REQUIREMENTS FOR ISSUE, RENEWAL AND CONTINUED VALIDITY OF AIR OPERATOR CERTIFICATE

AIR NAVIGATION ORDER

VERSION : 8.1
DATE OF IMPLEMENTATION : 22-04-2019
OFFICE OF PRIME INTEREST : Flight Standards Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. AITZAZ A. QURESHI	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. M. MOHSIN MALIK	O/Director Flight Standards	Signed
VERIFIED BY	SYED NASIR ALI SHAH	Addl. Director Legal (Reg.)	Signed
APPROVED BY	SHAHRUKH NUSRAT	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by Director General, Civil Aviation Authority (DGCAA) in pursuance of powers vested in him under Rule 4 , provisions of relevant Rules contained in Part-XI, Section 1 & 3 (Air Operator Certificate) and Rule 360 of Civil Aviation Rules (CARs), 1994 (as amended).

B. PURPOSE:

B1. This ANO provides the minimum eligibility requirements, terms & conditions, application process and responsibilities of the applicant concerning issue, renewal and continued validity of Air Operator Certificate issued under Civil Aviation Rules - 1994.

C. SCOPE:

C1. This ANO applies to all persons, organization or enterprises who are either the applicant for the Air Operator Certificate (AOC) or the holder of an AOC for Commercial Air Operations involving transportation of passengers, cargo or mail, for remuneration or hire.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 For the purpose of this ANO and in line with ICAO Standards, Recommended Practices and procedures, the following terms are defined as hereunder:

D1.1.1 **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.;

D1.1.2 **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. For the purpose of this ANO, it would mean both, fixed wing and rotary wing aircraft;

D1.1.3 **Air Operator Certificate (AOC):** A certificate authorizing an Operator to carry out specified commercial air transport operations, including Air Operator Certificate issued under the Civil Aviation Rules, 1994 (CARs, 94);

D1.1.4 **Approval:** An approval is an active response by the CAA to a matter submitted for its review. It constitutes a finding or determination of compliance with the applicable standards and 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 CAA;

D1.1.5 **Balloons:** A non-power-driven lighter-than-air aircraft;

D1.1.6 **CAA:** Civil Aviation Authority of Pakistan;

D1.1.7 **Competent Authority:** The Director General, Civil Aviation Authority (DGCAA) or an officer/any other person delegated the authority by DGCAA under Rule 5 of CARs, 94;

D1.1.8 **Commercial Air Transport Operation:** An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire; alternatively it is an aviation operation other than private operation (under Part XI & XII of CARs 94, and ICAO Annex 6, Part. I & III). Operations under this head are:

D1.1.8.1 **Regular Public Transport Operations:** A flight operations in which an aircraft is used for the carriage of passengers or cargo for hire or reward in accordance with fixed schedules to and from fixed terminals over specific routes with or without intermediate stopping places between terminals, and any reference to "Regular Public Transport" (RPT) has a corresponding meaning;

D1.1.8.2 **Charter Operation:** A flight operations in which an aircraft is used for the carriage of passengers or cargo for hire or reward; and any reference to "Charter" has a corresponding meaning:

a) To and from any place but not in accordance with fixed schedules to and from fixed terminals; or

b) In accordance with fixed schedules to and from fixed terminals in circumstances in which the accommodation in the aircraft is not available for use by members of the public;

D1.1.8.3 **Aerial Work Operations:** 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.;

D1.1.8.4 **Tourism Promotion & Regional Integration (TPRI) Operations:** A flight operations in which an aircraft is used to promote tourism (including religious and medical tourism) and regional connectivity including helicopter services. TPRI operation will be scheduled commuter services on Socio Economic Routes in accordance with existing National Aviation Policy and PCAA regulations.

D1.1.9 **Flight Data Analysis:** A process of analyzing recorded flight data in order to improve the safety of flight operations;

D1.1.10 **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;

D1.1.11 **Flight Operations Officer/Flight Dispatcher:** A person designed by the Operator to engage in the control and supervision of flight operations, whether licensed or not, suitably qualified in accordance with CAA *Licensing ANO-012-XXLC-4.0*, who supports, briefs and / or assists the Pilot-in-Command in the safe conduct of the flight;

D1.1.12 **Flight Recorder:** Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation;

D1.1.13 **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;

D1.1.14 **Flight Simulation Training Device:** Any one of the following three types of apparatus in which flight conditions are simulated on the ground:

D1.1.14.1 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;

D1.1.14.2 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;

D1.1.14.3 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.

D1.1.15 **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.

D1.1.16 **Flying School:** An operator/organization licensed under the Rules for flying training. Flying Schools have two classes namely:

D1.1.16.1 **Class I,** being a school carrying out flying training and ground instructions to enable candidates to qualify for the issue of a Private Pilot License (PPL) and to qualify for the endorsement of aircraft rating on the personal licenses;

D1.1.16.2 **Class II,** being a school carrying out flying training and ground instructions to enable candidates to qualify for the issue of Private Pilot License (PPL), or a Commercial Pilot License (CPL) and qualify for the endorsement of ratings on such licenses.

D1.1.17 **General Aviation Operation:** An aircraft operation other than a commercial air transport operation or aerial work operation.

D1.1.18 **Ground handling:** Services necessary for an aircraft’s arrival at, and departure from, an airport, other than air traffic services;

D1.1.19 **Inspector:** Inspector duly authorized by the Competent Authority under Rule 5 of CARs 94;

D1.1.20 **Instrument Meteorological Conditions (IMC):** Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling (As defined in ICAO Annex 2), 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.

D1.1.21 **Large Aeroplane:** An aeroplane of a maximum certificated take-off mass of over 5700 kg.

D1.1.22 **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.

D1.1.23 **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.

D1.1.24 **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.

D1.1.25 **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.

D1.1.26 **Operations Manual:** A manual containing procedures, policies, instructions, checklists, and guidance for use by the operational personnel in the execution of their duties. It would essentially include all the manuals and other requirements as specified in ANO-003-FSXX-5.0 (Contents of Operations Manual) either by reference or otherwise and shall be approved by the CAA;

D1.1.27 **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.

D1.1.28 **Operations Specifications**: The authorizations, conditions and limitations associated with the Air Operator Certificate and subject to the conditions in the Operations Manual.

D1.1.29 **Operator:** A person, company, organization or enterprise engaged in or offering to engage in an aircraft operation under an Air Operator Certificate issued by the CAA in accordance with CARs 94;

D1.1.30 **Rules:** Civil Aviation Rules, 1994 (CARs, 94), as amended from time to time;

D1.1.31 **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 (ICAO Doc 9587).

D1.1.32 **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.

D1.1.33 **Visual Meteorological Conditions (VMC):** Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling (As defined in ICAO Annex 2), equal to or better than specified minima.

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

D2. <u>THE AIR OPERATOR CERTIFICATE (AOC):</u>

D2.1 An aircraft shall not fly for the purpose of:

a) Regular Public Transport;
b) Charter; or
c) Aerial Work;
d) Tourism Promotion and Regional Integration

Unless the Operator of that aircraft holds an Air Operator Certificate issued by the Director General of CAA.

D2.2 The Air Operator Certificate shall authorize the Operator to conduct commercial air transport operations in accordance with such conditions and limitations as may be specified in Operations Specifications.

D2.3 The AOC shall be issued consequent to a satisfactory demonstration by the Operator that his equipment, organization, staffing, maintenance and other arrangements are adequate to ensure safe operation of the type of the aircraft included in the Operations Specifications of the AOC Holder. He shall also demonstrate adequate method of control and supervision of the flight operations, training policies / programs, ground handling and maintenance arrangements are consistent with the nature and extent of the type of operations specified.

D2.4 The continued validity of an Air Operator Certificate shall depend upon the Operator maintaining the requirements of Para D2.3 above.

D2.5 The Air Operator Certificate shall follow the layout and the contents as specified in Appendix "A" to this ANO.

D2.6 The Operations Specifications associated with the Air Operator Certificate shall follow the layout and the contents as specified in Appendix "A" to ANO-002-FSXX-4.0 (Operations Specifications).

D2.7 The processes and procedures for certification as specified in "AOC Guide – Commercial Air Operations" (CAAD-617) shall be adhered to both for initial and recurrent issue of AOC by CAA. This process involves the evaluation of the 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.

D2.8 CAA shall keep continuous surveillance of the Operator, as stipulated in Flight Inspectors Operations Manual (CAAD-624), to ensure that the required standards of operations established in certification are maintained.

D3. TYPES OF AIR OPERATOR CERTIFICATE (AOC):

D3.1 AOC – RPT: which shall authorize the holder to engage in Regular Public Transport (RPT) operations within the conditions and limitations of that certificate, provided that the Operator holds a valid license for such operations issued by the Government of Pakistan / Federal Government.

D3.2 AOC – Charter: which shall authorize the holder to engage in Charter Operations within the conditions and limitations of that certificate, provided that in the case of International Charter Operations and of Charter Operations by aircraft with a maximum permissible take-off mass greater than 5700 Kg, he has also been granted a license for a such Operations by the Government of Pakistan / Federal Government.

D3.3 AOC – Aerial Work: which shall authorize the holder to engage in Aerial Work operations within the conditions and limitations of that certificate, provided that in the case of international aerial work, he has also been granted a license by the Government of Pakistan / Federal Government.

D3.4 AOC – TPRI: which shall authorize the holder to engage in TPRI operations within the conditions and limitations of the certificate, provided that the operator holds a valid license for such operations issued by the Director General, PCAA. TPRI operation shall be permitted with aircraft acquired by the operator on purchase/ dry lease basis only.

D3.5 Contents of an AOC: The AOC shall contain at least the following information and shall follow the layout of Appendix "A"

a) The State of the Operator and the Issuing Authority;
b) AOC Number and its expiration date;
c) The Operator's 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 control document carried on board, where the contact details of the operational management can be found.

D4. VALIDITY OF AN AOC:

D4.1 An AOC issued under CARs 94, shall be valid for a period of one year from the date of issue or renewal, unless earlier suspended or cancelled by Director General, CAA.

D4.2 The Air Operator Certificate and/or the Licence issued under the Rules shall be non-transferable.

D4.3 The Director General, CAA may refuse to grant, ask for re-evaluation, suspend or cancel an AOC on any one or more of the following grounds:

D4.3.1 The Operator has failed to satisfy a requirement prescribed in the CARs 94, Air Navigation Orders (ANOs), Air Safety Circulars (ASCs), Airworthiness Notices (AWNs) and/or in relation to the granting of the Certificate;

D4.3.2 The Operator has made a false or misleading statement in his application or in connection with his application;

D4.3.3 The Operator is a holder of a licence that is suspended or has been cancelled.

D4.4 The AOC shall lapse if the Operator ceases to continue his operation for more than 45 days; and shall be subject to re-evaluation of the Operator's Operation for validation of AOC.

D4.5 If an AOC has not been renewed after one year of its issue/renewal, under Rule 54 or Rule 188 (as applicable), the AOC shall be deemed invalid.

D4.6 Licence issued under Rule 52 or Rule 177 of CARs, 94 shall be deemed to have been suspended under Rule 341; and may be recommended for cancellation if:

D4.6.1 A Licence-holder fails to meet the conditions required for issuance of an AOC within two years from the date of issuance of Licence;

D4.6.2 An AOC has not been renewed for two consecutive years.

D5. AOC ISSUE AND RENEWAL PROCESS - OPERATOR:

The Operator shall:

D5.1 have an appropriate license issued by the Competent Authority in pursuance of Civil Aviation Rules 1994 and/ or PCAA regulations; and

D5.2 deposit the applicable fee as specified in "AOC Guide – Commercial Air Operations" (CAAD-617) and obtain the receipt;

D5.3 submit an application on the Form, prescribed by the Competent Authority in AOC Guide (CAAD-617) along with the fee deposit receipt. This application shall be signed by the person who is appropriately qualified and approved by Authority. For commercial operations, it shall be Director Operations, Director Flight Operations (DFO) or the Chief Pilot Operations / General Manager Operations, Charter and Aerial Work Operators may give this responsibility to either Chief Pilot or General Manager Flight Operations;

D5.4 append the application with the supporting documents to satisfy the Competent Authority of the following:-

D5.4.1 a suitable organization established and management system in place for Operational Control of all flights in accordance with ANO-004-FSXX-3.0; (Operational Control Systems)

D5.4.2 an adequate number of suitably qualified, experienced and competent personnel including the key management personnel with appropriate experience in management, flight safety and operational control;

D5.4.3 the chain of command established within the organization, appropriate for conduct of safe and efficient operations;

D5.4.4 adequacy of facilities at all locations from/to where the operations are intended or conducted;

D5.4.5 types of aircraft, State of Registry and if leased, copies of Lease agreement and Transfer agreement. Refer to ANO-016-FSXX-3.0 (Aircraft Leasing and Operations with Leased Aircraft) for operation with leased aircraft;

D5.4.6 suitable procedures and practices to have control over the proposed operation and the organization for the provision of safety of operation and services;

D5.4.7 ground Handling Services necessary for an aircraft's arrival at, and departure from, an airport, as specified in ANO-003-FSXX-5.0 (Contents of Operations Manual);

D5.4.8 arrangements for maintenance and inspection of aircraft, associated parts & equipment in accordance with relevant Airworthiness Notice;

D5.4.9 provision of:

D5.4.9.1 Operations Manual (in duplicate) to Flight Standards Directorate for review and approval. Operations Manual shall include all the manuals (including customized FCOM/AOM/FOM, QRH, Mass & Balance Manual), policies, instructions, procedures, MEL/CDL/DDPG, checklists, training requirements, limitations and guidance material for use by operational personnel in execution of their duties. Refer to ANO-003-FSXX-5.0 on requirements of Operations Manual;

D5.4.9.2 Aircraft Maintenance Manuals, maintenance control manual, maintenance training program, and maintenance reliability program to Airworthiness Directorate, CAA for Approval.

Note-1: All documents mentioned in clause D5.4.9.1 shall be original, legible and in English language along with a soft copy in a CD duly marked with contents.

Note-2: All documents written/produced by the Operator, must be reviewed every two (02) years from the date of initial approval and/or date of last such review. Reviewed documents must be presented to Flight Standards Directorate, CAA for approval. In case no items need amendments, a Certificate is to be furnished to Flight Standards Directorate (FSD) that the document was reviewed and no amendments are found necessary.

D5.4.10 insurance policies (Passenger, Aircraft, Third Party and Hull) within and outside Pakistan in accordance with Rule 179(2)(c) and Rule 199 of CARs, 94; Carriage by Air Act, 2012 and other Federal statutes, instructions & rules as promulgated / amended from time to time;

D5.4.11 provision of a compliance statement describing as to how the applicant intends to comply with applicable Rules, ANOs, and other related requirements;

D5.4.12 ensure that the application along with the documents as prescribed in clause D5.4.1 to D5.4.11 is submitted at least Eighty (80) days before the applicant proposes to commence operations and in case of renewal, Forty (40) days before the expiry of existing AOC.

D6. AOC ISSUE AND RENEWAL PROCESS:

D6.1 Subject to the provision of all the documents/evidence as given in D5.4; an application for issue or renewal of an AOC shall be processed by CAA in the following sequence:

D6.1.1 Documentation Evaluation for issuance or renewal of an AOC;

D6.1.2 Operational and maintenance inspection which shall include but is not limited to, Organization, Operations Manual, Operational Procedures, Operational Control, Crew Qualification, Training Programs, Records, Flight Operations, Fixed & Mobile Facilities, Ground Handling and Technical Assessment of Maintenance arrangements as mentioned in AOC Guide (CAAD-617);

D6.1.3 Emergency evacuation and ditching demonstration (if applicable) in accordance with ANO-008-FSXX-2.0 (Emergency Evacuation Demonstration) & ANO-009-FSXX-2.0 (Ditching Demonstration);

D6.1.4 Proving Tests/Flights in accordance with Rule 204 of CARs, 94 and ANO-006-FSXX-2.0 (Proving Flights);

D6.1.5 Subject to the completion of the processes in clause D5 and satisfactory results, the Competent Authority shall issue/renew the AOC on the prescribed Form along with Operations Specifications;

D6.1.6 Surveillance and Inspections by the Inspectors for the continued life of AOC in accordance with CAA requirements.

D7. GENERAL CONDITIONS APPLICABLE TO AN AOC:

D7.1 Where an AOC is issued the Operator shall continue to satisfy the Competent Authority in relation to all matters specified in CAA Rules and Regulations, Air Navigation Orders (ANOs), Air Safety Circulars (ASCs) and all directives issued by the Federal Government or DG CAA. For compliance accountable executive/ managers of an operator shall be responsible to PCAA. All accountable managers shall be approved by PCAA for their competence to hold the assigned post. The accountable managers shall be selected from a panel of nominees (more than one up to three) provided by an operator.

Note 1: Accountable Executive is either a CEO, COO or Chairman/ President of Operator Company.

Note 2: Accountable Managers include Head of Operations (Chief Pilot Ops/ DFO/ GM Ops); Head of Training (Chief Pilot Trg/ Training Manager); For General Aviation Chief Pilot/ CFI.

D7.2 Operation Specifications issued along with an AOC shall be:

D7.2.1 complied with by the Operator and shall not be varied in any respect to aircraft types, Manufacturers Serial Numbers (MSN), registration, operations, routes (where applicable) and aerodromes, without the prior approval of the Competent Authority;

D7.2.2 made available (certified true copy) on board each aircraft before the commencement of each flight. If the Operations Specifications are in a language other than English, an English translated copy of the same shall be included.

D7.3 The Operator shall maintain insurance policies (Passenger, Aircraft, Third Party and Hull), within and outside Pakistan, in accordance with Rule 179 (2) (c), Rule 199 of CARs, 94 and Carriage by Air Act, 2012.

D7.4 The Operator shall abide by the terms and conditions given in ANO-016-FSXX-3.0 for leasing and operations with leased aircraft. Additional requirements of Rule 368A on Transfer Agreement between State of Registry and CAA shall be applicable if a foreign registered aircraft is leased-in or Pakistan registered aircraft is leased-out before the commencement of its operation. The Operator shall be responsible for arrangement and the expenses incurred for such an agreement.

D7.5 Operator shall comply with all requirements specified in ANO-024-FSXX-6.0 for Commercial Air Transport Operations - Aeroplanes.

D8. TRAINING OF CAA INSPECTORS:

D8.1 Where an Operator inducts a new type of aircraft, which is not available on “Civil Aviation Register” or there is no Inspector currently trained on that type of aircraft, the operator shall arrange training of one Flight Operation Inspector from Flight Standards Directorate, Headquarters CAA at the expense of the Owner/Operator.

D8.2 The AOC holder shall also arrange and bear the cost of recurrent training of Flight Operations Inspectors of Flight Standards Directorate, Headquarters CAA on their respective equipment, as per existing rules and regulations of licensing requirements.

D8.3 It shall be the responsibility of the individual Operator to provide Flying, Simulators and Technical Refreshers to CAA Flight Inspectors assigned to them, to ensure that the Inspectors maintain currency and proficiency on individual aircraft type. Flying currency of the Flight Inspector as required in the CARs/ANOs shall be the responsibility of the Operator.

D9. CAA SAFETY OVERSIGHT FUNCTIONS:

D9.1 Certification and Surveillance of Operators:

D9.1.1 The CAA Inspectors, for the purposes of issuance, renewal and for continued validity of the AOC, are delegated the powers under Rule 4 & Rule 5 of CARs, 94, by the Competent Authority for safety oversight functions. The Inspectors shall conduct operational inspections of the AOC holder for ensuring the validity of continued life of the AOC issued under the Rules.

D9.1.2 The Operator shall ensure that the CAA inspectors are provided with uninterrupted access to their personnel for any direct or indirect examination/tests and or spot-checks for their documents, aircraft for inspections, operations, facilities and associated records/documents for the purpose of certification and continued surveillance.

D9.2 Surveillance of Operations by a “Foreign Operator”

D9.2.1 CAA 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 regulatory requirements specified in ANO-024-FSXX-6.0 (Commercial Air Transport Operations - Aeroplanes).

D9.2.2 In order to ensure Safety of Operations in Pakistan territory, CAA shall carry out surveillance of Operations by Foreign Operators. All such surveillance shall be conducted in a programmed manner.

D9.2.3 A Foreign Operator shall meet and maintain the requirements established by the CAA and other States in which the operations are conducted. Such operator shall also comply with the provisions of Rule 368 of CARs, 94.

D10. VARIATION TO THE CONDITIONS OR OBLIGATIONS:

D10.1 An Operator may apply in writing to the Director General, CAA for approval of a variation in the conditions and/or obligations applicable to the AOC.

D10.2 An application for any variation shall be made on the prescribed Form provided in ANO-002-FSXX-4.0 (Operations Specifications) along with full details of the proposed variation.

D11. ADVERSE ACTIONS / PENALTIES:

D11.1 A person who contravenes or fails to comply with the provisions of Civil Aviation Rules, 1994 and ANOs shall be dealt with under Parts XVIII and XIX of the CARs, 94.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
AOM	:	AIRCRAFT OPERATING MANUAL
ASC	:	AIR SAFETY CIRCULAR
CARs	:	CIVIL AVIATION RULES
CDL	:	CONFIGURATION DEVIATION LIST
CFI	:	CHIEF FLYING INSTRUCTOR

DDPG	:	DISPATCH DEVIATION PROCEDURES GUIDE
DFO	:	DIRECTOR FLIGHT OPERATIONS
DGCAA	:	DIRECTOR GENERAL CIVIL AVIATION AUTHORITY
FCOM	:	FLIGHT CREW OPERATING MANUAL
FSD	:	FLIGHT STANDARDS DIRECTORATE (OF CAA)
GHA	:	GROUND HANDLING AGENT/AGENCY
MEL	:	MINIMUM EQUIPMENT LIST
OM	:	OPERATIONS MANUAL
CAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
PIC	:	PILOT IN COMMAND
QAR	:	QUICK ACCESS RECORDER
QRH	:	QUICK REFERENCE HANDBOOK
RPT	:	REGULAR PUBLIC TRANSPORT
SEP	:	SAFETY AND EMERGENCY PROCEDURES
TPRI	:	TOURISM PROMOTION & REGIONAL INTEGRATION

E2. RECORDS:

E2.1 Air Operator Certificate

E3. REFERENCES:

E3.1 "AOC Guide – Commercial Air Operations" CAAD-617; (MNL-005-FSXX-3.0)

E3.2 ICAO Annex 6 Part 1.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from **22nd April, 2019** and supersedes ANO-001-FSXX-8.0.

--S/d--

(SHAHRUKH NUSRAT)
Director General,
Pakistan Civil Aviation Authority

Dated: - **17th April, 2019**

--S/d--

(CAPT. M. MOHSIN MALIK)
O/Director Flight Standards

Dated- **17th April, 2019**
File No. HQCAA/1077/012/FSAC

APPENDIX "A"

AIR OPERATOR CERTIFICATE ***(RPT / CHARTER / AERIAL WORK / TPRI OPERATIONS)***
ISLAMIC REPUBLIC OF PAKISTAN
Pakistan Civil Aviation Authority

AOC NO.: **EXPIRY DATE:**	**OPERATOR'S NAME** **ADDRESS:** **TELEPHONE NO.(s) +92** **FAX NO. +92** **E-MAIL:**	**OPERATIONAL POINTS OF CONTACT:** **D/CP/GM Flight Operations** **TEL: +92 21** **FAX: +92 21** **E-Mail:**

This certificate certifies that <u>M/S (Operator's registered name)</u> is authorized to perform Commercial Air Operations, as defined in the attached Operations Specifications, in accordance with the Operations Manual and Part-XI, Section 3, of CARs 94.

This certificate is valid subject to validity of <u>*RPT / Charter / Aerial Work / TPRI*</u> License issued by Directorate of Air Transport, Pakistan Civil Aviation Authority.

Date of issue:	**(NAME & SIGNATURE)** Director General Civil Aviation Authority Pakistan

OPERATIONS SPECIFICATIONS

AIR NAVIGATION ORDER

VERSION	**:**	**4.1**
DATE OF IMPLEMENTATION	**:**	**22-04-2019**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. AITZAZ A. QURESHI	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. M. MOHSIN MALIK	O/Director Flight Standards	Signed
VERIFIED BY	SYED NASIR ALI SHAH	Addl. Director Legal (Reg.)	Signed
APPROVED BY	SHAHRUKH NUSRAT	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by the Director General Civil Aviation Authority, (DGCAA) in pursuance of the powers vested in him under Rules 4, 180, 186 to 189, 194, 360 and all other enabling provisions of the Civil Aviation Rules (CARs), 1994.

B. PURPOSE:

B1. To prescribe conditions and limitations for holder of Air Operator Certificate (AOC) which shall authorize the Operator to conduct Commercial Air Transport Operations in accordance with the authorization, conditions and limitations prescribed, which are named hereafter as "Operations Specifications".

C. SCOPE:

C1. This ANO is applicable to the operation of aeroplanes by Operators authorized to conduct Commercial Air Transport Operations.

C2. It encompasses the requirements of issuance, renewal, variations and amendment procedures of Operations Specifications.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 For the purpose of this ANO and in line with ICAO Standards, Recommended Practices and Procedures, the following terms are defined as hereunder:

D1.1.1 **Aeroplane:** A powered driven heavier than air aircraft, driving its lift in flight chiefly from aerodynamic reaction on surfaces which remain fixed under given conditions of flight;

D1.1.2 **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. For the purpose of this ANO, it would mean both, fixed and rotary wing aircraft.

D1.1.3 **Air Operator Certificate (AOC):** A certificate authorizing an operator to carry out specified commercial air transport operations.

D1.1.4 **Amendment Number:** The number allotted by the Operator for any amendment to any of the parts, the record of which shall be maintained by the operator for reference.

D1.1.5 **Application Form:** The prescribed Form in this ANO that shall be used for requesting any amendment to any part of the Operations Specifications. This form is appended as **Appendix "B"** to this ANO.

D1.1.6 **Approval:** An approval is an active response by the CAA to a matter submitted for its review. It constitutes a finding or determination of compliance with the applicable standards and 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 CAA.

D1.1.7 **CAA:** Civil Aviation Authority of Pakistan.

D1.1.8 **Competent Authority:** The Director General, Civil Aviation Authority (DGCAA) or an officer/any other person delegated the authority under Rule 5 of CARs, 94.

D1.1.9 Commercial Air Transport Operation: An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire; alternatively it is an aviation operation other than private operation (under Part XI & XII of CARs, 94, and ICAO Annex 6 Part. I & III). Operations under this head are:

D1.1.9.1 **Regular Public Transport Operations:** A flight operations in which an aircraft is used for the carriage of passengers or cargo for hire or reward in accordance with fixed schedules to and from fixed terminals over specific routes with or without intermediate stopping places between terminals, and any reference to "Regular Public Transport" (RPT) has a corresponding meaning;

D1.1.9.2 **Charter Operation:** A flight operations in which an aircraft is used for the carriage of passengers or cargo for hire or reward; and any reference to "Charter" has a corresponding meaning:

a) To and from any place but not in accordance with fixed schedules to and from fixed terminals; or

b) In accordance with fixed schedules to and from fixed terminals in circumstances in which the accommodation in the aircraft is not available for use by members of the public;

D1.1.9.3 **Aerial Work Operations:** 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.;

D1.1.9.4 **Tourism Promotion & Regional Integration (TPRI) Operations:** A flight operations in which an aircraft is used to promote tourism (including religious and medical tourism) and regional connectivity including helicopter services. TPRI operation will be scheduled commuter services on Socio Economic Routes in accordance with existing National Aviation Policy and PCAA regulations.

D1.1.10 Electronic Flight Bag (EFB): An electronic information system for flight crew which allows for storing, updating, delivering, displaying and / or computing digital data to support flight operations or duties.

D1.1.11 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 State of the Operator.

D1.1.12 Inspector: Inspector duly authorized under Rules 4 and 5 of CARs, 94;

D1.1.13 Maximum Diversion Time: Maximum allowable range, expressed in time, from a point on a route to an en-route alternate aerodrome.

D1.1.14 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.

D1.1.15 Operations Manual: A manual containing procedures, policies, instructions, checklists, and guidance for use by the operational personnel in the execution of their duties. It would essentially include all the manuals and other requirements as specified in ANO-003 (Contents of Operations Manual) either by reference or otherwise and shall be approved by CAA;

D1.1.16 Operations Specifications: The authorizations, conditions and limitations associated with the Air Operator Certificate and subject to the conditions in the Operations Manual;

D1.1.17 Operator: A person, company, organization or enterprise engaged in or offering to engage in an aircraft operation under an Air Operator Certificate issued by the CAA in accordance with CARs, 94;

D1.1.18 Rules: Civil Aviation Rules, 1994 (CARs, 94), as amended from time to time.

D1.1.19 **Threshold Time:** The range, expressed in time to an en-route alternate aerodrome, whereby any time beyond requires an EDTO approval from CAA.

D2. INITIAL ISSUE OF OPERATIONS SPECIFICATIONS

D2.1 The Operations Specifications associated with an AOC are an integral part of the authorization under which the operator conducts operations.

D2.2 The Operations Specifications identify the CAA office involved, the number of associated AOC, the name of operator, the date of issuance and the signature of the CAA official responsible for the issuance and show the make, model and series or master series of the aircraft, the type of operations and the geographical areas in which operations are authorized.

D2.3 The Operations Specifications cover all aspects of the operations and includes special limitations and authorizations with criteria as applicable.

D.2.3.1 In addition, 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).

D2.4 During the initial certification process for the issue of an AOC, the Operator makes out a draft of the Operations Specifications that they would like to have them issued with considering all operational aspects of their operations. These are forwarded to Flight Standards Directorate (FSD), CAA alongwith AOC Application including all the attachments as specified in ANO-001-FSXX-8.0.

D2.5 When the initial certification process of Operator for the issue of an AOC has reached a successful conclusion, draft Operations Specifications submitted are then framed in final form. The initial issue of Operations Specifications (approved by DFS, CAA) is accomplished concurrently with the issue of the AOC and only then operations can commence.

D3. VALIDITY OF OPERATIONS SPECIFICATIONS

D3.1 The validity of the Operations Specifications shall be as that of the AOC (i.e. 01 year). The validity period of Operations Specifications may, however, be reduced by Director Flight Standards (DFS), CAA under delegated authority of DGCAA and indicated under the heading of "Special Limitations".

D4. AMENDMENTS TO THE OPERATIONS SPECIFICATIONS

D4.1 Any subsequent change(s) to the Operations Specified on / to the equipment approved for use will necessitate amendments to the Operations Specifications.

D4.1.1 The process for the amendment of Operations Specifications will be similar to the original certification process, with the exception that in many cases it will be less complex, dependent upon the subject of change that necessitates the amendment. Where changes involve new types of operations, new geographical areas or new aircraft, the appropriate level of complexity will have to be applied to the process.

Note: Any amendment regarding RVSM, CAT II/III and EDTO approvals shall route through PCAA Airworthiness Directorate.

D4.2 Operator Requested Amendments

D4.2.1 Application for amendment to any part of the Operations Specifications (Appendix “A”) shall be completed with justification for the amendment required. This request form for amendment (Appendix “B”) shall be signed by CAA approved representative of the operator and submitted to Flight Standards Directorate, CAA a minimum of 15 days before the effective date requested.

D4.3 An amendment request must reach the designated office of the FSD a minimum of 15 days before the requested effective date. If FSD, CAA does not agree, for any reason, additional information or further justification may be required. In any event, the requested change will not be effected until such time that the additional information/justification has been provided and agreed to by FSD, CAA.

D4.4 It may be possible to have an amendment approved in less time than specified; however, adequate reasons for such an urgency would have to be given by the Operator. Only in exceptional cases, less than the specified time may be anticipated.

D4.5 CAA will, in no way, be responsible for any financial loss incurred by an Operator due to lack of forward or poor planning by an Operator on his own part. It is imperative that planning should be routinely completed in sufficient time for known requirements to be fulfilled.

D4.6 The Operator shall not effect the amendment in any way until or unless they are in possession of a signed copy in this regard from Flight Standards Directorate, CAA.

D4.7 In case the Certificate of Airworthiness (C of A) of an aircraft expires or is not renewed, the Operator shall inform Director Flight Standards, in writing, within seven (07) days of such an expiry. Thereafter, the Operator shall put up new Operations Specification for removal of the subject aircraft from its Operations Specification.

D5. OPERATIONS SPECIFICATIONS TEMPLATE (APPENDIX “A”):

D5.1 A person applying to CAA for issuance of Operations Specifications must submit an application:

a) In a form and manner as prescribed vide Appendix “B” (instructions for filling is provided in Appendix “A”);
b) An authorized officer or employee of the applicant, having knowledge of the matters stated in the application, must sign the application and certify in writing that the statements in the application are true and the operator is properly and adequately equipped to conduct the Operations described in the Operations Specifications and holds a valid AOC issued by CAA.

D6. TRAINING REQUIREMENTS ON OPERATIONS SPECIFICATIONS:

D6.1 All AOC holders shall ensure that training is conducted in the use of the Operations Specifications by their Crew Members, Flight Operation Officers (FOOs), Dispatchers and other concerned personnel. The language used in Operations Specifications is not designed to apply to any particular situation, but is written to specify absolute minimum conditions or provisions for a broad range of issues and situations.

D6.2 Each Operator shall ensure that all of their personnel who exercise any of the responsibility for “Operational Control” receive sufficient training in the information and requirements of the Operations Specifications. The Operations Specifications shall pertain only to information concerning that Operator’s type of operation and shall be a part of Operations Manual.

D6.3 Each Operator, upon receipt of new Operations Specification or amendment that is promulgated by the CAA concerning that Company's Operation, shall implement the amendment with immediate effect.

D7. CARRIAGE OF OPERATIONS SPECIFICATIONS ON BOARD EACH AIRCRAFT:

D7.1 Master copy (original) of all current parts of the Operations Specifications shall be maintained at the Head Office of the Operator, in a separate file that must be available to the CAA's authorized officer on request.

D7.2 Certified True Copies (CTC) of the approved Operations Specifications are required to be carried on board every aircraft of the Operator.

D7.3 When the Operations Specifications are issued in a language other than English, an English translation shall be included in the documents that are to be carried on board each aircraft.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
CAA	:	CIVIL AVIATION AUTHORITY
CAR	:	CIVIL AVIATION RULES
DFO	:	DIRECTOR FLIGHT OPERATIONS
DFS	:	DIRECTOR FLIGHT STANDARDS
FOO	:	FLIGHT OPERATIONS OFFICER
FSD	:	FLIGHT STANDARDS DIRECTORATE (CAA)
ICAO	:	INTERNATIONAL CIVIL AVIATION AUTHORITY
RPT	:	REGULAR PUBLIC TRANSPORT
TPRI	:	TOURISM PROMOTION & REGIONAL INTEGRATION

E2. RECORDS:

E2.1 Amendment to Operations Specifications Application Form **(CAAF-028-FSXX-2.0)**

E2.2 Operations Specifications

E3. REFERENCES:

E3.1 "AOC Guide – Commercial Air Operations" CAAD-617; (MNL-005-FSXX-3.0)

E3.2 ICAO Annex 6 Part 1.

IMPLEMENTATION:
This Air Navigation Order shall be implemented with effect from **22nd April, 2019** and supersedes ANO-002-FSXX-4.0.

--S/d--

(SHAHRUKH NUSRAT)
Director General,
Pakistan Civil Aviation Authority

Dated: - **17th April, 2019**

--S/d--

(CAPT. M. MOHSIN MALIK)
O/Director Flight Standards

Dated- **17th April, 2019**
File No. HQCAA/1077/013/FSAC

APPENDIX "A"

OPERATIONS SPECIFICATIONS

(subject to the approved conditions in the Operations Manual)

PAKISTAN CIVIL AVIATION AUTHORITY CONTACT DETAILS[1]

Telephone: ________________ Fax: __________________ E-mail: ______________

AOC #[2] ___________ Operator Name[3]____________ Date[4]__________ Signature____________

Dba Trading Name_____________________

Aircraft Model[5]:

Types of Operations: Commercial Air Transportation ☐ Passenger ☐ Cargo ☐ Others[6] _________

Area (s) of Operation[7]:

Special Limitations[8]:

SPECIFIC APPROVAL	YES	NO	DESCRIPTION[9]	REMARKS
Dangerous Goods	☐	☐		
Low Visibility Operations Approach and Landing Take-off Operational Credit(s)	 ☐ ☐ ☐	 ☐ ☐ ☐	CAT[10]____ RVR____m DH___ft RVR[11] ____m [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]	[19]
Others[20]	☐	☐		

Notes:

1. *Telephone and fax contact details of the authority, including the country code. E-mail 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).*
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 meters. 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, 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 (in 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. *List whether "installed" or "portable".*
20. *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). If authorizations and limitations are identical for two or more models, these models may be grouped in a single list.*

APPENDIX "B"

	PAKISTAN CIVIL AVIATION AUTHORITY FLIGHT STANDARDS DIRECTORATE **AMENDMENT TO OPERATIONS SPECIFICATIONS APPLICATION FORM**	CAAF-028-FSXX-2.0

1. Air Operator: ______________________ 2. AOC No.: ______________

3. Amendment No.: ______________________

4. Brief Description of Amendment:

5. Applicant's Details:

Name: ______________________________________

Title or Designation: ______________________________

Signature: ______________________ Date: ______________

6. Remarks by POI/Flight Inspector:

____

____

____

Recommended / Not Recommended

Title ______________ Signature ______________ Date: __________

7. Remarks by DFS:

____

____

Approved/ Not Approved

Title ______________ Signature ______________ **Effective Date**: ________

Instructions:

1. *A request for amendment/variation to Operations Specifications must only be submitted on this Form.*
2. *Extra pages may be appended, if so required.*
3. *Append all attachments and supporting documents as required.*
4. *Item 3 – A serial number is to be allotted by the Operator e.g. 01 of 2007, 02 of 2009 etc.*
5. *Item 5 – Application Form shall be signed by the Head of Operations or the person authorized by CAA. (ANO-003-FSXX-5.0 may be referred to in this regard).*

CONTENTS OF OPERATIONS MANUAL

AIR NAVIGATION ORDER

VERSION : 5.0
DATE OF IMPLEMENTATION : 26.02.2015
OFFICE OF PRIME INTEREST : Flight Standard Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. NASIMULLAH	Flight Inspector(Pilot)	Signed
REVIEWED BY	CAPT. SYED GULREZ AKHTER	Flight Inspector(Pilot)	Signed
VERIFIED BY	CAPT.ZAFAR MAHMOOD	Director Flight Standards	Signed
APPROVED BY	AIR MARSHAL (R) MUHAMMAD YOUSAF	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by the Director General Civil Aviation Authority in pursuance of powers vested in him under Rule-4(3) of Civil Aviation Rules 1994 and all other enabling provisions of Civil Aviation Rules 1994 (CARs94).

B. PURPOSE:

B1. This document is intended to provide guidance for Operators to prepare an Operations Manual in line with the SARP's in Annex-6, Operation of Aircraft, Parts I and III and PCAA CAR's Rule 191 and 192.

B2. Under PCAA CAR's Rule 191, an Operator (of commercial operations) must create and provide an Operations Manual for use by, and guidance of the Operations personnel of the Operator. The Operations Manual must contain all necessary information, procedures and instructions to ensure the safe conduct of aircraft operations.

C. SCOPE:

C1. This ANO applies to all persons, organizations or enterprises who are either the applicant or holder of an AOC and it sets the minimum requirements, conditions and obligations in the preparation of an Operations Manual.

C2. These guidelines include requirements under the existing legislation (i.e. CAR's and ICAO SARPS). Nonetheless, Operators must satisfy themselves that all their operations are conducted in accordance with the relevant acts, regulations, orders and other secondary aviation legislation and comply with the procedures and limits set out in the AIP.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 **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.

D1.2 **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.

D1.3 **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.

D1.4 **Air Operator Certificate (AOC):** A certificate authorizing an Operator to carry out specified commercial air transport operations. For the purpose of this ANO, Air Operator Certificate issued under Rule-54 & Rule-187 of the Civil Aviation Rules-1994 (CARs 94).;

D1.5 **Approval.** An approval is an active response by the PCAA to a matter submitted for its review. It constitutes a finding or determination of compliance with the applicable standards and 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 PCAA.

D1.6 **Balloons:** A non-power-driven lighter-than-air aircraft;

D1.7 **CARs 94:** Civil Aviation Rules - 1994 as amended from time to time;

D1.8 **Competent Authority:** The Director General, Civil Aviation Authority (DGCAA) or an officer/any other person delegated the authority under Rule 5 of CARs 94;

D1.9 **Commercial Flight Operation:** An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire.

D1.9.1 Charter Operation: A flight operations in which an aircraft is used for the carriage of passengers or cargo for hire or reward; and any reference to “Charter” has a corresponding meaning:

D1.9.1.1 To and from any place but not in accordance with fixed schedules to and from fixed terminals; or

D1.9.1.2 In accordance with fixed schedules to and from fixed terminals in circumstances in which the accommodation in the aircraft is not available for use by members of the public;

D1.10 **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.

D1.11 **Flight Data Analysis:** A process of analyzing recorded flight data in order to improve the safety of flight operations;

D1.12 **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;

D1.13 **Flight Operations Officer/Flight Dispatcher:** A person designed by the Operator to engage in the control and supervision of flight operations, whether licensed or not, suitably qualified in accordance with ***Licensing ANO-012-XXLC-4.0 current issue***, who supports, briefs and / or assists the Pilot-in-Command in the safe conduct of the flight;

D1.14 **Flight Recorder:** Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation;

D1.15 **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;

D1.16 **Flying School:** An Operator/organization licensed under the CARs 94 for flying training. Flying Schools have two classes namely:

D1.16.1 **Class I,** being a school carrying out flying training and ground instructions to enable candidates to qualify for the issue of a Private Pilot License (PPL) and to qualify for the endorsement of aircraft rating on the personal licenses;

D1.16.2 **Class II,** being a school carrying out flying training and ground instructions to enable candidates to qualify for the issue of Private Pilot License (PPL), or a Commercial Pilot License (CPL) and qualify for the endorsement of ratings on such licenses.

D1.17 **Ground handling:** Services necessary for an aircraft’s arrival at, and departure from, an airport, other than air traffic services;

D1.18 **Inspector:** Flight Operation Inspector (Pilot or Flight Engineer), Airworthiness Officers or the Surveyors duly authorized by the Competent Authority under Rule 5 of CARs 94;

D1.19 **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.

D1.20 **Operations Manual:** A manual containing procedures, policies, instructions, checklists, and guidance for use by the operational personnel in the execution of their duties. It would essentially include all the manuals and other requirements as specified in ANO-003-FSXX-5.0 (Contents of Operations Manual) either by reference or otherwise and shall be approved by the PCAA;

D1.21 **Operations Specifications** means the authorizations, conditions and limitations associated with the Air Operator Certificate and subject to the conditions in the Operations Manual.

D1.22 **Operator:** A person, company, organization or enterprise engaged in or offering to engage in an aircraft operation under an Air Operator Certificate issued by the PCAA in accordance with CARs 94;

D1.23 **PCAA:** Civil Aviation Authority of Pakistan;

D1.24 **Private Operation:** Flight operations other than aerial work, charter, or regular public transport in which no remuneration, hire or reward is given to the owner or the operator of the aircraft in respect of that flight or the purpose of that flight; (ICAO Annex-6 Part-I Chapter-1, Definitions, describes Private Operations as General Aviation Operations).

D1.25 **Quick Access Recorder (QAR):** A secondary recorder with a removable recording medium. traditionally a tape, now moving towards Optical Disk or Solid State. QAR is an airborne flight data recorder designed to provide quick and easy access to raw flight data, through means such as USB or cellular network connection and / or use of standards flash memory cards.

D2. OPERATOR'S OBLIGATION:

D2.1 An Operator, prior to commencement of operation shall:

D2.1.1 Provide for the use and guidance of Operation's personnel concerned, an Operation's Manual in accordance with guidelines contained in this ANO. The Operation's Manual shall be amended or revised as is necessary to ensure that the information contained there in is kept up-dated. All such amendments or revisions are issued to all personnel that are required to use the Manual.

D2.1.2 Provide a copy of the Operation's Manual together with all amendments and/ or revisions for review and, where required for approval. The Operator shall incorporate in the Operation's Manual such mandatory material as is required by the SARP's in ICAO Annex-6 and current PCAA rules and regulations.

D2.1.3 The contents of the Operations Manual, including all amendments or revisions, do not contravene the conditions intended/contained in the Air Operator Certificate (AOC) or any applicable regulations of PCAA and the countries into or over which its aeroplanes are operated or planned to be operated and must have an approval of PCAA. Approval will be issued by Director Flight Standard's Office in the shape of an Approval letter, copy of which may be placed in the opening pages of Manual(s);

D2.1.4 The structure and contents of the Operations Manual are in accordance with this ANO;

D2.1.5 The Operations Manual contains all instructions and information necessary for operations personnel to perform their duties and the relationship of such duties to the operation as a whole ;

D2.1.6 The Operations Manual is amended or revised as is necessary to ensure that the information contained therein kept up to date and all such amendments or revisions after the Approval of FSD, PCAA, are issued to all personnel that are required to use this Manual. All amendments and revisions required by FSD, PCAA shall be incorporated;

D2.1.7 The approved Operations Manual is provided at the Operators Headquarter, Flight Dispatch, Operating ports and relevant portion with each member of his operating staff;

D2.1.8 Flights Standards Directorate (FSD), PCAA is provided with a copy of Approved Operations Manual, and all its amendments or revisions thereafter;

D2.1.9 Those current parts of the Operations Manual relevant to the duties of the crew are carried on each flight and are easily accessible to the crew on board the aeroplane;

D2.1.10 Such mandatory material as PCAA may require is incorporated in the Operations Manual;

D2.1.11 The Approved Operations Manual is followed for all the facets of Operations without any deviation;

D2.1.12 All operations personnel have easy access to a copy of each part of the Operations Manual, which is relevant to their duties. In addition, the Operator shall supply crewmembers with a personal copy of, or sections from, Parts A, B and D of the Operations Manual as are relevant for personal reference.

D2.1.13 All documents written/produced by the Operator, must be reviewed every two (02) years from the date of initial approval and/or date of last such review. Reviewed documents shall be presented to Flight Standards Directorate, PCAA for approval. A Certificate is to be furnished to Flight Standards Directorate (FSD) incase the document was reviewed and no amendments were found necessary.

D3. OPERATIONS MANUAL – GENERAL:

D3.1 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 Operations as a whole.

D3.1.1 In selecting the format of the Operations Manual the primary criteria is that the Manual shall be easily useable and understood.

D3.1.2 The essential philosophy when creating an Operations Manual should be to set out procedures that enable operational staff to comply with the legislative requirements applicable to the Company's Operations without them having to consult the legislative material itself.

D3.1.3 The quality of paper (A5 size) and printing, reproduction of text and diagrams shall be readable under all operating conditions. The Manual shall be in a format, which is easily amendable. Electronic versions of the Operations Manual are acceptable, provided they meet all the requirements of this ANO. However, approval will only be stamped on paper copy (A5 size).

D3.1.4 The Operations Manual shall also include adequate guidance for use by any other personnel directly involved with the operations of any aircraft.

D3.1.5 Each Operations Manual must be complete within itself and contain procedures that cover the gamut of operations carried out under the particular authorization. It shall not be acceptable for company personnel to have to refer to other operations manuals to get the required information.

D3.1.6 The Operations Manual shall have a master content list, preferably in volume-1, Part-A. In addition each volume shall have its own content's page. There shall be a table of contents at the beginning of each volume and for each section.

D4. STRUCTURE OF THE OPERATIONS MANUAL:

D4.1 An Operations Manual which may be issued in separate parts, corresponding to specific aspects of operations, provided in accordance with Para D2.1 shall be organized with the following structure:

D4.1.1 Part A. General
This part shall comprise all non type-related operational policies, instructions and procedures needed for a safe operation;

D4.1.2 Part B. Aircraft Operating Information
This part shall comprise all type-related instructions and procedures needed for a safe operation. It shall take account of any differences between types, variants or individual aeroplanes used by the Operator;

D4.1.3 Part C. Areas, Routes and Aerodromes
This part shall comprise all instructions and information needed for the area of operation;

D4.1.4 Part D. Training
This part shall comprise all training instructions for Operations personnel required for a safe operation.

D5. CONTENTS OF THE OPERATIONS MANUAL:

(Contents of this section are numbered with reference to the parts of Operations Manual with different format.)

D5.1 PART A – GENERAL:

D5.1.1 ADMINISTRATION AND CONTROL OF OPERATIONS MANUAL:

D5.1.1.1 Introduction: It shall contain the following:

D5.1.1.1.1 A statement that the Manual complies with all applicable regulations and with the terms and conditions of the applicable Air Operator Certificate;

D5.1.1.1.2 A statement that the Manual contains operational instructions those are to be complied with by the relevant personnel;

D5.1.1.1.3 A list and brief description of the various parts, their contents, applicability and use;

D5.1.1.1.4 Explanations and definitions of terms and words used in use of the Manual.

D5.1.1.2 System of amendment and revision: These pages shall include:

D5.1.1.2.1 Name of the PCAA approved person responsible for the issuance and dissemination of amendments and revisions. This responsibility shall be given to the most experienced person out of the Key management. For Airlines, it shall be Director Operations, Director Flight Operations (DFO) or the Chief Pilot. Charter and Aerial work Operators may give this responsibility to either Chief Pilot or General Manager Flight Operations;

D5.1.1.2.2 A record of amendments and revisions;

D5.1.1.2.3 A statement that handwritten amendments and revisions are not permitted;

D5.1.1.2.4 A list of effective pages (LEP);

D5.1.1.2.5 A description of the distribution system for the manuals, amendments and revisions.

D5.1.1.2.6 The Operations Manual shall also have a master content list, preferably in Volume-1, Part-A. In addition each volume shall also have it's own contents page. There shall be a table of contents at the beginning of each volume and for each section or chapter. Appendices, additional headings and procedures shall be included in a suitable location within the Manual.

D5.1.2 ORGANISATION AND RESPONSIBILITIES:

D5.1.2.1 A description of the organizational structure including the general Company organogram and operation departmental organogram. The organogram must depict the relationship between the Operations Department and other Departments of the Company. In particular, the subordination and reporting lines of all Divisions, Departments etc, which pertain to the safety of flight operations, must be shown.

D5.1.2.2 The name of each nominated post holder responsible for flight operations, the maintenance system, crew training, flight safety, ground handling and safety management system. A description of their function and responsibilities must be included.

D5.1.2.3 A description of the duties, responsibilities and authority of operations management personnel pertaining to the safety of flight operations and the compliance with the applicable regulations.

D5.1.2.4 Authority, duties and responsibilities of the Pilot-in-Command as required by CARs 94, Part XII, Section 3.

D5.1.2.5 Duties and responsibilities of crew members other than the Pilot-in-Command and operational personnel including FOO as required by CARs 94, and Appendix 2 of Annex 6, Part 1.

D5.1.3 OPERATIONAL CONTROL AND SUPERVISION: FOLLOWING TOPICS SHALL BE INCLUDED:

D5.1.3.1 An organization and management system for the operational control of all flights in accordance with specific operating regulations applicable to aircraft operations

D5.1.3.2 Responsibilities for operational control and development of related policies, processes, standards and procedures shall be provided.

D5.1.3.3 A description of the system for supervision of the operation by the Operator. This must show how the safety of flight operations and the qualifications of personnel is supervised. The procedures related to the following items must be described:

D5.1.3.3.1 License and qualification validity;

D5.1.3.3.2 Competence of operations personnel;

D5.1.3.3.3 Control, analysis and storage of records, flight documents, additional information and data.

D5.1.3.4 System of promulgation of additional operational instructions and information

D5.1.3.5 Powers of the PCAA: A description of the powers of the Authority and guidance to staff on how to facilitate inspections by PCAA personnel.

D5.1.4 SAFETY MANAGEMENT SYSTEM (SMS):

D5.1.4.1 SMS of the Operator shall essentially cover the following:

D5.1.4.1.1 A comprehensive corporate approach to safety that shall include safety policy based on human factors, formation of a safety committee, audits, safety meetings, actions on the safety issues and risk management. SMS of the Operator shall:

D5.1.4.1.1.1 Identify safety hazards;

D5.1.4.1.1.2 Ensure that remedial action necessary to maintain an acceptable level of safety is implemented;

D5.1.4.1.1.3 Provide for continuous monitoring and regular assessment of the safety level achieved;

D5.1.4.1.1.4 Aim to make continuous improvement to the overall level of safety.

D5.1.4.1.2 A safety management system shall clearly define lines of safety accountability throughout the Operator's organization, including a direct accountability for safety on the part of senior management;

D5.1.4.1.3 Nomination of a post holder responsible for the development and establishment of the safety management system and his/her functions and responsibilities clearly defined and documented in the flight safety documents system;

D5.1.4.1.3.1 Safety policy statement and responsibilities of the personnel.

D5.1.4.1.3.2 Systems to achieve safety oversight;

D5.1.4.1.3.3 Handling & Notification of Accidents and Incidents: The procedures must include:

D5.1.4.1.3.3.1 Definition of occurrences and of the relevant responsibilities of all persons involved;

D5.1.4.1.3.3.2 Illustrations of forms used for reporting all types of occurrences or copies of the forms themselves, instructions on how they are to be completed, the addresses to which they should be sent and the time allowed for this to be done;

D5.1.4.1.3.3.3 In the event of an accident, descriptions of which Company Departments, Authorities and other organisations that have to be notified, how this will be done and in what sequence;

D5.1.4.1.3.3.4 Procedures for verbal notification to air traffic service units of incidents involving TCAS/ACAS RAs, bird hazards, dangerous goods and hazardous conditions;

D5.1.4.1.3.3.5 Procedures for submitting written reports on air traffic incidents, TCAS / ACAS RAs, bird strikes, dangerous goods incidents or accidents, and unlawful interference;

D5.1.4.1.3.3.6 Internal safety related reporting procedures, designed in a way so that the Pilot-in-Command is informed immediately of any incident that has endangered, or may have endangered, safety during flight and that he is provided with all relevant information;

D5.1.4.1.3.3.7 Policy and procedures for flight crew to record and report on volcanic activity;

D5.1.4.1.3.3.8 Policy and procedures for flight crew to record and report on routine meteorological observation during departure and en-route and climb-out phases of the flight and special and other non-routine observations during any phase of the flight.

D5.1.4.1.3.4 Flight Data Analysis Programme as specified by ANO-028-FSXX-3.0. This programme shall be non-punitive and contain adequate safeguards to protect the source(s) of the data. An 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.

D5.1.5 <u>CREW COMPOSITION:</u>

D5.1.5.1 Crew Composition. The number and composition of the flight crew which shall not be less than that specified in the Manufacturers Flight Manual (FM) or Aeroplane Flight Manual AFM / Operations Manual. The flight crew shall include flight crewmembers in addition to the minimum numbers specified in the Flight Manual or other documents associated with the certificate of airworthiness. A description and the method for determining crew compositions/minimum crew composition taking account of the following:

D5.1.5.1.1 The type of aeroplane being used;

D5.1.5.1.2 The area and type of operation being undertaken;

D5.1.5.1.3 The phase of the flight;

D5.1.5.1.4 The minimum crew requirement and flight duty period planned;

D5.1.5.1.5 Experience (total and on type), recency and qualification of the crewmembers.

D5.1.5.2 When necessitated by considerations related to the type of aeroplane used, the type of operation involved, following crewmembers may be required:

D5.1.5.2.1 Radio operator: The flight crew shall include at least one member who holds a valid licence, issued or rendered valid by the PCAA, authorizing operation of the type of radio transmitting equipment to be used;

D5.1.5.2.2 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 license, without interference with regular duties;

D5.1.5.2.3 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 PCAA, navigation necessary for the safe conduct of the flight cannot be adequately accomplished by the pilots from the pilot station.

D5.1.5.3 Designation of Pilot-in-Command. The rules applicable for the designation of the Pilot-in-Command (IFR,VFR) and, if necessitated by the duration of the flight, the procedures for the relief of the Pilot-in-Command or other members of the flight crew.

D5.1.5.4 The designation of the cabin crew, lead cabin crew and, if necessitated by the duration of the flight, the procedures for the relief of the lead cabin crew member and any other member of the cabin crew.

D5.1.5.5 Flight crew incapacitation. Instructions on the succession of command in the event of flight crew incapacitation.

D5.1.5.6 Operation on more than one type or variant.

D5.1.6 QUALIFICATION REQUIREMENTS:

D5.1.6.1 A description of the required (licence, ratings) qualification/competency e.g. for routes and aerodromes, experience, training, checking and recency for operations personnel to conduct their duties with consideration to the aeroplane type, kind of operation and composition of the crew.

D5.1.6.2 Flight crew Qualification: Details shall be provided on qualification requirements with reference to the CARs 94 and relevant ANOs issued by Licencing Office for the following:

D5.1.6.2.1 Pilot-in-Command and co-pilot

D5.1.6.2.2 Recent experience of Take off and landing;

D5.1.6.2.3 Area, route, aerodrome qualification with adequacy of knowledge;

D5.1.6.2.4 Actual approach and landing requirement;

D5.1.6.2.5 One trip on that route or area in a capacity of pilot or observer in preceding 12 months;

D5.1.6.2.6 Pilot unable to perform the above in preceding 12 months;

D5.1.6.2.7 Pilot proficiency checks.

D5.1.6.2.8 Cruise relief pilot Recent experience requirements;

D5.1.6.2.9 Requirement of Single pilot operations under IFR or at night;

D5.1.6.2.10 Co-pilot;

D5.1.6.2.11 Pilot under supervision;

D5.1.6.2.12 Flight Engineer;

D5.1.6.2.13 Flight Crew Training, Checking and supervision personnel.

D5.1.6.3 Cabin crew: Details shall be provided on qualification requirements in accordance with CARs 94 and ANO-018-FSXX-3.0 and Personnel Licensing Office ANO-022-XXLC for the following:

D5.1.6.3.1 Cabin crew;

D5.1.6.3.2 Lead Cabin crew;

D5.1.6.3.3 Required cabin crew;

D5.1.6.3.4 Training, Checking and supervisory personnel (DCCCs and Instructors).

D5.1.6.4 Flight Operations Officer: FOO shall not be assigned to duty unless that person has:

D5.1.6.4.1 Satisfactorily completed PCAA license specific training course that addresses all the components of method of control and supervision of flight operations;

D5.1.6.4.2 Holds a valid Licence from PCAA;

D5.1.6.4.3 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, and the FOO must be able to monitor the flight crew intercommunication system and radio communications, and be able to observe the actions of the flight crew during the flight;

D5.1.6.4.4 Demonstrated to the Operator a knowledge of:

D5.1.6.4.4.1 The contents of the Operations Manual as described in this ANO;

D5.1.6.4.4.2 The radio equipment in the aeroplanes used;

D5.1.6.4.4.3 The navigation equipment in the aeroplanes used.

D5.1.6.4.5 Demonstrated the 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;

D5.1.6.4.6 The seasonal meteorological conditions and the sources of meteorological information;

D5.1.6.4.7 The effects of meteorological conditions on radio reception in the aeroplanes used;

D5.1.6.4.8 The peculiarities and limitations of each navigation system, which is used by the operation;

D5.1.6.4.9 The aeroplane loading instructions.

D5.1.6.4.10 Demonstrated the knowledge and skills related to human performance relevant to dispatch duties;

D5.1.6.4.11 Demonstrated the ability to perform the duties, specified in Personnel Licensing Office ANO-012-XXLC-4.0.

D5.1.6.5 Other operations personnel in accordance with the requirements specified in CARs 94, and relevant ANOs.

D5.1.6.6 Record keeping requirements that are sufficient to satisfy the PCAA of the qualification of the flight crew and other operations personnel; and of the manner in which such qualification has been achieved.

D5.1.7 <u>CREW HEALTH PRECAUTIONS:</u>

D5.1.7.1 Crew health precautions. The relevant regulations and guidance to crew members concerning health including:

D5.1.7.1.1 Alcohol and other intoxicating liquor;

D5.1.7.1.2 Narcotics;

D5.1.7.1.3 Drugs;

D5.1.7.1.4 Tranquilizers;

D5.1.7.1.5 Pharmaceutical preparations;

D5.1.7.1.6 Immunizations;

D5.1.7.1.7 Deep diving;

D5.1.7.1.8 Blood donation;

D5.1.7.1.9 Surgical operations;

D5.1.7.1.10 Sleep and rest;

D5.1.7.1.11 Meal precautions prior to and during flight.

D5.1.8 <u>FLIGHT AND DUTY TIME LIMITATIONS AND REST REQUIREMENTS:</u>

D5.1.8.1 A detailed policy limiting the flight time and flight duty periods and providing for adequate rest periods for flight crewmembers and cabin crew as required by and in accordance with CARs 94 and current issue of ANO-012-FSXX-5.0.

D5.1.8.2 Adequate System and procedures to maintain current records of flight time, flight duty periods and rest periods of all its crewmembers in accordance with latest issue of ANO-012-FSXX-5.0.

D5.1.8.3 Conditions under which flight and duty time may be exceeded or rest periods may be reduced and the procedures used to report these cases.

D5.1.9 <u>OPERATING PROCEDURES:</u>

D5.1.9.1 **<u>FLIGHT PREPARATION:</u>**

As applicable to the operation:

D5.1.9.1.1 A flight shall not commence until flight preparation forms have been completed verifying that the pilot-in-command is satisfied that:

D5.1.9.1.1.1 The aeroplane is airworthy and the appropriate Airworthiness certificate (i.e. C of A, C of R) are on board the aeroplane.

D5.1.9.1.1.2 The instruments and equipment prescribed in

D5.1.9.1.1.2.1 Minimum Flight Altitudes. A description of the method of determination and application of minimum altitudes including procedures to establish the minimum altitudes/flight levels for VFR flights; and for IFR flights;

D5.1.9.1.1.2.2 Criteria for determining the usability of aerodromes;

D5.1.9.1.1.2.3 The method for establishing aerodrome operating minima for each aerodrome to be used in operations be provided as specified in ANO-019-FSXX-2.0 & ANO-024-FSXX-6.1;

D5.1.9.1.1.2.4 En-route Operating Minima for VFR Flights or VFR portions of a flight and, where single engine aeroplanes are used, instructions for route selection with respect to the availability of surfaces which permit a safe forced landing.

D5.1.9.1.1.2.5 Presentation and Application of Aerodrome and En-route Operating Minima;

D5.1.9.1.1.2.6 Interpretation of meteorological information. Explanatory material on the decoding of MET forecasts and MET reports relevant to the area of operations, including the interpretation of conditional expressions;

D5.1.9.1.1.2.7 Specific instructions for the computation of the quantities of fuel and oil to be carried, having regard to all circumstances of the operation including the possibility of loss of pressurization and the failure of one or more power units while en-route in accordance with ANO-024-FSXX-6.1;

D5.1.9.1.1.2.8 Mass and Centre of Gravity. The general principles and instructions for mass and balance control.

D5.1.9.1.2 Definitions, Methods, procedures and responsibilities for preparation and acceptance of mass and centre of gravity calculations;

D5.1.9.1.3 The policy for using standard and/or actual masses;

D5.1.9.1.4 The method for determining the applicable passenger, baggage and cargo mass;

D5.1.9.1.5 The applicable passenger and baggage masses for various types of operations and aeroplane type;

D5.1.9.1.6 General instruction and information necessary for verification of the various types of mass and balance documentation in use;

D5.1.9.1.7 Specific gravity of fuel, oil and water methanol;

D5.1.9.1.8 Seating policy/procedures and Last Minute Changes procedures;

D5.1.9.1.9 ATS Flight Plan. Procedures and responsibilities for the preparation and submission of the air traffic services flight plan. Factors to be considered include the means of submission for both individual and repetitive flight plans;

D5.1.9.1.10 Operational Flight Plan. Procedures and responsibilities for the preparation and acceptance of the operational flight plan as specified in ANO-024-FSXX-6.2;

D5.1.9.1.11 Operator's Aeroplane Technical Log. The responsibilities and the use of the Operator's Aeroplane Technical Log must be described, including samples of the format used;

D5.1.9.1.12 Contents of journey log book / official flight log and the corresponding roman numerals as:

D5.1.9.1.13 Aeroplane nationality and registration;

D5.1.9.1.14 Date;

D5.1.9.1.15 Names of crew members;

D5.1.9.1.16 Duty assignments of crew;

D5.1.9.1.17 Place of departure;

D5.1.9.1.18 Place of arrival;

D5.1.9.1.19 Time of departure;

D5.1.9.1.20 Time of arrival.

D5.1.9.1.21 Hours of flight;

D5.1.9.1.22 Nature of flight (private, aerial work, scheduled or non-scheduled);

D5.1.9.1.23 Incidents, observations, if any;

D5.1.9.1.24 Signature of person In charge.

D5.1.9.1.25 Entries in the journey logbook should be made currently and in blue ink, blue ballpoint pen or indelible pencil;

D5.1.9.1.26 Completed journey logbook should be retained to provide a continuous record of the last six months' operations;

D5.1.9.1.27 List of documents, forms and additional information: For each flight, documents and forms listed in ANO-024-FSXX-6.1 are carried onboard either in original or as a certified true copy. When the certificates and the associated authorizations, conditions and limitations are issued in a language other than English, an English translation of all shall be included.

D5.1.9.2 <u>GROUND HANDLING:</u>

D5.1.9.2.1 For all ground handling operations;

D5.1.9.2.1.1 An organizational structure which includes the responsibilities and authority for the management of all ground handling functions prior to the issuance of an AOC;

D5.1.9.2.1.2 Line of responsibilities is clearly defined for ground handling functions and associated with the following, when applicable:

D5.1.9.2.1.2.1 Ramp operations;

D5.1.9.2.1.2.2 Passenger services;

D5.1.9.2.1.2.3 Baggage services;

D5.1.9.2.1.2.4 Cabin services;

D5.1.9.2.1.2.5 Weight and balance control;

D5.1.9.2.1.2.6 Ground support equipment;

D5.1.9.2.1.2.7 Fuel services.

D5.1.9.2.1.3 In case where all or a part of the functions and tasks related to ground handling services have been contracted to a Ground Handling Agency (GHA), all the above requirements shall be applicable to him.

Notes:

1) Before contracting out the ground handling to a GHA, it has to be assured that he is appropriately licenced, his operational facilities are approved by PCAA. He has to be equipped with ground handling manual and other related publications for handling the AOC holder aircraft. Required training may also imparted to the staff of GHA by the Operator if required;

2) Ground-handling responsibility shall be permanently maintained by the Operator, even if all or part of the functions and tasks related to ground handling services have been contracted to a Ground Handling Agency.

a) Fuelling procedures. A description of fuelling procedures, including:
   i) Safety precautions during refuelling and defueling including when an APU is in operation or when a turbine engine is running and the prop-brakes are ON;
   ii) Refuelling and defueling when passengers are embarking, on-board or disembarking;
   iii) Precautions to be taken to avoid mixing fuels.

b) Aeroplane, passengers and cargo handling procedures related to safety. A description of the handling procedures to be used when allocating seats and embarking and disembarking passengers and when loading and unloading the aeroplane. Further procedures, aimed at achieving safety whilst the aeroplane is on the ramp, must also be given;

c) Instructions for the conduct and control of ground de-icing/anti-icing operations and description of policy and procedures. These shall include descriptions of the types and effects of icing and other contaminants on aeroplanes whilst stationary, during ground movements and during take-off. In addition, a description of the fluid types used must be given including:
   i) Proprietary or commercial names;
   ii) Characteristics;
   iii) Effects on aeroplane performance;
   iv) Hold-over times; and
   v) Precautions during usage.

D5.1.9.3 <u>FLIGHT PROCEDURES:</u>

D5.1.9.3.1 VFR/IFR Policy. A description of the policy for allowing flights to be made under VFR, or of requiring flights to be made under IFR, or of changing from one to the other;

D5.1.9.3.2 Navigation Procedures. A description of all navigation procedures relevant to the type(s) and area of operation. Consideration must be given to:

D5.1.9.3.2.1 Standard navigational procedures including policy for carrying out independent cross-checks of keyboard entries where these affect the flight path to be followed by the aeroplane;

D5.1.9.3.2.2 MNPS navigation and navigation in other designated areas;

D5.1.9.3.2.3 RNAV;

D5.1.9.3.2.4 In-flight replanning;

D5.1.9.3.2.5 Procedures in the event of system degradation;

D5.1.9.3.2.6 RVSM.

D5.1.9.3.3 Altimeter setting procedures;

D5.1.9.3.4 Altitude alerting system procedures;

D5.1.9.3.5 Ground Proximity Warning System (GPWS): GPWS with a forward looking terrain avoidance system is a requirement on each aircraft. Instructions and training requirements for the avoidance of controlled flight into terrain and policy for the use of the Ground Proximity Warning System (GPWS);

D5.1.9.3.6 Policy and procedure on TCAS/ACAS/ FDR: Policy, instructions, procedures and training requirements for the avoidance of collisions, use of the airborne collision avoidance system (ACAS) and Flight Data Recorder;

D5.1.9.3.7 Policy and procedures for in-flight fuel management;

D5.1.9.3.8 Adverse and potentially hazardous atmospheric conditions. Procedures for operating in, and/or avoiding, adverse and potentially hazardous atmospheric conditions including:

D5.1.9.3.8.1 Thunderstorms;

D5.1.9.3.8.2 Icing conditions;

D5.1.9.3.8.3 Turbulence;

D5.1.9.3.8.4 Windshear;

D5.1.9.3.8.5 Jet stream;

D5.1.9.3.8.6 Volcanic ash clouds;

D5.1.9.3.8.7 Heavy precipitation;

D5.1.9.3.8.8 Sand storms;

D5.1.9.3.8.9 Mountain waves;

D5.1.9.3.8.10 Significant Temperature inversions;

D5.1.9.3.9 A policy and procedures for flight crew to record and report on volcanic activity.

D5.1.9.3.9.1 Wake Turbulence. Wake turbulence separation criteria, taking into account aeroplane types, wind conditions and runway location;

D5.1.9.3.9.2 Crew members at their stations. The requirements for crew members to occupy their assigned stations or seats during the different phases of flight or whenever deemed necessary in the interest of safety;

D5.1.9.3.9.3 Use of safety belts for crew and passengers. The requirements for crew members and passengers to use safety belts and/or harnesses during the different phases of flight or whenever deemed necessary in the interest of safety;

D5.1.9.3.9.4 Admission to Flight Deck. The conditions for the admission to the flight deck of persons other than the flight crew. The policy regarding the admission of Inspectors from the Authority must also be included;

D5.1.9.3.9.5 Use of vacant crew seats. The conditions and procedures for the use of vacant cockpit and cabin crew seats;

D5.1.9.3.9.6 Incapacitation of crewmembers. Procedures to be followed in the event of incapacitation of crewmembers in flight. Examples of the types of incapacitation and the means for recognizing them must be included;

D5.1.9.3.9.7 Cabin Safety Requirements. Procedures pertinent to:

D5.1.9.3.9.7.1 Cabin preparation for flight, in-flight requirements and preparation for landing including procedures for securing the cabin and galleys;

D5.1.9.3.9.7.2 Passengers seating where, in the event that an emergency evacuation is required, they may best assist and not hinder evacuation from the aeroplane;

D5.1.9.3.9.7.3 Passenger embarkation and disembarkation;

D5.1.9.3.9.7.4 Refueling/defueling with passengers embarking on board or disembarking and Smoking on board.

D5.1.9.3.10 Passenger briefing: The contents, means and timing of passenger briefing;

D5.1.9.3.11 Procedures for aeroplanes to be operated above 15 000 m (49 000 ft) to determine the best course of action to take as specified in ANO-024-FSXX-6.2;

D5.1.9.3.12 Requirement for carriage of cosmic or solar radiation detection equipment. Procedures for use and recording the readings including actions to be taken in the event that limit values specified in the Operations Manual are exceeded.

D5.1.9.4 <u>ALL WEATHER OPERATIONS:</u>

D5.1.9.4.1 A description of the operational procedures associated with all weather operations.

D5.1.9.4.2 Non-Precision and Category I Operations;

D5.1.9.4.3 Low Visibility Operations.

