioning of cabin crew safety reports (voyage reports).
I. Assuming any responsibilities delegated by the Operations Manager;

J. Training of cabin crewmembers in accordance with the approved training program and ensuring two line checks are carried out on each cabin crewmember once a year.
K. The maintenance of cabin crewmembers training records;
L. Liaison with other company departments in reference to enhancement of safety; M. Liaising with company departments to ensure cabin safety objectives are met
N. Liaising with the regulatory authority for cabin safety compliance. O. The development of safety features cards for DGCA's approval; and
P. In his or her absence, all responsibilities for duties shall be delegated to another qualified individual acceptable to the DGCA.

12.18 Cabin Crew Safety Training Manager

12.18.1 The cabin crew safety training manager is responsible for the development of cabin crew safety training programme in accordance with published regulations & requirements. The training managers shall demonstrate that they possess the competencies described by CAASL and that they have the ability to develop training, accordance with the features of a competency based approach to training, as required. They shall be well versed with;

A. Understanding competency based training programme
B. Benefits of competency based training

C. Development of competency framework
D. Breakdown of the framework components
E. Structure of the competence based training

12.18.2 Qualifications

A. The cabin crew safety training manager shall have a minimum of 3 years' experience as

a cabin crewmember.

B. The cabin crew safety training manager shall have followed a "Train the Trainer" programme or a similar programme to ensure that the person has the attitude & skill to impart knowledge.

C. Shall complete the Initial training as specified by the authority and shall maintain on a recurrent basis the knowledge & skill required to ensure the knowledge is up to date.

D. Shall be evaluated once a year by the respective CAASL Inspector to ensure the competency and the subject knowledge required with respect to the delegated task is satisfactory.

F. Training requirements of the cabin crew safety training manager shall be stipulated in the training manual which shall have the prior approval of the DGCA.

12.18.3 Responsibilities

A. Designing of the training programme
B. Defining training objectives
C. Designing course examinations & practical evaluations
D. Designing training modules
E. Determining training strategy
F. Selecting training media (CBT, Classroom. Cabin Training Devices) G. Make available competency based training & assessment material
H. Constant improving of the training programme based on analysis of different sources of information, (e.g. – safety audits, trainee feedback, reporting systems etc.)
I. Conduct training sessions with the safety instructors & assessors to ensure regulatory & Company objectives are met with the training programmes.

12.19 Cabin Safety Instructors & Assessors

12.19.1 All personnel imparting / assessing knowledge on cabin safety of cabin crewmembers shall have the prior approval of the DGCA. The nominated persons shall be assessed to check that the person has the knowledge, capability and competence, suitable for the Instructor/ Assessor role and to determine the individual's motivational capability as well. The Civil Aviation Authority Inspector shall determine the person nominated is a subject matter expert on the field he/she intends imparting/ assessing knowledge by an evaluation process as determined by CAASL.

12.19.2 Qualifications:

A. All safety trainers & assessors shall have a minimum of 3 years' experience as a cabin Crewmember.

B. All safety trainers shall have followed a "Train the Trainer" programme or a similar programme to ensure that the person has the attitude & skill to impart knowledge.

C. Shall complete the Initial training as specified by the authority and shall maintain on a recurrent basis the knowledge & skill required to ensure the knowledge is up to date.

D. Shall be evaluated once a year by the respective CAASL Inspector to ensure the competency and the subject knowledge required with respect to the delegated task is satisfactory.

E. Training requirements of the instructor & the assessor shall be stipulated in the training manual which shall have the prior approval of the DGCA.

Note: Prior to recommending the candidates for para 17, 18 &19 to the DGCA's approval, the operator shall assess the individuals' knowledge, capabilities & the competency by a panel of safety instructors to determine that he/she is a subject matter expert who is capable of executing the responsibilities.

12.19.3 Instructor Responsibilities:

A. Conduct training as per the approved programme.

B. Ensure that the training programme is accurate & up to date.

C. Endeavor to constantly improve the training requirements in reference to programme material, equipment & evaluation processes etc.

D. Manage occupational health & safety of the training environment.

E. Prepare the training environment with regard to the facilities & equipment required.

F. Manage & support the trainee to ensure the needs of the trainee is met with the company objectives.

G. Perform trainee assessment with regard to individual characteristics, determine learning needs & styles, identify strengths & weaknesses, in order to develop the trainee to achieve the company requirement & objective.

12.19.4 Assessor Responsibilities:

A. Shall be knowledgeable & an expert in the field of assessment of the trainee. B. Carry out assessments as per DGCA's directives.

B. Shall be aware of the required competency based framework of the organization.

C. All assessors shall have consistency in assessment of performance standards & expected knowledge of the trainee & hence shall have approved checklists with answer keys.

D. Clarify assessment process and rules with the trainee and give positive feedback & Reinforcement.

F. Responsible for making a determination of the actual standard attained by the trainee and if necessary recommend corrective action required to the Cabin Safety Manager.

G. Submit evaluation forms to Cabin Safety Manager & respect confidentiality.

12.20 FLIGHT TIME, FLIGHT DUTY PERIODS AND REST PERIODS

The DGCA shall establish regulations specifying the limits applicable to flight time, flight duty periods and rest periods for cabin crew. Refer to IS 054

Note. — Guidance on the establishment of limitations is given in SLCAP 4210 and Attachment A of this IS

Annex A to Chapter 12
ISSUANCE OF CABIN CREWMEMBER CERTIFICATES.

Pursuant to this Implementing Standard, it is mandatory for operators employing cabin crewmembers in their airline to obtain a certificate to that effect from the DGCA.

A. The Operator shall submit to the Civil Aviation Authority, completed Application Form for the issuance of the Cabin Crewmembers Certificate with the applicable fee. The operator has to register with the Computerized Licensing System through CAASL official website www.caa.lk and create the user profile and submit the application form of "Issuance of Cabin Crew Certificate".

B. Once issued, the Certificate shall be renewed annually by the Operator. The holder is required to attend a recurrent training programme (SEP) as approved by the Civil Aviation Authority for the renewal of the certificate.

C. An Operator shall ensure that following completion of initial and/or recurrent training each crewmember undergoes a minimum of two (2) on board line checks covering the training received, in order to verify the proficiency of the crewmember. These checks must be carried out by personnel approved by the Civil Aviation Authority.

D. An operator shall maintain records of each crewmember of all training and checking required as above.

E. The Cabin Crewmember Certificate is valid for five years from the date of issue. The operator shall submit training details pertaining to the holder, along with an Application Form for the subsequent issue of Cabin Crewmember Certificate.

F. The loss of a Crewmember Certificate shall be informed to the Civil Aviation Authority forthwith. For a re issuance of a Cabin Crewmember certificate the applicable fee and a penalty fee of Rs. 500/= or the fee in force, shall be paid to the Civil Aviation Authority.

G. The cabin crewmember shall undergo a Class II Medical Examination as approved by the Civil Aviation Authority.

H. The airline shall keep the Civil Aviation Authority informed with regard to any change in the Application Form and for any subsequent issuance of Crewmember Certificate, item F) mentioned above shall be in force.

I. The validity of a Cabin Crewmember Certificate will expire automatically with the crewmember's separation from the operator, due to any reason.

CHAPTER 13. SECURITY *

13.1 DOMESTIC COMMERCIAL OPERATIONS

Recommendation. — *International Standards and Recommended Practices set forth in this chapter should be applied by all AOC holders also in case of domestic commercial operations (air services).*

13.2 SECURITY OF THE FLIGHT CREW COMPARTMENT

13.2.1 In all aeroplanes which are equipped with a flight crew compartment door, this door shall be capable of being locked, and means shall be provided by which cabin crew can discreetly notify the flight crew in the event of suspicious activity or security breaches in the cabin.

13.2.2 All passenger-carrying aeroplanes of a maximum certificated take-off mass in excess of 45 500 kg or with a passenger seating capacity greater than 60 shall be equipped with an approved flight crew compartment door that is designed to resist penetration by small arms fire and grenade shrapnel, and to resist forcible intrusions by unauthorized persons. This door shall be capable of being locked and unlocked from either pilot's station.

13.2.3 In all aeroplanes which are equipped with a flight crew compartment door in accordance with 13.2.2:

a) This door shall be closed and locked from the time all external doors are closed following embarkation until any such door is opened for disembarkation, except when necessary to permit access and egress by authorized persons; and

b) Means shall be provided for monitoring from either pilot's station the entire door area outside the flight crew compartment to identify persons requesting entry and to detect suspicious behavior or potential threat.

13.2.4 **Recommendation.** — *All passenger-carrying aeroplanes should be equipped with an approved flight crew compartment door, where practicable, that is designed to resist penetration by small arms fire and grenade shrapnel, and to resist forcible intrusions by unauthorized persons. This door should be capable of being locked and unlocked from either pilot's station.*

13.2.5 **Recommendation.** — *In all aeroplanes which are equipped with a flight crew compartment door in accordance with 13.2.4:*

a) The door should be closed and locked from the time all external doors are closed following embarkation until any such door is opened for disembarkation, except when necessary to permit access and egress by authorized persons; and

b) Means should be provided for monitoring from either pilot's station the entire door area outside the flight crew compartment to identify persons requesting entry and to detect suspicious behavior or potential threat.

* In the context of this chapter, the word "security" is used in the sense of prevention of illicit acts against civil aviation.

13.3 AEROPLANE SEARCH PROCEDURE CHECKLIST

The operator shall ensure that there is on board a checklist of the procedures to be followed in searching for a bomb in case of suspected sabotage and for inspecting aeroplanes for concealed weapons, explosives or other dangerous devices when 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.

13.4 TRAINING PROGRAMMES

13.4.1 The operator shall establish and maintain an approved security training programme which ensures crew members act in the most appropriate manner to minimize the consequences of acts of unlawful interference. As a minimum, this programme shall include the following elements:

a) Determination of the seriousness of any occurrence;
b) Crew communication and coordination;
c) Appropriate self-defense responses;
d) Use of non-lethal protective devices assigned to crew members whose use is authorized by the DGCA;
e) Understanding of behavior of terrorists so as to facilitate the ability of crew members to cope with hijacker behavior and passenger responses;
f) Live situational training exercises regarding various threat conditions;
g) Flight crew compartment procedures to protect the aeroplane; and
h) Aeroplane search procedures and guidance on least-risk bomb locations where practicable.

13.4.2 The operator shall also establish and maintain a training programme to acquaint appropriate employees with preventive measures and techniques in relation to passengers, baggage, cargo, mail, equipment, stores and supplies intended for carriage on an aeroplane so that they contribute to the prevention of acts of sabotage or other forms of unlawful interference.

13.5 REPORTING ACTS OF UNLAWFUL INTERFERENCE

Following an act of unlawful interference, the pilot-in-command shall submit, without delay, a report of such an act to the designated local authority.

13.6 MISCELLANEOUS

13.6.1 **Recommendation.** — *Specialized means of attenuating and directing the blast should be provided for use at the least-risk bomb location.*

13.6.2 **Recommendation.** — *Where the operator accepts the carriage of weapons removed from passengers, the aeroplane should have provision for stowing such weapons in a place so that they are inaccessible to any person during flight time.*

CHAPTER 14. DANGEROUS GOODS

14.1 STATE RESPONSIBILITIES

Note 1. — Compliance by operators to this chapter shall be in accordance with SLCAIS 57 and Attachment J of this IS

Note 2.— ICAO Annex 18, Chapter 11, contains requirements for each Contracting State to establish oversight procedures for all entities (including packers, shippers, ground handling agents and operators) performing dangerous goods functions.

Note 3. — Operator responsibilities for the transport of dangerous goods are contained in Chapters 8, 9 and 10 of ICAO Annex 18. Part 7 of the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284) (Technical Instructions) contains the operator's responsibilities and requirements for incident and accident reporting, and guidance in Manual on Transport of Dangerous Goods SLCAP 4400.

Note 4. — The requirements pertaining to crew members or passengers carrying dangerous goods on aircraft are set forth in Part 8, Chapter 1, of the Technical Instructions.

Note 5.— COMAT that meets the classification criteria of the Technical Instructions for dangerous goods are considered cargo and must be transported in accordance with Part 1;2.2.2 or Part 1;2.2.3 of the Technical Instructions (e.g. aircraft parts such as chemical oxygen generators, fuel control units, fire extinguishers, oils, lubricants, cleaning products).

APPENDIX 1.
LIGHTS TO BE DISPLAYED BY AEROPLANES
(Chapter 6, 6.10, refers)

1. TERMINOLOGY

When the following terms are used in this Appendix, they have the following meanings:

Angles of coverage.

a) Angle of coverage A is formed by two intersecting vertical planes making angles of 70 degrees to the right and 70 degrees to the left respectively, looking aft along the longitudinal axis to a vertical plane passing through the longitudinal axis.

b) Angle of coverage F is formed by two intersecting vertical planes making angles of 110 degrees to the right and 110 degrees to the left respectively, looking forward along the longitudinal axis to a vertical plane passing through the longitudinal axis.

c) Angle of coverage L is formed by two intersecting vertical planes, one parallel to the longitudinal axis of the aeroplane, and the other 110 degrees to the left of the first, when looking forward along the longitudinal axis.

d) Angle of coverage R is formed by two intersecting vertical planes, one parallel to the longitudinal axis of the aeroplane, and the other 110 degrees to the right of the first, when looking forward along the longitudinal axis.

Horizontal plane. The plane containing the longitudinal axis and perpendicular to the plane of symmetry of the aeroplane.

Longitudinal axis of the aeroplane. A selected axis parallel to the direction of flight at a normal cruising speed, and passing through the center of gravity of the aeroplane.

Making way. An aeroplane on the surface of the water is “making way” when it is under way and has a velocity relative to the water.

Under command. An aeroplane on the surface of the water is “under command” when it is able to execute maneuvers as required by the International Regulations for Preventing Collisions at Sea for the purpose of avoiding other vessels.

Under way. An aeroplane on the surface of the water is “under way” when it is not aground or moored to the ground or to any fixed object on the land or in the water.

Vertical planes. Planes perpendicular to the horizontal plane.

Visible. Visible on a dark night with a clear atmosphere.

2. NAVIGATION LIGHTS TO BE DISPLAYED IN THE AIR

Note. — The lights specified herein are intended to meet the requirements of ICAO Annex 2 for navigation lights.

As illustrated in Figure 1, the following unobstructed navigation lights shall be displayed:

a) A red light projected above and below the horizontal plane through angle of coverage L;

b) A green light projected above and below the horizontal plane through angle of coverage R;

c) a white light projected above and below the horizontal plane rearward through angle of coverage A.

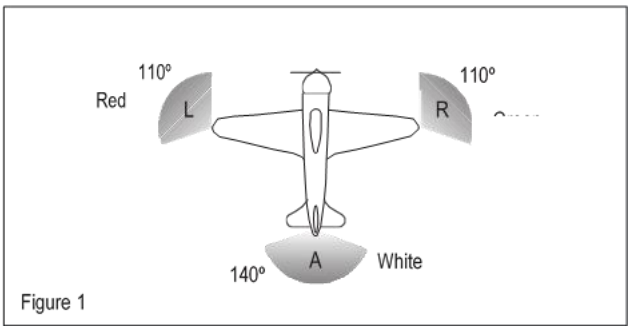


Figure 1

3. LIGHTS TO BE DISPLAYED ON THE WATER

3.1 General

Note. — The lights specified herein are intended to meet the requirements of ICAO Annex 2 for lights to be displayed by aeroplanes on the water.

The International Regulations for Preventing Collisions at Sea require different lights to be displayed in each of the following circumstances:

a) When under way;
b) When towing another vessel or aeroplane;
c) When being towed;
d) When not under command and not making way;
e) When making way but not under command;
f) When at anchor;
g) When aground.

The lights required by aeroplanes in each case are described below.

3.2 When under way

As illustrated in Figure 2, the following appearing as steady unobstructed lights:

a) A red light projected above and below the horizontal through angle of coverage L;
b) A green light projected above and below the horizontal through angle of coverage R;
c) A white light projected above and below the horizontal through angle of coverage A; and
d) A white light projected through angle of coverage F.

The lights described in 3.2 a), b) and c) should be visible at a distance of at least 3.7 km (2 NM). The light described in 3.2 d) should be visible at a distance of 9.3 km (5 NM) when fitted to an

aeroplane of 20 m or more in length or visible at a distance of 5.6 km (3 NM) when fitted to an aeroplane of less than 20 m in length.

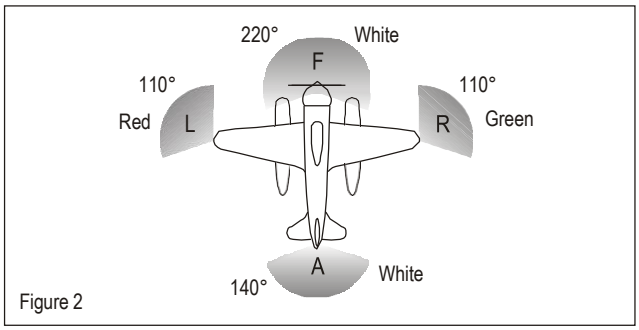


Figure 2

3.3 When towing another vessel or aeroplane

As illustrated in Figure 3, the following appearing as steady, unobstructed lights:

a) The lights described in 3.2;

b) A second light having the same characteristics as the light described in 3.2 d) and mounted in a vertical line at least 2 m above or below it; and

c) A yellow light having otherwise the same characteristics as the light described in 3.2 c) and mounted in a vertical line at least 2 m above it.

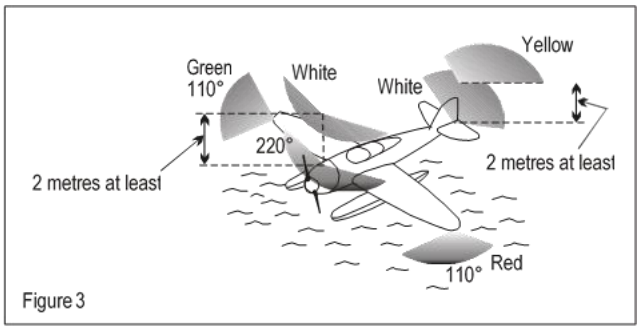


Figure 3

3.4 When being towed

The lights described in 3.2 a), b) and c) appearing as steady, unobstructed lights.

3.5 When not under command and not making way

As illustrated in Figure 4, two steady red lights placed where they can best be seen, one vertically over the other and not less than 1 m apart, and of such a character as to be visible all around the horizon at a distance of at least 3.7 km (2 NM).

3.6 When making way but not under command

As illustrated in Figure 5, the lights described in 3.5 plus the lights described in 3.2 a), b) and c).

Note. — The display of lights prescribed in 3.5 and 3.6 is to be taken by other aircraft as signals that the aeroplane showing them is not under command and cannot therefore get out of the way. They are not signals of aeroplanes in distress and requiring assistance.

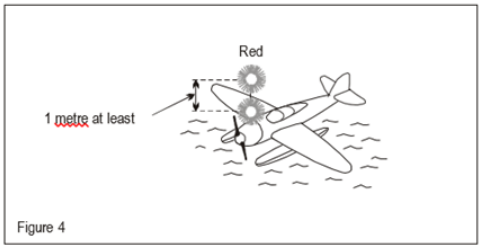


Figure 4

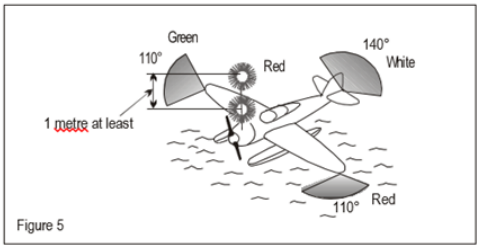


Figure 5

3.7 When at anchor

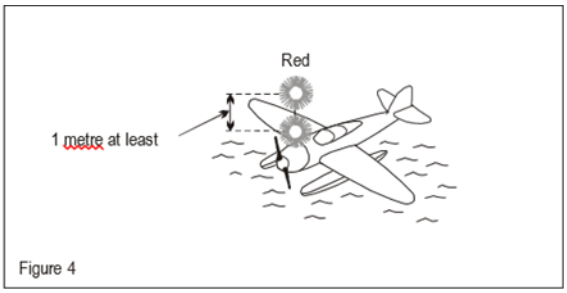


Figure 4

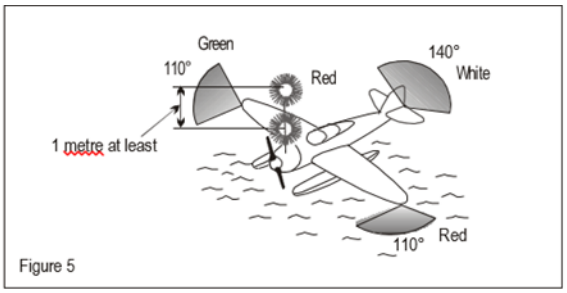


Figure 5

a) If less than 50 m in length, where it can best be seen, a steady white light (Figure 6), visible all around the horizon at a distance of at least 3.7 km (2 NM).

b) If 50 m or more in length, where they can best be seen, a steady white forward light and a steady white rear light (Figure 7) both visible all around the horizon at a distance of at least 5.6 km (3 NM).

c) If 50 m or more in span a steady white light on each side (Figures 8 and 9) to indicate the maximum span and visible, so far as practicable, all around the horizon at a distance of at least 1.9 km (1 NM).

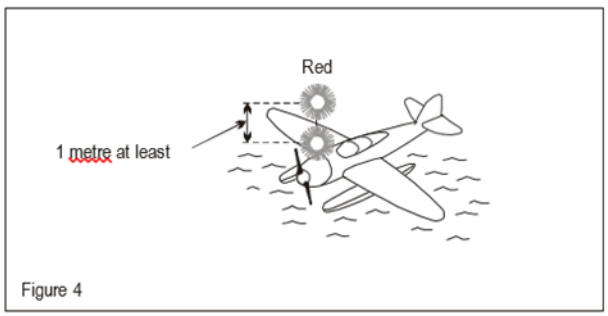


Figure 4

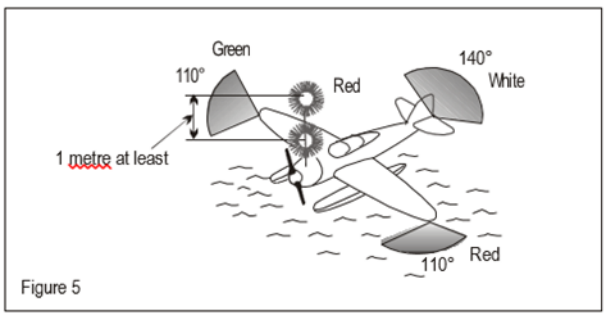


Figure 5

3.8 When aground

The lights prescribed in 3.7 and in addition two steady red lights in vertical line, at least 1 m apart so placed as to be visible all around the horizon.

APPENDIX 2.
ORGANIZATION AND CONTENTS OF AN OPERATIONS MANUAL
(Chapter 4, 4.2.3.1, refers)

1. ORGANIZATION

An operations manual, which may be issued in separate parts corresponding to specific aspects of operations, provided in accordance with Chapter 4, 4.2.3.1, shall be organized with the following structure:

a) General;

b) Aircraft operating information;

c) Areas, routes and aerodromes; and

d) Training.

2. CONTENTS

The operations manual referred to in 1 shall contain at the least the following:

2.1 General

2.1.1 Instructions outlining the responsibilities of operations personnel pertaining to the conduct of flight operations.

2.1.2 Information and policy relating to fatigue management including:

a) rules pertaining to flight time, flight duty period, duty period limitations and rest requirements for flight and cabin crew members in accordance with Chapter 4, 4.10.2 a); and

b) Policy and documentation pertaining to the operator's FRMS in accordance with Appendix 7 of this IS.

2.1.3 A list of the navigational equipment to be carried including any requirements relating to operations where performance-based navigation is prescribed.

2.1.4 Where relevant to the operations, the long-range navigation procedures, engine failure procedure for EDTO and the nomination and utilization of diversion aerodromes.

2.1.5 The circumstances in which a radio listening watch is to be maintained.

2.1.6 The method for determining minimum flight altitudes.

2.1.7 The methods for determining aerodrome operating minima.

2.1.8 Safety precautions during refueling with passengers on board.

2.1.9 Ground handling arrangements and procedures.

2.1.10 Procedures, as prescribed in ICAO Annex 12, for pilots-in-command observing an accident.

2.1.11 The flight crew for each type of operation including the designation of the succession of command.

2.1.12 Specific instructions for the computation of the quantities of fuel and oil to be carried, taking into account all circumstances of the operation including the possibility of loss of pressurization and the failure of one or more engines while en route.

2.1.13 The conditions under which oxygen shall be used and the amount of oxygen determined in accordance with Chapter 4, 4.3.9.2.

2.1.14 Instructions for mass and balance control.

2.1.15 Instructions for the conduct and control of ground de-icing/anti-icing operations.

2.1.16 The specifications for the operational flight plan.

2.1.17 Standard operating procedures (SOPs) for each phase of flight.

2.1.18 Instructions on the use of normal checklists and the timing of their use.

2.1.19 Departure contingency procedures.

2.1.20 Instructions on the maintenance of altitude awareness and the use of automated or flight crew altitude call-out.

2.1.21 Instructions on the use of autopilots and auto-throttles in IMC.

Note.— Instructions on the use of autopilots and auto-throttles, together with 2.1.26 and 2.1.30, are essential for avoidance of approach and landing accidents and controlled flight into terrain accidents.

2.1.22 Instructions on the clarification and acceptance of ATC clearances, particularly where terrain clearance is involved.

2.1.23 Departure and approach briefings.

2.1.24 Procedures for familiarization with areas, routes and aerodromes.

2.1.25 Stabilized approach procedure.

2.1.26 Limitation on high rates of descent near the surface.

2.1.27 Conditions required to commence or to continue an instrument approach.

2.1.28 Instructions for the conduct of precision and non-precision instrument approach procedures.

2.1.29 Allocation of flight crew duties and procedures for the management of crew workload during night and IMC instrument approach operations.

2.1.30 Instructions and training requirements for the avoidance of controlled flight into terrain and policy for the use of the ground proximity warning system (GPWS).

2.1.31 Policy, instructions, procedures and training requirements for the avoidance of collisions and the use of the airborne collision avoidance system (ACAS).

Note. — Procedures for the operation of ACAS are contained in PANS-OPS (Doc 8168), Volume I, and in PANS-ATM (Doc 4444), Chapters 12 and 15.

2.1.32 Information and instructions relating to the interception of civil aircraft including:

a) Procedures, as prescribed in ICAO Annex 2, for pilots-in-command of intercepted aircraft; and

b) Visual signals for use by intercepting and intercepted aircraft, as contained in ICAO Annex 2.

2.1.33 For aeroplanes intended to be operated above 15 000 m (49 000 ft):

a) Information which will enable the pilot to determine the best course of action to take in the event of exposure to solar cosmic radiation; and

b) Procedures in the event that a decision to descend is taken, covering:

1) The necessity of giving the appropriate ATS unit prior warning of the situation and of obtaining a provisional descent clearance; and

2) The action to be taken in the event that communication with the ATS unit cannot be established or is interrupted.

Note. — Guidance material on the information to be provided is contained in Circular 126 — Guidance Material on SST Aircraft Operations.

2.1.34 Details of the safety management system (SMS) provided in accordance with Chapters 3 and 4 of ICAO Annex 19.

2.1.35 Information and instructions on the carriage of dangerous goods, in accordance with Chapter 14, including action to be taken in the event of an emergency.

Note.— Guidance material on the development of policies and procedures for dealing with dangerous goods incidents on board aircraft is contained in Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods (Doc 9481).

2.1.36 Security instructions and guidance.

2.1.37 The search procedure checklist provided in accordance with Chapter 13, 13.3.

2.1.38 Instructions and training requirements for the use of head-up displays (HUD) and enhanced vision systems (EVS) equipment as applicable.

2.1.39 Instructions and training requirements for the use of the EFB, as applicable.

2.2 Aircraft operating information

2.2.1 Certification limitations and operating limitations.

2.2.2 The normal, abnormal and emergency procedures to be used by the flight crew and the checklists relating thereto as required by Chapter 6, 6.1.4.

2.2.3 Operating instructions and information on climb performance with all engines operating, if provided in accordance with Chapter 4, 4.2.4.3.

2.2.4 Flight planning data for pre-flight and in-flight planning with different thrust/power and speed settings.

2.2.5 The maximum crosswind and tailwind components for each aeroplane type operated and the reductions to be applied to these values having regard to gusts, low visibility, runway surface conditions, crew experience, use of autopilot, abnormal or emergency circumstances, or any other relevant operational factors.

2.2.6 Instructions and data for mass and balance calculations.

2.2.7 Instructions for aircraft loading and securing of load.

2.2.8 Aircraft systems, associated controls and instructions for their use, as required by Chapter 6, 6.1.4.

2.2.9 The minimum equipment list and configuration deviation list for the aeroplane types operated and specific operations authorized, including any requirements relating to operations where performance-based navigation is prescribed.

2.2.10 Checklist of emergency and safety equipment and instructions for its use.

2.2.11 Emergency evacuation procedures, including type-specific procedures, crew coordination, assignment of crew's emergency positions and the emergency duties assigned to each crew member.

2.2.12 The normal, abnormal and emergency procedures to be used by the cabin crew, the checklists relating thereto and aircraft systems information as required, including a statement related to the necessary procedures for the coordination between flight and cabin crew.

2.2.13 Survival and emergency equipment for different routes and the necessary procedures to verify its normal functioning before take-off, including procedures to determine the required amount of oxygen and the quantity available.

2.2.14 The ground-air visual signal code for use by survivors, as contained in ICAO Annex 12.

2.3 Routes and aerodromes

2.3.1 A route guide to ensure that the flight crew will have, for each flight, information relating to communication facilities, navigation aids, aerodromes, instrument approaches,

instrument arrivals and instrument departures as applicable for the operation, and such other information as the operator may deem necessary for the proper conduct of flight operations.

2.3.2 The minimum flight altitudes for each route to be flown.

2.3.3 Aerodrome operating minima for each of the aerodromes that are likely to be used as aerodromes of intended landing or as alternate aerodromes.

2.3.4 The increase of aerodrome operating minima in case of degradation of approach or aerodrome facilities.

2.3.5 Instructions for determining aerodrome operating minima for instrument approaches using HUD and EVS.

2.3.6 The necessary information for compliance with all flight profiles required by regulations, including but not limited to, the determination of:

a) Take-off runway length requirements for dry, wet and contaminated conditions, including those dictated by system failures which affect the take-off distance;

b) Take-off climb limitations;

c) En-route climb limitations;

d) Approach climb limitations and landing climb limitations;

e) landing runway length requirements for dry, wet and contaminated conditions, including systems failures which affect the landing distance; and

f) Supplementary information, such as tire speed limitations.

2.4 Training

2.4.1 Details of the flight crew training programme, as required by Chapter 9, 9.3.

2.4.2 Details of the cabin crew duties training programme as required by Chapter 12, 12.4.

2.4.3 Details of the flight operations officer/flight dispatcher training programme when employed in conjunction with a method of flight supervision in accordance with Chapter 4, 4.2.1.

Note. — Details of the flight operations officer/flight dispatcher training programme are contained in Chapter 10, 10.2.2

APPENDIX 3.
ADDITIONAL REQUIREMENTS FOR APPROVED OPERATIONS BY SINGLE-ENGINE TURBINE-POWERED AEROPLANES AT NIGHT AND/OR IN INSTRUMENT METEOROLOGICAL CONDITIONS (IMC)
(Chapter 5, 5.4.1, refers)

Airworthiness and operational requirements provided in accordance with Chapter 5, 5.4.1, shall satisfy the following:

1. TURBINE ENGINE RELIABILITY

1.1 Turbine engine reliability shall be shown to have a power loss rate of less than 1 per 100 000 engine hours.

Note.— Power loss in this context is defined as any loss of power, the cause of which may be traced to faulty engine or engine component design or installation, including design or installation of the fuel ancillary or engine control systems. (See Attachment G of this IS.)

1.2 The operator shall be responsible for engine trend monitoring.

1.3 To minimize the probability of in-flight engine failure, the engine shall be equipped with:

a) an ignition system that activates automatically, or is capable of being operated manually, for take-off and landing, and during flight, in visible moisture;

b) A magnetic particle detection or equivalent system that monitors the engine, accessories gearbox, and reduction gearbox, and which includes a flight deck caution indication; and

c) An emergency engine power control device that permits continuing operation of the engine through a sufficient power range to safely complete the flight in the event of any reasonably probable failure of the fuel control unit.