D5.1.9.5 <u>EXTENDED DIVERSION TIME OPERATIONS (EDTO):</u>

D5.1.9.5.1 Where relevant to the operations, the long-range navigation and operational procedures, engine failure procedure for EDTO, dispatch requirements, operating and planning minima and the nomination and utilization of diversion aerodromes.

D5.1.9.6 <u>USE OF THE MINIMUM EQUIPMENT AND CONFIGURATION DEVIATION LISTS (MEL/CDL):</u>

D5.1.9.6.1 Unserviceabilities;

D5.1.9.6.2 MEL;

D5.1.9.6.3 Specific MEL & CDL.

D5.1.9.7 <u>NON REVENUE FLIGHTS:</u>

D5.1.9.7.1 Procedures and limitations for:

D5.1.9.7.2 Passenger Carrying Flights;

D5.1.9.7.3 Non-Passenger Flights like:

D5.1.9.7.3.1 Training flights;

D5.1.9.7.3.2 Proving Test flights;

D5.1.9.7.3.3 Ferry flights;

D5.1.9.7.3.4 Demonstration flights;

D5.1.9.7.3.5 Positioning flights.

D5.1.9.8 <u>OXYGEN REQUIREMENT:</u>

D5.1.9.8.1 Conditions under which Oxygen shall be used and the amount of Oxygen requirement to supply all the crew members and passengers in accordance with ANO-024-FSXX-6.2.

D5.1.9.8.1.1 Un-Pressurized Aeroplanes;

D5.1.9.8.1.2 Pressurized Aeroplanes;

D5.1.9.8.1.3 Crew Protective Breathing Equipment – Pressurized Aeroplanes;

D5.1.9.8.1.4 Crew Protective Breathing Equipment -- Non-Pressurized Aeroplanes – Future Requirement.

D5.1.9.9 <u>NAVIGATION AND COMMUNICATION EQUIPMENT:</u>

D5.1.9.9.1 A List of the Communication Equipment sufficient for conducting two-way communication, receiving meteorological information and communications on the aeronautical emergency frequency 121.5 MHz;

D5.1.9.9.2 A list of Navigation equipment that will enable each aircraft to proceed in accordance with its operational flight plan and with the requirements of air traffic services;

D5.1.9.9.3 The equipment listed shall be sufficient 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 operational flight plan and with the requirements of air traffic services;

D5.1.9.9.4 Required Navigation equipment for flights in defined portions of airspace or on routes where:

D5.1.9.9.5 RNP type has been prescribed;

D5.1.9.9.6 Minimum navigation performance specifications (MNPS) are prescribed;

D5.1.9.9.7 A reduced vertical separation minimum RVSM of 300 m (1000 ft) is applied between FL 290 and FL 410 inclusive;

D5.1.9.9.8 On flights in which it is intended to land in instrument meteorological conditions.

D5.1.9.9.9 Requirement of equipment installation in such a way that the failure of any single unit will not result in the failure of another unit;

D5.1.9.9.10 Adequate procedures and their implementation to ensure the timely distribution and insertion of current and unaltered electronic navigation data to all aircraft that requires it. This shall include monitoring both the processes and the products by PCAA.

D5.1.10 <u>DANGEROUS GOODS AND WEAPONS:</u>

D5.1.10.1 Information and instructions on the carriage of dangerous goods, including action in the event of an emergency.

D5.1.10.2 Operator’s policy on the transport of dangerous goods.

D5.1.10.3 Preparation and usage of acceptance checklist to prevent acceptance of dangerous goods for transport by air unless they are accompanied by a completed dangerous goods transport document and their marking, package, over pack or freight container have been inspected in accordance with the Technical Instructions on Dangerous Goods.

D5.1.10.4 Guidance on the requirements for acceptance, labeling, handling, stowage and segregation of dangerous goods.

D5.1.10.5 Provision of information to employees, which will enable them to comply with the requirements in the Technical Instruction and instructions as to the action to be taken in the event of any emergency that might arise involving dangerous goods.

D5.1.10.6 Provision of Instructions on Dangerous goods not to be loaded into the aircraft unless the appropriate loading, segregation and inspection for damage or leakage procedures are followed.

D5.1.10.7 Provision of written information (NOTOC) to the pilot-in-command on an aircraft in which dangerous goods are carried in accordance with ICAO Technical Instructional.

D5.1.10.8 Provision of written & verbal information to the intending passengers in his aircraft of the types of goods which are forbidden for transport aboard an aircraft either in checked baggage or in carry on baggage. This shall be done through briefings, notices on check-in counter, information on tickets / e-tickets etc.

D5.1.10.9 Procedure for retention of NOTOC on ground and its immediate accessibility to the aerodromes of last departure and next scheduled arrival for each of its flights on which dangerous goods are carried.

D5.1.10.10 Adequate in-flight procedures for emergency response for aircraft incidents involving dangerous goods.

D5.1.10.11 Duties of personnel.

D5.1.10.12 Carriage of employees.

D5.1.10.13 Regular and random Inspection, surveillance and enforcement procedures by PCAA for achieving compliance with its dangerous goods regulations. in accordance with ICAO Technical Instructions.

D5.1.10.14 Procedures to convey information to emergency services and to appropriate authorities in the event of an incident or accident of an aircraft carrying dangerous goods.

D5.1.10.15 The conditions under which weapons, munitions of war and sporting weapons may be carried.

D5.1.10.16 Initial and recurrent dangerous goods training programmes (irrespective of carry or no carry operation) have been established and maintained by the organizations or agencies, which are involved in the transport of dangerous goods.

D5.1.11 <u>SECURITY:</u>

D5.1.11.1 The authority and responsibilities of operations personnel.

D5.1.11.2 Security instructions and guidance of a non-confidential nature which must include policy and adequate procedures:

a) For handling and reporting crime on board such as unlawful interference, sabotage, bomb threats, and hijacking must also be included;

b) To enable cabin crew to discreetly communicate to flight crew in the event of suspicious activity or security breaches in the passenger cabin;

(i) In relation to the flight crew compartment access;

(ii) In relation to a bomb threat or warning, when the aircraft is on the ground or in flight.

D5.1.11.3 Provision of a checklist on board the aircraft of the procedures to be followed in searching for a bomb and for concealed weapons, explosives or other dangerous devices that may be the object of an act of unlawful interference. The checklist shall be supported by guidance on the appropriate course of action and information on the least-risk bomb location specific to the aeroplane.

D5.1.11.4 Establishment of preventative security measures and a security-training programme for cockpit and cabin crew that will require an approval by the PCAA before the AOC is granted.

D5.1.12 LEASING:

D5.1.12.1 A description of the operational arrangements for leasing, associated procedures and management responsibilities in accordance with ANO-016-FSXX-3.

D5.1.13 RULES OF THE AIR :

D5.1.13.1 Visual and instrument flight rules.

D5.1.13.2 Territorial application of the Rules of the Air.

D5.1.13.3 Communication procedures including Communication-failure procedures.

D5.1.13.4 The circumstances in which a radio listening watch is to be maintained.

D5.1.13.5 Signals.

D5.1.13.6 Time system used in operation;

D5.1.13.7 ATC clearances (read-back, confirmation and conformance) adherence to flight plan and position reports.

D5.1.13.8 Visual signals used to warn an unauthorised aeroplane flying in or about to enter a restricted, prohibited or danger area.

D5.1.13.9 Information and instructions relating to the interception of civil aeroplanes.

D5.1.13.10 Procedures for pilots observing an accident or receiving a distress transmission.

D5.1.13.11 The ground/air visual codes for use by survivors, description and use of signal aids.

D5.1.13.12 Distress and urgency signals.

D5.1.13.13 Policy and adequate procedures for the:

D5.1.13.13.1 Flight crew to record and report on routine meteorological observation during flight and other non-routine & special observations during any phase of the flight;

D5.1.13.13.2 Provision of pre-flight aeronautical information essential for the safety, regularity and efficiency of air navigation to flight crew and operational personnel, at any aerodrome authorized in its AOC and corresponding Operations Specifications;

D5.1.13.13.3 Preparation and dissemination of NOTAM to flight crew and operations personnel;

D5.1.13.13.4 Preparation and dissemination of the information to flight crew and operations personnel contained in the:

D5.1.13.13.4.1 Aeronautical Information Publication (AIP);

D5.1.13.13.4.2 Aeronautical Information Regulation and Control (AIRAC);

D5.1.13.13.4.3 Aeronautical Information Circular (AIC).

D5.1.14 <u>STANDARD OPERATING PROCEDURES:</u>

D5.1.14.1 Standard operating procedures (SOP) that provide guidance to flight operational personnel for each phase of flight including crew briefing as its integral part;

D5.1.14.2 The normal procedures and duties assigned to the crew, normal checklists, the system and the timing for use of the checklists and a statement covering the necessary coordination procedures between flight and cabin crew as an integral part of SOP;

D5.1.14.3 Departure contingency procedures;

D5.1.14.4 Instructions on the clarification and acceptance of ATC clearances, particularly where terrain clearance is involved;

D5.1.14.5 The normal procedures and duties must be included for Pre-flight, Pre-departure, Altimeter setting and checking, Taxi, Take-Off and Climb;

D5.1.14.6 Departure, approach and landing briefings;

D5.1.14.7 Instructions on the maintenance of altitude awareness and the use of automated or flight crew altitude call-out;

D5.1.14.8 Instructions on the use of autopilots and auto-throttles / auto-thrust in IMC;

D5.1.14.9 Stabilized approach procedure;

D5.1.14.10 Procedures for familiarization with areas, routes and aerodromes;

D5.1.14.11 Limitation on high rates of descent near the surface;

D5.1.14.12 Conditions required to commence or to continue an instrument approach;

D5.1.14.13 Instructions for the conduct of precision and non-precision instrument approach procedures;

D5.1.14.14 Allocation of flight crew duties and procedures for the management of crew work load during night and IMC instrument approach and landing operations.

D5.2 PART B – AIRCRAFT OPERATING INFORMATION:

Note: *All the manuals in this part including AOM, FCOM and Flight Manuals are updated by implementing changes made mandatory or approved by PCAA, manufacturer or the State of Registry if not registered in Pakistan.*

Provision of a system to provide aircraft operating information to its operations staff and flight crew, including mandatory revisions taking account of the differences between types, and variants of types, under the following headings:

D5.2.1 GENERAL INFORMATION & UNITS OF MEASUREMENT:

D5.2.1.1 General Information e.g. aeroplane dimensions, including a description of the units of measurement used for the operation of the aeroplane type concerned and conversion tables.

D5.2.2 CERTIFICATION LIMITATIONS AND OPERATING LIMITATIONS:

D5.2.2.1 A description of the certification limitations and the applicable operational limitations including:

D5.2.2.1.1 Certification status;

D5.2.2.1.2 Passenger seating configuration for each aeroplane type including a pictorial presentation;

D5.2.2.1.3 Types of operation that are approved e.g. VFR/IFR, CAT II/III, RNP Type, flights in known icing conditions etc;

D5.2.2.1.4 Crew composition;

D5.2.2.1.5 Mass and centre of gravity;

D5.2.2.1.6 Speed limitations;

D5.2.2.1.7 Flight envelopes;

D5.2.2.1.8 Wind limits including operations on contaminated runways;

D5.2.2.1.9 Performance limitations for applicable configurations;

D5.2.2.1.10 Limitations on wet or contaminated runways;

D5.2.2.1.11 Airframe contamination;

D5.2.2.1.12 Runway slope;

D5.2.2.1.13 System limitations.

D5.2.3 NORMAL, ABNORMAL AND EMERGENCY PROCEDURES:

D5.2.3.1 Provision of an aircraft operating manual and the checklists relating thereto as a part of Operations Manual, for each aircraft type operated that contains the normal, abnormal and emergency procedures relating to the operation of the aircraft to operations staff and flight crew. Flight Crew Operating Manual (FCOM) shall include details of the aircraft systems, associated controls and instructions for their use, and its design shall be in accordance with human factors principles.

D5.2.4 **NORMAL PROCEDURES:**

D5.2.4.1. The normal procedures and duties assigned to the crew, the appropriate checklists, the system for use of the checklists and a statement covering the necessary coordination procedures between flight and cabin crew. The following normal procedures and duties must be included:

D5.2.4.1.1 Pre-flight;

D5.2.4.1.2 Pre-departure;

D5.2.4.1.3 Altimeter setting and checking;

D5.2.4.1.4 Taxi, Take-Off and Climb;

D5.2.4.1.5 Noise abatement;

D5.2.4.1.6 Cruise and descent;

D5.2.4.1.7 Approach, Landing preparation & briefing;

D5.2.4.1.8 VFR Approach;

D5.2.4.1.9 Instrument approach;

D5.2.4.1.10 Visual Approach and Circling Approach;

D5.2.4.1.11 Missed Approach;

D5.2.4.1.12 Normal Landing;

D5.2.4.1.13 Post Landing;

D5.2.4.1.14 Operation on wet and contaminated runways.

D5.2.5 **ABNORMAL AND EMERGENCY PROCEDURES:**

D5.2.5.1 The abnormal and emergency procedures and duties assigned to the crew, the appropriate checklists, the system for use of the checklists and a statement covering the necessary co-ordination procedures between flight and cabin crew. The following abnormal and emergency procedures and duties must be included:

D5.2.5.1.1 Crew Incapacitation;

D5.2.5.1.2 Fire and Smoke Drills;

D5.2.5.1.3 Un-pressurised and partially pressurised flight;

D5.2.5.1.4 Exceeding structural limits such as overweight landing;

D5.2.5.1.5 Exceeding cosmic radiation limits;

D5.2.5.1.6 Lightning Strikes;

D5.2.5.1.7 Distress Communications and alerting ATC to Emergencies;

D5.2.5.1.8 Engine failure;

D5.2.5.1.9 System failures;

D5.2.5.1.10 Guidance for Diversion in case of Serious Technical Failure;

D5.2.5.1.11 Ground Proximity Warning;

D5.2.5.1.12 ACAS / TCAS Warning;

D5.2.5.1.13 Wind shear;

D5.2.5.1.14 Emergency Landing/ Ditching.

D5.2.6 <u>AIRCRAFT PERFORMANCE:</u>

D5.2.6.1 Operating instructions and information on 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, as is specified in ANO-029-FSAC-2.0.

D5.2.6.2 Aircraft Performance which provides the necessary data for compliance with the performance requirements must be included to allow the determination of:

D5.2.6.2.1 Take-off climb limits e.g. Mass, Altitude, Temperature;

D5.2.6.2.2 Take-off field length (dry, wet, contaminated);

D5.2.6.2.3 Net flight path data for obstacle clearance calculation or, where applicable, take-off flight path;

D5.2.6.2.4 The gradient losses for banked climb outs;

D5.2.6.2.5 En-route climb limits;

D5.2.6.2.6 Approach climb limits;

D5.2.6.2.7 Landing climb limits;

D5.2.6.2.8 Landing field length dry, wet, contaminated) including the effects of an in-flight failure of a system or device, if it affects the landing distance;

D5.2.6.2.9 Brake energy limits;

D5.2.6.2.10 Speeds applicable for various flight stages also considering wet or contaminated runway(s).

D5.2.6.3 Supplementary data covering flights in icing conditions. Any certificated performance related to an allowable configuration, or configuration deviation, such as anti-skid inoperative, must be included.

D5.2.6.4 If performance Data, as required for the appropriate performance class, is not available in the approved AFM, then other data acceptable to PCAA must be included.

D5.2.6.5 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.

D5.2.6.6 Additional Performance Data. Additional performance data where applicable including:

D5.2.6.6.1 All engine climb gradients;

D5.2.6.6.2 Drift-down data;

D5.2.6.6.3 Effect of de-icing/anti-icing fluids;

D5.2.6.6.4 Flight with landing gear down;

D5.2.6.6.5 For aeroplanes with 3 or more engines, one engine inoperative ferry flights;

D5.2.6.6.6 Flights conducted under the provisions of the CDL.

D5.2.7 Flight planning data for pre-flight and in-flight planning with different thrust/power and speed settings:

D5.2.7.1 Data and instructions necessary for pre-flight and in-flight planning including factors such as speed schedules and power settings. Where applicable, procedures for engine(s)-out operations, ETOPS / EDTO particularly one-engine-inoperative cruise speed and maximum distance to an adequate aerodrome determined and flights to isolated aerodromes must be included;

D5.2.7.2 The method for calculating fuel needed for the various stages of flight.

D5.2.8 Mass and Balance: Instructions and data for the calculation of the mass and balance including:

D5.2.8.1 Calculation system e.g. Index system;

D5.2.8.2 Information and instructions for completion of mass and balance documentation, including manual and computer generated types;

D5.2.8.3 Limiting masses and centre of gravity for the types, variants or individual aeroplanes used by the operator;

D5.2.8.4 Dry Operating mass and corresponding centre of gravity or index.

D5.2.9 Loading: Instructions, procedures and provisions for aircraft loading and securing of load.

D5.2.10 **<u>MINIMUM EQUIPMENT LIST (MEL) AND CONFIGURATION DEVIATION LIST (CDL):</u>**

D5.2.10.1 The minimum equipment list and configuration deviation list for the aeroplane types operated and specific operations authorized, including any requirements relating to operations in RNP airspace;

D5.2.10.2 MEL shall include the navigational equipment and take into account the required navigation performance for the route and area of operation;

D5.2.10.3 It shall take account of the aeroplane types and variants operated and the type(s) / area(s) of operation including procedures to be followed when an aeroplane is being despatched under the terms of its MEL/CDL.

D5.2.11 SURVIVAL AND EMERGENCY EQUIPMENT INCLUDING OXYGEN:

D5.2.11.1 A list of the survival equipment to be carried for the routes to be flown and the procedures to verify the serviceability of this equipment prior to take-off. Instructions regarding the location, accessibility and use of survival and emergency equipment and its associated checklists must also be included.

D5.2.11.2 The procedure for determining the amount of oxygen required and the quantity that is available. The flight profile, number of occupants and possible cabin decompression must be considered. The information provided must be in a form in which it can be used without difficulty.

D5.2.12 CABIN CREW – CHECKLIST FOR EMERGENCY, SAFETY EQUIPMENT & INSTRUCTIONS FOR ITS USE:

D5.2.12.1 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.

D5.2.13 EMERGENCY EVACUATION PROCEDURES:

D5.2.13.1 Emergency evacuation procedures, including type specific procedures, crew coordination, assignment of crew's emergency positions and the emergency duties assigned to each crew member.

D5.2.13.2 Emergency evacuation procedures. A description of the duties of all members of the crew for the rapid evacuation of an aeroplane and the handling of the passengers in the event of a forced landing, ditching or other emergency.

D5.2.13.3 The ground/air visual codes for use by survivors, description and use of signal aids.

D5.2.14 AEROPLANE SYSTEMS:

D5.2.14.1 A description of the aeroplane systems, related controls, indications and operating instructions.

D5.2.15 Aeroplane Instruments, Equipment and Flight Documents that includes the requirements for MEL, all aircraft on all flights, flight recorder, all aeroplanes operated as VFR flights and IFR flights, over designated land areas, on flights over water, on long-range over-water flights, high altitude flights, icing conditions, operated at night, weather radar, radiation indicator, complying with the noise certification Standards, Mach number indicator, ground proximity warning systems (GPWS), cabin crew seats, Emergency locator transmitter (ELT), Airborne Collision Avoidance System (ACAS II) / TCAS, pressure-altitude reporting transponder, Microphones, forward-looking wind shear warning system, a single pilot flights under the Instrument Flight Rules (IFR) or at night, is followed as is specified in ANO-024-FSXX-6.1.

D5.2.15.1 Instructions for the preservation of flight recorder records and, if necessary, associated flight recorders to the extent possible, in the event that the aeroplane becomes involved in an accident or incident.

D5.2.15.2 Procedures for the retention of flight recorder records and flight recorders in safe custody pending their disposition.

D5.3 PART C - AREAS, ROUTES AND AERODROMES:

D5.3.1 Provision of a route guide as a part of flight safety document system, to ensure that the flight crew will have, for each flight, information relating to navigation aids, communication facilities, 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.

D5.3.2 Instructions and information relating to including minimum flight levels and altitudes for each route to be flown and operating minima for each aerodrome planned to be used, including:

D5.3.2.1 Minimum flight level/altitude for each route to be flown;

D5.3.2.2 Aerodrome operating minima for each of the aerodromes that are likely to be used as aerodromes of intended landing or as alternate aerodromes;

D5.3.2.3 The increase of aerodrome operating minima in case of degradation of approach or aerodrome facilities.

D5.3.3 The necessary information for compliance with all flight profiles required by regulations, including but not limited to, the determination of:

D5.3.3.1 Take-off runway length requirements for dry, wet and contaminated conditions, including those dictated by system failures which affect the take-off distance;

D5.3.3.2 Take-off climb, En-route climb, Approach and landing climb limitations;

D5.3.3.3 Landing runway length requirements for dry, wet and contaminated conditions, including systems failures which affect the landing distance; and

D5.3.3.4 Supplementary information, such as tire speed limitations

D5.3.3.5 Communication facilities and navigation aids;

D5.3.3.6 Availability of aerodrome facilities, runway data, communication failure procedures, MET services and aeronautical information;

D5.3.3.7 Approach, missed approach and departure procedures including noise abatement procedures;

D5.3.3.8 Search and rescue facilities in the area over which the aeroplane is to be flown;

D5.3.3.9 A description of the aeronautical charts that must be carried on board in relation to the type of flight and the route to be flown, including the method to check their validity;

D5.3.3.10 Aerodrome categorisation for flight crew competence qualification.

D5.4 PART D – TRAINING REQUIREMENTS:

D5.4.1 GENERAL:

D5.4.1.1 A training manual (Part D of Operations Manual) as part of the flight safety documents system shall be developed, published, distributed and revised which shall includes training programmes and syllabi for initial, recurrent, transition (conversion), re-qualification, upgrade, recency of experience, familiarization, differences, safety management and/or other specialized training, as applicable. The Manual or a part thereof shall also include:

D5.4.1.1.1 Training policies and directives;

D5.4.1.1.2 Administrative support of Air Operator;

D5.4.1.1.3 List of designated instructors and line check airmen;

D5.4.1.1.4 Comprehensive syllabi, including lesson plans for approved training;

D5.4.1.1.5 Procedures for the conduct of examinations and maneuver tolerances;

D5.4.1.1.6 Procedures to require that flight crew members are properly trained and examined on abnormal and emergency conditions;

D5.4.1.1.7 Procedures for remedial training and subsequent examination of flight crew unable to achieve or maintain required standards;

D5.4.1.1.8 TCAS / ACAS training programme for pilots on ‘ACAS / TCAS equipped aircraft’;

D5.4.1.1.9 CFIT, ALAR, UPRT, Stall Recovery.

D5.4.1.1.10 If a separate training organization is approved to provide Air Operators’ crew training, the training provided and flight documentation used to correctly reflect the Operators’ flight safety documents system.

D5.4.1.2 Provisions for adequate ground and flight training facilities, flight simulation training devices, computer-based training (CBT), etc.) and syllabus materials.

D5.4.1.3 Adequate procedures to ensure that all the necessary requirements are included in the training manual, which shall be reviewed by the authority before granting the AOC.

D5.4.2 FLIGHT CREW TRAINING PROGRAMME:

D5.4.2.1 The training programme shall include details of the initial and recurrent flight crew training programme and shall:

D5.4.2.1.1 Consist of ground and flight training (in the types of aeroplane on which the flight crew member serves), and shall include proper flight crew coordination and training in all types of emergency or abnormal situations or procedures caused by power plant, airframe or systems malfunctions, fire or other abnormalities;

D5.4.2.1.2 Include training in knowledge and skills related to CRM, human performance and in the transport of dangerous goods;

D5.4.2.1.3 Be given on a recurrent basis, as determined by PCAA and shall include an examination to determine competence;

D5.4.2.1.4 Include annual training in accomplishing the emergency duties and functions and shall include instruction in the use of all emergency and lifesaving equipment required to be carried, and drills in the emergency evacuation of the aeroplane.

D5.4.2.2 The training for each flight crew member, particularly that relates to abnormal or emergency procedures shall 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. The requirement for recurrent flight training in a particular type of aeroplane shall be considered fulfilled by:

D5.4.2.2.1 The use, to the extent deemed feasible by the PCAA, of aeroplane synthetic flight trainers approved by that State for that purpose; or

D5.4.2.2.2 The completion within the appropriate period of the proficiency check in that type of aeroplane.

D5.4.2.3 The training shall cater for the following:

D5.4.2.3.1 Prohibition of in-flight simulation of emergency or abnormal situations when passengers or cargo are being carried;

D5.4.2.3.2 Flight training may, to the extent deemed appropriate by PCAA, be given in aeroplane synthetic flight trainers approved by PCAA or the State where it is located for that purpose;

D5.4.2.3.3 The scope of the recurrent training may be varied and need not be as extensive as the initial training given in a particular type of aeroplane;

D5.4.2.3.4 The use of correspondence courses and written examinations as well as other means may, to the extent deemed feasible by PCAA, be utilized in meeting the requirements for periodic ground training.

D5.4.2.4 The requirement for recurrent flight training in a particular type of aeroplane may be considered fulfilled if:

D5.4.2.4.1 The use, to the extent deemed feasible by the PCAA, of aeroplane synthetic flight trainers approved by PCAA for that purpose; or

D5.4.2.4.2 The completion of the proficiency check twice within any period of one year in that type of aeroplane to check Piloting technique, Ability to execute emergency procedures and Compliance with IFR.

D5.4.2.5 Part D shall also include:

D5.4.2.5.1 Instructions and training requirements for the avoidance of controlled flight into terrain (CFIT) and policy for the use of the ground proximity warning system (GPWS); Stall & Recovery, UPRT, etc

D5.4.2.5.2 Policy, instructions, procedures and training requirements for the avoidance of collisions and the use of the airborne collision avoidance system (ACAS / TCAS);

D5.4.2.5.3 Established for its flight crew an ACAS training programme on ACAS.

D5.4.2.5.4 Established for its flight crew a UPRT (aeroplane upset and recovery) program.

D5.4.3 <u>CABIN CREW TRAINING PROGRAMME:</u>

D5.4.3.1 The training Manual or a part thereof shall include:

D5.4.3.1.1 A training programme on cabin crew duties, approved by PCAA, to be completed by all persons before being assigned as a cabin crew prior to the issuance of an AOC;

D5.4.3.1.2 A recurrent training programme, approved by PCAA including an examination to determine competence, annually.

D5.4.3.2 The training programmes shall include theoretical and practical training addressing at least the following:

D5.4.3.2.1 Basic indoctrination in the different functions, duties and responsibilities of cabin crew members;

D5.4.3.2.2 Introduction to aircraft systems and limitations;

D5.4.3.2.3 Aircraft emergency evacuation, life-safety equipment and related information to passengers;

D5.4.3.2.4 Cabin crew members assignment, coordination and two-way communication;

D5.4.3.2.5 Knowledge and skills related to the transport of dangerous goods;

D5.4.3.2.6 Security procedures to enable cabin crew to discreetly communicate to flight crew in the event of suspicious activity or security breaches in the passenger cabin;

D5.4.3.2.7 CRM.

D5.4.3.3 Competency, duties and Obligation as specified in ANO-018-FSXX-3.

D5.4.3.4 Minimum requirements for selecting and appointing cabin crew instructors, LCC and DCCC.

D5.4.3.5 Requirements for maintaining, on a recurrent basis, knowledge, skills and qualifications of cabin crew instructors and DCCCs.

D5.4.3.6 A surveillance programme by PCAA to ensure that the appointed instructors and examiners for cabin crew maintain their competency with respect to delegated tasks.

D5.4.4 <u>FOO TRAINING PROGRAMME: (THE TRAINING MANUAL OR A PART THERE OF SHALL INCLUDE):</u>

D5.4.4.1 Details of the flight operations officer/flight dispatcher training programme when employed in conjunction with a method of flight supervision prior to the issuance of an AOC.

D5.4.4.2 The training programme, duties and responsibilities (privileges) of flight operations officer/flight dispatcher shall essentially cover the contents as specified in ANO 91.0012, Issue-5. The training programme shall cater for:

D5.4.4.2.1 Civil air law and regulations

D5.4.4.2.2 Aviation indoctrination

D5.4.4.2.3 Use of Operations Manual

D5.4.4.2.4 Aircraft performance

D5.4.4.2.5 Navigation

D5.4.4.2.6 Flight planning and monitoring

D5.4.4.2.7 Rules of the air, communication and air traffic management

D5.4.4.2.8 Meteorology

D5.4.4.2.9 Mass and balance control

D5.4.4.2.10 Use of MEL/CDL

D5.4.4.2.11 Transport of dangerous goods by air

D5.4.4.2.12 Security procedures

D5.4.4.2.13 Emergency response plan

D5.4.4.2.14 Flight observation

D5.4.4.2.15 Recurrent training programme

D5.4.4.2.16 Minimum requirements for the Air Operator to select and appoint flight dispatch/flight operations officers ground instructors

D5.4.4.2.17 Requirement to maintain on a recurrent basis, the knowledge, skills and qualifications of flight dispatch/flight operations officers ground instructors.

D5.4.4.3 Minimum requirements to select and appoint flight dispatch/flight operations officers ground instructors in accordance with ANO 91.0012, Issue-5.

D5.4.4.4 Requirement to maintain, on a recurrent basis, the knowledge, skills and qualifications of flight dispatch/flight operations officers ground instructors in accordance with ANO 91.0012, Issue-5.

D5.4.5 DANGEROUS GOODS: THE TRAINING MANUAL (OPS MANUAL PART D) SHALL INCLUDE:

D5.4.5.1 Dangerous Goods Training Requirements: In accordance with CARs 94, ANOs and ICAO Technical instructions, specific training programmes to be established and maintained for/by:

D5.4.5.1.1 Shippers of dangerous goods, including packers and shippers agents;

D5.4.5.1.2 Air Operators;

D5.4.5.1.3 Agencies which perform, on behalf of the operator, the act of accepting, handling, loading, unloading, transferring or other processing of cargo;

D5.4.5.1.4 Agencies located at an aerodrome which perform, on behalf of the Operator, the act of processing passengers;

D5.4.5.1.5 Agencies not located at an aerodrome which perform, on behalf of the Operator, the act of checking in passengers;

D5.4.5.1.6 Agencies other than Operators involved in processing cargo;

D5.4.5.1.7 Agencies engaged in the security screening of passengers and their baggage.

D5.4.5.2 Dangerous goods procedures and training programmes

D5.4.5.2.1 Dangerous goods procedures and training programmes incorporated in either the Operations Manual or in a separate document as a part of the flight safety documents system;

D5.4.5.2.2 Dangerous goods training programmes review and approval requirement by FSD, PCAA;

D5.4.5.2.3 A training programme for ground and flight personnel, even when not authorized to transport dangerous goods by air (no carry of dangerous goods by Operator);

D5.4.5.2.4 Procedures to convey information to emergency services and to appropriate authorities in the event of an incident or accident of an aircraft carrying dangerous goods.

D5.4.6 SECURITY: THE TRAINING MANUAL (OPS MANUAL PART D) SHALL INCLUDE:

D5.4.6.1 Security training programme addresses, as applicable, at least the following:

D5.4.6.1.1 Security of the flight crew compartment;

D5.4.6.1.2 Aircraft search procedure checklist and guidance on least-risk bomb locations where practicable;

D5.4.6.1.3 Determination of the seriousness of any occurrences;

D5.4.6.1.4 Crew communication and coordination;

D5.4.6.1.5 Appropriate self-defence responses;

D5.4.6.1.6 Use of non-lethal protective devices assigned to crew members whose use is authorized by PCAA or the State of the Operator;

D5.4.6.1.7 Understanding of behavior of terrorists;

D5.4.6.1.8 Live situational training exercises regarding various threat conditions;

D5.4.6.1.9 Flight deck procedures to protect the aeroplane;

D5.4.6.1.10 Post-flight concerns for the crew.

D5.4.7 CREW RESOURCE MANAGEMENT:

D5.4.7.1 Contents of training programme shall be in accordance with human factor principle and shall be approved by PCAA.

D6. COMPLIANCE WITH OPERATIONS MANUAL:

D6.1 An Operator shall be responsible to ensure that the crew members of an aircraft and the personnel employed by an Operator on operational control duties comply with all instructions relating to their duties which are contained in Operations Manual.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

AIC	:	AERONAUTICAL INFORMATION CIRCULAR
AIP	:	AERONAUTICAL INFORMATION PUBLICATION
AIRAC	:	AERONAUTICAL INFORMATION REGULATION AND CONTROL
ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
AOM	:	AIRCRAFT OPERATING MANUAL
ATS	:	AIR TRAFFIC SERVICE
CARs	:	CIVIL AVIATION RULES
CBT	:	COMPUTER BASED TRAINING
CDL	:	CONFIGURATION DEVIATION LIST
CFIT	:	CONTROLLED FLIGHT INTO TERRAIN
CRM	:	CREW RESOURCE MANAGEMENT
DCCC	:	DESIGNATED CHECK CABIN CREW
DFS	:	DIRECTOR FLIGHT STANDARDS (PCAA)
DGR	:	DANGEROUS GOODS
ELT	:	EMERGENCY LOCATOR TRANSMITTER
EDTO	:	EXTENDED DIVERSION TIME OPERATIONS
FCOM	:	FLIGHT CREW OPERATING MANUAL
FDR	:	FLIGHT DATA RECORDER
FOO	:	FLIGHT OPERATIONS OFFICER
FSD	:	FLIGHT STANDARDS DIRECTORATE
GHA	:	GROUND HANDLING AGENTS
GM	:	GENERAL MANAGER
GPWS	:	GROUND PROMIXITY WARNING SYSTEM
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
IFR	:	INSTRUMENT FLIGHT RULES
IMC	:	INSTRUMENT METROLOGICAL CONDITION

MEL	:	MINIMUM EQUIPMENT LIST
MNPS	:	MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS
NOTAM	:	NOTICE TO AIRMEN
NOTOC	:	NOTIFICATION TO CAPTAIN
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
PPC	:	PILOT PROFICIENCY CHECK
QAR	:	QUICK ACCESS RECORDER
RAs	:	RESOLUTION ADVISORIES
RFFS	:	RESCUE AND FIRE FIGHTING SERVICES
RNAV	:	AREA NAVIGATION
RNP	:	REQUIRED NAVIGATION PERFORMANCE
RPT	:	REGULAR PUBLIC TRANSPORT
RVSM	:	REDUCED VERTICAL SEPARATION MINIMA
SMS	:	SAFETY MANAGEMENT SYSTEM
SOP	:	STANDARD OPERATING PROCEDURE
TA	:	TRAFFIC ADVISORIES
TCAS	:	TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM
VFR	:	VISUAL FLIGHT RULES

E2. RECORDS:

Nil

E3. REFERENCES:

E3.1 ICAO Annex 6, Part-1, UK CAAP 215-1.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 26th February, 2015 and supersedes ANO 91.0003 (Issue-4).

- s/d -

(MUHAMMAD YOUSAF)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **25 February, 2015**

- s/d -

(CAPT. NASIMULLAH)
Director Flight Standards

Dated- **20th February, 2015**
File No. HQCAA/1077/014/FSAC

OPERATIONAL CONTROL SYSTEMS

AIR NAVIGATION ORDER

VERSION : 3.0
DATE OF IMPLEMENTATION : 01.01.2018
OFFICE OF PRIME INTEREST : Flight Standards Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. BALBAN SABIR	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR MARSHAL (RETD.) ASIM SULEIMAN	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by the Director General of the Civil Aviation Authority (CAA) in pursuance of the powers vested under Rule 4 of Civil Aviation Rules 1994 (CARs 94).

B. PURPOSE:

B1. Provision of expanded regulatory information to the Operators on:

B1.1 Rule 187 that states "the Director-General shall issue or renew Air Operator Certificates, when he is satisfied that an applicant has demonstrated that his equipment, organisation, staffing, maintenance and other arrangements are adequate to secure the safe operation of the types of aircraft to be included in the certificate, on such flights as are to be authorised, and that the applicant can establish and maintain a satisfactory method of supervision of these flight operations. Satisfactory method of supervision of the flight operations under ICAO Standards, is defined to be as Operational Control;

B1.2 Rule 189 states that the Operator shall comply with such rules as are applicable and with all the operating conditions attached to the certificate and shall conduct his operations at least to the standard of flight safety required to qualify for the issue of such a certificate. Operating conditions attached to the AOC are contained in Operations Specifications which are applicable to Operator, Pilot-in-Command and flight operations officer.

C. SCOPE:

C1. This ANO covers the regulatory requirements for all Operators to exercise Operational Control over all commercial flights they conduct. It also covers as to who may be delegated to with the responsibility of Operational Control.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 For the purpose of this ANO and in line with ICAO Standards and Recommended Practices, the following terms are defined as hereunder:

D1.1.1 **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.;

D1.1.2 **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. For the purpose of this ANO, it would mean both, fixed wing and rotary wing aircraft;

D1.1.3 **Air Operator Certificate (AOC):** A certificate authorizing an Operator to carry out specified commercial air transport operations, including Air Operator Certificate issued under the Civil Aviation Rules, 1994 (CARs, 94);

D1.1.4 **Approval:** An approval is an active response by the PCAA to a matter submitted for its review. It constitutes a finding or determination of compliance with the applicable standards and 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 PCAA;

D1.1.5 **PCAA:** Civil Aviation Authority of Pakistan;

D1.1.6 **Competent Authority:** The Director General, Civil Aviation Authority (DGCAA) or an officer/any other person delegated the authority by DGCAA under Rule 5 of CARs, 94;

D1.1.7 **Commercial Air Transport Operation:** An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire; alternatively it is an aviation operation other than private operation (under Part XI & XII of CARs 94, and ICAO Annex 6, Part. I & III). Operations under this head are:

D1.1.7.1 **Regular Public Transport Operations:** A flight operations in which an aircraft is used for the carriage of passengers or cargo for hire or reward in accordance with fixed schedules to and from fixed terminals over specific routes with or without intermediate stopping places between terminals, and any reference to "Regular Public Transport" (RPT) has a corresponding meaning;

D1.1.7.2 **Charter Operation:** A flight operations in which an aircraft is used for the carriage of passengers or cargo for hire or reward; and any reference to "Charter" has a corresponding meaning:

a) To and from any place but not in accordance with fixed schedules to and from fixed terminals; or

b) In accordance with fixed schedules to and from fixed terminals in circumstances in which the accommodation in the aircraft is not available for use by members of the public;

D1.1.7.3 **Aerial Work Operations:** 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.;

D1.1.8 **EDTO (Extended Diversion Time Operations)**. 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 PCAA.

D1.1.9 **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;

D1.1.10 **Flight Operations Officer/Flight Dispatcher:** A person designed by the Operator to engage in the control and supervision of flight operations, whether licensed or not, suitably qualified in accordance with CAA *Licensing ANO-012-XXLC-4.0*, who supports, briefs and / or assists the Pilot-in-Command in the safe conduct of the flight;

D1.1.11 **Flight Recorder:** Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation;

D1.1.12 **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;

D1.1.13 **Inspector:** Inspector duly authorized by the Competent Authority under Rule 5 of CARs 94;

D1.1.14 **Instrument Meteorological Conditions (IMC):** Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling (As defined in ICAO Annex 2), 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.

D1.1.15 **Operations Manual:** A manual containing procedures, policies, instructions, checklists, and guidance for use by the operational personnel in the execution of their duties. It would essentially include all the manuals and other requirements as specified in ANO-003-FSXX-5.0 (Contents of Operations Manual) either by reference or otherwise and shall be approved by the PCAA;

D1.1.16 **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.

D1.1.17 **Operations Specifications**: The authorizations, conditions and limitations associated with the Air Operator Certificate and subject to the conditions in the Operations Manual.

D1.1.18 **Operator:** A person, company, organization or enterprise engaged in or offering to engage in an aircraft operation under an Air Operator Certificate issued by the PCAA in accordance with CARs 94;

D1.1.19 **Rules:** Civil Aviation Rules, 1994 (CARs, 94), as amended from time to time;

D1.1.20 **Serious injury:** An injury which is sustained by a person in an accident and which:

a) Requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received; or
b) Results in a fracture of any bone (except simple fractures of fingers, toes or nose); or
c) Involves lacerations which cause severe haemorrhage, nerve, muscle or tendon damage; or
d) Involves injury to any internal organ; or
e) Involves second or third degree burns, or any burns affecting more than 5 per cent of the body surface; or
f) Involves verified exposure to infectious substances or injurious radiation.

D1.1.21 **Visual Meteorological Conditions (VMC):** Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling (As defined in ICAO Annex 2), equal to or better than specified minima.

D2. OPERATIONAL CONTROL:

D2.1 Operational Control is defined as 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.

D2.2 Civil Aviation Rules and relevant Air Navigation Orders require an Operator to establish and maintain a method of control and supervision of flight operations which is approved by PCAA.

D2.3 Operational Control systems may vary with the kind of operation the Operator is authorised/proposed to conduct, the complexity of the operations, the means of communication, and with the persons who are involved in preparing for and conducting flights under the Operator's Operational Control system.

D2.4 In addition to foregoing, following factors should also be taken into consideration for the purpose of Operational Control functions, organization and responsibilities:

D2.4.1 Rapidly improving communications capabilities and advances in weather forecasting and reporting in some areas have brought about a trend towards consolidation and centralization of Operational Control facilities;

D2.4.2 Availability of computerized or stored flight plans and fuel load determination and the use of direct pilot/operations control centre communications have facilitated the performance of the Operational Control of flights;

D2.4.3 The Pilot-in-Command may, in many cases, have more up-to-date information and may be in a better position to evaluate evolving flight conditions than personnel in a distantly located.

D3. RESPONSIBILITY:

D3.1 An Operator or a designated representative shall have Operational Control responsibility.

D3.2 The actual responsibilities assigned shall be a part of the approved method of control and supervision of flight operations.

D3.3 Responsibility for Operational Control shall be delegated only to the Pilot-in-Command and to a flight operations officer. Both are jointly responsible for the pre-flight planning, delay, and dispatch release of a flight in compliance with this ANO and Operator’s operations specifications.

D4. OPERATIONAL MANUAL:

D4.1 The description of the Operational Control system shall be described in Operations Manual which shall be approved by PCAA and shall include the following information, as appropriate to the kind of operation:

D4.1.1 Organization and management system with responsibilities for the Operational Control of all flights in accordance with operating regulations of PCAA applicable to aircraft operations;

D4.1.2 List of name and title of each person designated as representative with the responsibility for Operational Control by the Operator;

D4.1.3 Related policies, processes, standards and procedures;

D4.1.4 Method of Operational Control and supervision of flight operations which shall require an approval of PCAA;

D4.1.5 Functions and responsibilities of flight crew and flight operations officers/flight dispatchers for the initiation, continuation, diversion and termination of flights;

D4.1.6 Guidance on the conditions that must be met before a flight may be initiated or continued, or under which a flight shall be diverted or terminated;

D4.1.7 Methods and procedures for initiating, diverting, and terminating flights;

D4.1.8 Persons or duty positions authorised to, and responsible for, exercise of Operational Control;

D4.1.9 Facilities and location of facilities used by the Operator in the exercise of Operational Control;

D4.1.10 Communication systems and procedures used by the Operator;

D4.1.11 Special co-ordination methods and/or procedures used by the Operator to assure the aircraft is airworthy;

D4.1.12 Emergency notification procedures.

D4.2 In practice, it is not feasible for an individual to exercise Operational Control without assistance in any but the simplest of flight operations. Most Operators create specialised departments for crew scheduling, load control, and other functions. These functions may or may not be placed under the management and supervision of the "flight control" department. When these functions are delegated to specialised sections of the Operator's organisation, the Operator shall be responsible for the following:

D4.2.1 Establishing a means to ensure that all functions have been accomplished before a flight can be authorised to depart;

D4.2.2 Establish effective internal communications, operating procedures, and administrative controls to meet this obligation;

D4.2.3 Ensuring that these procedures are published in the Operators Operations Manual.

D4.3 The operational manual shall be amended or revised as is necessary, to ensure that the info contained therein is kept upto date. All such amendment or revision shall be issued to all personal that are required to use this manual.

D4.4 PCAA 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 PCAA may require.

Note 1: Requirements for the organization and content of an operations manual are provided in ANO-003-FSXX.

Note 2: Specific items in the operations manual require the approval of PCAA in accordance with the Standards in ANO-003-FSXX.

D5. DUTIES OF PILOT-IN-COMMAND:

D5.1 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.

D5.2 The pilot-in-command shall use the checklist 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.

D5.3 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 D1.1.19.

D5.4 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.

D5.5 The pilot-in-command shall be responsible for the journey log book or the general declaration containing the information listed in Para D11.4.1, ANO-024-FSXX.

Note: By virtue of Resolution A10-36 of the Tenth Session of the Assembly (Caracas, June–July 1956) “the General Declaration, [described in 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 Contracting States to be an acceptable form of journey log book”.

D5.6 Each Pilot-in-Command has full control and authority in the operation of the aircraft, without limitation, over other crewmembers and their duties during flight time, whether or not he holds valid certificates authorizing him to perform the duties of those crewmembers.

D5.7 The Pilot-in-Command is the person ultimately responsible for the safety of the flight.

D6. DUTIES OF FLIGHT OPERATIONS OFFICER / FLIGHT DISPATCHER:

D6.1 A flight operations officer/flight dispatcher in conjunction with a method of control and supervision of flight operations in accordance with Para D4.2.1.3, ANO-024-FSXX shall:

D6.1.1 Assist the pilot-in-command in flight preparation and provide the relevant information;

D6.1.2 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;

D6.1.3 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

D6.1.4 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.

D6.2 In the event of an emergency, a flight operations officer/flight dispatcher shall:

D6.1.4 Initiate such procedures as outlined in the operations manual while avoiding taking any action that would conflict with ATC procedures; and

D6.3.5 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.

D6.3 When the State of the Operator 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.

D6.4 In accepting proof of qualifications other than the option of holding of a flight operations officer/flight dispatcher licence, the State of the Operator, 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.

D6.5 A flight operations officer/flight dispatcher shall not be assigned to duty unless that person has:

D6.5.1 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 Para D4.2.1.3, ANO-024-FSXX;

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.

D6.5.2 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.

D6.5.3 Demonstrated to the operator a knowledge of:

D6.5.3.1 The contents of the operations manual described in ANO-003-FSXX;

D6.5.3.2 The radio equipment in the aeroplanes used; and

D6.5.3.3 The navigation equipment in the aeroplanes used;

D6.5.4 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:

D6.5.4.1 The seasonal meteorological conditions and the sources of meteorological information;

D6.5.4.2 The effects of meteorological conditions on radio reception in the aeroplanes used;

D6.5.4.3 The peculiarities and limitations of each navigation system which is used by the operation; and

D6.5.4.4 The aeroplane loading instructions;

D6.5.5 Demonstrated to the operator knowledge and skills related to human performance relevant to dispatch duties; and

D6.5.6 Demonstrated to the operator the ability to perform the duties specified in Para D4.6, ANO-024-FSXX.

D6.6 **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.

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).

D6.7 **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 Para D6.5 are met.

D7. OPERATIONAL CONTROL - FUNCTIONS:

D7.1 Operators shall conduct Operational Control by making those decisions and performing those actions on a daily basis that are necessary to operate flights safely and in compliance with PCAA rules and regulations. Operational Control shall include, but is not limited to the Operator's performance of the following functions:

D7.1.1 Ensuring that only those operations authorised by the Operations Specifications shall be conducted;

D7.1.2 Ensuring that only trained and qualified crewmembers trained and qualified in accordance with the applicable regulations shall be assigned to conduct a flight;

D7.1.3 Ensuring that crewmembers shall be in compliance with flight and duty time requirements when departing on a flight;

D7.1.4 Designating a Pilot-in-Command for each flight;

D7.1.5 Crew and aircraft scheduling;

D7.1.6 Flight planning;

D7.1.7 Procedures for flight crews and other operations personnel to follow in the performance of their duties;

D7.1.8 Provide the Pilot-in-Command and other personnel who perform Operational Control functions with access to the necessary information for the safe conduct of the flight (such as weather, NOTAMs, and airport analysis);

D7.1.9 Specifying the conditions under which a flight may be dispatched or released (weather minimums, flight planning, airworthiness of aircraft, aircraft loading, and fuel requirements);

D7.1.10 Ensuring that each flight shall comply with the conditions specified for release before it is allowed to depart;

D7.1.11 Ensuring that when the conditions specified for a flights release cannot be met, the flight shall be either cancelled, delayed, re-routed, or diverted; and

D7.1.12 Monitor the progress of each flight and shall ensure initiating timely actions when the flight cannot be completed as planned, including diverting or terminating a flight.

D7.1.13 Developing and publishing flight control policies;

D7.1.14 Collecting and disseminating information that is needed to plan and conduct flights safely, including information about en-route and terminal weather conditions, navigation, and airport facilities.

D8. PROVISION OF STAFFING:

D8.1 The Operator shall ensure that:

D8.1.1 Operational Control centre is staffed with sufficient personnel to competently handle the assigned workload in accordance with operating regulations;

D8.1.2 Daily duty time limitations is prescribed in operations manual for flight operations officers and is adhered;

D8.1.3 Flight operations officers are not used for performing other functions such as that of clerks, maintenance officers, etc., to the detriment of the primary function;

D8.1.4 The conditions at the Operational Control centre facilities such as space, temperature, lighting, noise level and controlled access are adequate for carrying out dispatch and Operational Control responsibilities.

D9. COMMUNICATION FACILITIES:

D9.1 The Operator shall ensure that:

D9.1.1 The communications facilities meet the requirements of the proposed operation;

D9.1.2 The procedures to be used to notify flights regarding hazardous conditions relating to aerodromes or navigation aids, etc., are adequate;

D9.1.3 NOTAMs to be made available to flight crew personnel in a timely manner;

D9.1.4 Emergency communications, procedures and facilities are adequate;

D9.1.5 Flight operations officers are able to establish rapid and reliable voice communications with the flight crew at the gate;

D9.1.6 Communications between the Operational Control centre and appropriate ATS facilities are adequate;

D9.1.7 Air-ground communications and point-to-point circuits used for flight safety messages are adequate and are reasonably free of congestion to ensure rapid and reliable communications throughout the geographical area of operations;

D9.1.8 Flight operations officers are familiar with all facets of operations within their geographical areas of responsibility and are properly authorized and qualified in the use of all communications channels required by the approved method of control and supervision of flight operations;

D9.1.9 The necessary emphasis is placed on the timely receipt of messages both in the aircraft and at the Operational Control centre or en-route stations;

D9.1.10 Facilities for the communication of weather information to en-route stations and to aircraft are adequate.

D10. METEOROLOGY:

D10.1 The Operator shall ensure that:

D10.1.1 Adequate procedures have been established to ensure the availability of weather forecasts and reports needed by the applicant for flight planning purposes;

D10.1.2 Procedures are established and followed to utilize all useful weather information pertinent to the area with which the Operational Control is concerned;

D10.1.3 Up-to-date knowledge is possessed by individual flight operations officers with respect to meteorology in general and to the weather conditions in the area with which they are concerned in particular;

D10.1.4 The pilots and the flight operations officers are provided with timely information pertaining to clear air, turbulence, thunderstorms, icing conditions and volcanic ash, as well as to the best routes and altitudes for avoiding such occurrences;

D10.1.5 Established procedures is employed by Operational Control for disseminating information pertaining to clear air turbulence, thunderstorms, volcanic ash, icing conditions and other significant weather phenomena;

D10.1.6 Procedures are established for provision of adequate weather information to the Pilot-in-Command at en-route stops.

D11. <u>OPERATIONAL RECORDS:</u>

D11.1 Operators shall ensure that the procedures are established and are followed for the keeping of records relating to individual flights to ensure that:

D11.1.1 The operational flight plans are completed and retained;

D11.1.2 The operational flight plans provide all the information required by the operations manual;

D11.1.3 Flight preparation forms are completed and recorded;

D11.1.4 An Operational Control log is maintained and that all watch-keeping is adequately documented; and

D11.1.5 Oil and fuel records are kept.

D12. <u>FUEL REQUIREMENTS:</u>

D12.1 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.

D12.2 The amount of usable fuel to be carried shall, as a minimum, be based on:

D12.2.1 The following data:

D12.2.1.1 Current aeroplane-specific data derived from a fuel consumption monitoring system, if available; or

D12.2.1.2 If current aeroplane-specific data are not available, data provided by the aeroplane manufacturer; and

D12.2.2 The operating conditions for the planned flight including:

D12.2.2.1 Anticipated aeroplane mass;

D12.2.2.2 Notices to Airmen;

D12.2.2.3 Current meteorological reports or a combination of current reports and forecasts;

D12.2.2.4 Air traffic services procedures, restrictions and anticipated delays; and

D12.2.2.5 The effects of deferred maintenance items and/or configuration deviations.

D12.3 The pre-flight calculation of usable fuel required shall include:

D12.3.1 **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;

D12.3.2 **Trip Fuel**, which shall be the amount of fuel required to enable the aeroplane to fly from take-off, or the point of inflight re-planning, until landing at the destination aerodrome taking into account the operating conditions of D4.3.6.2 b), ANO-024-FSXX;

D12.3.3 **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.

D12.3.4 Destination alternate fuel, which shall be:

D12.3.4.1 Where a destination alternate aerodrome is required, the amount of fuel required to enable the aeroplane to:

D12.3.4.1.1 Perform a missed approach at the destination aerodrome;

D12.3.4.1.2 Climb to the expected cruising altitude;

D12.3.4.1.3 Fly the expected routing;

D12.3.4.1.4 Descend to the point where the expected approach is initiated; and

D12.3.4.1.5 Conduct the approach and landing at the destination alternate aerodrome; or

D12.3.4.2 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

D12.3.4.3 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

D12.3.4.4 Where the aerodrome of intended landing is an isolated aerodrome:

D12.3.4.4.1 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

D12.3.4.4.2 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;

D12.3.4.5 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:

D12.3.4.5.1 For a reciprocating engine aeroplane, the amount of fuel required to fly for 45 minutes, under speed and altitude conditions specified by the State of the Operator; or

D12.3.4.5.2 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;

D12.3.4.6 Additional fuel, which shall be the supplementary amount of fuel required if the minimum fuel calculated in accordance with D4.3.6.3 b), c), d) and e), ANO-024-FSXX is not sufficient to:

D12.3.4.6.1 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;

D12.3.4.6.2 Allow an aeroplane engaged in EDTO to comply with the EDTO critical fuel scenario as established by the State of the Operator;

D12.3.4.6.3 Meet additional requirements not covered above;

Note 1: Fuel planning for a failure that occurs at the most critical point along a route (D4.3.6.3 f) 1), ANO-024-FSXX) may place the aeroplane in a fuel emergency situation based on D4.3.7.2, ANO-024-FSXX.

Note 2: Guidance on EDTO critical fuel scenarios is contained in ANO-013-FSXX;

D12.3.4.7 Discretionary fuel, which shall be the extra amount of fuel to be carried at the discretion of the pilot-in-command.

D12.4 **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.

D12.5 A flight shall not commence unless the usable fuel on board meets the requirements in D4.3.6.3 a), b), c), d), e) and f), ANO-024-FSXX if required and shall not continue from the point of in-flight re-planning unless the usable fuel on board meets the requirements in D4.3.6.3 b), c), d), e) and f), ANO-024-FSXX if required.

D12.6 Notwithstanding the provisions in D4.3.6.3 a), b), c), d) and f), ANO-024-FSXX the State of the Operator 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:

D12.6.1 Flight fuel calculations;

D12.6.2 Capabilities of the operator to include:

D12.6.2.1 A data-driven method that includes a fuel consumption monitoring programme; and/or

D12.6.2.2 The advanced use of alternate aerodromes; and

D12.6.3 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).

D12.7 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).

D13. FUEL AND OIL RECORDS:

D13.1 The operator shall maintain fuel records to enable the State of the Operator to ascertain that, for each flight, the requirements of D4.3.6 and D4.3.7.1 of ANO-024-FSXX have been complied with.

D13.2 The operator shall maintain oil records to enable the State of the Operator to ascertain that trends for oil consumption are such that an aeroplane has sufficient oil to complete each flight.

D13.3 Fuel and oil records shall be retained by the operator for a period of three months.

D14. PROCEDURES:

D14.1 The Operator shall ensure that procedures are established:

D14.1.1 To ensure that flight operations officers are adequately trained and informed on important aspects of flight planning such as weather forecasts and reports, fuel requirements, aerodrome limitations, NOTAM, navigation equipment, navigation facilities, ATM procedures, aircraft performance data, etc.;

D14.1.2 To comply with PCAA regulations concerning aircraft performance, i.e. the computation of the mass of the aircraft and the centre of gravity location, critical speeds, climb gradients, runway and obstacle clearance limitations, etc.;

D14.1.3 For the release of a flight which will ensure that the aircraft and its load are in conformity with the relevant flight release documents, e.g. aircraft maintenance release, minimum equipment list, configuration deviation list, aircraft mass and balance form, manifest, etc.;

D14.1.4 For adequate flight monitoring and meet the requirements of PCAA regulations.

D14.1.5 For flight crew to record and report on routine meteorological observation during en-route and climb-out phases of the flight and special and other non-routine; observations during any phase of the flight;

D14.1.6 For flight crew to record and report on volcanic activity;

D14.1.7 To make available to flight crew and operational personnel, at any aerodrome authorized in its AOC and corresponding operations specifications, pre-flight aeronautical information essential for the safety, regularity and efficiency of air navigation;

D14.1.8 For the preparation and dissemination of NOTAM and information contained in the Aeronautical Information Publication (AIP) to flight crew and operations personnel;

D14.1.9 For the preparation and dissemination of the information contained in the Aeronautical Information Regulation and Control (AIRAC) to flight crew and operations personnel;

D14.1.10 For the preparation and dissemination of the information contained in the Aeronautical Information Circular (AIC) to flight crew and operations personnel.

D15. COMPUTATION AND VERIFICATION:

D15.1 The Operator shall ensure that Operations Manual contains the specified procedures, formats, and forms to be used for computation and verification of computed details. A flight plan may be computed manually or with computer aids. Operators shall ensure that flight crew and Operational Control personnel verify the accuracy of planning. Since even computer generated flight plans are subject to input errors, use of a computer system that contains internal software to check for errors in flight plans is desirable.

D15.2 Operations Manual of the Operator shall contain adequate procedures for flight crew and Operational Control personnel to scrutinise all computer generated and all manually generated flight plans for accuracy.

D16. OPERATOR OVERSIGHT RESPONSIBILITY:

D16.1 Operator shall ensure that both its flight crew and Operational Control employees comply with published policies and procedures.

D17. OPERATIONAL CONTROL BY CONTRACTORS:

D17.1 Operators may contract for equipment and facilities and, under some circumstances, the services of Operational Control personnel. The person performing those services shall be approved by PCAA for the performance of those services.

D17.2 If an Operator contracts for the service of a flight operations officer to exercise Operational Control, the Operator shall maintain exclusive control over the duties, functions, and responsibilities of the contract flight operations officer.

D17.3 Operator may contract another organisation to exercise Operational Control of its operations provided that the organisation performing the services shall obtain approval and authority to perform those services from the PCAA.

D17.4 Operators may contract for control functions but the final responsibility for Operational Control shall be retained by the Operator. The Operator shall be responsible for ensuring that:

D17.4.1 The training and qualification of contract personnel is adequate;

D17.4.2 Contractor personnel are performing their duties diligently;

D17.4.3 The provisions of the Operator's manual are being complied with;

D17.4.4 An effective means of disciplining contractor personnel is in place when set guidance and policy is not complied with.

D18. EVALUATION:

D18.1 Operational Control system of each Operator shall be evaluated by PCAA to ensure that the Operator complies with the applicable rules and that the system is effective and provides for an adequate level of safety in the operations actually being conducted. This detailed evaluation shall be carried out before the issue/renewal of AOC. Subsequent surveillance shall continue to ensure that the same standards for an adequate level of safety in the operations is maintained.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

AIC	:	AERONAUTICAL INFORMATION CIRCULAR
AIP	:	AEROAUTICAL INFORMATIN PUBLICATION
AIRAC	:	AERONAUTICAL INFORMATION REGULATION AND CONTROL
ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
ATM	:	AIR TRAFFIC MANAGEMENT
ATS	:	AIR TRAFFIC SERVICES
CARs	:	CIVIL AVIATION RULES
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
OM	:	OPERATIONS MANUAL
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
PIC	:	PILOT IN COMMAND
RPT	:	REGULAR PUBLIC TRANSPORT

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 "AOC Guide – Commercial Air Operations" CAAD-617; (MNL-005-FSXX-3.0)

E3.2 ICAO Annex 6 Part 1.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st January, 2018 and supersedes ANO 91.0004 (Issue-2).

--S/d--

(ASIM SULEIMAN)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **26th December, 2017**

--S/d--

(CAPT. ARIF MAJEED)
Director Flight Standards

Dated- **19th December, 2017**
File No. HQCAA/1077/015/FSAC

FERRY FLIGHTS OF THREE / FOUR-ENGINE AIRCRAFT WITH ONE ENGINE INOPERATIVE

AIR NAVIGATION ORDER

VERSION	**:**	**4.0**
DATE OF IMPLEMENTATION	**:**	**01.12.2017**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. M. IRFAN S. HASHMI	Flight Inspector (Pilot)	
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	
APPROVED BY	AIR MARSHAL (RETD.) ASIM SULEIMAN	Director General, Civil Aviation Authority	
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order is issued by the Director General Civil Aviation Authority in pursuance of the powers vested in him under Rule 4 of Civil Aviation Rules 1994.

B. PURPOSE:

B1. This ANO provides procedure, restrictions and crew training for ferry flights of three / four-engine aircraft with one engine inoperative.

C. SCOPE:

C1. This ANO prescribes the conditions under which ferry flights of three/ four-engine aircraft with one engine inoperative, and the crew competence pertaining to Ferry Flights, may be conducted.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 Ferry flight means a flight conducted by an aircraft for the sole purpose of moving that aircraft from one aerodrome to another aerodrome.

D2. NOTIFICATION / INFORMATION OF FERRY FLIGHT:

D2.1 Prior to the commencement of ferry flight, the Operator shall file the information on the Performa attached hereto as Appendix A, with Flight Standards Directorate for the approval and conduct of that flight.

D3. FLIGHT RESTRICTIONS:

D3.1 Ferry flights of three / four-engine aircraft with one engine inoperative shall be subject to the following restrictions:

D3.1.1 Ferry flights of three / four engine aircraft with one engine inoperative shall not be undertaken unless approved procedures as per type Aircraft Flight Manual and/or Maintenance & Operations Manual, have been complied.

D3.1.2 All the provisions to ferry the aircraft, with required serviceable engines, have been exhausted;

D3.1.3 The aircraft shall be airworthy in every respect with the exception of the faulty engine and/or its accessories;

D3.1.4 Boroscopic Check shall be conducted on the remaining Two/Three Engines (if required);

D3.1.5 All limitations in the Approved Operating Manuals and Certificate of Airworthiness shall be complied with unless restricted by ferry authorization;

D3.1.6 No passenger or cargo shall be carried;

D3.1.7 Take-Off shall be conducted in day light and from a dry surface only.

D3.1.8 Cloud ceiling for Takeoff, approach and landing minima shall not be less than 1000 feet, visibility not less than 5 KM with cross wind component less than 10 knots and absence of icing/thunderstorm activity in the terminal area.

D4. CREW QUALIFICATION:

D4.1 Minimum flight crew with appropriate qualification as given below, shall be carried;

D4.2 Qualified Instructors and current on the type, with a minimum of 500 flying hours on type;

D4.3 Specifically designated to carry out flights of three / four engine aircraft with one engine inoperative;

D4.4 Specifically trained to carry out such ferry flights;

D4.5 Flight Engineer: Trained in the procedures and technique of an engine out ferry and Designated Check Flight Engineer-A / Simulator Instructor / Training Flight Engineer on the type Flight Manual/Operations Manual as approved by PCAA.

D5. TRAINING:

D5.1 The training of Pilots & Flight Engineers in the handling of aircraft for such ferry flights shall be conducted in accordance with the requirements of the aircraft type Flight Manual/Operations Manual as approved by PCAA.

Note: A list of crew trained for such ferry flights shall be made available by all the Operators to the Flight Standards Directorate. This list of authorized crew shall be updated whenever there is any change in the authorized crew.

D6. RECENT EXPERIENCE:

D6.1 The Pilot-in-Command and other flight crew scheduled to operate ferry flight, shall have been trained and shall have demonstrated competence to handle the aircraft in all manoeuvres associated with a flight of this type, within the preceding ninety days on simulator/aircraft.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 “AOC Guide – Commercial Air Operations” CAAD-617; (MNL-005-FSXX-3.0)

E3.2 ICAO Annex 6 Part 1.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st December, 2017 and supersedes ANO 91.0005 (Issue-3).

--S/d--

(ASIM SULEIMAN)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **30th November, 2017**

--S/d--

(CAPT. ARIF MAJEED)
Director Flight Standards

Dated- **20th November, 2017**
File No. HQCAA/1077/016/FSAC

APPENDIX "A"

NOTIFICATION FOR APPROVAL OF "ONE ENGINE INOPERATIVE FERRY FLIGHT" OF THREE/FOUR ENGINE AIRCRAFT

1. Airline/ Operator________________________ 2. Aircraft Type__________________________

3. Registration No ________________________ 4. Location ______________________________

5. Destination Airport_____________________ 6. Distance ______________________________

7. Approx. Flt. Time_______________________ 8. Date _________________________________

9. E.T.D_____________________________ 10. Locked Rotor, Engine No._______________

11. Nature of Engine Fault ____

____

12. Boroscopic Inspection of Eng. No. 1,2, 3,4(as applicable) ________________________

13. Flight hours on each engine (as applicable)

Eng.No 1: __________ Eng.No 2: __________ Eng.No 3: __________ Eng.No 4: __________

14. Flight Crew

Particulars of Flight Crew	Captain	Co-pilot	Flt. Engineer (if applicable)
Name			
Licence No.			
Expiry Date			
Hrs. on Type			
Last ferry training c/out			
Last actual ferry flown			
Supervisory assignment			

15. Director Flight Operations or Designated Representative of the Operator.

Signature ________________________

Name ___________________________

Date ___________________________________ Designation ______________________

16. Director Flight Standards or Designated Representative of DG CAA.

Approved/Not Approved

Signature ________________________

Name ___________________________

Date _________________________________ Designation ______________________

PROVING FLIGHTS

AIR NAVIGATION ORDER

VERSION	**:**	**2.0**
DATE OF IMPLEMENTATION	**:**	**01.01.2018**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. MARATIB ALI ZAFAR	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR MARSHAL (RETD.) ASIM SULEIMAN	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by the Director General of the Civil Aviation Authority (CAA) in pursuance of the powers vested in him under Rule 4 of the Civil Aviation Rules 1994 (CARs 94).

A2. CARs 187, 188 and 189 states applicants for an Air Operator Certificate (AOC) shall comply with such rules as are applicable for certification, as given below:

A2.1 R-187. **Issue of air operator certificates.-**

(1) The Director-General shall issue or renew air operator certificates under this Part, when he is satisfied that an applicant has demonstrated that his equipment, organization, staffing, maintenance And other arrangements are adequate to secure the safe operation of the types of aircraft to be included in the certificate, on such flights as are to be authorized, and that the applicant can establish and maintain a satisfactory method of supervision of these flight operations. For this purpose an applicant shall supply such information as the Director-General may require.

(2) An air operator certificate issued under this Part shall be subject to such conditions as the Director-General may include in the certificate in the interests of flight safety.

A2.2 R-188. **Air operator certificates.-**

(1) An air operator certificate issued under this Part shall be:

(i) an "air operator certificate - airline" which shall authorize the holder to engage in regular public transport operations within the conditions and limitations of that certificate, provided that he has also been granted a licence for such operations by the Federal Government;

(ii) an "air operator certificate - charter" which shall authorise the holder to engage in charter operations within the conditions and limitations of that certificate, provided that in the case of international charter operations, and of charter operations by aircraft with a maximum permissible take-off mass greater than 5,700 kgs, he has also been granted a licence for such operations by the Federal Government; or

(iii) an "air operator certificate-aerial work" which shall authorise the holder to engage in aerial work operations within the conditions and limitations, of that certificate, provided that in the case of international aerial work he has also been granted a licence by the Federal Government.

(2) An air operator certificate issued under this Part shall be valid for a period of one year from the date of issue or renewal, unless suspended or cancelled by the Director-General.

A2.3 R-189. **Operators to comply with conditions of an air operator certificate.-** The holder of an air operator certificate issued or renewed under this Part shall comply with such rules as are applicable and with all the operating conditions attached to the certificate and shall conduct his operations at least to the standard of flight safety required to qualify for the issue of such a certificate. Non-compliance with such operating conditions or failure to comply with the rules or to maintain an adequate standard of flight safety shall subject to the provisions of rule 341 result in the cancellation of the certificate by the Director-General or suspension of the certificate for such period as he thinks fit.

B. PURPOSE:

B1. Proving flights are required during the operational phases of certification process or any time deemed necessary by the Director General, for each type aircraft which is intended to be operated in public transport services e.g. but not limited to following occasions:-

a) A new aircraft type;

b) A new route / destination;

c) Any major changes in an aircraft previously in operation on public transport services;

d) Use of aircraft in an operation different to that in which it was previously used.

C. SCOPE:

C1. Proving flights are a series of flights which are designed to demonstrate, prior to the issuance of the AOC, that the applicant is capable of operating and maintaining each aircraft type which he proposes to use to the same standards required of an established operator.

C2. Proving flights may also be required of a fully certificated AOC holder, which is adding a new airplane to its fleet.

C3. Successful proving flights may be considered the final proof that an applicant is ready to commence revenue operations with a specific type of aeroplane. During these inspections, the CAA will have the opportunity to observe and evaluate the in-flight operations within the total operational environment of the air transportation system.

C4. Revenue passengers will not be carried. However, it is generally desirable for the applicant to have on board company officials who can make decisions and commitments on behalf of the applicant concerning actions to correct deficiencies. These company officials may also serve as passengers for the purpose of realism, so that the company can perform their normal duties such as passenger briefings and meal services.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 Proving Flights are conducted by an air operator to demonstrate to regulatory authority its ability to operate according to proposed procedures and in vague regulatory requirements.

D2. PLANNING REQUIREMENTS:

D2.1 The applicant and the CAA inspector should plan well in advance for the conduct of the proving flights. All concerned must have a clear understanding and agreement as to what must be accomplished by the applicant to show compliance with the applicable operating regulations and rules. This is extremely important to prevent any unnecessary delays causing additional financial difficulties. General objectives for pre-certification proving flights should include the determination of the adequacy of:

D2.1.1 In-flight procedures laid down in the operations manual and compliance with those procedures.

D2.1.2 The facilities and equipment provided to the flight crew to operate and conduct the flight safely and in accordance with regulations.

D2.1.3 The support provided by operational control to the flight crew.

D2.1.4 The general provisions made for ground handling of aircraft and assisting the flight crew to carry out their duties at all aerodromes utilized by the applicant along the routes; and

D2.1.5 En-route facilities.

D2.1.6 Proving flights are operated as exactly as though *the* applicant is conducting revenue flights. However, during the course of the flights, CAA may introduce simulated situations, which will require appropriate responses by crewmember's and ground personnel.

D3. PROVING FLIGHT DEMOSTRATIONS:

D3.1 Proving will consist of a minimum of 10 hours (5 hours for domestic flights) flown over routes representative for which the operator seeks approval. At least 4 route segments must be flown, if practicable. If the operator seeks approval for night operations, 5 of the 10 hours must be flown at night, if practicable. The sequence of events for the proper planning *for* and carrying *out* of proving flights will be as follows:

D3.1.1 Well before the proving flights (during the pre-application phase of the certification process) CAA will have briefed the operator regarding the necessity for proving flights, what must be accomplished, and the areas which will be evaluated.

D3.1.2 At least 10 days prior to the proving flights, the operator must submit a proving test plan consisting of a detailed schedule of the proposed flights including dates, times, and airports to be used, along with a list of names of all crewmember's who will be used on each flight. The applicant should also provide a list of names and titles of non-crewmember personnel who *will* be aboard the aircraft during the flights. Preliminary flight plan information containing predicted fuel, baggage, and passenger loads for each segment along with predicted gross takeoff and landing weights must also be provided.

D3.1.3 After receipt of the proving test plan from the operator, the CAA team will develop a proving flight scenario consisting of simulated emergencies and other means of testing the crewmember's and operator's ability to cope with actual operational contingencies.

D3.2 Since the primary purpose of the proving flights is to ensure basic compliance with safe operating procedures during routine operations, the introduction of simulated abnormal and emergency conditions should be kept to the minimum required to evaluate the operator's capability to respond to such conditions. The following are typical scenarios, which may be useful in evaluating the operator's capabilities:

D3.2.1 Diversion to alternate airports for reasons such as weather or maintenance- This tests the company's communications, maintenance, ground handling and other operational capabilities.

D3.2.2 MEL or CDL situations - this test crewmember's understanding of specific operational limitations, company's operations and maintenance procedures. For example, dispatching with an inoperative AC generator tests the operator's ability to comply with the operational and maintenance provisions of the MEL.

D3.2.3 Performance problems - this requires the aircrew and dispatch or flight control personnel to demonstrate competency and knowledge of such items as aircraft performance, airport analysis charts and alternative company procedures. For example, simulating one-half inch of standing water on a departure runway will test the operator's ability to make performance adjustments.

D3.2.4 Hazardous cargo - the introduction of simulated hazardous cargo will test the applicant's ability to properly document and handle such items.

D3.2.5 Simulated aircraft emergencies such as engine failure - this tests the flight crew's knowledge and competency in handling emergency situations. It also tests the operator's communications, maintenance, and other capabilities. Under no circumstances may an actual engine shutdown be required. However, at the discretion of the CAA team leader, a throttle may be retarded to idle thrust during flight, and throughout the approach and landing.

D3.2.6 Simulated cabin emergencies - this tests the ability of the applicant to deal with cabin abnormalities in accordance with established company procedures; and to coordinate with the flight deck crew. Possible scenarios may include a simulated incapacitated passenger in need of immediate medical assistance, a simulated lavatory fire, or a simulated loss of pressurization.

D3.3 The proving test flights are then carried out in accordance with the operator's plan and the CAA scenario.

D3.4 Following each segment of the flight, the operator should be debriefed by the CAA team leader regarding the progress thus far. Unsatisfactory conditions noted by the team leader should immediately be brought to the attention of the applicant for corrective action. An opportunity should be provided to the applicant to remedy any deficiencies affecting the safety of the operation before any further flights are undertaken. All discrepancies and items of non-compliance must be corrected or resolved to the satisfaction of the CAA team leader before the series of flights can be considered successful. Some examples of deficiencies requiring corrective action are:

D3.4.1 Flight crewmember not properly trained, e.g. requires assistance from applicant supervisors or a CAA inspector;

D3.4.2 Flight crewmember not familiar with aircraft, systems, procedures or Performance;

D3.4.3 Cabin crewmember not properly trained or not familiar with the location or use of emergency equipment or emergency evacuation procedures;

D3.4.4 Numerous aircraft deficiencies and/or systems malfunctions;

D3.4.5 Unsatisfactory operational control, e.g. improper flight planning and flight release procedures;

D3.4.6 Unacceptable maintenance procedures or practices; and

D3.4.7 Improper aircraft servicing and ground handling procedures.

D3.5 Within 24 hours after the entire series of proving flights is completed, the operator will be provided with a detailed debriefing; and will be informed whether or not his overall performance was satisfactory or unsatisfactory. This will be followed with a letter stating the same information.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
MEL	:	MINIMUM EQUIPMENT LIST
CDL	:	CONFIGURATION DEVIATION LIST

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 "AOC Guide – Commercial Air Operations" CAAD-617; (MNL-005-FSXX-3.0)

E3.2 ICAO Annex 6 Part 1.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st January, 2018 and supersedes ANO 91.0006 (Issue-1).

--S/d--

(ASIM SULEIMAN)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **28th December, 2017**

--S/d--

(CAPT. ARIF MAJEED)
Director Flight Standards

Dated- **19th December, 2017**
File No. HQCAA/1077/017/FSAC

MASTER MINIMUM EQUIPMENT LIST, MINIMUM EQUIPMENT LIST, CONFIGURATION DEVIATION LISTS AND DISPATCH DEVIATION PROCEDURES GUIDE

AIR NAVIGATION ORDER

VERSION	**:**	**4.0**
DATE OF IMPLEMENTATION	**:**	**01.01.2018**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. IFTIKHAR JALEES USMANI	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR MARSHAL (RETD.) ASIM SULEIMAN	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by the Director General of the Civil Aviation Authority (CAA) under Rule 31 in pursuance of the powers vested under Rule 4, Civil Aviation Rules (CARs) 1994.

A2. Rule 31 of CARs 94 states that a regular public transport aircraft, or charter aircraft registered in Pakistan shall not fly unless all the items of equipment; which are included in the minimum equipment list in the approved Flight Manual, or other certification document for the aircraft, as being required to be serviceable for the particular operation, are serviceable. No amendment shall be made to a minimum equipment list; except with the approval of the Director General.

B. PURPOSE:

B1. This ANO applies to all operations of RPT/Charter, General Aviation, Flying Schools, Aerial Works, and to all civil aircraft registered and/or leased in Pakistan.

C. SCOPE:

C1. This ANO provides regulatory requirements and guidelines for provision of:

C1.1 Master Minimum Equipment List (MMEL) from the State of design/ manufacturer and/or State of Registry established for the aircraft type by the organization responsible for the type design in conjunction with the State of Design;

C1.2 Minimum Equipment List (MEL), based on the Master Minimum Equipment List, from the operator; and approved by the State of Operator.

C1.3 CDL / DDPG from the manufacturer.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 For the purpose of this ANO and in line with ICAO Standards and Recommended Practices, the following terms are defined as hereunder:

D1.1.1 **"As required by operating requirements"** - The listed item of equipment is subject to certain provisions (restrictive or permissive) expressed in the applicable operational requirements.

D1.1.2 **“Approved by CAA”** - means approved by Authorities (State of Registry) & the State of operator, in accordance with procedures agreed by those Authorities.

D1.1.3 **"Aircraft Flight Manual" (AFM)** - The AFM is developed by the manufacturer and approved by the regulatory body of the country where the aircraft was manufactured. The AFM is the source document for operational limitations and performance parameters for an aircraft.

D1.1.4 **"Aircraft Maintenance Manual" (AMM)** - The AMM is the source document for aircraft maintenance procedures.

D1.1.5 **"Calendar Day"** - A 24 hours period from midnight to midnight based on either UTC or local time, as selected by the operator.

D1.1.6 **"Commencement of flight"** - The point when an aircraft begins to move under its own power for the purpose of preparing for take off.

D1.1.7 **"Configuration Deviation List" (CDL)** - Aircraft certified under the provisions of the Civil Aviation Organisation of an ICAO contracting state, and intended to be used in commercial air transportation service, are approved for operations with missing secondary airframe and engine parts. The source documents for such operations is the CDL.

D1.1.8 **"Despatch Deviation Procedures Guide" (DDPG)** – This document issued by the manufacturer is generally combined with CDL and provides amplification of O&M procedures.

D1.1.9 **"Day of Discovery"** - The day of discovery is the calendar day an equipment malfunction was recorded in the aircraft maintenance log or record. This day is excluded from the calendar days or flight days specified in the MMEL for the repair of an inoperative item of equipment.

D1.1.10 **"Dispatch"** - Dispatch for the purpose of the MEL/MMEL refers to the moment the aircraft starts its takeoff roll. In the case of a helicopter, it refers to the moment the helicopter commences air or ground taxi. The MEL is approved on the basis that equipment will be operative for takeoff unless the appropriate MEL procedures have been carried out. The operator's MEL shall include procedures to deal with any failures, which occur between the start of taxi or push hack and takeoff brake release. Any failure, which occurs after takeoff commences, shall be dealt with as an in-flight failure, by reference to the appropriate section of the aircraft flight manual, if necessary. After takeoff commences, no MEL action is required, until the completion of the next landing.

D1.1.11 **"Ferry Flight"** - A positioning flight, except that such flight is flown only to return the aircraft to a place where it can be repaired.

D1.1.12 **"If installed"** - The listed item of equipment is either optional or is not required to be installed on all aircraft covered by the MMEL.

D1.1.13 **"Inoperative"** - means in relation to an item, function, component or system, that the item, function, component or system malfunctions to the extent that it does not accomplish its intended purpose or is not consistently functioning within its design operating limits or tolerances. Some systems have been designed to be fault tolerant and are monitored by digital computers, which transmit fault messages to a centralised computer for the purpose of maintenance. The presence of this category of message does not mean that the system is inoperative.

D1.1.14 **"MEL"** - An abbreviation for Minimum Equipment List. It is derived from the MMEL and is applicable to an individual operator.

D1.1.15 **"MMEL"** - An abbreviation for Master Minimum Equipment List. It is a list of equipment that the regulatory body has determined may be inoperative under certain operational conditions and still provide an acceptable level of safety. The MMEL contains the conditions, limitations and procedures required for operating the aircraft with these items inoperative. The MMEL is used as a starting point in the development and review of an individual operator Minimum Equipment List.

D1.1.16 **"MMEL Supplement"** - A list associated with MMELs for aircraft for which application for first type certification is made to CAA. The list identifies any differences from the initial countries approved MMEL. The source MMEL and the Supplement constitute the CAA approved MMEL.

D1.1.17 **"Passenger Convenience Items"** - The passengers' convenience items, as contained in the operators approved MEL, are those related to passengers convenience, comfort, or entertainment, such as, but not limited to, galley equipment, audio/video equipment, in-flight phones, ashtrays, stereo equipment, and overhead reading lamps.

D1.1.18 **"Positioning Flight"** - It is defined for the purpose of this ANO as flights carrying neither passengers nor freight for revenue consideration, operated purely to position aircraft for further revenue service;

D1.1.19 **"Repair Interval"** - Operators shall make repairs within the time period specified by the MEL. Although the MEL might permit multiple days of operation with certain inoperative equipment, operators must repair the affected item as soon as possible.

D1.1.20 **"Rectification Interval Extension" (RIE)** - The maximum time an aircraft may be operated between the deferral of an inoperative item and its repair;

D1.1.21 **"Type Certificate".** A Type Certificate, Supplemental Type Certificate, or equivalent, issued by CAA.

D2. OPERATOR'S & PIC RESPONSIBILITY:

D2.1 Operators shall establish for each aircraft, an MEL approved by the PCAA that will be based upon the relevant Master Minimum Equipment List (MMEL).

D2.2 Operators shall not operate an aircraft other than in accordance with the MEL unless permitted by the CAA. Any such permission or approval will in no circumstances permit operations outside the constraints of the MMEL.

D2.3 Except as provided in this ANO, no person shall take off or operator an aircraft, with inoperative instruments or equipment installed unless the conditions contained in MEL are complied with.

D2.4 Approved MEL /Amendments thereof shall be disseminated to all concerned maintenance/ operations personnel and a copy shall be placed in each aircraft (type) library.

D3. MASTER MINIMUM EQUIPMENT LIST (MMEL):

D3.1 General Requirement:

D3.1.1 The MMEL is a master list (including a preamble) appropriate to an aircraft type which determines those instruments, items of equipment or functions that, while maintaining the level of safety intended in the applicable Regulation, may temporarily be inoperative either due to the inherent redundancy of the design, and/or due to specified operational and maintenance procedures, conditions and limitations, and in accordance with the applicable procedures for Continued Airworthiness.

D3.1.2 The MMEL is applicable to an aircraft type but does not take into account the operating circumstances of individual operators of that type; therefore, it cannot in-itself be regarded as providing operational permission. In order to establish whether or not it is acceptable to dispatch with particular equipment unserviceable, it will be necessary for each operator to prepare and seek CAA approval of MEL.

D3.1.3 An MMEL is not an exhaustive list of all equipment items required by law to be carried. An operator may include in a Minimum Equipment List (MEL) any additional items that are required to be carried where such entries clarify legal requirements (e.g. an operator may choose to include an item concerning torches for Regular Public Transport operations simply to establish the minimum numbers required for a particular type of aircraft).The MMEL will deal with items of equipment which may safely be permitted to be unserviceable under certain conditions. Those items, which are essential for safety under all conditions, will not necessarily be included.

D3.1.4 Where an approved MMEL has not been produced for a particular aircraft type, there may be an (equivalent document) acceptable to the CAA. The MMEL may be a standalone document or it may be an MMEL Supplement to be used in conjunction with a specific MMEL. In the absence of an approved MMEL (or equivalent document), the Minimum Equipment List (MEL) may only include un-serviceabilities as expressly permitted by the ANO or by special limitations and procedures in Flight Manual or by agreement with the CAA.

D3.2 MMEL Approval - Pakistan Manufactured and Certificated Aircraft

D3.2.1 Although production of an MMEL is not one of the conditions for Type Certification or for the issue of a Certificate of Airworthiness (C of A) it is strongly recommended that, for new aircraft types, the MMEL is prepared during the certification process and is completed before entry into service. It may not be possible for the CAA to approve an MEL in order to allow operation with items unserviceable unless an MMEL exists.

D3.2.2 The manufacturer shall produce an initial draft of the proposed MMEL. This draft will then be reviewed by the CAA, involving consultation with the specialist departments within the CAA.

D3.2.3 After the manufacturer has made the required changes, final draft of MMEL shall be submitted to the CAA for approval. The CAA approved MMEL will be published and distributed to customers by the manufacturer.

D3.2.4 Proposals to amend the MMEL may be initiated by the CAA, the manufacturer or by operator(s). Proposals from an operator should be channeled, in the first instance, through the manufacturer. If the manufacturer supports the change, a formal proposal should be made by the manufacturer to the CAA. Amendment proposals initiated by manufacturers or operators must be accompanied by a technical justification, which should include any changes to the associated operational and/or maintenance procedures.

D3.2.5 Applicants for approval of modifications to aircraft shall, at the time of application, consider the effects of the proposed modification upon the information and instructions contained in the MMEL for the type, and shall inform the CAA of any revisions likely to be required as a consequence of the incorporation of the modification. Modifications to be approved by CAA.

D3.2.6 The manufacturer will be consulted and informed before an amendment is approved. Where the CAA considers it necessary, the consultation process may be extended to other interested parties.

D3.3 MMEL Approval - Pakistan Manufactured Aircraft

D3.3.1 CAA shall only approve the MMEL and all changes when it is satisfied that compliance has been shown with the applicable requirements of this ANO.

D3.3.2 Where a change to the Type Certificate has an effect upon the MMEL, the Type Certificate holder shall apply for approval of the necessary change(s) to the MMEL, which shall require an Approval of CAA.

D3.3.3 CAA may prefer to use an FAA or JAA MMEL even if they are not the country of manufacture, if it is deemed to be more appropriate.

D3.3.4 In exceptional cases where no suitable MMEL exists an operator may, with the approval of the CAA, use an FAA or JAA MMEL even if they are not the country of manufacture or use an MEL. Any such approval would depend upon the operator providing the appropriate technical or operational justification for the proposed alleviations.

D3.4 MMEL Acceptance - Foreign Manufactured / Certificated Aircraft

D3.4.1 It is issued by the manufacturer and approved by the Aviation Authority of the State of design. Where such an MMEL already exists, it shall be accepted by CAA.

D3.4.2 Applicants for approval of modifications to aircraft shall, at the time when application is made, consider the effects of the proposed modification upon the information and instructions contained in the MMEL for the type, and shall inform the CAA of any revisions likely to be required as a consequence of the incorporation of the modification.

D4. MINIMUM EQUIPMENT LIST (MEL):

D4.1 General Requirements:

D4.1.1 The Minimum Equipment List (MEL) is:

D4.1.1.1 A list that provides for the operation of aircraft, under specified conditions, with particular instruments, items of equipment or functions inoperative at the commencement of flight. This list, approved by CAA, is 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;

D4.1.1.2 Prepared by the Operators to allow the operation of an aircraft with certain systems or equipment inoperative provided an acceptable level of safety is maintained;

D4.1.1.3 Intended to permit operations with inoperative items of equipment for a period of time until repairs can be accomplished. It is important that repairs be accomplished at the earliest opportunity.

D4.1.1.4 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;

D4.1.1.5 To maintain the required level of safety and reliability the MEL establishes limitations on the duration of and conditions for operations with inoperative equipment.

D4.1.1.6 Required to clearly indicate 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;

D4.1.1.7 Based upon, but no less restrictive than the relevant approved MMEL.

D4.1.2 Format of MEL:

D4.1.2.1 The MEL shall be provided with a relevant Preamble, Definitions and, if appropriate, Clarifying Notes which shall adequately reflect the scope, extent and purpose of the List.

D4.1.2.2 A five-column format for the technical pages of all MEL is preferred. These columns from 1 to 5 shall contain respectively the system & sequence number, category, number installed, number required for dispatch and remarks or exceptions;

D4.1.2.3 The MEL shall be written in English and/or a language acceptable to CAA.

D41.2.4 The MEL shall cover the kinds of operation for which the aircraft type is certificated;

D4.1.2.5 All items related to the airworthiness of the aircraft and not included in the list are automatically required to be operative.

D4.1.2.6 Non-safety related items such as galley equipment, passenger convenience items, need not be listed. Operators shall establish an effective decision making process for failures that are not listed to determine if they are related to airworthiness and required for safe operation.

D4.1.2.7 The MEL may contain additional advisory material or modified operational and maintenance procedures.

D4.2 Contents of MEL (Covered in Appendix-A).

D4.3 MEL Approval / Permission

D4.3.1 CAA will approve an MEL and all changes when it is satisfied that it is in agreement with the applicable MMEL and compliance has been shown with the applicable requirements of this ANO. MEL Approval / Acceptance / Permission process is provided in Appendix C and application for this purpose is given in Appendix-B. Also for better management and compliance requirements, PCAA Airworthiness Directorate Form CAAF-457-AWRG-4.0 titled “Acceptance of Minimum Equipment List (MEL)” duly filled in is to be attached with the said application.

D4.2.2 **Aircraft operated under an Air Operator's Certificate (AOC)**.

D4.2.2.1 Operators are required to apply when submitting an initial MEL, or an amendment to the MEL, to FSD CAA. This application shall be submitted, together with the MEL, and/or the amendment. The inclusion of references to source material and justification for MEL items will facilitate the efficient processing of draft MEL documents or amendments.

D4.2.2.2 When the CAA is satisfied that the MEL or the amendment to the MEL is acceptable, the CAA will accord an approval and return it to the operator for their records and compliance. At this point the MEL may be published and disseminated. The approved MEL will form part of the Operations Manual.

D4.2.2.3 Special Permissions shall be given by FSD,CAA on MEL on case to case basis (refer to Appendix E). Exemption / Waiver Form.

D4.2.3 **Aircraft not operated under an AOC**. Private Operators, who wish to use MELs in accordance with this ANO, must obtain a written Permission from the PCAA. Applications should be made to FSD,PCAA, which will manage the process in accordance with the approved procedure given above.

D4.4 Amendments to the MEL (Time Scales)

D4.4.1 It remains the responsibility of an operator to provide the timely revision related to the modification and/or supplement and till such time that it is approved by PCAA, the modification/retrofit shall be considered as “No Go” both by the Operator and the PCAA.

D4.4.2 When an MMEL approved by the PCAA of state of design first becomes available, operators of the particular aircraft type concerned will be allowed 60 days from the date of publication of the MMEL to prepare their MELs.

D4.4.3 When the MMEL is amended so as to become more restrictive, or when the CAA requires immediate amendment of the MEL, operators will be allowed 15 days from the date of notification to amend their MEL.

D4.4.4 In all other cases, when an MMEL revision is issued, operators will be allowed 30 days from the date of notification to amend their MEL. Reduced time scales for implementation of safety related revisions might be required.

D4.4.5 Amendment of the MEL shall be approved by CAA, provided the proposed change is no less restrictive than the MMEL.

D4.5 Non-Standard Operations

D4.5.1 When aircraft are (not very often) flown for purposes other than those associated with their most common use. Such non-standard uses of aircraft may well allow less stringent minimum equipment requirements. Examples of non-standard use may be:

D4.5.1.1 Demonstration Flights;

D4.5.1.2 Test Flights - after maintenance;

D4.5.1.3 Training Flights;

D4.5.1.4 Positioning;

D4.5.1.5 Ferry Flights

D4.5.2 Minimum equipment requirements may only be reduced with prior approval of CAA and an operator would have to provide evidence that such flights change the category of use of aircraft in accordance with this ANO.

D4.5.3 Any reference to a reduction in minimum equipment requirements in an MEL must be clearly labeled as such, together with the type of non-standard flight applicable.

Note: Such non-standard flights may only be undertaken if the aircraft's Flight Manual contains the appropriate procedures and are approved by the CAA. Refer to Appendix-E for application Form.

D4.6 Operations Outside the Scope of the MEL:

D4.6.1 The CAA may exempt an operator from compliance with the appropriate MEL on an individual case-by-case basis, provided such exemption complies with applicable limitations in the MMEL. (Refer to Appendix-E for exemption application).

D5. <u>OPERATIONS WITH WET LEASED AIRCRAFT:</u>

D5.1 The requirements of MEL are equally applicable to all aircraft wet leased from other States;

D5.2 A Minimum Equipment List (MEL) for each aircraft approved by the State of the Registry is a regulatory requirement. Approved MEL of wet leased aircraft must be submitted to CAA in the induction process as laid down in ANO 91-0016;

D5.3 In case deviations from the requirements of States in the certification of aircraft are not permitted; the aircraft shall not be flown unless all systems and equipment were operable.

D6. CONFIGURATION DEVIATION LISTS (CDL) / DESPATCH DEVIATION PROCEDURES GUIDE:

D6.1 Configuration Deviation Lists (CDL) or their equivalent, are not a part of the MMEL/MEL. CDL/DDPG provide amplified actions on O&M procedures. Both are generally combined and are issued by the manufacturer. CDL/DDPG identify any external components of an aircraft type, which may be missing for dispatch and any associated information on performance corrections for such cases (e.g. missing landing gear doors, flap actuator fairings, etc.). The CDL/DDPG may be published as part of the CAA approved Flight Manual.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

AFM	:	AIRCRAFT FLIGHT MANUAL
AMM	:	AIRCRAFT MAINTENANCE MANUAL
ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
CAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
CARs	:	CIVIL AVIATION RULES
CDL	:	CONFIGURATION DEVIATION LIST
DDPG	:	DISPATCH DEVIATION PROCEDURES GUIDE
FSD	:	FLIGHT STANDARDS DIRECTORATE
ICAO	:	INTERNATINOAL CIVIL AVIATION ORGANIZATION
MEL	:	MINIMUM EQUIPMENT LIST
MMEL	:	MASTER MINIMUM EQUIPMENT LIST
RPT	:	REGULAR PUBLIC TRANSPORT

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 “AOC Guide – Commercial Air Operations” CAAD-617; (MNL-005-FSXX-3.0)

E3.2 ICAO Annex 6 Part 1.

E3.3 CARs’ 1994.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st January, 2018 and supersedes ANO 91.0007 (Issue-3).

--S/d--

(ASIM SULEIMAN)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **26th December, 2017**

--S/d--

(CAPT. ARIF MAJEED)
Director Flight Standards

Dated- **19th December, 2017**
File No. HQCAA/1077/018/FSAC

APPENDIX "A"

CONTENTS OF MINIMUM EQUIPMENT LIST (AIRCRAFT TYPE)

The MEL contains only those items required by Operating Regulations or those items of airworthiness significance which may be inoperative prior to dispatch, provided that appropriate and limitations procedures are observed. Equipment obviously basic to aircraft airworthiness such as wings, rudders, flaps, engines, landing gear, etc. are not listed and must be operative for all flights. It is important to note that: All Items which are related to the airworthiness of the aircraft and not included on the list are automatically required to be operative.

1. Contents of MEL

1.1 Format of MEL

a) The MEL shall contain a relevant Preamble, Definitions and, if appropriate, clarifying Notes which shall adequately reflect the scope, extent and purpose of the List. It shall also contain rectification interval(s) in line with the definitions in this ANO. The MEL shall indicate the revision status of the MMEL, upon which it is based.

1.2 Revision Status

a) The revision page must provide with revision number, effective date and highlights of all the amendments pertaining to any addition or deletion along with page number and item number;
b) Each page must have revision number and effective date.
c) Any change/addition/deletion shall be highlighted on the applicable page with a vertical line in right hand side margin.

1.3 Preamble: The purpose of MEL preamble is to provide the:

a) Basis on which the MEL has been prepared
b) Considerations to type of aircraft, equipment, configuration, operational conditions, routes and requirements set by the CAA
c) Compliance statement not to deviate from CAA requirements
d) Purpose of the MEL
e) Safety Obligations of Pilot-in command
f) Applicability of MEL
g) Approval/Permission by the CAA
h) Criteria for Dispatch
i) Maintenance Action
j) Multiple Unserviceabilities
k) Rectification Intervals
l) Centralized Message Systems (If Applicable)
m) Special Procedures for Operation Outside the Scope of the MEL, Approval and Conditions

1.4 Definitions

The abbreviations and terminology used for various meanings within the text of MEL shall be defined in the opening pages so as to facilitate the reader with ready guidance.

1.5 Clarifying Notes

Required clarification must also be provided wherever it is required.

1.6 Operational and Maintenance (O&M) Procedures

a) The MEL shall include O&M procedures or symbols to indicate them. O&M procedures in the MMEL may be referred to for this purpose.;

b) The MEL shall be appropriately amended as and when applicable operational or maintenance procedures are revised;
c) Operational procedures shall be accomplished in planning for and/or operating with the listed item inoperative. Normally these procedures are accomplished by the flight crew; however, other personnel may be qualified and authorised to perform certain functions. The satisfactory accomplishment of all procedures, regardless of who performs them, is the responsibility of the operator;
d) Maintenance procedures shall be accomplished prior to operating with the listed item inoperative. Normally these procedures are accomplished by maintenance personnel; however, other personnel may be qualified and authorized to perform certain functions. The satisfactory accomplishment of all maintenance procedures, regardless of who performs them, is the responsibility of the operator;
e) Systems or equipment accepted as inoperative for a flight shall be placarded where appropriate and all such items shall be recorded in the aircraft technical log to inform the flight crew and maintenance personnel of the inoperative system or equipment;
f) Appropriate operational and maintenance procedures are required to be published as a part of the operator's manual(s) or MEL. Operator's manuals may include the Operations Manual, the Maintenance Manual or other documents acceptable to the CAA.

1.7. Maintenance Action

a) Every effort shall be made by Maintenance to correct all technical defects as early as practicable and that the aircraft be released from a maintenance station in fully operational condition. The Pilot-in-command must be informed by Maintenance as soon as practicable, should it be impossible to rectify the inoperative item prior to departure.
b) Whenever an aircraft is released by Maintenance for dispatch with items inoperative, the following is required:-The technical log book aboard the aircraft must contain a detailed description of the inoperative items(s), special advice to the flight crew, if necessary, and information about corrective action taken.
c) When they are accessible to the crew in flight, the control(s), and/or indicator(s) related to inoperative unit(s) or component(s) must be clearly placarded.
d) If inadvertent operation could produce a hazard such equipment must be rendered inoperative (physically) as given in the appropriate Maintenance Procedures.

1.8 Rectification Interval Categories

1.8.1 The maximum time an aircraft may be operated between the deferral of an inoperative item and its repair will be specified in the MEL. Since the MEL is a dispatch document, the repair interval may expire in flight. It is therefore an essential requirement that inoperative items or components, deferred in accordance with the MEL, must be rectified at or prior to the established rectification intervals and if during a planned flight RI is anticipated to expire, the flight may not be dispatched.

Passenger convenience items must include a category. Most of these items will be a "D' category provided any (M) procedures (in the case of electrically supplied items) is applied.

1.8.2 Following letter designators shall be used in the "Cat" column of the MEL.

a) Category A
No standard interval is specified, however, items in this category shall be rectified in accordance with the conditions stated in the Remarks column (5) of the MMEL.
Whenever the provision in the "Remarks or Exceptions" column of the MMEL states cycles or flight time, the time interval begins with the next flight. Whenever the time interval is listed as flight days, the time interval begins on the flight day following the day of discovery.
Time Limited Dispatch - Some MEL's have relief that is subject to time limited dispatch expressed as a specific number of engine hours or cycles, and will start in accordance with

the times established by the engine manufacturer or as indicated in the remarks column of the MEL. Time limited relief cannot be extended.

b) Category B
Items in this category shall be rectified within 3 consecutive calendar days, excluding the day of discovery.

c) Category C
Items in this category shall be rectified within 10 consecutive calendar days, excluding the day of discovery.

d) Category D
items in this category shall be rectified within 120 consecutive calendar days, excluding the clay of discovery

Notes:
1) The MMEL/MEL is intended to permit operations with inoperative items of equipment for that period of time necessary to organise rectification(s).
2) The MMEL/MEL is not intended as a tool for prolonged or permanent operation of aircraft in a configuration deviating from their certification status. It is important therefore that rectifications be accomplished at the earliest opportunity in order that the affected aircraft can be returned to its certification status. In order to maintain this level, the MMEL establishes limitations on the duration of operation with inoperative equipment. These are called Rectification Intervals and are designated A, B, C or D.
3) The Rectification Interval Category for each item in the MMEL is stated in column 2 of MEL.
4) 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/Design or of CAA unless the appropriate Authority or the Flight Manual provides otherwise.

1.8.3 Operation of the aircraft is not allowed after expiry of the Rectification Interval specified in the MEL, unless:
a) The defect has been rectified; or
b) The Rectification Interval is extended in accordance with RIEs in this ANO.

1.9 Operations with Multiple Unserviceabilities

1.9.1 The MEL cannot include all combinations of unserviceabilities. Therefore it has to be accepted that because of the variety of multiple unserviceabilities, which could arise, it is likely that many will not be covered in the MMEL/MEL

1.9.2 The MEL shall provide guidance on the effects of multiple unserviceabilities which may have a significant effect upon safety. MEL Preambles should make it clear that not all unserviceabilities are considered

1.9.3 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.

1.9.4 The decision as to whether or not to dispatch with multiple unserviceabilities, which individually would be allowed by the MEL, will ultimately rest with the pilot-in-command, taking into consideration both, the advice from the operator's specialists where available and the constraints of above paragraph. The responsibilities of the pilot-in-command in accepting an aircraft for operation with deficiencies in accordance with a minimum equipment list are specified in Rule 219 of CARs 94. Refer to Appendix-F “Pilot Decision Sequence when operating with an MEL” in this regard.

1.9.5 If a failure occurs during the taxi phase before the start of the take-off roll, any decision to continue the flight shall be subject to pilot judgment and good airmanship. The pilot-in-command may refer to the MEL before any decision to continue the flight is taken.

1.10 Criteria For Dispatch

1.10.1 The decision of the Pilot-in-command of the flight to have allowable inoperative items corrected prior to flight will take precedence over the provisions contained in the MEL. The Pilot-in-command may request requirements above the minimum listed, whenever in his judgment such added equipment is essential to the safety of a particular flight under the special conditions prevailing at the time.

1.10.2 The MEL cannot take into account all multiple un-serviceabilities. Therefore, before dispatching an aircraft with multiple MEL items inoperative, it must be assured that any interface or inter-relationship between inoperative items will not result in a degradation in the level of safety and/or an undue increase in crew workload. It is particularly in this area of multiple discrepancies and especially discrepancies in related systems that good judgment, based on the circumstances of the case including climatic and en-route conditions must be used.

1.11 Ferry Flights

Ferry flights may be dispatched with less than the equipment specified in this MEL provided all the equipment expected to be utilised in flight is operable and any relevant Sections of the Flight Manual are applied. Permission for such a flight, however, must be requested from CAA or be granted by some other agreed procedure.

APPENDIX "B"

	CIVIL AVIATION AUTHORITY MINIMUM EQUIPMENT LIST (MEL) COMPLIANCE DOCUMENT	CAAF-046-FSXX-2.0
	Flight Standards Directorate	

MEL / MEL Amendment Approval Application Form

Aircraft type	MEL Ref	Issue No	Date
Source MMEL / Supp	**Amendment No**	**Version No**	**Date**

MEL / Item	Action to be taken	Justification

Compliance Statement: This MEL complies with ANO-007-FSXX and is no less restrictive than the applicable approved / acceptable MMEL / Supplement (delete as appropriate)

Name: .... Appointment / Position: .... Signed: ....

Date: .... ………….. Operator: ....

For CAA use only

1. **Airworthiness Surveyor**
   Technical review of items mentioned in Checklist CAAF-457-AWRG completed in accordance with ANO-007-AWRG. Technically acceptable / Not acceptable.
   Remarks (if any):

Name: .... Designation: .... Signed: .... Date: …………….

2. **Flight Operations Inspector**
   Flight Operations review completed. Operationally and technically acceptable / not acceptable.
   Remarks (if any):

Name: .... Designation: .... Signed: .... Date: …………….

3. **Director Flight Standards**
   Final review completed. **Approved / Not Approved** and Compliance statement returned to operator.
   Remarks (if any):

Name: .... Designation: .... Signed: .... Date: …………….

For Operator use only

1. Approved MEL/MEL amendment received & incorporated in Operations Manual **(should be incorporated within 07 working days from the date of receipt)**
2. Not Approved MEL/MEL amendment received & process for correction initiated.

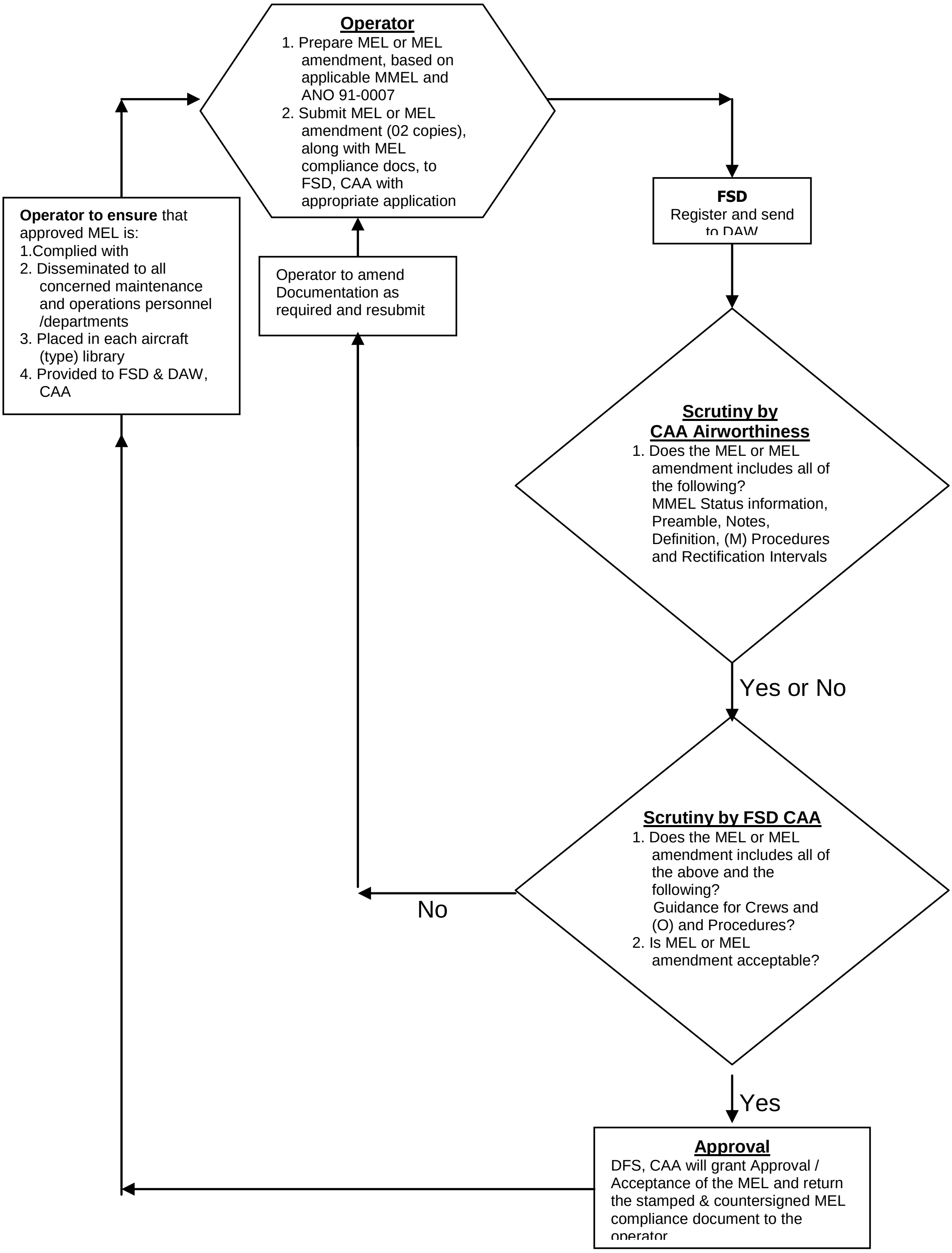
Name: .... Appointment / Position: .... Signed: ....

Date: .... ………….. Operator: ....

……► Cross inapplicable item(s)

APPENDIX "C"

MEL APPROVAL - PROCESS FLOW CHART



APPENDIX "D"

	CIVIL AVIATION AUTHORITY **RECTIFICATION INTERVAL EXTENSION APPLICATION FORM**	**CAAF-047-FSXX-2.0**
	Flight Standards Directorate	

Part 1 - MEL Defect

Operator	Date of Defect	Aircraft Registration	Aircraft Type	RIE Number

Detail of Defect	Reason for not rectifying

Rectification Interval Category	Expiry date of Rectification Interval	MEL Reference Number

Part 2 - RIE Request

Name of Applicant	Position/Appointment
Why this RIE is Required?	
List of attached documented evidence pertaining to non-availability of parts/components including tracking records, correspondence with/from manufacturer, vender and or repair station:	

Part 3 - Scrutiny

Comments by Airworthiness:
Recommendation of DAW/JtDS:

Part 4 – Approval by DFS

Comments by DFS/POI (To include history of previous RIE use for this item where appropriate):		
Duration of RIE (if Approved):	Latest date that defect is due for rectification:	
Name of Approving Authority	Position	Date

➔ Cross inapplicable item(s)

APPENDIX "E"

	CIVIL AVIATION AUTHORITY **MEL EXEMPTION/WAIVER FORM**	**CAAF-048-FSXX-2.0**
	Flight Standards Directorate	

Part 1 - Exemption/Waiver Details

Operator	Date of expected flight	Aircraft Registration	Aircraft Type	Exemption/Waiver No.

Detail of Exemption/Waiver requested	Type of non-standard operation
	a) Demonstration Flights; b) Test Flights - after maintenance; c) Training Flights; d) Positioning; e) Ferry Flights f) Any other reason
Documentary evidence for changing the category for use of aircraft to non-standard operation for the requested flight:	
Does AFM contain appropriate procedures for the requested non-standard operation?	

Expiry date of Rectification Interval (if any)	MEL Reference Number

Part 2 – Exemption/Waiver Application

Name of Applicant	Position/Appointment	Signed
Why an Exemption/Waiver is Required?		
Any documented evidence of the above statement?		

Part 3 - Scrutiny

Comments by Flight Inspector/POI:
Recommendations by DAW/JtDS:

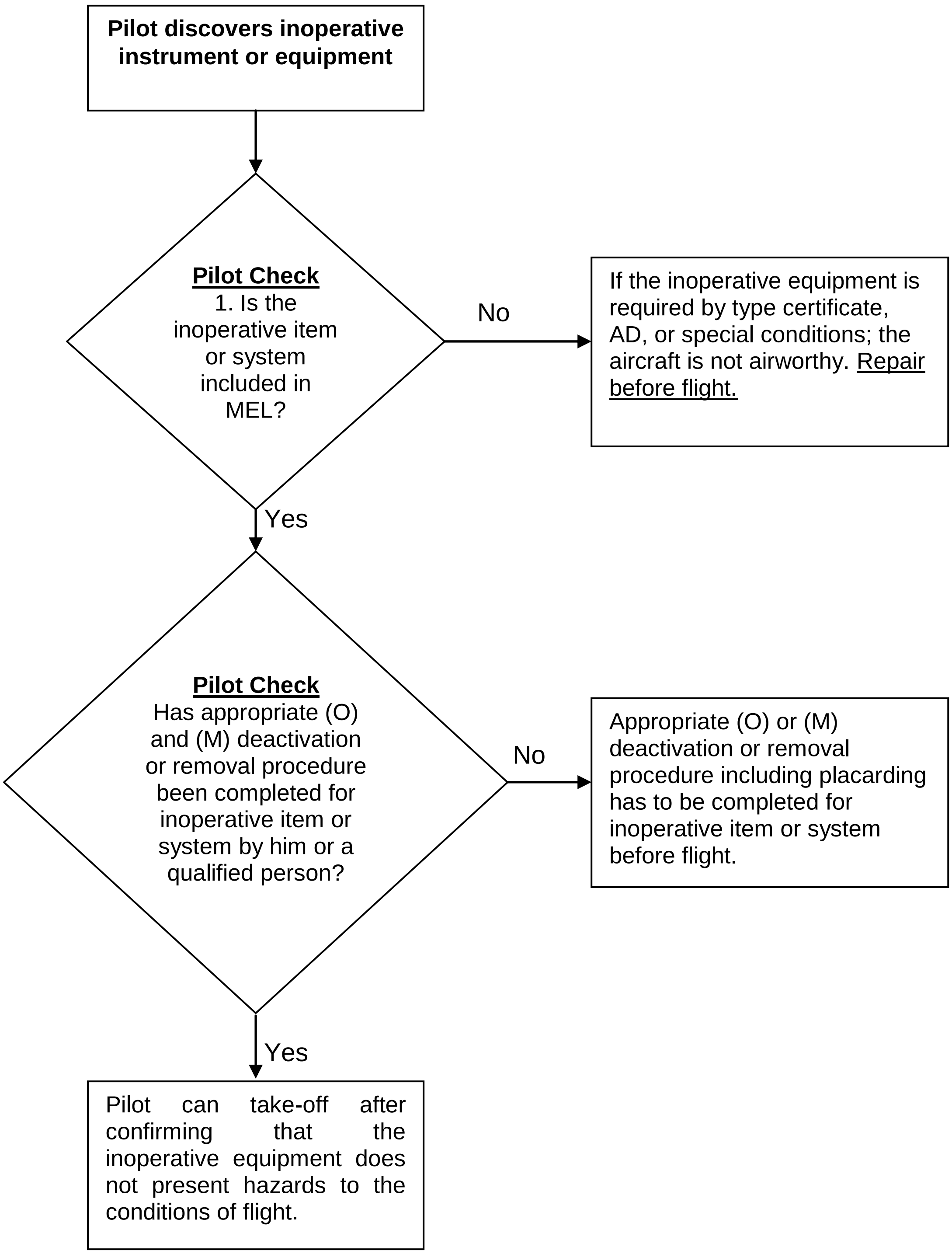
Part 4 – Approval by DFS/POI

Comments by DFS/POI:		
Approved / Not approved	Signed	
Name of Approving Authority	Position	Date

➔ Cross inapplicable item(s)

APPENDIX "F"

PILOT DECISION SEQUENCE WHEN OPERATING WITH AN MEL



EMERGENCY EVACUATION / FIRE FIGHTING DRILL PROCEDURES AND DEMONSTRATIONS

AIR NAVIGATION ORDER

VERSION : 3.0
DATE OF IMPLEMENTATION : 15.01.2023
OFFICE OF PRIME INTEREST : Flight Standards Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	MR. ABDUL RAHIM	Cabin Safety Inspector	Signed
REVIEWED BY	CAPT. IFTIKHAR J. USMANI	Director Flight Standards	Signed
VETTED BY	MR. RIZWAN UDDIN	Oi/C Legal (Regulatory)	Signed
VERIFIED BY	MR. NADIR SHAFI DAR	Dy. Director General (Regulatory) Civil Aviation Authority	Signed
APPROVED BY	MR. KHAQAN MURTAZA	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) has been issued by the DGCAA in pursuance of powers vested in him under Rule 4(3), of the Civil Aviation Rules, 1994.

B. PURPOSE:

B1. The purpose of this ANO is to prescribe training requirements for the flight crew / cabin crew in abnormal and emergency situations and address the operator's abnormal and emergency procedures to specifically focus on crew members' roles and responsibilities during these types of situations. The training will enable cabin crew members to immediately recognize an abnormal or emergency situation, rapidly gain awareness of situational dynamics and if necessary initiate communication with the flight crew and/or take necessary measures to deal with the developing situation. The training will also enable cabin crew members to anticipate additional risks that may result from the actions they choose to take and mitigate them, if required.

C. SCOPE:

C1. This ANO is applicable to airline operators and crew members. This ANO is also applicable to CAA authorized inspectors dealing with the subject matters of this ANO.

Note: OPI may wide this scope of applicability by adding entities and persons covered in this ANO.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 The terms used in this ANO have the following meanings:

D1.1.1 **Able-Bodied Passengers**. Passengers who are clearly physically able and are willing to help cabin crew maintain good order and discipline on board the aircraft;

D1.1.2 **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.

D1.1.3 **Approved Training- Cabin Crew**. Training conducted under special curricula and supervision approved by PCAA, where applicable, is conducted within an approved training organization;

D1.1.4 **Approved Training Organization - Cabin Crew**. An organization approved by PCAA with the national regulations to perform cabin crew training and which operates under the supervision of PCAA.

D1.1.5 **Attendants Panel**. Control panel(s) intended for use by cabin crew to operate and/or monitor aircraft systems relevant to cabin crew duties during normal operations and in the event of abnormal and emergency situations;

D1.1.6 **Auxiliary power unit (APU).** A gas-turbine powered unit that provides on-board electrical power and compressed ventilation air, independent of the aircraft propulsion engines.

D1.1.7 **Baggage**. Personal property of passengers or crew carried on an aircraft by agreement with the operator.

D1.1.8 **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;

D1.1.9 **Classroom Training**. In-person, instructor-led training which may include group exercises and interactive instructional sessions.

D1.1.10 **Clean Aircraft Concept**. All critical surfaces of an aircraft must be clean of any surface contamination. The critical surfaces of an aircraft are the wings, control surfaces, rotors, propellers, horizontal stabilizers, vertical stabilizers or any other stabilizing surface. In the case of an aircraft with rear mounted engines, the upper surface of the fuselage is also a critical surface.

D1.1.11 **Clear Zone**. The area of the passenger cabin immediately in front of the flight crew compartment door, including galleys and lavatories.

D1.1.12 **Competency**. A combination of skills, knowledge and attitudes required to perform a task to the prescribed standard.

D1.1.13 **Competency Element**. An action that constitutes a task that has a triggering event and a terminating event that clearly defines its limits, and an observable outcome.

D1.1.14 **Contaminant.** An airborne constituent that may reduce air quality.

D1.1.15 **Co-Pilot**. A licensed pilot serving in any piloting capacity other than as pilot-in-command but excluding a pilot who is on board the aircraft for the sole purpose of receiving flight instruction;

D1.1.16 **Crew Member**. A person assigned by an operator to perform duty on an aircraft during a flight duty period;

D1.1.17 **Critical Phases of Flight**. The period of high workload on the flight deck, normally being the periods between the beginning of taxiing until the aircraft is on the route climb phase and between the final part of descent to aircraft parking.

D1.1.18 **Disinfectants.** Chemical or physical agents used to control or kill infectious agents on a surface or in or on baggage, cargo, containers, conveyances and goods.

D1.1.19 **Disinsectants.** Chemical agents used to control or kill insects.

D1.1.20 **Emergency Exit.** Door, window exit, or any other type of exit (e.g. hatch in the flight deck, tail cone exit) used as an egress point to allow maximum opportunity for cabin evacuation within an appropriate time period;

D1.1.21 **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:

D1.1.21.1 Automatic-Fixed ELT (ELT(AF)). An automatically activated ELT which is permanently attached to an aircraft.

D1.1.21.2 Automatic-Portable ELT (ELT(AP)). An automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft.

D1.1.21.3 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.

D1.1.21.4 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.

D1.1.22 **Emergency Procedures** mean all procedures established by the operator in the Operations Manual for abnormal and emergency situations. For this purpose, "abnormal" refers to a situation that is not typical or usual, deviates from normal operation and may result or lead in to an emergency;

D1.1.23 **Engine bleed air.** Air extracted from the compressor stages of gas turbine propulsion engines and auxiliary power units.

D1.1.24 **Environmental control system.** The equipment in an aircraft used to pressurize, ventilate, air condition or humidify the aircraft. It includes cabin-supply airflow control, temperature control, pressure control, distribution, recirculation and filtration.

D1.1.25 **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 crew member's alertness and ability to safely operate an aircraft or perform safety-related duties.

D1.1.26 **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.

D1.1.27 **Fume(s).** Odorous, gaseous compounds which are not visible.

Note: Fumes and odours are deemed to be synonymous, and the term "fume(s)" includes both fumes and odours.

D1.1.28 **Hands-on Exercise**. Exercise on the use of equipment/aircraft systems that is conducted without a specific context. Equipment that is removed from operation, or other representative training equipment considered acceptable by State, can be used for the purposes of this training;

D1.1.29 **Human Factor 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;

D1.1.30 **Human Performance**. Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operation;

D1.1.31 **In-Flight**. The period from the moment all external aircraft doors are closed following boarding through the moment when one external door is opened to allow passengers to leave the aircraft or until, if a forced landing, competent authorities take over responsibility for the aircraft and individuals and property on the aircraft. For the purpose of the Tokyo Convention an aircraft is considered to be in flight from the moment when power is applied for the purpose of take-off until the moment when the landing run ends.

D1.1.32 **Lead Cabin Crew Member**. who has overall responsibility for the conduct and coordination of cabin procedures applicable during normal operations and during abnormal and emergency situations for flights operated with more than one cabin crew member.

D1.1.33 **Minimum Equipment List (MEL).** A list which provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative, planned by an operator in conformity with, or more restrictive than, the master minimum equipment list (MMEL) established for the aircraft type;

D1.1.34 **Master Minimum Equipment List (MMEL).** An abbreviation for Master Minimum Equipment List. It is a list of equipment that the regulatory body has determined may be inoperative under certain operational conditions and still provide an acceptable level of safety. The MMEL contains the conditions, limitations and procedures required for operating the aircraft with these items inoperative. The MMEL is used as a starting point in the development and review of an individual operator Minimum Equipment List.

D1.1.35 **Mock-Up**. A training device that is a partial, functional replica of an actual aircraft, without motion;

D1.1.36 **Operations Manual**. A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties;

D1.1.37 **Operator**. A person, organization or enterprise engaged in or offering to engage in an aircraft operation;

D1.1.38 **Performance Criteria**. Simple, evaluative statements on the required outcome of the competency element and a description of the criteria used to judge whether the required level of performance has been achieved;

D1.1.39 **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;

D1.1.40 **Protective Breathing Equipment (PBE)**. Breathing equipment providing full, sealed protection against smoke, fumes, etc., covering the head, the collar and upper shoulder area. Fifteen-minutes minimum oxygen supply per PBE is recommended.

D1.1.41 **Re-circulated air.** Air from the aircraft passenger cabin that is reused as part of the air supply.

D1.1.42 **Safety Management System**. A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

D1.1.43 **Safety Risk**. The predicted probability and severity of the consequences or outcomes of a hazard;

D1.1.44 **Simulated Exercise**. Exercise representing a full context scenario (e.g. aircraft evacuation) where cabin crew apply the operator's procedures and associated crew responsibilities for dealing with the specific situation. This is typically conducted in a representative training device capable of reproducing the appropriate environment/equipment characteristics (e.g. cabin, flight deck, accessible cargo compartment, crew rest area, etc.), or on an actual aircraft.

D1.1.45 **Smoke.** The product of burning materials made visible by the presence of small particles.

D1.1.46 **Sterile Flight Deck**. During critical phases of flight and all flight operations (except cruise) conducted below 10 000 feet, no crew member may engage in any activity or conversation that is not required for safe operation of the aircraft. Non-essential cockpit-cabin communication is prohibited during this period.

D1.1.47 **Unstaffed Exit**. Emergency exit for which no cabin crew member has been positioned for the flight.

D2. EMERGENCY DEMONSTRATION PROCEDURE:

D2.1 It is essential that cabin crew members are given the opportunity to participate in simulated exercises and practice competencies during training, i.e. the execution of abnormal and emergency procedures, such as those required to prepare an aircraft for an evacuation or Ditching / Wet Drill ,extinguish an in-flight fire, supervise the cabin following a decompression, manage passengers during an emergency evacuation ,etc Hands-on exercises and simulated exercises offer an acceptable level of practical experience close to what can be expected in actual occurrences. Therefore, hands-on exercises and simulated exercises should be integrated into the cabin crew safety training. program In the absence of representative training devices, the operator should conduct hands-on and simulated exercises on an actual aircraft. All exercises should be carried out giving special regard to the standard operating procedures laid down in the operator's approved operations manual.

Note 1: When participating in simulated exercises, trainees may be evaluated individually or as part of a team. It is recommended that the operator hold joint flight crew/cabin crew abnormal/emergency training exercises at least once during initial training and during recurrent training. These exercises can help to reflect the operational environment and instil a one-crew concept among all crew members. Joint simulations promote coordination of cabin and flight crew procedures, give flight crew and cabin crew members a greater insight into their respective duties and responsibilities and enable them to work as a synchronized team with a sound appreciation of each other's contribution toward successful management of an abnormal or emergency situation.

Note 2: All Cockpit and Cabin Crew Members are required to wear uniform or approved suitable dress while simulating all drills.

Note 3: Simulated exercises should involve scenarios in which the cabin crew member finds him/herself acting alone (simulating incapacitation of other cabin crew members). The "solo" exercise demonstrates the ability of the cabin crew member to take command of a situation, measures knowledge and the ability to use available safety and emergency equipment and the capacity to respond to emergency situations, appropriately, without the assistance of fellow crew members. Such simulated exercises enable trainees to experience the flow-rate and the time element involved. They allow the DCCCs and CSIs to assess whether the prescribed standard has been achieved.

Note 4: Passenger flow control management is an important part of any emergency evacuation or ditching drill. Cabin crew proper action ensure all available exits are used efficiently. Cabin crew to evaluate passenger use of exits and to direct passengers to another exit to increase the number of passengers evacuating the airplane in emergency.

Note 5: The operator should use a checklist to ensure that each cabin crew trainee participates as a crew member in the different simulations described.

D2.2 Emergency Land Landing Demonstration:

There are two types of evacuation demonstrations that may be required. These are:

D2.2.1 Full Scale Evacuation Demonstration:

D2.2.1.1 This type of demonstration is normally required only during the initial aircraft certification process. It could be required if an operator wants to operate an aircraft with more passenger seats that originally certificated or if an aircraft was initially certificated as a cargo aircraft only and an operator wants to use it in a passenger configuration and at any other time as required by the Director General. PCAA will advise an operator as to procedures to be followed and the requirements that must be satisfied in the event that a full-scale demonstration is required.

Note 1: Rule 187, of the CARs of 1994 requires an operator to demonstrate that his "other arrangements" are adequate to secure the safe operation of the types of aircraft to be included in the certificate. It has been determined by the Director General that this activity fits into the category of "other arrangements". The primary purpose of an evacuation demonstration is to ensure that the airplane design and seating configuration will permit the safe and complete evacuation of all passengers through 50 % of the installed emergency exits within a specified time frame. The purpose of the partial evacuation demonstration is for the applicant/operator to demonstrate the adequacy of his training programme to ensure that his cabin crew can effectively carry out the procedures for an emergency evacuation.

Note 2: An emergency evacuation demonstration is to be required during the operational inspection phase of the certification process prior to certification, or any time deemed necessary by the Director-General, for each aircraft type, models, and seating configuration. The CAA shall make a case by case determination as to whether or not an emergency evacuation will be required in each type of aircraft to be operated where an operator wants to commence operations with more than one type of aircraft.

Note 3: An emergency evacuation demonstration may be required when a different type of aircraft is to be inducted by an operator. This determination shall be made by PCAA when an operator informs PCAA about the induction plan for an additional type aircraft.

D2.2.2 Partial Evacuation Demonstration:

D2.2.2.1 This is the type that is normally used by an operator to prove that his procedures and training is sufficient to evacuate an aircraft in an emergency situation. This type of demonstration is a part of the operator certification process and is to be carried out periodically during the life of an operator AOC at intervals specified by the Director General.

D2.2.2.2 The following procedures will be followed in conducting a partial emergency evacuation demonstration:

a) A planning meeting will be held with the operator or applicant well in advance of the demonstration in order to discuss the exact procedures to be followed and the criteria for a successful demonstration.

b) The operator shall provide an aircraft of the type, model, and cabin configuration for which approval is sought, along with a qualified and current set of cockpit and cabin crew current on type of aircraft.

Note: to fulfill the scenarios based drill requirement operator to provide adequate numbers of crew members for purpose of drill.

c) The demonstration will be conducted on an apron / hanger or mockup with light extinguished to assess the ability and respond in a hostile environment (smoke, darkness, fire etc.)

d) During the steps leading to the commencement of the timing of the demonstration, the airplane's electrical system will be fully powered by either an external power source or the aircraft APU.

e) Crewmembers will simulate complete preparation for take-off, including the execution of all checklists up to and including the take-off checklist. Engine operation will be simulated. All participates will be seated at their normal stations for take-off.

f) The cockpit crew will simulate the commencement of the take-off roll followed by a high speed, aborted take-off due to an engine fire or other appropriate simulated malfunction as designated by the PCAA.

g) The evacuation of the airplane will be signalled through the failure of normal electrical power (by disconnecting the external power unit or APU). Interruption of normal power will be a clear signal to all involved that the timing of the demonstration has commenced. Outside, the aircraft's external lights (taxi lights, anti-collision lights, position and logo lights) will extinguish. Inside, normal cabin lighting will extinguish and all emergency exit lights and floor level lighting (if installed) will illuminate if functioning properly.

h) Immediately upon failure of the normal electrical system the cabin crew will be required to unbuckle their safety harness, leave their jump seats, ascertain which exits are usable, open the usable exits, and deploy the escape slides. In order for the demonstration to be successful, the total time, which elapse from the interruption of electrical power, until full deployment of all activated slides must not exceed 15 seconds. Slides are not considered fully deployed until they reach the ground and are inflated to a firmness, which would safely support the egress of passengers.

i) To monitor, time, and evaluate the demonstration, PCAA personnel will be positioned in the cockpit and at each exit inside the airplane and outside the airplane at each exit. The PCAA inspector who is responsible for the timing of the demonstration will be positioned outside of the airplane with a stop watch. He will commence timing when the external lights of the aircraft

are extinguished. After precisely 15 seconds, he will call "time" to all participants and the demonstration will be considered complete. He will then confer with the participants team members who were stationed at the exit both inside and outside of the airplane to confer whether or not procedures were properly followed and that the slides were adequately deployed by the time 15 seconds elapsed.

j) Only 50 % of the exit will be used. The operator's personnel inside the airplane should know in advance which exits will be used and which exits will be rendered unusable. One method for indicating to the company immediately after the commencement of the demonstration, which exits are, unusable is to station PCAA personnel with bright flashlights outside of those exits. When the exterior lights of the airplane are extinguished and the timing begins, those PCAA personnel will shine their flashlights directly on the windows of the emergency exits, which are to be considered inoperable, thus simulating a fire on that side of the airplane. In accordance with their procedures, cabin crew must look through the window of an emergency exit to make sure that it is usable before opening it and deploying the escape slide for use by the passenger. In this case, if the cabin crew approaches an exit and observes a light shinning on the window, he or she will consider it inoperative and choose an alternate exit to be opened.

k) The applicant/operator shall ensure strict compliance with the operator procedures and PCAA requirements for the conduct of the demonstration. If the results are unsatisfactory, the applicant will be required to conduct an additional demonstration after being afforded time to re-train or otherwise correct the deficiencies.

D2.3 Emergency landing on water (Ditching / Wet Drill Demonstration):

There are two types of Ditching / Wet Drill Demonstrations that may be required. These are:

D2.3.1 Full Scale Ditching / Wet Drill Demonstration:

D2.3.1.1 Rule 187 states that the holder of an "Air Operator Certificate issued under this Part shall be subject to such conditions as the Director-General may include in the certificate in the interests of flight safety" and 189 states that an operator shall comply with such rules as are applicable and with all operating conditions attached to the Air Operator Certificate (AOC). A Ditching / Wet Drill demonstration is to be required during the operational phase of the certification process, or any time deemed necessary by the Director General. The demonstration shall be required for each aircraft type, model, and configuration, which will be operated on extended flights over water routes or any route, which passes more than 50 nautical miles from land.

D2.3.1.2 The purpose of the demonstration is to evaluate the adequacy of the operators training programme and his ability to safely prepare passengers, airplane, and Ditching / Wet Drill equipment for a planned water landing.

D2.3.1.3 In addition to the initial demonstration by each operator during the initial certification process, a periodic demonstration of continuing proficiency is to be carried out by each operator at specified intervals. That frequency has been determined to be once each 3 years for all crewmembers or at the time of induction of a new type of aircraft. In the case of induction of a new but similar type of aircraft by an operator, the PCAA will make a determination when the induction plan is submitted to PCAA as to whether or not such a demonstration is required for that particular type of aircraft before it can be placed into service.

D2.3.2 Partial Ditching / Wet Drill Demonstration **(Appendix A & B)**:

D2.3.2.1 The following procedures will be followed in conducting a partial Ditching / Wet Drill demonstration:

a) The demonstration must be conducted during daylight hours or in a lighted hanger if conducted at night.

b) All required crewmembers must be available and used.

c) Passenger participants (company personnel other than crewmembers) who are acting as "passengers" will be used only when the operators procedures require passengers to assist in the removing and launching of life rafts. If used, passengers will not receive any instructions before the demonstration except what is contained in the operator's manual.

d) To commence the demonstration, the crewmembers will simulate in a parked airplane a normal takeoff and climb to cruise flight. Engine start will be simulated and all checklists will be accomplished. Upon the CAA team leader signal, the captain will order the crew to prepare for Ditching / Wet Drill. At that time, the CAA team leader will commence timing for 6 minutes in order to give the crew time to prepare for a simulated water landing. After the simulated water landing, all life rafts must be removed from storage. This action is not specifically timed; however, the crewmembers must demonstrate competency in removing the rafts from the storage area and the raft must be capable of being removed from the airplane for deployment in a reasonable amount of time.

e) When the Ditching / Wet Drill signal is given, each crewmember and evacuee must put on a life preserver in accordance with the operator's manual and the Cabin Crew's briefing.

f) Each life raft must be removed from storage for inspection.

g) One life raft, selected by the CAA team leader, will be inflated and launched and the evacuees assigned to the raft will get in it. The crewmembers assigned to the rafts will locate and describe the use of each item of emergency equipment contained in the raft.

Note 1: For the purpose of the demonstration, "launching" a life raft means to remove it from storage, manipulate it out of the airplane by means of stands or ramps, and position it on the ground before inflation. Launching a slide raft means to inflate it in the normal manner.

Note 2: Air operators to provide realistic environments for wet ditching training and drills. Objectives should be accomplished in PCAA approved swimming pools or other safe aquatic environments using the flotation devices required to be on board the aircraft. CSIs shall ensure that inadvertent water impact accidents (ditching), such as those occurring with little or no warning, are emphasized during wet ditching training and drills.

D2.4 Fire Fighting Demonstration:

D2.4.1 A simulated firefighting exercise should be conducted in a confined PCAA approved area, to simulate cabin fire, and under the supervision of

Designated Check Cabin Crew (DCCC). The device used for a simulated fire fighting exercise should include aircraft furnishings as found on board an aircraft, such as seats, galley units, lavatories, panels, overhead bins and waste bins. Fire fighting equipment and the restraints used should be representative to those installed on an aircraft with respect to weight, dimensions, controls, types and operations. The demonstration must be conducted during daylight hours.

Note: Fire extinguishers used for live fire fighting should be charged with the appropriate agent or with an environmentally friendly agent.

D3. DRILLS:

D3.1 Evacuation Drill (Appendix-C):

D3.1.1 **General:**

D3.1.1.1 Evacuations are emergency situations which crew members must effectively manage using their knowledge of procedures and the resources available to them. Skills are developed through practice.

D3.1.1.2 Each trainee shall assume an actual crew position and shall perform the designated evacuation responsibilities for that position. Where a double cabin crew seat is available and would normally be occupied by two crew members the drill shall be conducted to reflect this reality.

D3.1.1.3 Demonstration should be completed by an instructor or by video demonstration prior to trainee conduct of evacuation drills. This will allow the trainees to see theory put to practice.

D3.1.2 **Simulation Scenarios**

D3.1.2.1 An evacuation drill is training and evaluation scenario, which must portray an operational flight and include abnormal and emergency occurrences and interactions amongst cabin crew, flight crew members and passengers.

D3.1.2.2 The variables should differ in sequence from one drill to the next and can include but is not limited to the following:

a) Unserviceable exits;

b) Inflation devices that fail or only partially inflate;

c) Aircraft attitude which necessitates a decision to use the exit or redirect passengers;

d) Poor visibility (e.g. darkness, smoke);

e) Incapacitated crew members **(Appendix D & E)**;

f) Exits which become unusable during the evacuation;

g) Passengers with a special need (e.g. elderly, person with a disability, etc.);

h) Passengers in panic (e.g. positive, negative, false leadership);

i) Failure of aircraft emergency systems (e.g. lighting, evacuation signal, communication, etc.);

j) Decompression; and cabin pressurization problems;

k) Exits which require the use of non-standard "commands" (e.g. ramp with slide, tail cone, ventral stairs, etc.);

l) Anticipated and unanticipated emergency landing/ditching;

m) Rapid disembarkation / Evacuation **(Appendix C1)**.

D3.2 Raft Drill:

D3.2.1 Equipment Criteria:

a) The raft drill shall be conducted using life saving equipment that is identical to that installed in the aircraft with respect to weight, dimensions, appearance, features and operation.

b) Rafts may be substituted where they are much the same with respect to weight, dimensions, appearance, features and operations and differences training have been provided.

D3.3 Aircraft Slide Drill:

D3.3.1 Equipment Criteria:

D3.3.1.1 The evacuation slide shall be of a type installed in the aircraft with respect to the following categories:

a) Inflatable, double channel slides;

b) Inflatable slide and ramp combination;

c) Upper deck door slide(s), if applicable;

d) Inflatable, single channel slides and

e) Non-inflatable slide.

D3.4 Fire Fighting Drill (Appendix-F):

D3.4.1 **General:** Drill scenarios will provide each trainee with the opportunity to merge procedural knowledge with practical skills. Their ability to successfully react to different fire situations will enhance their level of confidence and their ability to deal with fire in flight.

D3.4.2 **Simulation Scenarios:** Cabin fire fighting drills may include in the following locations but is not limited to this:

a) Cabin area (e.g. upholstery ,under seat, overhead bin, closet);
b) Galley area (e.g. garbage bin, lower lobe area upper electrical panel, oven);
c) Confined area (e.g. waste bin, lavatory) crew rest area and,
d) Hidden (e.g. behind panels);

D3.4.3 **Equipment Criteria:**

D3.4.3.1 Fire fighting drills shall be conducted using aircraft furnishings as found on the operator's aircraft, such as seats, galley units, panels, waste bins, etc., as appropriate to the drill;

D3.4.3.2 Fire fighting equipment and the brackets used for restraint shall be identical to those installed in the aircraft with respect to weight, dimensions, controls, types and operations. Fire extinguishers used for live fire fighting shall be charged with the appropriate agent or with an environmentally friendly agent. Protective Breathing Equipment (PBE.)

D3.4.4 **Equipment Practice:**

D3.4.4.1 Each trainee shall practice the following but is not limited to this:

a) Remove from stowage, don and activate protective breathing equipment and practice communications;
b) Remove from stowage and operate / use each type of fire extinguisher, smoke protective gloves, crash axe, as per requirement; and
c) Initiate firefighting procedures including intervention involving one or more crew members.

D3.4.5 **Live Fire Fighting Drill:**

D3.4.5.1 Each trainee shall demonstrate approach to finding the source of fire and the effectiveness of a fire extinguisher correctly applied to an actual fire while wearing a PBE and protective gloves.

D3.5 In-Flight Medical Emergencies/Incidents:

D3.5.1 Medical emergencies may occur onboard, crew must practice crew medical responsibilities such as illness or injury symptom recognition & examination; attempt to obtain medical history; assessment of passenger; handling of passenger; aircraft limitations; apparent death in flight; crew coordination, including flight crew notification; requesting and verification of medically qualified personnel; ground-to-air assistance; removal of ill or injured passengers during evacuation.

D3.6 Hijacking: crew are required to perform operators hijacking procedures; reinforcement of security procedures; methods of communicating with other crew members when hijacking is threatened or in progress.

D3.7 **Bomb Threat:** crew are required to perform operators security procedures for bomb threat, reinforcement of security procedures, crew coordination procedures, specific bomb search procedures; bomb handling and stabilization procedures for type aircraft.

D3.8 **Turbulence.**

D3.8.1 Basic Action (Dependent on Severity of Turbulence): crew member notification procedures, communication procedures for securing passengers, crewmembers, cabin, galleys, serving carts.

D3.8.2 Severe Turbulence (Anticipated or Unanticipated): Crew Coordination Procedures and appropriate actions.

D3.8.3 Mild Turbulence (Anticipated or Unanticipated): Crew Coordination Procedures and appropriate actions.

D3.9 **Decompression (Appendix-G).**

D3.9.1 General: Causes and recognition of cabin pressure loss; physiological effects of reduced atmospheric pressure; time of useful consciousness.

D3.9.2 Rapid Decompression (Immediate Action/Secondary Action Procedures): Possible causes; cabin effects; physiological effects; crew coordination procedures; “immediate action procedures,” including recognition of signs of decompression, grasping nearest oxygen mask, sitting down or holding onto something solid, waiting for notification from the flight deck before moving around; “secondary action procedures,” including obtaining and putting on portable oxygen, checking other Cabin Crew, assisting passengers, treating injuries, damage assessment and control.

D3.9.3 Insidious Decompression: Possible causes; cabin effects; physiological effects; crew coordination; immediate action procedures.

D3.9.4 Cracked Window/Pressure Seal Leaks: Cabin effects; crew coordination; immediate action procedures.

D4. DRILLS PERFORMANCE EVALUATION CRITERIA:

D4.1 Trainee performance will be observed and debriefed according to:

a) Recognition or identification of the emergency situations;

b) Secure themselves in a cabin crew jump seat;

c) Recognize that an emergency situation is developing and react appropriately to the drill scenario;

d) Apply all applicable commands and procedures as per operator’s Operations Manual;

e) Effective communication / coordination procedures throughout the drill (i.e. notify cabin crew members of the situation, establish and maintain communication with the flight deck, provide clear, concise information to the pilot-in-command, inform and assist passengers, etc.);

f) Activate emergency lights, evacuation horn;

g) Assess conditions inside and outside the exit to determine exit usability throughout the evacuation;

h) Locate and don life preserver / life Jackets and command passengers as appropriate;

i) Prepare and open exit;

j) Secure exit in fully open position or ensure correct stowage;

k) Pull inflation handle(s) and ensure deployment, inflation of ramp, slide;

l) Assume appropriate protective position;

m) Access the raft compartment, experience the difficulty associated with moving the weight of a packaged raft within a space representative of the aircraft aisle;

n) Examine all features a fully inflated raft, survival kit and initiate passenger evacuation;

o) Board raft(s), assist passengers into raft;

p) Final cabin, lavatory and flight deck checks and remove required emergency equipment;

q) Demonstrate post evacuation procedures;

D4.2 Each trainee shall demonstrate the ability to carry out fire fighting procedures in a cabin environment as a primary fire fighter and perform the following:

a) Recognize that there is a potential fire situation (e.g. smoke detector signal or unusual fumes, odours);

b) Locate the source of fire;

c) Apply communication/co-ordination procedures;

d) Select and remove the nearest appropriate fire extinguisher and (if applicable) other fire fighting equipment;

e) Inform, assist and control passengers;

f) Operate the extinguisher; and

g) Monitor for re-ignition, and apply post-fire follow-up procedures.

D5. AIRCRAFT SURFACE CONTAMINATION PROCEDURES:

D5.1 Description of surface contamination.