2. SYSTEMS AND EQUIPMENT

Single-engine turbine-powered aeroplanes approved to operate at night and/or in IMC shall be equipped with the following systems and equipment intended to ensure continued safe flight and to assist in achieving a safe forced landing after an engine failure, under all allowable operating conditions:

a) Two separate electrical generating systems, each one capable of supplying all probable combinations of continuous in-flight electrical loads for instruments, equipment and systems required at night and/or in IMC;

b) A radio altimeter;

c) An emergency electrical supply system of sufficient capacity and endurance, following loss of all generated power, to as a minimum:

1) Maintain the operation of all essential flight instruments, communication and navigation systems during a descent from the maximum certificated altitude in a glide configuration to the completion of a landing;

2) Lower the flaps and landing gear, if applicable;

3) Provide power to one pitot heater, which must serve an air speed indicator clearly visible to the pilot;

4) Provide for operation of the landing light specified in 2 j);

5) Provide for one engine restart, if applicable; and

6) Provide for the operation of the radio altimeter;

d) Two attitude indicators, powered from independent sources;

e) A means to provide for at least one attempt at engine re-start;

f) Airborne weather radar;

g) A certified area navigation system capable of being programmed with the positions of aerodromes and safe forced landing areas, and providing instantly available track and distance information to those locations;

h) For passenger operations, passenger seats and mounts which meet dynamically-tested performance standards and which are fitted with a shoulder harness or a safety belt with a diagonal shoulder strap for each passenger seat;

i) in pressurized aeroplanes, sufficient supplemental oxygen for all occupants for descent following engine failure at the maximum glide performance from the maximum certificated altitude to an altitude at which supplemental oxygen is no longer required;

j) A landing light that is independent of the landing gear and is capable of adequately illuminating the touchdown area in a night forced landing; and

k) An engine fire warning system.

3. MINIMUM EQUIPMENT LIST

The DGCA shall require the minimum equipment list of the operator approved in accordance with Chapter 5, 5.4 to specify the operating equipment required for night and/or IMC operations, and for day/VMC operations.

4. FLIGHT MANUAL INFORMATION

The flight manual shall include limitations, procedures, approval status and other information relevant to operations by single-engine turbine-powered aeroplanes at night and/or in IMC.

5. EVENT REPORTING

5.1 The operator approved for operations by single-engine turbine-powered aeroplanes at night and/or in IMC shall report all significant failures, malfunctions or defects to the DGCA who in turn will notify the State of Design.

5.2 The DGCA shall review the safety data and monitor the reliability information so as to be able to take any actions necessary to ensure that the intended safety level is achieved. The DGCA will notify major events or trends of particular concern to the appropriate Type Certificate Holder and the State of Design.

6. OPERATOR PLANNING

6.1 Operator route planning shall take account of all relevant information in the assessment of intended routes or areas of operations, including the following:

a) The nature of the terrain to be overflown, including the potential for carrying out a safe forced landing in the event of an engine failure or major malfunction;

b) Weather information, including seasonal and other adverse meteorological influences that may affect the flight; and

c) Other criteria and limitations as specified by the DGCA.

6.2 The operator shall identify aerodromes or safe forced landing areas available for use in the event of engine failure, and the position of these shall be programmed into the area navigation system.

Note 1. — A 'safe' forced landing in this context means a landing in an area at which it can reasonably be expected that it will not lead to serious injury or loss of life, even though the aeroplane may incur extensive damage.

Note 2.— Operation over routes and in weather conditions that permit a safe forced landing in the event of an engine failure, as specified in Chapter 5, 5.1.2, is not required by Appendix 3, 6.1 and 6.2 for aeroplanes approved in accordance with Chapter 5, 5.4. Of this IS. The availability of forced landing areas at all points along a route is not specified for these aeroplanes because of the very high engine reliability, additional systems and operational equipment, procedures and training requirements specified in this Appendix.

7. FLIGHT CREW EXPERIENCE, TRAINING AND CHECKING

7.1 The DGCA shall prescribe the minimum flight crew experience required for night/IMC operations by single-engine turbine-powered aeroplanes.

7.2 The operator's flight crew training and checking shall be appropriate to night and/or IMC operations by single- engine turbine-powered aeroplanes, covering normal, abnormal and emergency procedures and, in particular, engine failure, including descent to a forced landing in night and/or in IMC conditions.

8. ROUTE LIMITATIONS OVER WATER

The DGCA shall apply route limitation criteria for single-engine turbine-powered aeroplanes operating at night and/or in IMC on over water operations if beyond gliding

distance from an area suitable for a safe forced landing/ditching having regard to the characteristics of the aeroplane, seasonal weather influences, including likely sea state and temperature, and the availability of search and rescue services.

9. OPERATOR CERTIFICATION OR VALIDATION

The operator shall demonstrate the ability to conduct operations by single-engine turbine-powered aeroplanes at night and/or in IMC through a certification and approval process specified by the DGCA.

Note. — Guidance on the airworthiness and operational requirements is contained in Attachment G of this IS.

APPENDIX 4.
ALTIMETRY SYSTEM PERFORMANCE REQUIREMENTS FOR OPERATIONS IN RVSM AIRSPACE
(Chapter 7, 7.2.7, refers)

1. In respect of groups of aeroplanes that are nominally of identical design and build with respect to all details that could influence the accuracy of height-keeping performance, the height-keeping performance capability shall be such that the total vertical error (TVE) for the group of aeroplanes shall have a mean no greater than 25 m (80 ft) in magnitude and shall have a standard deviation no greater than $28 – 0.013z2$ for $0 \leq z \leq 25$ when z is the magnitude of the mean TVE in metres, or $92 – 0.004z2$ for $0 \leq z \leq 80$ where z is in feet. In addition, the components of TVE shall have the following characteristics:

a) The mean altimetry system error (ASE) of the group shall not exceed 25 m (80 ft) in magnitude;

b) The sum of the absolute value of the mean ASE and of three standard deviations of ASE shall not exceed 75 m (245 ft.); and

c) The differences between cleared flight level and the indicated pressure altitude actually flown shall be symmetric about a mean of 0 m, with a standard deviation no greater than 13.3 m (43.7 ft.), and in addition, the decrease in the frequency of differences with increasing difference magnitude shall be at least exponential.

2. In respect of aeroplanes for which the characteristics of the airframe and altimetry system fit are unique and so cannot be classified as belonging to a group of aeroplanes encompassed by paragraph 1, the height-keeping performance capability shall be such that the components of the TVE of the aeroplane have the following characteristics:

a) The ASE of the aeroplane shall not exceed 60 m (200 ft) in magnitude under all flight conditions; and

b) The differences between the cleared flight level and the indicated pressure altitude actually flown shall be symmetric about a mean of 0 m, with a standard deviation no greater than 13.3 m (43.7 ft), and in addition, the decrease in the frequency of differences with increasing difference magnitude shall be at least exponential.

APPENDIX 5.
SAFETY OVERSIGHT OF AIR OPERATORS
(Chapter 4, 4.2.1.8, refers)

Note 1. — Appendix 1 to ICAO Annex 19 contains the general provisions for a State safety oversight system.

Note 2. — This Appendix provides additional provisions for the safety oversight of international commercial air transport operators.

1. PRIMARY AVIATION LEGISLATION

The DGCA shall enact and implement laws that enable the State to regulate the certification and continued supervision of air operators and the resolution of safety issues identified by the authority and to ensure that compliance will result in an acceptable level of safety performance for the operations undertaken.

Note 1. — The term authority as used in this Appendix refers to the Civil Aviation Authority as well as equivalent organizations, including inspectors and staff.

Note 2. — Guidance on the inspection, certification and continued surveillance of operations is contained in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335) and the Airworthiness Manual (Doc 9760).

2. SPECIFIC OPERATING REGULATIONS

The DGCA shall adopt regulations that provide for the certification and continued surveillance of aircraft operations and the maintenance of aircraft in conformity with the Annexes to the Convention on International Civil Aviation.

3. STATE SAFETY OVERSIGHT SYSTEM AND FUNCTIONS

3.1 The DGCA shall ensure that the authority is responsible for the safety oversight of air operators.

3.2 The DGCA shall use a methodology to determine its inspector staffing requirements according to the size and complexity of civil air operations in that State.

3.3 **Recommendation.** — *The methodology in 3.2 should be documented.*

3.4 The DGCA shall ensure that authority inspectors have adequate support, credentials and transportation to accomplish, independently, their certification and continued surveillance tasks.

4. QUALIFIED TECHNICAL PERSONNEL

The DGCA shall require that the initial and recurrent training of the authority inspectors include aircraft- specific subjects.

Note. — Guidance on experience and training for inspectors is contained in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335).

5. TECHNICAL GUIDANCE, TOOLS AND PROVISION OF SAFETY-CRITICAL INFORMATION

5.1 The DGCA shall ensure that authority inspectors are provided with technical guidance manuals containing the policies, procedures and standards to be used in the certification and continued surveillance of air operators.

5.2 The DGCA shall ensure that authority inspectors are provided with technical guidance manuals containing the policies, procedures and standards to be used in the resolution of safety issues, including enforcement.

5.3 The DGCA shall ensure that authority inspectors are provided with technical guidance manuals that address ethics, personal conduct and the avoidance of actual or perceived conflicts of interest in the performance of official duties.

6. CERTIFICATION OBLIGATIONS

The DGCA shall require, prior to commencement of new commercial air transport operations, air operators to demonstrate that they can safely conduct the proposed operations.

Note. — Attachment D of this IS contains further information in this regard.

7. CONTINUED SURVEILLANCE OBLIGATIONS

The DGCA shall use an ongoing surveillance plan to confirm that operators continue to meet the relevant requirements for initial certification and that each air operator is functioning satisfactorily.

8. RESOLUTION OF SAFETY ISSUES

Note. — Provisions for the resolution of safety issues are contained in Appendix 1 to ICAO Annex 19.

APPENDIX 6.
AIR OPERATOR CERTIFICATE (AOC)
(Chapter 4, 4.2.1.5 and 4.2.1.6, refer)

1. PURPOSE AND SCOPE

1.1 The AOC and its associated model specific operations specifications shall contain the minimum information required in paragraphs 2 and 3 respectively, in a standardized format.

1.2 The air operator certificate and its associated operations specifications shall define the operations for which the operator is authorized.

Note. — Attachment D, paragraph 3.2.2, of this IS contains additional information that may be listed in the operations specifications associated with the air operator certificate.

2. AOC TEMPLATE

Note. — Chapter 6, 6.1.2, requires a certified true copy of the AOC to be carried aboard.

AIR OPERATOR CERTIFICATE

Note.— Chapter 6, 6.1.2, requires a certified true copy of the AOC to be carried aboard.

<table>
<tr><td colspan="3">AIR OPERATOR CERTIFICATE</td></tr>
<tr><td>[1]</td><td>STATE OF THE OPERATOR[2]</td><td>[1]</td></tr>
<tr><td></td><td>ISSUING AUTHORITY[3]</td><td></td></tr>
<tr><td>AOC #[4]:
Expiry date[5]:</td><td>OPERATOR NAME[6]

Dba trading name[7]:
Operator address[8]:
Telephone[9]:
Fax:
Email:</td><td>OPERATIONAL POINTS OF CONTACT[10]

Contact details, at which operational management can be contacted without undue delay, are listed in _____[11].</td></tr>
<tr><td colspan="3">This certificate certifies that _____[12] is authorized to perform commercial air operations, as defined in the attached operations specifications, in accordance with the operations manual and the _____[13].</td></tr>
<tr><td>Date of issue[14]:</td><td colspan="2">Name and signature[15]:
Title:</td></tr>
</table>

Notes.—

1. For use of the State of the Operator.
2. Replace by the name of the State of the Operator.
3. Replace by the identification of the issuing authority of the State of the Operator.
4. Unique AOC number, as issued by the State of the Operator.
5. Date after which the AOC ceases to be valid (dd-mm-yyyy).

6. Replace by the operator's registered name.

7. Operator's trading name, if different. Insert "dba" before the trading name (for "doing business as").
8. Operator's principal place of business address.
9. Operator's principal place of business telephone and fax details, including the country code. Email to be provided if available.
10. The contact details include the telephone and fax numbers, including the country code, and the email address (if available) at which operational management can be contacted without undue delay for issues related to flight operations, airworthiness, flight and cabin crew competency, dangerous goods and other matters, as appropriate.
11. Insert the controlled document, carried on board, in which the contact details are listed, with the appropriate paragraph or page reference, e.g.: "Contact details are listed in the operations manual, Gen/Basic, Chapter 1, 1.1" or "… are listed in the operations specifications, page 1" or "… are listed in an attachment to this document".
12. Operator's registered name.
13. Insertion of reference to the appropriate civil aviation regulations.
14. Issuance date of the AOC (dd-mm-yyyy).
15. Title, name and signature of the authority representative. In addition, an official stamp may be applied on the AOC.

3. OPERATIONS SPECIFICATIONS FOR EACH AIRCRAFT MODEL

Note. — Chapter 6, 6.1.2, requires a copy of the operations specifications of this section to be carried aboard.

3.1 For each aircraft model in the operator's fleet, identified by aircraft make, model and series, the following list of authorizations, conditions and limitations shall be included: issuing authority contact details, operator name and AOC number, date of issue and signature of the authority representative, aircraft model, types and area of operations, special limitations and authorizations.

Note. — If authorizations and limitations are identical for two or more models, these models may be grouped in a single list.

3.2 The operations specifications layout referred to in Chapter 4, 4.2.1.6, shall be as follows:

Note. — The MEL constitutes an integral part of the operations manual.

OPERATIONS SPECIFICATIONS

(subject to the approved conditions in the operations manual)

ISSUING AUTHORITY CONTACT DETAILS[1]

Telephone:_____ Fax:_____ Email: _____

AOC#[2]:_____Operator name[3]:_____Date[4]:_____Signature: _____

Dba trading name: _____

Aircraft model[5]:

Types of operation: Commercial air transportation ☐Passengers ☐ Cargo ☐ Other[6]: _____

Area(s) of operation[7]:

Special limitations[8]:

SPECIFIC APPROVAL	YES	NO	DESCRIPTION [9]	REMARKS
Dangerous goods	☐	☐		
Low visibility operations				
Approach and landing	☐	☐	CAT[10]:_____ RVR:_____m DH:_____ft	
Take-off	☐	☐	RVR[11]:_____m	
Operational credit(s)	☐	☐	[12]	
RVSM[13] ☐ N/A	☐	☐		
EDTO[14] ☐ N/A	☐	☐	Threshold time[15]:_____minutes Maximum diversion time[15]:_____minutes	
AR navigation specifications for PBN operations	☐	☐	[16]	
Continuing airworthiness			[17]	
EFB			[18]	
Other [19]	☐	☐		

Notes.—

1. *Telephone and fax contact details of the authority, including the country code. Email to be provided if available.*
2. *Insert the associated AOC number.*
3. *Insert the operator's registered name and the operator's trading name, if different. Insert "dba" before the trading name (for "doing business as").*
4. *Issuance date of the operations specifications (dd-mm-yyyy) and signature of the authority representative.*
5. *Insert the Commercial Aviation Safety Team (CAST)/ICAO designation of the aircraft make, model and series, or master series, if a series has been designated (e.g. Boeing-737-*

3K2 or Boeing-777-232). The CAST/ICAO taxonomy is available at: http://www.intlaviationstandards.org/.

6. *Other type of transportation to be specified (e.g. emergency medical service).*
7. *List the geographical area(s) of authorized operation (by geographical coordinates or specific routes, flight information region or national or regional boundaries).*
8. *List the applicable special limitations (e.g. VFR only, day only).*
9. *List in this column the most permissive criteria for each approval or the approval type (with appropriate criteria).*
10. *Insert the applicable precision approach category (CAT II, IIIA, IIIB or IIIC). Insert the minimum RVR in metres and decision height in feet. One line is used per listed approach category.*
11. *Insert the approved minimum take-off RVR in metres. One line per approval may be used if different approvals are granted.*
12. *List the airborne capabilities (i.e. automatic landing, HUD, EVS, SVS, CVS) and associated operational credit(s) granted.*
13. *"Not applicable (N/A)" box may be checked only if the aircraft maximum ceiling is below FL 290.*
14. *If extended diversion time operations (EDTO) approval does not apply based on the provisions in Chapter 4, 4.7, select "N/A". Otherwise a threshold time and maximum diversion time must be specified.*
15. *The threshold time and maximum diversion time may also be listed in distance (NM), as well as the engine type.*
16. *Performance-based navigation (PBN): one line is used for each PBN AR navigation specification approval (e.g. RNP AR APCH), with appropriate limitations listed in the "Description" column.*
17. *Insert the name of the person/organization responsible for ensuring that the continuing airworthiness of the aircraft is maintained and the regulation that requires the work, i.e. within the AOC regulation or a specific approval (e.g. EC2042/2003, Part M, Subpart G).*
18. *List the EFB functions with any applicable limitations.*
19. *Other authorizations or data can be entered here, using one line (or one multi-line block) per authorization (e.g. special approach authorization, MNPS, approved navigation performance).*

APPENDIX 7.
FATIGUE RISK MANAGEMENT SYSTEM REQUIREMENTS

Note. — Guidance on the development and implementation of FRMS regulations is contained in the Manual for the Oversight of Fatigue Management Approaches (Doc 9966).

A Fatigue Risk Management System (FRMS) established in accordance with Chapter 4, 4.10.6, shall contain, at a minimum:

1. FRMS POLICY AND DOCUMENTATION

1.1 FRMS policy

1.1.1 The operator shall define its FRMS policy, with all elements of the FRMS clearly identified.

1.1.2 The policy shall require that the scope of FRMS operations be clearly defined in the operations manual.

1.1.3 The policy shall:

a) Reflect the shared responsibility of management, flight and cabin crews, and other involved personnel;

b) Clearly state the safety objectives of the FRMS;

c) Be signed by the accountable executive of the organization;

d) Be communicated, with visible endorsement, to all the relevant areas and levels of the organization;

e) Declare management commitment to effective safety reporting;

f) Declare management commitment to the provision of adequate resources for the FRMS;

g) Declare management commitment to continuous improvement of the FRMS;

h) Require that clear lines of accountability for management, flight and cabin crews, and all other involved personnel are identified; and

i) Require periodic reviews to ensure it remains relevant and appropriate.

Note. — Effective safety reporting is described in the Safety Management Manual (SMM) (Doc 9859).

1.2 FRMS documentation

The operator shall develop and keep current FRMS documentation that describes and records:

a) FRMS policy and objectives;

b) FRMS processes and procedures;

c) Accountabilities, responsibilities and authorities for these processes and procedures;

d) Mechanisms for ongoing involvement of management, flight and cabin crew members, and all other involved personnel;

e) FRMS training programmes, training requirements and attendance records;

f) Scheduled and actual flight times, duty periods and rest periods with significant deviations and reasons for deviations noted; and

Note. — Significant deviations are described in the Manual for the Oversight of Fatigue Management Approaches (Doc 9966).

g) FRMS outputs including findings from collected data, recommendations, and actions taken.

2. FATIGUE RISK MANAGEMENT PROCESSES

2.1 Identification of hazards

Note.— Legal guidance for the protection of information from safety data collection and processing systems is contained in Appendix 3 to ICAO Annex 19.

The operator shall develop and maintain three fundamental and documented processes for fatigue hazard identification:

2.1.1 Predictive

The predictive process shall identify fatigue hazards by examining crew scheduling and taking into account factors known to affect sleep and fatigue and their effects on performance. Methods of examination may include but are not limited to:

a) Operator or industry operational experience and data collected on similar types of operations;

b) evidence-based scheduling practices; and

c) Bio-mathematical models.

2.1.2 Proactive

The proactive process shall identify fatigue hazards within current flight operations. Methods of examination may include but are not limited to:

a) Self-reporting of fatigue risks;

b) Crew fatigue surveys;

c) Relevant flight and cabin crew performance data;

d) Available safety databases and scientific studies; and

e) Analysis of planned versus actual time worked.

2.1.3 Reactive

The reactive process shall identify the contribution of fatigue hazards to reports and events associated with potential negative safety consequences in order to determine how the impact of fatigue could have been minimized. At a minimum, the process may be triggered by any of the following:

a) Fatigue reports;

b) Confidential reports;

c) Audit reports;

d) Incidents; and

e) Flight data analysis events.

2.2 Risk assessment

2.2.1 The operator shall develop and implement risk assessment procedures that determine the probability and potential severity of fatigue-related events and identify when the associated risks require mitigation.

2.2.2 The risk assessment procedures shall review identified hazards and link them to:

a) Operational processes;

b) Their probability;

c) Possible consequences; and

d) The effectiveness of existing safety barriers and controls.

2.3 Risk mitigation

The operator shall develop and implement risk mitigation procedures that:

a) Select the appropriate mitigation strategies;

b) Implement the mitigation strategies; and

c) Monitor the strategies' implementation and effectiveness.

3. FRMS SAFETY ASSURANCE PROCESSES

The operator shall develop and maintain FRMS safety assurance processes to:

a) Provide for continuous FRMS performance monitoring, analysis of trends, and measurement to validate the effectiveness of the fatigue safety risk controls. The sources of data may include, but are not limited to:

1) Hazard reporting and investigations;
2) Audits and surveys; and
3) Reviews and fatigue studies;

b) Provide a formal process for the management of change which shall include but is not limited to:

1) Identification of changes in the operational environment that may affect FRMS;
2) Identification of changes within the organization that may affect FRMS; and
3) Consideration of available tools which could be used to maintain or improve FRMS performance prior to implementing changes; and

c) Provide for the continuous improvement of the FRMS. This shall include but is not limited to:

1) The elimination and/or modification of risk controls that have had unintended consequences or that are no longer needed due to changes in the operational or organizational environment;

2) Routine evaluations of facilities, equipment, documentation and procedures; and

3) The determination of the need to introduce new processes and procedures to mitigate emerging fatigue-related risks.

4. FRMS PROMOTION PROCESSES

FRMS promotion processes support the ongoing development of the FRMS, the continuous improvement of its overall performance, and attainment of optimum safety levels. The following shall be established and implemented by the operator as part of its FRMS:

a) training programmes to ensure competency commensurate with the roles and responsibilities of management, flight and cabin crew, and all other involved personnel under the planned FRMS; and

b) An effective FRMS communication plan that:

1) Explains FRMS policies, procedures and responsibilities to all relevant stakeholders; and

2) Describes communication channels used to gather and disseminate FRMS-related information.

APPENDIX 8.
FLIGHT RECORDERS
(Chapter 6, 6.3, refers)

The material in this Appendix concerns flight recorders intended for installation in aeroplanes engaged in international air navigation. Crash protected flight recorders comprise one or more of the following systems: a flight data recorder (FDR), a cockpit voice recorder (CVR), an airborne image recorder (AIR) and/or a data link recorder (DLR). Lightweight flight recorders comprise one or more of the following systems: an aircraft data recording system (ADRS), a cockpit audio recording system (CARS), an airborne image recording system (AIRS) and/or a data link recording system (DLRS).

1. GENERAL REQUIREMENTS

1.1 Non-deployable flight recorder containers shall:

a) Be painted a distinctive orange or yellow colour;

b) Carry reflective material to facilitate their location; and

c) Have securely attached an automatically activated underwater locating device operating at a frequency of 37.5 kHz. At the earliest practicable date, but not later than 1 January 2018, this device shall operate for a minimum of 90 days.

Note. — Current industry practice is to phase out yellow flight recorder containers at the end of the service life of the flight recorder.

1.2 Automatic deployable flight recorder containers shall:

a) Be painted a distinctive orange colour, however the surface visible from outside the aircraft may be of another colour;

b) Carry reflective material to facilitate their location; and

c) Have an integrated automatically activated ELT.

1.3 The flight recorder systems shall be installed so that:

a) The probability of damage to the recordings is minimized;

b) They receive electrical power from a bus that provides the maximum reliability for operation of the flight recorder systems without jeopardizing service to essential or emergency loads;

c) There is an aural or visual means for pre-flight checking that the flight recorder systems are operating properly; and

d) If the flight recorder systems have a bulk erasure device, the installation shall be designed to prevent operation of the device during flight time or crash impact.

1.4 The flight recorder systems, when tested by methods approved by the appropriate certificating authority, shall be demonstrated to be suitable for the environmental extremes over which they are designed to operate.

1.5 Means shall be provided for an accurate time correlation between the flight recorder systems recordings.

1.6 The manufacturer shall provide the appropriate certificating authority with the following information in respect of the flight recording systems:

a) Manufacturer's operating instructions, equipment limitations and installation procedures;

b) Parameter origin or source and equations which relate counts to units of measurement; and

c) Manufacturer's test reports.

2. FLIGHT DATA RECORDER (FDR)

2.1 The flight data recorder shall start to record prior to the aeroplane moving under its own power and record continuously until the termination of the flight when the aeroplane is no longer capable of moving under its own power.

2.2 Parameters to be recorded

2.2.1 Flight data recorders shall be classified as Type I, Type IA, Type II and Type IIA depending upon the number of parameters to be recorded and the duration required for retention of the recorded information.

2.2.2 The parameters that satisfy the requirements for FDRs are listed in the paragraphs below. The number of parameters to be recorded shall depend on aeroplane complexity. The parameters without an asterisk (*) are mandatory parameters which shall be recorded regardless of aeroplane complexity. In addition, the parameters designated by an asterisk (*) shall be recorded if an information data source for the parameter is used by aeroplane systems or the flight crew to operate the aeroplane. However, other parameters may be substituted with due regard to the aeroplane type and the characteristics of the recording equipment.

2.2.2.1 The following parameters shall satisfy the requirements for flight path and speed:

— Pressure altitude
— Indicated airspeed or calibrated airspeed
— Air-ground status and each landing gear air-ground sensor when practicable
— Total or outside air temperature
— Heading (primary flight crew reference)
— Normal acceleration
— Lateral acceleration
— Longitudinal acceleration (body axis)
— Time or relative time count
— Navigation data*: drift angle, wind speed, wind direction, latitude/longitude

— Groundspeed*
— Radio altitude*

2.2.2.2 The following parameters shall satisfy the requirements for attitude:

— Pitch attitude
— Roll attitude
— Yaw or sideslip angle*
— Angle of attack*

2.2.2.3 The following parameters shall satisfy the requirements for engine power:

— Engine thrust/power: propulsive thrust/power on each engine, cockpit thrust/power lever position
— Thrust reverse status*
— Engine thrust command*
— Engine thrust target*
— Engine bleed valve position*
— Additional engine parameters*: EPR, N1, indicated vibration level, N2, EGT, TLA, fuel flow, fuel cut-off lever position, N3

2.2.2.4 The following parameters shall satisfy the requirements for configuration:

— Pitch trim surface position
— Flaps*: trailing edge flap position, cockpit control selection
— Slats*: leading edge flap (slat) position, cockpit control selection
— Landing gear*: landing gear, gear selector position
— Yaw trim surface position*
— Roll trim surface position*
— Cockpit trim control input position pitch*
— Cockpit trim control input position roll*
— Cockpit trim control input position yaw*
— Ground spoiler and speed brake*: Ground spoiler position, ground spoiler selection, speed brake position, speed brake selection
— De-icing and/or anti-icing systems selection*
— Hydraulic pressure (each system)*
— Fuel quantity in CG trim tank *
— AC electrical bus status*
— DC electrical bus status*
— APU bleed valve position*
— Computed centre of gravity*

2.2.2.5 The following parameters shall satisfy the requirements for operation:

— Warnings
— Primary flight control surface and primary flight control pilot input: pitch axis, roll axis, yaw axis
— Marker beacon passage
— Each navigation receiver frequency selection
— Manual radio transmission keying and CVR/FDR synchronization reference

— Autopilot/autothrottle/AFCS mode and engagement status*
— Selected barometric setting*: pilot, first officer
— Selected altitude (all pilot selectable modes of operation)*
— Selected speed (all pilot selectable modes of operation)*
— Selected Mach (all pilot selectable modes of operation)*
— Selected vertical speed (all pilot selectable modes of operation)*
— Selected heading (all pilot selectable modes of operation)*
— Selected flight path (all pilot selectable modes of operation)*: course/DSTRK, path angle
— Selected decision height*
— EFIS display format*: pilot, first officer
— Multi-function/engine/alerts display format*
— GPWS/TAWS/GCAS status*: selection of terrain display mode including pop-up display status, terrain alerts, both cautions and warnings, and advisories, on/off switch position
— Low pressure warning*: hydraulic pressure, pneumatic pressure
— Computer failure*
— Loss of cabin pressure*
— TCAS/ACAS (traffic alert and collision avoidance system/airborne collision avoidance system)*
— Ice detection*
— Engine warning each engine vibration*
— Engine warning each engine over temperature*
— Engine warning each engine oil pressure low*
— Engine warning each engine over speed*
— Wind shear warning*
— Operational stall protection, stick shaker and pusher activation*
— All cockpit flight control input forces*: control wheel, control column, rudder pedal cockpit input forces
— Vertical deviation*: ILS glide path, MLS elevation, GNSS approach path
— Horizontal deviation*: ILS localizer, MLS azimuth, GNSS approach path
— DME 1 and 2 distances*
— Primary navigation system reference*: GNSS, INS, VOR/DME, MLS, Loran C, ILS
— Brakes*: left and right brake pressure, left and right brake pedal position
— Date*
— Event marker*
— Head up display in use*
— Para visual display on*

Note.— It is not intended that aeroplanes issued with an individual certificate of airworthiness before 1 January 2016 be modified to meet the range, sampling, accuracy or resolution guidance detailed in this Appendix.

2.2.2.6 Type IA FDR. This FDR shall be capable of recording, as appropriate to the aeroplane, at least the 78 parameters in Table A8-1.

2.2.2.7 Type I FDR. This FDR shall be capable of recording, as appropriate to the aeroplane, at least the first 32 parameters in Table A8-1.

2.2.2.8 Types II and IIA FDRs. These FDRs shall be capable of recording, as appropriate to the aeroplane, at least the first 16 parameters in Table A8-1.

2.2.2.9 The parameters that satisfy the requirements for flight path and speed as displayed to the pilot(s) are listed below. The parameters without an (*) are mandatory parameters which shall be recorded. In addition, the parameters designated by an (*) shall be recorded if an information source for the parameter is displayed to the pilot and is practicable to record:

— Pressure altitude
— Indicated airspeed or calibrated airspeed
— Heading (primary flight crew reference)
— Pitch attitude
— Roll attitude
— Engine thrust/power
— Landing-gear status*
— Total or outside air temperature*
— Time*
— Navigation data*: drift angle, wind speed, wind direction, latitude/longitude
— Radio altitude*

2.3 Additional information

2.3.1 A Type IIA FDR, in addition to a 30-minute recording duration, shall retain sufficient information from the preceding take-off for calibration purposes.

2.3.2 The measurement range, recording interval and accuracy of parameters on installed equipment shall be verified by methods approved by the appropriate certificating authority.

2.3.3 Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability/maintenance information shall be maintained by the operator. The documentation needs to be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.

3. COCKPIT VOICE RECORDER (CVR) AND COCKPIT AUDIO RECORDING SYSTEM (CARS)

3.1 Signals to be recorded

The CVR and CARS shall start to record prior to the aeroplane moving under its own power and record continuously 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 CVR and CARS shall 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.

3.1.1 The CVR shall record on four separate channels, or more, at least the following:

a) Voice communication transmitted from or received in the aeroplane by radio;

b) Aural environment on the flight deck;

c) Voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed;

d) Voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and

e) Voice communication of flight crew members using the passenger address system, if installed

3.1.2 The CARS shall record on two separate channels, or more, at least the following:

a) Voice communication transmitted from or received in the aeroplane by radio;

b) Aural environment on the flight deck; and

c) Voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed.

3.1.3 The CVR shall be capable of recording on at least four channels simultaneously. On a tape-based CVR, to ensure accurate time correlation between channels, the CVR is to record in an in-line format. If a bi-directional configuration is used, the in-line format and channel allocation shall be retained in both directions.

3.1.4 The preferred channel allocation shall be as follows: Channel 1 —co-pilot headphones and live boom microphone Channel 2 —pilot headphones and live boom microphone Channel 3 —area microphone
Channel 4 —time reference plus the third and fourth crew members' headphone and live microphone, if applicable.

Note 1. — Channel 1 is located closest to the base of the recording head.

Note 2.— The preferred channel allocation presumes use of current conventional magnetic tape transport mechanisms, and is specified because the outer edges of the tape have a higher risk of damage than the middle. It is not intended to preclude use of alternative recording media where such constraints may not apply.