D5.2 Description of "Clean Aircraft Concept".

D5.3 Cabin Crew responsibilities

D5.4 Crew communication / CRM

D5.5 De-Icing/Anti-Icing

D5.5.1 Cabin Crew responsibility to monitor wing surface conditions for contamination in conditions of adverse weather.

D5.5.2 Cabin Crew responsibility to report to the pilot-in-command, any time prior to the take-off roll, any concerns conveyed by a passenger relating to wing contamination.

D5.6 Fumes events **(Appendix-H)**: crew to identify potential source of fumes. This may include but not limited to,

D5.6.1 Fuel, disinsectants, food items, exhaust (aircraft or ground vehicles), de-icing/anti icing fluid.

D5.6.2 Crew responsibility to identify the location, source, type, odor, intensity of fumes (air supply system or cabin equipment).

D5.6.3 Crew task to apply communication procedures, manage passengers, cabin and complete applicable documentation if required.

Note: Guidance on cabin crew training related to fume events is contained in the Guidelines on Education, Training and Reporting Practices related to Fume Events (ICAO Cir 344).

D6. UNSATISFACTORY PERFORMANCE – OPERATOR / CREW:

D6.1 The severity and basic course of deficiency must be considered.

D6.1.1 Minor deficiencies usually can be resolved by responsible company personnel without having to declare the demonstration unsatisfactory.

a) A demonstration is unsatisfactory if the operator fails to meet the specified time limit.
b) Crew member ineffectiveness or equipment malfunctions may be grounds for declaring a demonstration to be unsatisfactory.
c) If a relatively severe deficiency occurs due to improper company training, procedure or maintenance the demonstration should be declared unsatisfactory.

Note 1: The operator shall ensure strict compliance and if the emergency evacuation demonstration is unsatisfactory, the operator shall be required to conduct an additional emergency evacuation demonstration(s) after re-training of the crewmembers and / or the deficiencies have otherwise been corrected.

Note 2: Grading: S-Satisfactory, SB-Satisfactory with Briefing, U-Unsatisfactory, N/O-Not Observed. Failure Criteria: 04 SBs or Unsatisfactory in any one item.

D7. VALIDITY:

D7.1 The validity of the emergency drills shall be as follows:

i)	Wet Drill	Three Years
ii)	Evacuation Drill	One Year
iii)	Fire Drill	One Year

Note: Evacuation and fire drill shall be part of each recurrent training.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ABP	:	ABLE BODIED PASSENGER
ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
AOR	:	AREA OF RESPONSIBILITY (DEICING EMERGENCY)
APU	:	AUXILIARY POWER UNIT
ATS	:	AIR TRAFFIC SERVICES
ATO	:	APPROVED TRAINING ORGANIZATION
CAAF	:	CIVIL AVIATION AUTHORITY FORMS
CARs	:	CIVIL AVIATION RULES, 1994
CRM	:	CREW RESOURCE MANAGEMENT
CSI	:	CABIN SAFETY INSPECTOR
CTD	:	CABIN TRAINING DEVICES
DCCC	:	DESIGNATED CHECK CABIN CREW
DFS	:	DIRECTOR FLIGHT STANDARDS
DGCAA	:	DIRECTOR GENERAL, CIVIL AVIATION AUTHORITY
ELT	:	EMERGENCY LOCATOR TRANSMITTER
EMK	:	EMERGENCY MEDICAL KIT
FAK	:	FIRST AID KIT
FRMS	:	FATIGUE RISK MANAGEMENT SYSTEM
FSD	:	FLIGHT STANDARDS DIRECTORATE
GIC	:	GROUND INSTRUCTOR CABIN
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
LCC	:	LEAD CABIN CREW
MEL	:	MINIMUM EQUIPMENT LIST
MMEL	:	MASTER MINIMUM EQUIPMENT LIST
OM	:	OPERATIONS MANUAL
PBE	:	PROTECTIVE BREATHING EQUIPMENT
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
PC	:	PERFORMANCE CRITERIA
PED	:	PERSONAL ELECTRONIC DEVICE
PIC	:	PILOT IN COMMAND
PM	:	POWER MEGAPHONE
POI	:	PRINCIPAL OPERATIONS INSPECTOR
RPT	:	REGULAR PUBLIC TRANSPORT
SARPS	:	STANDARDS AND RECOMMENDED PRACTICES
SMS	:	SAFETY MANAGEMENT SYSTEM
SSP	:	STATE SAFETY PROGRAMME
TEM	:	THREAT AND ERROR MANAGEMENT
UTC	:	COORDINATED UNIVERSAL TIME

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 "AOC Guide – Commercial Air Operations" CAAD-617; (MNL-005-FSXX-3.0)

E3.2 ICAO Annex 6, Part-I

E3.3 ICAO Doc. 10002

E3.4 Air Canada / FAA Emergency Evacuation Procedures

IMPLEMENTATION:
This Air Navigation Order shall be implemented with effect from **15th January, 2023** and supersedes ANO-008-FSXX-2.0.

--S/d--

(KHAQAN MURTAZA)
Director General,
Pakistan Civil Aviation Authority

Dated: - **11th January, 2023**

--S/d--

(CAPT. IFTIKHAR J. USMANI)
Director Flight Standards

Dated **05th January, 2023**
File No. HQCAA/1077/019/FSAC

APPENDIX-A

ANTICIPATED / PLANNED EMERGENCY LANDING OR DITCHING

PROCEDURES FOR AN ANTICIPATED EMERGENCY LANDING OR DITCHING

a) Recognize emergency signal from the flight crew

b) Obtain briefing from the flight crew on the situation

c) Stow service-related items and stand-by for further instructions

d) Brief cabin crew on the situation

e) Brief passengers

f) Don life jacket, in case of ditching

g) Assign, relocate and brief able-bodied passengers, as required

h) Secure cabin

i) Check galley

j) Check cabin

k) Check lavatory

l) Check crew rest area, if applicable

m) Check remote area, if applicable

n) Confirm "cabin readiness" to the flight crew

o) Comply with signal from the flight crew

p) Take assigned station/seat

q) Check door status, if applicable

r) Perform silent review

s) Comply with flight crew emergency communication

t) Take brace position

u) Shout brace commands

v) Complete the applicable documentation

KNOWLEDGE

a) identification of verbal/non-verbal signals and/or commands signalling an emergency situation;
b) importance of gathering information from flight crew briefing and what it should include (e.g. time available, special instructions, etc.) and communicating it to the other cabin crew members;
c) importance of applying the appropriate procedures and checklist during an anticipated emergency landing in a sequence to ensure that priority items are identified and accomplished first;
d) preparation for emergency evacuation on land and on water. This may include, but is not limited to:
   1) cabin crew tasks;
   2) brace position;
   3) appropriate commands;
   4) precautions and adaptations for passenger management;
   5) time element and time management;
   6) donning of life jackets; and
   7) various possible aircraft attitudes, and associated evacuation procedures;

e) importance of assigning, relocating and briefing able-bodied passengers, as required, as well as the items to cover in the briefing;
f) brace position and appropriate brace commands; and
g) procedures for completing the applicable documentation, such as an incident report form.

TASK STANDARDS

a) recognize in-flight emergency signal from the flight crew, such as a chime, public address announcement, or call and respond as per operator procedures;
b) gather information from the flight crew briefing on the type and the nature of emergency, time remaining, etc. Repeat, clarify and acknowledge the information from the flight crew;
c) stow service-related items and stand-by for further instructions;
d) brief cabin crew members on the situation, as per flight crew briefing. Cabin crew members should repeat, clarify and acknowledge the information from the in-charge cabin crew member, if time permits;
e) brief passengers, as per operator procedures. Items covered during this briefing may include, but are not limited to instructing passengers:
    1) not to take any carry-on baggage;
    2) brace position;
    3) nearest and alternate exits;
    4) if/when to remove high-heeled shoes;
    5) not to inflate life jackets inside the aircraft; and
    6) any items specific to briefing special categories of passengers;
f) distribute infant life jackets/infant survival cots, if applicable, as per operator's procedures (or verify that they have been distributed if the operator provides them ahead of time);
g) don life jacket, in case of ditching;
h) assign, relocate and brief able-bodied passengers, as required. Items covered during the briefing mayinclude tasks such as:
    1) assessment of internal/external conditions;
    2) opening exits;
    3) crowd control during evacuation;
    4) bringing safety and emergency equipment;
    5) assisting other passengers, including special categories of passengers, if possible; and
    6) asking able-bodied passengers to repeat, clarify and acknowledge the information provided by cabin crew members;
i) secure cabin as per operator procedures. This may include, but is not limited to, verifying that:
    1) carry-on baggage is stowed;
    2) seat belts are fastened and infants are secured in compliance with the operator's policy;
    3) headrests, armrests and footrests are stowed;
    4) seatbacks are in the upright position;
    5) tray tables are stowed;
    6) life jackets are donned;
    7) the IFE is switched off;
    8) in-seat monitors are stowed;
    9) overhead monitors are retracted, if applicable;
    10) PEDs are not used;
    11) bassinets are stowed; and
    12) animals in the cabin are secured, as per operator procedures;
j) check galley as per operator procedures. This may include, but is not limited to, verification of stowagelatches, trolley brakes, and securing or removing curtains;
k) conduct a final check of the cabin, lavatory, crew rest area, and remote area, if applicable;
l) confirm "cabin readiness" to the flight crew, as per operator procedures;
m) receive and adhere to advisory to occupy station/seat;
n) check door status, if applicable, as per operator procedures;
o) perform silent review. This may include, but is not limited to, items such as:
    1) brace position;
    2) emergency notification procedures;

3) location and operation of exits;
4) location of safety and emergency equipment and removal of equipment designated to the cabin crew station;
5) passenger management and the visual identification of potential able-bodied passengers who may be able to assist in an emergency, number of passengers on board the aircraft, and special categories of passengers;
6) brace commands;
7) interior and exterior evacuation conditions;
8) protective position while commanding the evacuation; and
9) evacuation commands; and

p) brace and shout brace commands (with appropriate tone, pitch, volume and pace) once the flight crew signal is received. This may include the use of the commands for the appropriate scenario (landing vs.ditching) as per the phraseology defined in the operations manual.
q) Aircraft flotation characteristics; adverse conditions; assisting handicapped; directing passenger flow; boarding rafts.
r) Survival at Sea: Raft management; basic survival procedures in a raft environment; signaling.

COMPETENCIES

a) application of policies and procedures;
b) communication
c) leadership and teamwork;
d) passenger management;
e) problem solving and decision making;
f) situation awareness and management of information; and
g) workload management.

APPENDIX-B

UNANTICIPATED / UNPLANNED EMERGENCY LANDING OR DITCHING

PROCEDURES FOR AN UNANTICIPATED EMERGENCY LANDING OR DITCHING

a) Recognize emergency signal from the flight crew

b) Take assigned station/seat

c) Check door status, if applicable

d) Perform silent review

e) Comply with flight crew emergency communication

f) Take brace position

g) Shout brace commands

h) Complete the applicable documentation

KNOWLEDGE

a) identification of verbal/non-verbal signals and/or commands signalling an emergency situation;
b) brace position and appropriate brace commands; and
c) procedures for completing the applicable documentation, such as an incident report form.

TASK STANDARDS

a) recognize in-flight emergency signal from the flight crew, such as a chime, public address announcement, or call and respond as per operator procedures;
b) take assigned cabin crew station/seat. If the cabin crew member is unable to do so, he/she should secure him/herself in the nearest available seat, and/or remain secured at the assigned station/seat;
c) check door status, if applicable, as per operator procedures;
d) perform silent review. This may include, but is not limited to, items such as:
    1) brace position;
    2) emergency notification procedures;
    3) location and operation of exits;
    4) location of safety and emergency equipment and removal of equipment designated to the cabin crew station;
    5) passenger management and the visual identification of potential able-bodied passengers who may be able to assist in an emergency, number of passengers on board the aircraft, and special categories of passengers;
    6) brace commands;
    7) interior and exterior evacuation conditions;
    8) protective position while commanding the evacuation; and
    9) evacuation commands; and
e) brace and shout brace commands (with appropriate tone, pitch, volume and pace) once the flight crew signal is received. This may include the use of the commands for the appropriate scenario (landing vs.ditching) as per the phraseology defined in the operations manual.

COMPETENCIES

a) application of policies and procedures;
b) communication;
c) problem solving and decision making; and
d) situation awareness and management of information.

APPENDIX-C

EVACUATION

EVACUATE AIRCRAFT

a) Obtain evacuation order or initiate evacuation, as applicable

b) Shout evacuation commands

c) Operate emergency lighting systems, if applicable

d) Don life jacket, in case of unanticipated ditching

e) Assess inside and outside conditions prior to opening exit

f) Open exit

g) Hold on to fixed part of the aircraft to prevent fall

h) Control crowd/manage cabin

i) Conduct cabin search

j) Take survival equipment prior to exiting the aircraft, if applicable

k) Evacuate the aircraft

l) Operate life raft or slide-raft, in case of ditching

m) Gather passengers away from the aircraft

n) Perform post-evacuation duties

o) Apply survival procedures

p) Complete the applicable documentation

KNOWLEDGE

a) identification of verbal/non-verbal signals and/or commands to initiate an evacuation and crew coordination;
b) scenarios when cabin crew members may initiate an evacuation;
c) the importance of checking exit status and assessing exits before opening;
d) recognition of internal/external hazards;
e) identification of alternate exits and the importance of using all available exits;
f) emergency evacuation of passengers: crew duties, evacuation on land, on water and the applicable escape routes;
g) passenger problems in an evacuation. These may include, but are not limited to:
   1) recognizing and managing the different types of passenger behaviour (e.g. passive, aggressive, hysterical, etc.);
   2) redirecting passengers, as necessary;
   3) avoiding panic;
   4) imparting confidence; and
   5) using verbal and non-verbal commands adapting accordingly to the situation;
h) time management in an evacuation and factors affecting survivability. These may include, but are not limited to:
   1) fire, smoke or fumes;
   2) water;
   3) human behaviour;
   4) fuselage damage; and

5) any other danger;

i) ability to respond in a hostile environment (smoke, darkness, fire, etc.);

j) responsibility of crew members to assist passengers and incapacitated fellow crew members in an evacuation and conditions when crew members should evacuate themselves in life-threatening situations;

k) importance of situation awareness, as well as awareness of the cabin crewmember's own duties, the duties of other crew members and the need to take over duties of fellow crew members when required;

l) crew members' responsibility after an evacuation (e.g. grouping passengers, assisting with first aid, etc.); including liaison with the airport emergency services and cooperating with local authorities;

m) uncommanded evacuation; causes and management;

n) post-evacuation procedures to increase survivability under all conditions including sea, jungle, desert, as well as polar and mountainous areas;

o) slide/slide-raft and life raft operation, if applicable. This may include, but is not limited to:
   1) activation and deployment of slides/slide rafts;
   2) aircraft-specific knowledge of exits that cannot be used in certain scenarios (e.g. gear-up landing or ditching);
   3) exit status appropriate to the evacuation;
   4) methods for automatic and manual activation of exits;
   5) slide-raft: operation, boarding, supplementary survival kits, canopy installation, disconnection, time management, and seaworthiness;
   6) removal of life rafts from stowage points and positioning at exits, time management, harness attachment, attachment of static lines, raft buoyancy, raft release mechanism, danger of premature inflation of the life raft, distribution of supplementary survival kits, ejection of life rafts, inflation, boarding, and seaworthiness; and
   7) transfer of slide-raft from unusable exit to usable exit;

p) procedures to be applied with regards to special categories of passengers and injured occupants during an evacuation;

q) Emergency signalling devices. These may include, but are not limited to:
   1) emergency locator transmitter;
   2) radio locator beacon; and
   3) signalling equipment;

r) aquatic survival techniques and physiological limitations in water;

s) survival techniques for other environments (e.g. polar, jungle), if applicable;

t) transmitting signals at time of sunrise/sunset or moonrise/moonset, as aid in establishing position; and

u) procedures for completing the applicable documentation, such as an incident report form.

TASK STANDARDS

a) recognize in-flight emergency signal from the flight crew, such as a chime, public address announcement, or call and respond as per operator procedures. If applicable, initiate evacuation, without signal from the flight crew under scenarios such as: life-threatening situation, smoke or fire, catastrophic break-up of the fuselage, etc. or if the evacuation has already been initiated at other exits;

b) shout appropriate commands (with appropriate tone, pitch, volume and pace). This may include the use of the commands for the appropriate scenario (land vs. water evacuation) as per the phraseology defined in the operations manual;

c) as per operator procedures, operate emergency lighting systems, if applicable;

d) in case of unanticipated ditching, assess inside and outside conditions and don life jacket;

e) assess inside and outside conditions prior to opening the exit. The assessment of conditions may include:
   1) passengers rushing to exits (crowd control);
   2) water level inside/outside the cabin (ditching);

   3) aircraft attitude;
   4) debris/obstacle outside the exit; and
   5) smoke/fire;
- f) check the door status and open the exit (or block it based on the situation). Perform crowd control and verify that the slide is fully inflated before egress, if applicable. Continue assessing conditions and block the exit while redirecting passengers when the exit does not open or the slide malfunctions/deflates. Exit malfunctions may include but are not limited to: door jam, handle jam, power assist failure, slide inflation failure;
- g) hold on to fixed part of the aircraft, such as door assist handle, to prevent fall when opening the exit. The cabin crew member should remain away from the flow of traffic so as to not block the exit, for example by standing in the dedicated crew assist space;
- h) control the crowd and manage the situation in the cabin. This may include, but is not limited to
   1) giving appropriate instructions;
   2) preventing passengers (as much as possible) from going down the slide in high-heeled shoes, and/or with carry-on baggage;
   3) dealing with hesitating/panicked passengers in an assertive manner;
   4) redirecting passengers as necessary;
   5) using a flashlight in a smoke filled environment or in darkness to indicate the location of the exit(s)to passengers; and
   6) instructing passengers to move away from the aircraft;
- i) conduct a cabin search, if time/conditions permit. This may include but is not limited to:
   1) the cabin crew member using their voice to call passengers towards them;
   2) verifying rows and floor in case passengers are unconscious;
   3) using a flashlight in a smoke filled environment or in darkness; and
   4) verifying that lavatories, flight deck and crew rest area are vacated, if conditions permit;
- j) apply procedures related to special categories of passengers and injured occupants during an evacuation;
- k) take survival equipment prior to exiting the aircraft, if applicable. This may include, but is not limited to:
   1) first-aid kit;
   2) radio beacon/emergency locator transmitter;
   3) axe;
   4) additional survival kits;
   5) flashlight; and
   6) megaphone;
- l) evacuate (self) using appropriate technique;
- m) as per operator procedure, operate life raft or slide-raft, in case of ditching. This may include, but is notlimited to:
   1) directing passengers to remove life rafts from stowage areas and position them at the exit(s), if applicable;
   2) instructing passengers to board the raft on alternating sides; and
   3) if possible, preventing passengers from jumping directly into the water;
- n) perform post-evacuation duties. These may include but are not limited to:
   1) administering first aid while waiting for medical assistance;
   2) crowd control; and
   3) liaising with the airport emergency services and cooperating with local authorities; and
- o) as per operator procedure, apply survival procedures. These may include: survival procedures for the sea, jungle, and desert, as well as polar and mountainous regions. For survival at sea, procedures may include, but are not limited to:
   1) putting the canopy on the life raft/slide-raft;
   2) aquatic survival techniques; and
   3) distress signalling.

COMPETENCIES
- a) application of policies and procedures;
- b) communication;
- c) leadership and teamwork;
- d) passenger management;
- e) problem solving and decision making;
- f) situation awareness and management of information; and
- g) workload management.

APPENDIX-C1

RAPID DISEMBARKATION

CONDUCT A RAPID DISEMBARKATION

a) Recognize signal from flight crew or cabin crew for a rapid disembarkation

b) Apply procedure for a rapid disembarkation using the applicable door(s)

c) Apply communication procedures

d) Control crowd/manage cabin

e) Exit the aircraft

f) Move away from the aircraft and manage crowd

g) Complete the applicable documentation

KNOWLEDGE

a) definition of a rapid disembarkation;
b) scenarios when a rapid disembarkation can be used, versus an evacuation, as per operator procedures;
c) safety considerations when a rapid disembarkation is carried out on the apron;
d) cooperating with the local authorities (e.g., airport emergency services, and airport security); and
e) procedures for completing the applicable documentation, such as an incident report form.

TASK STANDARDS

Provide a verbal or written description of the applicable procedure.

COMPETENCIES

a) application of policies and procedures;
b) communication;
c) leadership and teamwork;
d) passenger management;
e) problem solving and decision making;
f) situation awareness and management of information; and
g) workload management.

APPENDIX-D

FLIGHT CREW INCAPACITATION

FLIGHT CREW MEMBER INCAPACITATION PROCEDURES

a) Respond to call from the flight crew

b) Move the incapacitated flight crew member away from the controls

c) Secure the incapacitated flight crew member

d) Administer first aid

e) Assist the remaining flight crew member (pilot-in-command), as instructed

f) Complete the applicable documentation

KNOWLEDGE

a) operation of the flight deck seat, harness and oxygen system;
b) procedures associated with flight crew member incapacitation;
c) first-aid procedures; and
d) procedures for completing the applicable documentation, such as an incident report form.

TASK STANDARDS

a) react to signal from the flight crew, such as a chime, public address announcement, or call;
b) use the flight deck seat mechanism to move the incapacitated flight crew member fully back, away from the controls;
c) use the harness to secure the incapacitated flight crew member;
d) administer flight deck oxygen to incapacitated flight crew member and perform related first-aid procedures; and
e) follow instructions from the remaining flight crew member (pilot-in-command).

COMPETENCIE

a) application of policies and procedures;
b) communication;
c) leadership and teamwork ;
d) problem solving and decision making;
e) situation awareness and management of information; and
f) workload management.

APPENDIX-E

CABIN CREW INCAPACITATION

CABIN CREW MEMBER INCAPACITATION PROCEDURES

a) Administer first aid

b) Secure the incapacitated cabin crew member

c) Inform the flight crew

d) Reassign required cabin crew stations, or Assign an able-bodied passenger to assist the cabin crew member(if required)

e) Complete the applicable documentation

KNOWLEDGE

a) procedures associated with cabin crew member incapacitation;
b) assuming the role of the in-charge cabin crew member, if required;
c) first-aid procedures;
d) re-distribution of cabin crew members' duties; and
e) procedures for completing the applicable documentation, such as an incident report form.

TASK STANDARDS

a) administer first aid, as per operator procedures;
b) communicate with flight crew and with other crewmembers to inform them of the situation;
c) secure the incapacitated cabin crew member; and
d) re-distribute the cabin crew members' tasks, including the role of the in-charge cabin crew member.
e) Provide a verbal or written description of the applicable procedure.

COMPETENCIES

a) application of policies and procedures;
b) communication;
c) leadership and teamwork;
d) problem solving and decision making;
e) situation awareness and management of information; and
f) workload management.

KNOWLEDGE (Single Cabin Crew Compliment)

a) preventive measures in case of any doubt of own fitness to perform tasks, informing flight crew, selecting an able-bodied passenger and providing necessary briefing, etc.;
b) procedures associated with single cabin crew member incapacitation;
c) administering first aid on oneself (e.g. self-Heimlich manoeuvre); and
d) procedures for completing the applicable documentation, such as an incident report form.

APPENDIX-F

FIRE FIGHTING

FIREFIGHTING PROCEDURE

a) Detect and eliminate fire hazards

b) Locate source of smoke/fire

c) Identify the type of fire

d) Apply communication procedures

e) Use appropriate fire fighting equipment and protective equipment, as required

f) Fight fire

g) Manage passengers and cabin, as required

h) Apply post-fire fighting procedure

i) Complete the applicable documentation

KNOWLEDGE

a) identification of the different types of fires, means of fire detection, firefighting systems and establishedfirefighting procedures;
b) location, pre-flight check and use of firefighting and protective equipment on board the aircraft type. This may include, but is not limited to:
   1) smoke detectors;
   2) portable extinguishers;
   3) installed automatic extinguishers (e.g. in lavatory);
   4) crowbar;
   5) axe;
   6) protective breathing equipment;
   7) protective gloves; and
   8) equipment specific to accessible cargo compartments/combi aircraft;
c) understanding of fire prevention techniques. This may include, but is not limited to:
   1) monitoring smoking in the cabin and lavatories;
   2) inspecting the integrity of automatic lavatory extinguisher;
   3) checking that the lavatory waste bin cover flap is closed at all times;
   4) preventing ignited materials from being discarded in trash carts; and
   5) identifying and eliminating hazardous flammable materials;
d) techniques and procedures for fighting fires. This may include, but is not limited to:
   1) immediate and aggressive approach to finding the source of the fire;
   2) fighting the fire aggressively and effectively;
   3) type of extinguisher to use based on the type of fire;
   4) additional firefighting equipment needed such as protective breathing equipment (PBE);
   5) techniques for using extinguishers; and
   6) communicating while using PBE;
e) firefighting procedures for specific types/locations of fires. This may include, but is not limited to:
   1) galleys;
   2) lavatories;
   3) overhead bins;
   4) electrical systems;
   5) ovens;
   6) flammable liquids;
   7) metal fires;

8) lithium battery fires;
9) upholstery;
10) remote locations (e.g. crew rest or lower lobe galleys);
11) hidden fires; and
12) assisting with flight deck fires, if the flight crew requires assistance;

f) specific crew member responsibilities for firefighting and the importance of being prepared to apply appropriate firefighting procedures;

g) importance of crew communication and coordination in fighting a fire and providing the flight crew with accurate updates on:
1) fire source/location;
2) extent/severity of smoke/fire;
3) actions taken, including relocation of passengers;
4) notification of any injuries to passengers and/or crew members;
5) types and the number of firefighting equipment used; and
6) current status of smoke/fire (as the situation progresses);

h) obstructions to firefighting on board aircraft. This may include, but is not limited to:
1) limited visibility due to smoke or fumes;
2) firefighting in confined spaces;
3) difficulty in locating/accessing the source of the fire (e.g. hidden fires); and
4) resources to fight the fire (e.g. limited number of portable extinguishers);

i) hazards associated with on-board fires. This may include, but is not limited to:
1) toxicity of smoke and fumes;
2) flammability of cabin materials; and
3) variety of combustible materials and volatility;

j) external fires (e.g. engine fires, tailpipe fires, fuel spill/apron fires, fires on loading bridges, service vehicle fires, etc.) and procedures established for such fire situations including recognition, communication and coordination; and

k) procedures for completing the applicable documentation, such as an incident report form.

l) simulated firefighting exercise in a representative training device capable of reproducing the appropriate environment/equipment characteristics (e.g. cabin, flight deck, accessible cargo compartment, crew rest area, etc.), or on an actual aircraft, where cabin crew apply the operator's procedures and associated crew responsibilities for dealing with the situation; and

Note: PBE should be used and operated in a simulated firefighting exercise within a smokefilled environment.

m) live firefighting exercise using firefighting equipment (e.g. extinguisher, PBE, gloves, axe, etc.).

TASK STANDARDS

a) Conduct cabin surveillance to monitor for/identify potential sources of fire. This may include, but is not limited to:
1) debris in ovens (e.g. oil spills, papers, inserts);
2) electrical malfunctions (e.g. tripped circuit breakers, overheating in-flight entertainment (IFE));
3) lavatories (e.g. waste bins, panels);
4) PEDs;
5) investigating abnormal smells; and
6) detecting smoke (e.g. coming from panels, due to electrical systems, etc.);

b) use visual, audio and physical clues when locating the source of smoke or fire. This may include, but is not limited to:
1) using hands to feel if panels are hot;
2) noticing tripped circuit breaker;
3) noticing unusual odours; and
4) listening for crackling sound;

c) as per operator procedures, extinguish fire while using firefighting and protective equipment appropriate for the type of fire;
d) apply communication procedures. This may include, but is not limited to:
   1) back-up duties;
   2) crew coordination; and
   3) informing cabin crew members, the flight crew and passengers about the situation;
e) manage passengers and cabin, as required. This may include, but is not limited to:
   1) relocating passengers;
   2) reassuring passengers;
   3) instructing passengers to breathe into a cloth (cover nose and mouth); and
   4) relocating equipment such as oxygen bottles, if required;
f) apply post-firefighting procedure. This may include, but is not limited to:
   1) monitoring area for re-ignition;
   2) continued communication with flight crew, other cabin crew and passengers; and
   3) administering first aid, if required.

COMPETENCIES

a) application of policies and procedures;
b) communication;
c) leadership and teamwork;
d) passenger management;
e) problem solving and decision making;
f) situation awareness and management of information; and
g) workload management.

APPENDIX-G

CABIN PRESSURIZATION / DECOMPRESSION

MANAGE CABIN PRESSURIZATION PROBLEM / DECOMPRESSION

a) Recognize signs and symptoms of cabin pressurization problem/decompression

b) Don nearest oxygen mask, if installed

c) Secure self and occupy nearest seat, if available

d) Apply communication procedures

e) Apply post-decompression procedure

f) Complete the applicable documentation

KNOWLEDGE

a) hypoxia: elementary physiology of oxygen intake and utilization;
b) general effects of hypoxia: recognition and dangers associated with hypoxia's euphoric effect; aggravation by exertion; individual susceptibility in healthy persons; increased susceptibility in some medical conditions; altitude/time-of-useful-consciousness relationships (duration of consciousness without supplemental oxygen);
c) body gas volume changes: abdominal pain on cabin altitude ascent; "blocked ears" on emergency descent of aircraft;
d) effects on the human body of reduced atmospheric pressure;
e) effects of rapid decompression on any unsecured objects or persons;
f) recognition of conditions in the cabin and the potential threat to flight safety caused by rapid and slow decompressions;
g) concept of cabin altitude profiles during rapid decompressions and cabin pressurization problems; potential causes of rapid decompression (e.g. fuselage failure, window/door blowout, air pack failure, etc.) and cabin pressurization problems (e.g. door seal leaks, cracked windows, system malfunctions, etc.);
h) location, pre-flight check and use of portable oxygen devices;
i) immediate actions required to be taken in the case of rapid decompression or cabin pressure leaks;
j) operation of passenger oxygen systems and the use of oxygen masks;
k) procedures for crew communication and coordination; for passenger communications during a rapid decompression and cabin pressurization problems; identification of specific information to be relayed to the flight crew and back-up means of communication should normal systems be rendered inoperative (e.g. structural damage);
l) knowledge of anticipated flight crew response (e.g. emergency descent) and its effect on the cabin and its occupants;
m) need of cabin crew members to obtain oxygen first before attending to passengers' needs;
n) post-decompression procedures; and
o) procedures for completing the applicable documentation, such as an incident report form.

TASK STANDARDS

a) use visual, audio or physical clues to recognize signs and symptoms of cabin pressurization problems/decompression. This may include, but is not limited to:
   1) mist in the cabin;
   2) hissing sound;
   3) euphoria;
   4) dizziness;
   5) cold temperature; and
   6) ear pain;

b) don nearest oxygen mask (if installed), secure self and occupy nearest seat (if available), or at a safe location;
c) apply communication procedures. This may include contacting the flight crew in case of a slow decompression to ascertain their knowledge of situation and verify that they have donned their oxygen masks, especially when an emergency descent has not started or in the absence of any information from the flight crew; and
d) apply post-decompression procedure. This may include, but is not limited to:
   1) contacting the flight crew;
   2) checking cabin and lavatories, cabin crew and passengers; and
   3) administering first aid, if required.

COMPETENCIES

a) application of policies and procedures;
b) communication;
c) leadership and teamwork;
d) passenger management;
e) problem solving and decision making; and
f) situation awareness and management of information.

APPENDIX-H

FUME EVENTS

PROCEDURE FOR FUME EVENTS

a) Identify and locate the source of the fumes

b) Identify the type and intensity of the fumes

c) Apply communication procedures

d) Manage passengers and cabin, as required

e) Apply post-event procedures

f) Complete the applicable documentation

KNOWLEDGE

a) sources and types of on-board fumes;
b) odour descriptors to recognize the presence of oil and hydraulic fluid fumes;
c) potential for crew member impairment (including a list potential acute symptoms that may be experienced as a result of exposure to oil or hydraulic fluid fumes) and its impact on flight safety;
d) procedures to apply in fume events; and
e) procedures for completing the applicable documentation, such as an incident report form.

TASK STANDARDS

Provide a verbal or written description of the applicable procedure. This may include, but is not limited to:

a) cabin surveillance to identify and monitor potential sources of fumes. This may include, but is not limited to:
   1) de-icing and/or anti-icing fluid;
   2) exhaust (aircraft or ground vehicles);
   3) fuel;
   4) disinsectants; and
   5) food items;
b) identify the location or source, type and intensity of fumes (i.e. air supply system or cabin equipment/item) and attempt to identify the type of odour (e.g. dirty socks, musty or mouldy, acrid) andintensity (e.g. mild, moderate or strong) of the fumes;
c) apply communication procedures. This may include providing information on:
   1) nature of the fumes;
   2) intensity of the fumes;
   3) any visible signs (e.g. haze or mist);
   4) apparent source and, for suspected air supply system fumes, confirmation that cabin sources have been ruled out, to the extent possible;
   5) location within the cabin;
   6) phase of flight when the odour was first noticed, as well as subsequent times when it was noticed;
   7) action(s) already taken (if any) and coordination with flight crew members on actions to be taken; and
   8) presence of any affected passengers and/or crew members, including the type of symptoms and the administration of first aid, if applicable;
d) manage passengers and cabin, as required. This may include, but is not limited to:
   1) relocating passengers, if required;
   2) informing passengers and reassuring them; and
   3) administering first aid to passengers and/or crew members; and
e) apply post-event procedures for the remainder of the flight. These may include, but are not limited to:
   1) monitoring the area;
   2) continued communication with the flight crew and other cabin crew members; and
   3) applying crew member incapacitation procedures, if applicable.

COMPETENCIES

a) application of policies and procedures;
b) communication;
c) leadership and teamwork;
d) passenger management;
e) problem solving and decision making;
f) situation awareness and management of information; and
g) workload management.

Note: The competencies listed above are relevant only if an operator chooses to conduct simulated exercise for this task.

FLIGHT PREPARATION & FUEL / OIL / OXYGEN SUPPLY

AIR NAVIGATION ORDER

VERSION : 2.0
DATE OF IMPLEMENTATION : 01.01.2018
OFFICE OF PRIME INTEREST : Flight Standards Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. NAVED SHABAHAT KHAN	Flight Inspector (Pilot)	Signed
	CAPT. KHALID MAHMOOD	Addl. Director General Aviation	Signed
	CAPT. IMRAN ALI SHEIKH	Flight Inspector (Heli)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR MARSHAL (RETD.) ASIM SULEIMAN	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. The Air Navigation Order (ANO) is issued by the Director General Civil Aviation Authority (CAA) in pursuance of the powers vested under Rule 4, Civil Aviation Rules 1994 (CARs 94).

B. PURPOSE:

B1. The ANO has been developed to comply with CARs, 94 and the minimum standards and practices adopted by the International Civil Aviation Authority (ICAO).

C. SCOPE:

C1. The ANO contained herein shall apply to all Air Carrier and General Aviation Charter Operators holding licenses and Air Operator Certificates (AOC) issued under Part XI, CARs 94.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 When the following terms are used in this ANO, they have the following meanings:

D1.1.1 **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.

D1.1.2 **Air Operator Certificate (AOC).** A certificate authorizing an Operator to carry out specified commercial air transport operations.

D1.1.3 **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.

D1.1.4 **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.

D1.1.5 **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.

D1.1.6 **Flight Plan.** Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft.

D1.1.7 **General Aviation Operation.** An aircraft operation other than a commercial air transport operation or an aerial work operation.

D1.1.8 **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.

D1.1.9 **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.

D1.1.10 **Operations Manual.** A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

D1.1.11 **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.

D1.1.12 **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.

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

D1.1.13 **Visual Meteorological Conditions (VMC).** Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specific minima.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

AFM	:	AIRCRAFT FLIGHT MANUAL
ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
ATS	:	AIR TRAFFIC SERVICES
CARs	:	CIVIL AVIATION RULES
FDTL	:	FLIGHT AND DUTY TIME LIMITATIONS
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
IFR	:	INSTRUMENT FLIGHT RULES
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
PNR	:	POINT OF NO RETURN
VFR	:	VISUAL FLIGHT RULES
VMC	:	VISUAL METEOROLOGICAL CONDITIONS

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 ICAO Annex-6, Part-I, Part-II & Part-III

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st January, 2018 and supersedes ANO 91.0010 (Issue-1).

--S/d--

(ASIM SULEIMAN)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **26th December, 2017**

--S/d--

(CAPT. ARIF MAJEED)
Director Flight Standards

Dated- **19th December, 2017**
File No. HQCAA/1077/021/FSAC

APPENDIX "A"

COMMERCIAL AIR OPERATORS
(DOMESTIC AND INTERNATIONAL)

1. FLIGHT PREPARATION:

1.1. 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 for the particular type of operation to be undertaken, are installed and are sufficient for the flight;
c) a maintenance release 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 can be complied with for the flight to be undertaken; and
g) the Standards relating to operational flight planning have been complied with.
h) completed flight preparation forms (if applicable) shall be kept for a period of 90 days.

1.2. 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 stall be left with the aerodrome authority or on record in a suitable place at the point of departure.

1.3 The Operations Manual must describe the content and use of the operational flight plan.

2. OPERATIONAL FLIGHT PLANNING:

2.1 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.

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

3. ALTERNATE AERODROME:

3.1 Take-off alternate aerodrome:

3.1.1 A take-off alternate aerodrome shall be selected and specified in the operational flight plan either if 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.

3.1.2 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.

3.1.3 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.

3.2 <u>En-route alternate aerodromes:</u>

3.2.1 En-route alternate aerodromes, required by additional requirements for operations by aeroplanes with turbine engines beyond 60 minutes to an en-route alternate aerodrome including EDTO by aeroplanes with two turbine engines, shall be selected and specified in the operational and air traffic services (ATS) flight plans.

3.3 <u>Destination alternate aerodromes:</u>

3.3.1 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 D5.3 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).

3.3.2 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.

3.4 Notwithstanding the provisions in D3.1, D3.2 and D3.3, the State of the Operator 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. METEOROLOGICAL CONDITIONS:

4.1. A flight to be conducted in accordance with the visual flight rules 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 the visual flight rules will, at the appropriate time, be such as to enable compliance with these rules.

4.2. 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. 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 State of the Operator, 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).

4.4. The State of the Operator 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).

4.5. 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.

4.6. 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).

5. FUEL REQUIREMENTS:

5.1 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.

5.2 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.

5.3 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 D5.2 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 D5.3 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 State of the Operator; 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 D5.3 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 State of the Operator;
3) meet additional requirements not covered above;

Note 1: Fuel planning for a failure that occurs at the most critical point along a route (D5.3 f) 1) may place the aeroplane in a fuel emergency situation based on D6.2.

Note 2: Guidance on EDTO critical fuel scenarios is contained in Attachment D;

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

5.4 **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.

5.5 A flight shall not commence unless the usable fuel on board meets the requirements in D5.3 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 D5.3 b), c), d), e) and f) if required.

5.6 Notwithstanding the provisions in D5.3 a), b), c), d) and f), the State of the Operator 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).

5.7 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).

6. IN-FLIGHT FUEL MANAGEMENT:

6.1 An operator shall establish policies and procedures, approved by the State of the Operator, to ensure that in-flight fuel checks and fuel management are performed.

6.2 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).

6.2.1 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.

6.2.2 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).

6.2.3 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 D5.3 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).

7. REFUELLING WITH PASSENGERS ON BOARD:

7.1 An aeroplane shall not be refuelled 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.

7.2 When refuelling 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 refuelling and the qualified personnel on board the aeroplane.

Note 1: The provisions of D7.1 do not necessarily require the deployment of integral aeroplane stairs or the opening of emergency exits as a prerequisite to refuelling.

Note 2: Provisions concerning aircraft refuelling are contained in 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 refuelling 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.

8. 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

8.1 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.

8.2 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.

APPENDIX "B"

GENERAL AVIATION – AEROPLANES

1. APPLICABILITY:

1.1 The SARPS contained in Annex 6, Part-II shall be applicable to General Aviation with reference as defined in Section 2.6.3.

1.2 The requirements of this ANO, shall ensure that the planning of flight(s) is based upon:

a) The aeroplane is airworthy, duty registered and that appropriate aircraft with respect to thereto are onboard the aeroplane.
b) Procedures and data contained in or derived from the approved Operations Manual or current Aircraft Flight Manual (AFM); and
c) The operating conditions under which the flight (s) is to be conducted including:
   1) Realistic aircraft fuel consumption data;
   2) Anticipated masses;
   3) Enroute, destination and alternate airfield;
   4) Expected meteorological conditions; and
   5) Air Traffic Services procedures and restrictions.

1.3 PLANNING PRE REQUIREMENTS

1.3.1 An AOC holder for an General Aviation operator, or pilot in command, shall ensure that the pre-flight calculations of usable fuel required for a flight (s) includes:

a) Taxi fuel
b) Trip fuel
c) Reserve fuel consisting of:
   (i) Contingency fuel
   (ii) Alternate fuel, if a destination alternate is required. (This does not preclude selection of the departure airport as the destination alternate);
   (iii) Reserve fuel; and
   (iv) Additional fuel, if required by the type of operation (EDTO, ect); and
   (v) Extra fuel if required by the pilot in command.

1.4 An AOC holder authorized Class 1 and 2 Charter operations, all General Aviation operators, including VIP/VVIP and pilot in command, shall ensure that in-flight re-planning procedures for calculating usable fuel require when a flight (s) has to proceed along a route or to a destination other than originally planned includes:

a) Trip fuel for the remainder of the flight;
b) Reserve fuel consisting of:
   (i) Contingency fuel;
   (ii) Alternate fuel, if a destination alternate is required (This does not preclude selection of the departure airport as the destination alternate).

1.5 WEATHER

1.5.1 An AOC holder authorized Class I and 2 Charter operations, all general aviation operators, including VIPNVIP, and pilot-in command shall not operate to or from an aerodrome using operating minima lower than those which may be established for that aerodrome by the State in which it is located, except with the specific approval of the CAA. (Example CAT 2).

1.6 Before commencing a flight, an AOC holder authorized Class 1 and 2 Charter operations, all general aviation operations, including VIP / VVIP, and the pilot-in-command shall be familiar with all available meteorological information appropriate to the intended flight. Preparation for a flight away from the vicinity of the place of departure and for every flight under the instrument flight rules, shall include:

1) a study of available current weather reports and forecast; and
2) the planning of an alternative course of action to provide for the eventuality that the flight cannot be completed as planned, because of weather conditions.

1.7 A flight, except one of purely local character in visual meteorological conditions, to be conducted in accordance with the visual flight rules shall not be commenced unless the available 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 visual flight rules, will, at the appropriate time, be such as to render compliance with this ANO and CARs 94.

1.8 INSTRUMENT FLIGHT RULES

1.8.1 Flight in accordance with Instrument Flight Rules:

a) When a destination alternate aerodrome is required. A flight to be conducted in accordance with the instrument flight rules shall not be commenced unless the available information indicates that conditions, at the aerodrome of intended landing and at least one destination alternate will, at the estimated time of arrival, be at least at or above the aerodrome operating minima.

b) When no destination alternate aerodrome is required. A flight to be conducted in accordance with the instrument flight rules to an aerodrome when no alternate aerodrome is required shall not commence unless:

   1) A standard instrument approach procedure is prescribed for the aerodrome of intended landing; and
   2) Available current meteorological information indicates that the following meteorological conditions will exists from two hours before to two hours after the estimate time of arrival:
      (i) A cloud base of at least 300 m (1,000 ft) above the minimum associated with the instrument approach procedure; and
      (ii) Visibility of at least 5.5 km or of 4 km more than the minimum associated with the procedure.

1.9 A flight shall not be continued towards the aerodrome of intended landing unless the latest available meteorological information indicates the conditions at the aerodrome, or at least one destination alternate aerodrome, will, at the estimated time of arrival, be at or above the specified aerodrome operating minima.

1.10 Except the case of emergency, an aeroplane shall not continue its approach to land beyond a point at which the limits of the aerodrome operating minima would be infringed.

1.11 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.

1.12 ENROUTE ALTERNATE AERODROMES

1.12.1 Destination alternate aerodromes. 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 flight plan unless:

a) the duration of the flight and the meteorological conditions prevailing are such that there is reasonable certainty that, at the estimated time of arrival at the aerodrome of intended landing, and for a reasonable period before and after such time, the approach and landing may be made under VMC; or

b) the aerodrome of intended landing is isolated and there is no suitable destination alternate aerodrome.

2. FUEL & OIL

2.1. This section is applicable to fuel and oil requirements.

2.2. A flight shall not be commenced unless, taking into account both the meteorological conditions and any delays that are expected in flight, the aeroplane carries sufficient fuel and oil to ensure that it can safely complete the flight. In addition, a reserve shall be carried to provide for contingencies.

2.3. Propeller driven aeroplanes. The fuel and oil carried in order to comply with paragraph 2.2 shall, in the case of propeller driven aeroplanes, be at least the amount sufficient to allow the aeroplane:

[When a destination alternate aerodrome is required, either]:

a) to fly to the aerodrome to which the flight is planned thence to the most critical (in terms of fuel consumption) alternate aerodrome specified in the operational and ATS flight plans and thereafter for a period of 45 minutes; or

b) to fly to the alternate aerodrome via any predetermined point and thereafter for 45 minutes, provided that this shall not be less than the amount required to fly to the aerodrome to which the flight is planned and thereafter for:

   i) 45 minutes plus 15% of the flight time planned to be spent at the cruising level (s) or

   ii) two hours, which ever is less.

[When a destination alternate aerodrome is not required];

a) In terms of paragraph 1.11. a), to fly to the aerodrome to which the flight is planned and thereafter for a period of 45 minutes; or

b) In terms of paragraph 1.11. b), to fly to the aerodrome to which the flight is planned and thereafter for:

   i) 45 minutes plus 15% of the flight time planned to be spent at cruising level (s), or

   ii) Two hours, which ever is less.

2.4. Aeroplanes equipped with turbo-jet engines. The fuel and oil carried in order to comply with paragraph 2.2 shall,

[When a destination alternate is required, either]:

a) To fly to and execute an approach, and a missed approach, at the aerodrome to which the flight is planned, and thereafter:

   i) To fly to the alternate aerodrome specified in the operational and ATS flight plans; and then

   ii) To fly for 30 minutes at holding speed at 450 m (1,500 ft) above the alternate aerodrome under standard temperature conditions, and approach and land; and

   iii) To have an additional amount of fuel sufficient to provide for the increased consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the Director General; or

b) To fly to the alternate aerodrome via any predetermined point and thereafter for 30 minutes at 450 m (1,500 ft) above the alternate aerodrome, due provision having been made for an additional amount of fuel consumption to provide for the increased consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the Director General; provided that fuel shall not he less than the amount of fuel required to fly to the aerodrome to which the flight is planned and thereafter for two hours at normal cruise consumption.

[When a destination aerodrome is not required]:

a) In terms of paragraph 1.11.a), to fly to the aerodrome which the flight is planned and additionally:
   i) To fly 30 minutes at holding speed at 450 m (1,500 ft) above the aerodrome to which the flight is planned under standard temperature conditions; and
   ii) To have an additional amount of fuel, sufficient to provide for the increased fuel consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the Director General; and

b) In terms of paragraph 1.1. b), to fly to the aerodrome to which the flight is planned and thereafter for a period of two hours at normal fuel consumption.

2.5 In computing the fuel and oil required by paragraphs 2.2 and 2.3 at least the following shall be considered:

a) Meteorological conditions forecast;
b) Expected air traffic control routings and traffic delays;
c) For IFR flight, one instrument approach at the destination aerodrome, including a missed approach;
d) The procedures prescribed in the operations manual for the loss of pressurization, where applicable, or failure of one power unit while en-route; and
e) Any other consideration that may delay the landing of the aeroplane or increase fuel and/or oil consumption.

Note: Nothing in Section 2.1 precludes amendment of a flight plan in flight in order to re-plan the flight to another aerodrome, provided that the requirements of this Section can be complied with from the point where the flight has been re-planned.

3. OXYGEN SUPPLY

3.1 Each AOC holder authorized Class 1 and 2 Charter operations, all general aviation operators, including VIP/VVIP and pilot in command, shall ensure that breathing oxygen is available to crew members and passengers in sufficient quantities for all flights at such altitudes where a lack of oxygen might result in impairment of the facilities of a crew member or harmfully affect passengers.

3.2. USE OF OXYGEN:

a) All flight crew members, when engaged in performing duties essential to the safe operation of an aeroplane in flight, shall use breathing oxygen continuously wherever the circumstances prevail for which its supply has been required for the duration of the flight.

Note: Additional guidance on the carriage and use of oxygen is contained in ICAO Annex 6, Part 2, International Operations, General Aviation-Aeroplanes, Attachment B.

APPENDIX "C"

COMMERCIAL AIR OPERATIONS – HELICOPTERS FLIGHT OPERATIONS

1. OPERATING FACILITIES:

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 helicopter 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: "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.

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.

2. OPERATIONAL CERTIFICATION AND SUPERVISION:

2.1 THE AIR OPERATOR CERTIFICATE:

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 Pakistan Civil Aviation Authority.

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

2.1.3 The issue of an air operator certificate by the Pakistan Civil Aviation Authority 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.

2.1.4 The continued validity of an air operator certificate shall depend upon the operator maintaining the requirements of 2.1.3 under the supervision of the Pakistan Civil Aviation Authority.

2.2 SURVEILLANCE OF OPERATIONS BY A FOREIGN OPERATOR:

2.2.1 Contracting States 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 Annex and in Annex 19.

2.2.2 States 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.

2.2.3 The operator shall meet and maintain the requirements established by the States in which the operations are conducted.

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).

2.4 OPERATING INSTRUCTIONS — GENERAL:

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.

2.4.2 A helicopter rotor shall not be turned under power, without a qualified pilot / pilots at the controls.

2.4.3 The operator should issue operating instructions and provide information on helicopter climb performance with all engines operating to enable the pilot-in-command to determine the climb gradient that can be achieved during the take-off and initial climb phase for the existing take-off conditions and intended take-off technique. This information should be based on the helicopter manufacturer's or other data, acceptable to the Pakistan Civil Aviation Authority, and should be included in the operations manual.

2.5 IN-FLIGHT SIMULATION OF EMERGENCY SITUATIONS:

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

2.6 CHECKLISTS:

2.6.1 The checklists 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, the helicopter 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).

2.7 MINIMUM FLIGHT ALTITUDES (OPERATIONS UNDER IFR):

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 Pakistan Civil Aviation Authority, provided that they shall not be less than those established by that Pakistan Civil Aviation Authority, unless specifically approved.

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 State flown over, or the responsible State, 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.

2.8 HELIPORT OR LANDING LOCATION OPERATING MINIMA:

2.8.1 The operator establish operating minima for each heliport or landing location 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 heliports or landing locations by the State of the Aerodrome, except when specifically approved by that Pakistan Civil Aviation Authority.

2.8.1.1 The Pakistan Civil Aviation Authority may approve operational credit(s) for operations with helicopters 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, a minima below the heliport or landing location 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 I 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).

Note 4: Automatic landing system - helicopter is an automatic approach using airborne systems which provide automatic control of the flight path, to a point aligned with the landing surface, from which the pilot can transition to a safe landing by means of natural vision without the use of automatic control.

2.8.2 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).

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

2.8.4 For instrument approach operations, heliport or landing location operating minima below 800 m visibility should not be authorized unless RVR information or an accurate measurement or observation of visibility is provided.

2.8.5 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.

2.8.6 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.

2.9 FUEL AND OIL RECORDS:

2.9.1 The operator shall maintain fuel and oil records to enable the Pakistan Civil Aviation Authority to ascertain that, for each flight, the requirements of 3.6 have been complied with.

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

2.10 CREW:

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

2.10.2 Flight time, flight duty periods and rest periods. The operator shall formulate rules to limit flight time and flight duty periods and for the provision of adequate rest periods for all its crew members. These rules shall be in accordance with the regulations established by the Pakistan Civil Aviation, or approved by that State, and included in the operations manual.

2.10.3 The operator shall maintain current records of the flight time, flight duty periods and rest periods of all its crew members.

2.11 PASSENGERS:

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

a) seat belts or harnesses;
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.

2.11.2 The operator shall ensure that the passengers are informed of the location and general manner of use of the principal emergency equipment carried for collective use.

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

2.11.4 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 a helicopter shall be secured in their seats by means of the seat belts or harnesses provided.

2.12 OVER-WATER FLIGHTS:

2.12.1 All helicopters on flights over water in a hostile environment shall be certificated for ditching. Sea state shall be an integral part of ditching information.

3 FLIGHT PREPARATION:

3.1 A flight, or series of flights, shall not be commenced until flight preparation forms have been completed certifying that the pilot-in-command is satisfied that:

a) the helicopter is airworthy;
b) the instruments and equipment for the particular type of operation to be undertaken, are installed and are sufficient for the flight;
c) a maintenance release as has been issued in respect of the helicopter;
d) the mass of the helicopter 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 can be complied with for the flight to be undertaken; and
g) the Standards of 3.3 relating to operational flight planning have been complied with.

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

3.3 OPERATIONAL FLIGHT PLANNING:

3.3.1 An operational flight plan shall be completed for every intended flight or series of flights, and approved by the pilot-in-command, and shall be lodged with the appropriate authority. The operator shall determine the most efficient means of lodging the operational flight plan.

3.3.2 The operations manual shall describe the content and use of the operational flight plan.

3.4 ALTERNATE HELIPORTS:

3.4.1 Take-off alternate heliport

3.4.1.1 A take-off alternate heliport shall be selected and specified in the operational flight plan if the weather conditions at the heliport of departure are at or below the applicable heliport operating minima.

3.4.1.2 For a heliport 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 heliport operating minima for that operation.

3.4.2 Destination alternate heliport

3.4.2.1 For a flight to be conducted in accordance with IFR, at least one destination alternate shall be specified in the operational flight plan and the flight plan, unless:

a) the duration of the flight and the meteorological conditions prevailing are such that there is reasonable certainty that, at the estimated time of arrival at the heliport of intended landing, and for a reasonable period before and after such time, the approach and landing may be made under visual meteorological conditions as prescribed by the Pakistan Civil Aviation Authority; or

b) the heliport of intended landing is isolated and no alternate is available. A point of no return (PNR) shall be determined.

3.4.2.2 For a heliport to be selected as a destination alternate, the available information shall indicate that, at the estimated time of use, the conditions will be at or above the heliport operating minima for that operation.

3.4.2.3 For a flight departing to a destination which is forecast to be below the heliport operating minima, two destination alternates should be selected. The first destination alternate should be at or above the heliport operating minima for destination and the second at or above the heliport operating minima for alternate.

3.4.3 When an offshore alternate heliport is specified, it shall be specified subject to the following:

a) the offshore alternate heliport shall be used only after a PNR. Prior to a PNR, onshore alternate heliports shall be used;
b) mechanical reliability of critical control systems and critical components shall be considered and taken into account when determining the suitability of the alternate heliport(s);
c) one engine inoperative performance capability shall be attainable prior to arrival at the alternate heliport;
d) to the extent possible, deck availability shall be guaranteed; and
e) weather information must be reliable and accurate.

Note: The landing technique specified in the flight manual following control system failure may preclude the nomination of certain helidecks as alternate heliports.

3.4.4 Offshore alternate heliports should not be used when it is possible to carry enough fuel to have an onshore alternate. Offshore alternate heliports should not be used in a hostile environment.

3.5 METEOROLOGICAL CONDITIONS:

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 or in the intended area of operations under VFR will, at the appropriate time, be such as to enable compliance with these rules.

Note: When a flight is conducted in accordance with VFR, the use of night vision imaging systems (NVIS) or other vision enhancing systems does not diminish the requirement to comply with the provisions of 3.5.1.

3.5.2 A flight to be conducted in accordance with IFR shall not be commenced unless information is available which indicates that conditions at the destination heliport or landing location or, when an alternate is required, at least one alternate heliport will, at the estimated time of arrival, be at or above the heliport operating minima.

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 heliport or landing location, the operator shall specify appropriate incremental values for height of cloud base and visibility, acceptable to the State of the Operator, to be added to the operator's established heliport or landing location operating minima.

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

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

3.5.5 A flight to be planned or expected to operate in suspected or known ground icing conditions shall not be commenced unless the helicopter 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 helicopter 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).

3.6 FUEL AND OIL REQUIREMENTS:

3.6.1 All helicopters. A flight shall not be commenced unless, taking into account both the meteorological conditions and any delays that are expected in flight, the helicopter carries sufficient fuel and oil to ensure that it can safely complete the flight. In addition, a reserve shall be carried to provide for contingencies.

3.6.2 VFR operations. The fuel and oil carried in order to comply with 3.6.1 shall, in the case of VFR operations, be at least the amount to allow the helicopter to:

a) fly to the landing site to which the flight is planned;
b) have final reserve fuel to fly thereafter for a period of 20 minutes at best-range speed; and
c) have an additional amount of fuel to provide for the increased consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the State of the Operator.

3.6.3 IFR operations. The fuel and oil carried in order to comply with 3.6.1 shall, in the case of IFR operations, be at least the amount to allow the helicopter:

3.6.3.1 When an alternate is not required, in terms of 3.4.2.1 a), to fly to and execute an approach at the heliport or landing location to which the flight is planned, and thereafter to have:

a) final reserve fuel to fly 30 minutes at holding speed at 450 m (1 500 ft) above the destination heliport or landing location under standard temperature conditions and approach and land; and
b) an additional amount of fuel to provide for the increased consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the State of the Operator.

3.6.3.2 When an alternate is required, to fly to and execute an approach, and a missed approach, at the heliport or landing location to which the flight is planned, and thereafter:

a) fly to and execute an approach at the alternate specified in the flight plan; and then
b) have final reserve fuel to fly for 30 minutes at holding speed at 450 m (1 500 ft) above the alternate under standard temperature conditions, and approach and land; and
c) have an additional amount of fuel to provide for the increased consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the State of the Operator.

3.6.3.3 When no alternate heliport or landing location is available, in terms of 3.4.2.1 (e.g. the destination is isolated), sufficient fuel shall be carried to enable the helicopter to fly to the destination to which the flight is planned and thereafter for a period that will, based on geographic and environmental considerations, enable a safe landing to be made.

3.6.4 In computing the fuel and oil required in 2.3.6.1, at least the following shall be considered:

a) meteorological conditions forecast;
b) expected air traffic control routings and traffic delays;
c) for IFR flight, one instrument approach at the destination heliport, including a missed approach;

d) the procedures prescribed in the operations manual for loss of pressurization, where applicable, or failure of one engine while en route; and
e) any other conditions that may delay the landing of the helicopter or increase fuel and/or oil consumption.

Note: Nothing in 2.3.6 precludes amendment of a flight plan in flight in order to replan the flight to another heliport, provided that the requirements of 2.3.6 can be complied with from the point where the flight has been replanned.

3.6.5 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.

3.7 REFUELLING WITH PASSENGERS ON BOARD OR ROTORS TURNING:

3.7.1 A helicopter should not be refuelled when passengers are embarking, on board, disembarking or when the rotor is turning unless the operator is granted specific authorization by the Pakistan Civil Aviation Authority setting forth the conditions under which such fuelling may be carried out.

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

Note 2: Additional precautions are required when refuelling 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.

3.8 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

3.8.1 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.

3.8.2 A flight to be operated with a pressurized helicopter 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 the helicopter is operated at flight altitudes at which the atmospheric pressure is more than 376 hPa and cannot descend safely to a flight altitude at which the atmospheric pressure is equal to 620 hPa within four minutes, there shall be no less than a 10-minute supply for the occupants of the passenger compartment.

4 IN-FLIGHT PROCEDURES

4.1 HELIPORT OPERATING MINIMA:

4.1.1 A flight shall not be continued towards the heliport of intended landing, unless the latest available information indicates that at the expected time of arrival, a landing can be effected at that heliport, or at least one destination alternate heliport, in compliance with the operating minima established in accordance with 2.2.8.1.

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

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

4.1.3 If, after entering the final approach segment or after descending below 300 m (1 000 ft) above the heliport 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, a helicopter shall not continue its approach-to-land at any heliport beyond a point at which the limits of the operating minima specified for that heliport would be infringed.

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 Annex 3, the PANS-ATM (Doc 4444) and the appropriate Regional Supplementary Procedures (Doc 7030).

4.3 HAZARDOUS FLIGHT CONDITIONS:

4.3.1 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 FLIGHT CREW MEMBERS AT DUTY STATIONS:

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

4.4.2 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 helicopter or for physiological needs.

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

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 harness 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.

4.5 USE OF OXYGEN:

4.5.1 All flight crew members, when engaged in performing duties essential to the safe operation of a helicopter in flight, shall use breathing oxygen continuously whenever the circumstances prevail for which its supply has been required in 3.8.1 or 3.8.2.

4.6 SAFEGUARDING OF CABIN CREW AND PASSENGERS IN PRESSURIZED AIRCRAFT IN THE EVENT OF LOSS OF PRESSURIZATION:

4.6.1 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.

4.7 INSTRUMENT FLIGHT PROCEDURES:

4.7.1 One or more instrument approach procedures to serve each final approach and take-off area or heliport utilized for instrument flight operations shall be approved and promulgated by the State in which the heliport is located, or by the State which is responsible for the heliport when located outside the territory of any State.

4.7.2 All helicopters operated in accordance with IFR shall comply with the instrument approach procedures approved by the State in which the heliport is located, or by the State which is responsible for the heliport when located outside the territory of any State.

Note 1: Operational procedures recommended for the guidance of operations personnel involved in instrument flight operations are described in PANS-OPS (Doc 8168), Volume I.

Note 2: 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 Section II, Chapter 1, 1.1.1).

4.8 HELICOPTER OPERATING PROCEDURES FOR NOISE ABATEMENT:

Recommendation: The operator should ensure that take-off and landing procedures take into account the need to minimize the effect of helicopter noise.

4.9 IN-FLIGHT FUEL MANAGEMENT:

4.9.1 The operator shall establish policies and procedures, approved by the Pakistan Civil Aviation Authority, to ensure that inflight fuel checks and fuel management are performed.

4.9.2 The pilot-in-command shall monitor the amount of usable fuel remaining on board to ensure it is not less than the fuel required to proceed to a landing site where a safe landing can be made with the planned final reserve fuel remaining.

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

Note 1: The declaration of MINIMUM FUEL informs ATC that all planned landing site options have been reduced to a specific landing site of intended landing, that no precautionary landing site is available, and any change to the existing clearance, or air traffic delays, 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: A precautionary landing site refers to a landing site, other than the site of intended landing, where it is expected that a safe landing can be made prior to the consumption of the planned final reserve fuel.

4.9.4 The pilot-in-command shall declare a situation of fuel emergency by broadcasting MAYDAY MAYDAY MAYDAY FUEL, when the usable fuel estimated to be available upon landing at the nearest landing site where a safe landing can be made is less than the required final reserve fuel in compliance with 3.6.

Note 1: The planned final reserve fuel refers to the value calculated in 3.6 and is the minimum amount of fuel required upon landing at any landing site. The declaration of MAYDAY MAYDAY MAYDAY FUEL informs ATC that all available landing options have been reduced to a specific site and a portion of the final reserve fuel may be consumed prior to landing.

Note 2: The pilot estimates with reasonable certainty that the fuel remaining upon landing at the nearest safe landing site will be less than the final reserve fuel taking into consideration the latest information available to the pilot, the area to be overflown (i.e. with respect to the availability of precautionary landing areas), meteorological conditions and other reasonable contingencies.

Note 3: 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.

5 DUTIES OF PILOT-IN-COMMAND

5.1 The pilot-in-command shall be responsible for the operation and safety of the helicopter and for the safety of all crew members, passengers and cargo on board, from the moment the engine(s) are started until the helicopter finally comes to rest at the end of the flight, with the engine(s) shut down and the rotor blades stopped.

5.2 The pilot-in-command shall ensure that the checklists specified in 2.2.6 are complied with in detail.

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 helicopter, resulting in serious injury or death of any person or substantial damage to the helicopter or property.

Note: A definition of the term “serious injury” is contained in Annex 13.

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

5.5 The pilot-in-command shall be responsible for the journey log book or the general declaration containing the information listed in 9.4.1.

Note: By virtue of Resolution A10-36 of the Tenth Session of the Assembly (Caracas, June–July 1956) “the general declaration, [described in 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 Contracting States to be an acceptable form of journey log book”.

6 DUTIES OF FLIGHT OPERATIONS OFFICER/FLIGHT DISPATCHER

6.1 A flight operations officer/flight dispatcher in conjunction with a method of control and supervision of flight operations in accordance with 2.2.1.3 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; and
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.

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 a flight, particularly in the context of emergency situations.

7 CARRY-ON BAGGAGE

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

APPENDIX “D”

GENERAL AVIATION – HELICOPTERS FLIGHT OPERATIONS

1. ADEQUACY OF OPERATING FACILITIES:

1.1 The pilot-in-command shall not commence a flight unless it has been ascertained by every reasonable means available that the ground and/or water facilities available and directly required for such flight and for the safe operation of the helicopter are adequate including communication facilities and navigation aids.

Note: “Reasonable means” in this Standard is intended to denote the use, at the point of departure, of information available to the pilot-in-command either through official information published by the aeronautical information services or readily obtainable from other sources.

2. HELIPORT OR LANDING LOCATION OPERATING MINIMA:

2.1 The pilot-in-command shall establish operating minima in accordance with criteria specified by the State of Registry for each heliport or landing location to be used in operations. Such minima shall not be lower than any that may be established 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 operating minima.

2.1.1 The State of Registry may approve operational credit(s) for operations with helicopters 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 (2.6.3.2), a minima below the heliport or landing location 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 I 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).

Note 4: Automatic landing system — helicopter is an automatic approach using airborne systems which provide automatic control of the flight path, to a point aligned with the landing surface, from which the pilot can transition to a safe landing by means of natural vision without the use of automatic control.

3. BRIEFING:

3.1 The pilot-in-command shall ensure that crew members and passengers are made familiar, by means of an oral briefing or by other means, with the location and the use of:

a) seat belts or harnesses; and, as appropriate,
b) emergency exits;
c) life jackets;
d) oxygen dispensing equipment; and
e) other emergency equipment provided for individual use, including passenger emergency briefing cards.

3.2 The pilot-in-command shall ensure that all persons on board are aware of the location and general manner of use of the principal emergency equipment carried for collective use.

4. HELICOPTER AIRWORTHINESS AND SAFETY PRECAUTIONS:

4.1 A flight shall not be commenced until the pilot-in-command is satisfied that:
a) the helicopter is airworthy, duly registered and that appropriate certificates with respect thereto are aboard the helicopter;
b) the instruments and equipment installed in the helicopter are appropriate, taking into account the expected flight conditions;
c) any necessary maintenance has been performed in accordance with Chapter 6;
d) the mass of the helicopter 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; and
f) the helicopter operating limitations contained in the flight manual, or its equivalent, will not be exceeded.

5. WEATHER REPORTS AND FORECASTS:

5.1 Before commencing a flight the pilot-in-command shall be familiar with all available meteorological information appropriate to the intended flight. Preparation for a flight away from the vicinity of the place of departure, and for every flight under IFR, shall include: 1) a study of available current weather reports and forecasts; and 2) the planning of an alternative course of action to provide for the eventuality that the flight cannot be completed as planned, because of weather conditions.

Note: The requirements for flight plans are contained in Annex 2 and the PANS-ATM (Doc 4444).

6. LIMITATIONS IMPOSED BY WEATHER CONDITIONS:

6.1 FLIGHT IN ACCORDANCE WITH VFR:

6.1.1 A flight, except one of purely local character in visual meteorological conditions, 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.

6.2 FLIGHT IN ACCORDANCE WITH IFR:

6.2.1 When an alternate is required. A flight to be conducted in accordance with IFR shall not be commenced unless the available information indicates that conditions, at the heliport of intended landing and at least one alternate heliport will, at the estimated time of arrival, be at or above the heliport operating minima.

Note: It is the practice in some States to declare, for flight planning purposes, higher minima for a heliport when nominated as an alternate than for the same heliport when planned as that of intended landing.

6.2.2 When no alternate is required. A flight to be conducted in accordance with IFR to a heliport when no alternate heliport is required shall not be commenced unless available current meteorological information indicates that the following meteorological conditions will exist from two hours before to two hours after the estimated time of arrival, or from the actual time of departure to two hours after the estimated time of arrival, whichever is the shorter period:

a) a cloud base of at least 120 m (400 ft) above the minimum associated with the instrument approach procedure; and
b) visibility of at least 1.5 km more than the minimum associated with the procedure.

Note: These should be considered as minimum values where a reliable and continuous meteorological watch is maintained. When only an "area" type forecast is available these values should be increased accordingly.

6.3 HELIPORT OPERATING MINIMA:

6.3.1 A flight shall not be continued towards the heliport of intended landing unless the latest available meteorological information indicates that conditions at that heliport, or at least one alternate heliport, will, at the estimated time of arrival, be at or above the specified heliport operating minima.

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

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

6.3.3 If, after entering the final approach segment or after descending below 300 m (1 000 ft) above the heliport 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, a helicopter shall not continue its approach-to-land beyond a point at which the limits of the heliport operating minima would be infringed.

6.4 FLIGHT IN ICING CONDITIONS:

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

7. <u>ALTERNATE HELIPORTS:</u>

7.1 For a flight to be conducted in accordance with IFR, at least one alternate heliport or landing location shall be specified in the operational flight plan and the flight plan, unless:

a) the weather conditions in 2.6.2.2 prevail; or
b) 1) the heliport or landing location of intended landing is isolated and no alternate heliport or landing location is available; and
   2) an instrument approach procedure is prescribed for the isolated heliport of intended landing; and
   3) a point of no return (PNR) is determined in case of an offshore destination.

7.2 Suitable offshore alternates may be specified subject to the following:

a) the offshore alternates shall be used only after passing a PNR. Prior to a PNR, onshore alternates shall be used;

b) mechanical reliability of critical control systems and critical components shall be considered and taken into account when determining the suitability of the alternate;
c) one engine inoperative performance capability shall be attainable prior to arrival at the alternate;
d) to the extent possible, deck availability shall be guaranteed; and
e) weather information must be reliable and accurate.

Note: The landing technique specified in the flight manual following control system failure may preclude the nomination of certain helidecks as alternate heliports.

7.3 **Recommendation:** Offshore alternates should not be used when it is possible to carry enough fuel to have an onshore alternate. Offshore alternates should not be used in a hostile environment.

8. FUEL AND OIL REQUIREMENTS:

8.1 All helicopters. A flight shall not be commenced unless, taking into account both the meteorological conditions and any delays that are expected in flight, the helicopter carries sufficient fuel and oil to ensure that it can safely complete the flight. In addition, a reserve shall be carried to provide for contingencies.

8.2 VFR operations. The fuel and oil carried in order to comply with 2.8.1 shall, in the case of VFR operations, be at least the amount to allow the helicopter to:
a) fly to the landing site to which the flight is planned;
b) have a final reserve fuel to fly thereafter for a period of 20 minutes at best-range speed; and
c) have an additional amount of fuel to provide for the increased consumption on the occurrence of potential contingencies, as determined by the State and specified in the State regulations governing general aviation.

8.3 IFR operations. The fuel and oil carried in order to comply with 2.8.1 shall, in the case of IFR operations, be at least the amount to allow the helicopter:

8.3.1 When no alternate is required, in terms of 2.6.2.2, to fly to and execute an approach at the heliport or landing location to which the flight is planned, and thereafter to have:
a) a final reserve fuel to fly 30 minutes at holding speed at 450 m (1 500 ft) above the destination heliport or landing location under standard temperature conditions and approach and land; and
b) an additional amount of fuel to provide for the increased consumption on the occurrence of potential contingencies.

8.3.2 When an alternate is required, in terms of 2.6.2.1, to fly to and execute an approach, and a missed approach, at the heliport or landing location to which the flight is planned, and thereafter:
a) fly to and execute an approach at the alternate specified in the flight plan; and then
b) have a final reserve fuel to fly for 30 minutes at holding speed at 450 m (1 500 ft) above the alternate under standard temperature conditions, and approach and land; and
c) have an additional amount of fuel to provide for the increased consumption on the occurrence of potential contingencies.

8.3.3 When no alternate heliport or landing location is available (i.e. the heliport of intended landing is isolated and no alternate is available), to fly to the heliport to which the flight is planned and thereafter for a period as specified by the State of the Operator.

8.4 In computing the fuel and oil required in 2.8.1, at least the following shall be considered:
a) meteorological conditions forecast;
b) expected air traffic control routings and traffic delays;

c) for IFR flight, one instrument approach at the destination heliport, including a missed approach;
d) the procedures for loss of pressurization, where applicable, or failure of one engine while en route; and
e) any other conditions that may delay the landing of the helicopter or increase fuel and/or oil consumption.

Note: Nothing in 2.8 precludes amendment of a flight plan in flight in order to replan the flight to another heliport, provided that the requirements of 2.8 can be complied with from the point where the flight has been replanned.

8.5 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.

9. IN-FLIGHT FUEL MANAGEMENT:

9.1 The pilot-in-command shall monitor the amount of usable fuel remaining on board to ensure it is not less than the fuel required to proceed to a landing site where a safe landing can be made with the planned final reserve fuel remaining.

Note: The protection of final reserve fuel is intended to ensure safe landing at any heliport or landing location when unforeseen occurrences may not permit a safe completion of an operation as originally planned.

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

Note 1: The declaration of MINIMUM FUEL informs ATC that all planned landing site options have been reduced to a specific landing site of intended landing, that no precautionary landing site is available, and any change to the existing clearance, or air traffic delays, 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: A precautionary landing site refers to a landing site, other than the site of intended landing, where it is expected that a safe landing can be made prior to the consumption of the planned final reserve fuel.

9.3 The pilot-in-command shall declare a situation of fuel emergency by broadcasting MAYDAY MAYDAY MAYDAY FUEL, when the usable fuel estimated to be available upon landing at the nearest landing site where a safe landing can be made is less than the required final reserve fuel in compliance with 2.8.

Note 1: The planned final reserve fuel refers to the value calculated in 2.8 and is the minimum amount of fuel required upon landing at any landing site. The declaration of MAYDAY MAYDAY MAYDAY FUEL informs ATC that all available landing options have been reduced to a specific site and a portion of the final reserve fuel may be consumed prior to landing.

Note 2: The pilot estimates with reasonable certainty that the fuel remaining upon landing at the nearest safe landing site will be less than the final reserve fuel taking into consideration the latest information available to the pilot, the area to be overflown (i.e. with respect to the availability of precautionary landing areas), meteorological conditions and other reasonable contingencies.

Note 3: 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).

10. 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

10.1 A flight to be operated at 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;

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

10.2 A flight to be operated with a pressurized helicopter shall not be commenced unless a sufficient quantity of stored breathing oxygen is carried to supply all the crew members and a proportion of the 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.

11. USE OF OXYGEN:

11.1 All flight crew members, when engaged in performing duties essential to the safe operation of a helicopter in flight, shall use breathing oxygen continuously whenever the circumstances prevail for which its supply has been required in 2.9.1 or 2.9.2.

12. IN-FLIGHT EMERGENCY INSTRUCTION:

12.1 In an emergency during flight, the pilot-in-command shall ensure that all persons on board are instructed in such emergency action as may be appropriate to the circumstances.

13. WEATHER REPORTING BY PILOTS:

13.1 **Recommendation:** When weather conditions likely to affect the safety of other aircraft are encountered, they should be reported as soon as possible.

14. HAZARDOUS FLIGHT CONDITIONS:

14.1 **Recommendation:** Hazardous flight conditions, other than those associated with meteorological conditions, encountered en route should be reported as soon as possible. The reports so rendered should give such details as may be pertinent to the safety of other aircraft.

15. FITNESS OF FLIGHT CREW MEMBERS:

15.1 The pilot-in-command shall be responsible for ensuring that a flight:

a) will not be commenced if any flight crew member is incapacitated from performing duties by any cause such as injury, sickness, fatigue, the effects of alcohol or drugs; and

b) will not be continued beyond the nearest suitable heliport when flight crew members' capacity to perform functions is significantly reduced by impairment of faculties from causes such as fatigue, sickness, lack of oxygen.

16. FLIGHT CREW MEMBERS AT DUTY STATIONS:

16.1 TAKE-OFF AND LANDING:

16.1.1 All flight crew members required to be on flight deck duty shall be at their stations.

16.2 EN ROUTE:

16.2.1 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 helicopter, or for physiological needs.

16.3 SEAT BELTS:

16.3.1 All flight crew members shall keep their seat belt fastened when at their stations.

16.4 SAFETY HARNESS:

Recommendation: When safety harnesses are provided, any flight crew member occupying a pilot's seat should keep the safety harness fastened during the take-off and landing phases; all other flight crew members should keep their safety harness 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 strap(s) and a seat belt which may be used independently.

17. INSTRUMENT FLIGHT PROCEDURES:

17.1 One or more instrument approach procedures designed to support instrument approach operations shall be approved and promulgated by the State in which the heliport is located, or by the State which is responsible for the heliport when located outside the territory of any State, to serve each final approach and take-off area or heliport utilized for instrument flight operations.

17.2 All helicopters operated in accordance with IFR shall comply with the instrument approach procedures approved by the State in which the heliport is located, or by the State which is responsible for the heliport when located outside the territory of any State.

Note 1: See Section II, Chapter 2, 2.2.8.3, 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 Section II, Chapter 1, 1.1.1).

18. INSTRUCTION — GENERAL:

18.1 A helicopter rotor shall not be turned under power for the purpose of flight without a qualified pilot at the controls.

19. REFUELLING WITH PASSENGERS ON BOARD OR ROTORS TURNING:

19.1 **Recommendation:** A helicopter should not be refuelled when passengers are embarking, on board or disembarking or when the rotor is turning unless it is attended by the pilot-in-command or other qualified personnel ready to initiate and direct an evacuation of the helicopter by the most practical and expeditious means available.

19.2 **Recommendation:** When refuelling with passengers embarking, on board or disembarking, two-way communications should be maintained by helicopter inter-communications system or other suitable means between the ground crew supervising the refuelling and the pilot-in-command or other qualified personnel required by 2.19.1.

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

Note 2: Additional precautions are required when refuelling 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.

20. OVER-WATER FLIGHTS:

20.1 All helicopters on flights over water in a hostile environment in accordance with 4.3.1 shall be certificated for ditching. Sea state shall be an integral part of ditching information.

MISCELLANEOUS SAFETY REQUIREMENTS

AIR NAVIGATION ORDER

VERSION : 3.1
DATE OF IMPLEMENTATION : 01.04.2021
OFFICE OF PRIME INTEREST : Flight Standards Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. NADEEM HANIF	Inspector Inspector (Pilot)	Signed
REVIEWED BY	CAPT. S. M. RAFATULLAH	Director Flight Standards	Signed
VERIFIED BY	NADIR SHAFI DAR	Dy. Director General (Regulatory)	Signed
APPROVED BY	KHAQAN MURTAZA	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. The Air Navigation Order (ANO) is issued by the Director General Civil Aviation Authority (CAA) in pursuance of the powers vested under Rule 4 of Civil Aviation Rules 1994 (CARs 94).

B. PURPOSE:

B1. To provide assistance and guidance to comply with safety aspects and standard.

C. SCOPE:

C1. This ANO is issued to establish requirement on various safety related matters pertaining to the safety of passengers, crew and the Operational staff of both, the air operators and the ground handling agencies.

C2. Operators/handlers shall provide all the contents stated herein to the flight crew, cabin crew and all ground operations personnel related to any aspects of these safety requirements through Operations Manual, Passenger handling manual, baggage handling manual and/or policies as applicable. All the manuals/policies related to these requirements shall have an approval of FSD, CAA.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 When the following terms are used in this ANO, they have the following meanings:

D1.1.1 **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.

D1.1.2 **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.

D1.1.3 **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.

D1.1.4 **Crew Member.** A person assigned by an Operator to duty on an aircraft during a flight duty period.

D1.1.5 **Large Aeroplane.** An aeroplane of a maximum certificated take-off mass of over 5700 kg.

D1.1.6 **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.

D1.1.7 **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.

D1.1.8 **Operations Manual.** A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

D1.1.9 **Operator.** A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

D1.1.10 **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.

D2. USE OF PORTABLE ELECTRONIC DEVICES:

D2.1 An operator/handler shall not permit any person to use, and take all reasonable measures to ensure that no person does use, on board an aeroplane, a portable electronic device that can adversely affect the performance of the aeroplane's systems and equipment.

D2.2 Operators/handler shall ensure that passengers are informed of this restriction through written/verbal notices at Check-in and through PA Announcement before leaving the departure lounge.

D2.3 Use of Mobile phone may be allowed till the doors are open and passengers are boarding after doors are closed, operator / handler staff ensure that the passengers are informed to switch off all electronic devices / mobile phones or put them on Flight Mode, as their use may interfere with navigation and communication system of the aircraft. However, these electronic devices may be used after the seat belt signs are switched OFF after take off until seat belt signs are switched ON for landing.

D2.4 When the aircraft doors are closed, PA Announcement shall be made by cabin crew for switching off the mobile phones and a strict compliance to that has to be ensured. This announcement shall also cover restriction on use of all the portable electronic devices. (Refer to the passenger briefing).

D3. NO SMOKING ON-BOARD AN AIRCRAFT:

D3.1 An operator/handler shall establish procedures and take all reasonable measures to ensure that no person smokes while on board an aircraft on ground or in-flight. Electric Cigarettes and Cigars are also prohibited.

D3.2 The Pilot-in-command shall ensure that no person (including both, the crew and passengers) is allowed to smoke while on board an aircraft when he/she has the charge of aircraft whether on ground or in-flight.

D3.3 PA Announcement shall be made by cabin crew for no smoking and a strict compliance to that has to be ensured. This announcement shall be made repeatedly while passengers are boarding, seated before take-off, after take-off and before landing. (Refer to the passenger briefing).

D4. ASSISTING MEANS FOR EMERGENCY EVACUATION:

D4.1 An operator shall establish procedures to ensure that before taxiing, take-off and landing, and when safe and practicable to do so, an assisting means for emergency evacuation that deploys automatically, is armed.

D4.2 These procedures shall include a PA announcement for arming the doors, with a cross check by another cabin crew and confirmation from all the related cabin crew.

D5. USE OF ALCOHOL AND DRUGS:

D5.1 An operator/handler shall not permit any person to enter or be in, and take all reasonable measures to ensure that no person enters or is in, an aeroplane when under the influence of alcohol or drugs to the extent that the safety of the aeroplane or its occupants is likely to be endangered.

D5.2 The Pilot-in-command of an aircraft shall not commence flight if any of his cockpit flight crew member appears, or is unable to perform his duties because of any injury, sickness, fatigue, or under the effect of alcohol or drugs or suffers from any such incapacitation during flight, he shall land at the nearest airport or aerodrome; and shall have authority commensurate with these responsibilities.

D5.3 A person shall not act as a member of a flight crew or an aircraft while under the influence of intoxicating liquor or narcotics, or drugs, or medication.

D5.4 No person shall enter an aircraft while under the influence of intoxicating liquor, or drugs, nor shall any person consume intoxicating liquor in an aircraft registered in Pakistan.

D5.5 No person shall administer drugs during flight so as to become intoxicated except in the case of a person under qualified medical supervision.

D5.6 Narcotic drugs, mood changing or hallucinogenic drugs, depressant or stimulant drugs, or marijuana, shall not be carried in an aircraft except as a medicament prescribed for the individual use of a passenger by a qualified medical practitioner, or as part of the approved emergency medical kit approved by the Director-General.

D5.7 No person shall operate a motor or other vehicle at an aerodrome while under the influence of alcohol liquor or drugs to an extent that his ability to operate the vehicle is impaired.

D6. CARRIAGE OF PERSONS WITH REDUCED MOBILITY:

D6.1 A person with reduced mobility (PRM) is understood to mean a person whose mobility is reduced due to physical incapacity (sensory or locomotory), an intellectual deficiency, age, illness, expectant mothers or any other cause of disability when using transport and when the situation needs special attention and the adaptation to a person’s need of the service made available to all passengers.

D6.2 An operator/handler shall establish:

D6.2.1 Procedures for the carriage of Persons with Reduced Mobility (PRMs) and shall establish in operations manual, D6.2.2 The total number of PRMs on each type with reference to able-bodied persons capable of assisting with an emergency evacuation.

D6.2.3 Procedures for expectant mothers and any limitation for carriage.

D6.3 An operator/handler shall ensure that PRMs are not allocated, nor occupy, seats where their presence could:

D6.3.1 Impede the crew in their duties;

D6.3.2 Obstruct access to emergency equipment; or

D6.3.3 Impede the emergency evacuation of the aeroplane.

D6.4 The pilot-in-command must be notified when PRMs are to be carried on board.

D7. <u>PASSENGER SEATING:</u>

D7.1 An operator/handler shall establish procedures to ensure that passengers are seated where, in the event that an emergency evacuation is required, they may best assist and not hinder evacuation from the aeroplane.

D7.2 An operator/handler shall establish procedures to ensure that:

D7.2.1 Those passengers who are allocated seats which permit direct access to emergency exits, appear to be reasonably fit, strong and able to assist the rapid evacuation of the aeroplane in an emergency after an appropriate briefing by the crew;

D7.2.2 In all cases, passengers who, because of their condition, might hinder other passengers during an evacuation or who might impede the crew in carrying out their duties, should not be allocated seats which permit direct access to emergency exits. Soupy crew may be given seating priority on exit seat where operating cabin crew is not required.

D7.2.3 No revenue passenger(s) are allowed to occupy a cabin crewmember jump seat.

D7.3 The following categories of passengers are among those who should not be allocated to, or directed to seats which permit direct access to emergency exits:

D7.3.1 Passengers suffering from obvious physical, or mental, handicap to the extent that they would have difficulty in moving quickly if asked to do so;

D7.3.2 Passengers who are either substantially blind or substantially deaf to the extent that they might not readily assimilate printed or verbal instructions given;

D7.3.3 Passengers who because of age or sickness are so frail that they have difficulty in moving quickly;

D7.3.4 Passengers who are so obese that they would have difficulty in moving quickly or reaching and passing through the adjacent emergency exit;

D7.3.5 Children (whether accompanied or not) and infants;

D7.3.6 Deporentes or prisoners in custody; and

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

D7.4 An operator/handler shall establish procedures for the following contingencies:

D7.4.1 Carriage of medical passengers with and without stretcher;

D7.4.2 Birth on-board an aircraft;

D7.4.3 Death during the flight; and

D8. CARRIAGE OF INADMISSIBLE PASSENGERS, DEPORTEES OR PERSONS IN CUSTODY:

D8.1 An operator/handler shall establish procedures for the transportation of inadmissible passengers, deportees or persons in custody to ensure the safety of the aeroplane and its occupants.

D8.2 The pilot-in-command must be notified when the above-mentioned persons are to be carried on board.

D9. CARRIAGE/STOWAGE OF BAGGAGE AND CARGO:

D9.1 An operator/handler shall establish procedures to ensure that only such hand baggage is taken into the passenger cabin as can be adequately and securely stowed. These procedures must take account of the following:

D9.1.1 Each item carried in a cabin must be stowed only in a location that is capable of restraining it;

D9.1.2 Mass limitations placarded on or adjacent to stowages must not be exceeded;

D9.1.3 Under-seat stowages must not be used unless the seat is equipped with a restraint bar and the baggage is of such size that it may adequately be restrained by this equipment;

D9.1.4 Items must not be stowed in toilets or against bulkheads that are incapable of restraining articles against movement forwards, sideways or upwards and unless the bulkheads carry a placard specifying the greatest mass that may be placed there;

D9.1.5 Baggage and cargo placed in lockers must not be of such size that they prevent latched doors from being closed securely;

D9.1.6 Baggage and cargo must not be placed where it can impede access to emergency equipment; and

D9.1.7 Checks must be made before take-off, before landing, and whenever the fasten seat belts signs are illuminated or it is otherwise so ordered to ensure that baggage is stowed where it cannot impede evacuation from the aircraft or cause injury by falling (or other movement) as may be appropriate to the phase of flight.

D9.2 An operator/handler, crew member, or passenger handling staff personnel shall not allow a passenger(s) to board an aircraft with carry on baggage that exceeds the limits specified in Operations Manual (Passenger handling Manual/Baggage handling manual).

D9.3 An operator shall establish procedures to ensure that all baggage and cargo on board, which might cause injury or damage, or obstruct aisles and exits if displaced, is placed in stowages designed to prevent movement. These procedures must take account of the following:

D9.3.1 That dangerous goods are not permitted except those which fall in the accepted category;

D9.3.2 That a mix of the passengers and live animals should not be permitted;

D9.3.3 That the weight of the cargo does not exceed the structural loading limit(s) of the cabin floor or seat(s);

D9.3.4 That the number/type of restraint devices and their attachment points should be capable of restraining the cargo in accordance with baggage/cargo loading Manuals;

D9.3.5 That the location of the cargo should be such that, in the event of an emergency evacuation, it will not hinder egress nor impair the cabin crew's view.

D10. ACCESSIBILITY OF EMERGENCY EQUIPMENT:

D10.1 The pilot-in-command shall ensure that relevant emergency equipment remains easily accessible for immediate use.

D11. SECURING OF PASSENGER CABIN AND GALLEY(S):

D11.1 An operator shall establish procedures to ensure that before taxiing, take-off and landing all exits and escape paths are unobstructed.

D11.2 The pilot-in-command shall ensure that before take-off and landing, and whenever deemed necessary in the interest of safety, all equipment and baggage is properly secured.

D12. PASSENGER BRIEFING:

D12.1 An operator shall ensure that:

D12.1.1 Passengers are given a verbal briefing about safety matters in English and Urdu. Parts or all of the briefing may be provided by an audio-visual presentation.

D12.1.2 Passengers are provided with a safety-briefing card on which picture type instructions indicate the operation of emergency equipment and exits likely to be used by passengers.

D12.1.3 Upon Boarding, the Passengers are briefed for:

D12.1.3.1 Over- weight/over-sized hand baggage, use of mobile phones and for no smoking.

D12.1.3.2 Baggage properly stowed in hat racks and under the seat in front if allowed.

D12.1.4 Before Upon closing the doors / before door close:

D12.1.4.1 Passengers are briefed for switching-off / flight mode the mobile phones, no smoking on-board and that the persons seated by an emergency exit may be called-on to assist with the opening of that exit in an emergency and if the person is unable or unwilling to do so, he/she must inform the cabin crew immediately.

D12.1.4.2 Ensure that:

D12.1.4.2.1 All passengers are seated

D12.1.4.2.2 Able-bodied passengers are seated at exit seats and briefed.

D12.1.4.2.3 All Exit seat regulations are followed.

D12.1.4.2.4 Passengers with infant are seated on seats where extra oxygen masks are available.

D12.1.5 Before Take Off:

D12.1.5.1 Passengers are briefed on prohibition for use of certain portable electronic devices such as mobile phones, transceivers, CB radios and remote control devices including toys.

D12.1.5.2 The briefing shall also include security of carry-on baggage, prohibition of smoking, keeping the window shutters open, fastening seat belt, bringing seat back to an upright position, folding the meal table and time frame for the use of other devices such as Lap top computers, MP3 players, CD players, camcorders and digital cameras.

D12.1.5.3 Safety Demonstration on safety belts and/or safety harness, use of oxygen equipment, location of emergency exits and when required the use and location of life jackets, is given to the passengers as has been covered in the relevant part of this safety circular.

D12.1.6.4 All doors are closed, armed, cross-checked and confirmed to the PIC.

D12.1.6 After take-off passengers are reminded of the following:

D12.1.6.1 No Smoking regulations; and

D12.1.6.2 Use of safety belts and/or safety harnesses.

D12.1.7 Before landing passengers are reminded of the following if applicable:

D12.1.7.1 Smoking regulations;

D12.1.7.2 Use of safety belts and/or safety harnesses;

D12.1.7.3 Back of the seat to be in the upright position and tray table stowed;

D12.1.7.4 Re-stowage of hand baggage; and

D12.1.7.5 Restrictions on the use of portable electronic devices.

D12.1.8 After landing passengers are reminded of the following:

D12.1.8.1 Smoking regulations; and

D12.1.8.2 Use of safety belts and/or safety harnesses.

D12.1.9 In an emergency during flight, passengers are instructed in such emergency action as may be appropriate to the circumstances.

D13. REQUIREMENTS RELATED TO OPERATIONS PERSONNEL:

D13.1 An operator/handler shall establish procedures and policies to ensure that all personnel assigned to, or directly involved in, ground and flight operations at all locations are:

D13.1.1 Adequate for the kind of operation being undertaken;

D13.1.2 Properly instructed and duly trained on their particular duties;

D13.1.3 Able to perform given duties and have demonstrated their abilities in their particular duties;

D13.1.4 Aware of their responsibilities and the relationship of such duties to the operation as a whole;

D13.1.5 Provided with required rest, extreme weather protection and required equipment for performing the given duties;

D13.1.6 Provided with approved written guidance material and regulations concerning to their responsibilities and assigned tasks.

D13.1.7 Not asked/ subjected to prepare and/or sign any document for which they are not trained, qualified and authorized.

D13.2 Operator/handler shall establish written:

D13.2.1 Policy on duty time, extended duty time and compensation for extended duty time, clear day off in a week and sickness for all the operations related personnel.

D13.2.2 Duty roster which shall ensure that the personnel are not overworked and they are given due rest (and day off at base) in accordance with the approved policy.

D13.2.3 The duties and responsibilities of the supervisors and the staff.

D13.2.4 Records of all the above aspects for atleast three year.

D14. COMPLIANCE:

D14.1 All Operators, handlers, flight crew, cabin crew, passenger handling staff and all ground operations personnel shall comply with all the contents of this ANO.

D14.2 Enforcement action in accordance with Rule 341 of CARs 94 may be initiated upon non-compliance to the requirements stated in this ANO.

D15. PROCEDURES FOR SUSPECTED COMMUNICABLE DISEASE:

D15.1 All Operators shall establish procedures for Pilot-in-Command / Cabin Crew to promptly handle cases of Communicable Disease. In this regard following procedures is recommended:

D15.1.1 On Ground:

On ground the prime responsibility for detection of passengers suffering from any communicable disease (i.e. High Fever, Persistent Coughing, Impaired Breathing and bruising/bleeding etc) remains with the Traffic Department of the Operators however, at times certain passengers may be un-noticed by the Traffic Staff and may reach the aircraft for boarding. Such cases if noticed by the Lead Cabin Crew/Cabin Crew are to be stopped from boarding the aircraft meanwhile, Traffic Staff and Pilot in Command are to be intimated who may request ATC/Traffic Staff to arrange for PCAA Doctor. Subsequently, if it is confirmed that the passenger is suffering from a Communicable Disease he is to be denied boarding and off-loaded from the subject flight after seeking approval of PIC. Later the PIC is to report the incident in his de-brief.

Note: Also refer to Para 1.7 of ANO-018-FSXX-3.0

D15.1.2 In Air:

In view of the recent COVID-19 Pandemic or otherwise there may arise a situation whereby a passenger may be detected with communicable disease on-board during flight. In this regard compliance to Safety Instructions issued to Operators by PCAA specifically for COVID-19 are to be implemented for the handling and quarantine of the passenger during Cruise Phase and After Landing (Disembarkation). It would be the responsibility of the Lead Cabin Crew to isolate the passenger and inform the PIC immediately. In return the PIC must promptly report to Air Traffic Control (ATC) at the destination airport about the passenger and seek medical assistance on arrival during the disembarkation process. The information passed by the PIC to ATC will include the following details :-

a) Aircraft Identification;
b) Departure Aerodrome;
c) Destination Aerodrome;
d) ETA;
e) Number of Persons onboard;
f) Number of Suspected cases onboard; and
g) Nature of public health risk, if known.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

AIC	:	AERONAUTICAL INFORMATION CIRCULAR
AIP	:	AEROAUTICAL INFORMATIN PUBLICATION
AIRAC	:	AERONAUTICAL INFORMATION REGULATION AND CONTROL
ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
CARs	:	CIVIL AVIATION RULES

FSD	:	FLIGHT STANDARDS DIRECTORATE
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
OM	:	OPERATIONS MANUAL
PA	:	PUBLIC ADDRESS
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
PIC	:	PILOT IN COMMAND
PRM	:	PERSON WITH REDUCED MOBILITY

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 "AOC Guide – Commercial Air Operations" CAAD-617; (MNL-005-FSXX-3.0)

E3.2 ICAO Annex 6 Part 1.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st April, 2021 and supersedes ANO-011-FSXX-3.0.

--S/d--

(**KHAQAN MURTAZA**)
Director General,
Pakistan Civil Aviation Authority

Dated: - **18th March, 2021**

--S/d--

(CAPT. S. M. RAFATULLAH)
Director Flight Standards

Dated- **15th March, 2021**
File No. HQCAA/1077/022/FSAC

FLIGHT TIME, FLIGHT DUTY PERIOD, DUTY PERIOD & REST PERIODS FOR FATIGUE MANAGEMENT – FLIGHT AND CABIN CREW

AIR NAVIGATION ORDER

VERSION : 6.0
DATE OF IMPLEMENTATION : 01.12.2020
OFFICE OF PRIME INTEREST : Flight Standards Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. IFTIKHAR JALEES USMANI	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. S. M. RAFATULLAH	Director Flight Standards	Signed
	NISAR AHMED BROHI	Addl Dir Legal (Reg)	Signed
VERIFIED BY	NADIR SHAFI DAR	Dy DG (Regulatory) Civil Aviation Authority	Signed
APPROVED BY	HASAN NASIR JAMY	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued under Rule 201, 202 & 206 of the Civil Aviation Rules 1994 (CARs 94) by the Director-General of the Civil Aviation Authority (CAA) in pursuance of the powers vested in him under Rule-4 of CARs 94. It complies with ICAO Annex 6 and ICAO Doc 9966.

A2. An Operator shall establish flight time and duty period limitations and a rest scheme that shall enable it to manage the fatigue of all its flight and cabin crew members. This scheme shall comply with the regulations prescribed in this ANO, and shall be included in all PCAA Licensed Operators Operations Manual.

A3. This ANO makes it obligatory on all Operators to ensure that all operations are conducted in conformity with fatigue management covered hereafter. Any unavoidable deviation (unforeseen) must be duly authorized by Director Flight Standards, where a verbal approval is accorded beyond office hours it must be regularized.

B. PURPOSE: To provide regulatory information Operators on Flight Duty Time Limitations:

B1. The aviation industry provides one of the safest modes of transportation in the world. Nevertheless, a safety-critical industry must actively manage hazards with potential to impact safety. Fatigue is now an acknowledged hazard that predictably degrades various types of human performance and can contribute to aviation accidents or incidents. Human brain and body functions optimally with unrestricted sleep at night but with irregular work schedules across a 24 hours' day cycle 'fatigue' is inevitable in a 24/7 industry like aviation industry. The primary issues governing fatigue and alertness on the flight deck are the amount of sleep/ rest put in before subjecting the body and mind to strain. Duration and nature of flying work; frequency and circadian rhythm depending on the type of operations of aircraft strain body and mind variously. In a single day, a flight crew on international sector(s) may have to cross a number of time zones resulting in additional strain on the body. Modern commercial jet aircraft fly at very high altitudes in rarified atmosphere where lack of oxygen pressure also contributes to additional strain and consequent fatigue. Sleep deprivation and/ or inadequate sleep also causes fatigue therefore schedules must be designed to allow periodic extended opportunities for recovery. Recovery opportunities need to occur more frequently when daily sleep restriction is greater, and hence more rapid accumulation of fatigue. The usual recommendation for a recovery opportunity is a minimum of two consecutive nights of unrestricted sleep. This is not necessarily 48 hours off duty, 48-hour break starting at midnight will not allow most people two consecutive nights of unrestricted sleep (most people go to sleep before midnight). Conversely, a 40-hour break starting at 20:00 would allow most people two consecutive nights of unrestricted sleep.

B2. Aviation Industry must meet its operational demands and functions regardless of the time of the day. Aviation related activity therefore is undertaken in shift patterns. Frequent flights at night makes it an irregular work type. This gets compounded for the flight crew with number of flying hours and flights flown across time zones. In order to support continuous 24 hours a day operation, stringent regulations are required to provide adequate rest schemes for mitigating fatigue risk as a result of irregular and at times, unpredictable flying work patterns.

B3. While recognizing the 'effect of fatigue on performance' ICAO has recommended Contracting States to establish regulations specifying limitations applicable to flight time, flight duty period and rest period for flight crew members. ICAO mandates fatigue and consequential risk management through state enacted regulations to enhance safety of a flight. There is no absolute or perfect solution to the demands of duty and rest scheduling in aviation without following the prescribed limits as guiding principles. All Operators must therefore establish binding regulations for Flight Time, Flight Duty and Rest Periods schemes for fatigue and risk management.

B4. Flight Time, Flight Duty Period, Duty Period Limitations and Rest Requirements are established for the purposes of ensuring that flight and cabin crew members are performing at an optimum level of alertness for conduct of safe flight operations.

B5. This ANO is based upon scientific principles and knowledge, where available, with the aim of ensuring that crew members are performing at an adequate level of alertness and will provide safeguards against **transient fatigue** and **cumulative fatigue** both.

C. SCOPE:

C1. For the purpose of managing fatigue risk, these regulations are established under the Standards and Recommended Practices (SARPs) of ICAO Annex 6 and ICAO Doc 9966. This ANO provides limitations on flight time, flight duty period, duty period and rest requirements with regards to variables which are likely to influence flight and cabin crew member alertness (e.g., allowable flight hours, duty and flight duty periods, and minimum rest periods) that may be applied when flight and cabin crew rosters are planned.

C2. This ANO is applicable to:

a) All PCAA Operators
b) All PCAA Licensed/ PCAA Validated Flight Crew Members
c) All PCAA Licensed/ PCAA Validated Cabin Crew members

D. DESCRIPTION:

D1. DEFINITIONS: Following terms are defined to give clarity to their usage in subsequent paragraphs:

D1.1 Augmented Flight Crew: A flight crew that comprises more than the minimum number required to operate the aircraft and in which each flight crew member can leave their assigned post and be replaced by another appropriately qualified flight crew member for the purpose of in-flight rest.

D1.2 Break: A period free of all duties, but less than minimum rest period.

D1.3 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 does not act as flight crew member.

D1.4 Calendar Day: 24 hour period commencing at 0000 hours Local Time.

D1.5 Crew Compliment: It is defined as follows:

a)	**Single Crew**	Flight Crew, it is the minimum number of Flight Crew for the type as specified in approved Airplane Flight Manual (AFM) and/ or Operations Manual (OM) Cabin Crew, it is the minimum number of Cabin Crew required as specified in type/ configuration of aircraft, as approved in Operations Manual (OM)

b)	**Augmented Crew**	<u>Flight Crew</u> •Single Pilot Crew aircraft - 1 Captain •Two Pilot Crew aircraft - 2 Captains+1 First Officer •Three Cockpit Crew aircraft - 2 Captains+1 First Officer+2 Flt. Engineers. <u>Cabin Crew</u> it is additional Cabin Crew 50% more than the minimum required for type/ configuration of aircraft, as approved
c)	**Double Crew**	<u>Flight Crew</u> •Single Pilot Crew aircraft - 2 Captains •Two Pilot Crew aircraft - 2 Captains + 2 First Officers •Three Cockpit Crew aircraft - 2 Captains + 2 First Officers + 2 Flt. Engineers. <u>Cabin Crew</u> it is **Twice the number** of minimum cabin crew required for the type/ configuration of aircraft, as approved

D1.6 **Crew Member:** A person assigned by an Operator on duty on an aircraft during a flight duty period.

D1.7 **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. Cruise Relief Pilot should be a current Captain who is right seat qualified and can relieve the PIC and/ or a Copilot of his/ her duties at the controls during the cruise phase of a flight in multi pilot operations above FL100. The operator should document adequate cruise relief procedures in its Operations Manual. These procedures should include seat assignment, contents of relief briefing with specific focus on beginning of duty to its end, and the command function. A comprehensive policy should specify the circumstances where PIC relief is terminated, and PIC is required back in the cockpit and/ or at the controls.

D1.8 **Day Off:** A day off means when a crew member is relieved of any and all duties by an Operator at home base for leisure and relaxation. A day off shall include 1.5 times the Flight Duty Period rest of previous flight or 12 hours whichever is more, plus 24 hours.

D1.9 **Deadhead Time (Positioning):** Time that a non-operating crew member spends in positioning from place to place as a passenger at the behest of the Operator. It includes positioning for duty and return from duty back to crew home station. This time also includes time spent in road travel (necessitated by non availability of air travel) to operate a subsequent flight with or without an intervening rest period. This time is inclusive in crew members duty period and shall count towards calculating subsequent post duty rest period.

D1.10 **Duty:** Any task that a Flight or Cabin Crew member are required to perform at the behest of Operator is called 'Duty'.

D1.11 **Duty Period:** Any period, which starts when Flight or Cabin Crew members are required by an Operator to report for or to commence a duty and ends when that person is free from all assigned duties. This includes, but not limited to any office management duty, administrative work, training activity i.e training imparted or received (e.g. ground course or flight simulator) and deadhead time etc.

D1.12 **Flight Crew Member:** A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

D1.13 Flight Duty Period: A period which commences when a Flight or Cabin Crew member is required to report for any flight duty. This duty period finishes at the end of post flight duty. (refer D3.2).

D1.14 Flight Time

D1.14.1 Flight Time – Fixed Wing Airplanes: The total time from the moment an aircraft 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 defined here is synonymous with the term 'block to block' time or 'chock to chock' time in general usage which is measured from the time an aircraft first moves for the purpose of taking off until it finally stops at the end of the flight.

D1.14.2 Flight Time – Helicopters: The total time from the moment a helicopter's rotor blades start turning until the moment the helicopter finally comes to rest at the end of flight, and the rotor blades stop.

D1.15 Flight Relief Seat: A comfortable, fully reclining seat, separated from the flight deck and screened from passengers equipped with a call device, supplemental oxygen, and having a degree of privacy. Where no such facility exists within an Operator's fleet of aircraft, normal cabin seats **CANNOT** be used in lieu for employing multiple crew with extended flight time and flight duty proviso in this ANO.

D1.16 Home Base: A permanent location designated to a crew member by an Operator from where the crew member normally starts and ends a duty period or a series of duty periods.

D1.17 Local Day: A 24 hour period commencing at 0000 hours local time.

D1.18 Local Night: A period of 08 hours falling between 2200 hours and 0600 hours local time.

D1.19 Long Range Variations: For the purposes of clarity in Long Range and Extended Range Operations following shall define type of operation catering for seasonal wind pattern changes between a pair of cities:

a) **Long Range (LR):** Flights with planned Flight Time between 09:01 to 14:00 hours.

b) **Extended Long Range (ELR):** Flights with planned Flight Time between 14:01 to 16:00 hours.

c) **Ultra Long Range (ULR):** Flights with planned Flight Time above 16 hours.

D1.20 Neighbouring Countries: Neighbouring countries will be those countries where the standard local time differs from the Pakistan Standard Time (PST) by maximum of two hours or where the single flight time to destination is not more than four hours, whichever is more restrictive.

D1.21 Operator: A person, organisation, or enterprise engaged in or offering to engage in an aircraft operation.

D1.22 Positioning: The transferring of a non-operating crew member from place to place as a passenger either by air or by road travel at the behest of the Operator. 'Positioning' is **synonymous** with the term 'Deadheading' defined in para D1.9.

D1.23 **Reporting Time:** The time at which crew members are required by an Operator to report for duty.

D1.24 **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.

D1.25 **Roster:** A schedule provided by an Operator of the times when a crew member is required to undertake flight and/ or ground courses duties.

Note: 'Roster' is synonymous with 'Schedule', 'Pattern' and 'Rotation'.

D1.26 **Split Duty:** A flight duty period which consists of two or more flight duties separated by less than minimum rest period.

D1.27 **Standby:** A defined period of time during which a flight or cabin crew member is required by an Operator to be available to receive an assignment for a specific duty without an intervening rest period. Maximum standby duty shall be 12 hours within a day. The Operations Manual must quantify the length of Standby Duty. The start time and end time of standby should be defined and notified in advance. Where 'airport standby' is used immediately followed by a flight duty period, the relationship between such airport standby and the assigned flight duty must be defined. Airport standby should be considered as part of a duty period and should be taken into account to calculate the minimum rest preceding a subsequent flight duty period. When flight and cabin crew members are required to be on standby at suitable accommodation arranged by the Operator and adequate rest facilities must be provided.

D1.28 **Suitable Accommodation:** means a quiet place with sound mitigation, ventilated, temperature controlled and ability to control light that provides crew members with ability to sleep in a bed isolated from public and hotel guest thoroughfares. It applies only to ground facilities and does not apply to aircraft onboard rest facilities.

D1.29 **Unforeseen Operational Circumstances:** An unplanned event, such as un-forecasted weather phenomenon, unexpected equipment malfunction, or air traffic delay that is beyond the control of an Operator. Ramp return at home station is not unforeseen operational circumstance.

D2. RESPONSIBILITIES:

D2.1 Responsibility of Pakistan Civil Aviation Authority

D2.1.1 The objective of any prescriptive limitation(s) for fatigue risk management regulations is to ensure that flight and cabin crew members remain sufficiently alert so that they can operate to a satisfactory level of performance with alertness under all circumstances. The fundamental principle for every flight and cabin crew member is to be adequately rested when he/ she begins a flight duty period, and whilst flying be sufficiently alert to safely operate at satisfactory level of performance during all normal and abnormal situations.

D2.1.2 Issuance of this Air Navigation Order complies with the above mentioned responsibility. ICAO mandated 'continued surveillance' obligation by Pakistan Civil Aviation Authority is achieved through surveillance activities. Flight Standards Directorate shall surveil on behalf of PCAA on all Operators to verify compliance of the limits stipulated within this Air Navigation Order through frequent audits.

D2.2 Operator's Responsibilities

D2.2.1 It shall be the responsibility of an Operator's Accountable Executive to ensure implementation and strict adherence to limitations stipulated in this ANO. While the Accountable Manager is responsible for adherence to the ANO in crew scheduling practices by defining crew scheduling policy within Operator's Operations Manual and shall maintain oversight in monitoring adherence to limits herein.

D2.2.2 Operators may establish binding and more **conservative** flight time and duty period limitations and a rest scheme than proviso this ANO that enables it to manage fatigue of all its flight and cabin crew members. This scheme shall mandatorily comply with the regulations established in this ANO and shall be included in Operator's Operations Manual.

D2.2.3 An Operator shall define **maximum duty period** scheme for flight and cabin crew members in their Operations Manual which is **more conservative** than maximum cumulative time limits explained in succeeding paras. For purposes of clarity maximum duty period shall cover duty periods as in following:

a) Within 24 hours starting 0600 hours Local Time
b) Within seven (07) Consecutive Days
c) Within 30 Consecutive Days
d) Within 365 Consecutive Days

D2.2.4 Operators shall reflect in their Operations Manuals those elements of this ANO that are appropriate to the operations they undertake. If operations are planned that cannot be managed within the limitations as published in Operations Manual, a variation may be requested. In this case, and before a variation is approved, an Operator shall demonstrate to the PCAA that the variation provides an equivalent level of safety and that objections on grounds of safety are taken into account.

D2.2.5 An Operator shall not plan any flight crew with more than three sectors in case that duty is between 2200 – 0600 hours local time.

D2.2.6 Flight Crew Duty Rosters/ Flights' Schedule shall be prepared and published sufficiently in advance to provide flight and cabin crew members the opportunity to plan adequate rest. Consideration should be given to the cumulative effects of undertaking long duty hours interspersed with minimum rest. Operators shall avoid rosters that result in the serious disruption of work and sleep pattern.

D2.2.7 Crew member Duty Rosters should cover a period of at least 15 days for scheduled operations (crew rosters must be published at least three days before the commencement of the duty roster). For any non rostered adhoc flight (e.g Charter Flight, Extra Section(s), Test Flight, Ferry Flight, Positioning Flight etc) at least a 10 hours notice must be afforded to the crew member(s).

D2.2.8 Flights shall be planned to be completed within the allowable flight duty period taking into account the nature of operation with time necessary for pre-flight duties, flight time and turn-around time. Mandatory minimum rest period is to provide adequate rest based upon the actual flight operation.

D2.2.9 In order to avoid any detriment to flight or cabin crew member's performance, opportunities to consume a snack must be arranged when the flight duty period exceeds 04 hours for scheduled operations. For scheduled operations where a flight duty period is in excess of 06 hours a healthy meal shall be provided.

D2.2.10 The Operator should designate a home base for each flight and cabin crew member from where a flight/ cabin crew member will normally start and end a duty period or a series of duty periods.

D2.2.11 The Operator shall not require a crew member to operate an aircraft if it is known or suspected that limitations provided herein and in the Operations Manual are likely to exceed, or the crew member is fatigued to an extent that safety of flight may be adversely affected.

D2.2.12 In case of any deviation and/or exceedance to prescribed limits, Accountable Manager shall promptly report so in writing explaining reasons thereof for review by Director Flight Standards. Where a verbal authorization has been granted/ agreed to by DFS, it is Accountable Manager's responsibility to get it regularized in writing within three business/ working days.

D2.3. Flight and Cabin Crew Members' Responsibility

D2.3.1 Flight/ Cabin Crew Member shall not operate an aircraft when he/ she knows or suspects that limitations provided herein and in Operations Manual are likely to exceed, or he/ she is fatigued, or feels unfit to an extent that safety of the flight may be adversely affected.

D2.3.2 It is the responsibility of individual crew member to ensure adherence of limits proviso of this ANO viz flight time, flight duty etc. Any coercion tactics employed by operator or accountable managers on crew member to deviate or violate this FDTL scheme must be duly reported to Director Flight Standards.

D2.3.3 Flight/ Cabin Crew Members should make best use of the facilities and opportunities that are provided for rest and consumption of meals. They should utilize rest periods to ensure that they are fully rested prior to undertaking any flight duty.

D3. <u>REPORTING TIME:</u>

D3.1 Crew report times must realistically reflect the time required to complete pre-flight duties, both safety-and service-related (if appropriate), and a standard allowance time is to be added at the end of flight time to allow for the completion of checks and records.

D3.2 For record keeping purposes and calculating subsequent rest periods Pre-flight Report Time and Post Flight Time shall be counted within the Total Duty Period for a flight as follows:

Flight Type	Flight Crew		Cabin Crew	
	PRE FLIGHT	POST FLIGHT	PRE FLIGHT	POST FLIGHT
Domestic Flight	45 Mins	15 Mins	01:00 Hours	30 Mins
International Flight	01 Hour	30 Mins	01:00 Hours	30 Mins
***** Pre Flight and Post Flight time shall be included in total Flight Duty Period for purposes of calculating subsequent earned rest for Flight and Cabin Crew both.				

D3.3 Time spent in road travel to position for undertaking a flight shall be counted towards total Duty Period. Traveling time spent by a flight or cabin crew member between two stations immediately before commencing a flight duty shall be counted as duty period. It should therefore be taken into account when deciding where pre-flight rest should be taken.

D3.4 There may be a set of places where positioning of crew by air may not be possible owing to non availability of scheduled flights, for such places Operators must define and add road travel patterns with average road travel time in their Operations Manual. After any road travel of upto 3 hours or more undertaken for positioning purposes to operate a flight, no Operator shall permit any Crew Member to undertake a Flight Duty without an intervening rest period of minimum of 12 hours.

D4. MAXIMUM DUTY PERIOD, FLIGHT TIME AND FLIGHT DUTY PERIOD LIMITS:

D4.1 Maximum Flight Time and Maximum Flight Duty Period – Cockpit Crew

D4.1.1 Maximum Flight Time/ Flight Duty Period other than Long Range (LR), Extended Long Range (ELR) and Ultra Long Range (ULR) Operations:-

		Flight Time	Flight Duty
a)	**Flight Crew Compliment Aircraft Weight Category above 5700 kgs**	**Flight Time**	**Flight Duty**
	(i) **Single Cockpit Crew** compliment •Two Crew Cockpit (Capt & FO or 02 Capts) •Three Crew Cockpit (Capt, FO & Flt Engr)	 09 Hours 10 Hours	 12 Hours 13 Hours
	(ii) **Augmented Cockpit Crew** compliment* •Two Crew Cockpit (2 Capts & FO) •Three Crew Cockpit (2 Capts, FO & 2 Flt Engrs)	 11 Hours 12 Hours	 13 Hours 15 Hours
	(iii) **Double Cockpit Crew** compliment*	16 Hours	18 Hours
b)	**Flight Crew Compliment Aircraft Weight Category below 5700 kgs**	**Flight Time**	**Flight Duty**
	(i) Agricultural Spray	04 Hours	09 Hours
	(ii) Charter, Flying School, Aerial Work Ops below 1500 feet AGL •Without air-conditioning •With air-conditioning	 04 Hours 5.5 Hours	 09 Hours 12 Hours
	(iii) Charter, Flying School, Aerial Work Ops above 1500 feet above ground level (AGL) •Single Pilot •Two or more Pilots	 06 Hours 08 Hours	 09 Hours 12 Hours

D4.1.2 Maximum Flight Time/ Flight Duty Period Limitations for Long Range (LR)/ Extended Long Range (ELR) and Ultra Long Range (ULR) Operations:-

Flight Crew Compliment	Flight Time	Flight Duty
a) 2 Sets of Cockpit Crew (LR Flight)*	16 Hours	18 Hours
b) 2 Sets of Cockpit Crew + Cruise Relief Pilot (ELR Flight)**	17 Hours	20 Hours
c) 3 Sets of Cockpit Crew (ULR Flight)***	18 Hours	21 Hours
* Crew Sets A & B along with PIC for the flight/ sector must be clearly defined and annotated in printed flight schedule. ** Crew Sets A & B along with PIC for the flight/ sector must be clearly defined and		

annotated in printed flight schedule. Similarly, the Cruise Relief Pilot must also be clearly defined and annotated in printed flight schedule.

*** Crew Sets A,B & C along with PIC for the flight/ sector must be clearly defined and annotated in printed flight schedule.

D4.2 Maximum Flight Time and Maximum Flight Duty Period – Cabin Crew

D4.2.1 Maximum Flight Time/ Flight Duty Period other than Long Range (LR), Extended Long Range (ELR) and Ultra Long Range (ULR) Operations:-

Cabin Crew Compliment	Flight Time	Flight Duty
a) Single Cabin Crew compliment	12 Hours	16 Hours
b) Augmented Cabin Crew (additional 50% to single crew)	14 Hours	18 Hours
c) Double Cabin Crew compliment	16 Hours	20 Hours

D4.2.2 Maximum Flight Time/ Flight Duty Period Limitations for Long Range (LR)/ Extended Long Range (ELR) and Ultra Long Range (ULR) Operations:-

Flight Crew Compliment	Flight Time	Flight Duty
a) Double Cabin Crew Compliment	16 Hours	20 Hours
b) 2 Sets of Cabin Crew+50% of Single Cabin Crew	18 Hours	22 Hours
c) 3 Sets of Cabin Crew	20 Hours	24 Hours

D5. CONSECUTIVE NIGHT LIMITATIONS:

D5.1 Crew member shall neither be detailed nor undertake any flight duty between periods embracing 2200 to 0600 hours local time for more than two consecutive nights. In this case no crew member shall be detailed for next such flight pattern before availing full earned rest i.e not less than double the duty time of his/ her previous flight.

D5.2 All Simulator Training/ Checks shall be conducted between 0700 to 2359 hours local time only. Consecutive Night Limitations shall not apply to Simulator Training/ Checks.

D6. CUMULATIVE TOTAL TIME LIMITS:

D6.1 **Non Flight Training Environment – Cockpit Crew:** In compliance with cumulative total time limitations no Operator shall permit an aircraft to fly, and no cockpit crew member shall act as a crew member of an aircraft if during planned flight operations a flight crew member will accumulate flight time in:

a) Excess of 35 hours within seven (07) consecutive days.
b) Excess of 100 hours within 30 consecutive days.
c) Excess of 950 hours within 365 consecutive days.

D6.2 **Flight Training Environment – Cockpit Crew:** The Operator shall not permit an aircraft to fly, nor shall a person act as an Instructor/ trainee instructor pilot member of an aircraft if during planned flight following scheme would exceed a trainer and/or trainee instructor pilot's cumulative flight training time in:
a) Excess of 30 instructional flight hours within seven (07) consecutive days
b) Excess of 70 instructional flight hours within 30 consecutive days
c) Excess of 700 instructional flight hours within 365 consecutive days

D6.3 **Cabin Crew:** In compliance of cumulative total time limitations no Operator shall permit an aircraft to fly, and no cabin crew member shall act as a crew member of an aircraft if during planned flight operations a cabin crew member will accumulate flight time in:

a) Excess of 35 hours within seven (07) consecutive days.
b) Excess of 100 hours within 30 consecutive days.
c) Excess of 1000 hours within 365 consecutive days.

D7. LIMITATIONS ON NUMBER OF LANDINGS:

D7.1 In any one planned flight duty period, no crew member of an aircraft with weight category above 5700 Kgs, shall do or be tasked to do more than a total of:

a) 6 landings in day light in one duty period; or
b) 4 landings by day and 1 landing by night in one duty period; or
c) 3 landings by day and 2 landings by night in one duty period; or
d) 2 landings by day and 3 landings by night in one duty period; or
e) 3 landings by night in one duty period.

D7.2 In any one planned duty period, no crew member of an aircraft with weight category of 5700 Kgs and below, shall do or be asked to do more than a total of:

a) 8 landings in day light in one duty period; or
b) 6 landings by day and 2 landing by night in one duty period; or
c) 4 landings by day and 3 landings by night in one duty period; or
d) 5 landings by night in one duty period.

D7.3 Limitation on number of landings shall not include landing for technical, ferry and for the purpose of retrieval of aircraft after diversion.

D7.4 The restrictions with regard to number of landings during any 24 hours period are not applicable to:

a) Helicopter Operations

b) Flying Schools

c) Flight crew engaged in training flights. If the training flight is conducted after any commercial operation(s), the number of landings shall not be the limiting factor for calculation of FDTL. In such cases, flight duty period shall be the limiting factor. Whenever any commercial operation is conducted after a training flight, the number of landings and flight and duty time including the training flights shall be considered for calculating FDTL.

D8. TRAINING – SIMULATOR AND AIRCRAFT FLYING:

D8.1 Whenever an Instructor/ Examiner or a Flight Crew Member performs any training/ check on a flight simulator, all the time spent in pre and post briefing shall count towards flight duty period inclusive of the time spent in simulator. For the purposes of FDTL specific to Simulator pre and post briefing time shall be taken as two hours (01:30 hours of briefing and 00:30 hours debriefing).

D8.2 Where a Flight Crew Member is scheduled to fly an aircraft after flight simulator or vice versa, the flight duty period shall be counted from the reporting time for the first duty.

D9. EXTENSION OF FLIGHT DUTY PERIOD:

D9.1 Exceptions allow flexibility needed to respond to unforeseen circumstances that occur during routine flight operations beyond the control of an operator. **These exceptions are not intended for use in regular practice and must not be scheduled or planned by an Operator**. Any waivers obtained from Flight Standards Directorate must be communicated in written format to the Operating Crew through appropriate means by the Operator.

D9.2 PIC may extend Flight Duty Period by no more than One Hour in unforeseen operational circumstances, beyond one hour of extension by PIC Accountable Manager may further extend Flight Duty Period by another one hour. Accountable Manager so extending one hour of flight duty period beyond PIC's discretion shall verbally inform FSD of granting this extension within next 12 hours. Any extension beyond these two hours (one hour by PIC and One Hour by Accountable Manager) due authorization from DFS/ POI must be sought. Flight Duty Period extensions so exercised shall be regularized in writing within three working days.

D9.3 Before exercising any extension of flight duty period, the PIC should be satisfied that all members of the crew required to operate the aircraft consider themselves fit to do so. The PIC should also obtain a written consent of the operating crew before operating such flight.

D9.4 In an emergency situation, which in the judgement of the PIC presents a serious risk to health or safety of crew and passengers or endangers their lives, then the above limits may be exceeded till emergency situation is resolved. Limits so exceeded shall be promptly reported by accountable manager and must be regularized in writing within 72 hours for the approval of DFS.

D9.5 Any extension of flight duty period exercised must be filed by the PIC upon return explaining reasons thereof in the form of a brief write up for regularization within 72 hours for the approval of DFS.

D9.6 Maximum Flight Duty Period extension in unforeseen circumstances is 04 hours with prior approval of DFS and must never be exercised voluntarily by any Accountable Manager and/ or PIC. All such extensions must also be filed for regularization action in writing within 72 hours to DFS for approval of competent authority.

D10. MINIMUM REST PERIOD:

D10.1 Operator shall not assign any crew member to any duty during required rest period.

D10.2 **RPT Operations:** Minimum Rest Period for Regular Public Transport Operations shall be governed under following limits:

a) **Cockpit Crew:** An Operator shall provide minimum rest period of twice the duration of Flight Duty Period (of previous flight), but never less than 12 hours.

(e.g. 05 hours FDP x 2 = 10 Hours. Minimum Rest Required is 12 hours)

b) **Cabin Crew**: An Operator shall provide each cabin crew member with a minimum rest period before each flight duty period which shall not be less than twice the flight duty period of previous flight or 10 hours, whichever is more.

c) **Cockpit & Cabin Crew both**: In case of unplanned exigencies (death on board, serious sickness, technical landing etc.), retrieval of diverted aircraft, crew specially positioned for aircraft retrieval an additional landing is permissible. However, in this case minimum rest period may be reduced to eight (08) hours. Such exceedance shall only be availed with prior approval of DFS/ POI and with the express written consent of the operating crew. This rest period shall not include time allowed for preflight and post flight duties.

D10.3 Charter & Aerial Work Operation (Aircraft Weight Category Above 5700 Kgs): Twice the duration of flight duty period of previous flight or 12 hours, whichever is more.

D10.4 Charter, Aerial Work and Flying School (Aircraft Weight Category 5700 kgs and below): Twice the duration of flight duty period of previous flight or 12 hours, whichever is more.

D10.5 Mandatory Days Off: All Operators shall provide FIVE Mandatory Days Off at home base to all Crew Members (Cockpit & Cabin Crew both) in a Calendar Month. Mandatory Days Off in a month shall be prorated in case of leave in a month.

D10.6 Seventh Day Off: After six days of consecutive duty it is mandatory for an Operator to provide a day off to crew members at his/ her home base after availing his/ her rest period of last flight duty undertaken on sixth day. In case of a person being on a series of flights pattern, this Seventh Day Off shall be afforded after the person reverts to his/ her home base.

D10.7 In case a crew member voluntarily opts to forego his/ her rest period outstation, after completing a flight duty, and desires to be positioned at home base, the entire time spent for positioning back to home base as deadhead shall be counted in calculation of duty period. The Operator is obligated to provide full earned rest period at his/ her home base.

D10.8 Special Rest Requirements for LR, ELR and ULR Flights

a) Rest period prior to LR/ ELR flights shall be 24 hours (including one local night) prior to the scheduled departure of LR/ ELR flight.

b) Rest period prior to ULR flights shall be 48 hours (including two local nights) prior to schedule departure of ULR flight.

c) After operating LR, ELR and ULR Flights minimum rest period of double the duty time rest shall be provided at outstation.

d) Rest after return to home base on completion of LR, ELR and ULR flight shall be 48 hours or double the flight duty period rest whichever is more.

e) After operating

i) LR – Seven (07) days interval between flights

ii) ELR – Ten (10) days interval between flights

iii) ULR – Twelve (12 days interval between flights

D11. MISCELLANEOUS PROVISIONS:

D11.1 **Available:** The Operations Manual must define 'Available' (if applicable). When flight and cabin crew members are required to be available for contact over a brief period of time to receive instructions concerning a possible change of roster, that requirement should not prevent that crew member from having a rest period before reporting for duty. The time spent being available shall not be counted as Duty. But if the crew member is being asked to remain available for undertaking any flight his/ her time spent as being available shall be counted as Duty.

D11.2 **Flying while Fasting:** In compliance of CARs 1994 Rule 41(3) no crew member shall exercise the privileges of his/ her license as a crew member while fasting.

D11.3 **License Examinations:** No crew member is to undertake any pilot license examination on the day of his/ her scheduled flight duty and also during the intervening rest period provided for a series of flights.

D11.4 **Flights Operated by Augmented Crew & Provision of In-Flight Relief**

D11.4.1 The composition and number of flight crew members carried to provide in-flight relief, and the quality of rest facilities provided should determine the amount by which the basic flight duty period limitations may be extended. A sensible balance must be kept between the division of in-flight duty and in flight rest times.

D11.4.2 The Operator shall ensure that flight and cabin crew members are notified prior to commencement of the rest period preceding the flight of the role they are required to undertake (i.e. main or relief crew), so that they can plan their pre-flight rest accordingly. These notifications must be embedded within the printed crew schedules also.

D11.4.3 Augmented Crew and Double Crew are limited to 03 sectors on international and 04 sectors on Domestic/ Regional flights

D11.4.4 The Operator must address the following when it desires to operate a flight or a series of flights with Augmented or a Double Set of Crew:

a) The quality of the flight relief facilities must match the minimum requirements of a Flight Relief Seat.

b) The qualifications of crew members at the controls at all stages of flight should be such that the control and completion of the flight to a safe landing should not be dependent on the return of resting crew members to resume their duty.

c) The division of duty and rest between crew members must be kept in balance.

d) Operator must ensure that crew integrity is retained during the PIC's period of relief. Responsibility for the safe conduct of the flight will be delegated to the Relief Pilot who must be suitably qualified.

D11.5 **Management Crew Members' Time in Office**: Any time spent by any Management Crew Member (Cockpit & Cabin Crew) shall be counted as Duty and applicable for the purposes of calculating total duty period. Hence, the maximum flight duty period limits defined in para D4 shall apply.

D11.6 **Schedule Changes:** Crew Schedule must depict actual crew movement and positioning and it must not be altered in any way to legalise a flight duty.

D12. VARIATIONS TO FDTL:

D12.1 It may not be possible to cover every eventuality encountered in a flight operational environment. Should variations from these regulations become necessary, an Operator shall establish means with equivalent level of safety acceptable to PCAA to permit such variations. Any variation to fatigue risk management scheme of Flight and Duty Time Limitation outlined herein beyond the scope of an Operator may only be permitted by an express authority of Director General PCAA.

D13. RECORD KEEPING:

D13.1 To comply with the regulations established in this ANO, an Operator shall maintain records, for all its flight and cabin crew members of flight time, flight duty periods, duty periods and rest periods.

D13.2 The Operator shall ensure that these records include for each flight and cabin crew member, at least:

a) The start, duration and end of each flight duty period;

b) The start, duration and end of each duty period;

c) Positioning Records including road travel;

d) Rest Periods;

e) Flight time;

f) Record of crew changes with reasons;

g) Record of variations between Planned & Actual Flight Crew Rosters.

D13.3 To enable the Operator to ascertain that the fatigue management scheme is functioning as intended and as approved, the above mentioned records should be kept for 24 months from the date of the last relevant entry of the duties performed and rest periods achieved so as to facilitate inspection by the Operator's authorized personnel and audit by the PCAA.

D13.4 Flight crew members shall maintain a personal record of their daily flight time in their personal flying logbooks.

D13.5 The Operator should also keep records of occasions when an extension of flight duty period under unforeseen operational circumstances has been requested and approved.

D13.6 If extension (as mentioned above) has to be applied for similar reasons on more than 10 per cent of occasions when a particular route or route pattern is flown, it is likely that the intention of this guidance is not being met and undue fatigue may result. Arrangements must be made to change the schedule or the crewing arrangements so as to eliminate the frequency at which such events occur.

D13.7 All Operators must deposit a Quarterly Return of their Flight Duty Records along with any exceedances with elaborate reasons and actions taken to avoid such recurrences.

D13.8 PCAA may require submission of copies of certain additional records as and when necessitated.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
CARs	:	CIVIL AVIATION RULES
CSI	:	CABIN SAFETY INSPECTOR
DFS	:	DIRECTOR FLIGHT STANDARDS
ELR	:	EXTENDED LONG RANGE
FDTL	:	FLIGHT DUTY TIME LIMITATIONS
FI(P)	:	FLIGHT INSPECTOR (PILOT)
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
LR	:	LONG RANGE
OM	:	OPERATIONS MANUAL
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
PIC	:	PILOT IN COMMAND
POI	:	PRINCIPAL OPERATIONS INSPECTOR
PST	:	PAKISTAN STANDARD TIME
RPT	:	REGULAR PUBLIC TRANSPORT
ULR	:	ULTRA LONG RANGE

E2. RECORDS:

NIL

E3. REFERENCES:

E3.1 ICAO Annex 6 – Operation of Aircraft

E3.2 ICAO Doc 9966 – Manual for the Oversight of Fatigue Management Approaches

E3.2 FAA 14 CFR Part 117 – Flight and Duty Limitations and Rest

E3.3 UK CAP 371 - Avoidance of Fatigue in Aircrew

E3.4 GCAA CAP 14 – ULR Operations

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01.12.2020 and supersedes all previous versions of ANO-012-FSXX.

--S/d--

(HASSAN NASIR JAMY)
Director General,
Pakistan Civil Aviation Authority

Dated: - **14th September, 2020**

--S/d--

(CAPT. S. M. RAFATULLAH)
Director Flight Standards
Dated: - **14th September, 2020**
File No. HQCAA/1077/023/FSAC

EXTENDED DIVERSION TIME OPERATIONS (EDTO)

AIR NAVIGATION ORDER

VERSION	**:**	**2.0**
DATE OF IMPLEMENTATION	**:**	**01.04.2018**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. AITZAZ AHMED QURESHI	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Actg. Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. The Air Navigation Order (ANO) is Issued by the Director General of the Civil Aviation Authority (CAA) in pursuance of the powers vested under Rule 4 of CARs 94.

B. PURPOSE:

B1. The purpose of this document is to provide guidance on the general provisions relating to operations by aeroplanes beyond 60 minutes flying time to an en-route alternate aerodrome and EDTO. The guidance will form the basis for establishing a threshold time and approving the maximum diversion time for a given operator with a specific aeroplane type. This document also provides guidance on the means of achieving the required level of safety envisaged.

C. SCOPE:

C1. This ANO relates to the approval and training of Regular Public Transport Operators to conduct Extended Diversion Time Operations (EDTO).

C2. This (ANO) states an acceptable means for obtaining approval under CARs' 94 for two engine aeroplanes to operate over a route that contains a point farther than one hour flying time at the normal one engine inoperative cruise speed (in still air) from an adequate aerodrome and for more than two engine aircraft beyond 120 minutes. Specific criteria are included for deviation of 75 minutes, 120 minutes or 180 minutes from an adequate aerodrome.

C3. The instructions contained in this ANO shall be complied with by all operators who hold an Air Operator Certificate for Regular Public Transport Operations.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 The terms used in this ANO have the following meanings:

D1.1.1 **Alternate Aerodrome**

D1.1.1.1 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 at the expected time of arrival. Alternate aerodromes include the following:-

a) **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.

b) **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

c) **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.

D1.1.2 Extended Diversion Time Operation (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 PCAA.

D1.1.3 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, EDTO significant system. An aeroplane system whose failure or degradation could adversely affect the safety of an EDTO flight, or whose continued functioning is important to the safe flight and landing of an aeroplane during an EDTO diversion.

D1.1.4 Extended Range Twin Operations (ETOPS) enable properly certificated twin-engine aeroplanes operated by appropriately qualified flight crew to fly further than a threshold time of 60 minutes at One Engine Inoperative (OEI) cruise speed. In accordance with International Civil Aviation Organization (ICAO) Annex 6 Part I, such requirement is renamed as Extended Diversion Time Operations (EDTO) and is expanded to include the operation of aero planes with three and four engines.

D1.1.5 **Isolated Aerodrome**

D1.1.5.1 A destination aerodrome for which there is no destination alternate aerodrome suitable for a given aeroplane type.

D1.1.6 **Maximum Diversion Time**

D1.1.6.1 it should be understood that the maximum diversion time approved should take into consideration the most limiting EDTO significant system time limitation, if any, indicated in the Aeroplane's 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 model.

D1.1.7 **Point of no return**

D1.1.7.1 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.

D1.1.8 **Threshold Time**

D1.1.8.1 The range, expressed in time, established by PCAA to an en-route alternate aerodrome, whereby any time beyond requires an EDTO Approval from PCAA.

D2. INTRODUCTION:

D2.1 Extended Range Twin Operations (ETOPS) enable properly certificated twin-engined aeroplanes operated by appropriately qualified flight crew to fly further than a threshold time of 60 minutes at One Engine Inoperative (OEI) cruise speed. In accordance with International Civil Aviation Organization (ICAO) Annex 6 Part I, such requirement is renamed as Extended Diversion Time Operations (EDTO) and is expanded to include the operation of aeroplanes with three and four engines.

D2.2 For all twin-turbine engined aeroplanes which are flying for the purpose of public transport, with maximum authorized take-off weight exceeds 5,700 kg and certificated to carry more than 19 Passengers, and requires to fly more than a threshold time of 60 minutes (calculated at OEI cruise speed in still air and International Standard Atmosphere (ISA) conditions) from an en-route alternate aerodrome;

D2.3 ETOPS is considered as equivalent to EDTO for twin-turbine engined aeroplanes. Operators with ETOPS Approval DO NOT require to apply for EDTO Approval for the same aeroplane airframe/engine combinations and on the same routes and to the same maximum diversion time as was authorised for ETOPS. The previous edition of CAR 94, which details the corresponding provisions for ETOPS, is considered as an acceptable mean of compliance to the requirements for EDTO for twin-engined aeroplanes.

D2.4 Readers should note the following:

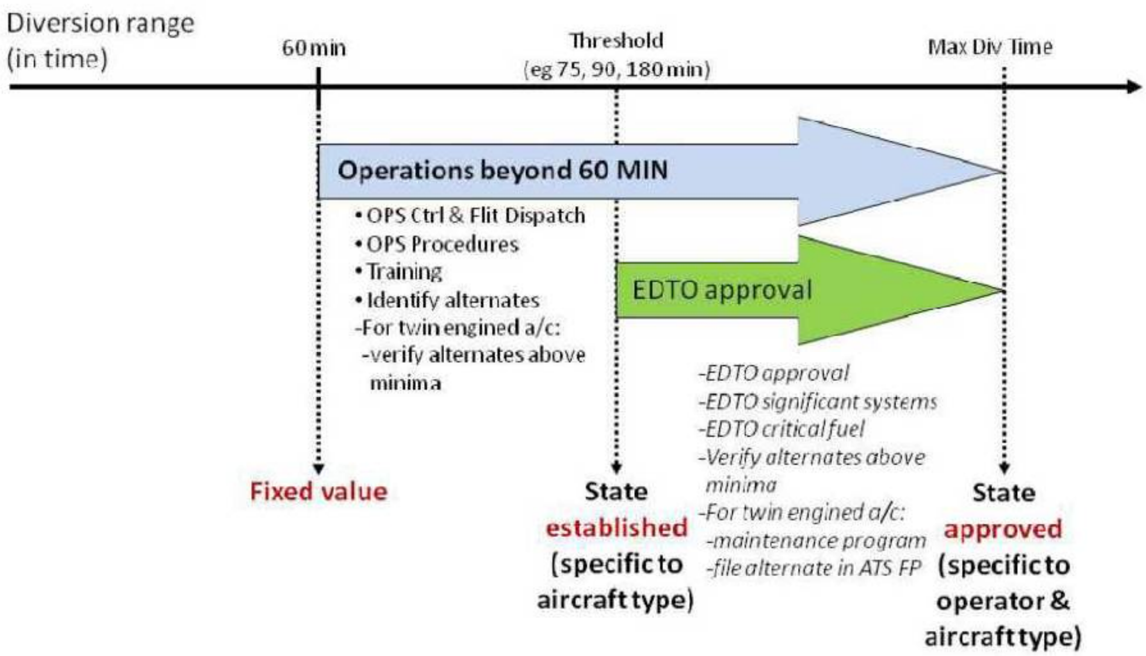
D2.4.1 When the diversion time exceeds the threshold time, the operation is considered to be an EDTO.

D3. OPERATIONS BY AEROPLANES WITH TURBINE ENGINES BEYOND 60 MINUTES TO AN EN-ROUTE ALTERNATE AERODROME:

D3.1 General

D3.1.1 All provisions for operating by aeroplanes with turbine engines beyond 60 minutes to an en-route alternate aerodrome also apply to EDTO (see Figure below).

Figure 1: Generic EDTO graphical representation.



D3.1.2 Operators conducting operations beyond 60 minutes from a point on a route to an en-route alternative aerodrome shall ensure that:

a) for all aeroplanes:

i) en-route alternate aerodromes are identified;

ii) 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.

D3.1.3 In addition to the requirements in paragraph 3.1.2, all operators shall ensure that the following are taken into account and provide the overall level of safety intended by the operator's Safety Management System (SMS):

a) operational control and flight dispatch procedures;
b) operating procedures; and
c) training programmes.

D3.1.4 In applying the requirements as stated in paragraph 3.1.3, 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.

D3.1.5 Aeroplanes with turbine engines operating beyond 60 minutes to an en-route alternate aerodrome are not required to have specific additional approval by PCAA except if they engage in EDTO.

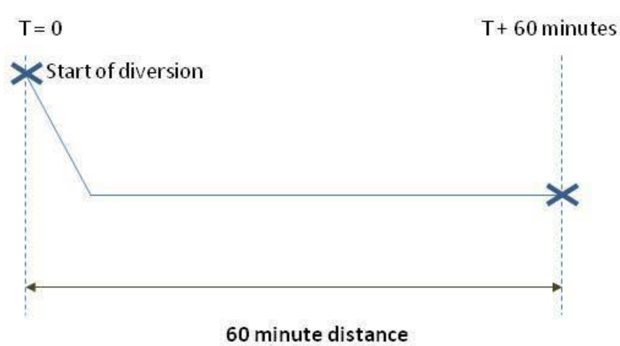
D3.2 Conditions to be used when converting diversion times to distances

D3.2.1 For the purpose of this guidance, an "approved OEI speed" or "approved AEO speed" is any speed within the certified flight envelope of the aeroplane.

D3.3 Determination of the 60 min distance - aeroplanes with two turbine engines

D3.3.1 For determining whether a point on the route is beyond 60 minutes to an en-route alternate, the operator should select an approved 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 the Figure below. For the purposes of computing distances, credit for drift down may be taken.

Figure 2: 60 min distance - Aeroplanes with two turbine engines



D3.4 Training

D3.4.1 Operators should ensure that the training programmes should include, but not limited to, route qualification, flight preparation, concept of EDTO and criteria for diversions.

D3.5 Flight dispatch and operational requirements

D3.5.1 In applying the general flight dispatch requirements, 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, reduced flight altitude, etc. For compliance with ICAO requirements 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 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).

D3.5.2 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.

D3.6 En-route alternate aerodromes

D3.6.1 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.

D4. EDTO REQUIREMENTS:

D4.1 Basic concept

D4.1.1 This section addresses provision that apply in addition 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 PCAA (i.e. EDTO).

D4.1.2 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 PCAA will grant approval. When approving the operator's maximum diversion time for an operator of a particular aeroplane type engaged in EDTO, PCAA will need to consider not only the capable range of the aircraft, taking into consideration any limitation of the aeroplanes type certificate, but also the operator's previous experience on similar aircraft types and routes. The following factors will also be considered in conjunction with other requirements stipulated in this document:

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.

D4.1.3 Notwithstanding the provisions in paragraph D4.1.2(a), the PCAA 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.

D4.1.4 For aeroplanes engaged in EDTO, the additional fuel required by CAR 94 shall include the fuel necessary to comply with the EDTO critical fuel scenario.

D4.1.5 A flight shall not proceed beyond the threshold time in accordance with paragraph D2.2 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 (i.e. suitable aerodromes). If any conditions are identified that would preclude a safe approach and landing at that aerodrome during the estimate time of use, an alternative course of action shall be determined.