4. AUTOMATIC DEPLOYABLE FLIGHT RECORDER (ADFR)

4.1 Operation

The following requirements shall apply to an ADFR:

— Deployment shall take place when the aeroplane structure has been significantly deformed;

— Deployment shall take place when an aeroplane sinks in water;

— ADFR shall not be capable of manual deployment;

— The ADFR shall be able to float on water;

— The ADFR deployment shall not compromise the safe continuation of the flight;

— The ADFR deployment shall not significantly reduce the chance of survival of the recorder and of successful transmission by its ELT;

— The ADFR deployment shall not release more than one piece;

— An alert shall be made to the flight crew when the ADFR is no longer captive to the aircraft;

— The flight crew shall have no means to disable ADFR deployment when the aircraft is airborne;

— The ADFR shall contain an integrated ELT, which shall activate automatically during the deployment sequence. Such ELT may be of a type that is activated in-flight and provides information from which a position can be determined; and

— The integrated ELT of an ADFR shall satisfy the same requirements as an ELT required to be installed on an aeroplane. The integrated ELT shall at least have the same performance as the fixed ELT to maximize detection of the transmitted signal.

Note 1. — Refer to the Manual on Location of Aircraft in Distress and Flight Recorder Data Recovery (Doc 10054) for more information on ADFR.

Note 2. — If an integrated ELT of a type that is activated in flight is used within an ADFR, it could be a means to comply with the requirements of Chapter 6, 6.18.

5. AIRBORNE IMAGE RECORDER (AIR) AND AIRBORNE IMAGE RECORDING SYSTEM (AIRS)

5.1 Classes

5.1.1 A Class A AIR or AIRS captures the general cockpit area in order to provide data supplemental to conventional flight recorders.

Note 1.— To respect crew privacy, the cockpit area view may be designed as far as practical to exclude the head and shoulders of crew members whilst seated in their normal operating position.

Note 2. — There are no provisions for Class A AIR or AIRS in this document.

5.1.2 A Class B AIR or AIRS captures data link message displays.

5.1.3 A Class C AIR or AIRS captures instruments and control panels.

Note.— A Class C AIR or AIRS may be considered as a means for recording flight data where it is not practical or is prohibitively expensive to record on an FDR or an ADRS, or where an FDR is not required.

5.2 Operation

The AIR or AIRS must start to record prior to the aeroplane moving under its own power and record continuously 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

AIR or AIRS 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.

6. DATA LINK RECORDER (DLR)

6.1 Applications to be recorded

6.1.1 Where the aircraft flight path is authorized or controlled through the use of data link messages, all data link messages, both uplinks (to the aircraft) and downlinks (from the aircraft), shall be recorded on the aircraft. As far as practicable, the time the messages were displayed to the flight crew and the time of the responses shall be recorded.

Note. — Sufficient information to derive the content of the data link communications message and the time the messages were displayed to the flight crew is needed to determine an accurate sequence of events on board the aircraft.

6.1.2 Messages applying to the applications listed below shall be recorded. Applications without the asterisk (*) are mandatory applications which shall be recorded regardless of the system complexity. Applications with an (*) shall be recorded only as far as is practicable given the architecture of the system.

— Data link initiation capability
— Controller-pilot data link communications
— Data link flight information services
— Automatic dependent surveillance — contract
— Automatic dependent surveillance — broadcast*
— Aeronautical operational control*.

Note. — Descriptions of the applications are contained in Table A8-2.

7. AIRCRAFT DATA RECORDING SYSTEMS (ADRS)

7.1 Parameters to be recorded

ADRS shall be capable of recording, as appropriate to the aeroplane, at least the essential (E) parameters in Table A8-3.

7.2 Additional information

7.2.1 The measurement range, recording interval and accuracy of parameters on installed equipment is usually verified by methods approved by the appropriate certificating authority.

7.2.2 Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability/maintenance information shall be maintained by the operator. The documentation needs to be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.

8. INSPECTIONS OF FLIGHT RECORDER SYSTEMS

8.1 Prior to the first flight of the day, the built-in test features for the flight recorders and flight data acquisition unit (FDAU), when installed, shall be monitored by manual and/or automatic checks.

8.2 FDR systems or ADRS, CVR systems or CARS, and AIR systems or AIRS shall have recording system inspection intervals of one year; subject to the approval from the appropriate regulatory authority, this period may be extended to two years provided these systems have demonstrated a high integrity of serviceability and self-monitoring.

DLR systems or DLRS shall have recording system inspection intervals of two years; subject to the approval from the appropriate regulatory authority, this period may be extended to four years provided these systems have demonstrated high integrity of serviceability and self-monitoring.

8.3 Recording system inspections shall be carried out as follows:

a) An analysis of the recorded data from the flight recorders shall ensure that the recorder operates correctly for the nominal duration of the recording;

b) The analysis of the FDR or ADRS shall evaluate the quality of the recorded data to determine if the bit error rate (including those errors introduced by recorder, the acquisition unit, the source of the data on the aeroplane and by the tools used to extract the data from the recorder) is within acceptable limits and to determine the nature and distribution of the errors;

c) A complete flight recording from the FDR or ADRS shall be examined in engineering units to evaluate the validity of all recorded parameters.

Particular attention shall be given to parameters from sensors dedicated to the FDR or ADRS. Parameters taken from the aircraft's electrical bus system need not be checked if their serviceability can be detected by other aircraft systems;

d) The readout facility shall have the necessary software to accurately convert the recorded values to engineering units and to determine the status of discrete signals;

e) An examination of the recorded signal on the CVR or CARS shall be carried out by replay of the CVR or CARS recording. While installed in the aircraft, the CVR or CARS shall record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards;

f) Where practicable, during the examination, a sample of in-flight recordings of the CVR or CARS shall be examined for evidence that the intelligibility of the signal is acceptable; and

g) An examination of the recorded images on the AIR or AIRS shall be carried out by replay of the AIR or AIRS recording. While installed in the aircraft, the AIR or AIRS shall record test images from each aircraft source and from relevant external sources to ensure that all required images meet recording quality standards.

8.4 A flight recorder system shall be considered unserviceable if there is a significant period of poor quality data, unintelligible signals, or if one or more of the mandatory parameters is not recorded correctly.

8.5 A report of the recording system inspection shall be made available on request to regulatory authorities for monitoring purposes.

8.6 Calibration of the FDR system:

a) for those parameters which have sensors dedicated only to the FDR and are not checked by other means, recalibration shall be carried out at least every five years or in accordance with the recommendations of the sensor manufacturer to determine any discrepancies in

the engineering conversion routines for the mandatory parameters and to ensure that parameters are being recorded within the calibration tolerances; and

b) When the parameters of altitude and airspeed are provided by sensors that are dedicated to the FDR system, there shall be a recalibration performed as recommended by the sensor manufacturer, or at least every two years.

Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
1	Time (UTC when available, otherwise relative time count or GPS time sync)	24 hours	4	±0.125% per hour	1 second
2	Pressure-altitude	–300 m (–1 000 ft) to maximum certificated altitude of aircraft +1 500 m (+5 000 ft)	1	±30 m to ±200 m (±100 ft to ±700 ft)	1.5 m (5 ft)
3	Indicated airspeed or calibrated airspeed	95 km/h (50 kt) to max V_{So} *(Note 1)* V_{So} to 1.2 V_D *(Note 2)*	1	±5% ±3%	1 kt (0.5 kt recommended)
4	Heading (primary flight crew reference)	360°	1	±2°	0.5°
5	Normal acceleration (*Note 3*)	–3 g to +6 g	0.125	±1% of maximum range excluding datum error of ±5%	0.004 g
6	Pitch attitude	±75° or usable range whichever is greater	0.25	±2°	0.5°
7	Roll attitude	±180°	0.25	±2°	0.5°
8	Radio transmission keying	On-off (one discrete)	1		
9	Power on each engine *(Note 4)*	Full range	1 (per engine)	±2%	0.2% of full range or the resolution required to operate the aircraft
10*	Trailing edge flap and cockpit control selection	Full range or each discrete position	2	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
11*	Leading edge flap and cockpit control selection	Full range or each discrete position	2	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
12*	Thrust reverser position	Stowed, in transit, and reverse	1 (per engine)		
13*	Ground spoiler/speed brake selection (selection and position)	Full range or each discrete position	1	±2% unless higher accuracy uniquely required	0.2% of full range
14	Outside air temperature	Sensor range	2	±2°C	0.3°C
15*	Autopilot/auto throttle/AFCS mode and engagement status	A suitable combination of discretes	1		
16	Longitudinal acceleration (*Note 3*)	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g

Note. — The preceding 16 parameters satisfy the requirements for a Type II FDR.

17	Lateral acceleration (Note 3)	±1 g	0.25	±0.015 g Excluding a datum Error of ±0.05 g	0.004 g

Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
18	Pilot input and/or control surface position-primary controls (pitch, roll, yaw) *(Note 5) (Note 6)*	Full range	0.25	±2° unless higher accuracy uniquely required	0.2% of full range or as installed
19	Pitch trim position	Full range	1	±3% unless higher accuracy uniquely required	0.3% of full range or as installed
20*	Radio altitude	–6 m to 750 m (–20 ft to 2 500 ft)	1	±0.6 m (±2 ft) or ±3% whichever is greater below 150 m (500 ft) and ±5% above 150 m (500 ft)	0.3 m (1 ft) below 150 m (500 ft) 0.3 m (1 ft) + 0.5% of full range above 150 m (500 ft)
21*	Vertical beam deviation (ILS/GPS/GLS glide path, MLS elevation, IRNAV/IAN vertical deviation)	Signal range	1	±3%	0.3% of full range
22*	Horizontal beam deviation (ILS/GPS/GLS localizer, MLS azimuth, IRNAV/IAN lateral deviation)	Signal range	1	±3%	0.3% of full range
23	Marker beacon passage	Discrete	1		
24	Master warning	Discrete	1		
25	Each NAV receiver frequency selection *(Note 7)*	Full range	4	As installed	
26*	DME 1 and 2 distance (includes Distance to runway threshold (GLS) and Distance to missed approach point (IRNAV/IAN)) *(Notes 7 and 8)*	0 – 370 km (0 – 200 NM)	4	As installed	1 852 m (1 NM)
27	Air/ground status	Discrete	1		
28*	GPWS/TAWS/GCAS status (selection of terrain display mode including pop-up display status) and (terrain alerts, both cautions and warnings, and advisories) and (on/off switch position)	Discrete	1		
29*	Angle of attack	Full range	0.5	As installed	0.3 % of full range
30*	Hydraulics, each system (low pressure)	Discrete	2		0.5% of full range
31*	Navigation data (latitude/longitude, ground speed and drift angle) *(Note 9)*	As installed	1	As installed	
32*	Landing gear and gear selector position	Discrete	4	As installed	

Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
33*	Groundspeed	As installed	1	Data should be obtained from the	1 kt

				most accurate system	
34	Brakes (left and right brake pressure, left and right brake pedal position)	(Maximum metered brake range, discretes or full range)	1	±5%	2% of full range
35*	Additional engine parameters (EPR, N_1, indicated vibration level, N_2, EGT, fuel flow, fuel cut-off lever position, N_3)	As installed	Each engine each second	As installed	2% of full range
36*	TCAS/ACAS (traffic alert and collision avoidance system)	Discretes	1	As installed	
37*	Wind shear warning	Discrete	1	As installed	
38*	Selected barometric setting (pilot, co-pilot)	As installed	64	As installed	0.1 mb (0.01 in-Hg)
39*	Selected altitude (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
40*	Selected speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
41*	Selected Mach (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
42*	Selected vertical speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
43*	Selected heading (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
44*	Selected flight path (all pilot selectable modes of operation) (course/DSTRK, path angle, final approach path (IRNAV/IAN))		1	As installed	
45*	Selected decision height	As installed	64	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot, co-pilot)	Discrete(s)	4	As installed	
47*	Multi-function/engine/alerts display format	Discrete(s)	4	As installed	
48*	AC electrical bus status	Discrete(s)	4	As installed	
49*	DC electrical bus status	Discrete(s)	4	As installed	
50*	Engine bleed valve position	Discrete(s)	4	As installed	
51*	APU bleed valve position	Discrete(s)	4	As installed	
52*	Computer failure	Discrete(s)	4	As installed	
53*	Engine thrust command	As installed	2	As installed	
54*	Engine thrust target	As installed	4	As installed	2% of full range
55*	Computed centre of gravity	As installed	64	As installed	1% of full range

Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
56*	Fuel quantity in CG trim tank	As installed	64	As installed	1% of full range
57*	Head up display in use	As installed	4	As installed	
58*	Para visual display on/off	As installed	1	As installed	
59*	Operational stall protection, stick shaker and pusher activation	As installed	1	As installed	
60*	Primary navigation system reference (GNSS, INS, VOR/DME, MLS, Loran C, localizer glideslope)	As installed	4	As installed	
61*	Ice detection	As installed	4	As installed	
62*	Engine warning each engine vibration	As installed	1	As installed	
63*	Engine warning each engine over temperature	As installed	1	As installed	
64*	Engine warning each engine oil pressure low	As installed	1	As installed	
65*	Engine warning each engine over speed	As installed	1	As installed	
66*	Yaw trim surface position	Full range	2	±3% unless higher accuracy uniquely required	0.3% of full range
67*	Roll trim surface position	Full range	2	±3% unless higher accuracy uniquely required	0.3% of full range
68*	Yaw or sideslip angle	Full range	1	±5%	0.5°
69*	De-icing and/or anti-icing systems selection	Discrete(s)	4		
70*	Hydraulic pressure (each system)	Full range	2	±5%	100 psi
71*	Loss of cabin pressure	Discrete	1		
72*	Cockpit trim control input position, Pitch	Full range	1	±5%	0.2% of full range or as installed
73*	Cockpit trim control input position, Roll	Full range	1	±5%	0.2% of full range or as installed
74*	Cockpit trim control input position, Yaw	Full range	1	±5%	0.2% of full range or as installed
75*	All cockpit flight control input forces (control wheel, control column, rudder pedal)	Full range (±311 N (±70 lbf), ± 378 N (±85 lbf), ± 734 N (±165 lbf))	1	±5%	0.2% of full range or as installed
76*	Event marker	Discrete	1		
77*	Date	365 days	64		
78*	ANP or EPE or EPU	As installed	4	As installed	

1. Vso stalling speed or minimum steady flight speed in the landing configuration is in Section "Abbreviations and Symbols".

2. VD design diving speed.

3. Refer to 6.3.1.2.11 for increased recording requirements.

4. Record sufficient inputs to determine power.

5. For aeroplanes with control systems in which movement of a control surface will back drive the pilot's control, ''or'' applies. For aeroplanes with control systems in which movement of a control surface will not back drive the pilot's control, ''and'' applies. In aeroplanes with split surfaces, a suitable combination of inputs is acceptable in lieu of recording each surface separately.

6. Refer to 6.3.1.2.12 for increased recording requirements.
7. If signal available in digital form.

8. Recording of latitude and longitude from INS or other navigation system is a preferred alternative.

9. If signals readily available.

If further recording capacity is available, recording of the following additional information should be considered:

a) Operational information from electronic display systems, such as electronic flight instrument systems (EFIS), electronic centralized aircraft monitor (ECAM) and engine indication 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, ETC.;

3) Warnings and alerts;

4) The identity of displayed pages for emergency procedures and checklists; and

b) Retardation information including brake application for use in the investigation of landing overruns and rejected take-offs.

APPENDIX 9.
LOCATION OF AN AEROPLANE IN DISTRESS
(Chapter 6, 6.18, refers)

1. PURPOSE AND SCOPE

Location of an aeroplane in distress aims at establishing, to a reasonable extent, the location of an accident site within a 6 NM radius.

2. OPERATION

2.1 An aeroplane in distress shall automatically activate the transmission of information from which its position can be determined by the operator and the position information shall contain a time stamp. It shall also be possible for this transmission to be activated manually. The system used for the autonomous transmission of position information shall be capable of transmitting that information in the event of aircraft electrical power loss, at least for the expected duration of the entire flight.

Note. — Guidance on the location of an aeroplane in distress is provided in Attachment K.

2.2 An aircraft is in a distress condition when it is in a state that, if the aircraft behavior event is left uncorrected, can result in an accident. Autonomous transmission of position information shall be active when an aircraft is in a distress condition. This will provide a high probability of locating an accident site to within a 6 NM radius. The operator shall be alerted when an aircraft is in a distress condition with an acceptable low rate of false alerts. In case of a triggered transmission system, initial transmission of position information shall commence immediately or no later than five seconds after the detection of the activation event.

Note 1.— Aircraft behavior events can include, but are not limited to, unusual attitudes, unusual speed conditions, collision with terrain and total loss of thrust/propulsion on all engines and ground proximity warnings.

Note 2. — A distress alert can be triggered using criteria that may vary as a result of aircraft position and phase of flight. Further guidance regarding in-flight event detection and triggering criteria may be found in the EUROCAE ED-237, Minimum Aviation System Performance Specification (MASPS) for Criteria to Detect In-Flight Aircraft Distress Events to Trigger Transmission of Flight Information.

2.3 When an aircraft operator or an air traffic service unit (ATSU) has reason to believe that an aircraft is in distress, coordination shall be established between the ATSU and the aircraft operator.

2.4 The DGCA shall identify the organizations that will require the position information of an aircraft in an emergency phase. These shall include, as a minimum:

a) Air traffic service unit(s) (ATSU); and

b) SAR rescue coordination centre(s) (RCC) and sub-centres.

Note 1. — Refer to ICAO Annex 11 for emergency phase criteria.

Note 2. — Refer to ICAO Annex 12 for required notifications in the event of an emergency phase.

2.5 When autonomous transmission of position information has been activated, it shall only be able to be deactivated using the same mechanism that activated it.

2.6 The accuracy of position information shall, as a minimum, meet the position accuracy requirements established for ELTs.

ATTACHMENT A.
MEDICAL SUPPLIES
Supplementary to Chapter 6, 6.2.2 a)

TYPES, NUMBER, LOCATION AND CONTENTS OF MEDICAL SUPPLIES

1. TYPES

1.1 The different types of medical supplies should be provided as follows: first-aid kit(s) for carriage on all aeroplanes, universal precaution kit(s) for carriage on all aeroplanes that require a cabin crew member, and a medical kit for carriage where the aeroplane is authorized to carry more than 100 passengers on a sector length of more than two hours. Where national regulations allow it, operators may elect to carry the recommended medication in the first-aid kit.

1.2 Based on the limited available evidence, only a very small number of passengers are likely to benefit from the carriage of automated external defibrillators (AED) on aeroplanes. However, many operators carry them because they offer the only effective treatment for cardiac fibrillation. The likelihood of use, and therefore of potential benefit to a passenger, is greatest in aircraft carrying a large number of passengers, over long duration sector lengths. The carriage of AEDs should be determined by operators on the basis of a risk assessment taking into account the particular needs of the operation.

2. NUMBER OF FIRST-AID AND UNIVERSAL PRECAUTION KITS

2.1 First-aid kits

The number of first-aid kits should be appropriate to the number of passengers which the aeroplane is authorized to carry:

Passenger	First-aid kits
0 –100	1
101 – 200	2
201 – 300	3
301 – 400	4
401 – 500	5
More than 500	6

2.2 Universal precaution kits

For routine operations, one or two universal precaution kits should be carried on aircraft that are required to operate with at least one cabin crew member. Additional kit(s) should be made available at times of increased public health risk, such as during an outbreak of a serious communicable disease having pandemic potential. Such kits may be used to clean up any potentially infectious body contents such as blood, urine, vomit and faeces and to protect the cabin crew members who are assisting potentially infectious cases of suspected communicable disease.

3. LOCATION

3.1 First-aid and universal precaution kits should be distributed as evenly as practicable throughout the passenger cabins. They should be readily accessible to cabin crew members.

3.2 The medical kit, when carried, should be stored in an appropriate secure location.

4. CONTENTS

4.1 The following provides guidance on typical contents of first-aid, universal precaution and medical kits.

4.1.1 First-aid kit:

— List of contents
— Antiseptic swabs (10/pack)
— Bandage: adhesive strips
— Bandage: gauze 7.5 cm × 4.5 m
— Bandage: triangular; safety pins
— Dressing: burn 10 cm × 10 cm
— Dressing: compress, sterile 7.5 cm × 12 cm
— Dressing: gauze, sterile 10.4 cm × 10.4 cm
— Tape: adhesive 2.5 cm (roll)
— Steri-strips (or equivalent adhesive strip)
— Hand cleanser or cleansing towelettes
— Pad with shield, or tape, for eye
— Scissors: 10 cm (if allowed by national regulations)
— Tape: Adhesive, surgical 1.2 cm × 4.6 m
— Tweezers: splinter
— Disposable gloves (multiple pairs)
— Thermometers (non-mercury)
— Mouth-to-mouth resuscitation mask with one-way valve
— First-aid manual, current edition
— Incident record form

The following suggested medications can be included in the first-aid kits where permitted by national regulations:

— Mild to moderate analgesic
— Antiemetic
— Nasal decongestant
— Antacid
— Antihistamine

4.1.2 Universal precaution kit:

— Dry powder that can convert small liquid spill into a sterile granulated gel
— Germicidal disinfectant for surface cleaning
— Skin wipes
— Face/eye mask (separate or combined)
— Gloves (disposable)
— Protective apron
— Large absorbent towel
— Pick-up scoop with scraper
— Bio-hazard disposal waste bag
— Instructions

4.1.3 Medical kit:

Equipment

— List of contents
— Stethoscope
— Sphygmomanometer (electronic preferred)
— Airways, oropharyngeal (three sizes)
— Syringes (appropriate range of sizes)
— Needles (appropriate range of sizes)
— Intravenous catheters (appropriate range of sizes)
— Antiseptic wipes
— Gloves (disposable)
— Needle disposal box
— Urinary catheter
— System for delivering intravenous fluids
— Venous tourniquet
— Sponge gauze
— Tape – adhesive
— Surgical mask
— Emergency tracheal catheter (or large gauge intravenous cannula)
— Umbilical cord clamp
— Thermometers (non-mercury)
— Basic life support cards
— Bag-valve mask
— Flashlight and batteries

Medication

— Epinephrine 1:1 000
— Antihistamine – injectable
— Dextrose 50% (or equivalent) – injectable: 50 ml
— Nitroglycerin tablets, or spray
— Major analgesic
— Sedative anticonvulsant – injectable
— Antiemetic – injectable
— Bronchial dilator – inhaler
— Atropine – injectable
— Adrenocortical steroid – injectable
— Diuretic – injectable
— Medication for postpartum bleeding
— Sodium chloride 0.9% (minimum 250 ml)
— Acetyl salicylic acid (aspirin) for oral use
— Oral beta blocker

If a cardiac monitor is available (with or without an AED) add to the above list:

— Epinephrine 1:10 000 (can be a dilution of epinephrine 1:1 000)

Note.— The United Nations Conference for Adoption of a Single Convention on Narcotic Drugs in March 1961 adopted such a Convention, Article 32 of which contains special provisions concerning the carriage of drugs in medical kits of aircraft engaged in international flight.

ATTACHMENT B.
AEROPLANE PERFORMANCE OPERATING LIMITATIONS

1. PURPOSE AND SCOPE

The purpose of this Attachment is to provide guidance as to the level of performance intended by the provisions of Chapter 5 as applicable to turbine-powered subsonic transport type aeroplanes over 5 700 kg maximum certificated take-off mass having two or more engines. However, where relevant, it can be applied to all subsonic turbine-powered or piston-engine aeroplanes having two, three or four engines. Piston-engine aeroplanes having two, three or four engines which cannot comply with this Attachment may continue to be operated in accordance with Examples 1 or 2 of this Attachment.

Note.— This Attachment is not intended for application to aeroplanes having short take-off and landing (STOL) or vertical take-off and landing (VTOL) capabilities.

2. DEFINITIONS

Accelerate-stop distance available (ASDA). The length of the take-off run available plus the length of the stopway, if provided.

CAS (calibrated airspeed). The calibrated airspeed is equal to the airspeed indicator reading corrected for position and instrument error. (As a result of the sea level adiabatic compressible flow correction to the airspeed instrument dial, CAS is equal to the true airspeed (TAS) in Standard Atmosphere at sea level.)

Declared temperature. A temperature selected in such a way that when used for performance purposes, over a series of operations, the average level of safety is not less than would be obtained by using official forecast temperatures.

Expected. Used in relation to various aspects of performance (e.g. rate or gradient of climb), this term means the standard performance for the type, in the relevant conditions (e.g. mass, altitude and temperature).

Grooved or porous friction course runway. A paved runway that has been prepared with lateral grooving or a porous friction course (PFC) surface to improve braking characteristics when wet.

Height. The vertical distance of a level, a point, or an object considered as a point, measured from a specified datum.

Note. — For the purposes of this example, the point referred to above is the lowest part of the aeroplane and the specified datum is the take-off or landing surface, whichever is applicable.

Landing distance available (LDA). The length of runway which is declared available and suitable for the ground run of an aeroplane landing.

Landing surface. That part of the surface of an aerodrome which the aerodrome authority has declared available for the normal ground or water run of aircraft landing in a particular direction.

Net gradient. The net gradient of climb throughout these requirements is the expected gradient of climb diminished by the manoeuvre performance (i.e. that gradient of climb necessary to provide power to manoeuvre) and by the margin (i.e. that gradient of climb necessary to provide for those variations in performance which are not expected to be taken explicit account of operationally).

Reference humidity. The relationship between temperature and reference humidity is defined as follows:

— At temperatures at and below ISA, 80 per cent relative humidity,
— At temperatures at and above ISA + 28° C, 34 per cent relative humidity,
— At temperatures between ISA and ISA + 28° C, the relative humidity varies linearly between the humidity specified for those temperatures.

Runway surface condition. The state of the surface of the runway: either dry, wet, or contaminated:

a) Contaminated runway. A runway is contaminated when more than 25 per cent of the runway surface area (whether in isolated areas or not) within the required length and width being used is covered by:

— Water, or slush more than 3 mm (0.125 in) deep;
— Loose snow more than 20 mm (0.75 in) deep; or
— Compacted snow or ice, including wet ice.

b) Dry runway. A dry runway is one which is clear of contaminants and visible moisture within the required length and the width being used.

c) Wet runway. A runway that is neither dry nor contaminated.

Note 1. — In certain situations, it may be appropriate to consider the runway contaminated even when it does not meet the above definition. For example, if less than 25 per cent of the runway surface area is covered with water, slush, snow or ice, but it is located where rotation or lift-off will occur, or during the high speed part of the take-off roll, the effect will be far more significant than if it were encountered early in take-off while at low speed. In this situation, the runway should be considered to be contaminated.

Note 2.— Similarly, a runway that is dry in the area where braking would occur during a high speed rejected take-off, but damp or wet (without measurable water depth) in the area where acceleration would occur, may be considered to be dry for computing take-off performance. For example, if the first 25 per cent of the runway was damp, but the remaining runway length was dry, the runway would be wet using the definitions above. However, since a wet runway does not affect acceleration, and the braking portion of a rejected take-off would take place on a dry surface, it would be appropriate to use dry runway take-off performance.

Take-off distance available (TODA). The length of the take-off run available plus the length of the clearway, if provided.

Take-off run available (TORA). The length of runway declared available and suitable for the ground run of an aeroplane taking off.

Take-off surface. That part of the surface of an aerodrome which the aerodrome authority has declared available for the normal ground or water run of aircraft taking off in a particular direction.

TAS (True airspeed). The speed of the aeroplane relative to undisturbed air.

Vso. A stalling speed or minimum steady flight speed in the landing configuration. (Note. — See Example 1, 2.4.)

V_{S_1}. A stalling speed or minimum steady flight speed. (Note. — See Example 1, 2.5.)

Note 1. — See Chapter 1 and ICAO Annexes 8 and 14, Volume I, for other definitions.

Note 2.— The terms "accelerate-stop distance", "take-off distance", "V1", "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", as relating to the aeroplane, have their meanings defined in the airworthiness requirements under which the aeroplane was certificated. If any of these definitions are found inadequate, then a definition specified by the DGCA should be used.

3. GENERAL

3.1 The provisions of 4 to 7 should be complied with, unless deviations therefrom are specifically authorized by the DGCA on the grounds that the special circumstances of a particular case make a literal observance of these provisions unnecessary for safety.

3.2 Compliance with 4 to 7 should be established using performance data in the flight manual and in accordance with other applicable operating requirements. In no case should the limitations in the flight manual be exceeded.
However, additional limitations may be applied when operational conditions not included in the flight manual are encountered. The performance data contained in the flight manual may be supplemented with other data acceptable to the DGCA if necessary to show compliance with 4 to 7. When applying the factors prescribed in this Attachment, account may be taken of any operational factors already incorporated in the flight manual data to avoid double application of factors.

3.3 The procedures scheduled in the flight manual should be followed except where operational circumstances require the use of modified procedures in order to maintain the intended level of safety.

Note. — See the Airworthiness Manual (Doc 9760) for the related airworthiness performance guidance material.

4. AEROPLANE TAKE-OFF PERFORMANCE LIMITATIONS

4.1 No aeroplane should commence a take-off at a mass which exceeds the take-off mass specified in the flight manual for the altitude of the aerodrome and for the ambient temperature existing at the time of the take-off.

4.2 No aeroplane should commence a take-off at a mass such that, allowing for normal consumption of fuel and oil in flight to the aerodrome of destination and to the destination alternate aerodromes, the mass on arrival will exceed the landing mass specified in the flight manual for the altitude of each of the aerodromes involved and for the ambient temperatures anticipated at the time of landing.

4.3 No aeroplane should commence a take-off at a mass which exceeds the mass at which, in accordance with the minimum distances for take-off scheduled in the flight manual, compliance with 4.3.1 to 4.3.3 inclusive is shown.

4.3.1 The take-off run required should not exceed the take-off run available.

4.3.2 The accelerate-stop distance required should not exceed the accelerate-stop distance available.

4.3.3 The take-off distance required should not exceed the take-off distance available.

4.3.4 When showing compliance with 4.3 the same value of V1 for the continued and discontinued take-off phases should be used.

4.4 When showing compliance with 4.3 the following parameters should be taken into account:

a) The pressure altitude at the aerodrome;
b) The ambient temperature at the aerodrome;
c) The runway surface condition and the type of the runway surface;
d) The runway slope in the direction of the take-off;
e) The runway slope;
f) Not more than 50 per cent of the reported headwind component or not less than 150 per cent of the reported tailwind component; and
g) The loss, if any, of runway length due to alignment of the aeroplane prior to take-off.

4.5 Credit is not taken for the length of the stopway or the length of the clearway unless they comply with the relevant specifications in ICAO Annex 14, Volume I.

5. TAKE-OFF OBSTACLE CLEARANCE LIMITATIONS

5.1 No aeroplane should commence a take-off at a mass in excess of that shown in the flight manual to correspond with a net take-off flight path which clears all obstacles either by at least a height of 10.7 m (35 ft) vertically or at least 90 m (300 ft) plus 0.125D laterally, where D is the horizontal distance the aeroplane has travelled from the end of take-off distance available, except as provided in 5.1.1 to 5.1.3 inclusive.

For aeroplanes with a wingspan of less than 60 m (200 ft) a horizontal obstacle clearance of half the aeroplane wingspan plus 60 m (200 ft), plus 0.125D may be used.

In determining the allowable deviation of the net take-off flight path in order to avoid obstacles by at least the distances specified, it is assumed that the aeroplane is not banked before the clearance of the net take-off flight path above obstacles is at least one half of the

wingspan but not less than 15.2 m (50 ft) height and that the bank thereafter does not exceed 15°, except as provided in 5.1.4.

The net take-off flight path considered is for the altitude of the aerodrome and for the ambient temperature and not more than 50 per cent of the reported headwind component or not less than 150 per cent of the reported tailwind component existing at the time of take-off. The take-off obstacle accountability area defined above is considered to include the effect of crosswinds.

5.1.1 Where the intended track does not include any change of heading greater than 15°,

a) For operations conducted in VMC by day, or
b) For operations conducted with navigation aids such that the pilot can maintain the aeroplane on the intended track with the same precision as for operations specified in 5.1.1 a),

Obstacles at a distance greater than 300 m (1 000 ft) on either side of the intended track need not be cleared.

5.1.2 Where the intended track does not include any change of heading greater than 15° for operations conducted in IMC, or in VMC by night, except as provided in 5.1.1 b); and where the intended track includes changes of heading greater than 15° for operations conducted in VMC by day, obstacles at a distance greater than 600 m (2 000 ft) on either side of the intended track need not be cleared.

5.1.3 Where the intended track includes changes of heading greater than 15° for operations conducted in IMC, or in VMC by night, obstacles at a distance greater than 900 m (3 000 ft) on either side of the intended track need not be cleared.

5.1.4 An aeroplane may be operated with bank angles of more than 15° below 120 m (400 ft) above the elevation of the end of the take-off run available, provided special procedures are used that allow the pilot to fly the desired bank angles safely under all circumstances. Bank angles should be limited to not more than 20° between 30 m (100 ft) and 120 m (400 ft), and not more than 25° above 120 m (400 ft). Methods approved by the DGCA should be used to account for the effect of bank angle on operating speeds and flight path including the distance increments resulting from increased operating speeds. The net take-off flight path in which the aeroplane is banked by more than 15° should clear all obstacles by a vertical distance of at least 10.7 m (35 ft) relative to the lowest part of the banked aeroplane within the horizontal distance specified in 5.1. The use of bank angles greater than those mentioned above should be subject to the approval from the DGCA.