D4.2 EDTO significant systems

D4.2.1 EDTO significant systems may be the aeroplane propulsion system and any other aeroplane systems whose failure or malfunctioning could adversely affect safety unique to an EDTO flight, or whose functioning is important to continued safe flight and landing during an aeroplane EDTO diversion.

D4.2.2 Many of the aeroplane systems which are essential for non-EDTO may need to be reconsidered to ensure that the redundancy level and/or reliability will be adequate to support the conduct of safe EDTO.

D4.2.3 The maximum diversion time should not exceed the value of the EDTO significant system limitation(s), if any, for EDTO identified in the Aeroplane's Flight Manual.

D4.3 Maximum diversion time

D4.3.1 It should be understood that the maximum diversion time approved should take into consideration the most limiting EDTO significant system time limitation, if any, indicated in the Aeroplane's 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.

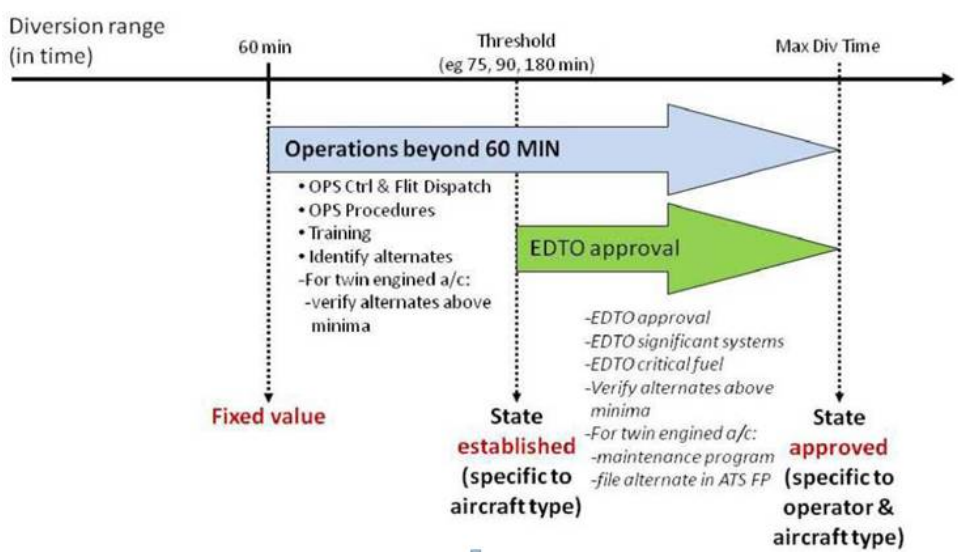
D4.4 EDTO for Aeroplanes with Two Turbine Engines

D4.5 Basic Principles

D5. GENERAL:

D5.1 EDTO provisions for aeroplanes with two turbine engines do not differ from the previous ETOPS provisions. Therefore ETOPS carry the same meaning as EDTO for twin turbine-engined aeroplanes (see Figure below).

Figure 3: Generic EDTO Graphical representation



D5.2 Operational and Diversion Planning Principles

D5.2.1 When planning or conducting EDTO, an 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
c) in the event of a single or multiple failure of an EDTO significant systems 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 results from any decision made to continue the planned flight.

D5.3 EDTO Critical Fuel

D5.3.1 An aeroplane with two engines engaged in EDTO operations should carry enough fuel to fly to an en-route alternate aerodrome. This EDTO critical fuel corresponds to the additional fuel that may be required to comply with CARs 94.

D5.3.2 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;

   i) the speed selected for the AEO diversion (i.e. depressurization alone) may be different from the approved OEI speed used to determine the EDTO threshold and maximum diversion distance. (see paragraphD9).

   ii) 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 paragraph D9).

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).

D5.3.3 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, weight, 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, weather, wind, and terrain, in proximity of the en-route alternate aerodrome; and

d) instrument approaches and approach/runway lighting available, rescue and fire fighting services (RFFS) at the en-route alternate aerodrome;
e) 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.

D5.4 Threshold Time

D5.4.1 In establishing the appropriate threshold time and to maintain the required level of safety, the PCAA will consider the following:

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. Considering the above factors in relation to the aircraft currently registered in Pakistan, the threshold time set for twin turbine-engined aeroplanes is 60 minutes unless otherwise stated.

D5.4.2 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 paragraphD9.

D5.5 Maximum Diversion Time

D5.5.1 In approving the maximum diversion time, the PCAA will take into account the following for the assessment of the overall level of safety:

a) reliability of the propulsion system;
b) airworthiness certification for EDTO of the aeroplane type; and
c) EDTO maintenance programme.

Factors such as the EDTO certified capability of the aeroplane, the aeroplanes 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 will also be considered.

D5.5.2 For determining the maximum diversion distance to an en-route alternate, the operator should use the approved speed.

D5.5.3 The operator's approved maximum diversion time should not exceed the EDTO certified capability of the aeroplane nor the most limiting EDTO significant system time limitation identified in the Aeroplane's Flight Manual.

D6. <u>EDTO SIGNIFICANT SYSTEMS:</u>

D6.1 This section addresses particular provisions for aeroplanes with two turbine engines.

D6.2 The reliability of the propulsion system for the aeroplane-engine combination being certified is such that the risk of double engine failures from independent causes is assessed and found acceptable to support the diversion time being approved.

D6.3 Consideration of time limitations

D6.3.1 For all operations beyond the EDTO threshold as determined by PCAA, 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's Flight Manual (directly or by reference) and relevant to that particular operations.

D6.3.2 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.

D7. <u>EN-ROUTE ALTERNATE AERODROMES:</u>

D7.1 In addition to the en-route alternate aerodrome provisions described in paragraph D3.6, the following apply:

a) for route planning purposes, identified en-route alternate aerodromes need to be located at a distance within the maximum diversion time from the route and which could be used if necessary;
b) in EDTO, 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.

D7.2 During flight preparation and throughout the flight the most up-to-date information should be provided to the flight crew on the identified en-route alternate aerodromes, including operational status and meteorological conditions.

D8. <u>OPERATIONAL APPROVAL PROCEDURE:</u>

D8.1 In approving an operator with a particular aeroplane type for EDTO, PCAA will establish an appropriate threshold time and approve a maximum diversion time, ensure that:

D8.1.1 specific operational approval is granted (by PCAA);

D8.1.2 the operator's past experience and compliance record is satisfactory and the operator establishes the processes necessary for successful and reliable EDTO and shows that such processes can be successfully applied throughout such operations;

D8.1.3 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;

D8.1.4 the operator's crew training programme is adequate for the proposed operation;

D8.1.5 documentation accompanying the authorization covers all relevant aspects; and

D8.1.6 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:

i) the most limiting EDTO significant system time limitation, if any, for EDTO identified in the Aeroplane's Flight Manual directly or by reference; or
ii) total loss of engine generated electric power; or
iii) total loss of thrust from one engine; or
iv) any other condition which PCAA considers to be equivalent in airworthiness and performance risk.

D8.2 EDTO Approval will be evidenced by a Permission specifically related to each operation.

D9. CONDITIONS TO BE USED WHEN CONVERTING DIVERSION TIMES TO DISTANCES FOR THE DETERMINATION OF THE GEOGRAPHICAL AREA BEYOND THRESHOLD AND WITHIN MAXIMUM DIVERSION DISTANCES:

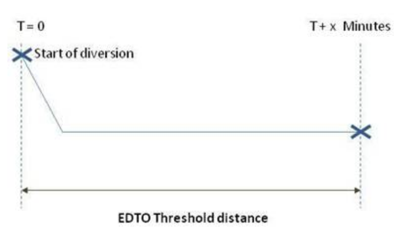
D9.1 For the purpose of this guidance, an "approved OEI speed" is any OEI speed within the certified flight envelope of the aeroplane.

D9.2 When applying for EDTO an operator should identify, and PCAA will approve the OEI speed that will be used to calculate diversion distances considering ISA and still air conditions. The identified speed 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 minutes and EDTO thresholds.

D10. DETERMINATION OF THE EDTO THRESHOLD:

D10.1 For determining whether a point of the route is beyond the EDTO threshold to an en-route alternate, the operator should use the approved speed. The distance is calculated from the point of the diversion followed by cruise for the threshold time as determined by PCAA and is shown in Figure below. For the purposes of computing distances, credit for drift down may be taken.

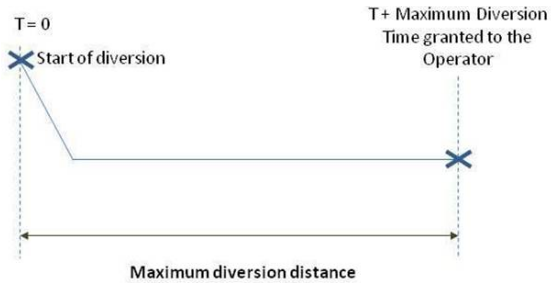
Figure 4: Threshold Distance – Aeroplanes with Two Turbine Engines



D11. DETERMINATION OF THE MAXIMUM DIVERSION THE DISTANCE:

D11.1 For determining the maximum diversion time distance to an en-route alternate, the operator should use the approved speed. The distance is calculated from the point of the diversion followed by cruise for the maximum diversion time as approved by PCAA. For the purposes of computing distances, credit for drift down may be taken. See Figure below for illustration.

Figure 5: Maximum Diversion Distance – Aeroplanes with two Turbine Engines



E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

AC	:	ALTERNATING CURRENT
ANO	:	AIR NAVIGATION ORDER
APU	:	AUXILIARY POWER UNITS
CARs	:	CIVIL AVIATION RULES
CMP	:	CONFIGURATION MAINTENANCE AND PROCEDURES
EDTO	:	EXTENDED DIVERSION TIME OPERATIONS
ETOPS	:	EXTENDED RANGE OPERATIONS
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
MEL	:	MINIMUM EQUIPMENT LIST
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 “AOC Guide – Commercial Air Operations” PCAAD-617; (MNL-005-FSXX-3.0)

E3.2 ICAO Annex 6 Part 1.

E3.3 UK CAA CAP 513

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st April, 2018 and supersedes ANO 91.0013 (Issue-1).

(USAID-UR-REHMAN USMANI)
Air Vice Marshal
Actg. Director General,
Pakistan Civil Aviation Authority

Dated: - ______ **March, 2018**

(CAPT. ARIF MAJEED)
O/Director Flight Standards

Dated- ______ **March, 2018**
File No. HQCAA/1077/015/FSAC

APPENDIX "A"

ACCEPTABLE MEAN OF COMPLIANCE TO THE REQUIREMENTS FOR EDTO WITH TWO ENGINES

1. PURPOSE:

1.1. The detailed requirements of this sub-section will be applicable to all twin-engined aeroplanes (including those powered by turbo-props and reciprocating engines) which are flying for the purpose of public transport, and which meet both of the following criteria:

2. APPLICABILITY:

2.1 the maximum authorised take-off weight exceeds 5700 kg; and

2.2 the aeroplane is certificated to carry more than 19 passengers. Although many of the requirements in this sub-section are currently incorporated into an operators approved programmes for other aeroplanes or route structures, the case of EDTO operations with twin-engined aeroplanes necessitates an evaluation of these operations, to ensure that the approved programmes provide a level of safety broadly consistent with that achieved for current EDTO operations with three and four-engined turbine powered aero planes.

3. DEFINITIONS:

3.1 Aerodrome:

In general terms, an operator may make an appraisal that an aerodrome has long enough runways, and is sufficiently equipped to be considered adequate for his planned EDTO routes. The commander must satisfy himself on the day, using criteria provided by the operator, that he has sufficient adequate aerodromes which, taking into account the weather and any equipment unserviceablilities, are suitable for his intended operation. Definitions of adequate and suitable aerodromes are in Appendix B, paragraph B.2.

3.2 Auxiliary Power Unit (APU):

a gas turbine engine intended for use as a power source for driving generators, hydraulic pumps, and other aeroplane accessories and equipment, and/or to provide compressed air for aeroplane pneumatic systems.

a) An essential APU installation provides the bleed air and/or mechanical power necessary for the despatch of a transport category aeroplane for operations other than EDTO with twin-engined aeroplanes.
b) An APU installation required for EDTO provides the bleed air and/or mechanical power necessary for the safe flight of a twin-engined transport category aeroplane approved for EDTO and is designed and maintained to provide a level of reliability necessary to perform its intended function.

3.3 Engine:

The basic engine assembly plus its essential accessories as supplied by the engine manufacturer.

3.4 EDTO / ETOPS:

For the purpose of this sub-section, EDTO/ETOPS are those operations by a twin-engined aeroplane over a route that contains a point further than 60 minutes flying time (threshold time) in still air at the normal OEI cruise speed from an **adequate** aerodrome.

3.5 EDTO / ETOPS Entry Point:

The EDTO/ETOPS entry point is the point on the aeroplane's outbound route which is 60 minutes flying time at the agreed OEI cruise speed (in still air) from a SUITABLE aerodrome prior to entering the EDTO/ETOPS segment.

3.6 EDTO / ETOPS Exit Point:

The EDTO/ETOPS exit point is the point on the aeroplane's routing at the end of the EDTO/ETOPS segment and is 60 minutes flying time at the agreed OEI cruise speed (in still air) of a SUITABLE aerodrome.

3.7 EDTO / ETOPS Segment:

The EDTO/ETOPS segment is the route segment from the EDTO/ETOPS entry point to the DTO/ETOPS exit point, wherein the aeroplane remains within the permitted Rule Time.

3.8 Extremely Improbable:

So Extremely Remote that it does not have to be considered as possible to occur.

3.9 Normal OEI Cruise Speed (Rule Distance):

For the purpose of this sub-section, this cruise speed shall be the TAS specified in the EDTO/ETOPS Airworthiness Approval in the Aeroplane Flight Manual, and agreed with the Department and specified in the Company Operation Manual. If not otherwise specified, it shall be calculated from the single-engine, long range, cruise control data for the aeroplane, assuming that it:

a) takes off at maximum authorised take-off weight; and
b) climbs to and maintains the two-engined optimum initial cruise level for long range cruise, in ISA conditions, until two hours from take-off, and;
c) at its then current weight, in ISA conditions, with one engine shutdown and the other at the power recommended for maximum continuous operation is flying level at a comfortably achievable maximum height and at the resultant stabilised speed.

3.10 Powerplant:

A system consisting of an engine and all ancillary parts installed on the engine prior to installation on the aeroplane to provide and control power/thrust and for the extraction of energy.

3.11 Rule Time:

The maximum one engine inoperative diversion time that any point on the EDTO/ETOPS route may be from a SUITABLE aerodrome for landing.

3.12 Rule Distance:

The distance travelled in still air in the Rule Time, at the normal one-engine-inoperative cruise speed.

3.13 System:

A system includes all elements of equipment necessary for the control and performance of a particular major function. It includes both the equipment specifically provided for the function in question, and other basic equipment, such as that required to supply power for the equipment operation.

a) Airframe System

Any system on the aeroplane that is not a propulsion system.

b) Propulsion System

The aeroplane powerplant installation, including each component that:

Is necessary for propulsion; affects the control of the propulsion units; or affects the safety of the propulsion units.

3.14 Threshold Distance:

The distance travelled in still air in 60 minutes by an aeroplane at the normal one-engine inoperative cruise speed..

3.15 Threshold Time:

60 minutes

3.16 Unacceptable Thrust-Loss:

Total thrust loss, or loss of thrust to an extent that might affect continued safe flight.

4. CONCEPTS:

Although it is self-evident that the overall safety of an EDTO cannot be better than that provided by the reliability of the propulsion systems, some of the factors related to EDTO are not necessarily obvious. For example, cargo compartment fire suppression/containment capability could be a significant factor, or operational practices may invalidate certain assumptions made during the aeroplane type design certification, or the probability of propulsion system failures. Although engine reliability is a critical factor, it is not the only factor which should be seriously considered in evaluating EDTO. Any decision relating to EDTO with twin-engined aeroplanes should also consider the probability of occurrence of any condition which would prevent the continued safe flight and landing, as well as the probability of occurrence of any condition which would reduce the capability of the aeroplane or the ability of the crew to cope with adverse operating condition.

5. FLIGHT DESPATCH CONSIDERATIONS

5.1 General:

The flight despatch considerations specified herein are in addition to, or amplify; the requirements contained CAR 94 and specifically apply to EDTO. Although many of the considerations in this Publication are currently incorporated into approved procedures for other aeroplanes or route structures, the nature of EDTO necessitates a re-examination of these operations, to ensure that the approved
procedures are adequate for this purpose.

5.2 Minimum Equipment List (MEL):

Primary system redundancy levels appropriate to EDTO will be reflected in the MEL. For aeroplanes lready in operational service, the existing MEL will be re-evaluated and adjusted appropriately, to reflect primary system redundancy levels necessary for EDTO. Primary airframe systems are considered to be those systems which have a fundamental influence on flight safety and could be adversely affected by the shutdown of a power unit. Such systems may include, but are not limited to:

a) Electrical, including battery;
b) Hydraulic;
c) Pneumatic;
d) Flight instrumentation;
e) Fuel;
f) Flight control;
g) Ice protection;
h) Engine start and ignition;
i) Propulsion system instruments;
j) Navigation and communications;
k) Auxiliary power-units;
l) Air conditioning and pressurisation
m) Cargo fire suppression;
n) Emergency equipment;
o) Engine fire detection and extinguishing systems; and
p) Any other equipment required for EDTO.

5.3 Communication and Navigation Facilities:

An aeroplane shall not be despatched on an EDTO unless:

a) Communications facilities are available to provide, under all expected conditions of propagation at the normal OEI cruise altitudes, reliable two-way voice communications between the aeroplane and the appropriate air traffic control unit over the planned route of flight and the routes to any suitable alternate to be used in the event of diversion; and
b) Non-visual ground navigation aids are available and located so as to provide, taking account of the navigation equipment installed in the aeroplane, the navigation accuracy required over the planned route and altitude of flight, and the routes to any alternate and altitudes to be used in the event of diversion for whatever reason; and (c) Approved visual and non-visual aids are available at the specified alternates for the authorised types of approaches and operating minima.

5.4 Fuel and Oil Supply:

a) General
An aeroplane shall not be despatched on an extended range flight unless it carries sufficient fuel and oil to meet the requirements of the Air Navigation Order, as amplified in CAR 94 Air Operator's Certificates Requirements Document; and in addition, such additional fuel and oil as may be required to fly to a suitable aerodrome for landing in the event of the shutdown of an engine, or in the event of airframe system failure(s), which may require diversion to an alternate. It should be assumed that this event occurs at the most critical point in terms of overall fuel and oil requirements along the planned route of flight.

b) Critical Fuel Scenario
The following describes the assumptions to be used in determining the fuel reserve required to cover the en-route diversion case. The operator should confirm that this scenario is operationally the most critical, having considered also the possibilities of no engine failure but total pressurisation failure, and no pressurisation failure but one engine failure.

i) At that particular critical point, consider simultaneous failure of an engine and the pressurisation system; (critical point based on time to a suitable alternate at the one-engine-inoperative cruise speed, for existing conditions, using forecast winds at the appropriate flight level).
ii) Immediate descent to the continued cruise altitude of 10 000 feet at the relevant OEI cruise speed (or above 10 000 feet if the aeroplane is equipped with sufficient supplemental oxygen in accordance with the CAR 94.
iii) When approaching the diversion aerodrome, descend to 1 500 feet above destination, hold for 15 minutes, initiate an approach followed by a missed approach, and then continue to a normal approach and landing.
iv) Unless the operator has an established value for inservice deterioration in cruise fuel mileage, the fuel calculated under (i) and (ii) above should be increased by 5 per cent.

c) Fuel Planning Considerations

In computing fuel and oil requirements, advantage may be taken of driftdown, where appropriate, and at least the following should be considered as applicable:

i) Current forecast winds and meteorological conditions along the expected flight path at the OEI cruising altitude and throughout the approach and landing; to allow for errors in wind forecasts and navigation, a contingency figure of 5 per cent should be added to calculated fuel burn from the critical point.
ii) Any Configuration Deviation List items;
iii) Any necessary operation of ice protection systems, and any performance loss due to ice accretion on unheated surfaces of the aeroplane, if icing conditions are likely to be encountered during the diversion.
iv) Any necessary operation of an auxiliary power unit and/or RAT;
v) Any known Air Traffic Control constraints.

5.5 Alternate Aerodromes:

An aeroplane must not be despatched on an EDTO unless the required take-off, destination and alternate aerodrome, including suitable en-route alternate aerodromes to be used in the event of power-unit shutdown or system failure(s) which require a diversion, are listed in the cockpit documentation e.g. computerised flight plan). Suitable en-route alternates must be identified and listed in the ATC flight plan and the despatch release (if applicable) for all cases where the planned route of flight contains a point more than 60 minutes flying time at the OEI speed from an adequate aerodrome. Since these suitable en-route alternates serve a different purpose from the destination alternate aerodrome, and would normally be used only in the event of an engine failure or the loss of primary airframe systems, an aerodrome should not be listed as a suitable en-route alternate unless:

a) The landing distances required as specified in the AFM for the altitude of the aerodrome, for the runway expected to be used, taking into account wind conditions, runway surface conditions, and aeroplane handling characteristics, permit the aeroplane to be stopped within the landing distance available as declared by the aerodrome authorities and computed in accordance with the CAR 94.
b) The aerodrome services and facilities are adequate for the operator's approved approach procedure(s) and operating minima for the runway expected to be used;
c) The latest available forecast weather conditions for a period commencing one hour before the established earliest time of landing, and ending one hour after the established latest time of landing at that aerodrome, equal or exceed the Planning Minima for alternate aerodromes in the AOC holder's operations manual, and
d) For the period commencing one hour before the established earliest time of landing, and ending one hour after the established latest time of landing at that aerodrome, the forecast crosswind component, including gusts, for the intended landing runway is at or less than the maximum permitted crosswind for landing, with one engine inoperative.

5.6 Aeroplane Performance Data:

No aeroplane should be despatched on an extended range flight unless the Operations Manual contains:

a) Detailed one-engine-inoperative performance data covering:

   i) Drift-down;
   ii) Cruise (altitude coverage including 10 000 feet);
   iii) Holding;
   iv) Altitude capability;
   v) Missed approach.

b) Details of any other conditions relevant to EDTO which can cause significant deterioration of performance, such as ice accretion on the unheated surfaces of the aeroplane; Ram Air Turbine (RAT) deployment; etc.

6. FLIGHT CREW TRAINING AND EVALUATION PROGRAMME:

The operator's ground training programme in respect of EDTO should provide training for flight crew members in the following areas:

6.1 Performance:

a) EDTO Flight planning.
b) EDTO Flight performance progress monitoring.

6.2 Procedures:

a) Diversion procedures;
b) Use of appropriate navigation and communication systems;
c) Abnormal and emergency procedures to be followed in the event of failures, including:

   i) Procedures for single and multiple in-flight equipment failures that would require flight to the nearest suitable aerodrome;
   ii) Operational restrictions associated with these failures;
   iii) Procedures for airborne start of the propulsion systems, including the APU, if required;
   iv) Crew incapacitation;

6.3 Evaluation:

In addition to initial training given to crew members, operators should arrange an annual evaluation programme in order to ensure that the level of awareness on matters relating to EDTO is kept at a satisfactory level. The evaluation must include a written test paper which may be included in the annual line check.

7. OPERATIONAL LIMITATIONS:

7.1 Area of Operations:

An operator may be authorised to conduct EDTO with a particular airframe/engine combination within a particular area where the maximum diversion time, from any point along the proposed route of flight to an adequate aerodrome, is up to 180 minutes or less as specified by PCAA at the normal OEI cruise speed (under standard conditions, in still air). The particular areas may be specified on the permission issued by PCAA for the purpose of approving EDTO.

7.2 Operations Manual Instructions:

Operations Manual instructions should specify the maximum diversion time from a suitable aerodrome to be used when planning a particular EDTO. The maximum diversion time in still air at the normal one-engine-inoperative cruise speed cannot be any greater than that established by paragraphs (a) and (b) of this section. Authorization for operations beyond these values will not be permitted until operational experience, in EDTO with twin-engined aeroplanes, clearly indicates that further credit is appropriate.

a) Use of Standard Maximum Diversion Time

   The Operations Manual instructions should ensure that EDTO are limited to flight plan routes where a maximum diversion time of 120 minutes or less at the normal OEI cruise speed in still air to suitable aerodromes can be met. Operators should also give instructions that:

   i) Upon occurrence of an in-flight shutdown of an engine, the pilot should fly to and land at the nearest suitable aerodrome, under the prevailing conditions, at which a safe landing can be made; and
   ii) the event of a single or multiple primary system failure, the pilot should fly to and land at the nearest suitable aerodrome, under the prevailing conditions, unless it has been demonstrated that no substantial degradation of safety results from continuation of the planned flight.

8. OPERATIONS MANUAL:

8.1 The Operations Manual must make it clear that without the appropriate and relevant Permission, EDTO are not authorised and may not be conducted.

8.2 Information in the operations manual for EDTO should specifically include provisions covering at least the following:

a) Designation of the particular airframe/engine combination, including specification of modifications required for EDTO;
b) Approved area of operation, and all relevant ATC requirements;
c) Minimum altitudes to be flown along planned and diversionary routes, and maximum altitudes if restricted by EDTO considerations (e.g. APU start capability);
d) Rule Distance;
e) The power setting, speeds, and flight levels to be used after the failure or shutdown of an engine;
f) Aerodromes authorised for use, including alternates and associated instrument approaches, operation minima, and planning minima (see Appendix B);
g) A clear statement that it is the commander's responsibility not to accept ATC clearances that would take the aeroplane outside the approved EDTO envelope in terms of Rule Distance and Flight Level;
h) Reference to the approved maintenance schedule requirements for EDTO, including those items specified in the type design approval of the EDTO variant;
i) Identification of those aeroplanes designated for EDTO by make and model, as well as by serial number and registration letters.
j) Minimum crew qualifications and recency to allow them to operate unsupervised on extended range flights.
k) Guidance on minimum acceptable system and equipment levels of serviceability in order to continue an EDTO in the event of an in-flight failure. Full information should be provided as and when a flight may continue in these circumstances at the normal or at a reduced Rule Distance from suitable alternate.
l) Procedures to enable the flight to be conducted on an alternative rule as non-EDTO, i.e. not more than 60 minutes from a suitable alternate. Otherwise a statement in the Operations Manual that non-EDTO flights are not approved on that route.

APPENDIX "B"

CONTINUING SURVEILLANCE AND ENGINE RELIABILITY REPORT

1. CONTINUING SURVEILLANCE:

The fleet average In Flight Shut Down (IFSD) rate for the specified airframe/engine combination will continue to be monitored in accordance with Appendix B. As with all other operations, the Department will monitor all aspects of the EDTO it has authorized, to ensure the levels of reliability achieved in EDTO remain at the necessary levels, and that the operation continues to be conducted safely. In the event that an acceptable level of reliability is not maintained, or if significant deficiencies are detected in the conduct of operations, the Department will require the operator to take all necessary action to resolve the problems in a timely manner, or will withdraw the authorization for EDTO.

2. ENGINE RELIABILITY REPORT:

A propulsion system reliability report will be published, providing the results of the assessment of the world fleet engine reliability as it relates to design and operations for a particular airframe/engine combination.

APPENDIX "C"

EN-ROUTE ALTERNATE AERODROMES

1. GENERAL:

1.1 One of the distinguishing features of extended range twin-engined operations is the concept of a suitable (see paragraph 2 of this Appendix) en-route alternate being available, to which an aeroplane can divert after a single failure or failure combinations which require a diversion. Whereas most twin-engined aeroplanes operate in an environment where there is usually a choice of diversions available, the EDTO aeroplane may have only one aerodrome within a range dictated by the endurance of a particular airframe system (e.g. cargo fire suppressant), or by the approved maximum diversion time for that route.

1.2 It is, therefore, important that any aerodromes designated as en-route alternates should have the capabilities, services, and facilities to safely support that particular aeroplane. The weather conditions at the time of arrival should provide a higher than normal assurance that adequate visual reference will be available upon arrival at decision height (DH) or minimum decision altitude (MDA), and the surface wind conditions and corresponding runway surface conditions should be within acceptable limits to permit the approach and landing to be safely completed with an engine inoperative. These considerations shall apply to all aerodromes which are considered as alternates when flying the EDTO segment, thus possibly including the departure and/or destination aerodromes.

1.3 Designated alternates and all their associated performance and planning data should be specified in the Operations Manuals.

2. DEFINITIONS OF AERODROMES:

2.1 Adequate:

For the purpose of this Publication, an adequate aerodrome is an aerodrome which the operator of the aeroplane considers to be adequate, having regard to his responsibilities pursuant to Article CAR 94. In particular, it should be expected that at the anticipated time of use:

a) the aerodrome will be available, and equipped with necessary ancillary services, such as ATC, sufficient lighting, communications, weather reporting, navaids, and safety cover; and
b) at least one letdown aid (ground radar would so qualify) will be available for an instrument approach.

2.2 Suitable:

For the purpose of this Publication, a suitable aerodrome is an adequate aerodrome where, at the anticipated time of use, weather reports, or forecasts, or any combination thereof, indicate that the weather conditions are very likely to be at or above the normal operating minima at the time of the intended operation, using the criteria set out in this Appendix. Where a condition is forecast as 'Prob.', provided the probability percent factor is less than 40 percent, then that condition can be ignored for planning minima purposes. 'Tempo.', 'Inter.' and 'Gradu.' conditions are normally qualified by a time band and must be considered in determining the suitability of an aerodrome with respect to planning minima. Where a time band is omitted then the conditions need not be considered with respect to planning minima. The commander is expected however to exercise good judgement in assessing the overall weather conditions when making a decision to exclude ‘Tempo.’, ‘Inter.’, ‘Gradu.’ and ‘Prob.’ conditions.

3. PLANNING MINIMA:

3.1 Due to the natural variability of weather conditions with time, as well as the need to determine the suitability of a particular en-route aerodrome prior to departure, the en-route alternate weather minima for despatch purposes (Planning Minima) should be higher than the weather minima required to initiate a normal instrument approach. This is necessary to ensure that the instrument approach and landing can be conducted safely if the flight has to divert to the alternate aerodrome. Additionally, since the visual reference required to safely complete an approach and landing is determined, amongst other things, by the accuracy with which the aeroplane can be controlled along the approach path by reference to instruments, and by the accuracy of ground-based instrument aids, as well as by the tasks the pilot is required to accomplish to manoeuvre the aeroplane so as to complete the landing, the weather minima for non-precision approaches are generally higher than for precision approaches.

3.2 The following standard en-route alternate planning weather minima are to be established for flight planning and despatch purposes with twin-engined aeroplanes in EDTO. These weather minima recognise the benefits of ILS/MLS, as well as the increased assurance of safely completing an instrument approach at aerodromes which are equipped with ILS/MLS approaches to at least two separate runways. A particular aerodrome may be considered to be a suitable aerodrome for flight planning and dispatch purposes for EDTO if it meets the criteria of section 5 paragraph 5.5, and has forecast weather or better than the following planning minima:

a) Single ILS/MLS, or PAR:

Cloudbase of 600 feet and a visibility of 3 km (2 statute miles) or a cloudbase of 400 feet and a visibility of 1.5 km (1 statute mile) above the lowest authorised landing minima; whichever is higher.

b) Non-precision and circling approaches (including SRA):

Cloudbase of 800 feet and a visibility of 3 km (2 statute miles) or a cloudbase of 400 feet and a visibility of 1.5 km (1 statute mile) above the lowest authorised landing minima; whichever is higher.

c) Two or more ILS/MLS/PAR to separate runways:

Where forecast wind and surface conditions indicate that two or more separate runways will be available within the Rule Distance, whether at one or more aerodromes, the relevant Planning Minima cloudbase may be reduced by 200 feet and the visibility by 1 km (½ statute mile).

3.3 The appropriate planning minima may only be used if the expected wind and surface conditions would permit an engine-out landing on the runway(s) served by the aid(s). For planning purposes the expected cross-winds, including gusts, for a period commencing one hour before the established earliest time of landing and ending one hour after the established latest time of landing at that aerodrome, should not exceed the maximum permitted cross-wind for landing, taking into account the factors of Chapter 4 paragraph 4.5 (a) of this Sub-Section, unless otherwise agreed with the Department. In all cases, the Department may direct that higher planning minima shall apply. However, the

Department may approve lower aerodrome planning minima for a specific en-route alternate aerodrome on the basis of favourable special meteorological, terrain and operational studies produced by an operator or group of operators.

3.4 Once an EDTO aeroplane has been despatched, the suitability of an en-route alternate aerodrome for an aeroplane flying within an EDTO sector is based on a determination that the aerodrome is still suitable or the circumstances, and that the weather conditions at thataerodrome will permit an instrument approach to be initiated and landing completed. In the event that the weather deteriorates at a specified alternate, so that it is unlikely that a successful landing could be achieved, the Commander should re-plan the flight to come within the specified Rule Distance of another suitable alternate.

APPENDIX "D"

EDTO MAINTENANCE REQUIREEMNTS

1. GENERAL:

The maintenance programme should contain the standards, guidance, and direction necessary to support the intended operations. Maintenance personnel involved should be made aware of the special nature of EDTO and have the knowledge, skill and ability to accomplish the requirements of the programme.

2. EDTO MAINTENANCE PROGRAMME:

The basic maintenance programme for the aeroplane being considered for EDTO is the continuous airworthiness maintenance schedule currently approved for that operator, for the make and model airframe/engine combination. This schedule should be reviewed to ensure that it provides an adequate basis for development of EDTO maintenance requirements. These should include maintenance procedures to preclude identical action being applied to multiple similar elements in any EDTO critical systems (e.g. fuel control changes on both engines).

a) EDTO related tasks should be identified on the operator's routine work forms and related instructions.
b) EDTO related procedures, such as involvement of centralized maintenance control, should be clearly defined in the operator's programme.
c) An EDTO service check should be developed to verify that the status of the aeroplane and certain critical items are acceptable. This check should be accomplished and signed off by an EDTO qualified maintenance person immediately prior to an EDTO flight.
d) The Technical Log should be reviewed and documented as appropriate to ensure proper MEL procedures, deferred items and maintenance checks, and that system verification procedures have been properly performed.

3. EDTO MANUAL:

The operator should develop a manual for use by personnel involved in EDTO. This manual need not include, but should at least reference, the maintenance programme and other requirements described by this Appendix, and clearly indicate where they are located in the operator's manual system. All EDTO requirements, including supportive programme procedures, duties and responsibilities, should be identified and be subject to revision control. This manual should be submitted for approval to PCAA 30 days before implementation of EDTO flights. Subsequently all proposed EDTO manual amendments should be submitted to the Department for approval 30 days before implementation of the amendment.

4. OIL CONSUMPTION PROGRAMME:

The operator's oil consumption programme should reflect the manufacturer's recommendations and be sensitive to oil consumption trends. It should consider the amount of oil added at the departing EDTO stations with reference to the running average consumption; i.e. the monitoring must be continuous up to, and including, oil added at the EDTO departure station. If oil analysis is meaningful to this make and model, it should be included in the programme. If the APU is required for EDTO operation, it should be added to the oil consumption programme.

5. ENGINE CONDITION MONITORING:

This programme should describe the parameters to be monitored, method of data collection and corrective action process. The programme should reflect manufacturer's instructions and industry practice. This monitoring will be used to detect deterioration at an early stage to allow for corrective action before safe operation is effected. The programme should ensure that engine limit margins are maintained so that a prolonged single-engine diversion may be conducted without exceeding approved engine limits (i.e. rotor speeds, exhaust gas temperatures) at all approved power levels and expected environmental conditions. Engine margins preserved through this programme should account for the effects of additional engine loading demands (e.g. anti-ice, electrical, etc.) which may be required during the single-engine flight phase associated with the diversion.

6. RECTIFICATION OF AEROPLANE DEFECTS:

The operator should develop a verification programme, or procedures should be established, to ensure corrective action following an engine shutdown, primary system failure, adverse trends or any prescribed events which require verification flight or other action and establish means to assure their accomplishment. A clear description of who must initiate verification actions and the section or group responsible for the determination of what action is necessary should be identified in the programme. Primary systems or conditions requiring verification actions should be described in the operators EDTO manual.

7. RELIABILITY PROGRAMME:

An EDTO reliability programme should be developed or the existing reliability programme supplemented. This programme should be designed with early identification and prevention of EDTO related problems as the primary goal. The programme should be event-orientated and incorporate reporting procedures for significant events detrimental to EDTO flights. This information should be readily available for use by the operator and the Department to help establish that the reliability level is adequate, and to assess the operator's competence and capability to safely continue EDTO. The Department should be notified within 96 hours of events reportable through this programme.

a) In addition to the items addressed by (Condition Monitored Maintenance) for routine reliability reporting, the following items should be included:

   i) In-flight shutdowns.
   ii) Diversion or turnback.
   iii) Uncommanded power changes or surges.
   iv) Inability to control the engine or obtain desired power.
   v) Problems with systems critical to EDTO.
   vi) Any other event detrimental to EDTO.

b) The report should identify the following:

   i) Aeroplane identification.
   ii) Engine identification (make and serial number).
   iii) Total time, cycles, and time since last shop visit.
   iv) For systems, time since overhaul or last inspection of the defective unit.
   v) Phase of flight.
   vi) Corrective action.

8. PROPULSION SYSTEM MONITORING:

The operator's assessment of propulsion systems reliability for the extended range fleet should be made available to the Department (with the supporting data) on at least a monthly basis, to ensure that the approved maintenance programme continues to maintain a level of reliability necessary for EDTO. Any adverse trend would require an immediate evaluation to be accomplished by the operator in consultation with the Department. The evaluation may result in corrective action or operational restriction being applied.

9. MAINTENANCE TRAINING:

Maintenance training should focus on the special nature of EDTO. This programme should be included in normal maintenance training. The goal of this programme is to ensure that all personnel involved in EDTO are provided the necessary training so that the EDTO maintenance tasks are properly accomplished and to emphasise the special nature of EDTO maintenance requirements. Qualified maintenance personnel are those that have completed the operator's extended range training programme and have satisfactorily performed extended range tasks under supervision, within the framework of the operator's approved procedures for Personnel Authorisation.

10. EDTO PARTS CONTROL:

The operator should develop a parts control programme that ensures the proper parts and configuration are maintained for EDTO. The programme includes verification that parts placed on EDTO aeroplane during parts borrowing or pooling arrangements as well as those parts used after repair or overhaul, maintain the necessary EDTO configuration for that aeroplane.

APPENDIX "E"

EDTO APPROVAL PROCEDURE PCAA PAKISTAN

1. Any Operator requesting EDTO approval shall submit a formal letter of intent and required supporting data to DGCAA at least 06 months prior to start of extended range operations with specific airframe-engine combination. EDTO request will be forwarded to Flight Standards Directorate and Airworthiness Directorate who will from an EDTO approval team, with POI as Team Leader and Airworthiness surveyor as member. EDTO team will assess the operations request taking in consideration aspects of flight operations and maintenance according to following procedure in conjunction with ANO.91.0013 to complete Flight Operations and Maintenance EDTO regulatory requirements – as outlined in the diagram below:

EDTO Approval Process

FLIGHT STANDARDS	Approval Plan*	AIRWORTHINESS
- Area of Operations Routes, Alternates Speed Time - Flight Planning Weather Communications - MEL* - APU Start* - Check Airman, Training	Review Gates	- EDTO Significant System - Task Cards, Parts Control - Oil Consumption, ECM* - Problem Resolution* - Training
Demonstrated Processes Ops Documents Validation Flight	EDTO Approval (Ops Spec)	Demonstrated Process EDTO Manual
World Fleet IFSD Rate	Continuing Airworthiness	CMP Standard Reliability Reporting

*** Involves coordination between Departments**

2. EDTO FLIGHT OPERATIONS ASSESSMENT, FLIGHT STANDARDS DIRECTORATE:

2.1 Flight Crew Training, Evaluations and Operating Manuals

a) Adequacy of Flight Crew Training and Operating Manuals
b) Flight Crew Training and Evaluations Programme
- Introduction to EDTO regulations
- Rules and aerodromes intended to be used in EDTO Operation area

c) Performance
- Flight Planning including all contingencies
- Flight Performance flight monitoring

d) Procedures
- Diversion Procedures and Diversion "Decision Making"
- Use of appropriate navigation and communication systems including appropriate flight management devices
- Flight Crew Initial and Recurrent Training which emphasises abnormal and emergency procedure in single / multiple failures in flight and associated operational restrictions including MEL, procedure for Air start of propulsion system including APU and crew incapacitation
- Use of emergencies equipment including protective breathing and ditching equipment
- Fuel management

e) Flight Dispatchers Training
- Aeroplane Performance Data
- Alternate Aerodromes
- Critical Fuel Reserves
- Critical Fuel Scenario
- Company MEL (to include "EDTO" specific dispatch restrictions).

3. EDTO MAINTENANCE ASSESSMENT : AIRWORTHINESS DIRECTORATE:

3.1 EDTO Maintenance and Documentation:

a) The operator EDTO maintenance programmes should endeavor to contain the standards guidance and direction necessary to support the EDTO operations
b) Maintenance and personnel involved in the operation should be made EDTO aware and have the knowledge stills and ability to accomplish their requirements of the EDTO programme.

3.2 EDTO Maintenance Programme:

a) Maintenance Programme
   i) Basic Maintenance Programme with supplemental EDTO tasks
   ii) Clearly defined EDTO related procedures
   iii) EDTO related task identification on routine
   iv) Work forms and related instructions
   v) EDTO service checks to verify aircraft status and critical systems
   vi) Procedures to preclude identical action being applied to multiple similar elements in any EDTO critical system.

b) EDTO Manual
   i) It shall contain standards, guidance, procedures, etc. to support the EDTO programme
   ii) It shall list operations considerations to assure compliance with regulatory requirements.

c) Engine Condition Monitoring
   i) Supplemental to the existing programme
   ii) Monitor, detect deterioration and allow corrective action to ensure EDTO Operation
   iii) Ensure engine limit margins are maintained.

d) Oil Consumption Programme
   i) Sensitive to oil consumption trends (oil added with reference to the minimising average)
   ii) Include APU oil consumption.

e) EDTO Parts Control
   i) EDTO part provisioning requires an assessment of
      - EDTO MEL requirements
      - CMP Document Configuration Standard / Part List
      - Reliability data (MTBUR / MTBF)
      - Type / area of operation.

   ii) Based upon the EDTO part assessment, the airline will be able to establish EDTO Parts List.
      - Main Base and outstations
      - EDTO Flight Kit (dependant on type/area of operation).

f) Reliability Programme
   i) General
   ii) Readability Data Base
   iii) Engine Condition Monitoring
   iv) Oil Consumption Monitoring
   v) APU High Attitude / Cold Soak Start Programme.

g) ETOPS Training
   i) General
   ii) Requirement
   iii) Applicability
   iv) EDTO Courses Outline / Content.

4. VALIDATION OF OPERATOR ETOPS MAINTENANCE AND OPERATIONS CAPABILITY:

a) The operator shall demonstrate that it has the competence and capability to conduct safely and support adequately the intended operations
b) Prior to being granted EDTO operational approval, the operator shall demonstrate that the EDTO maintenance checks, servicing and programmes are being properly conducted at representative departure and destination aerodromes
c) The operator shall also demonstrate that EDTO flight release practices, policies and procedures are established for operations to and from representative departure and destination aerodromes
d) A validation flight, in the aeroplane or an approved simulator (as determined by the Authority on an individual basis) should also incorporate demonstration of the following emergency procedures:
   i) Total loss of thrust of one engine
   ii) Total loss of normal generated electrical power
   iii) Any other condition considered to be in equivalent in airworthiness, crew workload or performance risk.

5. EDTO MAINTENANCE ASSESSMENT:

5.1 Operations Specifications issued by PCAA for EDTO should specifically include provision of the following:
   a) Definition of particular airframe – engine combination including the current CMP

standard

b) Authorized area of operation
c) Minimum attitude to be flown along planned and diversionary routes
d) The minimum diversion since at the approval one engine – inoperative speed
e) Aerodromes nominated for use, including alternates and associated instrument approaches and operating minimum
f) The approved maintenance and reliability programme
g) Identification of aeroplanes by make, model, serial number and registration number
h) Aeroplane performance reference.

6. CONTINUING SURVEILLANCE:

The fleet average In Flight Shut Down (IFSD) rate for the specified airframe – engine combination will continue to be monitored by PCAA surveillance to ensure level of reliability achieved in EDTO remain at necessary level and operation continues to be conducted safely. If significant adverse trend exists or it significant deficiencies are detected in the type design or the conduct of EDTO operations, then the PCAA will initiate a special evaluation / impose operational restriction(s).

CREW RESOURCE MANAGEMENT TRAINING

AIR NAVIGATION ORDER

VERSION : **2.0**
DATE OF IMPLEMENTATION : **01.01.2018**
OFFICE OF PRIME INTEREST : **Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. KHALID RASHEED KHAN	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR MARSHAL (RETD.) ASIM SULEIMAN	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by the Director-General of the Civil Aviation Authority in pursuance of the powers vested in him under Rule 4 of the Civil Aviation Rules (CARs) 1994.

B. PURPOSE:

B1. This ANO presents guidelines for developing, implementing, reinforcing and assessing Crew Resource Management (CRM) training programs for flight crewmembers, cabin crew members and other personnel essential to flight safety. These programs are designed to become an integral part of training programs and operations. We recommend applicants/operators study this ANO and implement the material, which is applicable to your organization. The primary purpose of the ANO is to increase CRM efficiency, with which flight personnel perform by focusing on communication skills, teamwork, task allocation, and decision making.

C. SCOPE:

C1. This ANO relates to the training of RPT and charter operators in Crew Resource Management (CRM).

C2. The instructions contained in this ANO shall be complied with by all operators who hold an Air Operator Certificate and applicants for an AOC for RPT or Charter operations.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 For the purpose of this ANO and in line with ICAO Standards and Recommended Practices, the following terms are defined as hereunder:

D1.1.1 Human factor is a multi disciplinary field devoted to optimizing human performance and reducing human error. It incorporates the methods and principles of the behavioral and social sciences, engineering, and physiology. Human factor is the applied science, which studies people working together in concert with machines. Human factors embraces variables that influence individual performance and variables that influence team or crew performance.

D1.1.2 It is recognized that inadequate system design or inadequate operator training can contribute to individual human error that leads to system performance degradation. Further, it is recognized that inadequate design and management of crew tasks can contribute to group errors that lead to system performance degradation.

D1.1.3 Crew Resource Management (CRM) is the application of team management concepts in the flight deck environment was initially known as Cockpit Resource Management. As CRM programs evolved to include flight attendants, maintenance personnel and others, the phrase Crew Resource Management has been adopted.

D1.1.4 CRM now refers to the effective use of all available resources; human resources, hardware, and information. A current definition includes all other groups routinely working with the cockpit crew who are involved in decisions required to operate a flight safely. These groups include but are not limited to:

D1.1.4.1 Aircraft dispatchers

D1.1.4.2 Flight attendants

D1.1.4.3 Maintenance personnel

D1.1.4.4 Air traffic controllers

D1.1.4.5 Management

D1.1.5 CRM is one way of addressing the challenge of optimizing the human/machine interface and accompanying interpersonal activities. These activities include team building and maintenance, information transfer, problem solving, decision making, maintaining situational awareness, and dealing with automated systems. CRM training is comprised of three basic components: initial indoctrination/awareness, recurrent practice / feedback, and continual reinforcement. Each component must be continually renewed.

D2. THE MISSION OF CRM TRAINING:

D2.1 An operator shall ensure that each flight crew member:

D3. BASIC CONCEPTS OF CRM:

D3.1 CRM training is based on awareness that a high degree of technical proficiency is essential for safe and efficient operations. Demonstrated mastery of CRM concepts cannot overcome a lack of proficiency. Similarly, high technical proficiency might not guarantee safe operations in the absence of effective crew co-ordination.

D3.2 Experience has shown that lasting behavior changes in any environment cannot be achieved in a short time period, even if the training is very well designed. Trainees need awareness, practice and feedback, and continuing reinforcement: **in a word**, time to learn attitudes that will endure. In order to be effective, CRM concepts should be integrated into all aspects of training and operations.

D3.3 While there are various useful methods in use in CRM training today, certain features are highly recommended:

D3.3.1 CRM training should focus on the functioning of crewmembers as teams, not as a collection of technically competent individuals.

D3.3.2 CRM training should instruct crewmembers how to behave in ways that foster crew effectiveness.

D3.3.3 CRM training should provide opportunities for crewmembers to practice the skills.

D3.3.4 Necessary to be effective team leaders and team members.

D3.3.5 CRM training exercises should include all crewmembers functioning in the same roles (for example, captain, first officer, and/or flight engineer, flight attendants) they normally perform in flight.

D3.3.6 CRM training should include effective team behaviours during normal, routine operations.

D3.4 Good training for routine operations can have a strong positive effect on how well individuals function during times of high workload or high stress. During emergency situations, when time pressure might exist, a crew member probably would not take the time to reflect upon his or her CRM training in order to choose the appropriate behaviour. But practice of desirable behaviours during times of low stress increases the likelihood that emergency's will be handled effectively.

D3.5 CRM is defined by the following characteristics:

D3.5.1 CRM is a comprehensive system of applying human factors concepts to improve crew performance.

D3.5.2 CRM embraces all operational personnel.

D3.5.3 CRM can be blended into all forms of aircrew training.

D3.5.4 CRM concentrates on crewmembers attitudes and behaviours and their impact on safety.

D3.5.5 CRM uses the crew as the unit of training.

D3.5.6 CRM is training that requires the active participation of all crewmembers. It provides an opportunity for individuals and crews to examine their own behaviour and to make decisions on how to improve cockpit teamwork.

D3.5.6.1 In cases where simulators are not available, crewmembers can participate in group problem solving activities designed to exercise CRM skills. Through taped feedback during debriefing, they can then assess the positive and negative behaviors of all crewmembers.

D3.5.6.2 Crewmembers may also participate in role playing exercises. Such exercises permit practice in developing strategies for dealing with incidents and allow analysis of behaviors during those incidents. Again, taped feedback is useful for assessment and feedback during debriefing. Crews abilities can be clearly observed in such areas as decision making, teamwork, and leadership.

D3.5.6.3 Attitude and/or personality measures can also be used to provide feedback to participants, allowing them to assess their own strengths and weaknesses.

D3.5.7 Success of a CRM training program depends upon check airmen, instructors, and supervisors who are highly qualified and specially trained in CRM.

D4. FUNDAMENTALS OF CRM TRAINING IMPLEMENTATION:

D4.1 Research programs and airline operational experience suggest that the greatest benefits are achieved by adhering to the following practices:

D4.1.1 Assess the Status of the Organisation before Implementation. It is important to know how widely CRM concepts are understood and practised before designing specific training. Surveys of crewmembers, observation of crews in line observations, and analysis of incident/accident reports can provide essential data for program designers.

D4.1.2 Get Commitment from All Managers, Starting with Senior Managers. CRM programs are received much more positively by operations personnel when senior managers, flight operations managers, and flight standards officers conspicuously support CRM concepts and provide the necessary resources for training. Flight operations manuals and training manuals should embrace CRM concepts by providing crews with necessary policy and procedures guidance.

D4.1.3 Customize the Training to Reflect the Nature and Needs of the Organisation. Using knowledge of the state of the organisation, priorities should be established for topics to be covered including specific issues such as the effects of mergers or the introduction of advanced technology aircraft. This approach increases the relevance of training for crewmembers.

D4.1.4 Define the Scope of the Program. Institute special CRM training for key personnel including check airmen, supervisors, and instructors. It is highly beneficial to provide training for these groups before beginning training for crewmembers. CRM training may be expanded to include aircraft dispatchers, flight attendants, maintenance personnel and other company team members as appropriate. It is also helpful to develop a long term strategy for program implementation.

D4.1.5 Communicate the Nature and Scope of the Program before Start-up. Training departments should provide crews with a preview of what the training will involve together with plans for initial and continuing training. These steps can prevent misunderstandings about the focus of the training or any aspect of its implementation.

D4.1.6 Institute Quality Control Procedures.

D4.2 It has proved helpful to monitor the delivery of training and to determine areas where training can be strengthened. Monitoring can be initiated by providing special training to program instructors (often called facilitators) in using surveys to collect systematic feedback from participants in the training.

D5. COMPONENTS OF CRM TRAINING

D5.1 The topics outlined below have been identified as recommended components of effective CRM training. They do not represent a fixed sequence of phases, each with a beginning and an end. Ideally, each component is continually renewed at every stage of training.

D5.1.1 **Initial Indoctrination / Awareness**

D5.1.1.1 Indoctrination/awareness typically consists of classroom presentations and focuses on communications and decision making, interpersonal relations, crew co-ordination, and leadership. In this component of CRM training, the concepts are developed, defined, and related to the safety of line operations. This component also provides a common conceptual framework and a common vocabulary for identifying crew co-ordination problems.

D5.1.1.2 Indoctrination/awareness can be accomplished by a combination of training methods. Lectures, audio-visual presentations, discussion groups, role playing exercises, computer based instruction, and videotaped examples of good and poor team behaviour are commonly used methods.

D5.1.1.3 Initiating indoctrination/awareness training depends upon the development of a curriculum that addresses CRM skills that have been demonstrated to influence crew performance. To be most effective, the curriculum should define the concepts involved and relate them directly to operational issues that crews encounter. Many organisations have found it useful to survey crewmembers. Survey data have helped identify embedded attitudes regarding crew co-ordination and cockpit management. The data have also helped to identify operational problems and to prioritise training issues.

D5.2 Effective indoctrination/awareness training increases understanding of CRM concepts. That understanding, in turn, often influences individual attitudes favourably regarding human factor issues. Often the training also suggests more effective communication practices.

D5.3 It is important to recognise that classroom instruction alone does not fundamentally alter crewmember attitudes over the long term. The indoctrination/awareness training should be regarded as a necessary first step towards effective crew performance training.

D5.3.1 **Recurrent Practice and Feedback**

D5.3.1.1 CRM training should be included as a regular part of the recurrent training requirement. Recurrent CRM training should include refresher practice and feed back exercises such as role plying in a flight training device. It is recommended that these recurrent CRM exercises take place with a full crew, each member operating in his or her normal crew position. A complete crew will always be scheduled, and every attempt will be made to maintain crew integrity.

D5.3.1.2 Recurrent training and feedback allows participants to practice newly improved skills in communication and interpersonal relationships and to receive feedback on their effectiveness. Feedback has its greatest impact when it comes from self-critique and from peers, together with guidance from a facilitator with special training in assessment and debriefing techniques.

D5.3.1.3 Effective feedback refers to the co-ordination concepts identified in Indoctrination/Awareness training and relates to specific behaviours. Practice and feedback are best accomplished through the use of simulators or training devices and videotape. Taped feedback, with the guidance of a facilitator, is particularly effective because it allows participants to view themselves from a third person perspective. This view is especially compelling in that strengths and weaknesses are captured on tape and vividly displayed. Stop action, replay, and slow motion are some of the playback features available during debriefing. Attitudes and behaviours are easily seen, and appropriate adjustments are often self-evident.

D5.3.2 **Continuing Reinforcement**

D5.3.2.1 No matter how effective each curriculum segment is in the classroom, the role playing exercises, or the feedback, one-time exposures are simply not sufficient. The attitudes and norms that contribute to ineffective crew co-ordination have developed over a crewmembers lifetime. It is unrealistic to expect a short training program to reverse years of habits. To be maximally effective, CRM should be embedded in every stage of training, and CRM concepts should be stressed in line operations as well.

D5.3.2.2 CRM should become an inseparable part of the organisation’s culture.

D5.3.2.3 There is a common tendency to think of CRM as training only for the managers and captains. This notion misses the essence of the CRM training mission: the prevention of crew related accident CRM training works best in the context of the entire crew. Training exercises are most effective if all crewmember’s work together and learn together. In the past, much of flight crew training has been segmented by crew position. This segmentation has been effective for meeting certain training needs such as seat dependent technical training, and upgrade training, but segmentation is not appropriate for CRM training.

D5.3.2.4 Reinforcement can be accomplished in many areas. Training such as joint cabin and cockpit crew training in security can deal with many human factor issues. Joint training with aircraft dispatchers, maintenance personnel and gate agents can also reinforce CRM concepts.

D6. SUGGESTED CURRICULUM TOPICS:

D6.1 The topics outlined below have been included in many current CRM programs. Specific content of training and organisation of topics should reflect an organization’s unique culture and specific needs. Appendix “A” offers a set of behavioural markers fitting subtopics within each topic cluster. These markers may be helpful in curriculum development and gives additional CRM training topics.

D6.2 **Communications Processes and Decision Behaviour.** This topic includes internal and external influences on interpersonal communications. External factors include communication barriers such as rank, age, gender, and organisational culture. Internal factors include listening skills and decision making skills, conflict resolution techniques, and the use of appropriate assertiveness and advocacy. More specific subtopics include the following:

D6.2.1 **Briefings.** Training in addressing both operational and interpersonal issues, and training in establishing open communications.

D6.2.2 **Inquiry / Advocacy / Assertion.** Training in the potential benefits of crewmember's advocating the course of action that they feel is best, even though it may involve conflict with others.

D6.2.3 **Crew Self-Critique (Decisions and Actions).** Illustrating the value of review, feedback, and critique focusing on the process and the people involved. One of the best techniques for reinforcing effective human factor practices is careful debriefing of activities highlighting the processes that were followed. Additionally, it is essential that each crewmember be able to recognise good and bad communications, and effective and ineffective team behaviour.

D6.2.4 **Conflict Resolution.** Demonstrating effective techniques of resolving disagreements among crewmember's in interpreting information or in proposing courses of action. Demonstrating effective techniques for maintaining open communication while dealing with conflict.

D6.2.5 **Communications and Decision Making.** Demonstrating effective techniques of seeking and evaluating information showing the influence of biases and other cognitive factors on decision quality. There are benefits in providing crews with operational models of this group decision process. Crews may refer to these models to make good choices in situations when information is incomplete or contradictory.

D6.3 **Team Building and Maintenance**. This topic includes interpersonal relationships and practices. Effective leadership/follower-ship and interpersonal relationships are key concepts to be stressed. Curricula can also include recognising and dealing with diverse personalities and operating styles. Subtopics include:

D6.3.1 **Leadership/Follower-ship/Concern for Task**. Showing the benefits of the practice of effective leadership through co-ordinating activities and maintaining proper balance between respecting authority and practising assertiveness. Staying centred on the goals of safe and efficient operations.

D6.3.2 **Interpersonal Relationships/Group Climate**. Demonstrating the usefulness of showing sensitivity to other crewmember's personalities and styles. Emphasising the value of maintaining a friendly, relaxed, and supportive toxic in the cockpit and aircraft cabin. The importance of recognising symptoms of fatigue and stress, and taking appropriate action.

D6.3.3 **Workload Management and Situational Awareness**. Stressing the importance of maintaining awareness of the operational environment and anticipating contingencies. Instruction may address practices (for example, vigilance, planning and time management, prioritising tasks, and avoiding distractions) that result in higher levels of situational awareness. The following operational practices may be included:

D6.3.3.1 **Preparation/Planning/Vigilance**. Issues include devoting appropriate attention to required tasks, asking for and responding to new information, and preparing in advance for required activities.

D6.3.3.2 **Workload Distribution/Distraction Avoidance**. Issues involve proper allocation of tasks to individuals, avoidance of work overloads in self and in others, prioritisation of tasks during periods of high workload, and preventing non-essential factors from distracting attention from critical tasks.

D6.3.4 **Individual Factors/Stress Reduction**. Training in this area may include describing and demonstrating individual characteristics that can influence crew effectiveness. Research has shown that many crewmembers are unfamiliar with the negative effects of stress and fatigue on individual cognitive functions and team performance. Training may include a. review of scientific evidence on fatigue and stress and their effects on performance. The content may include specific effects of fatigue and stress in potential emergency situations. The effects of personal and interpersonal problems and the increased importance of effective interpersonal communications under stressful conditions may also be addressed. Training may also include familiarisation with various permissible countermeasures for coping with stressors. Additional curriculum topics may include examination of personality and motivation characteristics, self-assessment of personal style, and identifying cognitive factors that influence perception and decision making.

D7. SPECIALISED TRAINING IN CRM CONCEPTS:

D7.1 As CRM programs have matured, some organisations have found it beneficial to develop and implement additional courses dealing with issues specific to their operations.

D7.1.1 After all the current crewmembers have completed the Initial Indoctrination/Awareness component of CRM training, arrangements are needed to provide newly hired crewmember's with the same material. A number of organisations have modified their CRM initial courses for inclusion as part of the initial training and qualification for new hire crewmembers.

D7.1.2 Training for upgrading to captain provides an opportunity for specialised training that deals with the human factor aspects of command. Such training can be incorporated in the upgrade process.

D7.1.3 Training involving communications and the use of automation can be developed for crews operating aircraft with advanced technology cockpits, or for crews transitioning into them.

D8. ASSESSMENT OF CRM TRAINING PROGRAMS:

D8.1 It is recommended that each program be assessed to determine if it is achieving its goals. Each organisation should have a systematic assessment program. Assessment should track the effects of the training program so that critical topics for recurrent training may be identified and continuous improvements may be made in all other respects. Assessment of the training program should include observation of the training process by program administrators and self-reports by participants using standard survey methods.

D8.1.1 The emphasis in this assessment should be on crew performance. The CRM related processes recommended for assessment include communication, decision making, team building and maintenance, workload management and situational awareness; and the assessment should address the blending of traditional technical proficiency with those processes. An additional function of such assessment is to determine the impact of CRM training and organisation-wide trends in crew performance.

D8.2 For optimal assessment, data on crewmember's' attitudes and behaviour should be collected before CRM indoctrination and again at intervals after the last component of CRM training to determine both initial and enduring effects of the program. The goal should be to obtain an accurate picture of the organisation's significant corporate personality traits before formal adoption of CRM training and to continue to monitor those traits after implementation.

D8.3 Reinforcement and feedback are recommended components of effective OHM training programs. Crewmembers should receive continual reinforcement to sustain CRM concepts. Effective reinforcement depends upon usable feedback to crewmembers on their CRM practices and on their technical performance.

D8.4 Usable feedback requires consistent assessment. Crewmembers and those involved in training and evaluation should be able to recognise effective and ineffective CRM behaviours. It is not expected or intended that crewmember's should be formally evaluated and graded on the practice of CRM concepts. Rather, CRM concepts should be included during briefing/debriefing phases of training.

D8.5 To summarise, the assessment program should:

D8.5.1 Measure and track the organisation's corporate culture as it is reflected in attitudes and norms.

D8.5.2 Identify topics needing emphasis within the CRM program.

D8.5.3 Ensure that all check airmen, supervisors, and instructors are well prepared and standardised.

D9. THE CRITICAL ROLE OF CHECK AIRMEN AND INSTRUCTORS:

D9.1 The success of any CRM training program ultimately depends on the skills of the people who administer the training and measure its effects. CRM instructors, check pilots, supervisors, and course designers should be skilled in all areas related to the practice and assessment of CRM. It is important to note that these skills are complementary to those skills associated with traditional flight instruction and checking.

D9.2 Gaining proficiency and confidence in CRM instruction, observation, and measurement requires special training for instructors, supervisors, and check pilots in many CRM training processes. Among those processes are role playing simulations, systematic crew centred observation, and providing useful feedback to crews.

D9.3 Instructors, supervisors, and check pilots also require special training in order to calibrate and standardize their own skills.

D9.4 Instructors, supervisors, and check airmen should use every available opportunity to emphasise the importance of crew co-ordination skills. The best results occur when the crews examine their own behaviour with the assistance of a trained instructor who can point out both positive and negative OHM performance. Whenever highly effective examples of crew co-ordination are observed, it is recommended that these positive behaviours be discussed and reinforced.

D9.5 Feedback from instructors, supervisors, and check airmen is most effective when it refers to the concepts that are covered in the initial indoctrination/awareness training. The best feedback refers to instances of specific behaviour, rather than behaviour in general.

D10. EVOLVING CONCEPTS OF CRM: EXTENDING TRAINING BEYOND THE COCKPIT:

D10.1 More and. more carriers are discovering the value of extending CRM training beyond the cockpit. Their objective is to improve the effectiveness of additional groups within the operations team.

D10.2 For many years air traffic controllers have been welcome in the cockpit in order to gain familiarity with procedures by observation from the cockpit jump seat. Similarly, pilots are welcome to observe operations in air traffic facilities.

D10.3 Aircraft dispatchers have functioned jointly with flight captains for years. They have been allowed, indeed required to observe cockpit operations from the cockpit jump seat as part of their initial and recurrent qualification under the CARs. Some carriers have included day trips to their aircraft dispatchers' offices to provide the pilot insight into the other side of the joint function scheme. Those trips have commonly been part of the special training offered to first-time captains.

D10.4 Maintenance personnel have also had access to the cockpit jump seat under the CARs. Training of first-time captains has often included day trips to a carrier's operations control centre where a pilot and a maintenance supervisor can meet face to face and discuss issues of mutual interest in a real-life setting.

D10.5 Even broader sharing of CRM concepts has been considered, using other groups such as passenger service agents, mid and upper level managers and special crisis teams like hijack and bomb threat teams.

D10.6 Cabin attendants are probably the most obvious of the groups other than pilots who may profit from CRM training. One idea for joint training has been that each group be made aware of the other's training on shared issues, with particular emphasis on differences. Examples of shared issues include delays, the use of personal electronic devices in the cabin, and evacuation and ditching. Other specific topics for joint training have been proposed, including:

D10.6.1 Pre-flight briefings;

D10.6.2 Post incident/accident procedures;

D10.6.3 Sterile cockpit procedures;

D10.6.4 Notification procedures pre-takeoff and pre-landing;

D10.6.5 Procedures for turbulence and other weather;

D10.6.6 Security procedures;

D10.6.7 Passenger handling procedures;

D10.6.8 In-flight medical problems;

D10.6.9 Smoke/fire procedures,

D10.6.10 Passenger related CARs such as those covering carry-on baggage, smoking, and. exit row seating;

D10.6.11 Authority of the pilot in command.

D10.7 It is thought that CRM principles are made more relevant, for both pilots and flight attendants, by treating them in a familiar job related context. Furthermore, each group should benefit from concurrent training in CRM that is complemented by usable knowledge of the other's job.

D10.8 Communication and co-ordination problems between cockpit crewmembers and flight attendants continue to challenge air carriers and the CAA. Other measures with positive CRM training value for flight-crews are being considered such as:

D10.8.1 Requiring cockpit observation flights for all new-hire flight attendants; and permitting cockpit observation flights for all other flight attendants;

D10.8.2 Including flight attendants as participants

D10.8.3 Scheduling month-long pairings of pilots and flight attendants; and

D10.8.4 Providing experienced flight crewmembers to teach new-hire flight attendant orientation classes.

D11. SUMMARY:

D11.1 Effective Crew Resource Management begins in initial training; it is strengthened by recurrent practice and feedback; and it is sustained by continuing reinforcement that is part of the corporate culture and embedded in every stage of training.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
CARs	:	CIVIL AVIATION RULES
CAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
CRM	:	CREW RESOURCE MANAGEMENT
RPT	:	REGULAR PUBLIC TRANSPORT

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 "AOC Guide – Commercial Air Operations" CAAD-617; (MNL-005-FSXX-3.0)

E3.2 ICAO Annex 6 Part 1.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st January, 2018 and supersedes ANO 91.0014 (Issue-1).

--S/d--

(ASIM SULEIMAN)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **26th December, 2017**

--S/d--

(CAPT. ARIF MAJEED)
Director Flight Standards

Dated- **19th December, 2017**
File No. HQCAA/1077/025/FSAC

APPENDIX "A"

CREW PERFORMANCE MARKER CLUSTERS

These behavioural markers are provided to assist organisations in program and curriculum development and to serve as guidelines for feedback. They are not presented as a checklist for evaluating individual crewmembers.

A. COMMUNICATIONS PROCESSES AND DECISION BEHAVIOUR CLUSTER:

A.1. Briefings. An effective briefing is interesting and thorough. It addresses co-ordination, planning, and problems. Although briefings are primarily a captain's responsibility, other crewmembers may add significantly to planning and should be encouraged to do so.

A.2. BEHAVIOURAL MARKERS:

(1) The briefing establishes an environment for open/interactive communications (for example, the captain calls for questions or comments, answers questions direct, listens with patience, does not interrupt or "talk over," does not rush through the briefing, and makes eye contact as appropriate).
(2) The briefing is interactive and emphasises the importance of questions, critique, and the offering of information.
(3) The briefing establishes a "team concept" (for example, the captain uses "we" language, encourages all to participate and to help with the flight).
(4) The briefing covers pertinent safety and operational issues.
(5) The briefing identifies potential problems such as weather, delays, and abnormal system operations.
(6) The briefing provides guidelines for crew actions; division of labour and crew workload is addressed.
(7) The briefing includes the cabin crew as part of the team.
(7) The briefing sets expectations for handing deviations from standard operating procedures. The briefing specifies pilot flying and pilot not flying duties and responsibilities.

A.3. Inquiry/Advocacy/Assertion. These behaviours relate to crewmembers' promoting the course of action that they feel is best, even when it invokes conflict with others.

A.4. BEHAVIOURAL MARKERS:

(1) Crewmembers speak up and state their information with appropriate persistence until there is some clear resolution.
(2) "Challenge and response" environment is developed.
(3) Questions are encouraged and are answered openly and non-defensively.
(4) Crewmembers are encouraged to question the actions and decisions of others.
(4) Crewmembers seek help from others when necessary.

A.5. Crew Self-Critique Regarding Decisions and Actions. These behaviours relate to the effectiveness of a group and/or an individual crewmember in critique and debriefing. Areas covered should include the product, the process, and the people involved. Critique may occur during an activity, and/or after completing it.

A.6. BEHAVIOUR MARKERS:

(1) Critique occurs at appropriate times, which may be times of low or high workload.
(2) Critique deals with positive as well as negative aspects of crew performance.
(3) Critique involves the whole crew interactively.
(4) Critique makes a positive learning experience. Feedback is specific, objective, usable, and constructively given.
(5) Critique is accepted objectively and non-defensively.

A.7. Communications/Decisions. These behaviours relate to free and open communication. They reflect the extent to which crewmember's provide necessary information at the appropriate time (for example, initiating checklists and alerting others to developing problems). Active participation in the decision making process is encouraged. Decisions are clearly communicated and acknowledged. Questioning of actions and decisions is considered routine.

A.8. BEHAVIOURAL MARKERS:

(1) Operational decisions are clearly stated to other crewmembers.
(2) Crewmembers acknowledge their understanding of decisions.
(3) "Bottom lines" for safety are established and communicated.
(1) The "big picture" and the game plan are shared within the team, including flight attendants and others as appropriate. Crewmembers are encouraged to state their own ideas, opinions, and recommendations. Efforts are made to provide an atmosphere that invites open and free communications.

B. TEAM BUILDING AND MAINTENANCE CLUSTER

B.1 Leadership Follower-ship/Concern for Tasks.
These behaviours relate to appropriate leadership and follower-ship. They reflect the extent to which the crew is concerned with the effective accomplishment of tasks.

Behaviour Markers:

(1) All available resources are used to accomplish the job at hand.
(2) Flight deck activities are co-ordinated to establish an acceptable balance between respect for authority and the appropriate practice of assertiveness.
(3) Actions are decisive when the situation requires.
(4) A desire to achieve the most effective operation possible is dearly demonstrated.
(5) The need to adhere to standard operating practices is recognised.
(6) Group climate appropriate to the operational situation is continually monitored and adjusted (for example, social conversation may occur during low workload, but not high).
(7) Effects of stress and fatigue on performance are recognised.
(8) Time available for the task is well managed.
(9) Demands on resources posed by operations of automated systems are recognised and managed.
(10) When programming demands could reduce situational awareness or create work overloads, levels of automation are reduced appropriately.

B.2. Interpersonal Relationships/Group Climate. These behaviours relate to the quality of interpersonal relationships and the pervasive climate of the flight deck.

B.3. BEHAVIOURAL MARKERS:

(1) Crewmembers remain calm under stressful conditions.
(2) Crewmembers show sensitivity and ability to adapt to the personalities of others
(3) Crewmembers recognise symptoms of psychological stress and fatigue in self and in others (for example, recognises when he/she is experiencing "tunnel vision and seeks help from the team; or notes when a crewmember is not communicating and draws him/her back into the team).
(4) "Tone" in the cockpit is friendly, relaxed, and supportive.
(4) During times of low communication, crewmember's check in with others to see how they are doing.

C. WORKLOAD MANAGEMENT AND SITUATIONAL AWARENESS CLUSTER

C.1. Preparation/Planning/Vigilance. These behaviours relate to crews anticipating contingencies and the various actions that may be required. Excellent crews are always "ahead of the curve" and generally seem relaxed. They devote appropriate attention to required tasks and respond without undue delay to new developments. (They may engage in casual social conversation during periods of low workload and not necessarily diminish their vigilance.)

C.2. BEHAVIOURAL MARKERS:

(1) Demonstrating and expressing situational awareness; for example, the "model" of what is happening is shared within the crew.
(2) Active monitoring of all instruments and communications and sharing relevant information with the rest of the crew.
(3) Monitoring weather and traffic and sharing relevant information with the rest of the crew.
(4) Avoiding "tunnel vision" caused by stress; for example, stating or asking for the "big picture."
(5) Being aware of factors such as stress that can degrade vigilance and watching for performance degradation in other crewmembers.
(6) Staying "ahead of the curve" in preparing for planned situations or contingencies.
(7) Ensuring that cockpit and cabin crewmember's are aware of plans.
(8) Including all appropriate crewmember's in the planning process.
(9) Allowing enough time before manoeuvres for programming of the flight management computer.
(10) Ensuring that all crewmembers are aware of initial entries and changed entries in the flight management system.

C.3. Workload Distributed/Distractions Avoided. These behaviours relate to time and workload management. They reflect how well the crew manages to prioritise tasks, share the workload, and. avoid being distracted from essential activities.

C.4. BEHAVIOURAL MARKERS:

(1) Crewmembers speak up when they recognise work overloads in themselves or in others.
(2) Tasks are distributed in ways that maximise efficiency.
(3) Workload distribution is clearly communicated and acknowledged.
(4) Non operational factors such as social interaction are not allowed to interfere with duties.
(5) Task priorities are dearly communicated.
(6) Secondary operational tasks (for example, dealing with passenger needs and communications with company) are prioritised so as to allow sufficient resources for primary flight duties.

D. APPROPRIATE CRM TRAINING TOPICS

1. Background Information.

D.1. Research findings suggest that CRM training can result in significant improvements in flight crew performance. CRM is seen as an effective approach to reducing flight errors and increasing aviation safety.

E. TRAINING TOPICS, PRINCIPLES, AND TECHNIQUES.

E.1. CRM training is recommended which includes the curriculum topics described in this Air Navigation Order and the topics, principles, and techniques which follow:

a. Theory and practice in using communication, decision- making, and team building techniques and skills.

b. Theory and practice in using proper supervision techniques, i.e., captains working with first officers.

c. Theory and practice in selecting and using interventions needed to correct flying errors made by either pilot, especially during critical phases of flight. These interventions may include, but not be limited to, communication, assertion, decision-making, risk assessment, and situational awareness skills.

a. During simulation training, information, and practice of non-flying pilot functions, i.e., monitoring and challenging pilot functions, and monitoring and challenging errors made by other crewmembers for flight engineers, first officers, and captains. Training will alert flight-crews of hazards caused by tactical decision errors, which are actually errors of omission. Practice in monitoring and challenging errors, especially during taxi operations, should be included. These skills are important to minimise procedural errors, which may occur as a result of inadequately performed checklists.

b. Training for check airmen in methods which can be used to enhance the monitoring and challenging functions of both captains and first officers.

f. Training for new first officers in performing the non-flying pilot role to establish a positive attitude toward monitoring and challenging errors made by the flying pilot.

g. Training for captains in giving and receiving challenges of errors.

h. Factual information about the detrimental effects of fatigue and strategies for avoiding and countering its effects.

i. Training for crewmember's which identifies conditions in which additional vigilance is required, such as holding in icing or near connective activity.
Training should emphasise the need for maximum situation awareness and the appropriateness of sterile cockpit discipline, regardless of altitude.

j. Training for crewmember's in appropriate responses when passengers intimidate, abuse, or interfere with crewmember performance of safety duties. Training should address crew co-ordination and actions, which might defuse the situation. Training should include specific communication topics, such as conflict resolution.

k. For cockpit crewmembers which address appropriate responses to the effects of a blocked pilot tube. Emphasis should be on situation awareness, inquiry/advocacy/assertion, and crew co-ordination, when flight instruments act abnormally.

l. For cockpit crewmember's which contain a controlled flight into terrain scenario. Emphasis should be on prevention through effective communication and decision behaviour. The importance of immediate, decisive, and correct response to a ground proximity warning should also be addressed.

F. APPROPRIATE TRAINING INTERVENTIONS.

F.1. The most effective CRM training involves active participation of crewmembers. Sessions give each crewmember opportunities to practice CRM skills through interactions with other crewmember's. If the training is videotaped, feedback based on crewmember's' actual behaviour.

F.2. CRM training can be presented using a combination of the following training interventions:

(1) Operator in-house courses.
(2) Training centre courses.
(3) Special Purpose Operational Training.
(4) Computer Based Training courses.

REDUCED VERTICAL SEPARATION MINIMUM (RVSM) AND NORTH ATLANTIC MINIMUM NAVIGATION PERFORMANCE SPECIFICATION (NAT – MNPS) APPROVAL REQUIREMENTS

AIR NAVIGATION ORDER

VERSION	**:**	**4.0**
DATE OF IMPLEMENTATION	**:**	**01.01.2018**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. MARATIB ALI ZAFAR	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR MARSHAL (RETD.) ASIM SULEIMAN	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued under Rule 252 of Civil Aviation Rules (CARs) 94 by Director General Civil Aviation Authority in pursuance of powers vested in him under Rule-4 of CARs 1994.

B. PURPOSE:

B1. This ANO provides acceptable means that can be used by Pakistani Operators to gain approval for conducting flights in airspace or on routes:

B1.1 At FL 290 and above where a vertical separation minimum (VSM) of 1000 ft is applied in airspace designated as Reduced Vertical Separation Minimum (RVSM) airspace and in airspace designated as North Atlantic Minimum Navigation Performance Specification (NAT-MNPS) Airspace. The approval process described in this ANO covers RVSM airworthiness approvals/validation for Pakistan/foreign registered aircraft and RVSM operational approvals for Pakistani Operators operating with Pakistan registered or foreign aircraft. It also provides:

B1.1.1 Pakistani aircraft owners and Operators with comprehensive information on a means of gaining airworthiness and operational approvals for RVSM operations;

B1.1.2 Sufficient knowledge to flight crew on RVSM operations to enable them to conduct operations safely.

B1.2 Designated as NAT-MNPS Airspace.

C. SCOPE:

C1. This ANO applies to all Operators with Pakistan Registered and/or foreign registered aircraft, and flight crews wishing to conduct flights into airspace designated as Reduced Vertical Separation Minimum (RVSM) airspace (airspace at FL 290 and above, where a 1000 ft vertical separation minimum is applied) and in airspace designated as NAT-MNPS Airspace.

C2. GLOBAL IMPLEMENTATION PROGRAMS FOR MNPS AND RVSM:

C2.1 A reduced vertical separation minimum of 1000 feet was introduced from FL 330 to FL 370 in parts of the NAT MNPS in 1997. In 1998, this was extended to cover FL 310 to FL 390 inclusive.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 The following definitions are intended to clarify certain specialized terms used in this ANO:-

D1.1.1 Aircraft Group: A group of aircraft that are of nominally identical in design and build with respect to all details that could influence the accuracy of height keeping performance;

D1.1.2 Altimetry System Error (ASE): The difference between the pressure altitude displayed to the flight crew when referenced to ISA standard ground pressure setting (29.92 in.Hg/1013.25 hPa) and free stream pressure altitude;

D1.1.3 Assigned Altitude Deviation (AAD): The difference between the transponder Mode C altitude and the assigned altitude/flight level;

D1.1.4 Automatic Altitude Control System: Any system, which is designed to automatically control the aircraft to a referenced pressure altitude;

D1.1.5 Avionics Error (AVE): The error in the processes of converting the sensed pressure into an electrical output, of applying any static source error correction (SSEC) as appropriate, and of displaying the corresponding altitude;

D1.1.6 Basic RVSM Envelope: The range of Mach numbers and gross weights within the altitude ranges FL 290 to FL 410 (or maximum available altitude where an aircraft can reasonably be expected to operate most frequently;

D1.1.7 Full RVSM Envelope: The entire range of operational Mach numbers, w/d, and altitude values over which the aircraft can be operated within RVSM airspace;

D1.1.8 Height-Keeping Capability: Aircraft height-keeping performance, which can be expected under nominal environmental operating conditions with proper aircraft operating practices and maintenance;

D1.1.9 Height-Keeping Performance: The observed performance of an aircraft with respect to adherence to a flight level;

D1.1.10 NAT-MNPS Airspace is defined as follows:

D1.1.10.1 Between latitude 27 degrees North and 67 degrees North;

D1.1.10.2 The Eastern Boundaries of Santa Maria Oceanic, Shanwick Oceanic, and Reykjavik Flight Information Region (FIR);

D1.1.10.3 The Western Boundaries of Reykjavik and Gander Oceanic FIRs and New York FIR East of longitude 60 degrees West;

D1.1.10.4 Between FL 275 and 400.

D1.1.11 Non-Group Aircraft: An aircraft for which the Operator applies for approval based on the characteristics of the unique airframe rather than on a group basis;

D1.1.12 Residual Static Source Error: The amount by which static source error (SSE) remains under-corrected or over-corrected after the application of SSEC;

D1.1.13 RVSM approval data package: It is the combination of performance and analytical data, service bulletin(s) or equivalent, continued airworthiness instructions, and the approved amendment or supplement to the AFM;

D1.1.14 RVSM Airworthiness Approval: RVSM airworthiness approval, in the context of this ANO, is a written approval given by PCAA for a Pakistani aircraft (i.e.

an aircraft registered in Pakistan) indicating that it is suitable to be operated in RVSM airspace;

D1.1.15 RVSM Foreign Airworthiness Approval: RVSM foreign airworthiness approval is an approval given for a foreign aircraft by a competent Authority of the country in which the aircraft is registered indicating that the aircraft is suitable to be operated in RVSM airspace;

D1.1.16 RVSM Operational Approval: This approval covers not only the Operator but also each individual aircraft group and each individual aircraft to be used by the Operator in RVSM operations.

D1.1.17 Static Source Error (SSE): The difference between the pressure sensed by the static system at the static port and the undisturbed ambient pressure;

D1.1.18 Static Source Error Correction (SSEC): A correction for static source error;

D1.1.19 Total Vertical Error (TVE): Vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level);

D1.1.20 Worst-case avionics: Combination of tolerance values, specified by the manufacturer for the altimetry installed / fitted the aircraft, which gives the largest combined absolute value for residual SSE plus avionics errors;

D2. RVSM APPROVAL:

D2.1 Airspace where RVSM is applied shall be considered special qualification airspace. Operators and the aircraft they intend to use in the RVSM airspace must be approved by PCAA before they can conduct flight(s) in RVSM airspace.

D2.1.1 RVSM Airworthiness Approval Requirements:

D2.1.1.1 Each aircraft that a Pakistani Operator intends to use in RVSM airspace must have an RVSM airworthiness approval or an RVSM foreign airworthiness approval before an RVSM operational approval can be granted by PCAA.

D2.1.2 Aircraft Systems and Equipment minimum requirement is:

D2.1.2.1 Two independent altitude measurement systems;

D2.1.2.2 One Secondary Surveillance Radar (SSR) altitude reporting transponder. If only one is fitted, it shall have the capability for switching to operate from either altitude measurement system;

D2.1.2.3 An altitude alert system;

D2.1.2.4 An automatic altitude control system.

D2.1.3 Maintenance Program: The Operator shall submit a maintenance program for approval with following details:

D2.1.3.1 Maintenance Practices;

D2.1.3.2 Maintenance Practices for Non-Compliant Aircraft;

D2.1.3.3 Maintenance Training Requirements;

D2.1.3.4 Test Equipment.

D2.1.4 Maintenance Documents: Following documents are required along with application:

D2.1.4.1 Aircraft Flight Manual including all the supplements and amendments;

D2.1.4.2 Maintenance Manuals;

D2.1.4.3 Structural Repair Manuals;

D2.1.4.4 Standards Practices Manuals;

D2.1.4.5 Illustrated Parts Catalogues;

D2.1.4.6 Maintenance Schedule;

D2.1.4.7 MMEL/MEL;

D2.1.4.8 Maintenance Control Manuals;

D2.1.4.9 Equipment Lists/Wiring Diagram Manuals;

D2.1.4.10 RVSM approval data package.

D2.1.5 RVSM approval data package: Following shall make up the RVSM approval data package:

D2.1.5.1 Performance and analytical data;

D2.1.5.2 Service Bulletin(s) or equivalent;

D2.1.5.3 The approved amendment or supplement to the AFM;

D2.1.5.4 Compliance Procedures;

D2.1.5.5 Operating Restrictions;

D2.1.5.6 Continued airworthiness instructions.

D2.1.6 RVSM Airworthiness Approval Process: Obtaining RVSM airworthiness approval is a two-stage process, which may involve more than one Authority:

D2.1.6.1 In the case of a newly built aircraft:

D2.1.6.1.1 The aircraft constructor develops and submits the performance and analytical data that supports the RVSM airworthiness approval of a defined build standard;

D2.1.6.1.2 The data will be supplemented with maintenance and repair manuals giving associated continued airworthiness instructions;

D2.1.6.1.3 Compliance with RVSM criteria will be stated in the Aircraft Flight Manual (AFM) including reference to the applicable build standard, related conditions and limitations;

D2.1.6.1.4 Approval by the responsible Authority, or Validation of that approval by other authorities.

D2.1.6.2 In the case of an aircraft already in service:

D2.1.6.2.1 The aircraft constructor (or an approved design organisation), submits to the responsible Authority, either in the state of manufacture or the state in which the aircraft is registered, the performance and analytical data that supports RVSM airworthiness approval of a defined build standard;

D2.1.6.2.2 The data will be supplemented with a Service Bulletin, or its equivalent, that identifies the work to be done to achieve the build standard, continued airworthiness instructions;

D2.1.6.2.3 An amendment to the AFM stating related conditions and limitations;

D2.1.6.2.4 Approval by the responsible Authority.

D2.1.6.3 Operator shall apply on PCAA Airworthiness Directorate prescribed form (CAAF-118-AWRG-3.0) for airworthiness approval of specific aircraft. All necessary data as mentioned below shall be submitted to the DAW PCAA for necessary review. The approved data package shall be used by the Operator to demonstrate compliance with RVSM performance standards. The application will need to be supported by evidence confirming that:

D2.1.6.3.1 The performance and analytical data is available;

D2.1.6.3.2 Where necessary, modified in accordance with applicable Service Bulletins;

D2.1.6.3.3 It is of a type and build standard that meets the RVSM airworthiness criteria;

D2.1.6.3.4 The approved AFM amendment or supplement has been incorporated;

D2.1.6.3.5 The specific aircraft has been inspected and approved by the responsible Authority;

D2.1.6.3.6 The continued airworthiness instructions are available.

D2.1.6.4 Post-Approval Modification: Any variation/modification from the initial installation that affects RVSM approval shall require clearance by the airframe manufacturer or approved design organisation and be cleared with PCAA to show that RVSM compliance has not been impaired.

D2.1.6.5 Continued Airworthiness: Refer to Appendix C of this ANO.

D2.1.7 RVSM Operational Approval (FSD PCAA)

D2.1.7.1 RVSM operational approval covers not only the Operator but also each individual aircraft group and each individual aircraft to be used by the Operator in RVSM operations. Each aircraft must have received an RVSM airworthiness approval or have a current RVSM foreign airworthiness approval before it will be listed on an Operator's RVSM operational approval.

D2.1.7.2 RVSM Operational Approval: This approval covers not only the Operator but also each individual aircraft group and each individual aircraft to be used by the Operator in RVSM operations. Operational Approval pertains to guidance on the operational procedures and programs, which an Operator shall adopt for RVSM operation.

D2.1.7.3 PCAA shall ensure that each Operator can demonstrate that the Operator's aircraft can maintain high levels of height-keeping performance. Flight crew training, Operations manuals and operational programs will be evaluated for adequacy by Flight Standards. Approval will be granted for individual Pakistan Operators.

D2.1.7.4 Pre-Application Meeting: A pre-application meeting shall be scheduled on Operator's request connection with to discuss PCAA's requirements and expectations in approval to operate in a RVSM environment. The content of the Operator's RVSM application, PCAA review and evaluation of the application, validation flight requirements, and conditions for removal of RVSM approval shall be basic items of discussion.

D2.1.7.5 Content/Attachments of Operator RVSM Application: An Operator applying (on prescribed Form) for RVSM approval shall provide to PCAA the following for review and evaluation at least 45 days prior to the intended start of RVSM operations.

D2.1.7.5.1 Description of Aircraft Equipment

D2.1.7.5.2 Airworthiness Approval Certificate

D2.1.7.5.3 Operations Manuals and Checklists

D2.1.7.5.4 Past Performance

D2.1.7.5.5 Minimum Equipment List

D2.1.7.5.6 Training Programs and Operating Practices/ Procedures

D2.1.8 Review and Evaluation Process

D2.1.8.1 Once the application has been submitted, PCAA will begin the process of review and evaluation. If content of the application is insufficient, PCAA will ask for additional information from the Operator. When all the airworthiness and operational requirements of the application are met, PCAA will proceed with the approval process.

D2.1.8.2 The PCAA:

D2.1.8.2.1 May evaluate a training course prior to accepting a training certificate;

D2.1.8.2.1 May accept a statement in the Operator's application that the Operator will ensure that its pilots will be knowledgeable on RVSM procedures contained in Appendix D; or

D2.1.8.2.1 May accept a statement by the Operator that it has or will conduct an in-house training program. Practices and procedures in the following areas shall be standardised using the guidelines of Appendix D:

i) Flight planning;
ii) Pre-flight procedures at the aircraft for each flight;
iii) Procedures prior to RVSM airspace entry;
iv) In-flight procedures; and
v) Flight crew training procedures.

D2.1.9 Validation Flight (s). In some cases, the review of the RVSM application and programs may suffice for validation purposes. However, the final step of the approval process may be the completion of a validation flights. PCAA Inspectors (Operations & Airworthiness) may accompany the Operator on a flight through airspace where RVSM is applied to verify that operations and maintenance procedures and practices are applied effectively.

D2.1.10 Approval: RVSM operational approval will only be issued if the RVSM airworthiness approval is enforced. The approval will take the form of a certificate and will identify the Operator, each individual aircraft the approval covers, and any conditions on the approval (e.g. height monitoring program to be completed within a specified time of the approval being issued).

D3. PLAN FOR PARTICIPATION IN VERIFICATIONS/MONITORING PROGRAMS:

D3.1 The Operator shall provide a plan for participation in the verification or monitoring program. This program shall normally entail a check of at least a portion of the Operator's aircraft by an independent height-monitoring system (Refer to Appendix F for this programme).

D4. CONDITIONS FOR SUSPENSION/CANCELLATION OF RVSM APPROVAL:

D4.1 The incidence of height-keeping errors, which can be tolerated in an RVSM environment, is very small. It is incumbent upon each Operator to take immediate action to rectify the conditions, which caused the error. The Operator shall also report the event to PCAA within 24 hours with initial analysis of causal factors and measures to prevent further events. PCAA will determine the requirement for follow-up reports.

D4.2 Following errors caused by either malfunction of aircraft equipment and/or operational errors shall be reported and investigated:

D4.2.1 Total vertical error (TVE) equal to or greater than ±300 ft (±90 m);

D4.2.2 Altimetry System Error (ASE) equal to or greater than ±245 ft (±75 m); and

D4.2.3 Assigned Altitude Deviation (AAD) equal to or greater than ±300 ft (±90 m).

D4.3 The Operator shall make an effective, timely response to each height-keeping error. PCAA may consider suspending/canceling an Operator's RVSM operational approval if the Operator's response to a height-keeping error is unsatisfactory.

D5. NAT- MNPS AIRSPACE:

D5.1 Operational Approval Considerations: Operators desiring to operate in NAT-MNPS airspace inform the PCAA a minimum of 30 days prior to the start of the required evaluation process. Navigation equipment utilized and the associated operating procedure are the choice of the Operator. The essential provision is that the combination of equipment and method of operation meet the navigation accuracy established by ICAO for operations within the NAT-MNPS airspace.

D5.2 Equipment Reliability: In evaluating a navigation system, consideration should be given to maintaining the highest level of navigational performance. Operators should consider equipment reliability and human error analysis when evaluating a navigation system for use in the NAT-MNPS airspace.

D5.3 Monitoring and Reporting: To ensure safety is not compromised through failure of Operators to meet the conditions for operations within the MNPS, ICAO has established procedures for monitoring of aircraft navigation performance using ATS radar near the boundaries of NAT-MNPS airspace. Lateral errors in excess of 25 NM will be reported for investigation as appropriate.

D5.4 PCAA shall take appropriate action concerning Operators who frequently fail to meet the navigation specifications, including restricting flights or withdrawing approval of those Operators to fly in the NAT-MNPS airspace.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 ICAO Doc. 9574.

E3.2 ICAO Doc. 7030.

E3.3 FAA-91-RVSM (Change 1).

E3.4 FAA Advisory Circular, AC 120-33.

E3.5 ICAO Annex 2.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st January, 2018 and supersedes ANO 91.0015 (Issue-3).

--S/d--

(ASIM SULEIMAN)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **26th December, 2017**

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Director Flight Standards

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APPENDIX "A"

RVSM PERFORMANCE & AIRCRAFT SYSTEM REQUIREMENTS

1. PERFORMANCE:

1.1 GENERAL:

The statistical performance statements of ICAO Doc. 9574 for a population of aircraft have been translated into airworthiness standards by assessment of the characteristics of Altimetry System errors and altitude control. The standards in this ANO are consistent with the requirements of RVSM as provided in ICAO Doc. 9574.

1.2 **RVSM FLIGHT ENVELOPES:**

For the purposes of RVSM approval, the aircraft flight envelope may be considered in two parts: the Basic RVSM Envelope and the Full RVSM Envelope. The Basic RVSM Envelope is the part of the flight envelope where aircraft operate the majority of time. The Full RVSM Envelope includes parts of the flight envelope where the aircraft operates less frequently and where a larger Altimetry System Error tolerance is allowed.

1.3 ALTIMETRY SYSTEM ERROR:

1.3.1 Factors Affecting ASE:

In order to evaluate a system against the ASE performance statements, it is necessary to quantify the mean and three standard deviation values for ASE, expressed as ASE mean and (ASE3SD) Altimetry System Error (three standard deviations). In order to do this, it is necessary to take into account the different ways in which variations in ASE can arise. The factors that affect ASE are:

a) Unit to unit variability of avionics;
b) Effect of environmental operating conditions on avionics;
c) Airframe to airframe variability of static source error; and
d) Effect of flight operating condition on static source error.

1.3.2 Assessment Requirement:

The assessment of Altimetry System Error (mean) and Altimetry System Error (three standard deviations) whether based on measured or predicted data, must, therefore, cover all the factors affecting ASE. Evaluating ASE at the most adverse flight condition in an RVSM flight envelope can eliminate the effect of SSC as a variable.

1.3.3 Basic RVSM Envelope:

The requirements in the Basic RVSM Envelope are:

a) At the point in the Basic RVSM Envelope where mean ASE reaches its largest absolute value, the absolute value shall not exceed 80 ft (25 m); and
b) At the point in the Basic RVSM Envelope where mean ASE plus three standard deviations of ASE reaches its largest absolute value, the absolute value shall not exceed 200 ft (60 m).

1.3.4 Full RVSM Envelope:

The requirements in the Full RVSM Envelope are:

a) At the point in the Full RVSM Envelope where mean ASE reaches its largest absolute value, the absolute value shall not exceed 120 ft (37 m);
b) At the point in the Full RVSM Envelope where mean ASE plus three standard deviations of ASE reaches its largest absolute value, the absolute value shall not exceed 245 ft (75 m); and;
c) If necessary, for the purpose of achieving RVSM approval for an aircraft group, an operating restriction may be established to restrict aircraft from conducting RVSM operations in areas of the Full RVSM Envelope where the absolute value of mean ASE exceeds 120 ft (37 m) and/or the absolute value of mean ASE plus three standard deviations of ASE exceed 245 ft (75 m). When such a restriction is established, it shall be identified in the data package and

documented in appropriate aircraft operating manuals, however, visual or aural warning/indication systems shall not be required to be installed on the aircraft.

1.3.5 Aircraft Types:
Aircraft types for which application for type certification or major change in type design is made after 1 January 1997 shall meet the criteria established for the Basic RVSM Envelope in the Full RVSM Envelope.

1.3.6 Interpretation of ICAO Requirements:
The standards given above may not apply to non-group aircraft approval because there can be no group data with which to develop airframe-to-airframe variability. Therefore, a single ASE value is established that controls the simple sum of the altimetry system errors. In order to control the overall population distribution, this limit is set at a value less than that for group approval. The standard for submission of non-group aircraft for approval is:

a) For all conditions in the Basic RVSM Envelope:
Residual static source error + worst case avionics ・ 160 ft (50 m)
b) For all conditions in the Full RVSM Envelope:
Residual static source error + worst case avionics ・ 200 ft (60 m)

1.4 <u>ALTITUDE KEEPING:</u>

An automatic altitude control system is required and must be capable of controlling altitude within ±65 ft (±20 m) about the acquired altitude when operated in straight and level flight under non-turbulent, non-gust conditions.

NOTE: Aircraft types for which application for type certification or major change in type design is made prior to 1 January 1997 which are equipped with automatic altitude control systems with flight management system/performance management system inputs allowing variations up to ±130 ft (±40 m) under non-turbulent, non-gust conditions do not require retrofit or design alteration.

2. <u>AIRCRAFT SYSTEMS REQUIREMENTS:</u>

2.1 Equipment for RVSM Operations: The minimum equipment fit is:

a) Two independent altitude measurement systems. Each system shall comprise of the following elements:
   i) Cross-coupled static source/system, provided with ice protection if located in areas subject to ice accretion;
   ii) Equipment for measuring static pressure sensed by the static source, converting it to pressure altitude and displaying the pressure altitude to the flight crew;
   iii) Equipment for providing a digitally coded signal corresponding to the displayed pressure altitude, for automatic altitude reporting purposes;
   iv) SSEC, if needed to meet the performance requirements of altimetry system errors, as appropriate; and
   v) The equipment fit shall provide reference signals for automatic control and alerting at selected altitude. These signals shall preferably be derived from an altitude measurement system meeting the full requirements of this document, but must in all cases enable the requirements of Altitude control and altitude alert to be met.
b) One Secondary Surveillance Radar (SSR) altitude reporting transponder. If only one is fitted, it shall have the capability for switching to operate from either altitude measurement system;
c) An altitude alert system; and
d) An automatic altitude control system.

Note: Details of the above equipment shall be forwarded by the Operator to DAW as an attachment to application.

2.2 ALTIMETRY:

The altimetry system of an aircraft comprises all those elements involved in the process of sampling free stream static pressure and converting it to a pressure altitude output.

2.2.1 The elements of the altimetry system fall into two main groups:

a) Airframe plus static sources; and
b) Avionics and/or instruments.

2.2.2 Altimetry System Outputs:

The following altimetry system outputs are significant for RVSM operations:

a) Pressure altitude (Baro Corrected) display;
b) Pressure altitude reporting data; and
c) Pressure altitude or pressure altitude deviation for an automatic altitude control device.

2.2.3 Altimetry System Accuracy:

The total system accuracy shall satisfy the requirements of Basic and full RVSM Envelope or ICAO standards on the subject, as appropriate.

2.2.4 Static Source Error Correction (SSEC):

If the design and characteristics of the aircraft and altimetry system are such that the basic and/or full RVSM envelope or ICAO standards on the subject, are not satisfied by the location and geometry of the static sources alone, then suitable Static Source Error Correction (SSEC) shall be applied automatically within the avionics part of the altimetry system. The design aim for static source error correction, whether aerodynamic/geometric or avionics, shall be to produce a minimum residual static source error, but in all cases it shall lead to satisfaction of the above standards, as appropriate.

2.2.5 Altitude Reporting Capability:

The aircraft altimetry system shall provide an output to the aircraft transponder.

2.2.6 Altitude Control Output:

The requirements are:

a) The altimetry system shall provide an output, which can be used by an automatic altitude control system to control the aircraft at a commanded altitude. The output may be used either directly or combined with other sensor signals. If Static Source Error Correction is necessary in order to satisfy the requirements of this ANO, then an equivalent Static Source Error Correction (SSEC) must be applied to the altitude control output. The output may be an altitude deviation signal, relative to the selected altitude, or a suitable absolute altitude output; and
b) Whatever the system architecture and Static Source Error Correction system the difference between the output to the altitude control system and the altitude displayed must be kept to the minimum.

2.2.7 Altimetry System Integrity:

During the RVSM approval process it must be verified analytically that the predicted rate of occurrence of undetected altimetry system failures does not exceed 1 x 10-5 per flight hour. All failures and failure combinations whose occurrence would not be evident from cross-cockpit checks, and which would lead to altitude measurement/display errors outside the specified limits, need to be assessed against this budget. No other failures or failure combinations need to be considered.

2.3 ALTITUDE ALERT:

The altitude deviation warning system must signal an alert when the altitude displayed to the flight crew deviates from selected altitude by more than a nominal value. For aircraft for which application for type certification or major change in type design is made before 1 January 1997, the nominal value shall not be greater than ±300 ft (±90 m). For aircraft for which application for type certification or major change in type design is made after 1 January 1997, the nominal value shall not be greater than ±200 ft (±60 m). The overall equipment tolerance in implementing these nominal threshold values shall not exceed ±50 ft (±15 m).

2.4 AUTOMATIC ALTITUDE CONTROL SYSTEM:

a) As a minimum, a single automatic altitude control system must be installed which is capable of controlling aircraft height within a tolerance band of ±65 ft (±20 m) about the acquired altitude when the aircraft is operated in straight and level flight under non-turbulent, non-gust conditions.

   Note: Aircraft for which application for type certificates was made prior to 1 January 1997, which are equipped with automatic altitude control system with flight management system/performance management system inputs which allow variations up to ±130 ft (±40 m) under non-turbulent, non-gust conditions do not require retrofit or design alteration.

b) Where an altitude select/acquire function is provided, the altitude select/acquire control panel must be configured such that an error of no more than ±25 ft (±8 m) exists between the display selected by the flight crew and the corresponding output to the control system.

APPENDIX “B”

CONTENTS OF THE DATA PACKAGE

The combination of performance and analytical data, Service Bulletin(s) or equivalent, continued airworthiness instructions, and the approved amendment or supplement to the AFM is known as the RVSM approval data package.

1. SCOPE:

As a minimum, the data package shall consist of the following:

a) A definition of the aircraft group or non-group aircraft to which the data package applies;
b) A definition of the flight envelope(s) applicable to the subject aircraft;
c) The data needed to show compliance with the requirements;
d) The compliance procedures to be used to ensure that all aircraft submitted for airworthiness approval meet RVSM requirements; and
e) The engineering data to be used to ensure continued in-service RVSM approval integrity.

2. AIRCRAFT GROUP:

For aircraft to be considered as members of a group for purposes of RVSM approval, they shall satisfy all of the following conditions:

a) Aircraft shall have been manufactured to a nominally identical design and be approved by the same Type Certificate (TC), TC amendment, or Supplemental TC, as applicable;
b) The static system of each aircraft shall be installed in a nominally identical manner and position. The same SSE corrections shall be incorporated in all aircraft of the group;
c) The avionics units installed on each aircraft to meet the minimum RVSM equipment requirements shall be manufactured to the manufacturer's specification and have the same part number; and
d) The RVSM data package shall have been produced or provided by the airframe manufacturer or design organisation.

Note 1: For derivative aircraft it may be possible to utilise the database from the parent configuration to minimise the amount of additional data required to show compliance. The extent of additional data required will depend on the nature of the changes between the parent aircraft and the derivative aircraft.

Note 2: Aircraft, which have avionics units that are of a different manufacturer or part number, may be considered part of the group, if it is demonstrated that this standard of avionics equipment provides equivalent system performance.

3. NON-GROUP AIRCRAFT:

If an airframe does not meet the conditions to qualify as a member of a group or is presented as an individual airframe for approval, then it must be considered as a non-group aircraft for the purposes of RVSM approval.

4. FLIGHT ENVELOPES:

The RVSM flight envelope is defined as the Mach number, W/· , and altitude ranges over which an aircraft can be operated in cruising flight within the RVSM airspace.

The RVSM operational flight envelope for any aircraft may be divided into two zones as defined below:

a) Full RVSM Envelope

The Full RVSM Envelope shall comprise the entire range of operational Mach number and altitude values over which the aircraft can be operated within RVSM airspace. Parameters that shall be considered are:

	Lower Boundary is Identified by	Upper Boundary is defined by
Altitude	FL 290	The lower of the following: • FL 410 • Aircraft maximum certified altitude • Altitude limited by cruise thrust, buffet, other aircraft flight limitations
Mach or Airspeed	The lower of the following: • Maximum endurance (holding) speed • Maneuver Speed	MMO/VMO • Speed limited by cruise thrust, buffet, other aircraft flight limitations
Gross Weight	• The lowest gross weight compatible with operation in RVSM airspace	• The highest gross weight compatible with operation in RVSM airspace

b) Basic RVSM Envelope

i) The boundaries for the Basic RVSM Envelope are the same as those for the Full RVSM Envelope except in regard to the upper Mach boundary.

ii) For the Basic RVSM Envelope, the upper Mach boundary may be limited to a range of airspeeds over which the aircraft group can reasonably be expected to operate most frequently. The manufacturer or design organisation shall declare this boundary for each aircraft group. The boundary may be defined as equal to the upper Mach/airspeed boundary defined for the Full RVSM Envelope or a specified lower value. This lower value shall not be less than the Long Range Cruise Mach Number plus 0.04 Mach, unless limited by available cruise thrust, buffet, or other aircraft flight limitations.

Note: Long Range Cruise Mach number is the Mach for 99% of best fuel mileage at the particular W/ · · under consideration.

5. DATA PACKAGE REQUIREMENTS

The data package shall contain data sufficient to substantiate that the accuracy standards are met.

a) General

i) ASE will generally vary with flight condition. The data package shall provide coverage of the RVSM envelope sufficient to define the largest errors in the basic and full RVSM envelopes. Note that in the case of group approval the worst flight condition may be different for each of the requirements and each shall be evaluated.

ii) Where precision flight calibrations are used to quantify or verify altimetry system performance they may be accomplished by any of the following methods. Flight calibrations shall only be performed once appropriate ground checks have been completed. Uncertainties in application of the method must be assessed and taken into account in the data package. The methods are:

- Precision tracking radar in conjunction with pressure calibration of atmosphere at test altitude;
- Trailing cone;
- Pacer aircraft; or
- Any other method acceptable to PCAA.

b) Altimetry System Error Budget: It is implicit, for group approvals and for non-group approvals that a trade may be made between the various error sources, which contribute to ASE. Separate limits are not specified for the various error sources, which contribute to the mean and variable components of ASE as long as the overall ASE accuracy requirements are met. In all cases the trade-off adopted shall be presented in the data package in the form of an error budget, which includes all significant error sources.

c) Avionics: Avionics equipment shall be identified by function and part number. It shall be demonstrated that the avionics equipment can meet the requirements established according to the error budget when the equipment is operated in the environmental conditions expected to be met during RVSM operations. This equipment must conform to the details submitted to DAW along with the application.

d) Groups of Aircraft: Where approval is sought for an aircraft group, the data package shall be sufficient to show that the requirements are met. Because of the statistical nature of these requirements, the content of the data package may vary considerably from group to group.
   i) The mean and airframe-to-airframe variability of ASE shall be established based on precision flight test calibration of a number of aircraft. Where analytical methods are available, it may be possible to enhance the flight test database and to track subsequent change in the mean and variability based on geometric inspections and bench test or any other method acceptable to the approving Authority. In the case of derivative aircraft it may be possible to utilise data from the parent as part of the database.
   ii) An assessment of the aircraft-to-aircraft variability of each error source shall be made. The error assessment may take various forms as appropriate to the nature and magnitude of the source and the type of data available. For some error sources (especially small ones) it may be acceptable to use specification values to represent Three standard deviations (3SD). For other error sources (especially larger ones) a more comprehensive assessment may be required; this is especially true for airframe error sources where 'specification' values of ASE contribution may not have been previously established.
   iii) In many cases one or more of the major ASE error sources will be aerodynamic in nature (such as variations in the aircraft surface contour in the vicinity of the static pressure source). If evaluation of these errors is based on geometric measurements, substantiation shall be provided that the methodology used is adequate to ensure compliance.
   iv) An error budget shall be established to ensure that the standards are met. The worst flight condition may be different for each of these standards and therefore the component error values may also be different.
   v) In showing compliance with the overall requirements, the component error sources shall be combined in an appropriate manner. In most cases this will involve the algebraic summation of the mean components of the errors, Root-Sum-Square (RSS) combination of the variable components of the errors, and summation of the RSS value with the absolute value of the overall mean. Care shall be taken that only variable component error sources, which are independent of each other, are combined by RSS.

e) Non-Group Aircraft: Where an aircraft is submitted for approval as a non-group aircraft, the data shall be sufficient to show that the requirements are met. The data package shall specify how the ASE budget has been allocated between residual SSE and avionics error. The following data shall be established.
   i) Precision flight-test calibration of the aircraft to establish its ASE or SSE over the RVSM envelope shall be required. Flight calibration shall be performed at points in the flight envelope(s) as agreed by the certifying Authority. One of the methods prescribed shall be used.
   ii) Calibration of the avionics used in the flight test as required to establish residual SSE. The number of test points shall be agreed by the certifying Authority. Since the purpose of the flight test is to determine the residual SSE, specially calibrated altimetry equipment may be used.
   iii) Specifications for the installed altimetry avionics equipment indicating the largest allowable errors will be presented.
   iv) If subsequent to aircraft approval for RVSM operation avionics units, which are of a different manufacturer or part number, are fitted, it shall be demonstrated that the standard of avionics equipment provides equivalent altimetry system performance.

6. COMPLIANCE PROCEDURES:

The data package must include a definition of the procedures, inspections/tests and limits which will be used to ensure that all aircraft approved against the data package 'conform to type', and that all future approvals, whether of new build or in-service aircraft, meet the budget allowances developed. The budget allowances will be established by the data package and include a methodology that allows for tracking the mean and SD for new build aircraft. Compliance requirements must be defined for each potential source of error.

7. OPERATING RESTRICTIONS:

Where an operating restriction has been adopted, the package shall contain data and information necessary to document and establish that restriction.

APPENDIX "C"

CONTINUED AIRWORTHINESS (MAINTENANCE REQUIREMENTS)

1. GENERAL:

The integrity of the design features necessary to ensure that altimetry systems continue to meet RVSM standards shall be verified by scheduled tests and/or inspections in conjunction with an approved maintenance program. The Operator shall review its maintenance procedures and address all aspects of continuing airworthiness, which are affected by RVSM requirements.

Each Operator shall demonstrate that adequate maintenance facilities are available to ensure continued compliance with the RVSM maintenance requirements.

2. MAINTENANCE PROGRAM APPROVAL REQUIREMENTS:

Each Operator requesting an RVSM operational approval shall submit a maintenance and inspection program which includes any maintenance requirements defined in the approved data package as part of a continued airworthiness (approved system of) maintenance program approval or an equivalent program approved by PCAA.

3. MAINTENANCE DOCUMENTS REQUIREMENTS:

The following items shall be reviewed as appropriate for RVSM maintenance approval:

a) Maintenance Manuals;
b) Structural Repair Manuals;
c) Standards Practices Manuals;
d) Illustrated Parts Catalogues;
e) Maintenance Schedule;
f) MMEL/MEL;
g) Maintenance Control Manuals; and
h) Equipment Lists/Wiring Diagram Manuals.

4. MAINTENANCE PRACTICES:

If the Operator is subject to an ongoing approved maintenance program, that program shall contain the maintenance practices outlined in the applicable aircraft and component manufacturer's maintenance manuals for each aircraft type. The following items shall be reviewed for compliance and if the Operator is not subject to an approved maintenance program the following items shall be followed:

a) All RVSM equipment shall be maintained in accordance with the component manufacturer's maintenance requirements and the performance requirements outlined in the approved data package;
b) Any modification, repair, or design change, which in any way alters the initial RVSM approval, shall be subject to a design review by persons approved by the approving Authority;
c) Any maintenance practices which may affect the continuing RVSM approval integrity, e.g. the alignment of pitot/static probes, dents, or deformation around static plates, shall be referred to PCAA or to persons delegated by PCAA;
d) Built-In Test Equipment (BITE) testing is not an acceptable basis for system calibrations, (unless it is shown to be acceptable by the airframe manufacturer with PCAA's agreement) and shall only be used for fault isolation and troubleshooting purposes;
e) Some aircraft manufacturers have determined that the removal and replacement of components utilising quick disconnects and associated fittings, when properly connected, will not require a leak check. While this approach may allow the aircraft to meet static system certification standards when properly connected, it does not always ensure the integrity of the fittings and connectors, nor does it confirm system integrity during component replacement and re-connections. Therefore, a system leak check or visual inspection shall be accomplished any time a quick disconnect static line is broken;

f) Airframe and static systems shall be maintained in accordance with the airframe manufacturer's inspection standards and procedures;
g) To ensure the proper maintenance of airframe geometry for proper surface contours and the mitigation of altimetry system error, surface measurements or skin waviness checks shall be made if needed to ensure adherence to the airframe manufacturer's RVSM tolerances. These tests and inspections shall be performed as established by the airframe manufacturer. These checks shall also be performed following repairs, or alterations having an effect of airframe surface and airflow;
h) The maintenance and inspection program for the autopilot shall ensure continued accuracy and integrity of the automatic altitude control system to meet the height-keeping standards for RVSM operations. This requirement will typically be satisfied with equipment inspections and serviceability checks; and
i) Where the performance of existing equipment is demonstrated as being satisfactory for RVSM approval, it shall be verified that the existing maintenance practices are also consistent with continued RVSM approval integrity.

5. MAINTENANCE PRACTICES FOR NON-COMPLIANT AIRCRAFT:

Those aircraft positively identified as exhibiting height-keeping performance errors that require investigation, shall not be operated in airspace where RVSM is applied until the following actions have been taken:

(a) The failure or malfunction is confirmed and isolated by maintenance action; and
(b) Corrective action is carried out as required and verified to ensure RVSM approval integrity.

6. MAINTENANCE TRAINING REQUIREMENTS:

Training requirements shall be provided for RVSM approvals processes. Areas that may need to be highlighted for initial and recurrent training of maintenance personnel are:

a) Aircraft geometric inspection techniques;
b) Test equipment calibration/usage techniques; and
c) Any special documentation or procedures introduced by RVSM approval.

7. TEST EQUIPMENT:

The test equipment shall have the capability to demonstrate continuing compliance with all the parameters established for RVSM approval in the initial data package or as approved by the approving Authority.

8. STANDARDS:

Test equipment shall be calibrated utilising reference standards whose calibration is certified as being traceable to the national standard. It shall be calibrated at periodic intervals as agreed by the approving Authority. The approved maintenance program shall encompass an effective quality control program, which includes the following:

a) Definition of required test equipment accuracy;
b) Regular calibrations of test equipment traceable to a master in-house standard. Determination of calibration interval shall be a function of the stability of the test equipment. The calibration interval shall be established on the basis of historical data so that degradation is small in relation to the required accuracy;
c) Regular audits of calibration facilities both in-house and outside;
d) Adherence to acceptable maintenance practices; and
e) Procedures for controlling Operator errors and unusual environmental conditions which may affect calibration accuracy.

APPENDIX "D"

TRAINING PROGRAMS AND OPERATING PRACTICES/PROCEDURES

1. INTRODUCTION:

Flight crews will need to have an awareness of the criteria for operating in RVSM airspace and be trained accordingly. The items detailed in this appendix shall be standardised and incorporated into training programs and operating practices and procedures. Certain items may already be adequately standardised in existing procedures. New technology may also remove the need for certain actions required of the flight crew. If this is so, then the intent of this guidance can be considered to be met.

2. FLIGHT PLANNING:

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

a) Verifying that the airframe is approved for RVSM operations;
b) Reported and forecast weather on the route of flight;
c) Minimum equipment requirements pertaining to height keeping & alerting systems;
d) Any airframe or operating restriction related to RVSM approval.

3. PRE-FLIGHT PROCEDURES AT THE AIRCRAFT FOR EACH FLIGHT:

The following actions shall be carried out during the pre-flight procedure:

a) Review technical logs and forms to determine the condition of equipment required for flight in RVSM airspace. Ensure that maintenance action has been taken to correct defects to required equipment;
b) During the external inspection of aircraft, particular attention shall be paid to the condition of static sources and the condition of the fuselage skin near each static source and any other component that affects altimetry system accuracy. This check may be accomplished by a qualified and authorized person other than the pilot (e.g. a flight engineer or ground engineer);
c) Before takeoff, the aircraft altimeters shall be set to the QNH of the airfield and shall display a known altitude, within the limits specified in the aircraft operating manuals. The two primary altimeters shall also agree within limits specified by the aircraft operating manual. An alternative procedure using QFE may also be used. Any required functioning checks of altitude indicating systems shall be performed; and
d) Before take-off, equipment required for flight in RVSM airspace shall be operative, and any indications of malfunction shall be resolved.

4. IN-FLIGHT PROCEDURES:

4.1 General

The following practices shall be incorporated into flight crew training and procedures:

a) Flight crews will need to comply with any aircraft operating restrictions, if required for the specific aircraft group, e.g. limits on indicated Mach number, given in the RVSM airworthiness approval.
b) Emphasis shall be placed on promptly setting the sub-scale on all primary and standby altimeters to 1013.25 hPa (29.92 in.Hg) when passing the transition altitude, and rechecking for proper altimeter setting when reaching the initial cleared Flight Level;
c) In level cruise it is essential that the aircraft is flown at the cleared Flight Level. This requires that particular care is taken to ensure that ATC clearances are fully understood and followed. The aircraft shall not intentionally depart from cleared Flight Level without a positive clearance from ATC unless the crew are conducting contingency or emergency manoeuvres;
d) When changing levels, the aircraft shall not be allowed to overshoot or undershoot the cleared Flight Level by more than 150 ft (45 m);

Note: It is recommended that the level off be accomplished using the altitude capture feature of the automatic altitude-control system, if installed.

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

f) Ensure that the altitude-alerting system is operative;

g) At intervals of approximately one hour, cross-checks between the primary altimeters shall be made. A minimum of two will need to agree within ±200 ft (±60 m). Failure to meet this condition will require that the altimetry system be reported as defective and notified to ATC:
   i) The usual scan of flight deck instruments shall suffice for altimeter cross-checking on most flights;
   ii) Before entering RVSM airspace, the initial altimeter cross check of primary and standby altimeters shall be recorded;

   Note: Some systems may make use of automatic altimeter comparators.

h) In normal operations, the altimetry system being used to control the aircraft shall be selected for the input to the altitude reporting transponder transmitting information to ATC;

i) If the pilot is advised in real time that the aircraft has been identified by a height-monitoring system as exhibiting a TVE greater than ±300 ft (± 90 m) and/or an ASE greater than ±245 ft (±75 m) then the pilot shall follow established regional procedures to protect the safe operation of the aircraft. This assumes that the monitoring system will identify the TVE or ASE within the set limits for accuracy; and

j) If the pilot is notified by ATC of an assigned altitude deviation, which exceeds ±300 ft (±90 m) then the pilot shall take action to return to the cleared Flight Level as quickly as possible.

4.2 Procedures Prior to RVSM Airspace Entry

The following equipment must be operating normally for entry into RVSM airspace:

a) Two primary altitude measurement systems;
b) One automatic altitude-control system;
c) One altitude-alerting device; and
d) An operating transponder.

Note: Dual equipment requirements for altitude-control systems will be established by regional agreement after an evaluation of criteria such as mean time between failures, length of flight segments and availability of direct pilot controller communications and radar surveillance.

Note: An operating transponder may not be required for entry into all designated RVSM airspace. The Operator shall determine the requirement for an operational transponder in each RVSM area where operations are intended. The Operator shall also determine the transponder requirements for transition areas next to RVSM airspace.

Note: If any of the required equipment fail prior to the aircraft entering RVSM airspace, the pilot must request a new clearance to avoid entering this airspace.

4.3 Contingency Procedures after Entering RVSM Airspace

The pilot shall notify ATC of contingencies (equipment failures, weather), which affect the ability to maintain the cleared Flight Level, and co-ordinate a plan of action appropriate to the airspace concerned. Examples of equipment failures, which shall be notified, to ATC are:

a) Failure of all automatic altitude-control systems aboard the aircraft;
b) Loss of redundancy of altimetry systems;
c) Loss of thrust on an engine necessitating descent; or
d) Any other equipment failure affecting the ability to maintain cleared Flight Level; The pilot shall notify ATC when encountering greater than moderate turbulence. If unable to notify ATC and obtain an ATC clearance prior to deviating from the cleared Flight Level, the pilot shall follow any established contingency procedures and obtain ATC clearance as soon as possible.

5. POST-FLIGHT PROCEDURES:

In making technical log entries against malfunctions in height keeping systems, the pilot shall provide sufficient detail to enable maintenance to effectively troubleshoot and repair the system. The pilot shall detail the actual defect and the crew action taken to try to isolate and rectify the fault. The following information shall be recorded when appropriate:

a) Primary and standby altimeter readings.
b) Altitude selector setting.
c) Sub-scale setting on altimeter.
d) Autopilot used to control the aeroplane and any differences when an alternative autopilot system was selected.
e) Differences in altimeter readings, if alternate static ports selected. Use of air data computer selector for fault diagnosis procedure.
f) The transponder selected to provide altitude information to ATC and any difference noted.

6. SPECIAL EMPHASIS ITEMS: The following items shall also be included in crew training:

a) Knowledge and understanding of standard ATC phraseology used in each area of operations;
b) Importance of crew members cross-checking each other to ensure that ATC clearances are promptly complied with;
c) Use and limitations in terms of accuracy of stand-by altimeters in contingencies. Where applicable, the pilot shall review the application of static source error correction/position error correction through the use of correction cards (note: such correction data will need to be readily available on the flight deck);
d) Problems of visual perception of other aircraft at 1 000ft (300m) planned separation during night conditions, when encountering local phenomena such as northern lights, for opposite and same direction traffic, and during turns;
e) Characteristics of aircraft altitude capture systems which may lead to the occurrence of overshoots;
f) Relationship between altimetry, automatic altitude control, and transponder systems in normal and abnormal situations; and
g) Any airframe operating restrictions, if required for a specific aircraft group, related to an RVSM airworthiness approval.

APPENDIX "E"

CONTINGENCY PROCEDURES

1. THE BASIC CONCEPTS FOR CONTINGENCIES ARE:

a) Guidance for contingency procedures shall not be interpreted in any way, which prejudices the final Authority and responsibility of the pilot in command for the safe operation of the aircraft.

b) If the pilot is unsure of the vertical or lateral position of the aircraft or the aircraft deviates from its assigned altitude or track for cause without prior ATC clearance, then the pilot must take action to mitigate the potential for collision with aircraft on adjacent routes or flight levels. In this situation, the pilot should alert adjacent aircraft by making maximum use of aircraft lighting and broadcasting position, flight level, and intentions on 121.5 MHz (as a back-up, the appropriate VHF inter-pilot air-to-air frequency may be used);

c) Unless the nature of the contingency dictates otherwise, the pilot should advise ATC as soon as possible of a contingency situation and if possible, request an ATC clearance before deviating from the assigned route or flight level.

d) If a revised ATC clearance cannot be obtained in a timely manner and action is required to avoid potential conflict with other aircraft, then the aircraft should be flown at an altitude and/or on a track where other aircraft are least likely to be encountered. This can be accomplished by offsetting from routes or altitudes normally flown in the airspace. The recommendations on the order of preference for pilot actions are:
   i) The pilot may offset half the lateral distance between routes or tracks.
   ii) The pilot may offset half the vertical distance between altitudes normally flown.
   iii) The pilot may also consider descending below FL 285 or climbing above FL 410.

e) When executing a contingency maneuver the pilot should:
   i) Watch for conflicting traffic both visually and by reference to ACAS, if equipped.
   ii) Continue to alert other aircraft using 121.5 MHz (as a back-up, the VHF inter-pilot air- to-air frequency may be used) and aircraft lights.
   iii) Continue to fly offset tracks or altitudes until an ATC clearance is obtained.
   iv) Obtain an ATC clearance as soon as possible.

2. Guidance to the Pilot (Including Expected ATC Actions) in the Event of Equipment Failures or Encounters with Turbulence after Entry into RVSM Airspace.

In addition to emergency conditions that require immediate descent, such as loss of thrust or pressurization, ATC should be made aware of the less explicit conditions that may make it impossible for an aircraft to maintain its CFL appropriate to RVSM. Controllers should react to such conditions but these actions cannot be specified, as they will be dynamically affected by the real-time situation.

a) Objective: The following material is provided with the purpose of giving the pilot guidance on actions to take under certain conditions of equipment failure and encounters with turbulence. It also describes the expected ATC controller actions in these situations. It is recognized that the pilot and controller will use judgment to determine the action most appropriate to any given situation. For certain equipment failures, the safest course of action may be for the aircraft to maintain the assigned FL and route while the pilot and controller take precautionary action to protect separation. For extreme cases of equipment failure, however, the safest course of action may be for the aircraft to depart from the cleared FL or route by obtaining a revised ATC clearance or if unable to obtain prior ATC clearance, executing the established contingency maneuvers for the area of operation.

b) Contingency Scenarios. These scenarios summarize pilot actions to mitigate the potential for conflict with other aircraft in certain contingency situations. These should be reviewed in conjunction with the expanded contingency scenarios detailed in Paragraph 3, which contain additional technical and operational detail.

Scenario 1: The pilot is:

1) Unsure of the vertical position of the aircraft due to the loss or degradation of all primary altimetry systems, or

2) Unsure of the capability to maintain CFL due to turbulence or loss of all automatic altitude control systems.

The Pilot should:	
Maintain CFL while evaluating the situation;	
Watch for conflicting traffic both visually and by reference to ACAS, if equipped;	
If considered necessary, alert nearby aircraft by 1)Making maximum use of exterior lights; 2)Broadcasting position, FL, and intentions on 121.5 MHz (as a back up, the VHF inter-pilot air-to-air frequency may be used).	
	ATC can be expected to:
Notify ATC of the situation and intended course of action. Possible courses of action include:	Obtain the pilot's intentions and pass essential traffic information.
1)Maintaining the CFL and route provided that ATC can provide lateral, longitudinal or conventional vertical separation.	1) If the pilot intends to continue in RVSM airspace, assess traffic situation to determine if the aircraft can be accommodated through the provision of lateral, longitudinal, or conventional vertical separation, and if so, apply the appropriate minimum.
2)Requesting ATC clearance to climb above or descend below RVSM airspace if the aircraft cannot maintain CFL and ATC cannot establish adequate separation from other aircraft.	2) If the pilot requests clearance to exit RVSM airspace, accommodate expeditiously, if possible.
3)Executing the Doc 7030 contingency maneuver to offset from the assigned track and FL, if ATC clearance cannot be obtained and the aircraft cannot maintain CFL.	3) If adequate separation cannot be established and it is not possible to comply with the pilot's request for clearance to exit RVSM airspace, advise the pilot of essential traffic information, notify other aircraft in the vicinity and continue to monitor the situation.
	4) Notify adjoining ATC facilities/sectors of the situation.

Scenario 2: There is a failure or loss of accuracy of one primary altimetry system (e.g., greater than 200 foot difference between primary altimeters)

The Pilot should
Cross check standby altimeter, confirm the accuracy of a primary altimeter system and notify ATC of the loss of redundancy. If unable to confirm primary altimeter system accuracy, follow pilot actions listed in the preceding scenario.

3. Expanded Equipment Failure and Turbulence Encounter Scenarios: Operators may consider this material for use in training programs.

Scenario 1: All automatic altitude control systems fail (e.g., Automatic Altitude Hold).

The Pilot should: Initially	
Maintain CFL	
Evaluate the aircraft's capability to maintain altitude through manual control.	
Subsequently	
Watch for conflicting traffic both visually and by reference to TCAS, if equipped.	
If considered necessary, alert nearby aircraft by 1) Making maximum use of exterior lights; 2)Broadcasting position, FL, and intentions on 121.5 MHz (as a back-up, the VHF inter-pilot air-to-air frequency may be used.)	
Notify ATC of the failure and intended course of action. Possible courses of action include:	**ATC can be expected to**
1)Maintaining the CFL and route, provided that the aircraft can maintain level.	1)If the pilot intends to continue in RVSM airspace, assess traffic situation to determine if the aircraft can be accommodated through the provision of lateral, longitudinal, or conventional vertical separation, and if so, apply the appropriate minimum.
2)Requesting ATC clearance to climb above or descend below RVSM airspace if the aircraft cannot maintain CFL and ATC cannot establish lateral, longitudinal or conventional vertical separation.	2)If the pilot requests clearance to exit RVSM airspace, accommodate expeditiously, if possible.
3)Executing the contingency maneuver to offset from the assigned track and FL, if ATC clearance cannot be obtained and the aircraft cannot maintain CFL.	3)If adequate separation cannot be established and it is not possible to comply with the pilot's request for clearance to exit RVSM airspace, advise the pilot of essential traffic information, notify other aircraft in the vicinity and continue to monitor the situation.
	4) Notify adjoining ATC facilities/ sectors of the situation.

Scenario 2: Loss of redundancy in primary altimetry systems

The Pilot should	**ATC can be expected to**
If the remaining altimetry system is functioning normally, couple that system to the automatic altitude control system, notify ATC of the loss of redundancy and maintain vigilance of altitude keeping.	Acknowledge the situation and continue to monitor progress

Scenario 3: The primary altimeters diverge by more than 200ft (60m)

The Pilot should
Attempt to determine the defective system through established trouble-shooting procedures and/or comparing the primary altimeter displace to the standby altimeter (as corrected by the correction cards, if required).
If the defective system can be determined, couple the functioning altimeter system to the altitude keeping device.
If the defective system cannot be determined, follow the guidance in Scenario 3 for failure or unreliable altimeter indications of all primary altimeters.

Scenario 4: All primary altimetry systems are considered unreliable or fail:

The Pilot should	
Maintain CFL by reference to the standby altimeter (if the aircraft is so equipped).	
Alert nearby aircraft by 1) Making maximum use of exterior lights; 2) Broadcasting position, FL, and intentions on 121.5 MHz (as a back-up, the VHF inter-pilot air-to-air frequency may be used).	
	ATC can be expected to
Consider declaring an emergency. Notify ATC of the failure and intended course of action. Possible courses of action include:	Obtain pilot's intentions, and pass essential traffic information.
1) Maintaining CFL and route provided that ATC can provide lateral, longitudinal or conventional vertical separation.	1) If the pilot intends to continue in RVSM airspace, assess traffic situation to determine if the aircraft can be accommodated through the provision of lateral, longitudinal, or conventional vertical separation, and if so, apply the appropriate minimum.
2) Requesting ATC clearance to climb above or descend below RVSM airspace if ATC cannot establish adequate separation from other aircraft.	2) If the pilot requests clearance to exit RVSM airspace, accommodate expeditiously, if possible.
3) Executing the Doc 7030 contingency maneuver to offset from the assigned track and FL, if ATC clearance cannot be obtained.	3) If adequate separation cannot be established and it is not possible to comply with the pilot's request for clearance to exit RVSM airspace, advise the pilot of essential traffic information, notify other aircraft in the vicinity and continue to monitor the situation.
	4) Notify adjoining ATC facilities/sectors of the situation.

Scenario 5: Turbulence (greater than moderate) which the pilot believes will impact the aircraft's capability to maintain flight level.

The Pilot should	
Watch for conflicting traffic both visually and by reference to TCAS, if equipped.	
If considered necessary, alert nearby aircraft by: 1) Making maximum use of exterior lights; 2) Broadcasting position, FL, and intentions on 121.5 MHz (as a back-up, the VHF inter-pilot air-to-air frequency may be used).	
Notify ATC of intended course of action as soon as possible. Possible courses of action include:	**ATC can be expected to**
1) Maintaining CFL and route provided ATC can provide lateral, longitudinal or conventional vertical separation.	1) Assess traffic situation to determine if the aircraft can be accommodated through the provision of lateral, longitudinal, or conventional vertical separation, and if so, apply the appropriate minimum.
2) Requesting flight level change, if necessary.	2) If unable to provide adequate separation, advise the pilot of essential traffic information and request pilot's intentions.
3) Executing the Doc 7030 contingency maneuver to offset from the assigned track and FL, if ATC clearance cannot be obtained and the aircraft cannot maintain CFL.	3) Notify other aircraft in the vicinity and monitor the situation
	4) Notify adjoining ATC facilities/ sectors of the situation.

4. Special Procedures for In-Flight Contingencies Published for Individual ICAO Regions in Doc 7030.

a) The Doc 7030 should be considered the source document for specific contingency procedures applicable to individual ICAO regions. Doc 7030 should always be consulted before training material or manuals are developed.
b) In-flight contingency procedures applicable to Pacific oceanic operations are published in paragraph 4.0 of the Regional Supplementary Procedures for the Pacific and the Middle East/Asia (Mid/Asia).
c) In-flight contingency procedures applicable to NAT oceanic operations are published in paragraph 5.0 of NAT Regional Supplementary Procedures.

5. WAKE TURBULENCE PROCEDURES.

These procedures provide for the contingency use of a 2 NM lateral offset to avoid exposure to wake turbulence. The procedures are published in NOTAMS, AIPs, and Regional Supplementary Procedures. These procedures should be incorporated in pilot training programs and manuals.

6. TRANSPONDER FAILURE AND RVSM TRANSITION AREAS.

Transition areas are planned to be established between airspaces where different vertical separation standards are applied. The specific actions that ATC will take in the event of transponder failure in RVSM transition areas will be determined by the provider States.

APPENDIX “F”

VERIFICATION/MONITORING PROGRAMS

1. GENERAL:

A program to monitor or verify aircraft height-keeping performance is considered a necessary element of RVSM implementation for at least the initial area where RVSM is implemented. A height-monitoring system based on Global Positioning System (GPS) satellites or an earth-based system may fulfill this function. However, it is expected that most Pakistan Operators will employ a GPS-based Monitoring System (GMS).

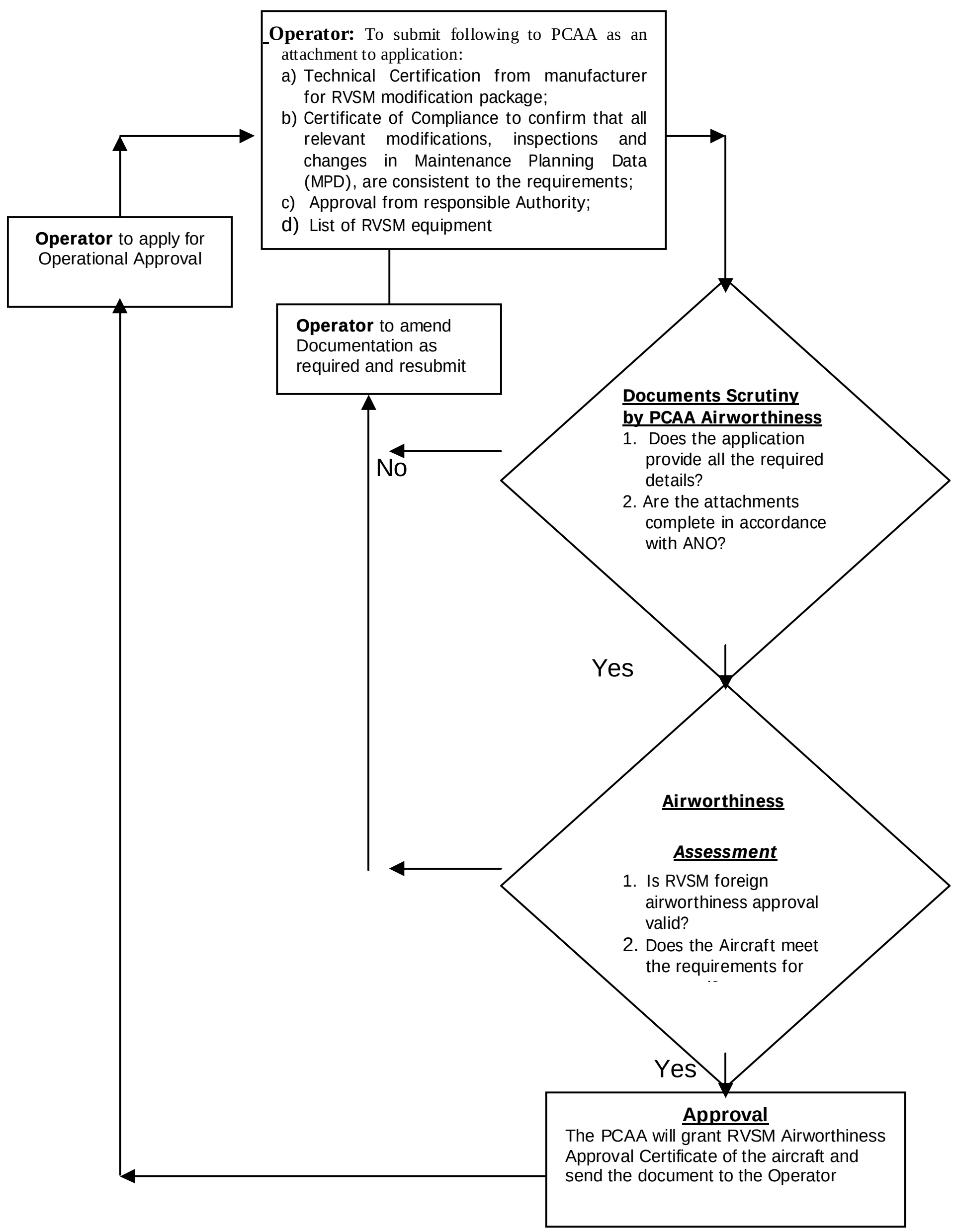
2. MONITORING AGENCY FOR ASIAN REGION (MAAR):

MAAR is the agency responsible for this function in the Asian region. Current RVSM minimum monitoring requirements and information on GMS flights are detailed in MAAR website http://www.aerothai.co.th/maar. It is anticipated that the necessity for such programs may be diminished or possibly eliminated after confidence is gained that RVSM programs are working as planned. MAAR website has all the necessary Forms i.e. F1& F2 and guidance for procedure to be followed for monitoring programme. Subject material on MAAR website is not included in this ANO as it is likely to change. Monitoring can only be undertaken after PCAA has issued an RVSM approval for the aircraft or group of aircraft.

APPENDIX “G”

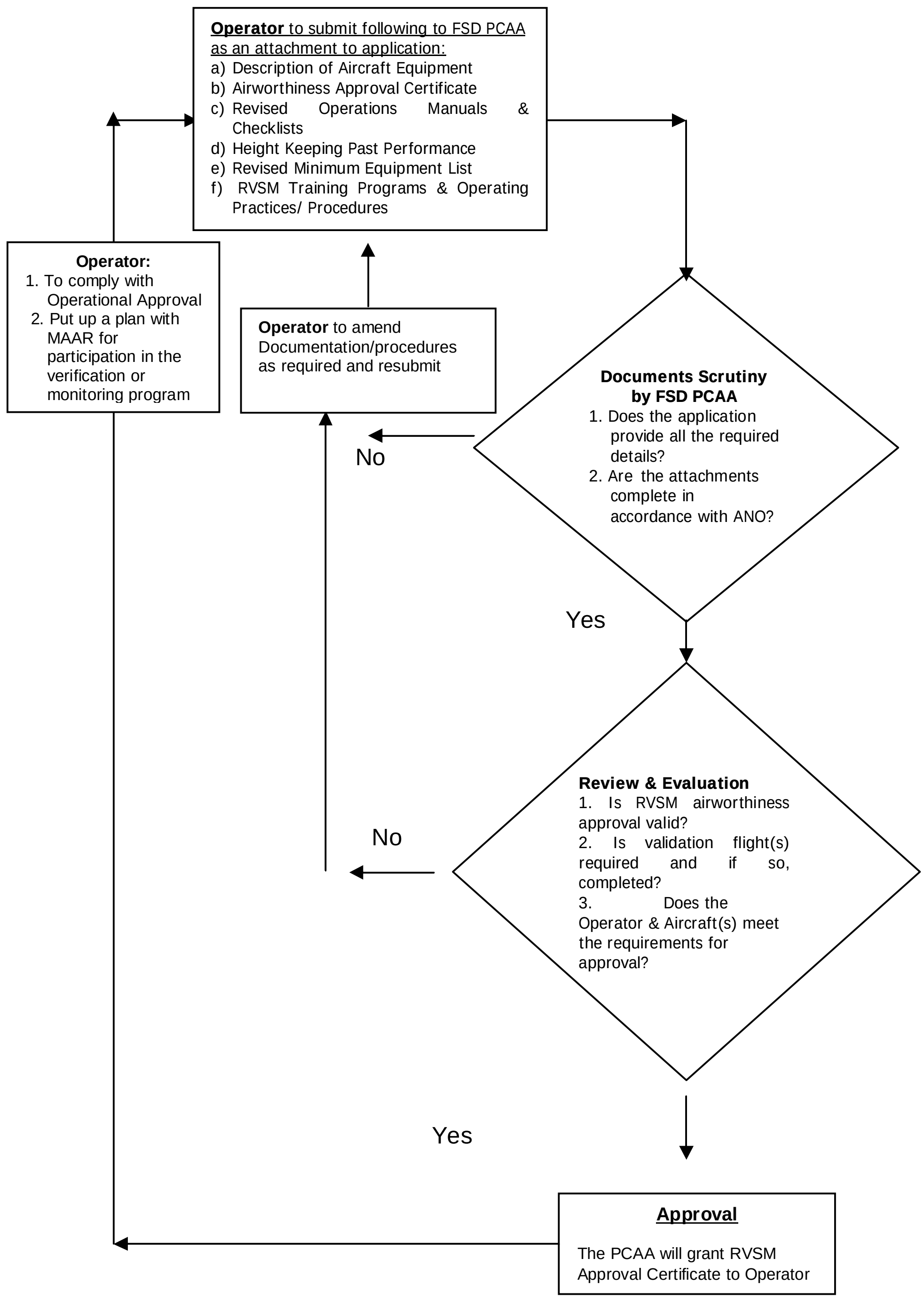
RVSM AIRCRAFT AIRWORTHINESS APPROVAL PROCESS FLOW CHART

RVSM AIRCRAFT AIRWORTHINESS APPROVAL - PROCESS FLOW CHART



APPENDIX "H"

RVSM OPERATIONAL APPROVAL - PROCESS FLOW CHART OPERATOR



APPENDIX "I"

	CIVIL AVIATION AUTHORITY **RVSM AIRCRAFT & OPERATIONAL APPROVAL APPLICATION FORM**	**CAAF-077-FSXX-1.0**
	Flight Standards Directorate	

Part 1 – Operator Details

1. Operator	2. Aircraft Registration	3. Aircraft Type(s)	4. Date
5. Operator's Address:			
6. Has the aircraft been approved for RVSM operation by the DAW? 7. If yes to No 6, attach the following documents: a) Description of Aircraft Equipment b) Airworthiness Approval Certificate c) Revised Operations Manuals & Checklists d) Height Keeping Past Performance e) Revised Minimum Equipment List f) RVSM Training Programs & Operating Practices/ Procedures g) Any other related information			
8. Is Monitoring required by MAAR? 9. If yes, state whether on Global Positioning System (GPS) satellites or GPS-based Monitoring System (GMS):			

10. Applicant's Name	11. Position	12. Signature

Part 2 - Scrutiny

1. Comments by POI: (Include results of verification flight / inspection of Operator & aircraft)

Part 3- Approval by DFS

1. Comments by DFS/POI:		
2. Any Limitations and/or Conditions:		
3. Name and Signature of Approving Authority	4.Position	5.Date

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AIRCRAFT LEASING AND OPERATIONS WITH LEASED AIRCRAFT

AIR NAVIGATION ORDER

VERSION : 3.0
DATE OF IMPLEMENTATION : 15.03.2018
OFFICE OF PRIME INTEREST : Flight Standards Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. MARATIB ALI ZAFAR	Flight Inspector (Pilot)	
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	
APPROVED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Actg. Director General, Civil Aviation Authority	
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by Director General, Civil Aviation Authority in pursuance of powers vested in him under Rule 4, Rule 36 and 368A of Civil Aviation Rules 1994.