6. EN-ROUTE LIMITATIONS

6.1 General

At no point along the intended track is an aeroplane having three or more engines to be more than 90 minutes at normal cruising speed away from an aerodrome at which the distance specifications for alternate aerodromes (see 7.3) are complied with and where it is expected that a safe landing can be made, unless it complies with 6.3.1.1.

6.2 One engine inoperative

6.2.1 No aeroplane should commence a take-off at a mass in excess of that which, in accordance with the one-engine- inoperative en-route net flight path data shown in the flight manual, permits compliance either with 6.2.1.1 or 6.2.1.2 at all points along the route.
The net flight path has a positive slope at 450 m (1 500 ft.) above the aerodrome where the landing is assumed to be made after engine failure. The net flight path used is for the ambient temperatures anticipated along the route.
In meteorological conditions where icing protection systems are to be operable, the effect of their use on the net flight path data is taken into account.

6.2.1.1 The slope of the net flight path is positive at an altitude of at least 300 m (1 000 ft) above all terrain and obstructions along the route within 9.3 km (5 NM) on either side of the intended track.

6..2.1.2 The net flight path is such as to permit the aeroplane to continue flight from the cruising altitude to an aerodrome where a landing can be made in accordance with 7.3, the net flight path clearing vertically, by at least 600 m (2 000 ft.), all terrain and obstructions along the route within 9.3 km (5 NM) on either side of the intended track. The provisions of 6.2.1.2.1 to 6.2.1.2.5 inclusive are applied.

6.2.1.2.1 The engine is assumed to fail at the most critical point along the route, allowance being made for indecision and navigational error.

6.2.1.2.2 Account is taken of the effects of winds on the flight path.

6.2.1.2.3 Fuel jettisoning is permitted to an extent consistent with reaching the aerodrome with satisfactory fuel reserves, if a safe procedure is used.

6.2.1.2.4 The aerodrome, where the aeroplane is assumed to land after engine failure, is specified in the operational flight plan, and it meets the appropriate aerodrome operating minima at the expected time of use.

6.2.1.2.5 The consumption of fuel and oil after the engine becomes inoperative is that which is accounted for in the net flight path data shown in the flight manual.

6.3 Two engines inoperative — aeroplanes with three or more engines

6.3.1 Aeroplanes which do not comply with 6.1 should comply with 6.3.1.1.

6.3.1.1 No aeroplane should commence a take-off at a mass in excess of that which, according to the two-engine inoperative en-route net flight path data shown in the flight manual, permits the aeroplane to continue the flight from the point where two engines are assumed to fail simultaneously, to an aerodrome at which the landing distance specification for alternate aerodromes (see 7.3) is complied with and where it is expected that a safe landing can be made.
The net flight path clears vertically, by at least 600 m (2 000 ft) all terrain and obstructions along the route within 9.3 km (5 NM) on either side of the intended track. The net flight path considered is for the ambient temperatures anticipated along the route. In altitudes and meteorological conditions where icing protection systems are to be operable, the effect of their use on the net flight path data is taken into account. The provisions of 6.3.1.1.1 to 6.3.1.1.5 inclusive apply.

6.3.1.1.1 The two engines are assumed to fail at the most critical point of that portion of the route where the aeroplane is at more than 90 minutes at normal cruising speed away

from an aerodrome at which the landing distance specification for alternate aerodromes (see 7.3) is complied with and where it is expected that a safe landing can be made.

6.3.1.1.2 The net flight path has a positive slope at 450 m (1 500 ft) above the aerodrome where the landing is assumed to be made after the failure of two engines.

6.3.1.1.3 Fuel jettisoning is permitted to an extent consistent with 6.3.1.1.4, if a safe procedure is used.

6.3.1.1.4 The aeroplane mass at the point where the two engines are assumed to fail is considered to be not less than that which would include sufficient fuel to proceed to the aerodrome and to arrive there at an altitude of at least 450 m (1 500 ft) directly over the landing area and thereafter to fly for 15 minutes at cruise power and/or thrust.

6.3.1.1.5 The consumption of fuel and oil after the engines become inoperative is that which is accounted for in the net flight path data shown in the flight manual.

7. LANDING LIMITATIONS

7.1 Aerodrome of destination — dry runways

7.1.1 No aeroplane should commence a take-off at a mass in excess of that which permits the aeroplane to be brought to a full stop landing at the aerodrome of intended destination from 15.2 m (50 ft) above the threshold:

a) For turbo jet powered aeroplanes, within 60 per cent of the landing distance available; and

b) For turbo-propeller aeroplanes, within 70 per cent of the landing distance available.

The mass of the aeroplane is assumed to be reduced by the mass of the fuel and oil expected to be consumed in flight to the aerodrome of intended destination. Compliance is shown with 7.1.1.1 and with either 7.1.1.2 or 7.1.1.3.

7.1.1.1 It is assumed that the aeroplane is landed on the most favourable runway and in the most favourable direction in still air.

7.1.1.2 It is assumed that the aeroplane is landed on the runway which is the most suitable for the wind conditions anticipated at the aerodrome at the time of landing, taking due account of the probable wind speed and direction, of the ground handling characteristics of the aeroplane, and of other conditions (i.e. landing aids, terrain).

7.1.1.3 If full compliance with 7.1.1.2 is not shown, the aeroplane may be taken off if a destination alternate aerodrome is designated which permits compliance with 7.3.

7.1.1.4 When showing compliance with 7.1.1 at least the following factors should be taken into account:

a) The pressure altitude of the aerodrome;
b) The runway slope in the direction of the landing if greater than ±2.0 per cent; and

c) Not more than 50 per cent of the headwind component or not less than 150 per cent of the tailwind component.

7.2 Aerodrome of destination — wet or contaminated runways

7.2.1 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 should be at least 115 per cent of the required landing distance determined in accordance with 7.1.

7.2.2 A landing distance on a wet runway shorter than that required by 7.2.1 but not less than that required by 7.1 may be used if the flight manual includes specific additional information about landing distance on wet runways.

7.2.3 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 should be the greater of:

a) The landing distance determined in accordance with 7.2.1; or

b) The landing distance determined in accordance with contaminated landing distance data with a safety margin acceptable to the DGCA.

7.2.4 If compliance with 7.2.3 is not shown, the aeroplane may take off if a destination alternate aerodrome is designated for which compliance is shown with 7.2.3 and 7.3.

7.2.5 When showing compliance with 7.2.2 and 7.2.3, the criteria of 7.1 should be applied accordingly. However, 7.1.1 a) and b) need not be applied to the wet and contaminated runway landing distance determination required by 7.2.2 and 7.2.3.

7.3 Destination alternate aerodrome

No aerodrome should be designated as a destination alternate aerodrome unless the aeroplane, at the mass anticipated at the time of arrival at such aerodrome, can comply with 7.1 and either 7.2.1 or 7.2.2, in accordance with the landing distance required for the altitude of the alternate aerodrome and in accordance with other applicable operating requirements for the alternate aerodrome.

7.4 Performance considerations before landing

The operator should provide the flight crew with a method to ensure that a full stop landing, with a safety margin acceptable to the DGCA, that is at least the minimum specified in the Type Certificate holder's aircraft flight manual (AFM), or equivalent, can be made on the runway to be used in the conditions existing at the time of landing and with the deceleration means that will be used.

EXAMPLE 1

1. PURPOSE AND SCOPE

The purpose of the following example is to illustrate the level of performance intended by the provisions of Chapter 5 as applicable to the types of aeroplanes described below.

The Standards and Recommended Practices in ICAO Annex 6 effective on 14 July 1949 contained specifications similar to those adopted by some Contracting States for inclusion in their national performance codes. A very substantial number of civil transport aeroplanes

have been manufactured and are being operated in accordance with these codes. Those aeroplanes are powered with reciprocating engines including turbo-compound design. They embrace twin-engined and four-engined
aeroplanes over a mass range from approximately 4 200 kg to 70 000 kg over a stalling speed range, Vso from approximately 100 to 175 km/h (55 to 95 Kts) and over a wing loading range from approximately 120 to 360 kg/m2. Cruising speeds range over 555 km/h (300 Kts). Those aeroplanes have been used in a very wide range of altitude, air temperature and humidity conditions. At a later date, the code was applied with respect to the evaluation of certification of the so-called "first generation" of turboprop and turbo-jet aeroplanes.

Although only past experience can warrant the fact that this example illustrates the level of performance intended by the Standards and Recommended Practices of Chapter 5, it is considered to be applicable over a wide range of aeroplane characteristics and atmospheric conditions. Reservation should however be made concerning the application of this example with respect to conditions of high air temperatures. In certain extreme cases, it has been found desirable to apply additional temperature and/or humidity accountability, particularly for the obstacle limited take-off flight path.

This example is not intended for application to aeroplanes having short take-off and landing (STOL) or vertical take-off and landing (VTOL) capabilities.

No detailed study has been made of the applicability of this example to operations in all-weather conditions. The validity of this example has not therefore been established for operations which may involve low decision heights and be associated with low minima operating techniques and procedures.

2. STALLING SPEED — MINIMUM STEADY FLIGHT SPEED

2.1 For the purpose of this example, the stalling speed is the speed at which an angle of attack greater than that of maximum lift is reached, or, if greater, the speed at which a large amplitude pitching or rolling motion, not immediately controllable, is encountered, when the manoeuvre described in 2.3 is executed.

Note. — It should be noted that an uncontrollable pitching motion of small amplitude associated with pre-stall buffeting does not necessarily indicate that the stalling speed has been reached.

2.2 The minimum steady flight speed is that obtained while maintaining the elevator control in the most rearward possible position when the manoeuvre described in 2.3 is executed. This speed would not apply when the stalling speed defined in 2.1 occurs before the elevator control reaches its stops.

2.3 Determination of stalling speed — minimum steady flight speed

2.3.1 The aeroplane is trimmed for a speed of approximately 1.4VS1. From a value sufficiently above the stalling speed to ensure that a steady rate of decrease is obtainable, the speed is reduced in straight flight at a rate not exceeding 0.5 m/s2 (1 Kt/s) until the stalling speed or the minimum steady flight speed, defined in 2.1 and 2.2, is reached.

2.3.2 For the purpose of measuring stalling speed and minimum steady flight speed, the instrumentation is such that the probable error of measurement is known.

2.4 Vso denotes the stalling speed if obtained in flight tests conducted in accordance with 2.3, or the minimum steady flight speed, CAS, as defined in 2.2, with:

a) Engines at not more than sufficient power for zero thrust at a speed not greater than 110 per cent of the stalling speed;

b) Propeller pitch controls in the position recommended for normal use during take-off;

c) Landing gear extended;

d) Wing flaps in the landing position;

e) Cowl flaps and radiator shutters closed or nearly closed;

f) Centre of gravity in that position within the permissible landing range which gives the maximum value of stalling speed or of minimum steady flight speed;

g) Aeroplane mass equal to the mass involved in the specification under consideration.

2.5 Vs1 denotes the stalling speed if obtained in flight tests conducted in accordance with 2.3, or the minimum steady flight speed, CAS, as defined in 2.2, with:

a) Engines at not more than sufficient power for zero thrust at a speed not greater than 110 per cent of the stalling speed;

b) Propeller pitch controls in the position recommended for normal use during take-off;

c) Aeroplane in the configuration in all other respects and at the mass prescribed in the specification under consideration.

3. TAKE-OFF

3.1 Mass

The mass of the aeroplane at take-off is not to exceed the maximum take-off mass specified in the flight manual for the altitude at which the take-off is to be made.

3.2 Performance

The performance of the aeroplane as determined from the information contained in the flight manual is such that:

a) The accelerate-stop distance required does not exceed the accelerate-stop distance available;

b) The take-off distance required does not exceed the take- off distance available;

c) The take-off path provides a vertical clearance of not less than 15.2 m up to D = 500 m (50 ft up to D = 1 500 ft) and 15.2 + 0.01 [D – 500] m (50 + 0.01 [D – 1 500] ft) thereafter,

above all obstacles lying within 60 m plus half the wing span of the aeroplane plus 0.125D on either side of the flight path, except that obstacles lying beyond 1 500 m on either side of the flight path need not be cleared.

The distance D is the horizontal distance that the aeroplane has travelled from the end of the take-off distance available.

Note.— This need not be carried beyond the point at which the aeroplane would be able, without further gaining in height, to commence a landing procedure at the aerodrome of take-off or, alternatively, has attained the minimum safe altitude for commencing flight to another aerodrome.

However, the lateral obstacle clearance is liable to be reduced (below the values stated above) when, and to the extent that, this is warranted by special provisions or conditions which assist the pilot to avoid inadvertent lateral deviations from the intended flight path. For example, particularly in poor weather conditions, a precise radio aid may assist the pilot to maintain the intended flight path. Also, when the take-off is made in sufficiently good visibility conditions, it may, in some cases, be possible to avoid obstacles which are clearly visible but may be within the lateral limits noted in 3.2 c).

Note 1. — The procedures used in defining the accelerate-stop distance required, the take-off distance required and the take-off flight path are described in the Appendix to this example.

Note 2. — In some national codes similar to this example, the specification for "performance" at take-off is such that no credit can be taken for any increase in length of accelerate-stop distance available and take-off distance available beyond the length specified in Section 1 for take-off run available. Those codes specify a vertical clearance of not less than 15.2 m (50 ft) above all obstacles lying within 60 m on either side of the flight path while still within the confines of the aerodrome, and 90 m on either side of the flight path when outside those confines.

It is to be observed that those codes are such that they do not provide for an alternative to the method of elements (see the Appendix to this example) in the determination of the take-off path. It is considered that those codes are compatible with the general intent of this example.

3.3 Conditions

For the purpose of 3.1 and 3.2, the performance is that corresponding to:

a) The mass of the aeroplane at the start of take-off;
b) An altitude equal to the elevation of the aerodrome; and for the purpose of 3.2:
c) The ambient temperature at the time of take-off for 3.2 a) and b) only;
d) The runway slope in the direction of take-off (landplanes);
e) Not more than 50 per cent of the reported wind component opposite to the direction of take-off, and not less than 150 per cent of the reported wind component in the direction of take-off. In certain cases of operation of seaplanes, it has been found necessary to take account of the reported wind component normal to the direction of take-off.

3.4 Critical point

In applying 3.2 the critical point chosen for establishing compliance with 3.2 a) is not nearer to the starting point than that used for establishing compliance with 3.2 b) and 3.2 c).

3.5 Turns

In case the flight path includes a turn with bank greater than 15 degrees, the clearances specified in 3.2 c) are increased by an adequate amount during the turn, and the distance D is measured along the intended track.

4. EN ROUTE

4.1 One engine inoperative

4.1.1 At all points along the route or planned diversion therefrom, the aeroplane is capable, at the minimum flight altitudes en route, of a steady rate of climb with one engine inoperative, as determined from the flight manual, of at least

1) $K\left(\frac{V_{s_o}}{185.2}\right)^2$ m/s, V_{s_o} being expressed in km/h;

2) $K\left(\frac{V_{s_o}}{100}\right)^2$ m/s, V_{s_o} being expressed in kt;

3) $K\left(\frac{V_{s_o}}{100}\right)^2$ ft/min, V_{s_o} being expressed in kt;

and K having the following value:

$K = 4.04 - \frac{5.40}{N}$ in the case of 1) and 2); and

$K = 797 - \frac{1\,060}{N}$ in the case of 3)

where N is the number of engines installed.

It should be noted that minimum flight altitudes are usually considered to be not less than 300 m (1 000 ft) above terrain along and adjacent to the flight path.

4.1.2 As an alternative to 4.1.1 the aeroplane is operated at an all engines operating altitude such that, in the event of an engine failure, it is possible to continue the flight to an aerodrome where a landing can be made in accordance with 5.3, the flight path clearing all terrain and obstructions along the route within 8 km (4.3 NM) on either side of the intended track by at least 600 m (2 000 ft). In addition, if such a procedure is utilized, the following provisions are complied with:

a) The rate of climb, as determined from the flight manual for the appropriate mass and altitude, used in calculating the flight path is diminished by an amount equal to

1) $K\left(\frac{V_{s_o}}{185.2}\right)^2$ m/s, V_{s_o} being expressed in km/h;

2) $K\left(\frac{V_{s_o}}{100}\right)^2$ m/s, V_{s_o} being expressed in kt;

3) $K\left(\frac{V_{s_o}}{100}\right)^2$ ft/min, V_{s_o} being expressed in kt;

and K having the following value:

$K = 4.04 - \frac{5.40}{N}$ in the case of 1) and 2); and

$K = 797 - \frac{1\,060}{N}$ in the case of 3)

where N is the number of engines installed.

b) The aeroplane complies with 4.1.1 at 300 m (1 000 ft) above the aerodrome used as an alternate in this procedure;

c) After the engine failure considered, account is taken of the effect of winds and temperatures on the flight path;

d) It is assumed that the mass of the aeroplane as it proceeds along its intended track is progressively reduced by normal consumption of fuel and oil;

e) It is customary to assume such fuel jettisoning as is consistent with reaching the aerodrome in question.

4.2 Two engines inoperative

(Applicable only to aeroplanes with four engines)

The possibility of two engines becoming inoperative when the aeroplane is more than 90 minutes at all engines operating cruising speed from an en-route alternate aerodrome is catered for. This is done by verifying that at whatever such point such a double failure may occur, the aeroplane in the configuration and with the engine power specified in the flight manual can thereafter reach the alternate aerodrome without coming below the minimum flight altitude. It is customary to assume such fuel jettisoning as is consistent with reaching the aerodrome in question.

5. LANDING

5.1 Mass

The calculated mass for the expected time of landing at the aerodrome of intended landing or any destination alternate aerodrome is not to exceed the maximum specified in the flight manual for the elevation of that aerodrome.

5.2 Landing distance

5.2.1 Aerodrome of intended landing

The landing distance at the aerodrome of the intended landing, as determined from the flight manual, is not to exceed 60 per cent of the landing distance available on:

a) The most suitable landing surface for a landing in still air; and, if more severe,

b) Any other landing surface that may be required for landing because of expected wind conditions at the time of arrival.

5.2.2 Alternate aerodromes

The landing distance at any alternate aerodrome, as determined from the flight manual, is not to exceed 70 per cent of the landing distance available on:

a) The most suitable landing surface for a landing in still air; and, if more severe,

b) Any other landing surface that may be required for landing because of expected wind conditions at the time of arrival.

Note. — The procedure used in determining the landing distance is described in the Appendix to this example.

5.3 Conditions

For the purpose of 5.2, the landing distances are not to exceed those corresponding to:

a) The calculated mass of the aeroplane for the expected time of landing;

b) An altitude equal to the elevation of the aerodrome;

c) For the purpose of 5.2.1 a) and 5.2.2 a), still air;

d) For the purpose of 5.2.1 b) and 5.2.2 b), not more than 50 per cent of the expected wind component along the landing path and opposite to the direction of landing and not less than 150 per cent of the expected wind component in the direction of landing.

APPENDIX TO EXAMPLE 1 ON AEROPLANE PERFORMANCE OPERATING LIMITATIONS — PROCEDURES USED IN DETERMINING TAKE-OFF AND LANDING PERFORMANCE

1. GENERAL

1.1 Unless otherwise specified, Standard Atmosphere and still air conditions are applied.

1.2 Engine powers are based on a water vapour pressure corresponding to 80 per cent relative humidity in standard conditions. When performance is established for temperature above standard, the water vapour pressure for a given altitude is assumed to remain at the value stated above for standard atmospheric conditions.

1.3 Each set of performance data required for a particular flight condition is determined with the engine accessories absorbing the normal amount of power appropriate to that flight condition.

1.4 Various wing flap positions are selected. These positions are permitted to be made variable with mass, altitude and temperature in so far as this is considered consistent with acceptable operating practices.

1.5 The position of the centre of gravity is selected within the permissible range so that the performance achieved in the configuration and power indicated in the specification under consideration is a minimum.

1.6 The performance of the aeroplane is determined in such a manner that under all conditions the approved limitations for the engine are not exceeded.

1.7 The determined performance is so scheduled that it can serve directly in showing compliance with the aeroplane performance operating limitations.

2. TAKE-OFF

2.1 General

2.1.1 The take-off performance data are determined:

a) For the following conditions:

1) Sea level;

2) Aeroplane mass equal to the maximum take-off mass at sea level;

3) Level, smooth, dry and hard take-off surfaces (landplanes);

4) Smooth water of declared density (seaplanes);

b) Over selected ranges of the following variables:

1) Atmospheric conditions, namely: altitude and also pressure-altitude and temperature;

2) Aeroplane mass;

3) steady wind velocity parallel to the direction of take-off;

4) steady wind velocity normal to the direction of take-off (seaplanes);

5) Uniform take-off surface slope (landplanes);

6) Type of take-off surface (landplanes);

7) Water surface condition (seaplanes);

8) Density of water (seaplanes);

9) Strength of current (seaplanes).

2.1.2 The methods of correcting the performance data to obtain data for adverse atmospheric conditions include appropriate allowance for any increased airspeeds and cowl flap or radiator shutter openings necessary under such conditions to maintain engine temperatures within appropriate limits.

2.1.3 For seaplanes appropriate interpretations of the term landing gear, etc., are made to provide for the operation of retractable floats, if employed.

2.2 Take-off safety speed

2.2.1 The take-off safety speed is an airspeed (CAS) so selected that it is not less than:

a) 1.20 V_{S1}, for aeroplanes with two engines;
b) 1.15 V_{S1}, for aeroplanes having more than two engines;
c) 1.10 times the minimum control speed, VMC, established as prescribed in 2.3;

Where V_{S1} is appropriate to the configuration, as described in 2.3.1 b), c) and d).

2.3 Minimum control speed

2.3.1 The minimum control speed, VMC, is determined not to exceed a speed equal to 1.2 V_{S1} where V_{S1} corresponds with the maximum certificated take-off mass with:

a) Maximum take-off power on all engines;
b) Landing gear retracted;
c) Wing flaps in take-off position;
d) Cowl flaps and radiator shutters in the position recommended for normal use during take-off;
e) Aeroplane trimmed for take-off;
f) Aeroplane airborne and ground effect negligible.

2.3.2 The minimum control speed is such that, when any one engine is made inoperative at that speed, it is possible to recover control of the aeroplane with the one engine still inoperative and to maintain the aeroplane in straight flight at that speed either with zero yaw or with a bank not in excess of 5 degrees.

2.3.3 From the time at which the engine is made inoperative to the time at which recovery is complete, exceptional skill, alertness, or strength on the part of the pilot is not required to prevent any loss of altitude other than that implicit in the loss of performance or any change of heading in excess of 20 degrees, nor does the aeroplane assume any dangerous attitude.

2.3.4 It is demonstrated that to maintain the aeroplane in steady straight flight at this speed after recovery and before retrimming does not require a rudder control force exceeding 800 N and does not make it necessary for the flight crew to reduce the power of the remaining engines.

2.4 Critical point

2.4.1 The critical point is a selected point at which, for the purpose of determining the accelerate-stop distance and the take-off path, failure of the critical engine is assumed to occur. The pilot is provided with a ready and reliable means of determining when the critical point has been reached.

2.4.2 If the critical point is located so that the airspeed at that point is less than the take-off safety speed, it is demonstrated that, in the event of sudden failure of the critical engine at all speeds down to the lowest speed corresponding with the critical point, the aeroplane is controllable satisfactorily and that the take-off can be continued safely, using normal piloting skill, without reducing the thrust of the remaining engines.

2.5 Accelerate-stop distance required

2.5.1 The accelerate-stop distance required is the distance required to reach the critical point from a standing start and, assuming the critical engine to fail suddenly at this point, to stop if a landplane, or to bring the aeroplane to a speed of approximately 6 km/h (3 kt) if a seaplane.

2.5.2 Use of braking means in addition to, or in lieu of, wheel brakes is permitted in determining this distance, provided that they are reliable and that the manner of their employment is such that consistent results can be expected under normal conditions of operation, and provided that exceptional skill is not required to control the aeroplane.

2.5.3 The landing gear remains extended throughout this distance.

2.6 Take-off path

2.6.1 General

2.6.1.1 The take-off path is determined either by the method of elements, 2.6.2, or by the continuous method, 2.6.3, or by any acceptable combination of the two.

2.6.1.2 Adjustment of the provisions of 2.6.2.1 c) 1) and 2.6.3.1 c) is permitted when the take-off path would be affected by the use of an automatic pitch changing device, provided that a level of performance safety exemplified by 2.6 is demonstrated.

2.6.2 Method of elements

2.6.2.1 In order to define the take-off path, the following elements are determined:

a) The distance required to accelerate the aeroplane from a standing start to the point at which the take-off safety speed is first attained, subject to the following provisions:

1) The critical engine is made inoperative at the critical point;

2) The aeroplane remains on or close to the ground;

3) The landing gear remains extended.

b) The horizontal distance traversed and the height attained by the aeroplane operating at the take-off safety speed during the time required to retract the landing gear, retraction being initiated at the end of 2.6.2.1 a) with:

1) The critical engine inoperative, its propeller windmilling, and the propeller pitch control in the position recommended for normal use during take-off, except that, if the completion of the retraction of the landing gear occurs later than the completion of the stopping of the propeller initiated in accordance with 2.6.2.1 c) 1), the propeller may be assumed to be stopped throughout the remainder of the time required to retract the landing gear;

2) The landing gear extended.

c) When the completion of the retraction of the landing gear occurs earlier than the completion of the stopping of the propeller, the horizontal distance traversed and the height attained by the aeroplane in the time elapsed from the end of 2.6.2.1 b) until the rotation of the inoperative propeller has been stopped, when:

1) The operation of stopping the propeller is initiated not earlier than the instant the aeroplane has attained a total height of 15.2 m (50 ft) above the take-off surface;

2) The aeroplane speed is equal to the take-off safety speed;

3) The landing gear is retracted;

4) The inoperative propeller is windmilling with the propeller pitch control in the position recommended for normal use during take-off.

d) The horizontal distance traversed and the height attained by the aeroplane in the time elapsed from the end of 2.6.2.1

c) Until the time limit on the use of take-off power is reached, while operating at the take-off safety speed, with:

1) The inoperative propeller stopped;

2) The landing gear retracted.

The elapsed time from the start of the take-off need not extend beyond a total of 5 minutes.

e) The slope of the flight path with the aeroplane in the configuration prescribed in 2.6.2.1 d) and with the remaining engine(s) operating within the maximum continuous power limitations, where the time limit on the use of take-off power is less than 5 minutes.

2.6.2.2 If satisfactory data are available, the variations in drag of the propeller during feathering and of the landing gear throughout the period of retraction are permitted to be taken into account in determining the appropriate portions of the elements.

2.6.2.3 During the take-off and subsequent climb represented by the elements, the wing flap control setting is not changed, except that changes made before the critical point has been reached, and not earlier than 1 minute after the critical point has been passed, are permitted; in this case, it is demonstrated that such changes can be accomplished without undue skill, concentration, or effort on the part of the pilot.

2.6.3 Continuous method

2.6.3.1 The take-off path is determined from an actual take-off during which:

a) The critical engine is made inoperative at the critical point;

b) The climb-away is not initiated until the take-off safety speed has been reached and the airspeed does not fall below this value in the subsequent climb;

c) Retraction of the landing gear is not initiated before the aeroplane reaches the take-off safety speed;

d) The wing flap control setting is not changed, except that changes made before the critical point has been reached, and not earlier than 1 minute after the critical point has been passed, are permitted; in this case, it is demonstrated that such changes can be accomplished without undue skill, concentration, or effort on the part of the pilot;

e) The operation of stopping the propeller is not initiated until the aeroplane has cleared a point 15.2 m (50 ft) above the take-off surface.

2.6.3.2 Suitable methods are provided and employed to take into account, and to correct for, any vertical gradient of wind velocity which may exist during the take-off.

2.7 Take-off distance required

The take-off distance required is the horizontal distance along the take-off flight path from the start of the take-off to a point where the aeroplane attains a height of 15.2 m (50 ft) above the take-off surface.

2.8 Temperature accountability

Operating correction factors for take-off mass and take-off distance are determined to account for temperature above and below those of the Standard Atmosphere. These factors are obtained as follows:

a) For any specific aeroplane type the average full temperature accountability is computed for the range of mass and altitudes above sea level, and for ambient temperatures expected in operation. Account is taken of the temperature effect both on the aerodynamic characteristics of the aeroplane and on the engine power. The full temperature accountability is expressed per degree of temperature in terms of a mass correction, a take-off distance correction and a change, if any, in the position of the critical point.

b) Where 2.6.2 is used to determine the take-off path, the operating correction factors for the aeroplane mass and take- off distance are at least one half of the full accountability values. Where 2.6.3 is used to determine the take-off path, the operating correction factors for the aeroplane mass and take-off distance are equal to the full accountability values. With both methods, the position of the critical point is further corrected by the average amount necessary to assure that the aeroplane can stop within the runway length at the ambient temperature, except that the speed at the critical point is not less than a minimum at which the aeroplane can be controlled with the critical engine inoperative.

3. LANDING

3.1 General

The landing performance is determined:

a) For the following conditions:

1) Sea level;

2) Aeroplane mass equal to the maximum landing mass at sea level;

3) Level, smooth, dry and hard landing surfaces (landplanes);

4) Smooth water of declared density (seaplanes);

b) Over selected ranges of the following variables:

1) Atmospheric conditions, namely: altitude and also pressure-altitude and temperature;

2) Aeroplane mass;

3) steady wind velocity parallel to the direction of landing;

4) Uniform landing-surface slope (landplanes);
5) Type of landing surface (landplanes);

6) Water surface condition (seaplanes);

7) Density of water (seaplanes);

8) Strength of current (seaplanes).

3.2 Landing distance

The landing distance is the horizontal distance between that point on the landing surface at which the aeroplane is brought to a complete stop or, for seaplanes, to a speed of approximately 6 km/h (3 Kts) and that point on the landing surface which the aeroplane cleared by 15.2 m (50 ft).

3.3 Landing technique

3.3.1 In determining the landing distance:

a) Immediately before reaching the 15.2 m (50 ft) height, a steady approach is maintained, landing gear fully extended, with an airspeed of not less than 1.3 Vso ;

b) The nose of the aeroplane is not depressed in flight nor the forward thrust increased by application of engine power after reaching the 15.2 m (50 ft) height;

c) The wing flap control is set in the landing position, and remains constant during the final approach, flare out and touch down, and on the landing surface at air speeds above 0.9 Vso When the aeroplane is on the landing surface and the airspeed has fallen to less than 0.9 Vs0, change of the wing-flap-control setting is permitted;

d) The landing is made in a manner such that there is no excessive vertical acceleration, no excessive tendency to bounce, and no display of any uncontrollable or otherwise undesirable ground (water) handling characteristics, and such that its repetition does not require either an exceptional degree of skill on the part of the pilot, or exceptionally favorable conditions;

e) Wheel brakes are not used in a manner such as to produce excessive wear of brakes or tires, and the operating pressures on the braking system are not in excess of those approved.

3.3.2 In addition to, or in lieu of, wheel brakes, other reliable braking means are permitted to be used in determining the landing distance, provided that the manner of their employment is such that consistent results can be expected under normal conditions of operation and that exceptional skill is not required to control the aeroplane.

3.3.3 The gradient of the steady approach and the details of the technique used in determining the landing distance, together with such variations in the technique as are recommended for landing with the critical engines inoperative, and any appreciable variation in landing distance resulting therefrom, are entered in the flight manual.

EXAMPLE 2

1. PURPOSE AND SCOPE

The purpose of the following example is to illustrate the level of performance intended by the provisions of Chapter 5 as applicable to the types of aeroplanes described below.

This material was contained in substance in Attachment C to the now superseded edition of ICAO Annex 6 which became effective on 1 May 1953. It is based on the type of requirements developed by the Standing Committee on Performance* with such detailed changes as are necessary to make it reflect as closely as possible a performance code that has been used nationally.

A substantial number of civil transport aeroplanes have been manufactured and are being operated in accordance with these codes. Those aeroplanes are powered with reciprocating engines, turbo-propellers and turbo-jets. They embrace twin- engined and four-engined aeroplanes over a mass range from approximately 5 500 kg to 70 000 kg over a stalling speed range, Vso, from approximately 110 to 170 km/h (60 to 90 Kts) and over a wing loading range from approximately 120 to 325 Kgs/M2 cruise speed range up to 740 Km/h (400Kts). Those aeroplanes have been used a very wide range of altitude, air temperature and humidity conditions.

Although only past experience can warrant the fact that this example illustrates the level of performance intended by the Standards and Recommended Practices of Chapter 5, it is considered to be applicable, except for some variations in detail as necessary to fit particular cases, over a much wider range of aeroplane characteristics. Reservation should, however, be made concerning one point. The landing distance specification of this example, not being derived from the same method as other specifications, is valid only for the range of conditions stated for Example 1 in this Attachment.

This example is not intended for application to aeroplanes having short take-off and landing (STOL) or vertical take-off and landing (VTOL) capabilities.

No detailed study has been made of the applicability of this example to operations in all-weather conditions. The validity of this example has not therefore been established for operations which may involve low decision heights and be associated with low weather minima operating techniques and procedures.

* The ICAO Standing Committee on Performance, established as a result of recommendations of the Airworthiness and Operations Divisions at their Fourth Sessions, in 1951, met four times between 1951 and 1953.

2. TAKE-OFF

2.1 Mass

The mass of the aeroplane at take-off is not to exceed the maximum take-off mass specified in the flight manual for the altitude and temperature at which the take-off is to be made.

2.2 Performance

The performance of the aeroplane, as determined from the information contained in the flight manual, is such that:

a) The accelerate-stop distance required does not exceed the accelerate-stop distance available;

b) The take-off run required does not exceed the take-off run available;

c) The take-off distance required does not exceed the take-off distance available;

d) The net take-off flight path starting at a point 10.7 m (35 ft) above the ground at the end of the take-off distance required provides a vertical clearance of not less than 6 m (20 ft) plus 0.005D above all obstacles lying within 60 m plus half the wing span of the aeroplane plus 0.125D on either side of the intended track until the relevant altitude laid down in the operations manual for an en-route flight has been attained; except that obstacles lying beyond 1 500 m on either side of the flight path need not be cleared.

The distance D is the horizontal distance that the aeroplane has travelled from the end of the take-off distance available.

Note.— This need not be carried beyond the point at which the aeroplane would be able, without further gaining in height, to commence a landing procedure at the aerodrome of take-off or, alternatively, has attained the minimum safe altitude for commencing flight to another aerodrome.

However, the lateral obstacle clearance is liable to be reduced (below the values stated above) when, and to the extent that, this is warranted by special provisions or conditions which assist the pilot to avoid inadvertent lateral deviations from the intended flight path.

For example, particularly in poor weather conditions, a precise radio aid may assist the pilot to maintain the intended flight path. Also, when the take-off is made in sufficiently good visibility conditions, it may, in some cases, be possible to avoid obstacles which are clearly visible but may be within the lateral limits noted in 2.2 d).

Note. — The procedures used in determining the accelerate-stop distance required, the take-off run required, the take-off distance required and the net take-off flight path are described in the Appendix to this example.

2.3 Conditions

For the purpose of 2.1 and 2.2, the performance is that corresponding to:

a) The mass of the aeroplane at the start of take-off;

b) An altitude equal to the elevation of the aerodrome;

c) Either the ambient temperature at the time of take-off, or a declared temperature giving an equivalent average level of performance; and for the purpose of 2.2:

d) The surface slope in the direction of take-off (landplanes);

e) Not more than 50 per cent of the reported wind component opposite to the direction of take-off, and not less than 150 per cent of the reported wind component in the direction of take-off. In certain cases of operation of seaplanes, it has been found necessary to take account of the reported wind component normal to the direction of take-off.

2.4 Power failure point

In applying 2.2 the power failure point chosen for establishing compliance with 2.2 a) is not nearer to the starting point than that used for establishing compliance with 2.2 b) and 2.2 c).

2.5 Turns

The net take-off flight path may include turns, provided that:

a) The radius of steady turn assumed is not less than that scheduled for this purpose in the flight manual;

b) If the planned change of direction of the take-off flight path exceeds 15 degrees, the clearance of the net take-off flight path above obstacles is at least 30 m (100 ft) during and after the turn, and the appropriate allowance, as prescribed in the flight manual, is made for the reduction in assumed gradient of climb during the turn;

c) The distance D is measured along the intended track.

3. EN ROUTE

3.1 All engines operating

At each point along the route and planned diversion therefrom, the all engines operating performance ceiling appropriate to the aeroplane mass at that point, taking into account the amount of fuel and oil expected to be consumed, is not less than the minimum altitude (see Chapter 4, 4.2.6) or, if greater, the planned altitude which it is intended to maintain with all engines operating, in order to ensure compliance with 3.2 and 3.3.

3.2 One engine inoperative

From each point along the route and planned diversions therefrom, it is possible in the event of one engine becoming inoperative to continue the flight to an en-route alternate aerodrome where a landing can be made in accordance with 4.2 and, on arrival at the aerodrome, the net gradient of climb is not less than zero at a height of 450 m (1 500 ft) above the elevation of the aerodrome.

3.3 Two engines inoperative
(Applicable only to aeroplanes with four engines)

For each point along the route or planned diversions therefrom, at which the aeroplane is more than 90 minutes' flying time at all engines operating cruising speed from an en-route alternate aerodrome, the two engines inoperative net flight path is such that a height of at least 300 m (1 000 ft.) above terrain can be maintained until arrival at such an aerodrome.

Note. — The net flight path is that attainable from the expected gradient of climb or descent diminished by 0.2 per cent.

3.4 Conditions

The ability to comply with 3.1, 3.2 and 3.3 is assessed:

a) Either on the basis of forecast temperatures, or on the basis of declared temperatures giving an equivalent average level of performance;

b) On the forecast data on wind velocity versus altitude and locality assumed for the flight plan as a whole;

c) In the case of 3.2 and 3.3, on the scheduled gradient of climb or gradient of descent after power failure appropriate to the mass and altitude at each point considered;

d) On the basis that, if the aeroplane is expected to gain altitude at some point in the flight after power failure has occurred, a satisfactory positive net gradient of climb is available;

e) In the case of 3.2 on the basis that the minimum altitude (see Chapter 4, 4.2.6), appropriate to each point between the place at which power failure is assumed to occur and the aerodrome at which it is intended to alight, is exceeded;

f) In the case of 3.2, making reasonable allowance for indecision and navigational error in the event of engine failure at any point.

4. LANDING

4.1 Mass

The calculated mass for the expected time of landing at the aerodrome of intended landing or any destination alternate aerodrome is not to exceed the maximum specified in the flight manual for the altitude and temperature at which the landing is to be made.

4.2 Landing distance required

The landing distance required at the aerodrome of the intended landing or at any alternate aerodrome, as determined from the flight manual, is not to exceed the landing distance available on:

a) The most suitable landing surface for a landing in still air; and, if more severe,

b) Any other landing surface that may be required for landing because of expected wind conditions at the time of arrival.

4.3 Conditions

For the purpose of 4.2, the landing distance required is that corresponding to:

a) The calculated mass of the aeroplane for the expected time of landing;
b) An altitude equal to the elevation of the aerodrome;

c) The expected temperature at which landing is to be made or a declared temperature giving an equivalent average level of performance;

d) The surface slope in the direction of landing;

e) For the purpose of 4.2 a), still air;

f) For the purpose of 4.2 b), not more than 50 per cent of the expected wind component along the landing path and opposite to the direction of landing and not less than 150 per cent of the expected wind component in the direction of landing.

APPENDIX TO EXAMPLE 2 ON AEROPLANE PERFORMANCE OPERATING LIMITATIONS — PROCEDURES USED IN DETERMINING TAKE-OFF AND LANDING PERFORMANCE

1. GENERAL

1.1 Unless otherwise stated, reference humidity and still air conditions are applied.

1.2 The performance of the aeroplane is determined in such a manner that the approved airworthiness limitations for the aeroplane and its systems are not exceeded.

1.3 The wing flap positions for showing compliance with the performance specifications are selected.

Note. — Alternative wing flap positions are made available, if so desired, in such a manner as to be consistent with acceptably simple operating techniques.

1.4 The position of the centre of gravity is selected within the permissible range so that the performance achieved in the configuration and power indicated in the specification under consideration is a minimum.

1.5 The performance of the aeroplane is determined in such a manner that under all conditions the approved limitations for the engine are not exceeded.

1.6 While certain configurations of cooling gills have been specified based upon maximum anticipated temperature, the use of other positions is acceptable provided that an equivalent level of safety is maintained.

1.7 The determined performance is so scheduled that it can serve directly in showing compliance with the aeroplane performance operating limitations.

2. TAKE-OFF

2.1 General

2.1.1 The following take-off data are determined for sea level pressure and temperature in the Standard Atmosphere, and reference humidity conditions, with the aeroplane at the corresponding maximum take-off mass for a level, smooth, dry and hard take-off surface (landplanes) and for smooth water of declared density (seaplanes):

a) Take-off safety speed and any other relevant speed;

b) Power failure point;

c) Power failure point criterion, e.g. airspeed indicator reading; associated with items d), e), f)

d) Accelerate-stop distance required;

e) Take-off run required;

f) Take-off distance required;

g) Net take-off flight path;

h) Radius of a steady Rate 1 (180 degrees per minute) turn made at the airspeed used in establishing the net take-off flight path, and the corresponding reduction in gradient of climb in accordance with the conditions of 2.9.

2.1.2 The determination is also made over selected ranges of the following variables:

a) Aeroplane mass;

b) Pressure-altitude at the take-off surface;

c) Outside air temperature;

d) Steady wind velocity parallel to the direction of take-off;

e) Steady wind velocity normal to the direction of take-off (seaplanes);

f) Take-off surface slope over the take-off distance required (landplanes);

g) Water surface condition (seaplanes);

h) Density of water (seaplanes);

i) Strength of current (seaplanes);

j) Power failure point (subject to provisions of 2.4.3).

2.1.3 For seaplanes appropriate interpretations of the term landing gear, etc., are made to provide for the operation of retractable floats, if employed.

2.2 Take-off safety speed

2.2.1 The take-off safety speed is an airspeed (CAS) so selected that it is not less than:

a) 1.20 V_{S1}, for aeroplanes with two engines;

b) 1.15 V_{S1}, for aeroplanes having more than two engines;

c) 1.10 times the minimum control speed, VMC, established as prescribed in 2.3;

d) The minimum speed prescribed in 2.9.7.6; where is V_{S1} appropriate to the take-off configuration.

Note. — See Example 1 for definition of V1.

2.3 Minimum control speed

2.3.1 The minimum control speed is such that, when any one engine is made inoperative at that speed, it is possible to recover control of the aeroplane with the one engine still inoperative and to maintain the aeroplane in straight flight at that speed either with zero yaw or with a bank not in excess of 5 degrees.

2.3.2 From the time at which the engine is made inoperative to the time at which recovery is complete, exceptional skill, alertness, or strength, on the part of the pilot is not required to prevent any loss of altitude other than that implicit in the loss of performance or any change of heading in excess of 20 degrees, nor does the aeroplane assume any dangerous attitude.

2.3.3 It is demonstrated that to maintain the aeroplane in steady straight flight at this speed after recovery and before retrimming does not require a rudder control force exceeding 800 N and does not make it necessary for the flight crew to reduce the power of the remaining engines.

2.4 Power failure point

2.4.1 The power failure point is the point at which sudden complete loss of power from the engine, critical from the performance aspect in the case considered, is assumed to occur. If the airspeed corresponding to this point is less than the take-off safety speed, it is demonstrated that, in the event of sudden failure of the critical engine at all speeds down to the lowest speed corresponding with the power failure point, the aeroplane is controllable satisfactorily and that the take-off can be continued safely, using normal piloting skill, without:

a) Reducing the thrust of the remaining engines; and

b) Encountering characteristics which would result in unsatisfactory controllability on wet runways.

2.4.2 If the critical engine varies with the configuration, and this variation has a substantial effect on performance, either the critical engine is considered separately for each element concerned, or it is shown that the established performance provides for each possibility of single engine failure.

2.4.3 The power failure point is selected for each take-off distance required and take-off run required, and for each accelerate-stop distance required. The pilot is provided with a ready and reliable means of determining when the applicable power failure point has been reached.

2.5 Accelerate-stop distance required

2.5.1 The accelerate-stop distance required is the distance required to reach the power failure point from a standing start and, assuming the critical engine to fail suddenly at this point, to stop if a landplane, or to bring the aeroplane to a speed of approximately 9 km/h (5 kt) if a seaplane.

2.5.2 Use of braking means in addition to, or in lieu of, wheel brakes is permitted in determining this distance, provided that they are reliable and that the manner of their employment is such that consistent results can be expected under normal conditions of operation, and provided that exceptional skill is not required to control the aeroplane.

2.6 Take-off run required

The take-off run required is the greater of the following:

1.15 times the distance required with all engines operating to accelerate from a standing start to take-off safety speed;

1.0 times the distance required to accelerate from a standing start to take-off safety speed assuming the critical engine to fail at the power failure point.

2.7 Take-off distance required

2.7.1 The take-off distance required is the distance required to reach a height of:

10.7 m (35 ft.), for aeroplanes with two engines,

15.2 m (50 ft.), for aeroplanes with four engines,

Above the take-off surface, with the critical engine failing at the power failure point.

2.7.2 The heights mentioned above are those which can be just cleared by the aeroplane when following the relevant flight path in an unbanked attitude with the landing gear extended.

Note.— Paragraph 2.8 and the corresponding operating requirements, by defining the point at which the net take-off flight path starts as the 10.7 m (35 ft) height point, ensure that the appropriate net clearances are achieved.

2.8 Net take-off flight path

2.8.1 The net take-off flight path is the one-engine-inoperative flight path which starts at a height of 10.7 m (35 ft) at the end of the take-off distance required and extends to a height of at least 450 m (1 500 ft) calculated in accordance with the conditions of 2.9, the expected gradient of climb being diminished at each point by a gradient equal to:

0.5 per cent, for aeroplanes with two engines,

0.8 per cent, for aeroplanes with four engines.

2.8.2 The expected performance with which the aeroplane is credited in the take-off wing flap, take-off power condition, is available at the selected take-off safety speed and is substantially available at 9 km/h (5 kts) below this speed.

2.8.3 In addition the effect of significant turns is scheduled as follows:

Radius. The radius of a steady Rate 1 (180 degrees per minute) turn in still air at the various true airspeeds corresponding to the take-off safety speeds for each wing-flap setting used in establishing the net take-off flight path below the 450 m (1 500 ft) height point, is scheduled.

Performance change. The approximate reduction in performance due to the above turns is scheduled and corresponds to a change in gradient of

$$\left[0.5\left(\frac{V}{185.2}\right)^2\right]$$ % where V is the true airspeed in km/h; and

$$\left[0.5\left(\frac{V}{100}\right)^2\right]$$ % where V is the true airspeed in knots.

2.9 Conditions

2.9.1 Air speed

2.9.1.1 In determining the take-off distance required, the selected take-off safety speed is attained before the end of the take-off distance required is reached.

2.9.1.2 In determining the net take-off flight path below a height of 120 m (400 ft), the selected take-off safety speed is maintained, i.e. no credit is taken for acceleration before this height is reached.

2.9.1.3 In determining the net take-off flight path above a height of 120 m (400 ft), the airspeed is not less than the selected take-off safety speed. If the aeroplane is accelerated after reaching a height of 120 m (400 ft) and before reaching a height of 450 m (1 500 ft), the acceleration is assumed to take place in level flight and to have a value equal to the true acceleration available diminished by an acceleration equivalent to a climb gradient equal to that specified in 2.8.1.

2.9.1.4 The net take-off flight path includes transition to the initial en-route configuration and airspeed. During all transition stages, the above provisions regarding acceleration are complied with.

2.9.2 Wing flaps

The wing flaps are in the same position (take-off position) throughout, except:

a) That the flaps may be moved at heights above 120 m (400 ft), provided that the airspeed specifications of 2.9.1 are met and that the take-off safety speed applicable to subsequent elements is appropriate to the new flap position;

b) The wing flaps may be moved before the earliest power failure point is reached, if this is established as a satisfactory normal procedure.

2.9.3 Landing gear

2.9.3.1 In establishing the accelerate-stop distance required and the take-off run required, the landing gear are extended throughout.

2.9.3.2 In establishing the take-off distance required, retraction of the landing gear is not initiated until the selected take-off safety speed has been reached, except that, when the selected take-off safety speed exceeds the minimum value prescribed in 2.2, retraction of the landing gear may be initiated when a speed greater than the minimum value prescribed in 2.2 has been reached.

2.9.3.3 In establishing the net take-off flight path, the retraction of the landing gear is assumed to have been initiated not earlier than the point prescribed in 2.9.3.2.

2.9.4 Cooling

For that part of the net take-off flight path before the 120 m (400 ft) height point, plus any transition element which starts at the 120 m (400 ft) height point, the cowl flap position is such that, starting the take-off at the maximum temperatures permitted for the start of take-off, the relevant maximum temperature limitations are not exceeded in the maximum anticipated air temperature conditions. For any subsequent part of the net take-off flight path, the cowl flap position and airspeed are such that the appropriate temperature limitations would not be exceeded in steady flight in the maximum anticipated air temperatures.

The cowl flaps of all engines at the start of the take-off are as above, and the cowl flaps of the inoperative engine may be assumed to be closed upon reaching the end of the take-off distance required.

2.9.5 Engine conditions

2.9.5.1 From the starting point to the power failure point, all engines may operate at maximum take-off power conditions. The operative engines do not operate at maximum take-off power limitations for a period greater than that for which the use of maximum take-off power is permitted.

2.9.5.2 After the period for which the take-off power may be used, maximum continuous power limitations are not exceeded. The period for which maximum take-off power is used is assumed to begin at the start of the take-off run.

2.9.6 Propeller conditions

At the starting point, all propellers are set in the condition recommended for take-off. Propeller feathering or pitch coarsening is not initiated (unless it is by automatic or auto-selective means) before the end of the take-off distance required.

2.9.7 Technique

2.9.7.1 In that part of the net take-off flight path prior to the 120 m (400 ft) height point, no changes of configuration or power are made which have the effect of reducing the gradient of climb.

2.9.7.2 The aeroplane is not flown or assumed to be flown in a manner which would make the gradient of any part of the net take-off flight path negative.

2.9.7.3 The technique chosen for those elements of the flight path conducted in steady flight, which are not the subject of numerical climb specifications, are such that the net gradient of climb is not less than 0.5 per cent.

2.9.7.4 All information which it may be necessary to furnish to the pilot, if the aeroplane is to be flown in a manner consistent with the scheduled performance, is obtained and recorded.

2.9.7.5 The aeroplane is held on, or close to the ground until the point at which it is permissible to initiate landing gear retraction has been reached.

2.9.7.6 No attempt is made to leave the ground until a speed has been reached which is at least:

15 per cent above the minimum possible unstick speed with all engines operating;
17 per cent above the minimum possible unstick speed with the critical engine inoperative;

Except that these unstick speed margins may be reduced to 10 per cent and 5 per cent, respectively, when the limitation is due to landing gear geometry and not to ground stalling characteristics.

Note. — Compliance with this specification is determined by attempting to leave the ground at progressively lower speeds (by normal use of the controls except that up-elevator is applied earlier and more coarsely than is normal) until it has been shown to be possible to leave the ground at a speed which complies with these specifications, and to complete the take- off. It is recognized that during the test manoeuvre, the usual margin of control associated with normal operating techniques and scheduled performance information will not be available.

2.10 Methods of derivation

2.10.1 General

The take-off field lengths required are determined from measurements of actual take-offs and ground runs. The net take-off flight path is determined by calculating each section separately on the basis of performance data obtained in steady flight.

2.10.2 Net take-off flight path

Credit is not taken for any change in configuration until that change is complete, unless more accurate data are available to substantiate a less conservative assumption; ground effect is ignored.

2.10.3 Take-off distance required

Satisfactory corrections for the vertical gradient of wind velocity are made.

3. LANDING

3.1 General

The landing distance required is determined:

a) For the following conditions:

1) Sea level;

2) Aeroplane mass equal to the maximum landing mass at sea level;

3) Level, smooth, dry and hard landing surfaces (landplanes);

4) Smooth water of declared density (seaplanes);

b) Over selected ranges of the following variables:

1) Atmospheric conditions, namely: altitude, or pressure-altitude and temperature;

2) Aeroplane mass;

3) Steady wind velocity parallel to the direction of landing;

4) Uniform landing surface slope (landplanes);

5) Nature of landing surface (landplanes);

6) Water surface condition (seaplanes);

7) Density of water (seaplanes);

8) Strength of current (seaplanes).

3.2 Landing distance required

The landing distance required is the measured horizontal distance between that point on the landing surface at which the aeroplane is brought to a complete stop or, for seaplanes, to a speed of approximately 9 km/h (5 kts) and that point on the landing surface which the aeroplane cleared by 15.2 m (50 ft.) multiplied by a factor of 1/0.7.

Note. — Some States have found it necessary to use a factor of 1/0.6 instead of 1/0.7.

3.3 Landing technique

3.3.1 In determining the measured landing distance:

a) Immediately before reaching the 15.2 m (50 ft.) height, a steady approach is maintained, landing gear fully extended, with an airspeed of at least 1.3 Vs0;

Note. — See Example 1 for definition of Vs0.

b) the nose of the aeroplane is not depressed in flight nor the forward thrust increased by application of engine power after reaching the 15.2 m (50 ft.) height;

c) the power is not reduced in such a way that the power used for establishing compliance with the balked landing climb requirement would not be obtained within 5 seconds if selected at any point down to touch down;

d) Reverse pitch or reverse thrust are not used when establishing the landing distance using this method and field length factor. Ground fine pitch is used if the effective drag/weight ratio in the airborne part of the landing distance is not less satisfactory than that of conventional piston-engined aeroplane;

Note. — This does not mean that reverse pitch or reverse thrust, or use of ground fine pitch, are to be discouraged.

e) The wing flap control is set in the landing position, and remains constant during the final approach, flare out and touch down, and on the landing surface at airspeeds above 0.9Vs0.
. When the aeroplane is on the landing surface and the airspeed has fallen to less than 0.9 Vs0, change of the wing-flap-control setting is acceptable;

f) The landing is made in a manner such that there is no excessive vertical acceleration, no excessive tendency to bounce, and no display of any other undesirable handling characteristics, and such that its repetition does not require either an exceptional degree of skill on the part of the pilot, or exceptionally favourable conditions;

g) Wheel brakes are not used in a manner such as to produce excessive wear of brakes or tires, and the operating pressures on the braking system are not in excess of those approved.

3.3.2 The gradient of the steady approach and the details of the technique used in determining the landing distance, together with such variations in the technique as are recommended for landing with the critical engine inoperative, and any appreciable variation in landing distance resulting therefrom, are entered in the flight manual.

ATTACHMENT C.
GUIDANCE FOR OPERATIONS BY TURBINE-ENGINED AEROPLANES BEYOND 60 MINUTES TO AN EN-ROUTE ALTERNATE AERODROME INCLUDING EXTENDED DIVERSION TIME OPERATIONS (EDTO)
(Supplementary to Chapter 4, 4.7)

1. INTRODUCTION

1.1 The purpose of this Attachment is to provide guidance on the general provisions relating to operations by turbine- engined aeroplanes beyond 60 minutes' flying time to an en-route alternate aerodrome and extended diversion time operations contained in Chapter 4, 4.7. The guidance will also assist DGCA in establishing a threshold time and approving the maximum diversion time for a given operator with a specific aeroplane type. The provisions in Chapter 4, 4.7, are divided into:

a) The basic provisions that apply to all aeroplanes operating beyond 60 minutes to an en-route alternate aerodrome; and

b) Provisions to fly beyond a threshold time, and up to a maximum diversion time, approved by the DGCA, that may be different for each operator/aeroplane type combination.

This Attachment provides guidance on the means of achieving the required level of safety envisaged.

1.2 Similar to the threshold time, the maximum diversion time is the range (expressed in time) from a point on a route to an en-route alternate aerodrome up to which the DGCA will grant approval. When approving the operator's maximum diversion time, DGCA will need to consider not only the capable range of the aircraft, taking into consideration any limitation of the aeroplane's type certificate, but also the operator's previous experience on similar aircraft types and routes.

1.3 The material in this Attachment is organized to address guidance on operations beyond 60 minutes to an en-route alternate aerodrome for all aeroplanes with turbine engines (Section 2) and guidance for extended diversion time operations (Section 3). The EDTO section is further divided into general provisions (Section 3.1), provisions that apply to aeroplanes with more than two engines (Section 3.2) and provisions that apply to aeroplanes with two engines (Section 3.3). The sections on aeroplanes with two engines and more than two engines are organized in exactly the same way. It should be noted that these sections may appear to be similar and thus repetitive; however there are requirement differences based on the aeroplane type. The reader should see Sections 2 and 3.1 and then either 3.2 for aeroplanes with more than two engines or 3.3 for aeroplanes with two engines.

2. OPERATIONS BY AEROPLANES WITH TURBINE ENGINES BEYOND 60 MINUTES TO AN EN-ROUTE ALTERNATE AERODROME

2.1 General

2.1.1 All provisions for operations by aeroplanes with turbine engines beyond 60 minutes to an en-route alternate aerodrome also apply to extended diversion time operations (EDTO).

Figure C-1 illustrates generically the integration of operations beyond 60 minutes to an en-route alternate aerodrome and EDTO.

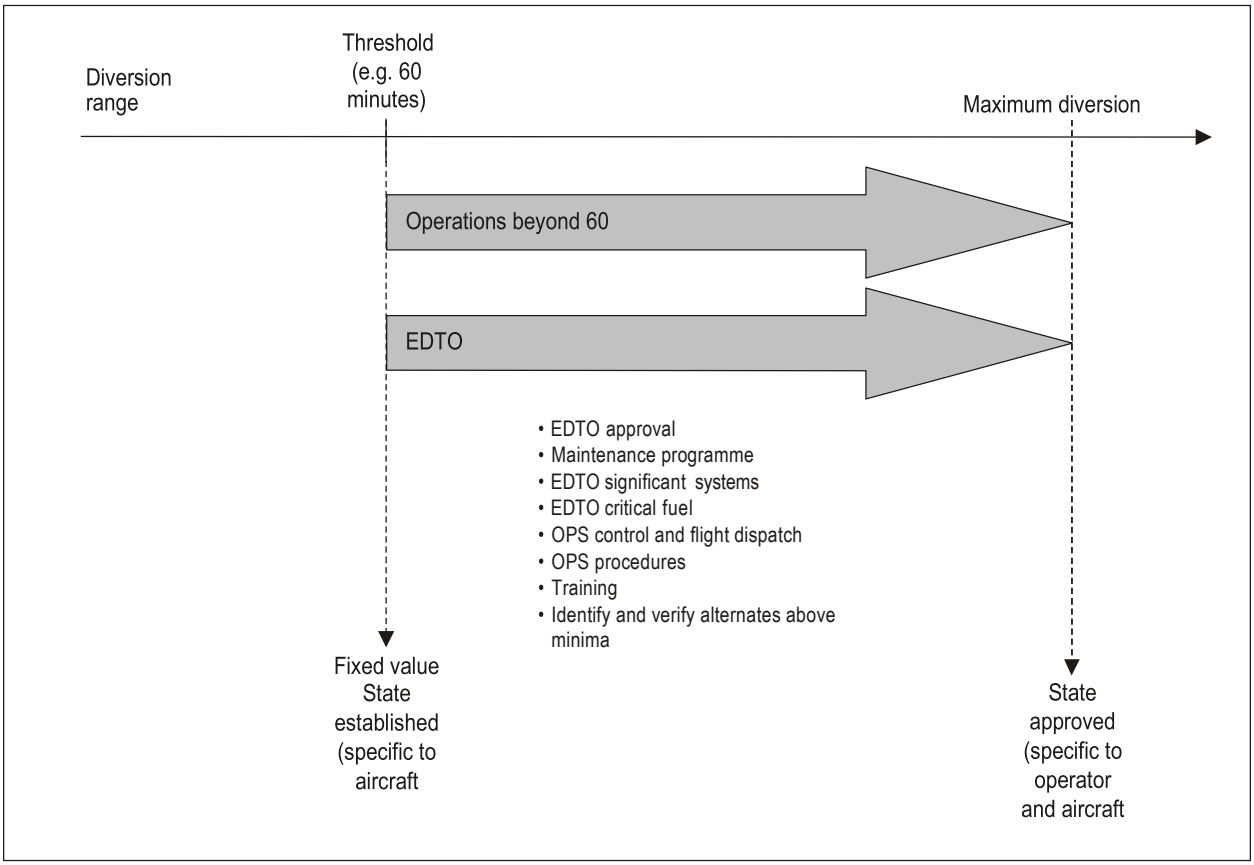


Figure C-1. Generic EDTO graphical representation

2.1.2 In applying the requirements for aeroplanes with turbine engines in Chapter 4, 4.7, it should be understood that:

a) Operational control refers to the exercise, by the operator, of responsibility for the initiation, continuation, termination or diversion of a flight;

b) Flight dispatch procedures refer to the method of control and supervision of flight operations. This does not imply a specific requirement for licensed flight dispatchers or a full flight following system;

c) Operating procedures refer to the specification of organization and methods established to exercise operational control and flight dispatch procedures in the appropriate manual(s) and should cover at least a description of responsibilities concerning the initiation, continuation, termination or diversion of each flight as well as the method of control and supervision of flight operations; and

d) Training programme refers to the training for pilots and flight operations officers/flight dispatchers in operations covered by this and following sections.

2.1.3 Aeroplanes with turbine engines operating beyond 60 minutes to an en-route alternate aerodrome are not required to have specific additional approval by the DGCA except if they engage in extended diversion time operations.

2.2 Conditions to be used when converting diversion times to distances

2.2.1 For the purpose of this guidance, an approved one-engine-inoperative (OEI) speed or approved all-engines- operative (AEO) speed is any speed within the certified flight envelope of the aeroplane.

2.2.2 Determination of the 60-minute distance — aeroplanes with two turbine engines

2.2.2.1 For determining whether a point on the route is beyond 60 minutes to an en-route alternate, the operator should select an approved OEI speed. The distance is calculated from the point of the diversion followed by cruise for 60 minutes, in ISA and still-air conditions, as shown in Figure C-2. For the purposes of computing distances, credit for driftdown may be taken.

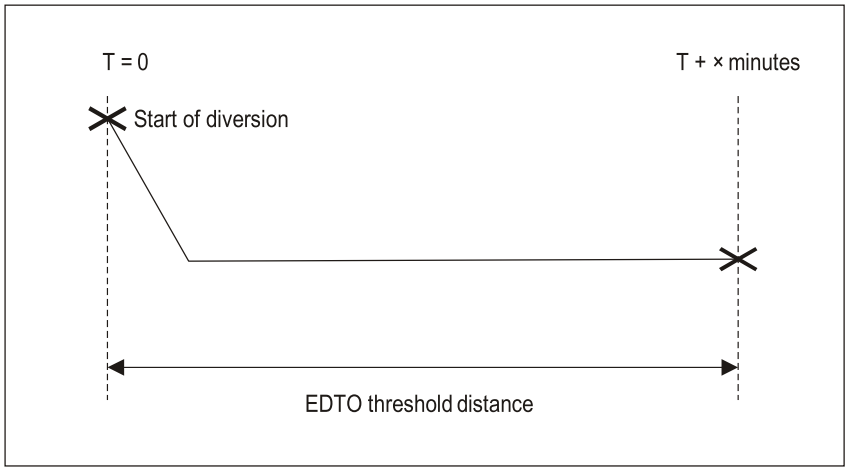


Figure C-2. Sixty-minute distance — aeroplanes with two turbine engines

2.2.3 Determination of the 60-minute distance — aeroplanes with more than two turbine engines

2.2.3.1 For determining whether a point on the route is beyond 60 minutes to an en-route alternate, the operator should select an approved AEO speed. The distance is calculated from the point of the diversion followed by cruise for 60 minutes, in ISA and still-air conditions, as shown in Figure C-3.

2.3 Training

2.3.1 Training programmes should ensure that the requirements of Chapter 9, 9.4.3.2, are complied with such as, but not limited to, route qualification, flight preparation, concept of extended diversion time operations and criteria for diversions.

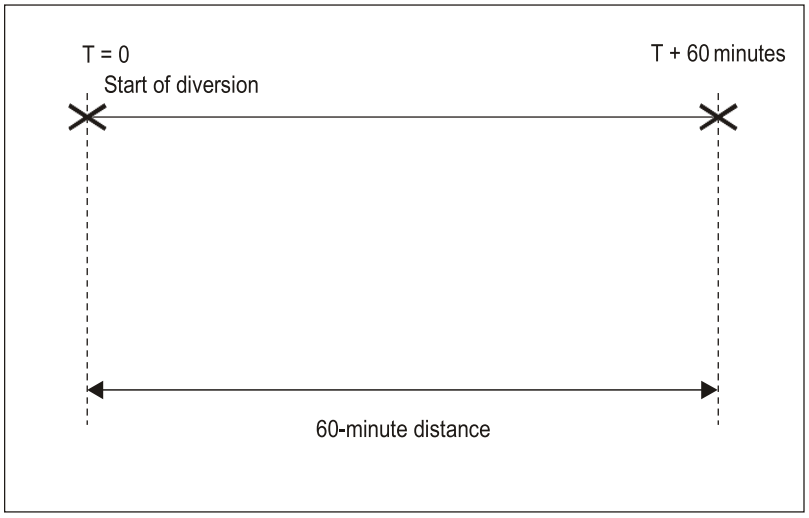


Figure C-3. Sixty-minute distance — aeroplanes with more than two turbine engines

2.4 Flight dispatch and operational requirements

2.4.1 In applying the general flight dispatch requirements of Chapter 4 particular attention should be paid to the conditions which might prevail any time that the operation is beyond 60 minutes to an en-route alternate aerodrome, e.g. systems degradation and reduced flight altitude. For compliance with the requirement of Chapter 4, 4.7, at least the following aspects should be considered:

a) Identify en-route alternate aerodromes;

b) ensure that, prior to departure, the flight crew is provided with the most up-to-date information on the identified en- route alternate aerodromes, including operational status and meteorological conditions and, in flight, make available means for the flight crew to obtain the most up-to-date weather information;

c) Methods to enable two-way communications between the aeroplane and the operator's operational control centre;

d) Ensure that the operator has a means to monitor conditions along the planned route including the identified alternate aerodromes and ensure that procedures are in place so that the flight crew are advised of any situation that may affect the safety of flight;

e) Ensure that the intended route does not exceed the established aeroplane threshold time unless the operator is approved for EDTO operations;

f) Pre-flight system serviceability including the status of items in the minimum equipment list;

g) Communication and navigation facilities and capabilities;

h) Fuel requirements; and

i) Availability of relevant performance information for the identified en-route alternate aerodrome(s).

2.4.2 In addition, operations conducted by aeroplanes with two turbine engines require that, prior to departure and in flight, the meteorological conditions at identified en-route alternate aerodromes will be at or above the aerodrome operating minima required for the operation during the estimated time of use.

2.5 En-route alternate aerodromes

2.5.1 Aerodrome(s) to which an aircraft may proceed in the event that a diversion becomes necessary while en route, where the necessary services and facilities are available, where aircraft performance requirements can be met, and which are expected to be operational if required, need to be identified any time that the operation is beyond 60 minutes to an en-route alternate aerodrome.

Note. — En-route alternate aerodromes may also be the take-off and/or destination aerodromes.

3. EXTENDED DIVERSION TIME OPERATIONS (EDTO) REQUIREMENTS

3.1 Basic concept

3.1.1 In addition to the provisions in Section 2, this section addresses the provisions that apply to operations by aeroplanes with two or more turbine engines where the diversion time to an en-route alternate aerodrome is greater than the threshold time established by the DGCA (extended diversion time operations).

3.1.2 EDTO significant systems

3.1.2.1 EDTO significant systems may be the aeroplane propulsion system and any other aeroplane systems whose failure or malfunctioning could adversely affect safety particular to an EDTO flight, or whose functioning is specifically important to continued safe flight and landing during an aeroplane EDTO diversion.

3.1.2.2 Many of the aeroplane systems that are essential for non-extended diversion time operations may need to be reconsidered to ensure that the redundancy level and/or reliability will be adequate to support the conduct of safe extended diversion time operations.

3.1.2.3 The maximum diversion time should not exceed the value of the EDTO significant system limitation(s), if any, for extended diversion time operations identified in the aeroplane flight manual, directly or by reference, reduced by an operational safety margin, commonly 15 minutes, specified by the DGCA.

3.1.2.4 The specific safety risk assessment to approve operations beyond the time limits of an EDTO significant time- limited system per the provisions in Chapter 4, 4.7.2.3.1, should be based on the safety risk management guidance contained in the Safety Management Manual (SMM) (Doc 9859).

Hazards should be identified and safety risks assessed according to predicted probability and the severity of the consequences based on the worst foreseeable situation. When addressing the following components of the specific safety risk assessment it should be understood that:

a) Capabilities of the operator refer to the operator's quantifiable in-service experience, compliance record, aeroplane capability and overall operational reliability that:

1) Are sufficient to support operations beyond the time limits of an EDTO significant time-limited system;

2) Demonstrate the ability of the operator to monitor and respond to changes in a timely manner; and

3) There is an expectation that the operator's established processes, necessary for successful and reliable extended diversion time operations, can be successfully applied to such operations;

b) Overall reliability of the aeroplane refers to:

1) quantifiable standards of reliability taking into account the number of engines, aircraft EDTO significant systems and any other factors that may affect operations beyond the time limits of a particular EDTO significant time-limited system; and

2) Relevant data from the aeroplane manufacturer and data from the operator reliability programme used as a basis to determine overall reliability of the aeroplane and its EDTO significant systems;

c) Reliability of each time-limited system refers to quantifiable standards of design, testing and monitoring that ensure the reliability of each particular EDTO significant time-limited system;

d) Relevant information from the aeroplane manufacturer refers to technical data and characteristics of the aeroplane and worldwide fleet operational data provided by the manufacturer and used as a basis to determine overall reliability of the aeroplane and its EDTO significant systems; and

e) Specific mitigation measures refer to the safety risk management mitigation strategies, which have manufacturer concurrence, that ensure an equivalent level of safety is maintained. These specific mitigations shall be based on:

1) Technical expertise (e.g. data, evidence) proving the operator's eligibility for an approval of operations beyond the time limit of the relevant EDTO significant system; and

2) An assessment of relevant hazards, their probability and the severity of the consequences that may adversely impact the safety of the operation of an aeroplane operated beyond the limit of a particular EDTO significant time-limited system.

3.1.3 Threshold time

3.1.3.1 It should be understood that the threshold time established in accordance with Chapter 4, 4.7, is not an operating limit. It is a flight time to an en-route alternate aerodrome, which is established by the DGCA as being the EDTO threshold beyond which particular consideration should be given to the aeroplane capability as well as the operator's relevant operational experience, before granting an EDTO approval.

3.1.4 Maximum diversion time

3.1.4.1 It should be understood that the maximum diversion time approved in accordance with Chapter 4, 4.7, should take into consideration the most limiting EDTO significant system time limitation, if any, indicated in the aeroplane flight manual (directly or by reference) for a particular aeroplane type and the operator's operational and EDTO experience, if any, with the aeroplane type or, if relevant, with another aeroplane type or model.

3.2 EDTO for aeroplanes with more than two turbine engines

3.2.1 General

3.2.1.1 In addition to the provisions in Sections 2 and 3.1 of this Attachment, this section addresses the provisions that apply in particular to aeroplanes with more than two turbine engines (see Figure C-4).

Note. — EDTO may be referred to as ETOPS in some documents.

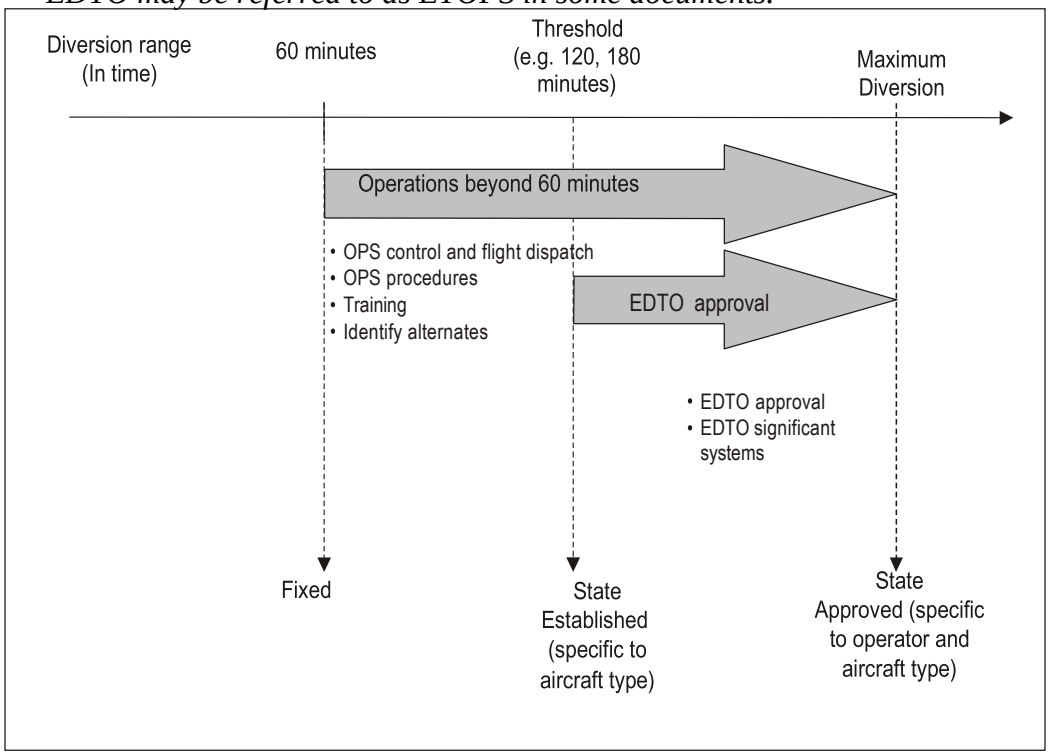


Figure C-4. Generic EDTO graphical representation for aeroplanes with more than two turbine engines

3.2.2 Operational and diversion planning principles

3.2.2.1 When planning or conducting extended diversion time operations, the operator and pilot-in-command should ensure that:

a) the minimum equipment list, the communications and navigation facilities, fuel and oil supply, en-route alternate aerodromes and aeroplane performance are appropriately considered;

b) if no more than one engine is shut down, the pilot-in-command may elect to continue beyond the nearest en-route alternate aerodrome (in terms of time) if the pilot-in-command determines that it is safe to do so. In making this decision the pilot-in-command should consider all relevant factors; and

c) in the event of a single or multiple failure of an EDTO significant system or systems (excluding engine failure), the aircraft can proceed to and land at the nearest available en-route alternate aerodrome where a safe landing can be made unless it has been determined that no substantial degradation of safety will result from any decision made to continue the planned flight.

3.2.2.2 EDTO critical fuel

3.2.2.2.1 An aeroplane with more than two engines engaged in EDTO operations should carry enough fuel to fly to an en-route alternate aerodrome as described in 3.2.6. This EDTO critical fuel corresponds to the additional fuel that may be required to comply with Chapter 4, 4.3.6.3 f) 2).

3.2.2.2.2 The following should be considered, using the anticipated mass of the aeroplane, in determining the corresponding EDTO critical fuel:

a) fuel sufficient to fly to an en-route alternate aerodrome, considering at the most critical point of the route, simultaneous engine failure and depressurization or depressurization alone, whichever is more limiting;

1) the speed selected for the diversions (i.e. depressurization, combined or not with an engine failure) may be different from the approved AEO speed used to determine the EDTO threshold and maximum diversion distance (see 3.2.8);

b) Fuel to account for icing;

c) Fuel to account for errors in wind forecasting;

d) Fuel to account for holding an instrument approach and landing at the en-route alternate aerodrome;

e) Fuel to account for deterioration in cruise fuel-burn performance; and

f) Fuel to account for APU use (if required).

Note. — Guidance on EDTO critical fuel planning can be found in the Flight Planning and Fuel Management Manual (Doc 9976).

3.2.2.3 The following factors may be considered in determining if a landing at a given aerodrome is the more appropriate course of action:

a) Aeroplane configuration, mass, systems status and fuel remaining;

b) Wind and weather conditions en route at the diversion altitude, minimum altitudes en route and fuel consumption to the en-route alternate aerodrome;

c) Runways available, runway surface condition and weather, wind and terrain in the proximity of the en-route alternate aerodrome;

d) Instrument approaches and approach/runway lighting available and rescue and firefighting services (RFFS) at the en-route alternate aerodrome;

e) The pilot's familiarity with that aerodrome and information about that aerodrome provided to the pilot by the operator; and

f) Facilities for passenger and crew disembarkation and accommodation.

3.2.3 Threshold time

3.2.3.1 In establishing the appropriate threshold time and to maintain the required level of safety, it is necessary for DGCA to consider that:

a) The airworthiness certification of the aeroplane type does not restrict operations beyond the threshold time, taking into account the aeroplane system design and reliability aspects;

b) Specific flight dispatch requirements are met;

c) Necessary in-flight operational procedures are established; and

d) The operator's previous experience on similar aircraft types and routes is satisfactory.

3.2.3.2 For determining whether a point on a route is beyond the EDTO threshold to an en-route alternate aerodrome, the operator should use the approved speed as described in 3.2.8.

3.2.4 Maximum diversion time

3.2.4.1 In approving the maximum diversion time, the DGCA should take into consideration the aeroplane's EDTO significant systems (e.g. limiting time limitation, if any, and relevant to that particular operation) for a particular aeroplane type and the operator's operational and EDTO experience with the aeroplane type or, if relevant, with another aeroplane type or model.

3.2.4.2 For determining the maximum diversion distance to an en-route alternate, the operator should use the approved speed as described in 3.2.8.

3.2.4.3 The operator's approved maximum diversion time should not exceed the most limiting EDTO significant system time limitation identified in the aeroplane flight manual, reduced by an operational safety margin, commonly 15 minutes, specified by the DCGA.

3.2.5 EDTO significant systems

3.2.5.1 In addition to the provisions in 3.1.1, this section addresses particular provisions for aeroplanes with more than two turbine engines.

3.2.5.2 Consideration of time limitations

3.2.5.2.1 For all operations beyond the EDTO threshold as determined by the DGCA should consider, at time of dispatch and as outlined below, the most limiting EDTO significant system time limitation, if any, indicated in the aeroplane flight manual (directly or by reference) and relevant to that particular operation.

3.2.5.2.2 The operator should check that from any point on the route, the maximum diversion time does not exceed the most limiting EDTO significant system time limitation, reduced by an operational safety margin, commonly 15 minutes, specified by the DGCA.

3.2.5.2.3 The maximum diversion time subject to cargo fire suppression time limitations are considered part of the most limiting EDTO significant time limitations in 3.3.5.2.2.

3.2.5.2.4 For that purpose, the operator should consider the approved speed as described in 3.2.8.2 or consider adjusting that speed with forecast wind and temperature conditions for operations with longer threshold times (e.g. beyond 180 minutes) as determined by the DGCA.

3.2.6 En-route alternate aerodromes

3.2.6.1 In addition to the en-route alternate aerodrome provisions described in 2.5 the following apply:

a) For route planning purposes, identified en-route alternate aerodromes, which could be used if necessary, need to be located at a distance within the maximum diversion time from the route; and

b) In extended diversion time operations, before an aeroplane crosses its threshold time during flight, there should always be an en-route alternate aerodrome within the approved maximum diversion time whose conditions will be at or above the operator's established aerodrome operating minima for the operation during the estimated time of use.

If any conditions, such as weather below landing minima, are identified that would preclude a safe approach and landing at that aerodrome during the estimated time of use, an alternative course of action should be determined such as selecting another en-route alternate aerodrome within the operator's approved maximum diversion time.

Note. — En route alternate aerodromes may also be the take-off and/or destination aerodromes.

3.2.7 Operational approval procedure

3.2.7.1 In approving the operator with a particular aeroplane type for extended diversion time operations, the DGCA should establish an appropriate threshold time and maximum diversion time and, in addition to the requirements previously set forth in this Attachment, ensure that:

a) Specific operational approval is granted (by the DGCA);

b) The operator's past experience and compliance record is satisfactory and the operator has established the processes necessary for successful and reliable extended diversion time operations and shown that such processes can be successfully applied throughout such operations;

c) The operator's procedures are acceptable based on certified aeroplane capability and adequate to address continued safe operation in the event of degraded aeroplane systems;

d) The operator's crew training programme is adequate for the proposed operation;

e) Documentation accompanying the authorization covers all relevant aspects; and

f) It has been shown (e.g. during the EDTO certification of the aeroplane) that the flight can continue to a safe landing under the anticipated degraded operating conditions which would arise from:

1) The most limiting EDTO significant system time limitation, if any, for extended diversion time operations identified in the aeroplane flight manual, directly or by reference; or

2) Any other condition which the DGCA considers to be equivalent in airworthiness and performance risk.

3.2.8 Conditions to be used when converting diversion times to distances for the determination of the geographical area beyond threshold and within maximum diversion distances

3.2.8.1 For the purpose of this guidance, an approved AEO speed is any all-engines-operative speed within the certified flight envelope of the aeroplane.

Note. — See 3.2.5.2.2 for operational considerations.

3.2.8.2 When applying for EDTO the operator should identify, and the DGCA should approve, the AEO speed(s), considering ISA and still-air conditions, that will be used to calculate the threshold and maximum diversion distances. The speed that will be used to calculate the maximum diversion distance may be different from the speed used to determine the 60-minute and EDTO thresholds.

3.2.8.3 Determination of the EDTO threshold

3.2.8.3.1 For determining whether a point on the route is beyond the EDTO threshold to an en-route alternate, the operator should use the approved speed (see 3.2.8.1 and 3.2.8.2). The distance is calculated from the point of the diversion followed by cruise for the threshold time as determined by the DGCA and shown in Figure C-5.

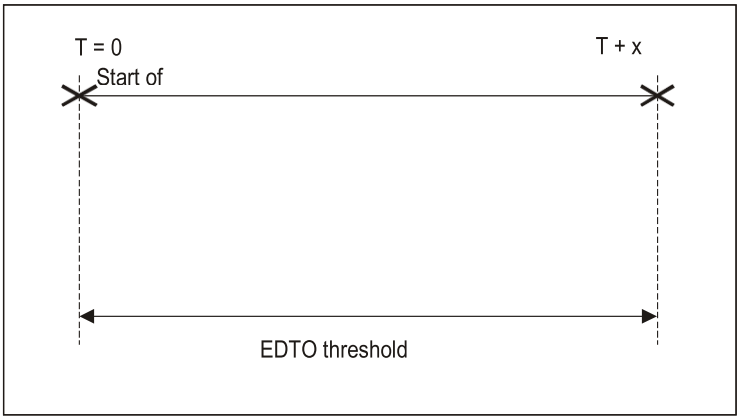


Figure C-5. Threshold distance — aeroplanes with more than two turbine engines

3.2.8.4 Determination of the maximum diversion time distance

3.2.8.4.1 For determining the maximum diversion time distance to an en-route alternate, the operator should use the approved speed (see 3.2.8.1 and 3.2.8.2). The distance is calculated from the point of the diversion followed by cruise for the maximum diversion time as approved by the DGCA and shown in Figure C-6.

3.2.9 Airworthiness certification requirements for extended diversion time operations beyond the threshold time

3.2.9.1 There are no additional EDTO airworthiness certification requirements for aeroplanes with more than two engines.

3.2.10 maintaining operational approval

3.2.10.1 In order to maintain the required level of safety on routes where these aeroplanes are permitted to operate beyond the established threshold time, it is necessary that:

Figure C-6. Maximum diversion distance — aeroplanes with more than two turbine engines

a) Specific flight dispatch requirements are met;
b) The necessary in-flight operational procedures are established; and
c) Specific operational approval is granted by the DGCA.

3.2.11 Airworthiness modifications and maintenance programme requirements

3.2.11.1 There are no additional EDTO airworthiness or maintenance requirements for aeroplanes with more than two engines.

3.2.12 Examples

3.2.12.1 In establishing the appropriate threshold and approved maximum diversion time for the operator with a particular aeroplane type, the DGCA should consider, but not be limited to, the following: the airworthiness certification of the aeroplane, the operator's experience in conducting operations beyond the 60-minute threshold, flight deck crew experience in conducting such operations, the maturity of that operator's flight dispatch system, the communication capability with the operator's operational control centre (ACARS, SATCOM, HF, etc.), the robustness of both the operator's standard operating procedures and the familiarity of the crews with those procedures, the maturity of the operator's safety management system, the crew training programme and the reliability of the propulsion system. The following examples are based on these considerations and are taken from actual State requirements:

a) **State A:** State A has established the threshold time at 180 minutes based on the capability of the operator and the aeroplane type for an aeroplane with more than two engines and has approved a maximum diversion time of 240 minutes. That operator will need to have specific approval to be further than 180 minutes to an en-route alternate aerodrome (AEO speed in ISA and still-air conditions), remain within 240 minutes to an en-route alternate aerodrome and meet the requirements in Chapter 4, 4.7.1 to 4.7.2.4.

If that operator, with the particular aeroplane type, plans a route within the threshold time established by the DGCA (in the above example this is 180 minutes) to an en-route alternate aerodrome, that operator would not require any additional approval from the DGCA and would only need to comply with the requirements in Chapter 4, 4.7.1, if the operation is conducted beyond 60 minutes from an en-route alternate aerodrome.

b) **State B:** The CAA is approached by the operator who is in the process of expansion, having acquired aeroplanes with more than two engines capable of EDTO. The operator submits an application to amend its AOC to include this new aeroplane type on newly granted routes. These routes take the flight beyond 60 minutes to an en-route alternate, thus requiring the establishment of a threshold time and approval of a maximum diversion time. Taking into account:

1) That the operator has not had previous experience with the routes and area of operation;
2) The new aeroplane type;
3) The inexperience of the company and its flight operations/operations control department at planning and dispatching such flights; and
4) The new operating procedures to be established,

State B determines that the threshold time for the operator should be limited to 120 minutes and approves a maximum diversion time of 180 minutes.
As the operator gains experience with the operation and the procedures over time, the DGCA may amend the initially established threshold time and approved maximum diversion time.

3.3 EDTO for aeroplanes with two turbine engines

3.3.1 General

3.3.1.1 In addition to the provisions in Sections 2 and 3.1, this section addresses the provisions that apply in particular to aeroplanes with two turbine engines (see Figure C-7).

3.3.1.2 EDTO provisions for aeroplanes with two turbine engines do not differ from the previous provisions for extended range operations by aeroplanes with two turbine engines (ETOPS). Therefore, EDTO may be referred to as ETOPS in some documents.

3.3.2 Operational and diversion planning principles

3.3.2.1 When planning or conducting extended diversion time operations, the operator and pilot-in-command should normally ensure that:

a) The minimum equipment list, the communications and navigation facilities, fuel and oil supply, en-route alternate aerodromes or aeroplane performance are appropriately considered;

b) In the event of an aeroplane engine shutdown, the aircraft can proceed to and land at the nearest (in terms of the least flying time) en-route alternate aerodrome where a safe landing can be made; and

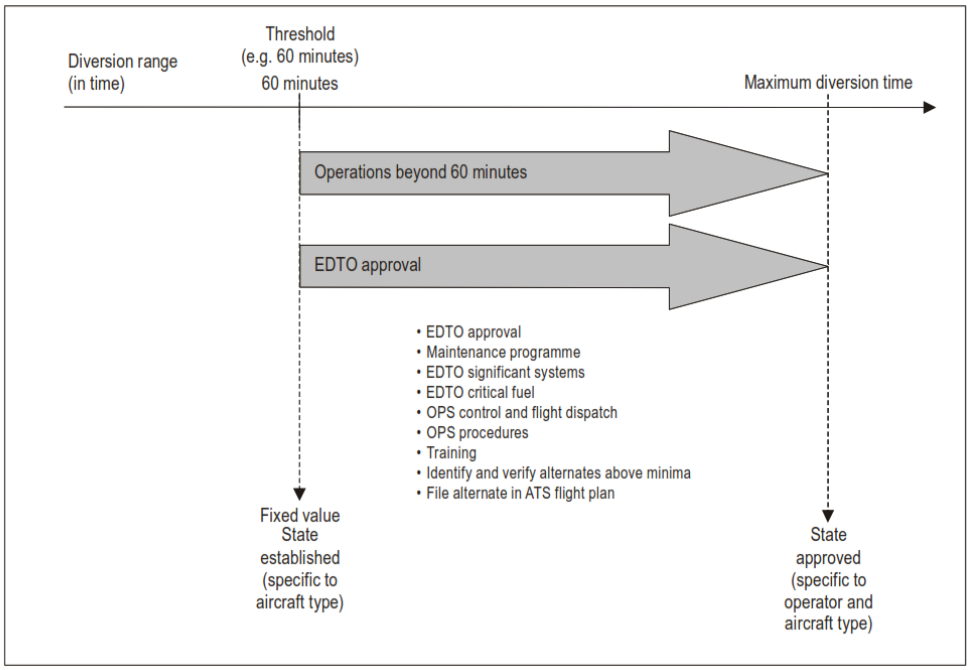


Figure C-7. Generic EDTO graphical representation for aeroplanes with two turbine engines

c) In the event of a single or multiple failure of an EDTO significant system or systems (excluding engine failure), the aircraft can proceed to and land at the nearest available en-route alternate aerodrome where a safe landing can be made unless it has been determined that no substantial degradation of safety will result from any decision made to continue the planned flight.

3.3.2.2 EDTO critical fuel

3.3.2.2.1 An aeroplane with two engines engaged in EDTO operations should carry enough fuel to fly to an en-route alternate aerodrome as described in 3.3.6. This EDTO critical fuel corresponds to the additional fuel that may be required to comply with Chapter 4, 4.3.6.3 f) 2).

3.3.2.2.2 The following should be considered, using the anticipated mass of the aeroplane, in determining the corresponding EDTO critical fuel:

a) fuel sufficient to fly to an en-route alternate aerodrome, considering at the most critical point of the route, failure of one engine or simultaneous engine failure and depressurization or depressurization alone, whichever is more limiting;

1) The speed selected for the all-engines-operative diversion (i.e. depressurization alone) may be different from the approved OEI speed used to determine the EDTO threshold and maximum diversion distance (see 3.3.8);

2) The speed selected for the OEI diversions (i.e. engine failure alone and combined engine failure and depressurization) should be the approved OEI speed used to determine the EDTO threshold and maximum diversion distance (see 3.3.8);

b) Fuel to account for icing;

c) Fuel to account for errors in wind forecasting;

d) Fuel to account for holding an instrument approach and landing at the en-route alternate aerodrome;

e) Fuel to account for deterioration in cruise fuel-burn performance; and

f) Fuel to account for APU use (if required).

Note. — Guidance on EDTO critical fuel planning can be found in the Flight Planning and Fuel Management Manual (Doc 9976).

3.3.2.3 The following factors may be considered in determining if a landing at a given aerodrome is the more appropriate course of action:

a) Aeroplane configuration, mass, systems status and fuel remaining;

b) Wind and weather conditions en route at the diversion altitude, minimum altitudes en route and fuel consumption to the en-route alternate aerodrome;

c) Runways available, runway surface condition and weather, wind and terrain in the proximity of the en-route alternate aerodrome;

d) Instrument approaches and approach/runway lighting available and rescue and firefighting services (RFFS) at the en-route alternate aerodrome;

e) The pilot's familiarity with that aerodrome and information about that aerodrome provided to the pilot by the operator; and

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f) Facilities for passenger and crew disembarkation and accommodation.

3.3.3 Threshold time

3.3.3.1 In establishing the appropriate threshold time and to maintain the required level of safety, it is necessary for DGCA to consider that:

a) The airworthiness certification of the aeroplane type specifically permits operations beyond the threshold time, taking into account the aeroplane system design and reliability aspects;

b) The reliability of the propulsion system is such that the risk of double engine failure from independent causes is extremely remote;

c) Any necessary special maintenance requirements are fulfilled;

d) Specific flight dispatch requirements are met;

e) Necessary in-flight operational procedures are established; and

f) The operator's previous experience on similar aircraft types and routes is satisfactory.

3.3.3.2 For determining whether a point on a route is beyond the EDTO threshold to an en-route alternate aerodrome, the operator should use the approved speed as described in 3.3.8.

3.3.4 Maximum diversion time

3.3.4.1 In approving the maximum diversion time, the DGCA should take into consideration the EDTO certified capability of the aeroplane, the aeroplane's EDTO significant systems (e.g. limiting time limitation, if any, and relevant to that particular operation) for a particular aeroplane type and the operator's operational and EDTO experience with the aeroplane type or, if relevant, with another aeroplane type or model.

3.3.4.2 For determining the maximum diversion distance to an en-route alternate, the operator should use the approved speed as described in 3.3.8.

3.3.4.3 The operator's approved maximum diversion time should not exceed the EDTO certified capability of the aeroplane or the most limiting EDTO significant system time limitation identified in the aeroplane flight manual, reduced by an operational safety margin, commonly 15 minutes, specified by the DGCA.

3.3.5 EDTO significant systems

3.3.5.1 In addition to the provisions in 3.1.1, this section addresses particular provisions for aeroplanes with two turbine engines.

3.3.5.1.1 The reliability of the propulsion system for the aeroplane/engine combination being certified is such that the risk of double engine failure from independent causes is assessed as provided for in the Airworthiness Manual (Doc 9760) and found acceptable to support the diversion time being approved.

Note. — EDTO may be referred to as ETOPS in some documents.

3.3.5.2 Consideration of time limitations

3.3.5.2.1 For all operations beyond the EDTO threshold, as determined by the DGCA, the operator should consider, at time of dispatch and as outlined below, the EDTO certified capability of the aeroplane and the most limiting EDTO significant system time limitation, if any, indicated in the aeroplane flight manual (directly or by reference) and relevant to that particular operation.

3.3.5.2.2 The operator should check that from any point on the route, the maximum diversion time at the approved speed as described in 3.3.8.2 does not exceed the most limiting EDTO significant system time limitation, other than the cargo fire suppression

system, reduced by an operational safety margin, commonly 15 minutes, specified by the DGCA.

3.3.5.2.3 The operator should check that from any point on the route, the maximum diversion time at all-engines operating cruise speed, considering ISA and still-air conditions, does not exceed the cargo fire suppression system time limitation, reduced by an operational safety margin, commonly 15 minutes, specified by the DGCA.

3.3.5.2.4 The operator should consider the approved speed as described in 3.3.5.2.2 and 3.3.5.2.3 or consider adjusting that speed with forecast wind and temperature conditions for operations with longer threshold times (e.g. beyond 180 minutes) as determined by the DGCA.

3.3.6 En-route alternate aerodromes

3.3.6.1 In addition to the en-route alternate aerodrome provisions described in 2.5, the following apply:

a) For route planning purposes, identified en-route alternate aerodromes, which could be used if necessary, need to be located at a distance within the maximum diversion time from the route; and

b) In extended diversion time operations, before an aeroplane crosses its threshold time during flight, there should always be an en-route alternate aerodrome within the approved maximum diversion time whose conditions will be at or above the operator's established aerodrome operating minima for the operation during the estimated time of use.

If any conditions, such as weather below landing minima, are identified that would preclude a safe approach and landing at that aerodrome during the estimated time of use, an alternative course of action should be determined such as selecting another en-route alternate aerodrome within the operator's approved maximum diversion time.

3.3.6.2 During flight preparation and throughout the flight the most up-to-date information on the identified en-route alternate aerodromes, including operational status and meteorological conditions, should be provided to the flight crew.

Note. — En route alternate aerodromes may also be the take-off and/or destination aerodromes.

3.3.7 Operational approval procedure

3.3.7.1 In approving the operator with a particular aeroplane type for extended diversion time operations, the DGCA should establish an appropriate threshold time and approve a maximum diversion time and, in addition to the requirements previously set forth in this Attachment, ensure that:

a) Specific operational approval is granted (by the DGCA);

b) The operator's past experience and compliance record is satisfactory and the operator has established the processes necessary for successful and reliable extended diversion time

operations and shown that such processes can be successfully applied throughout such operations;

c) The operator's procedures are acceptable based on certified aeroplane capability and adequate to address continued safe operation in the event of degraded aeroplane systems;

d) The operator's crew training programme is adequate for the proposed operation;

e) Documentation accompanying the authorization covers all relevant aspects; and

f) It has been shown (e.g. during the EDTO certification of the aeroplane) that the flight can continue to a safe landing under the anticipated degraded operating conditions which would arise from:

1) The most limiting EDTO significant system time limitation, if any, for extended diversion time operations identified in the aeroplane flight manual, directly or by reference; or

2) Total loss of engine-generated electric power; or

3) Total loss of thrust from one engine; or

4) Any other condition which the DGCA considers to be equivalent in airworthiness and performance risk.

3.3.8 Conditions to be used when converting diversion times to distances for the determination of the geographical area beyond threshold and within maximum diversion distances

3.3.8.1 For the purpose of this guidance, an approved OEI speed is any one-engine-inoperative speed within the certified flight envelope of the aeroplane.

Note. — See 3.3.5.2.2 for operational considerations.

3.3.8.2 When applying for EDTO the operator should identify, and the DGCA should approve, the OEI speed(s), considering ISA and still-air conditions, that will be used to calculate the threshold and maximum diversion distances. The identified speed that will be used to calculate the maximum diversion distance should be the same one used to determine fuel reserves for OEI diversions. This speed may be different from the speed used to determine the 60-minute and EDTO thresholds.

3.3.8.3 Determination of the EDTO threshold

3.3.8.3.1 For determining whether a point on the route is beyond the EDTO threshold to an en-route alternate, the operator should use the approved speed (see 3.3.8.1 and 3.3.8.2). The distance is calculated from the point of the diversion followed by cruise for the threshold time as determined by the DGCA and shown in Figure C-8. For the purposes of computing distances, credit for driftdown may be taken.

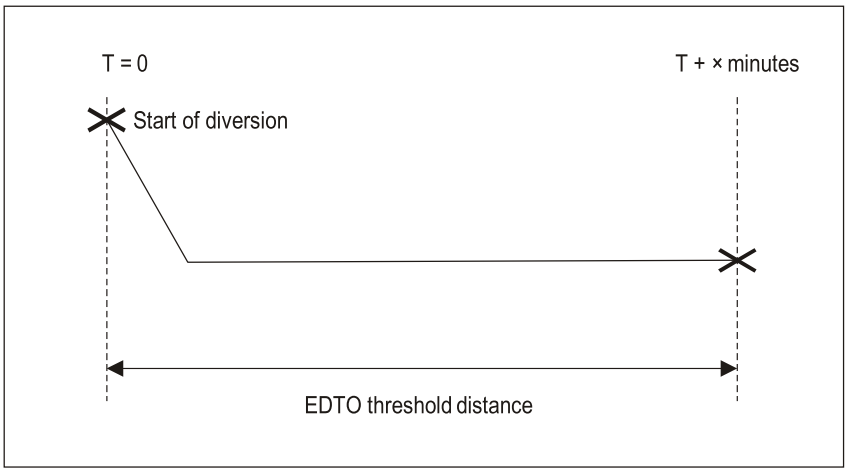

Figure C-8. Threshold distance — aeroplanes with two turbine engines

3.3.8.4 Determination of the maximum diversion time distance

3.3.8.4.1 For determining the maximum diversion time distance to an en-route alternate, the operator should use the approved speed (see 3.3.8.1 and 3.3.8.2). The distance is calculated from the point of the diversion followed by cruise for the maximum diversion time as approved by the DGCA and shown in Figure C-9. For the purposes of computing distances, credit for driftdown may be taken.

3.3.9 Airworthiness certification requirements for extended diversion time operations beyond the threshold time

3.3.9.1 During the airworthiness certification procedure for an aeroplane type intended for extended diversion time operations, special attention should be paid to ensure that the required level of safety will be maintained under conditions which may be encountered during such operations, e.g. flight for extended periods following failure of an engine and/or the aeroplane's EDTO significant systems.

Information or procedures specifically related to extended diversion time operations should be incorporated into the aeroplane flight manual, the maintenance manual, the EDTO configuration, maintenance and procedure (CMP) document or other appropriate document.

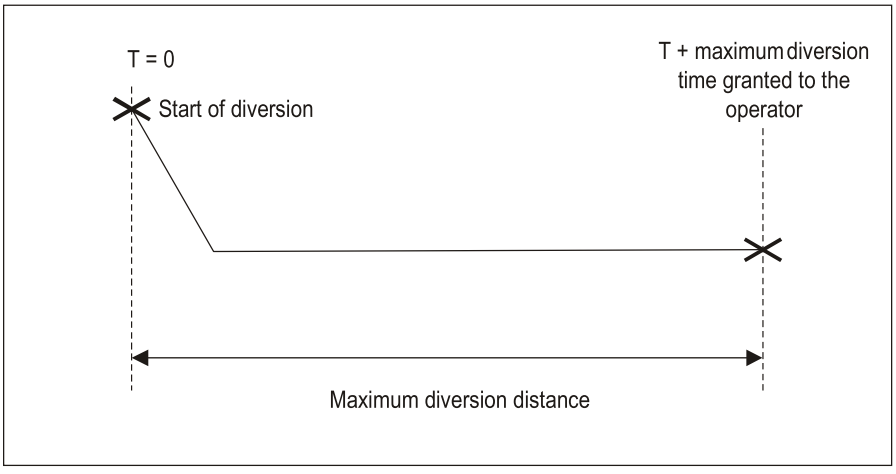

Figure C-9. Maximum diversion distance — aeroplanes with two turbine engines

3.3.9.2 Aeroplane manufacturers should supply data specifying the aeroplane's EDTO significant systems and, where appropriate, any time-limiting factors associated with those systems.

Note 1. — Criteria on aeroplane system performance and reliability for extended diversion time operations are contained in the Airworthiness Manual (Doc 9760).

Note 2. — EDTO may be referred to as ETOPS in some documents.

3.3.10 Maintaining operational approval

3.3.10.1 In order to maintain the required level of safety on routes where these aeroplanes are permitted to operate beyond the established threshold time, it is necessary that:

a) The airworthiness certification of the aeroplane type specifically permits operations beyond the threshold time, taking into account the aeroplane's system design and reliability aspects;

b) The reliability of the propulsion system is such that the risk of double engine failure from independent causes is extremely remote, assessed as provided for in the Airworthiness Manual (Doc 9760) and found acceptable to support the diversion time being approved;

c) Any special maintenance requirements are fulfilled;

d) Specific flight dispatch requirements are met;

e) The necessary in-flight operational procedures are established; and

f) Specific operational approval is granted by the DGCA.

Note 1.— The airworthiness considerations applicable to extended diversion time operations are provided in the Airworthiness Manual (Doc 9760), Part IV, Chapter 5.

Note 2. — EDTO may be referred to as ETOPS in some documents.

3.3.11 Airworthiness modifications and maintenance programme requirements

3.3.11.1 Each operator's maintenance programme should ensure that:

a) The titles and numbers of all airworthiness modifications, additions and changes which were made to qualify aeroplane systems for extended diversion time operations are provided to the DGCA and, where applicable, to the DGCA;

b) Any changes to maintenance and training procedures, practices or limitations established in the qualification for extended diversion time operations are submitted to the DGCA and, where applicable, to the State of Registry before such changes are adopted;

c) A reliability monitoring and reporting programme is developed and implemented prior to approval and continued after approval;

d) Prompt implementation of required modifications and inspections which could affect propulsion system reliability is undertaken;

e) Procedures are established which prevent an aeroplane from being dispatched for an extended diversion time operation after engine shutdown or EDTO significant system failure on a previous flight until the cause of such failure has been positively identified and the necessary corrective action has been completed. Confirmation that such corrective action has been effective may, in some cases, require the successful completion of a subsequent flight prior to dispatch on an extended diversion time operation;

f) a procedure is established to ensure that the airborne equipment will continue to be maintained at the level of performance and reliability required for extended diversion time operations; and

g) a procedure is established to minimize scheduled or unscheduled maintenance during the same maintenance visit on more than one parallel or similar EDTO significant system. Minimization can be accomplished by staggering maintenance tasks, performing and/or supervising maintenance by a different technician, or verifying maintenance correction actions prior to the aeroplane entering an EDTO threshold.

Note.— The maintenance considerations applicable to extended diversion time operations are provided in the Airworthiness Manual (Doc 9760).

3.3.12 Examples

3.3.12.1 In establishing the appropriate threshold and approved maximum diversion time for the operator with a particular aeroplane type, the DGCA should consider, but not be limited to, the following: the airworthiness certification of the aeroplane, the operator's experience in conducting operations beyond the 60-minute threshold, flight deck crew experience in conducting such operations, the maturity of that operator's flight dispatch system, the communication capability with the operator's operational control centre (ACARS, SATCOM, HF, etc.), the robustness of both the operator's standard operating procedures and the familiarity of the crews with those procedures, the maturity of the operator's safety management system, the crew training programme and the reliability of the propulsion system. The following examples are based on these considerations and are taken from actual State requirements:

a) State A: State A has established the threshold time at 60 minutes based on the capability of the operator and the aeroplane type for a twin-engined aeroplane and has approved a maximum diversion time of 180 minutes. That operator will need to have specific approval to be further than 60 minutes to an en-route alternate aerodrome (calculated in ISA and still-air conditions at the one-engine-inoperative cruise speed), remain within 180 minutes to an en-route alternate aerodrome and meet the requirements in Chapter 4, 4.7.1 to 4.7.2.6.

If that operator, with the particular aeroplane type, plans a route within the threshold time established by the DGCA (in the above example this is 60 minutes) to an en-route alternate aerodrome, that operator, by definition, would not be conducting an extended diversion time operation and thus would not need to meet any of the provisions in Chapter 4, 4.7.

b) State B: State B has established the threshold time at 90 minutes based on the capability of the operator and the aeroplane type for a twin-engined aeroplane and has approved a

maximum diversion time of 180 minutes. That operator will need to have specific approval to be further than 90 minutes to an en-route alternate aerodrome (calculated in ISA and still-air conditions at the one-engine-inoperative cruise speed), remain within 180 minutes to an en-route alternate aerodrome and meet the requirements in Chapter 4, 4.7.1 to 4.7.2.6.

If that operator, with the particular aeroplane type, plans a route within the threshold time established by the DGCA (in the above example this is 90 minutes) to an en-route alternate aerodrome, that operator would not require any additional approval from the DGCA and would need only to comply with the requirements in Chapter 4, 4.7.1, and in particular 4.7.1.1 b).

c) The same State B: The same State B is approached by the operator who is in the process of expansion, having acquired twin-engined aeroplanes capable of EDTO.

The operator submits an application to amend its AOC to include this new aeroplane type on newly granted routes. These routes take the flight beyond 60 minutes to an en-route alternate, thus requiring the establishment of a threshold time and approval of a maximum diversion time. Taking into account:

1) That the operator has not had previous experience with the routes and area of operation;

2) The new aeroplane type;

3) The inexperience of the company and its flight operations/operations control department at planning and dispatching such flights; and

4) The new operating procedures to be established,

State B determines that the threshold time for this operator should be limited to 60 minutes and approves a maximum diversion time of 120 minutes.

As this operator gains experience with the operation and the procedures over time, the DGCA amend the initially established threshold time and approved maximum diversion time.

ATTACHMENT D
AIR OPERATOR CERTIFICATION AND VALIDATION

Supplementary to Chapter 4, 4.2.1

1. PURPOSE AND SCOPE

1.1 Introduction

The purpose of this Attachment is to provide guidance concerning actions required by the DGCA in connection with the operator certification requirements in Chapter 4, 4.2.1, particularly the means of accomplishing and recording those actions.

1.2 Prior certification required

In accordance with Standard 4.2.1.3, the issuance of an air operator certificate (AOC) is "dependent upon the operator demonstrating" to the DGCA that its organization, training policy and programmes, flight operations, ground handling and maintenance arrangements are adequate considering the nature and extent of the operations to be conducted. The certification process involves the DGCA's evaluation of each operator and a determination that the operator is capable of conducting safe operations before initial issuance of an AOC or the addition of any subsequent authorizations to an AOC.

1.3 Standard certification practices

The DGCA is required by Standard 4.2.1.8 to establish a certification system to ensure compliance with the required standards for the type of operation to be conducted. Several States have developed policies and procedures to comply with this certification requirement as industry capabilities evolve. While those States did not develop their certification practices in coordination with each other, their practices are remarkably similar and consistent in their requirements. The effectiveness of their practices has been validated over many years, resulting in improved safety records of operators throughout the world. Many of these certification practices have been incorporated by reference in ICAO provisions.

2. REQUIRED TECHNICAL SAFETY EVALUATIONS

2.1 Approval and acceptance actions

2.1.1 The certification and continued surveillance of an air operator includes actions taken by a DGCA on matters submitted for its review. The actions can be categorized as approvals or acceptances depending on the nature of the response by the DGCA to the matter submitted for its review.

2.1.2 An approval is an active response by the DGCA to a matter submitted for its review. An approval constitutes a finding or determination of compliance with the applicable

standards. An approval will be evidenced by the signature of the approving official, the issuance of a document or certificate, or some other formal action taken by the DGCA.

2.1.3 An acceptance does not necessarily require an active response by the DGCA to a matter submitted for its review. A DGCA may accept a matter submitted to it for review as being in compliance with the applicable standards if the DGCA does not specifically reject all or a portion of the matter under review, usually after some defined period of time after submission.

2.1.4 The phrase "approved by the DGCA" or similar phrases using the word "approval" are frequently used in ICAO Annex 6, Part I. Provisions indicating a review and implying approval or at least "acceptance" by the DGCA occur even more frequently in ICAO Annex 6, Part I. In addition to these specific phrases, ICAO 6, Part I, contains numerous references to requirements which would, as a minimum, create the need for at least a technical review by the DGCA. This Attachment groups and outlines those specific Standards and Recommended Practices for ease of use by the DGCA.

2.1.5 The DGCA should make or arrange for a technical safety evaluation before issuing the approval or acceptance. The evaluation should:

a) Be accomplished by a person with specific qualifications to make such a technical evaluation;

b) Be in accordance with written, standardized methodology; and

c) Where necessary to safety, include a practical demonstration of the air operator's actual ability to conduct such an operation.

2.2 Demonstrations before issuance of some approvals

2.2.1 Standard 4.2.1.3 obligates the DGCA, prior to certification of the operator, to require sufficient demonstrations by the operator to enable the DGCA to evaluate the adequacy of the operator's organization, method of control and supervision of flight operations, ground handling and maintenance arrangements. These demonstrations should be in addition to the review or inspections of manuals, records, facilities and equipment. Some of the approvals required by ICAO Annex 6, Part I, such as approval for Category III operations, have significant safety implications and should be validated by demonstration before the State approves such operations.

2.2.2 While the specific methodology and extent of the required demonstrations and evaluations vary between States, the certification processes of States whose operators have good safety records are generally consistent. In these States, technically qualified inspectors evaluate a representative sample of the actual training, maintenance and operations prior to the issuance of an AOC or additional authorizations to the AOC.

2.3 Recording of certification actions

2.3.1 It is important that the certification, approval and acceptance actions of the DGCA are adequately documented. The DGCA should issue a written instrument, such as a letter or formal document, as an official record of the action.

These written instruments should be retained as long as the operator continues to exercise the authorizations for which the approval or acceptance action was issued.

These instruments are unambiguous evidence of the authorizations held by the operator and provide proof in the event that the DGCA and the operator disagree on the operations that the operator is authorized to conduct.

2.3.2 Some States collect certification records such as inspections, demonstrations, approvals and acceptance instruments into a single file which is retained as long as the operator is active. Other States retain these records in files according to the certification action performed, and revise the file as the approvals or acceptance instruments are updated. Regardless of the method used, these certification records are persuasive evidence that a DGCA is complying with its ICAO obligations regarding operator certification.

2.4 Coordination of operations and airworthiness evaluations

Some of the references to approval or acceptance in ICAO Annex 6, Part I, will require an operations evaluation and an airworthiness evaluation. Low minima approvals for the conduct of Category II and III ILS approaches, for example, require coordinated prior evaluation by operations and airworthiness specialists. Flight operations specialists should evaluate the operational procedures, training and qualifications. Airworthiness specialists should evaluate the aircraft, equipment reliability and maintenance procedures. These evaluations may be accomplished separately, but should be coordinated to ensure that all aspects necessary for safety have been addressed before any approval is issued.

2.5 State of the Operator and State of Registry responsibilities

2.5.1 ICAO Annex 6, Part I, places the responsibility for initial certification, issuance of the AOC, and ongoing surveillance of an air operator on the State of the Operator. ICAO Annex 6, Part I, also requires the DGCA to consider or act in accordance with various approvals and acceptances by the State of Registry. Under these provisions, the State of the Operator should ensure that its actions are consistent with the approvals and acceptances of the State of Registry and that the air operator is in compliance with State of Registry requirements.

2.5.2 It is essential that the State of the Operator be satisfied with the arrangements by which its air operators use aircraft on the register of another State, particularly for maintenance and crew training. The State of the Operator should review such arrangements in coordination with the State of Registry. Where appropriate, an agreement transferring oversight responsibilities from the State of Registry to the State of the Operator pursuant to Article 83 bis to the Convention on International Civil Aviation should be arranged to preclude any misunderstandings regarding which State is responsible for specific oversight responsibilities.

Note.— Guidance concerning the responsibilities of the State of Operator and the State of Registry in connection with lease, charter and interchange operations is contained in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335). Guidance concerning the transfer of State of Registry responsibilities to the State of the Operator in accordance with Article 83 bis is contained in Guidance on the Implementation of Article 83 bis of the Convention on International Civil Aviation (Cir 295).

3. APPROVAL ACTIONS

3.1 Approvals

The term "approval" implies a more formal action on the part of the DGCA with respect to a certification matter than does the term "acceptance". Some States require the Director of the Civil Aviation Authority (CAA) or a designated lower-level CAA official to issue a formal written instrument for every "approval" action taken. Other States allow a variety of documents to be issued as evidence of an approval.

The approval document issued and the matter addressed by the approval will depend on the delegated authority of the official. In such States, authority to sign routine approvals, such as operator minimum equipment lists for specific aircraft, is delegated to technical inspectors. More complex or significant approvals are normally issued by higher-level officials.

3.2 Air operator certificate (AOC)

3.2.1 The AOC required by ICAO Annex 6, Part I, Chapter 4, 4.2.1, is a formal instrument. Chapter 4, 4.2.1.5, lists the information to be included in the AOC.

3.2.2 In addition to the items in Appendix 6, paragraph 3 of this IS, operations specifications may include other specific authorizations, such as:

a) Special aerodrome operations (e.g. short take-off and landing operations or land and hold short operations);

b) Special approach procedures (e.g. steep gradient approach, instrument landing system precision runway monitor approach, localizer-type directional aid precision runway monitor approach, RNP approach);

c) Single-engine passenger transport at night or in instrument meteorological conditions; and

d) Operations in areas with special procedures (e.g. operations in areas using different altimetry units or altimeter setting procedures).

3.3 Provisions that require an approval

The following provisions require or encourage approval by specified States. The approval of the DGCA is required in all of the certification actions listed below that are not preceded by one or more asterisks. Certification actions listed below that are preceded by one or more asterisks require approval by the State of Registry (single asterisk or "*"), or by the State of Design (double asterisk or "**"). However, the DGCA should take the necessary steps to ensure that operators for which it is responsible comply with any applicable approvals issued by the DGCA and/or State of Design, in addition to its own requirements.

a) **Configuration deviation list (CDL) (Definitions);

b) **Master minimum equipment list (MMEL) (Definitions);

c) The method for establishing minimum flight altitudes (4.2.7.3);

d) The method of determining aerodrome operating minima (4.2.8.1);

e) Additional requirements for single pilot operations under the instrument flight rules (IFR) at night (4.9.1);

f) Flight time, flight duty periods and rest periods (4.2.11.2);

g) Specific extended range operations (4.7.1);

h) Additional requirements for operations of single-engine turbine-powered aeroplanes at night and/or in instrument meteorological conditions (IMC) (5.4.1);

i) Aircraft-specific minimum equipment list (MEL) (6.1.3);

j) Performance-based navigation operations (7.2.2 b));

k) MNPS operations (7.2.5 b));

l) RVSM operations (7.2.6 b));

m) Procedures for electronic navigation data management (7.5.1);

n) *Aircraft-specific maintenance programme (8.3.1);

o) *Approved maintenance organization (8.7.1.1);

p) *Maintenance quality assurance methodology (8.7.4.1);

q) Flight crew training programmes (9.3.1);

r) Training in the transport of dangerous goods (9.3.1, Note 5);

s) Aerodrome additional safety margin (9.4.3.3 a));

t) Pilot-in-command area, route and aerodrome qualifications (9.4.3.5);

u) Use of flight simulation training devices (9.3.1, Note 2 and 9.4.4, Note 1);

v) Method of control and supervision of flight operations (4.2.1.3 and 10.1);

w) **Mandatory maintenance tasks and intervals (11.3.2);

x) Cabin attendant training programmes (12.4).

3.4 Provisions that require a technical evaluation

Other provisions in ICAO Annex 6, Part I, require the DGCA to have made a technical evaluation. These provisions contain the phrases “acceptable to the DGCA”, “satisfactory to the DGCA”, “determined by the DGCA”, “deemed acceptable by the DGCA”, and “prescribed by the DGCA”.

While not necessarily requiring an approval by the DGCA, these Standards do require the DGCA to at least accept the matter at issue after it conducts a specific review or evaluation. These provisions are:

a) Details of the aircraft-specific checklists (Definition: aircraft operating manual and 6.1.4);

b) Details of the aircraft-specific systems (Definition: aircraft operating manual and 6.1.4);

c) Mandatory material for the operations manual (4.2.3.2/ Appendix 2 of this IS);

d) Engine trend monitoring systems (5.4.2);

e) Equipment for aeroplanes operated by a single pilot under the instrument flight rules or at night (6.23);

f) Requirements for approval to operate in RVSM airspace (7.2.7);

g) Monitoring of height-keeping performance of aeroplanes approved to operate in RVSM airspace (7.2.8);

h) Procedures for distribution and insertion of electronic navigation data in aircraft (7.5.2);

i) *operator's aircraft-specific maintenance responsibilities (8.1.1);

j) *method of maintenance and release (8.1.2);

k) *maintenance control manual (8.2.1);

l) *mandatory material for the maintenance control manual (8.2.4);

m) *reporting of maintenance experience information (8.5.1);

n) *implementing necessary maintenance corrective actions (8.5.2);

o) *modification and repair requirements (8.6);

p) *minimum competence level of maintenance personnel (8.7.6.3);

q) Requirement for flight navigator (9.1.4);

r) Training facilities (9.3.1);

s) Qualifications of instructors (9.3.1);

t) Need for recurrent training (9.3.l);

u) Use of correspondence courses and written examinations (9.3.1, Note 4);

v) Use of flight simulation training devices (9.3.2);

w) Flight crew qualification records (9.4.3.4);

x) Designated representative of the DGCA (9.4.4);

y) Pilot experience, recency and training requirements for single pilot operations under the instrument flight rules (IFR) or at night (9.4.5.1 and 9.4.5.2);

z) *flight manual changes (11.1);

- Minimum number of flight attendants assigned to a specific aircraft (12.1);
- Altimetry system performance requirements for operations in RVSM airspace (Appendix 4, 1 and 2 of this IS);

Single-engine operations

- Turbine engine reliability for approved operations by single-engine turbine-powered aeroplanes at night and/or in instrument meteorological conditions (IMC) (Appendix 3, 1.1 of this IS);
- Systems and equipment (Appendix 3, 2 of this IS); ee) minimum equipment list (Appendix 3, 3 of this IS); ff) flight manual information (Appendix 3, 4 of this IS); gg) event reporting (Appendix 3, 5 of this IS);
- Operator planning (Appendix 3, 6 of this IS);
- Flight crew experience, training and checking (Appendix 3, 7 of this IS); jj) route limitations over water (Appendix 3, 8 of this IS); and
- Operator certification or validation (Appendix 3, 9 of this IS).

4. ACCEPTANCE ACTIONS

4.1 Acceptance

4.1.1 The actual extent of the DGCA's technical evaluation of the operator's readiness to conduct certain flight operations should be much broader than just those Standards which require or imply approval. During certification, the DGCA should ensure that the operator will be in compliance with all requirements of ICAO Annex 6, Part I, prior to conducting international commercial air transport operations.

4.1.2 The concept of "acceptance" is used by some States as a formal method of ensuring that all critical aspects of operator certification are reviewed by the DGCA prior to the formal issuance of the AOC.
Using this concept, these States exercise their prerogative to have technical inspectors review all operators' policies and procedures impacting operational safety. The actual execution of an instrument to reflect this acceptance (assuming such a document is issued) may be delegated to the technical inspector assigned to the certification.

4.2 Conformance report

Some States use a conformance report to document the acceptances it makes with regard to a particular operator. This is a document submitted by the operator detailing how, with specific references to operations or maintenance manuals, it will comply with all applicable State regulations.

This type of document is referenced in Doc 8335 and the Airworthiness Manual (Doc 9760), Volume I, 6.2.1 c) 4). Such a conformance report should be actively used during the certification process and revised as necessary to reflect modifications required by the DGCA's policies and procedures. Then a final conformance report is included in the DGCA's certification records, along with other records of certification. The conformance report is an excellent method of demonstrating that the operator was properly certificated with respect to all applicable regulatory requirements.

4.3 Operations and maintenance manuals

4.3.1 Operations and maintenance manuals, and any subsequent amendments should be submitted to the DGCA (4.2.3.2, 8.1.1, 8.2.4, 8.3.2, and 8.7.2.3). The DGCA also establishes minimum contents for these manuals (11.2, 11.3, 11.4 and Appendix 2 of this IS). The pertinent portions of the operator's manual for evaluation should be identified in the DGCA's technical guidance, e.g. operations policy manual, operating manual, cabin crew manual, route guide, and training manual. Some States issue a formal instrument accepting each manual and any subsequent amendments.

4.3.2 The DGCA's technical evaluation should, in addition to ensuring that all required contents are addressed, consider if the specific policies and procedures would result in the desired outcome. For example, the specifications for the operational flight plan (Appendix 2, 2.1.16 of this IS) should provide the step-by-step completion guidance necessary for compliance with 4.3 concerning the content and retention of these plans.

4.3.3 Proven industry practices, such as an example of an actual completed operational flight plan for reference by the flight crew and dispatchers (although not a Standard), may also be required by a DGCA's technical evaluator during certification. This aspect of the technical evaluation should be conducted by inspectors experienced in operator certification. A major consideration with respect to evaluating for proven industry practices that are aircraft-specific, equipment-specific or have limited applications is the employment of evaluators who are currently qualified in the practice to be evaluated.

5. OTHER APPROVAL OR ACCEPTANCE CONSIDERATIONS

Some States provide for approval or acceptance of certain critical documents, records or procedures specified in ICAO Annex 6, Part I, although the relevant ICAO Annex 6 Standards do not require approval or acceptance by the DGCA. The following are some examples:

a) Flight data analysis programme (3.3.3);

b) Method for obtaining aeronautical data (4.1.1);

c) Adequacy of the fuel and oil records (4.2.10);

d) Adequacy of flight time, flight duty and rest period records (4.10);

e) Adequacy of the aircraft maintenance log book (4.3.1 a), b), and c));

f) Adequacy of the load manifest (4.3.1 d), e) and f));

g) Adequacy of the operational plan (4.3.1 g));

h) Method for obtaining weather data (4.3.5.1 and 4.3.5.2);

i) Method of compliance with carry-on baggage stowage (4.8);

j) Aeroplane performance operating limitations (5.2.4);

k) Method of obtaining and applying aerodrome obstacle data (5.3);

l) Adequacy of passenger information cards (6.2.2 d));

m) Procedures for long-range navigation (7.2.1 b));

n) Contents of the journey log book (11.4.1); and

o) Content of the security training programme (13.4).

6. VALIDATION OF THE STANDARD OF OPERATIONS

Standard 4.2.1.4 requires that the validity of an AOC shall depend upon the operator maintaining the original certification standards (4.2.1.3) under the supervision of the DGCA. This supervision requires that a system of continued surveillance be established to ensure the required standards of operations are maintained (4.2.1.8). A good starting point in the development of such a system is to require annual or semi-annual inspections, observations and tests to validate the required certification approval and acceptance actions.

7. AMENDMENT OF AIR OPERATOR CERTIFICATES

The certification of the operator is an ongoing process. Few operators will be satisfied over time with the initial authorizations issued with their AOC. Evolving market opportunities will cause the operator to change aircraft models and seek approval for new operational areas requiring other additional capabilities. Additional technical evaluations should be required by the DGCA before issuing the formal written instruments approving any changes to the original AOC and other authorizations. Where possible, each request should be “bridged”, using the original authorization as the foundation to determine the extent of the DGCA’s impending evaluation before issuing the formal instrument.

ATTACHMENT E
MINIMUM EQUIPMENT LIST (MEL)
Supplementary to Chapter 6, 6.1.2

1. If deviations from the requirements of States in the certification of aircraft were not permitted an aircraft could not be flown unless all systems and equipment were operable. Experience has proved that some unserviceability can be accepted in the short term when the remaining operative systems and equipment provide for continued safe operations.

2. The DGCA should indicate through approval of a minimum equipment list those systems and items of equipment that may be inoperative for certain flight conditions with the intent that no flight can be conducted with inoperative systems and equipment other than those specified.

3. A minimum equipment list, approved by the DGCA, is therefore necessary for each aircraft, based on the master minimum equipment list established for the aircraft type by the organization responsible for the type design in conjunction with the State of Design.

4. The DGCA should require the operator to prepare a minimum equipment list designed to allow the operation of an aircraft with certain systems or equipment inoperative provided an acceptable level of safety is maintained.

5. The minimum equipment list is not intended to provide for operation of the aircraft for an indefinite period with inoperative systems or equipment. The basic purpose of the minimum equipment list is to permit the safe operation of an aircraft with inoperative systems or equipment within the framework of a controlled and sound programme of repairs and parts replacement.

6. Operators are to ensure that no flight is commenced with multiple minimum equipment list items inoperative without determining that any interrelationship between inoperative systems or components will not result in an unacceptable degradation in the level of safety and/or undue increase in the flight crew workload.

7. The exposure to additional failures during continued operation with inoperative systems or equipment must also be considered in determining that an acceptable level of safety is being maintained. The minimum equipment list may not deviate from requirements of the flight manual limitations section, emergency procedures or other airworthiness requirements of the State of Registry or of the DGCA unless the appropriate airworthiness authority or the flight manual provides otherwise.

8. Systems or equipment accepted as inoperative for a flight should be placarded where appropriate, and all such items should be noted in the aircraft technical log to inform the flight crew and maintenance personnel of the inoperative system or equipment.

9. For a particular system or item of equipment to be accepted as inoperative, it may be necessary to establish a maintenance procedure, for completion prior to flight, to de-activate or isolate the system or equipment. It may similarly be necessary to prepare an appropriate flight crew operating procedure.

10. The responsibilities of the pilot-in-command in accepting an aeroplane for operation with deficiencies in accordance with a minimum equipment list are specified in Chapter 4, 4.3.1.

ATTACHMENT F.
FLIGHT SAFETY DOCUMENTS SYSTEM
Supplementary to Chapter 3, 3.5

1. INTRODUCTION

1.1 The following material provides guidance on the organization and development of the operator's flight safety documents system. It should be understood that the development of a flight safety documents system is a complete process, and changes to each document comprising the system may affect the entire system. Guidelines applicable to the development of operational documents have been produced by government and industry sources and are available to operators. Nevertheless, it may be difficult for operators to make the best use of these guidelines, since they are distributed across a number of publications.

1.2 Furthermore, guidelines applicable to operational documents development tend to focus on a single aspect of documents design, for example, formatting and typography. Guidelines rarely cover the entire process of operational documents development. It is important for operational documents to be consistent with each other, and consistent with regulations, manufacturer requirements and Human Factors principles. It is also necessary to ensure consistency across departments as well as consistency in application. Hence the emphasis on an integrated approach, based on the notion of the operational documents as a complete system.

1.3 The guidelines in this Attachment address the major aspects of the operator's flight safety documents system development process, with the aim of ensuring compliance with Chapter 3, 3.5. The guidelines are based not only upon scientific research, but also upon current best industry practices, with an emphasis on a high degree of operational relevance.

2. ORGANIZATION

2.1 A flight safety documents system should be organized according to criteria which ensure easy access to information required for flight and ground operations contained in the various operational documents comprising the system and which facilitate management of the distribution and revision of operational documents.

2.2 Information contained in a flight safety documents system should be grouped according to the importance and use of the information, as follows:

a) Time-critical information, e.g., information that can jeopardize the safety of the operation if not immediately available;

b) Time-sensitive information, e.g., information that can affect the level of safety or delay the operation if not available in a short time period;

c) Frequently used information;

d) Reference information, e.g., information that is required for the operation but does not fall under b) or c) above; and

e) Information that can be grouped based on the phase of operation in which it is used.

2.3 Time-critical information should be placed early and prominently in the flight safety documents system.

2.4 Time-critical information, time-sensitive information, and frequently used information should be placed in cards and quick-reference guides.

3. VALIDATION

The flight safety documents system should be validated before deployment, under realistic conditions. Validation should involve the critical aspects of the information use, in order to verify its effectiveness. Interactions among all groups that can occur during operations should also be included in the validation process.

4. DESIGN

4.1 A flight safety documents system should maintain consistency in terminology and in the use of standard terms for common items and actions.

4.2 Operational documents should include a glossary of terms, acronyms and their standard definition, updated on a regular basis to ensure access to the most recent terminology. All significant terms, acronyms and abbreviations included in the flight documents system should be defined.

4.3 A flight safety documents system should ensure standardization across document types, including writing style, terminology, use of graphics and symbols, and formatting across documents. This includes a consistent location of specific types of information, consistent use of units of measurement and consistent use of codes.

4.4 A flight safety documents system should include a master index to locate, in a timely manner, information included in more than one operational document.

Note. — The master index must be placed in the front of each document and consist of no more than three levels of indexing. Pages containing abnormal and emergency information must be tabbed for direct access.

4.5 A flight safety documents system should comply with the requirements of the operator's quality system, if applicable.

5. DEPLOYMENT

Operators should monitor deployment of the flight safety documents system, to ensure appropriate and realistic use of the documents, based on the characteristics of the operational environment and in a way which is both operationally relevant and beneficial to operational personnel. This monitoring should include a formal feedback system for obtaining input from operational personnel.

6. AMENDMENT

6.1 Operators should develop an information gathering, review, distribution and revision control system to process information and data obtained from all sources relevant to the

type of operation conducted, including, but not limited to, the State of the Operator, State of design, State of Registry, manufacturers and equipment vendors.

Note. — Manufacturers provide information for the operation of specific aircraft that emphasizes the aircraft systems and procedures under conditions that may not fully match the requirements of operators. Operators should ensure that such information meets their specific needs and those of the local authority.

6.2 Operators should develop an information gathering, review and distribution system to process information resulting from changes that originate within the operator, including:

a) Changes resulting from the installation of new equipment;
b) Changes in response to operating experience;
c) Changes in the operator's policies and procedures;
d) Changes in the operator certificate; and
e) Changes for purposes of maintaining cross fleet standardization.

Note. — Operators should ensure that crew coordination philosophy, policies and procedures are specific to their operation.

6.3 A flight safety documents system should be reviewed:

a) On a regular basis (at least once a year);
b) After major events (mergers, acquisitions, rapid growth, downsizing, etc.);
c) After technology changes (introduction of new equipment); and
d) After changes in safety regulations.

6.4 Operators should develop methods of communicating new information. The specific methods should be responsive to the degree of communication urgency.

Note. — As frequent changes diminish the importance of new or modified procedures, it is desirable to minimize changes to the flight safety documents system.

6.5 New information should be reviewed and validated considering its effects on the entire flight safety documents system.

6.6 The method of communicating new information should be complemented by a tracking system to ensure currency by operational personnel. The tracking system should include a procedure to verify that operational personnel have the most recent updates.

ATTACHMENT G.
ADDITIONAL GUIDANCE FOR APPROVED OPERATIONS BY SINGLE-ENGINE TURBINE-POWERED AEROPLANES AT NIGHT AND/OR IN INSTRUMENT METEOROLOGICAL CONDITIONS (IMC)
Supplementary to Chapter 5, 5.4 and Appendix 3

1. PURPOSE AND SCOPE

The purpose of this attachment is to give additional guidance on the airworthiness and operational requirements described in Chapter 5, 5.4 and Appendix 3 of this IS, which have been designed to meet the overall level of safety intended for approved operations by single-engine turbine-powered aeroplanes at night and/or in IMC.

2. TURBINE ENGINE RELIABILITY

2.1 The power loss rate required in Chapter 5, 5.4.1 and Appendix 3 of this IS should be established as likely to be met based on data from commercial operations supplemented by available data from private operations in similar theatres of operation. A minimum amount of service experience is needed on which to base the judgment, and this should include at least 20 000 hours on the actual aeroplane/engine combination unless additional testing has been carried out or experience on sufficiently similar variants of the engine is available.

2.2 In assessing turbine engine reliability, evidence should be derived from a world fleet database covering as large a sample as possible of operations considered to be representative, compiled by the manufacturers and reviewed with the States of Design and of the Operator. Since flight hour reporting is not mandatory for many types of operators, appropriate statistical estimates may be used to develop the engine reliability data. Data for individual operators approved for these operations including trend monitoring and event reports should also be monitored and reviewed by the DGCA to ensure that there is no indication that the operator's experience is unsatisfactory.

2.2.1 Engine trend monitoring should include the following:

a) An oil consumption monitoring programme based on manufacturers' recommendations; and

b) an engine condition monitoring programme describing the parameters to be monitored, the method of data collection and the corrective action process; this should be based on the manufacturer's recommendations. The monitoring is intended to detect turbine engine deterioration at an early stage to allow for corrective action before safe operation is affected.

2.2.2 A reliability programme should be established covering the engine and associated systems. The engine programme should include engine hours flown in the period and the in-flight shutdown rate for all causes and the unscheduled engine removal rate, both on a 12-month moving average basis. The event reporting process should cover all items relevant to the ability to operate safely at night and/or in IMC.

The data should be available for use by the operator, the Type Certificate Holder and the DGCA so as to establish that the intended reliability levels are being achieved. Any sustained adverse trend should result in an immediate evaluation by the operator in consultation with the DGCA and manufacturer with a view to determining actions to restore the intended safety level. The operator should develop a parts control programme with support from the manufacturer that ensures that the proper parts and configuration are maintained for single-engine turbine- powered aeroplanes approved to conduct these operations. The programme includes verification that parts placed on an approved single-engine turbine-powered aeroplane during parts borrowing or pooling arrangements, as well as those parts used after repair or overhaul, maintain the necessary configuration of that aeroplane for operations approved in accordance with Chapter 5, 5.4.

2.3 Power loss rate should be determined as a moving average over a specified period (e.g. a 12-month moving average if the sample is large). Power loss rate, rather than in-flight shut-down rate, has been used as it is considered to be more appropriate for a single-engine aeroplane. If a failure occurs on a multi-engine aeroplane that causes a major, but not total, loss of power on one engine, it is likely that the engine will be shut down as positive engine-out performance is still available, whereas on a single-engine aeroplane it may well be decided to make use of the residual power to stretch the glide distance.

2.4 The actual period selected should reflect the global utilization and the relevance of the experience included (e.g. early data may not be relevant due to subsequent mandatory modifications which affected the power loss rate). After the introduction of a new engine variant and whilst global utilization is relatively low, the total available experience may have to be used to try to achieve a statistically meaningful average.

3. OPERATIONS MANUAL

The operations manual should include all necessary information relevant to operations by single-engine turbine-powered aeroplanes at night and/or in IMC. This should include all of the additional equipment, procedures and training required for such operations, route and/or area of operation and aerodrome information (including planning and operating minima).

4. OPERATOR CERTIFICATION OR VALIDATION

The certification or validation process specified by the DGCA should ensure the adequacy of the operator's procedures for normal, abnormal and emergency operations, including actions following engine, systems or equipment failures.
In addition to the normal requirements for operator certification or validation, the following items should be addressed in relation to operations by single-engine turbine-powered aeroplanes:

a) Proof of the achieved engine reliability of the aeroplane engine combination (see Appendix 3, paragraph 1 of this IS);

b) Specific and appropriate training and checking procedures including those to cover engine failure/malfunction on the ground, after take-off and en-route and descend to a forced landing from the normal cruising altitude;

c) A maintenance programme which is extended to address the equipment and systems referred to in Appendix 3, paragraph 2 of this IS;

d) An MEL modified to address the equipment and systems necessary for operations at night and/or in IMC;

e) Planning and operating minima appropriate to the operations at night and/or in IMC;

f) Departure and arrival procedures and any route limitations;

g) Pilot qualifications and experience; and

h) The operations manual, including limitations, emergency procedures, approved routes or areas of operation, the MEL and normal procedures related to the equipment referred to in Appendix 3, paragraph 2 of this IS.

5. OPERATIONAL AND MAINTENANCE PROGRAMME REQUIREMENTS

5.1 Approval to undertake operations by single-engine turbine-powered aeroplanes at night and/or in IMC specified in an air operator certificate or equivalent document should include the particular airframe/engine combinations, including the current type design standard for such operations, the specific aeroplanes approved, and the areas or routes of such operations.

5.2 The operator's maintenance control manual should include a statement of certification of the additional equipment required, and of the maintenance and reliability programme for such equipment, including the engine.

6. ROUTE LIMITATIONS OVER WATER

6.1 Operators of single-engine turbine-powered aeroplanes carrying out operations at night and/or in IMC should make an assessment of route limitations over water. The distance that the aeroplane may be operated from a land mass suitable for a safe forced landing should be determined.
This equates to the glide distance from the cruise altitude to the safe forced landing area following engine failure, assuming still air conditions. DGCA may add to this an additional distance taking into account the likely prevailing conditions and type of operation. This should take into account the likely sea conditions, the survival equipment carried, the achieved engine reliability and the search and rescue services available.

6.2 Any additional distance allowed beyond the glide distance should not exceed a distance equivalent to 15 minutes at the aeroplane's normal cruise speed.

ATTACHMENT H.
AUTOMATIC LANDING SYSTEMS, HEAD-UP DISPLAY (HUD) OR EQUIVALENT DISPLAYS AND VISION SYSTEMS
Supplementary to Chapter 4, 4.2.8.1.1, and Chapter 6, 6.24

INTRODUCTION

The material in this attachment provides guidance for certified automatic landing systems, HUD or equivalent displays and vision systems intended for operational use in aeroplanes engaged in international air navigation. These systems and hybrid systems may be installed and operated to reduce workload, improve guidance, reduce flight technical error and enhance situational awareness and/or obtain operational credits. Automatic landing systems, HUD or equivalent displays and vision systems may be installed separately or together as part of a hybrid system. Any operational credit for their use requires a specific approval from the DGCA.

Note 1.— "Vision systems" is a generic term referring to the existing systems designed to provide images, i.e. enhanced vision systems (EVS), synthetic vision systems (SVS) and combined vision systems (CVS).

Note 2. — Operational credit can be granted only within the limits of the airworthiness approval.

Note 3. — Currently, operational credit has been given only to vision systems containing an image sensor providing a real-time image of the actual external scene on the HUD.

Note 4. — More detailed information and guidance on automatic landing systems, HUD or equivalent displays and vision systems is contained in the Manual of All-Weather Operations (Doc 9365). This manual should be consulted in conjunction with this attachment.

1. HUD AND EQUIVALENT DISPLAYS

1.1 General

1.1.1 A HUD presents flight information into the pilot's forward external field of view without significantly restricting that external view.

1.1.2 Flight information should be presented on a HUD or an equivalent display, as required for the intended use.

1.2 Operational applications

1.2.1 Flight operations with a HUD can improve situational awareness by combining flight information located on head-down displays with the external view to provide pilots with more immediate awareness of relevant flight parameters and situation information while they continuously view the external scene.

This improved situational awareness can also reduce errors in flight operations and improve the pilot's ability to transition between instrument and visual references as meteorological conditions change.

1.2.2 A HUD may be used to supplement conventional flight deck instrumentation or as a primary flight display if certified for this purpose.

1.2.3 An approved HUD may:

a) Qualify for operations with reduced visibility or reduced RVR; or

b) Replace some parts of the ground facilities such as touchdown zone and/or centre line lights.

1.2.4 The functions of a HUD may be provided by a suitable equivalent display. However, before such systems can be used, the appropriate airworthiness approval should be obtained.

1.3 HUD training

Training and recent experience requirements for operations using HUD or equivalent displays should be established by the DGCA. Training programmes should be approved by the DGCA and the implementation of the training should be subject to oversight by that DGCA. The training should address all flight operations for which the HUD or equivalent display is used.

2. VISION SYSTEMS

2.1 General

2.1.1 Vision systems can display electronic real-time images of the actual external scene achieved through the use of image sensors, i.e. EVS, or display synthetic images, which are derived from the on-board avionic systems, i.e. SVS. Vision systems can also consist of a combination of these two systems, called combined vision systems (i.e. CVS) . Such a system may display electronic real-time images of the external scene using the EVS component of the system. The information from vision systems may be displayed head-up and/or head-down. Operational credit may be granted to vision systems which are appropriately qualified.

2.1.2 Light emitting diode (LED) lights may not be visible to infrared-based vision systems. Operators of such vision systems will need to acquire information about the LED implementation programmes at aerodromes where they intend to operate. More details about the consequences of LED lights are contained in the Manual of All-Weather Operations (Doc 9365).

2.2 Operational applications

2.2.1 Flight operations with EVS allow the pilot to view an image of the external scene obscured by darkness or other visibility restrictions.

The use of EVS will also allow acquisition of an image of the external scene earlier than with natural, unaided vision, hence providing for a smoother transition to references by natural vision.

The improved acquisition of an image of the external scene may improve situational awareness. It may also qualify for operational credit if the information from the vision system is presented to the pilots in a suitable way and the necessary airworthiness approval and specific approval by the DGCA have been obtained for the combined system.

2.2.2 Vision system imagery may also enable pilots to detect other aircraft on the ground, terrain or obstructions on or adjacent to runways or taxiways.

2.3 Operational concepts

2.3.1 Instrument approach operations include an instrument phase and a visual phase. The instrument phase ends at the published MDA/H or DA/H unless a missed approach is initiated. Using the EVS or CVS does not change the applicable MDA/H or DA/H. The continued approach to landing from MDA/H or DA/H will be conducted using visual references. This also applies to operations with vision systems. The difference is that the visual references will be acquired by use of an EVS or CVS, natural vision or the vision system in combination with natural vision (see Figure H-1).

2.3.2 Down to a defined height in the visual segment, typically at or above 30 m (100 ft), the visual references may be acquired solely by means of the vision system. The defined height depends on the airworthiness approval and specific approval by the DGCA. Below this height the visual references should be solely based on natural vision. In the most advanced applications, the vision system may be used down to touchdown without the requirement for natural vision acquisition of visual references. This means that such a vision system may be the sole means of acquiring visual references and can be used without natural vision.

2.4 Vision systems training

Training and recent experience requirements should be established by the DGCA of the Operator. Training programmes should be approved by the DGCA and the implementation of the training should be subject to oversight by that DGCA. Training should address all flight operations for which the vision system is used.

2.5 Visual references

2.5.1 In principle, the required visual references do not change due to the use of an EVS or CVS, but those references are allowed to be acquired by means of either vision system until a certain height during the approach as described in 2.3.1.

2.5.2 In States that have developed requirements for operations with vision systems, the use of visual references have been regulated and examples of this are provided in the Manual of All-Weather Operations (Doc 9365).

3. HYBRID SYSTEMS

A hybrid system generically means that two or more systems are combined. The hybrid system typically has improved performance compared to each of the component systems, which in turn may qualify for operational credit. The inclusion of more systems in the hybrid system normally enhances the performance of the system. The Manual of All-Weather Operations (Doc 9365) contains some examples of hybrid systems.

4. OPERATIONAL CREDITS

4.1 Aerodrome operating minima are expressed in terms of minimum visibility/RVR and MDA/H or DA/H. When aerodrome operating minima are established, the combined capability of the aeroplanes equipment and on-ground infrastructure should be taken into account. Better equipped aeroplanes may be able to operate into lower natural visibility conditions, lower DA/H and/or operate with less ground infrastructure. Operational credit means that the aerodrome operating minima may be reduced in case of suitably equipped aeroplanes. Another way to grant operational credit is to allow visibility requirements to be fulfilled, wholly or partly, by means of the on-board systems. HUD, automatic landing or vision systems, which were not available at the time when the criteria for aerodrome operating minima were originally established.

EVS operations

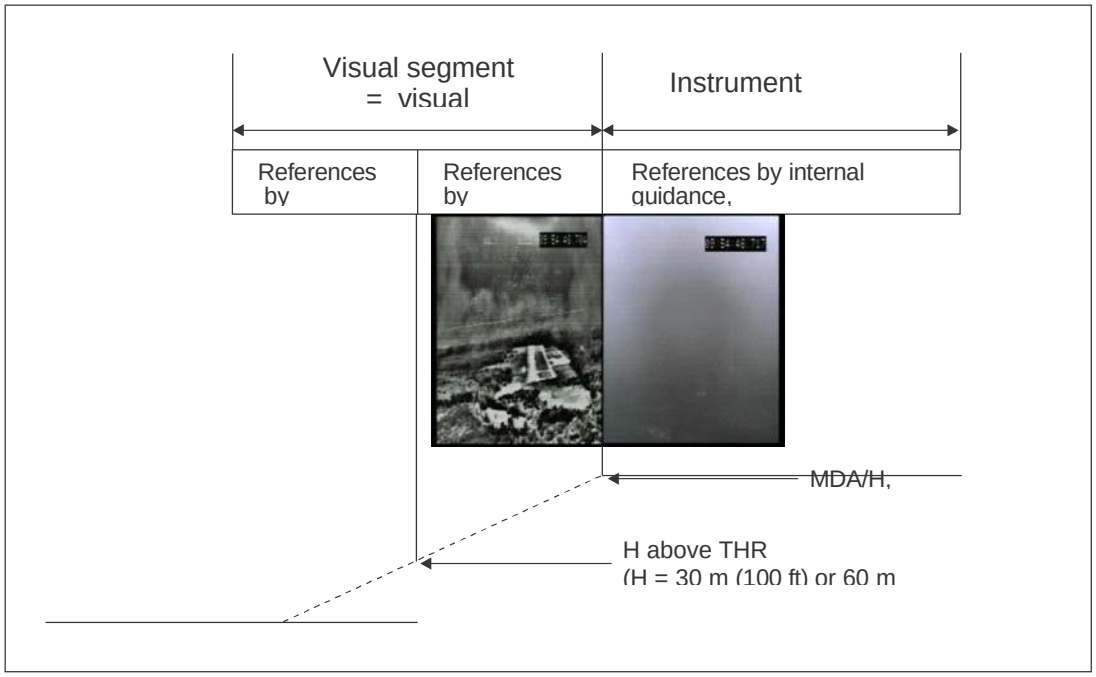

Figure H-1. EVS operations — transition from instrument to visual references

4.2 The granting of operational credits does not affect the classification (i.e. Type or Category) of an instrument approach procedure since they are designed to support instrument approach operations conducted using aeroplanes with the minimum equipment prescribed.

4.3 The relation between the procedure design and the operation can be described as follows. The OCA/H is the end product of the procedure design which does not contain any RVR or visibility values. Based on the OCA/H and all the other elements such as available

runway visual aids, the operator will establish MDA/H or DA/H and RVR/visibility, i.e. the aerodrome operating minima. The values derived should not be less than those prescribed by the State of the Aerodrome.

5. OPERATIONAL PROCEDURES

In accordance with Chapter 6, 6.24.2 the operator should develop suitable operational procedures associated with the use of an automatic landing system, a HUD or an equivalent display, vision systems and hybrid systems. These procedures should be included in the operations manual and cover at least the following:

a) Limitations;
b) Operational credits;
c) Flight planning;
d) Ground and airborne operations;
e) Crew resource management;
f) Standard operating procedures; and
g) ATS flight plans and communication.

6. APPROVALS

6.1 General

Note. — When the application for a specific approval relates to operational credits for systems not including a vision system, the guidance on approvals in this attachment may be used to the extent applicable as determined by the DGCA.

6.1.1 The operator that wishes to conduct operations with an automatic landing system, a HUD or an equivalent display, a vision system or a hybrid system will need to obtain certain approvals as prescribed in the relevant SARPs. The extent of the approvals will depend on the intended operation and the complexity of the equipment.

6.1.2 Systems that are not used for an operational credit or otherwise critical to the aerodrome operating minima, e.g. vision systems used to enhance situational awareness may be used without a specific approval. However, the standard operating procedures for these systems should be specified in the operations manual. An example of this type of operation may include an EVS or an SVS on a head-down display that is used only for situational awareness of the surrounding area of the aeroplane during ground operations where the display is not in the pilot's primary field of view. For enhanced situational awareness, the installation and operational procedures need to ensure that the operation of the vision system does not interfere with normal procedures or the operation or use of other aeroplane systems. In some cases, modifications to these normal procedures for other aeroplane systems or equipment may be necessary to ensure compatibility.

6.1.3 The Standard in Chapter 6, 6.24.1, requires that the use of an automatic landing system, a HUD or an equivalent display, EVS, SVS or CVS or any combination of those systems into a hybrid system, should be approved by the DGCA when those systems are used "for the safe operation of an aeroplane".

When operational credits are granted by the DGCA as per the Standard in Chapter 4, 4.2.8.1.1, the use of that system becomes essential for the safety of such operations and is subject to a specific approval. The use of these systems solely for enhanced situational awareness, reduced flight technical error and/or reduced workload is an important safety feature, but does not require a specific approval.

6.1.4 Any operational credit that has been granted should be reflected in the operation specifications for the type or individual aeroplane as applicable.

6.2 Specific approvals for operational credit

6.2.1 To obtain a specific approval for operational credit, the operator will need to specify the desired operational credit and submit a suitable application. The content of a suitable application should include:

a) Applicant details. The AOC holder's company name, AOC number and email.
b) Aircraft details. Aircraft make(s), model(s) and registration mark(s).
c) Operator's vision system compliance list. The contents of the compliance list are included in the Manual of All- Weather Operations (Doc 9365). The compliance list should include the information that is relevant to the specific approval requested and the registration marks of the aircraft involved. If more than one type of aircraft/fleet is included in a single application, a completed compliance list should be included for each aircraft/fleet.
d) Documents to be included with the application. Copies of all documents to which the operator has made references should be included in the application. There should be no need to send complete manuals; only the relevant sections/pages should be required. Additional guidance material can be found in the Manual of All-Weather Operations (Doc 9365).
e) Name, title and signature.

6.2.2 The following items should be covered in a vision systems compliance list:

a) Reference documents used in compiling the submission for approval;
b) Flight manual;
c) Feedback and reporting of significant problems;
d) Requested operational credit and resulting aerodrome operating minima;
e) Operations manual entries including MEL and standard operating procedures;
f) Safety risk assessments;
g) Training programmes; and
h) Continuing airworthiness.

Expanded guidance on these items is contained in the Manual of All-Weather Operations (Doc 9365).

ATTACHMENT I
RESCUE AND FIRE FIGHTING SERVICES (RFFS) LEVELS
Supplementary to Chapter 4, 4.1.4

1. PURPOSE AND SCOPE

1.1 Introduction

The purpose of this Attachment is to provide guidance for assessing the level of RFFS deemed acceptable by aeroplane operators using aerodromes for different purposes.

1.2 Basic concepts

1.2.1 While all aeroplane operators should aim to have the level of RFFS protection required by ICAO Annex 14, Volume I, Chapter 9, 9.2, some of the aerodromes currently used do not meet these requirements. Furthermore, ICAO Annex 14, Volume I provisions relate to the level of aerodrome RFFS to be provided for aeroplanes normally using an aerodrome.

1.2.2 If an aerodrome is exposed to a temporary reduction of its RFFS capability, ICAO Annex 14, Volume I, 2.11.3, requires that: "Changes in the level of protection normally available at an aerodrome for rescue and firefighting shall be notified to the appropriate air traffic services units and aeronautical information services units to enable those units to provide the necessary information to arriving and departing aircraft. When such a change has been corrected, the above units shall be advised accordingly."

1.2.3 The following guidance is intended to assist operators in making the assessment required by Chapter 4, 4.1.4. It is not intended that this guidance limit or regulate the operation of an aerodrome.

2. GLOSSARY OF TERMS

Aerodrome RFFS category. The RFFS category for a given aerodrome, as published in the appropriate Aeronautical Information Publication (AIP).

Aeroplane RFFS category. The category derived from ICAO Annex 14, Volume I, Table 9-1 for a given aeroplane type.

RFFS category. Rescue and firefighting services category as defined in ICAO Annex 14, Volume I, Chapter 9.

Temporary downgrade. RFFS category as notified, including by NOTAM, and resulting from the downgrade of the level of RFFS protection available at an aerodrome, for a period of time not exceeding 72 hours.

3. MINIMUM ACCEPTABLE AERODROME RFFS CATEGORY

3.1 Planning

3.1.1 In principle, the published RFFS category for each of the aerodromes used for a given flight should be equal to or better than the aeroplane RFFS category.
However, if the aeroplane RFFS category is not available at one or more of the aerodromes required to be specified in the operational flight plan, the operator should

ensure that the aerodrome has the minimum level of RFFS which is deemed acceptable for the intended use in accordance with the instructions contained in the operations manual. When establishing acceptable levels of minimum RFFS for these situations, the operator may use the criteria in Table I-1.

3.1.1.1 Intended operations to aerodromes with RFFS categories below the levels specified in ICAO Annex 14, Volume I, Chapter 9, 9.2, should be coordinated between the aeroplane operator and the aerodrome operator.

Aerodromes (Required to be specified in the operational flight plan) [1]	**Minimum acceptable aerodrome RFFS category** (Based on published aerodrome RFFS category)
Departure and destination aerodrome	RFFS category for each aerodrome should be equal to or better than the aeroplane RFFS category. **One** category [2] below the aeroplane RFFS category may be accepted where provided as a remission in accordance with ICAO Annex 14, Volume I, Chapter 9, 9.2, but not lower than Category 4 for aeroplanes with maximum certificated take-off mass of over 27 000 kg and not lower than Category 1
Departure and destination aerodrome in case of temporary downgrade and Take-off alternate, destination alternate and en-route alternate	**Two** categories below the aeroplane RFFS category, but not lower than Category 4 for aeroplanes with maximum certificated take-off mass of over 27 000 kg and not lower than Category 1 for other aeroplanes.
EDTO en-route alternate aerodrome	RFFS Category 4 for aeroplanes with maximum certificated take-off mass of over 27 000 kg or not lower than Category 1 for all other aeroplanes, under the condition that at least 30 minutes' notice will be given to the aerodrome operator prior to the arrival of the aeroplane.

Table I-1. Minimum acceptable aerodrome category for rescue and fire fighting

Notes.—

(1) If an individual aerodrome serves more than one purpose, the highest required category corresponding to that purpose at the time of expected use applies.

(2) ICAO Annex 14, Volume I, determines the aerodrome category for rescue and firefighting according to 9.2.5 and 9.2.6 except that, where the number of movements of the aeroplanes in the highest category normally using the aerodrome is less than 700 in the busiest consecutive three months, the category provided may be one lower than the determined category.

3.1.2 For all-cargo operations, further reductions might be acceptable provided that the RFFS capability is adequate to arrest fire around the flight deck area long enough for the persons on board to safely evacuate the aeroplane.

3.2 In flight

In flight, the pilot-in-command may decide to land at an aerodrome regardless of the RFFS category if, in the pilot's judgement after due consideration of all prevailing circumstances, to do so would be safer than to divert.

ATTACHMENT J.
DANGEROUS GOODS
(Supplementary to Chapter 14)

1. PURPOSE AND SCOPE

The material in this attachment provides guidance regarding the carriage of dangerous goods as cargo. Chapter 14, includes dangerous goods operational requirements that apply to all operators. Operators that are approved to transport dangerous goods as cargo need to meet additional requirements. In addition to the operational requirements contained in ICAO Annex 6, there are other requirements in ICAO Annex 18 and the Technical Instructions that also need to be complied with.

2. DEFINITIONS

Where the following term is used in this attachment, it has the meaning indicated:

Cargo. Any property carried on an aircraft other than mail and accompanied or mishandled baggage.

Note 1.— This definition differs from the definition of "cargo" given in ICAO Annex 9 — Facilitation.

Note 2.— COMAT that meets the classification criteria of dangerous goods and which is transported in accordance with Part 1;2.2.2 or Part 1;2.2.3 or Part 1;2.2.4 of the Technical Instructions are considered as "cargo" (e.g. aircraft parts such as chemical oxygen generators, fuel control units, fire extinguishers, oils, lubricants, cleaning products).

3. STATES

3.1 The State of the Operator should indicate in the operations specification if the operator is approved or is not approved to transport dangerous goods as cargo. When the operator is approved to transport dangerous goods as cargo any limitations should be included.

3.2 An operational approval may be granted for the transport of specific types of dangerous goods only (e.g. dry ice; biological substance, Category B; and dangerous goods in excepted quantities) or COMAT.

3.3 The Supplement to the Technical Instructions contains guidance on a State's responsibilities with respect to operators. This includes additional information to Part 7 of the Technical Instructions on storage and loading, provision of information, inspections, enforcement and ICAO Annex 6 information relevant to the State's responsibilities for dangerous goods.

3.4 Carriage of dangerous goods other than as cargo (e.g. medical flights, search and rescue) are addressed in Part 1, Chapter 1, of the Technical Instructions. The exceptions for the carriage of dangerous goods that are either equipment or for use on board the aircraft during flight are detailed in Part 1, 2.2.1, of the Technical Instructions.

4. OPERATOR

4.1 The operator's training programme should cover, as a minimum, the aspects of the transport of dangerous goods listed in the Technical Instructions in Table 1-4 for operators holding an approval or Table 1-5 for operators without an approval. Recurrent training must be provided within 24 months of previous training, except as otherwise provided by the Technical Instructions.

4.2 Details of the dangerous goods training programme including the policies and procedures regarding third-party personnel involved in the acceptance, handling, loading and unloading of dangerous goods cargo should be included in the operations manual.

4.3 The Technical Instructions require that operators provide information in the operations manual and/or other appropriate manuals that will enable flight crews, other employees and ground handling agents to carry out their responsibilities with regard to the transport of dangerous goods and that initial training be conducted prior to performing a job function involving dangerous goods.

4.4 Operators should meet and maintain requirements established by the States in which operations are conducted in accordance with 4.2.2.3 of this Annex.

4.5 Operators may seek approval to transport, as cargo, specific dangerous goods only, such as dry ice, biological substance, Category B, COMAT and dangerous goods in excepted quantities.

4.6 Attachment 1 to Part S-7, Chapter 7, of the Supplement to the Technical Instructions contains additional guidance and information on requirements regarding operators not approved to transport dangerous goods as cargo and for operators that are approved to transport dangerous goods as cargo.

4.7 All operators should develop and implement a system that ensures they will remain current with regulatory changes and updates. The Technical Instructions contain detailed instructions necessary for the safe transport of dangerous goods by air. These instructions are issued biennially, becoming effective on 1 January of an odd-numbered year.

ATTACHMENT K.
LOCATION OF AN AEROPLANE IN DISTRESS
(Supplementary to Chapter 6, 6.18)

GUIDANCE FOR LOCATION OF AN AEROPLANE IN DISTRESS

1. INTRODUCTION

The following material provides guidance on locating an aeroplane in distress. The Triggered Transmission of Flight Data Working Group (TTFDWG) reviewed forty-two accidents to determine an indication of the distance from a last-known aeroplane position to the location of an accident site. The report concluded that in approximately 95 per cent of the cases, when the aircraft position was known one minute prior to the accident, the accident site location was within a 6 NM radius of that position. (Click here to access the TTFDWG Report under the "publications" tab or go to https://www.bea.aero/en/.)

1.2 When an aeroplane has an accident into water and becomes submerged, the location of the accident site within a 6 NM radius on the surface becomes more important. Starting the initial search area beyond a 6 NM radius reduces the amount of time available to search for and locate the aeroplane. At current estimated underwater search capabilities of 100 km2/day, an area with a 6 NM radius could be searched in four days. Allowing for naval assets to reach the search area and conduct the search, it is estimated that an area of 2 300 km2, equivalent to a radius of 14 NM, will be able to be searched before the ULD battery degrades. Starting at an area of more than 6 NM radius reduces the probability of a successful location during an initial search, whilst extending the location requirement beyond 6 NM radius reduces the time available to search with no appreciable gain in the probability of recovery.

2. CLARIFICATION OF PURPOSE OF EQUIPMENT

2.1 Information from which a position can be determined: Information from an aircraft system which either is active, or, when automatically or manually activated, can provide position information which includes a time stamp. This is a performance-based requirement which is not system-specific and may also bring operational benefits.

2.2 Emergency locator transmitter (ELT): The current generation of ELTs were designed to provide the position of impact for a survivable accident. The next generation of ELTs may have the capability to activate a transmission in flight when any of the conditions detailed in EUROCAE ED-237, Minimum Aviation System Performance Specification (MASPS) for Criteria to Detect In-Flight Aircraft Distress Events to Trigger Transmission of Flight Information are met. When an ELT sinks below the surface of water, its signal is not detectable.

2.3 Automatic deployable flight recorder (ADFR): The purpose of an ADFR is to have flight recorder data available soon after an accident, in particular for accidents over water. The integrated ELT provides for both locating the accident site for accident investigation and search and rescue purposes. Being floatable, it will assist in locating the accident site by providing an ELT signal when the wreckage sinks below the surface of the water. It also ensures redundancy for one ELT.

2.4 Underwater locator device (ULD): A ULD operating at a frequency of 8.8 kHz is attached to the airframe to locate aeroplane wreckage below the surface of water when an ELT signal is not possible to detect. The ULDs operating at 37.5 kHz are attached to the flight recorders and are used for locating the flight recorders under water.

3. EQUIPAGE COMPLIANCE

The advancement of technology has made it possible to meet the equipage requirements by different means. Table K-1 below provides examples of compliance. In such potential installations, the cost will be minimized and the effectiveness of the current installation improved.

Current	**After 1 January 2021**
In-service	**Application for type certification is submitted to a Contracting State**
Two ELTs Two fixed recorders	Example: A system from which a position can be determined; and one ADFR with an integrated ELT; and one combined recorder; or A system from which a position can be determined and one ELT and two fixed recorders and an additional means to retrieve flight recorder data in a timely manner.

Note.— A system from which a position can be determined and used to comply with Chapter 6, 6.18, may replace one of the ELTs required by Chapter 6, 6.17.