B. PURPOSE:

B1. This ANO provides the requirements, terms, conditions and responsibilities of the Operators concerning leasing of aircrafts and operation with leased aircrafts.

C. SCOPE:

C1. This ANO applies to all the Operators who are either engaged or offering to engage in aircraft leasing and / or operations with leased aircraft.

C2. This ANO is applicable to all foreign aircraft taken on lease and engaged in public transport, aerial work and/or charter operations by or on behalf of Pakistani Operators.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 The terms used in this ANO have the following meanings:

D1.1.1 AOC means Air Operator Certificate issued under the Civil Aviation Rules (CARs, 1994) of Pakistan;

D1.1.2 PCAA means Pakistan Civil Aviation Authority;

D1.1.3 Crew member means person(s) assigned by an Operator for duty on an aircraft during flight time;

D1.1.4 Damp Lease means a wet lease with partial crew;

D1.1.5 Dry Lease means a lease of aircraft without the crew. In this case the aircraft is normally registered in the AOC holder’s State, bears the lessees AOC holder’s name / logo and is operated under the AOC of the Lessee;

D1.1.6 Flight crew means a licensed crewmember charged with duties essential to the operation of an aircraft during flight;

D1.1.7 Inspector means an Authorized Person duly authorized by the Competent Authority under Rule 5 of CARs 94;

D1.1.8 Leased Aircraft means an aircraft as one used under a contractual leasing arrangement;

D1.1.9 Lessor means the person, party or the AOC holder from whom the aircraft has been leased;

D1.1.10 Lessee means the person, party or the AOC holder to which the aircraft has been leased;

D1.1.11 Long Term Lease means an operating lease for a period exceeding 90 days;

D1.1.12 Operator means a person, organisation or the enterprise engaged in or offering to engage in an aircraft operation under an Air Operator Certificate issued by the PCAA in accordance with Rule 187 of Civil Aviation Rules 1994;

D1.1.13 Operational Control means the exercise of authority over initiating, conducting, and terminating a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight;

D1.1.14 Short Term Lease means a lease designed to meet an AOC holders need for additional aircraft for seasonal or short period not exceeding 90 days;

D1.1.15 State of Operator means the State in which the Operators principal place of business is located or, if there is no such place of business, the Operators permanent residence is located;

D1.1.16 State of Registry means the State on whose registry the aircraft is entered;

D1.1.17 Wet Lease means a lease of aircraft with the crew; under a contractual arrangement.

D2. CONCERNS AND LIMITATIONS:

D2.1 Cross-border leasing, as a form of commercial arrangement and practice, can result in complex and varied regulatory situations requiring highly coordinated actions by the various States involved, to ensure that the entirety of safety oversight obligations and responsibilities, are adequately met. This fragmented approach to oversight may result in dilution of equivalent levels of safety oversight and a lack of transparency.

D2.2 National regulations of the contracting States require that every aircraft on their registry, including those leased out to an Operator conducting flights under the authority of another State, operate in compliance with the regulations of the State of Registry. However, in discharging this responsibility, practical problems arise because the leased aircraft mostly operate in distant areas where the State of Registry finds it difficult to conduct their safety inspections. Compliance with the safety standards of the State of Registry may, therefore, diminish and violations of their regulations may occur. These may remain unknown to the State of Registry with the result the enforcement action to prevent such violations is unlikely to be taken with respect to operations of such leased aircraft.

D2.3 Complex legal, safety, enforcement and practical problems may arise for both the State of Registry of the aircraft and the State of Operator, because of possible uncertainty as to which State is responsible for the safe operation and airworthiness of the aircraft and as to which States regulations are required to be complied with. The problems associated with leased aircraft operations may become more serious if the lessee has little or no previous experience in aviation industry.

D2.4 To suitably address the foregoing problems, Article 83 bis was approved by the ICAO Assembly, as an amendment to the Chicago Convention, permitting the transfer of certain functions and duties from the State of Registry to the State of Operator in case of lease, charter, interchange or similar arrangement of aircraft. Accordingly, if an aircraft registered in a Contracting State is operated pursuant to an agreement for the lease, charter or interchange of the aircraft or any similar arrangements by an Operator who has his principal place of business or, if he has no such place of business, his permanent residence in another Contracting State, the State of Registry may, by agreement with such other State, transfer to it all or part of its functions and duties as State of Registry in respect of that aircraft under Articles 12, 30, 31 and 32 (a) of the Chicago Convention. The State of Registry shall be relieved of responsibility in respect of the functions and duties transferred, which can enhance safety in leased aircraft operations.

D2.5 Pakistan has ratified Article 83 bis and has accordingly made necessary regulatory provisions for its implementation for transfer of responsibility for airworthiness and operational control of leased aircraft operations.

D2.6 However, due to the possible safety implications, each application for any type of lease or commercial arrangements where an Operator proposes operation on behalf of another Operator will be assessed separately. An application for leasing an aircraft, primarily to increase an Operators fleet capacity will only be considered if a dry lease arrangement is proposed. A sub-lease, where the lease of an already dry leased aircraft is made to yet another third party will not be permitted. Wet lease of foreign Operators (wet lease-in), will only be permitted in exceptional circumstances, on provision of tenable justification and shall be for a short term period, not exceeding ninety days.

D3. GENERAL REQUIREMENTS FOR AIRCRAFT LEASING:

D3.1 **Regardless of the type of lease**, an AOC holder may be allowed to lease aircraft provided that any lease arrangement entered into and operation of leased aircraft thereafter, satisfies the following conditions:

D3.1.1 That such arrangements shall not be equivalent to giving a lessor of another country access to traffic rights not otherwise available to that lessor;

D3.1.2 The responsibility of the continued airworthiness and the adequacy of operating and maintenance standards of the leased aircraft having registration other than the State of Operator or of the State of Operator, shall be established to the satisfaction of the PCAA of both Contracting States;

D3.1.3 The Operator (lessee) shall be responsible for the operational control of leased aircraft;

D3.1.4 For leased aircraft operations in Pakistan, the aircraft should have been type certificated by Federal Aviation Administration of USA or Joint Airworthiness Authority of Europe or Civil Aviation Authority of UK or any other authority acceptable to PCAA;

D3.1.5 The lessee shall provide to PCAA information as stipulated in Appendix “A” about the aircraft proposed to be leased;

D3.1.6 The restrictions on age and origin of aircraft proposed for induction shall be governed as per instructions/policy/directives issued by Federal Government, Ministry of Defence, and/or DGCAA;

D3.1.7 PCAA may refuse import or operation of any aircraft under lease if reasonable doubt exists regarding airworthiness of the aircraft;

D3.1.8 CAA may withdraw permission for operation of a particular aircraft in Pakistan under lease agreement if during service it is found that safety of the aircraft operations is in doubt or the requirements of this ANO or any other safety rules and regulations are not being complied with;

D3.1.9 CAA may stipulate such additional requirements as may be considered necessary from time to time to do so with a view to ensure and enhance the safety of operations, which shall be complied with;

D3.1.10 That leased aircraft shall meet the Noise Certification as applicable;

D3.1.11 That, for the purpose of ensuring safety standards and compliance, all leasing arrangements, shall have prior approval from the PCAA;

D3.1.12 That wet leasing of foreign registered aircraft, shall not be approved for operation until all requirements of CARs 1994, ANOs and transfer agreement under ICAO Article 83 bis are met.

D4. AIRCRAFT LEASING PROCESS:

D4.1 Application for Aircraft Lease Prior to leasing of any aircraft; an Operator shall apply to PCAA in writing at least 30 days in advance, and shall obtain approval before using any leased aircraft;

D4.2 Particulars of Aircraft and Lessee / Lessor: The Operator shall provide PCAA with following information along with his application:

D4.2.1 Name and address of the parties/persons (Lessee and Lessor) to the proposed agreement;

D4.2.2 Type and Duration of the proposed Lease agreement with dates;

D4.2.3 Name and address of the registered owner;

D4.2.4 Aircraft Details and related Information (Refer to Appendix “A”)

a) Type of Aircraft;
b) Registration Mark(s);
c) Manufacturer;
d) Manufacturer Serial Number (MSN);
e) Date of Manufacture;
f) Number of Cycles Regulatory body of Initial Certification;
g) State of Registry;
h) Previous Operator;
i) Whether the present Operator is an AOC holder or not.

D4.2.5 Evidence for passenger and third party insurance in accordance with Rule 199 and 179(2)(c) of CARs 94;

D4.3 Inspection of Aircraft / Evaluation of Operational Aspects by PCAA.

D4.3.1 Data submitted by the Operator along with the application shall be reviewed by PCAA and if found in accordance with requirements of rules and regulations, an inspection team (Flight Operations Inspector and Airworthiness Surveyor) shall be detailed. Operator shall be notified on details of Inspectors and their date of availability, and he shall arrange visa (if applicable) and air travel for the inspection team. Inspection of aircraft/ Evaluation and scrutiny of documents shall be conducted by the Inspection team at no cost to the PCAA;

D4.3.2 Flight Inspector shall inspect the aircraft, check the documents, required publications, evaluate training devices / simulator and confirm all operational approvals in accordance with Air Safety Circular No.1 and other relevant ANOs;

D4.3.3 An inspection/evaluation of aircraft/documents shall be carried out by Airworthiness Surveyor in accordance with Airworthiness Notice No. 21 and other related Air Navigation Orders;

D4.3.4 The results of the above inspection shall be deciding factor for approving the induction of aircraft. Operator shall be informed on it in either case. With satisfactory report on the inspection, the subsequent part of the process shall apply.

D4.4 Operators Lease Agreement:

D4.4.1 A lease Agreement between the Lessor and Lessee shall be signed and a copy of this lease agreement shall be provided to PCAA when all documents are submitted for inclusion of the aircraft in Operations Specifications.

D4.4.2 The lessor shall give an undertaking in the lease agreement that he will comply with all the applicable rules and requirements of PCAA.

D4.5 Transfer Agreement (Wet Or Damp Lease):

D4.5.1 Where wet or damp leasing of foreign registered aircraft is proposed, a transfer agreement shall be signed between PCAA and State of Registry in accordance with Rule 368A of CARs 94 and ICAO Article-83 bis;

D4.5.2 Civil Aviation Authority of State of Registry shall enter into an agreement with CAA Pakistan to transfer all or part of the duties and functions pertaining to Articles 12, 30, 31 and 32(a) of the Chicago Convention to enhance surveillance and safety of operations keeping in view the guidelines and the model agreement prepared by the ICAO Secretariat on the implementation of Article 83 bis. Functions and duties of both CAAs shall be clearly defined in this agreement. A model agreement prepared in the light of guidelines is placed as Appendix B to this ANO. The specific responsibilities to be transferred and the particular aircraft to which they will apply shall be included in the agreement.

D4.5.3 All arrangements for meetings, discussions and signing of the Agreement shall be made by the Operator at no cost to PCAA. Operator shall either ask the proposed lessor or initiate the process himself for arranging this agreement;

D4.5.4 The PCAA team may consist of one representative each from the following Directorates:

a) Flight Standards,
b) Airworthiness, and
c) Licensing

Note: Where no delegation of responsibility has been agreed to between the States concerned, the operation shall not take place.

D4.5.5 In case, a transfer agreement already exist between PCAA and the State of Registry, an arrangement shall be made by the lessee to have the proposed aircraft included in the list of transfer agreement.

D4.5.6 ICAO shall be notified on completion of Transfer Agreement between CAAs of both the States by the Operator.

D4.6 Provision of Documents: Upon receipt of Approval for Induction, the Lessee shall provide following documents, in English, to FSD, PCAA.

D4.6.1 Draft Operations Specification for inclusion of the proposed aircraft;

D4.6.2 Operations Manual including Customized FCOM;

D4.6.3 Aircraft Flight Manual (AFM);

D4.6.4 Exposition Manual of the Company (Lessor), Maintenance Manuals and Maintenance Control Manual to Airworthiness;

D4.6.5 Photocopies of licenses of all Flight crew and Maintenance Engineers deployed on leased aircraft to Licensing Branch;

D4.6.6 The Minimum Equipment List (MEL), Configuration Deviation List (CDL) and MMEL of leased aircraft.

D5. OPERATIONS WITH AIRCRAFT TAKEN ON DRY LEASE:

D5.1 The lease of an aircraft without crew is normally referred to as a dry lease.

D5.1.1 In Dry Lease Operator (the lessee), shall:

D5.1.1.1 Have the commercial control of the aircraft;

D5.1.1.2 Use his/her airline designator code; and

D5.1.1.3 Have the traffic rights related to that/those aircraft in accordance with the Aviation Policy and Directives issued by Federal Government, Ministry of Defence or DGCAA.

D5.1.2 Operator (the lessee), shall be responsible:

D5.1.2.1 To provide licensed/certificated and competent crew for the operation of leased aircraft;

D5.1.2.2 To exercise operational control over the aircraft with all the related responsibilities;

D5.1.2.3 For custody of the aircraft and control of all operations;

D5.1.2.4 For the airworthiness and maintenance of the aircraft;

Note: In dry lease, when aircraft is placed on Pakistan Register, all other requirements as specified by CAA shall be applicable.

D5.1.3 All aircraft intended to be operated by a Pakistani Operator under dry lease agreement must be registered in Pakistan and entered in the Operations Specifications of the Operator, and must have valid documentation.

D5.1.4 Pakistan registration of the aircraft shall be valid as long as the lease is in force and the aircraft is operated and maintained in accordance with the regulations of PCAA, the terms and conditions specified in the Operators AOC and the Operators operations and maintenance control manuals. Pakistani Operator shall be responsible for complete operational and airworthiness control over the aircraft with all the attendant responsibilities.

D5.1.5 All flight crew shall be in possession of current appropriate licences with IR on type and valid proficiency checks. They shall also fully familiarise themselves with the routes they intend to fly. They shall operate under the operational control of the Pakistani Operator.

D5.1.6 The Operator shall have an operations manual for the type of leased aircraft. All the flight crew shall be made thoroughly familiar by the Operator with the contents of the manual before they start flying the aircraft type. The manual shall be updated from time to time incorporating the latest instructions and operating procedures, which shall also be brought to the notice of each crew member.

D5.1.7 The leased-in aircraft shall be subjected to airworthiness certification, maintenance and inspection procedures prescribed by PCAA Pakistan as in the case of any other Pakistani registered aircraft.

D5.1.8 In order that the Pakistani Operator could exercise effective maintenance and airworthiness control of the aircraft, it is necessary to know the history of the aircraft. The lessor should, therefore, provide history cards of all components.

D5.1.9 The Operator shall train his flight crew and engineers and shall obtain necessary approvals or endorsements before they are allowed to operate or maintain the aircraft. The training programme should be approved by PCAA prior to sending the engineers and crew for training.

D5.1.10. Pakistani Operator importing aircraft on lease shall ensure that all the airworthiness directives, modifications and inspections declared mandatory by PCAA Pakistan are complied with even if their compliance is not mandatory in the country from where the aircraft has been imported.

D5.1.11 The leased-in aircraft shall be fitted with the instruments and equipments in accordance with the Pakistani regulations detailed in CARs 94, ANOs, Airworthiness Notices and ASCs besides the requirements of the country of manufacture. Specifically, the Operator must ensure that the aircraft is equipped with ACAS, GPWS and floor path lighting etc.

D5.1.12 The Pakistani Operator should ensure that the ground equipment such as battery cart, trestles, tools, special tools specific to the aircraft/engines for carrying out the inspections and schedules within the country are available with him before start of the operations.

D5.1.13 If the Operator has to use foreign licenced crew or engineers for a limited period, it shall be done with the prior approval of the competent authority and only after grant of validation/approval of current foreign licences held by the flight crew or engineers and necessary security clearance. Such foreign crew and engineers shall also comply with the conditions stipulated in subsequent para 6 for wet lease operations.

D5.1.14 The cabin crew shall successfully undergo the PCAA approved training as Approved for the Operator.

D5.1.15 The flight dispatchers (if applicable) shall undergo requisite PCAA approved training.

D5.1.16 The commercial / traffic staff shall be adequately trained for the preparation of load and trim sheet and proper loading of the aircraft.

D5.1.17 Dry leasing of an aircraft type not presently in service with any Pakistani Operator will require training of PCAA personnel also so as to enable PCAA to exercise operational and airworthiness control on the new type of aircraft. The lessee will, therefore, arrange initial/recurrent training of PCAA officers at the facilities of the aircraft manufacturer or any other approved agency with whom he has made arrangement to train its personnel.

D5.1.18 Dry Leasing of Pakistan Registered aircraft may be allowed either from an AOC holder or from an owner/company provided all the applicable requirements given in Clauses 6, 7 and 8 are met.

D5.1.19 Regulatory requirements on aircraft, equipment, crew and documentation shall be adequately satisfied as required by the State of Operator for leasing out an aircraft. Unless the transfer of oversight responsibilities are not agreed to or not signed between CAAs of both States, aircraft lease-out shall not be allowed.

D6. <u>OPERATIONS WITH AIRCRAFT TAKEN ON WET LEASE:</u>

D6.1 The lease of an aircraft with crew is normally referred to as a Wet lease. The regulatory requirements and the obligations of lessee for wet lease short or long term, are as follows:

D6.1.1 Operation of foreign aircraft leased by Pakistani Operators is normally permitted on dry lease basis. Import of aircraft for commercial air transport operations on wet lease basis, from an AOC holder of a contracting State by a Pakistani AOC Holder shall not be permitted except in emergency situations and circumstances mentioned below:

D6.1.1.1 AOC holder has atleast one operating and fully serviceable aircraft on Pakistani Registration;

D6.1.1.2 Existing aircraft of a Pakistani Operator is grounded for maintenance/inspection checks or due to any other unforeseen reasons. In such cases, wet leasing shall be permitted only for the duration of grounding of aircraft;

D6.1.1.3 Existing aircraft is involved in some accident/incident resulting in reduction in capacity of the Operator's business;

D6.1.1.4 There is reduction of capacity due to expiry of lease and delay in finalisation of new lease agreement;

D6.1.1.5 For revival of sick operators who should have an agreement with the lessor initially for wet lease for a period not exceeding six months (non extendable) and thereafter automatic conversion to dry lease for the remaining period of lease.

D6.1.1.6 Short-term induction of capacity required to meet emergency situation such as natural calamity, industrial unrest or any other similar situation;

D6.1.1.7 To augment available capacity for purposes of transporting pilgrims only for and during Hajj.

D6.1.2 Wet leased aircraft may / only operate on ATS routes in Pakistan airspace. In special circumstances such as emergency / humanitarian operations the DGCAA may grant permission for operations for a maximum of 90 days.

D6.1.3 In wet lease operation, Operator (the lessee), shall:

D6.1.3.1 Comply with relevant requirements of this ANO;

D6.1.3.2 Have the commercial control of the aircraft;

D6.1.3.3 Use his/her airline designator code (if applicable); and

D6.1.3.4 Have the traffic rights related to leased aircraft.

D6.1.4 In wet lease operation, Operator (the lessee), shall be responsible for:

D6.1.4.1 Exercising operational control over the aircraft with all the related responsibilities;

D6.1.4.2 Custody of the aircraft and control of all operations;

D6.1.4.3 The maintenance of airworthiness of the leased aircraft.

D6.1.5 Operator shall follow the process and comply with the requirements provided in clause 6, 7 and 8 (applicable sub-clauses) of this ANO.

D6.1.6 In Transfer Agreement, the State of Registry shall confirm that their legislation enables them to divest themselves of the functions and duties that are the object of the transfer agreement.

D6.1.7 Wet Lease Agreement between the lessee and lessor shall be a well defined agreement stipulating that the Pakistani Operator and PCAA will have the authority to exercise operational and airworthiness control, in accordance with the transfer agreement on the wet lease aircraft operations.

D6.1.8 The operating conditions in Pakistan are more demanding because of severe weather conditions, hot, humid and dusty environment, hilly terrain around airports, limited runway length of some of the airports and non-availability of precision approach facilities at airports. It is, therefore, necessary to adopt more stringent safety norms. The Pakistani Operators using wet leased foreign aircraft should, therefore, comply with the following requirements:

D6.1.8.1 The foreign licenced Pilots, shall have a minimum of 100 hours flying experience on the type in case of fixed wing aircraft and 50 hours in case of rotary wing aircraft and meet recency requirements of PCAA.

D6.1.8.2 The flight crew and the cabin crew (if applicable) shall comply with the most stringent of the Flight and Duty Time Limitations of the Pakistani Operator and that of the lessor state and in no case exceed the FDTL laid down by PCAA.

D6.1.8.3 The flight crew shall follow the weather minima of the Pakistani Operator as approved by CAA.

D6.1.8.4 It will be the responsibility of the Pakistani Operator to give thorough briefing to the foreign crew, about the Pakistani rules and regulations, standard departure and arrival procedures at Pakistani airports, standard operating procedures, prohibited / restricted areas and precautions to be exercised while operating at various airports in Pakistan. Route familiarization will also be provided, as deemed necessary.

D6.1.8.5 The flight crew and the maintenance personnel shall comply with the instructions issued by the Pakistani Operator and the CAA. In case of any violation, their validation or approval to operate or maintain the aircraft in Pakistan may be withdrawn without giving any reason.

D6.1.8.6 The Flight Operations Inspectors and other officers authorised by DGCAA shall carry out random inspections / checks of the operations including Cabin crew training, Operational control, Dispatch and flight watch, Crew members scheduling etc.

D6.1.8.7 In case of any violation or accident/incident attributable to crew proficiency, the validation granted to foreign crew for operating aircraft of Pakistani Operator may be withdrawn.

D6.1.8.8 The foreign crew and maintenance engineers holding current valid and appropriate Licences / Certificates issued by state of Registry, can be deployed by the Pakistani Operators for operating and maintaining aircraft, only after they are cleared by the security agencies (as applicable) and on issue of validation or approval.

D6.1.8.9 If the Operator wishes to use some cabin crew of the foreign Operators, they should undergo the differences training necessary to meet the requirements of CAA. The cabin crew should be trained and approved on the aircraft type.

D6.1.8.10 The commercial staff shall be adequately trained for the preparation of load and trim sheet and proper loading of the aircraft.

D6.1.8.11 The flight crew shall ensure reporting of all incidents / accidents to CAA in accordance with the rules, procedures and practices of PCAA.

D6.1.8.12 The flight crew should be fully proficient to communicate in English language with the Air Traffic Control Units.

D6.1.8.13 Airworthiness requirements for maintenance on leased aircraft are met in accordance with the CAA and the State of Registry as agreed with in Transfer agreement.

D7. WET LEASING OF FOREIGN REGISTERED AIRCRAFT FROM A PERSON OR A COMPANY:

D7.1 Wet leasing of foreign registered aircraft from a person or company (not in possession of AOC from the State of Registry), may be allowed only for those Pakistani AOC holders who:

D7.1.1 Are in possession of their own (not contracted) infrastructure, maintenance set up, staffing, operational control and approved crew training programme;

D7.1.2 Fulfill all the applicable requirements of this ANO and any other additional condition if applied to, by PCAA.

D8. WET LEASING OF PAKISTANI REGISTERED AIRCRAFT FROM AN AOC HOLDER:

D8.1 Wet Leasing of Pakistani Registered aircraft from an AOC holder may be allowed provided:

D8.1.1 The lessee is an AOC holder; and

D8.1.2 The applicable requirements of this ANO are met.

D9. DAMP LEASE:

D9.1 Where wet leasing of aircraft is without crew or with partial crew, the lessee shall be responsible to provide licensed/certificated crew and shall meet all the applicable requirements as given in this ANO.

D10. <u>OPERATORS OBLIGATIONS:</u> The Lessee (Operator) shall ensure:

D10.1 Not to operate any aircraft, until such time that aircraft is placed in the Operation Specification of the AOC issued by the State of Operator;

D10.2 Compliance with the provisions, applicable to the aircraft and operations, of the Civil Aviation Rules -1994, the Air Navigation Orders and directives issued there under;

D10.3 That all flights are operated under the applicable Flight Rules as per Flight Plan Clearance, and procedures/ requirements of the Pakistan Aeronautical Information Publication (AIP) are complied with;

D10.4 That crew is in possession of a valid permits, certificates, licenses duly validated in accordance with the requirements specified in the relevant ANOs;

D10.5 That the pilot-in-command and other crew members, for safe conduct of flight operations, are aware of their responsibilities for compliance with statutory requirements of PCAA;

D10.6 Free and uninterrupted access to PCAA Inspectors, in accordance with Rule 4 of CARs 1994 and the Transfer Agreement to any premises in the occupation in control of the holder of this Certificate for the purpose of examining the premises and any document, equipment, tool, material or other things of whatsoever nature, relating to the operation of aircraft there-under, kept or used or intended to be used in connection with the operation of the aircraft;

D10.7 That the minimum number of Cabin crew required where applicable for safety in accordance with ANO-018-FSXX, are:

a) All Pakistani by nationality;
b) Qualified, fit and competent for the duties on the type of aircraft.

D10.8 That all In-flight announcement are made in Pakistani National language “Urdu” in addition to the Operators requirement;

D10.9 That all Placards and Safety Cards in cabin area are displayed in Pakistani National language Urdu;

D10.10 That the contents of First Aid Kit and Medical Kit (if applicable) on board are listed in English language;

D10.11 That the pilot reported defects as contained in Airworthiness Notice (AN) are intimated to the PCAA in English within period as specified in the Airworthiness Notices;

D10.12 That Notification procedure for maintenance of Airworthiness and of an incident as specified respectively in Rule 27 and 271 of CARs 94 are followed;

D10.13 To maintain a comprehensive insurance policy, within and outside Pakistan at the level specified in Rule 179(2)(c) and 19 of CARs 1994.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

AFM	:	AIRCRAFT FLIGHT MANUAL
ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
ASC	:	AIR SAFETY CIRCULAR
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
CARS	:	CIVIL AVIATION RULES, 1994
DGCAA	:	DIRECTOR GENERAL CIVIL AVIATION AUTHORITY
FSD	:	FLIGHT STANDARDS DIRECTORATE
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
MSN	:	MANUFACTURER SERIAL NUMBER

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 ICAO Annex 6 Part 1

E3.2 ICAO Convention - Article 83bis

E3.3 ICAO Circular 295-LE/2 Feb. 2003

E3.4 ICAO letter EC U93, AN 11141-05183 12 August 2005

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 15th March, 2018 and supersedes ANO 91.0016 (Issue-2).

(USAID-UR-REHMAN USMANI)
Air Vice Marshal
Actg. Director General,
Pakistan Civil Aviation Authority

Dated: - **07th March, 2018**

(CAPT. ARIF MAJEED)
O/Director Flight Standards

Dated **28th February, 2018**
File No. HQCAA/1077/027/FSAC

APPENDIX "A"

INFORMATION TO BE SUPPLIED ABOUT PROPOSED AIRCRAFT FOR LEASE

1. The aircraft type and serial number ______
2. Date of manufacture ______
3. Registration details: ______
4. Total aircraft flying hours/cycles logged since new: ______
5. Cycles/hours logged by each engine since new and last overhaul: ______
6. Status of compliance of mandatory modifications/service Bulletins: ______
7. The areas of previous operation: ______
8. Details of maintenance programme followed and approved by the airworthiness authority of the State of Registry: ______
9. Name and address of the owner/Operator: ______
10. Details of accidents/incidents, if any: ______
11. Details of repairs carried out: ______
12. TBOs and lives of all lived components: ______
13. History cards of all components ______
14. A statement from the owner/Operator that the aircraft fully complies with the airworthiness requirements of the State of Registry: ______

Date: Authorized Signatory

APPENDIX "B"

TRANSFER AGREEMENT BETWEEN STATE OF REGISTRY AND STATE OF OPERATOR CONCERNING THE TRANSFER OF REGULATORY OVERSIGHT FUNCTIONS AND DUTIES UNDER ICAO ARTICLE 83BIS

Agreement between (State) --------------- and (State) ----------------- on Implementation of Article 83 bis of the Convention

WHEREAS the Protocol relating to Article 83 bis of the Convention on International Civil Aviation (Chicago, 1944) (hereinafter referred to as "the Convention"), to which [State 1] and [State 2] are parties, entered into force on 20 June 1997;

WHEREAS Article 83 bis, with a view to enhanced safety, provides for the possibility of transferring to the State of the Operator all or part of the State of Registry's functions and duties pertaining to Articles 12, 30, 31 and 32 a) of the Convention;

WHEREAS, in line with Doc 9760 (Airworthiness Manual), Volume II, Part B, Chapter 10, and in light of Doc 8335 (Manual of Procedures for Operations Inspection, Certification and Continued Surveillance), Chapter 10, it is necessary to establish precisely the international obligations and responsibilities of [State 1] (State of Registry) and [State 2] (State of the Operator) in accordance with the Convention;

WHEREAS, with reference to the relevant Annexes to the Convention, this Agreement organizes the transfer from [State 1] to [State 2] of responsibilities normally carried out by the State of Registry, as set out in Sections 3 and 4 below;

The Government of [State 1], represented by its [Civil Aviation Authority], and The Government of [State 2], represented by its [Civil Aviation Authority], Hereinafter referred to as "the Parties", have agreed as follows on the basis of Articles 33 and 83 bis of the Convention:

ARTICLE I - SCOPE

Section 1. [State 1] shall be relieved of responsibility in respect of the functions and duties transferred to [State 2], upon due publicity or notification of this Agreement as determined in paragraph b) of Article 83 bis.

Section 2. The scope of this Agreement shall be limited to [types of aircraft] on the register of civil aircraft of [State 1] and operated under leasing arrangement by [Operator], whose principal place of business is in [State 2]. The list of aircraft concerned, identified by type, registration number and serial number, is reproduced in Attachment 1, which also indicates the term of each leasing arrangement.

ARTICLE II – TRANSFERRED RESPONSIBILITIES

Section 3. Under this Agreement, the Parties agree that [State 1] transfers to [State 2] the following functions and duties, including oversight and control of relevant items contained in the respective Annexes to the Convention:

Annex 1 — Personnel Licensing, issuance and validation of licences.

Annex 2 — Rules of the Air, enforcement of compliance with applicable rules and regulations relating to the flight and manoeuvre of aircraft.

Annex 6 — Operation of Aircraft (Part I - International Commercial Air Transport - Aeroplanes), all responsibilities which are normally incumbent on the State of Registry. Where responsibilities in Annex 6, Part I, may conflict with responsibilities in Annex 8 - Airworthiness of Aircraft, allocation of specific responsibilities is defined in Attachment 2.

Section 4. Under this Agreement, while [State 1] will retain full responsibility under the Convention for the regulatory oversight and control of Annex 8- Airworthiness of Aircraft, the responsibility for the approval of line stations used by the [Operator], which are located away from its main base, is transferred to [State 2]. The procedures related to the continuing airworthiness of aircraft to be followed by the [Operator] will be contained in the Operator's maintenance control manual (MCM). Attachment 2 hereunder describes the responsibilities of the Parties regarding the continuing airworthiness of aircraft.

ARTICLE III - NOTIFICATION

Section 5. Responsibility for notifying directly any States concerned of the existence and contents of this Agreement pursuant to Article 83 bis b) rests with [State 2] as the State of the Operator, as needed. This Agreement, as well as any amendments to it, shall also be registered with ICAO by [State 1] as the State of Registry or [State 2] as the State of the Operator, as required by Article 83 of the Convention and in accordance with the Rules for Registration with ICAO of Aeronautical Agreements and Arrangements (Doc 6685).

Section 6. A certified true copy [in each language] of this Agreement shall be placed on board each aircraft to which this Agreement applies.

Section 7. A certified true copy of the air Operator certificate (AOC) issued to [Operator] by [State 2], in which the aircraft concerned will be duly listed and properly identified, will also be carried on board each aircraft.

ARTICLE IV - COORDINATION

Section 8. Meetings between [State 1-CAA] and [State 2-CAA] will be held at [three-] month intervals to discuss both operations and airworthiness matters resulting from inspections that have been conducted by respective inspectors. For the sake of enhanced safety, these meetings will take place for the purpose of resolving any discrepancies found as a result of the inspections and in order to ensure that all parties are fully informed about the [Operator's] operations. The following subjects will be among those reviewed during these meetings:

Flight operations

a) Continuing airworthiness and aircraft maintenance
b) Operator's MCM procedures, if applicable
c) Flight and cabin crew training and checking
d) Any other significant matters arising from inspections

Section 9. Subject to reasonable notice, [State 1-CAA] will be permitted access to [State 2-CAA] documentation concerning [Operator] in order to verify that [State 2] is fulfilling its safety oversight obligations as transferred from [State 1].

Section10. During the implementation of this Agreement, and prior to any aircraft subject to it being made the object of a sub-lease, [State 2], remaining the State of the Operator, shall inform [State 1]. None of the duties and functions transferred from [State 1] to [State 2] may be carried out under the authority of a third State without the express written agreement of [State 1].

ARTICLE V - FINAL CLAUSES

Section 11. This Agreement will enter into force on its date of signature, and come to an end for aircraft listed in Attachment 1 at the completion of the respective leasing arrangements under which they are operated. Any modification to the Agreement shall be agreed by the parties thereto in writing.

Section 12. Any disagreement concerning the interpretation or application of this Agreement shall be resolve by consultation between the Parties.

Section 13

This agreement is made out in English and -----------------------------, and wherever any disagreement arises the English version will prevail.

Section 14. In witness thereof, the undersigned directors of civil aviation of [State 1] and [State 2] have signed this Agreement.

For the Government of State of Registry [State 1]	For the Government of State of Operator [State 2]
[Signature]	[Signature]
[Name, title, place and date]	[Name, title, place and date]

Attachments: Attachment 1 – Aircraft Affected by this Agreement
Attachment 2 – Responsibilities of [State 1] and [State 2] Regarding Airworthiness.

ATTACHMENT 1

AIRCRAFT AFFECTED BY THIS AGREEMENT

Aircraft type	Registration number	Serial number	Leasing term

ATTACHMENT 2

RESPONSIBILITIES OF [STATE 1] AND [STATE 2] REGARDING AIRWORTHINESS

ICAO Doc	Subject	Responsibilities of the State of Registry ([State 1])	Responsibilities of the State of the Operator ([State 2])
Annex 8, Part II, Chapter 4; Doc 9760, Volume II, Part B, Chapter 8	Mandatory continuing airworthiness information	Ensure that [State 2-CAA] and the [operator] receive all applicable mandatory continuing airworthiness information.	Ensure that the [operator] complies with mandatory continuing airworthiness information transmitted by [State 1-CAA].
Annex 6, Part I, 5.2.4	Operation of aircraft in compliance with its certificate of airworthiness (C of A)		Assume State of Registry's responsibility as defined in 5.2.4 of Annex 6, Part I.
Annex 6, Part I, 8.1.2 Annex 6, Part III, 6.1.2	Operator's maintenance responsibilities	Approve maintenance organizations used by the [operator], except for line stations away from operator's main base.	Approve line stations away from the [operator's] main base.
Annex 6, Part I, 8.2.1 to 8.2.4 Annex 6, Part III, 6.2.1 to 6.2.4	Operator's maintenance control manual (MCM)		Ensure that guidance is contained in the MCM, approve the MCM and transmit a copy to [State 1-CAA].
Annex 6, Part I, 8.4.1 to 8.4.3	Maintenance records	Inspect maintenance records and documents every six months.	Ensure that records are kept in accordance with 8.4.1 to 8.4.3 of Annex 6, Part I, and inspect in accordance with the requirements of the AOC.
Annex 6, Part I, 8.5.1 and 8.5.2 Annex 6, Part III, 6.5.1 and 6.5.2	Continuing airworthiness information	Ensure that the airworthiness requirements of [State 1] are known to both [State 2-CAA] and [operator].	Ensure that the airworthiness requirements of [State 1] and [State 2] are complied with and adequate procedures are incorporated in the MCM.
Annex 6, Part I, 8.6; Annex 6, Part III, 6.6 Doc 9760, Volume II, Part B, Chapter	Modifications and repairs	Ensure that they have been previously approved by the States of Design and of Manufacture.	Ensure that the requirements are contained in the MCM and approve the MCM.
Annex 6, Part I, 8.7 and 8.8 Annex 6, Part III, 6.7	Approved maintenance organization and maintenance release	Approval of the [operator's] base maintenance organization and procedures in accordance with 8.7 of Annex 6, Part I, and, as applicable, 8.8 of Annex 6, Part I, or 6.7 of Annex 6, Part III, and communication to [State 2- CAA] of related procedures to be included in the MCM.	Approval of the [operator's] line maintenance arrangements away from base. Ensure that procedures are contained in the MCM and approve the MCM.

FLIGHT CREW TRAINING REQUIREMENTS & PROCEDURES - AEROPLANE

AIR NAVIGATION ORDER

VERSION : **2.0**
DATE OF IMPLEMENTATION : **01.04.2018**
OFFICE OF PRIME INTEREST : **Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. BALBAN SABIR	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Actg. Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. The Air Navigation Order (ANO) contained herein is issued by the Director General (DG) Civil Aviation Authority (CAA) pursuance of the powers vested by Rule 4, Civil Aviation Rules 1994 (CARs 94).

B. PURPOSE:

B1. To establish regulations and procedures for Flight Crew Training Programmes and Procedures.

B2. Applicable for training programs conducted to develop properly trained and qualified flight crew(s).

B3. The program is to be established by the operator, in order to administer the flight crew training in an effective and efficient manner in accordance with PCAA approved training requirements as per Operator's Operations Manual.

C. SCOPE:

C1. The ANO contained herein shall apply to Air Carrier, General Aviation operators holding licenses, Air Operator Certificate (AOC) issued under Part XI, CARs 94.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 The terms used in this ANO have the following meanings:-

D1.1.1 **Approved Flight and Ground Instructors**: means qualified Flight and Ground Instructors duly approved by PCAA as per laid down regulations.

D1.1.2 **Conversion:** means the same as transition, and is the training required for crewmembers who have qualified and served in the same capacity on another aeroplane of the same group.

D1.1.3 **Evaluation:** means an effective and objective measurement of individual performance and system effectiveness.

D1.1.4 **Familiarization Training:** means training required for crewmembers who operate an aeroplane where a change of equipment or significant procedures have changed, requiring the acquisition of additional knowledge.

D1.1.5 **Flight Crew member:** means a licensed crewmember charged with duties essential to the operation of an aircraft during flight time, and any reference to "Flight Crew" has a corresponding meaning.

D1.1.6 **Flight Crew Training programmes:** means a programme described in detail either in the operations manual or in a training manual that whilst it forms part of the operations manual, will be issued as a separate manual.

D1.1.7 **Flight crew qualifications, licensing and training:** means that flight crew qualifications meet the requirements of the State regulations and that personnel are duly licensed and hold appropriate and valid ratings. That a training programme has been established as per State regulations, Operations Manual and is based on Annex 1 and Annex 6, Part I, or Part III, Section II.

D1.1.8 **Initial Training:** means training required for crewmembers who have not been qualified and served in the same capacity on that equipment with the operators approved training program and Operations Manual.

D1.1.9 **Licensed:** means licensed under the appropriate CARs 94 or ANOs in accordance with the PLM.

D1.1.10 **Operations Manual** means Operations Manual Part A, B. C & D.

D1.1.11 **Record Keeping Requirements:** means all operators shall maintain Flight Crew records reflecting all regulatory requirements of training and checking to meet the appropriate CARs 94 and ANOs. The records shall be made available upon request to the PCAA and shall indicate the following qualifications of each person assigned Flight Crew duties:

D1.1.11.1 Date of hire and duty assignment;

D1.1.11.2 Appropriate PCAA license and medical qualification;

D1.1.11.3 All remedial training including appropriate checks to verify currency required by PCAA regulations;

D1.1.11.4 Appropriate Flight and Duty Time Limitations required by CARs 94, Operations Specifications, or ANO;

D1.1.11.5 Records shall be retained throughout the period of employment of each flight crew member and for a further period of 3 months.

D1.1.12 **Second Officer:** A Second Officer usually refers to the third in line of command for a flight crew on a commercial aircraft. Usually a Second Officer is used on international or long haul flights where more than two crew are required to allow for adequate crew rest periods.

D1.1.13 **SFE:** A Synthetic Flight Examiner is a person who has been delegated powers to conduct simulator examination / checks on behalf of PCAA, on aircraft weight category 5700 Kgs.

D1.1.14 **SFI:** Synthetic Flight Instructor is a person who may conduct pilot type training on synthetic flight trainer for aircraft of weight category of 5700 Kgs and above.

D1.1.15 **Training:** means approved ground or flight training programmes for flight crews as appropriate for;

D1.1.15.1 Initial training;

D1.1.15.2 Conversion training;

D1.1.15.3 Differences and Familiarization training;

D1.1.15.4 Upgrade to Captain training;

D1.1.15.5 Pilot Qualification to Operate in Either Pilots Seat training;

D1.1.15.6 Recent Experience;

D1.1.15.7 Route and Aerodrome Competence Qualification training;

D1.1.15.8 Recurrent training; and

D1.1.15.9 Checking.

D1.1.16 **Training Requirement:**

a) Flight Training Department personnel are responsible for ensuring that all supporting documentation, including record keeping forms, assessment forms, instructor guides and notes, and all courseware associated with the pilot training courses and programs described in Operations Manual Part-D are current and sufficient for the purpose. This responsibility includes the compilation and distribution of the documentation used for the purposes of course administration, record keeping and assessment for the following courses and programs:
   i) Initial Training.
   ii) Conversion (Type) Training and Checking.
   iii) Upgrade command Training and Checking.
   iv) Second Officer Training and Checking.
   v) Cross Crew Qualification, Differences and Familiarization Training and Checking.
   vi) Recurrent Training and Checking.
   vii) Pilot Qualification to Operate in Either Pilot's Seat Training and Checking.
   viii) Instructor Training and Checking. The company retains course attendance and/or completion records in paper or electronic copy, for all courses of training undertaken.

b) The Chief Pilot Training assisted by the Crew Qualification Controllers, will be responsible for maintaining a record of the expiry dates, in their training software, of the following checks/tests/training:
   i) Ground and refresher training.
   ii) Operator Proficiency Check/ License Proficiency check (flight crew only).
   iii) Line checks (flight crew only).
   iv) RH seat qualification (flight crew only).
   v) English Language Proficiency Ratings (Level 4 and 5 only).
   vi) SEP training.
   vii) Dangerous Goods.
   viii) Route and Aerodrome competence qualification (commanders only).
   ix) Recent experience. (Flight crew only).
   x) TRI, TRE, SFI and SFE certifications (flight crew only). The training department shall ensure that the expiry dates in trg software are properly monitored, and that all necessary training is planned and conducted, in order to maintain the validity of crew qualifications.

D1.1.17 **TRE:** A Type Rating Examiner is a person who has been delegated powers to conduct flight checks on behalf of PCAA on an aircraft of weight category of 5700 Kgs and above.

D1.1.18 **TRI:** Type Rating Instructor is a person who may conduct pilot type training on an aircraft weight category of 5700 kgs and above.

D1.1.19 **Up-Grade Training:** means training required for crewmembers who have qualified and served on a particular aeroplane type, before they serve as pilot in command or second in command, respectively, on that aeroplane.

D1.1.20 **UPRT:** Upset Prevention and Recovery Techniques.

D2. MINIMUM REQUIREMENTS:

D2.1 An operator shall ensure that each flight crewmember:

D2.1.1 Holds the appropriate valid license and are qualified to conduct the duties he/she is assigned;

D2.1.2 Holds a valid medical assessment appropriate to the flight crewmembers license;

D2.1.3 Shall be capable of speaking, reading, and understanding the English language;

D2.1.4 Is current and qualified and competent to conduct the duties assigned to them;

D2.1.5 Procedures are established, acceptable to the PCAA, to prevent the scheduling and crewing together of inexperienced flight crewmembers; and

D2.1.6 Each flight crewmember shall, on each flight, carry a valid flight crew license with appropriate rating(s) current medical assessment.

D3. COMPOSITION OF FLIGHT CREW:

D3.1 An operator shall ensure the composition of the flight crew and the number of flight crewmembers at designated crew stations are both in compliance with and no less than the minimum specified in the Aeroplane Flight Manual and valid SEP training.

D3.2 One pilot amongst the flight crew shall be designated as pilot in command who may delegate the conduct of the flight to another qualified flight crewmember as specified in the Operator's approved Operations Manual.

D3.3 Charter Class 1 & 2, VIP, VVIP, and Aerial Work shall assign a minimum flight crew of 2 pilots for operations under IFR or at night. For all turbo-propeller aeroplane with a maximum approved passenger seating configuration of more than 9 seats and for all turbo-jet aeroplanes, the minimum flight crew shall be 2 pilots.

D4. TRAINING: (Refer Appendix "A" to Appendix "I")

D4.1 An operator shall ensure that each flight crewmember successfully completes Initial Training in accordance with the operators approved training programme and Operations Manual. For specific trainings refer to appendixes as indicated above.

D4.2 An operator shall ensure a flight crewmember completes Conversion Training when changing from one type of aeroplane to another type or class for which a new type or class rating is required.

D4.3 An operator shall ensure that a flight crewmember completes Difference Training when operating a variant of an aeroplane of the same type or another type of the same class currently operated; or when a change of equipment and/or procedures on types or variants currently operated, requires additional knowledge and training on an appropriate simulator/training device / ground schooling.

D4.4 An operator shall ensure that a flight crewmember completes Familiarization Training when operating another aeroplane of the same type or variant; or when a change of equipment and/or procedures on types or variants currently operated, requires the acquisition of additional knowledge.

Note: The operator shall specify in the Operations Manual when such Differences or Familiarization Training is required. This training shall have received CAA Approval.

D4.5 An operator shall ensure that all second in command flight crew member completes Up-grade to Captain Training prior to duty assignment as pilot in command. A minimal level of experience, acceptable to the CAA, shall be specified in the Operations Manual.

D4.6 An operator shall ensure that a flight crewmember who may be assigned to operate in either pilot seat completes the appropriate Training and within the preceding 12 months, as demonstrated proficiency in each Seat he is expected to occupy.

D4.7 An operator shall ensure that a pilot in command does not operate an aeroplane as pilot in command unless he has carried out at least three take-offs and three landings as pilot flying in an aeroplane or approved flight simulator of the type to be used, in the preceding 90 days.

D4.8 An operator shall ensure that, prior to being assigned as pilot in command, that pilot has demonstrated to the operator adequate knowledge of the route to be flown and of the aerodrome facilities and procedures to be used. The pilot shall complete an approved Route and Aerodrome Qualification training programme to obtain currency. The period of validity of the route, route segment and aerodrome competence qualification shall be 12 calendar months.

D4.9 An operator shall ensure that a flight crewmember completes the recurrent ground, flight and emergency training appropriate to the duties assigned by the AOC holder within the time specified.

D4.10 Each operator shall ensure all flight crewmember checking is accomplished in an approved simulator/training device as stated in the appropriate CARs 94 or ANO. Each flight crewmember shall be checked to verify his/her competence to perform all duties assigned to his/her specific function in accordance with procedures specified in the approved Operations Manual. A flight crewmember shall not perform duties or tasks (CAT-II, CAT-III A/B/C, EDTO, NDB, etc), on an aeroplane in which he/she has not been trained and properly authorized. The checks required by this paragraph shall be performed by PCAA or personnel designated by the PCAA to carry out those specific functions.

D4.11 The operator shall specify the training syllabus in the Operations Manual for instructor training on line / simulator training for TRI / TRE, SFI / SFE, LVP / CAT-II / CAT-III A/B/C and all ground schooling. No training to be undertaken unless, it has been approved by PCAA.

D4.12 Training Department Meetings:

Meetings will be conducted on a biannual basis as defined by the Operator's Operations Manual. These meetings shall be focused on flight crew, as well as on the content of the training programs applied to those personnel, and the devices and facilities supporting this training. These meetings must cover:

a) Flight crew training progress and training schedule;

b) Review coordination and communication between external and internal stake holders;

c) Flight documentations revision / amendments;

d) Standardization of procedures and checking standards among the instructor / examiner;

e) Any evolution in SOP.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ACAS	:	AIRBORNE COLLISION AVOIDANCE SYSTEM
ALT	:	ALTITUDE
ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
CARS	:	CIVIL AVIATION RULES
CAT-II	:	CATEGORY-II APPROACH
CAT-IIIABC	:	CATEGORY-III ABC APPROACH
DCP	:	DESIGNATED CHECK PILOT
EDTO	:	EXTENDED DIVERSION TIME OPERATIONS
ETPS	:	EQUI-TIME POINTS
FPV	:	FLIGHT PATH VECTORS
FSTD	:	FLIGHT SIMULATION TRAINING DEVICE
FMS	:	FLIGHT MANAGEMENT SYSTEM
GNSS	:	GLOBAL NAVIGATION SATELLITE SYSTEM
GPS	:	GLOBAL POSITIONING SYSTEM
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
IFR	:	INSTRUMENT FLIGHT RULES
LSALT	:	LOWEST SAFE ALT
LVP	:	LOW VISIBILITY PROCEDURES
MMEL	:	MASTER MINIMUM EQUIPMENT LIST
MEL	:	MINIMUM EQUIPMENT LIST
MNPS	:	MINIMUM NAVIGATION PERFORMANCE SPECIFICATION
NDB	:	NON-DIRECTION BEACON
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
PBN	:	PERFORMANCE BASED NAVIGATION
PED	:	PERSONAL ELECTRONIC DEVICE
PLM	:	PERSONAL LICENSING MANUAL
RCM	:	RUNWAY CONDITION MONITORING
RNAV	:	AREA NAVIGATION
RNP	:	REQUIRED NAVIGATION PERFORMANCE
RVSM	:	REDUCED VERTICAL SEPARATION MINIMUM
SFE	:	SYNTHETIC FLIGHT EXAMINER
SFI	:	SYNTHETIC FLIGHT INSTRUCTOR
SMS	:	SAFETY MANAGEMENT SYSTEM
TEM	:	THREAT AND ERROR MANAGEMENT
TRE	:	TYPE RATING EXAMINER
TRI	:	TYPE RATING INSTRUCTOR

UPRT	:	UPSET PREVENTION AND RECOVERY TRAINING
VFR	:	VISUAL FLIGHT RULES

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 "AOC Guide – Commercial Air Operations" CAAD-617; (MNL-005-FSXX-3.0)

E3.2 ICAO Annex 6, Part I, Part II & Part III.

E3.3 ANO-026-RGLC

E3.4 DCP Manual

E3.5 ICAO Doc 10011

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st April, 2018 and supersedes ANO 91.0017 (Issue-I).

--S/d--

(USAID-UR-REHMAN USMANI)
Air Vice Marshal
Actg. Director General,
Pakistan Civil Aviation Authority

Dated: - **7th March, 2018**

--S/d--

(CAPT. ARIF MAJEED)
O/Director Flight Standards

Dated- **7th March, 2018**
File No. HQCAA/1077/028/FSAC

APPENDIX "A"

TRAINING

1. An operator shall establish and maintain a ground and flight training programme, which ensure that all flight crewmembers are adequately trained to perform their assigned duties. These training programmes shall be approved by the PCAA prior to being utilized by the operator. No amendments to any training programme will be made until after approval for such amendments has received PCAA approval.

2. Ground and flight facilities as determined and approved by the PCAA shall be provided by the operators. Ground and flight training programmes shall only be taught by properly qualified and PCAA approved instructors.

3. The training programme shall consist of ground and flight simulator training in the type(s) of aircraft on which the flight crewmember serves, and shall include training on:

3.1 **Rules / Regulations / Manuals / Publications:**

a) CARs 94, ANOs, ANO-026-RGLC and Director General Directives, DCP Manual;

b) Appropriate portions of the Company Manual;

c) AOC and Operations Specifications;

d) Duties and Responsibilities;

e) Communication and Coordination with Cabin Crew(s).

3.2 **Type Technical Training:**

a) Appropriate Aircraft Type(s) Training including:

i) Power-plant, Systems, Airframe and Avionics

ii) System Malfunctions, Fire or Other Abnormalities

3.3 **Emergency / Evacuation Drills:**

a) Appropriate Emergency Training and Drill;

b) Appropriate Emergency Evacuation Training and Drill;

c) Appropriate Fire/Smoke Training and Drill;

d) Fighting Fires Caused by Lithium Type Batteries in Portable Electronic Devices.

e) Appropriate Water Survival Training and Drill;

f) Training on Medical Aspects and First Aid;

g) Weather and Air Traffic Services;

h) Hijacking and Unusual Situations;

3.4 **Safety and Operations:**

a) Review of Previous Aircraft Accidents and Incidents pertaining to actual emergency situations;

b) Handling of Dangerous Goods (DGR);

c) Crew Resource Management (CRM);

d) Wind shear Training and Drill;

e) Upset Prevention and Recovery Techniques;

f) Bird Hits Presentation on approach and landing in simulator.

3.5 And, If applicable the following:

a) EDTO Training and Drill;

b) RVSM Training;

c) MNPS Training;

d) CAT II Training and Drill;

e) NAT Ops training for NAT Operators;

f) ACAS Training and Drill;

g) UPRT Training and Drill;

h) Incapacitation;

i) RNAV Training;

j) PBN Training; and

k) RCM Training.

4. The elements listed in paragraph 3 (as a minimum) be used as a guide in development of the training programmes for Initial and Recurrent programmes. Recurrent Training for all flight crewmembers shall be conducted as a minimum once each 06 months and shall include an examination to determine competence.

5. Conversion Training

5.1. An operator shall ensure all the appropriate elements or components of a different type aircraft are included in conversion training, to include:

a) Ground training and checking of aircraft systems, normal, abnormal and emergency procedures;

b) Emergency and safety equipment training and checking;

c) Aircraft/flight simulator training and checking;

d) Line flying under supervision and line check; and

e) Other elements or components as required by an operator

6. Differences and Familiarization Training

6.1 When operating another variant of an aircraft of the same type or another type of the same class currently operated; or

6.2 When a change of equipment and/or procedures on types or variants currently operated, requires additional knowledge and training on an appropriate training simulator or device

6.3. An operator shall ensure that a flight crew member completes:

a) **Differences training;**

i) When operating another variant of an aircraft of the same type or another type of the same class currently operated; or

ii) When a change of equipment and/or procedures on types or variants currently operated, requires additional knowledge and training on an appropriate training simulator or device.

b) **Familiarization training;**

i) When operating another aircraft of the same type or variant; or

ii) When a change of equipment and/or procedures on types or variants currently operated, requires the acquisition of additional knowledge; or

iii) New or different equipment installed on the aircraft, shall not be turned on or operated until the required training is completed.

6.3. An operator shall specify in the approved Operations Manual when such Differences or Familiarization training is required.

7. Upgrade to Captain Training

7.1. An operator shall ensure that for Upgrade to Captain from co-pilot and those joining as Captain as follows:

a) A minimum level of experience, acceptable to the PCAA, is specified in the approved Operations Manual; and

b) For multi-crew operations, the pilot completes an appropriate Upgrade to Captain training programme specified in the approved Operations Manual and at least the following:

i) Training in the appropriate flight simulator and/or flying training;

ii) An operator proficiency check operating as captain;

iii) Captain's responsibilities;

iv) Line training, to include the minimum amount of sectors, in command under supervision as specified in the approved Operations Manual;

v) Completion of a Captains line check and route and airdrome competence qualification as prescribed in the CARs 94; and

vi) Crew Resource Management training.

8. Pilot Qualification to Operate in Either Pilot Seat

8.1. Flight crew members whose duties also require them to operate in the right-hand seat and carry out the duties of co-pilot, or flight crew members required to conduct training or examining duties from the right-hand seat, shall complete additional training and checking as specified in the approved Operations Manual, concurrent with the operators proficiency checks. This additional training and checks must be carried out in the seat to be occupied and shall include:

a) An engine failure during take-off;

b) A one engine inoperative approach and go-around;

c) A one engine inoperative landing; and

d) When operating in the right-hand seat, the checks required by the CARs 94 for operating in the left-hand seat must also be valid and current.

Note: When engine-out maneuvers are carried out in an aircraft, the engine failure shall be simulated only.

9. Recent Experience

9.1 An operator shall ensure that:

a) A pilot in command meets the requirements of CAR 198 (a), (i) through (iv); and

b) A second in command meets the requirements of CAR 198 (b).

10. Route and Aerodrome Competence Qualification

10.1 An 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 the following:

a) Each pilot-in-command shall demonstrate to the PCAA an adequate knowledge of the route to be flown, and the aerodromes, which are to be used. This shall include knowledge of:

i) The terrain and minimum safe altitudes;

ii) The seasonal meteorological conditions;

iii) The meteorological, communication and air traffic facilities, services and procedures;

iv) The search and rescue procedures; and

v) 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, homing and instrument approach procedures shall be accomplished in an appropriate simulator/training device or aeroplane which is adequate for this purpose.

10.2. 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 PCAA 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) Special Authorization and PCAA approval for training syllabus and training conducted over difficult terrain.

c) The descent from the initial approach altitude can be made by day in visual meteorological conditions; or

d) The PCAA qualifies the pilot in command to land at the aerodrome concerned by means of an adequate pictorial presentation; or

e) The aerodrome concerned is adjacent to another aerodrome at which the pilot in command is currently qualified to land.

10.3. The operator shall maintain a record, sufficient to satisfy the PCAA of the qualification of the pilot and of the manner in which such qualification has been achieved.

10.4. An operator shall not continue to utilize a pilot as a pilot-in-command on a route unless, within the preceding 06 months, the pilot has made at least one trip between the terminal points of that route as a pilot member of the flight crew, or as a check pilot, or as an observer on the flight deck. In the event that more than 06 months has elapsed in which a pilot has not made such a trip on a route in close proximity and over similar terrain, prior to again serving as a pilot-in-command on that route, that pilot shall re-qualify in accordance with paragraph 10.1 and 10.2.

10.5 MNPS, Ocean bodies and mountainous CAT ‘C’ airfields.

11. Training Code of Conduct

General Rules of Conduct General rules of conduct for instructors, examiners and other training personnel are specified below:

11.1 All training personnel shall ensure proper use of all equipment, facilities and devices. Validity of documents (License, Medical, Course(s), Training Folders etc.)

11.2 Instructors shall perform their duties in accordance with the policies, procedures and guidelines provided in approved training manuals and supporting documentation.

11.3 All safety rules shall be adhered to at all times.

11.4 Safety equipment shall be used in accordance with the applicable instructions whenever necessary.

11.5 Threatening or violent behaviour or language towards individuals, another instructor, or a trainee is prohibited.

11.6 Behaviour, actions or inactions that would in any way jeopardize the safety or well-being of other instructors, pilots, employees or passengers is prohibited.

11.7 Smoking in non-smoking areas is not permitted.

11.8 Instructors must not use behaviour, language, or non-verbal language that is discriminatory or intimidating.

11.9 Harassment of individuals, whether sexual or otherwise, is not permitted.

11.10 Instructors must not behave in a manner that brings, or may bring, the organization into disrepute.

11.11 Tactical Sickness, will not be tolerated, and shall result in disciplinary action.

12. Prohibition of:

12.1 Inappropriate Interference

A strict requirement of PCAA is that training and checking duties conducted by instructors and examiners shall never be subject to inappropriate interference by any internal or external personnel or agency. This requirement shall be ensured through the application of the following policies:

a) Except for the trainee(s) and the conducting instructor or examiner, or persons authorized by PCAA, no additional personnel may be present in the simulator during a training or check session, or in the cockpit during a training or check flight, unless have been specifically authorized by PCAA.

b) Any instructor or examiner who considers that he/she has been subject to inappropriate instructions or interference, from any source (including Company management), concerning the conduct or outcome of a training or checking session they have conducted, shall provide a full written report of the circumstances to PCAA as soon as possible. Such cases shall be subject to a full and comprehensive investigation and, if improper interference is subsequently confirmed, shall be reported to PCAA for appropriate action.

12.2 Altered or retracted PCAA Grade Slips / Reports / Assessments

All Operators shall also ensure that written reports or assessments submitted by an instructor or examiner are not altered or retracted in any way, by any person internal or external. All such cases shall be subject to a full and comprehensive investigation for appropriate action by PCAA.

Note: Personal Electronic Device (PED) must be swiched off before Take-off checklist

12. FSTD Training and Checking

12.1 Instructors and examiners shall adhere to the times and durations specified for each simulator training or checking session. When necessary, a session may be ruled as "incomplete" if, for whatever reason, insufficient time is available to complete all the items and objectives assigned in the applicable lesson plan. During simulator training and checking, instructors must adhere to the applicable lesson plans published in the Pilot Training Manual. As the training situation dictates during a training session (or series of sessions), and where this is for the benefit of the trainee(s), an instructor may deviate from the published lesson plan, for example to repeat an exercise, or to make some appropriate instructional inputs that will aid learning. However, all required items in the published lesson plan must be covered in order to record satisfactory completion of each training session. Lesson plans shall normally provide specific guidance to instructors regarding the simulated aircraft weight, fuelload, serviceability status, and environmental conditions required for the conduct of training items. Additionally, specific guidance may be provided concerning the level of automation to be employed. All such instructions and guidance must be strictly observed by instructors, in order to ensure the consistent and standardized conduct of simulator training and checking. For most training events the same version of the lesson plans will be made available for the trainee and for the instructor, which will provide the necessary information required to conduct the lesson efficiently and to achieve the training objectives. Instructors shall endeavour to maintain a realistic environment during simulator training and checking, with particular emphasis on weather conditions and on correct radio communications and clearances. Headsets should be used, unless the training content and/or situation require a substantial amount of discussion between the instructor and trainee(s).

12.2 The training conducted during FSTD sessions shall be completed to the expected level of proficiency according to the prescribed syllabus. If any training tasks are incomplete, or if the level of proficiency achieved by a trainee is below expectations, the instructor shall decide if the affected trainee may proceed to the next lesson, or if additional training is required. If an outcome of Additional Training Required is assigned, the instructor shall follow the Training Disruption Procedure as per Operations Manual Part-D.

Note: A PPC shall be carried out on an aeroplane or a Level C / D Simulator.

13. Requirements and Limitations Applicable to Training Flights:

13.1 Limitations and Prohibitions

13.1.1 All instructors and examiners shall not, under any circumstances, practice or simulate any technical malfunctions or abnormal/emergency situations during commercial or non-revenue flight operations. Such training shall only be performed in simulators. This prohibition applies to, but is not limited to, the following:

a) Pullingacircuitbreaker,orusingabnormalswitching,fortrainingpurposes–nocontrol,switch or c/b shall be used to force an abnormal situation.

b) Artificial limitation of the exterior field of vision.

c) Practice of stall recovery, windshear avoidance and recovery, upset recovery, terrain avoidance manoeuvres (response to GPWS alerts and CFIT recovery), or traffic avoidance manoeuvres (response to ACAS alerts).

d) Abnormal operation of an aircraft system.

e) Simulation or pretence of pilot incapacitation.

f) The shut down of an engine, or the operation of an engine at a thrust level intended to simulate engine failure.

g) Simulated or actual practice of any other abnormal or emergency situation that may increase the level of risk and jeopardize the safety of flight operations. Failures, malfunctions and abnormal / emergency situations may only be considered in the context of a discussion.

13.1.2 Also during Pre-Departure briefing before commencing a training flight, or a consecutive series of training flights, and in conjunction with the departure briefing, the instructor will brief the trainee on the following requirements:

a) The instructor will not intentionally establish any technical system malfunction or simulate an actual incapacitation during any phase of flight

b) Any technical system malfunction will be considered genuine, and will require the proper application of the associated procedure and/or checklist. During the Line flying Under Supervision phase, the instructor shall also brief the following:

c) During the training flight, the nominated captain (TRI, TRE) of the flight may ,if necessary, overrule any decision made by the trainee, and if circumstances require, shall assume control of the aircraft.

d) If the instructor is operating in the right seat, with a trainee Captain in the left seat, then either pilot may call "STOP" if the requirement to reject the takeoff is recognized.

e) Irrespective of which pilot calls "STOP", the pilot in the left seat shall initiate and complete the applicable stopping actions.

APPENDIX "B"

GROUND AND REFRESHER TRAINING

1. Ground and refresher training is considered the mechanism by which the operator ensures that flight crews gain and retain information essential to the safe operation of its aircraft. A prudent operator may consider spreading such training throughout the year with particular emphasis being placed on issues relevant to the approaching season and its associated weather characteristics and its effect on safety.

2. Aeroplane performance issues, particularly in relation to engine failure and terrain avoidance planning and procedures, should be included in the programs particularly in relation to flight in IMC. Many twin engine aeroplanes used in charter operations exhibit marginal performance characteristics after an engine failure. Therefore, flight crews should be able to demonstrate a sound level of decision making competency for the appropriate actions to be taken in the event of an engine failure during takeoff.

3. Ground and refresher training should include refresher training that addresses the following where applicable:

a) aeroplane systems, including any computerised navigation system, Airborne Collision Avoidance System (ACAS) where fitted. Where practicable this training could be conducted in the aeroplane type fitted with the system or an appropriate simulator;

b) operational procedures and requirements such as those relating to aircraft performance, wet and contaminated runways, equi-time points (ETPs) and point of no return (PNR) as applicable to the operations, ground de-icing and in multi-pilot operations, pilot incapacitation;

c) assessment of single engine climb performance and the relationship to obstacle clearance;

d) relevant operational procedures and requirements for the single-engine VFR operations;

e) aeroplane or simulator training (or where acceptable to CAA, a synthetic trainer) should include all major failures of the aeroplane systems;

f) short field take-off and landing training to satisfy regulatory requirements and meet the applicable standard.

4. When developing ground refresher training, knowledge should be verified by a questionnaire or other suitable method. Prudent and well-structured ground training and self development will form a sound adjunct to the operator's SMS.

APPENDIX "C"

PROFICIENCY CHECKING

1. Ground Segment

1.1 The following guidance for the ground segment of a proficiency check applies to all aircraft operations. The operator should tailor the ground segment applicable to the aircraft type and model and should use an aircraft where possible for the purpose of practical demonstration. The check should include but not be limited to:

a) general knowledge of the aeroplane systems including fuel sampling to check for contamination;

b) other pre-flight requirements as listed in the AFM and Operations Manual; and

c) the correct recording of defects and use of the Minimum Equipment List (MEL) according to the operator's standard operating procedures.

1.2 The pilot's general knowledge should be checked with respect to:

a) the effect of weight and temperature on aeroplane performance;

b) the effect of the failure of the critical engine on aeroplane performance including during a baulked approach;

c) the effect of the aircraft configuration on take-off and landing performance; and

d) the effect of various and severe weather conditions including thunderstorm avoidance, turbulence and aeroplane icing limitations.

2. In-Flight Segment

2.1 The instructor or examiner, if in a control seat, should normally be deemed as the pilot in command with the pilot under check acting in a capacity of 'in command under supervision'. Where the instructor or examiner occupies a backseat/jump seat (in an observing role), he/she is not the pilot in command.

2.2 A clear briefing prior to the proficiency check is essential. The actions by the pilot under check and by the instructor or examiner in the event of a real emergency should be briefed and clearly established. Normally the pilot under check will be flying the aircraft and there should never be any doubt as to who is flying the aircraft. Positive phraseology should be used and a visual check (side-by-side) or control movement (tandem) is recommended to verify that the exchange as occurred in the event that the instructor or examiner has to take control.

2.3 The pilot under check should demonstrate his/her ability to operate in accordance with the standard operating procedures as detailed in the company Operations Manual. Emergency procedures should include, as applicable, engine failure in multi-engined aircraft.

3. Multi-Engined Aeroplanes

3.1 In addition to the correct application of the normal standard operating procedures the pilot under check should demonstrate that he/she is capable of extracting the maximum performance for the aircraft following a simulated engine failure once the critical speed is reached. As applicable to aircraft type or class, satisfactory competency in the following activities should be demonstrated:

a) rejected take-off .This will necessitate the operator developing a safe strategy for assessing a rejected take-off, which may include the rejected take-off being demonstrated up to a safe speed dependent upon the yawing moment and controllability as well as any brake limitations.

b) engine failure after take-off at the aeroplane's take-off safety speed, or at a higher speed as necessary for safety; and

c) engine failure during the approach and landing phase including a missed approach.

3.2 An engine failure during the cruise presents the pilot with different considerations. Therefore the pilot should be able to demonstrate not only the ability to manage the engine failure in accordance with the AFM initial phase actions but also show that he/she has the required decision-making skills to successfully manage the aircraft until it is brought to a stop after landing. The pilot should demonstrate that they have at least taken the following points into consideration when developing a plan of action from the point of engine failure in a multi-engined aircraft:

a) preserving the live engine and securing the failed engine in accordance with the AFM or Operations Manual actions and any subsequent actions

b) single-engine drift down including diversion off track to maintain LSALT (Lowest Safe ALT);

c) communication of the problem in accordance with the instructions set out in the ERSA such as what assistance will be required;

d) location of the aircraft in relation to Critical Point (Equi-Time Point) and other suitable airports;

e) consideration of the weather and the planning of the approach into the selected airport; and

f) control and briefing of passengers.

4. Checking

4.1 An operator shall ensure that piloting technique and the ability to execute emergency procedures is checked in such a way as to demonstrate the pilots competence. Where the operation may be conducted under instrument flight rules, an operator shall ensure that the pilots competency to comply with such rules is demonstrated to either a check pilot of the operator or to the PCAA. Such cheeks 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.

4.2. Where authorized by the PCAA, specified flight checks shall be conducted in an approved simulator or training device.

5. FSTD Check Requirements

5.1 Completion standards and checking objectives are considered to be reached if the trainee has demonstrated satisfactory performance of:

5.1.1 Compliance with ATC instructions, SOP procedures, standard call out and briefings.

5.1.2 Adequate aircraft system knowledge and handling of systems.

5.1.3 Safe, correct and timely handling of abnormal in regards to usage of ECAM, QRH and FCOMs.

5.1.4 Correct use of automated system including reversion to selected modes or manual flying as the situation dictates.

5.1.5 Correct use of the CDU or MCDU.

5.1.6 Precise manual flying of the aircraft and safe flight path control at all times in particular with an engine out situation with appropriate tolerances:

a) Approach phase: In accordance with QRH FLT Parameters.

b) Engine out: Bank angle < 10° and the FD bars and beta target accurately followed/centered.

5.1.7 Correct judgment to execute a go around if not stable on approach at 1000' IMC or 500' VMC.

5.1.8 Compliance with all aircraft limitations.

5.1.9 Compliance with safe altitudes and descent minima.

5.1.10 Adequate knowledge of all relevant publications OM A, B, C, D / Jeppesen / CARs / ERG.

5.1.11 Adherence to competencies in the areas of:

a) Application of Procedures.

b) Communication.

c) Leadership and Teamwork.

d) Problem Solving & Decision Making.

e) Situation Awareness.

f) Workload Management.

5.1.12 Adequate knowledge of:

a) Approaches authorized by the PCAA.

b) Ceiling and visibility requirements applicable to takeoff, approach and landing.

c) The effect of inoperative ground components and aircraft equipment on operating minimums.

d) Wind limitations (crosswind, headwind and tailwind).

5.2 In addition to the above outlined standards, a captain must demonstrate superior ability to manage the entire aircraft operation and crew during normal and abnormal situations. He will demonstrate good CRM skills especially demonstrating leadership.

5.3 **Incapacitation:**

A First Officer / Captain must demonstrate the ability to support the PIC / First Officer during normal and abnormal situations. He will be able to operate the aircraft into airports classified “Category A” under normal and adverse conditions as PF. He will be able to land the aircraft safely in case of PF incapacitation using all means of automation available.

5.4 **Recording of Proficiency Check(s)**: Operator to ensure that FSTD Proficiency Check session(s) be recordable on portable digital storage media. Where FSTD does not have such provision that a session could be recorded, it would be Operator’s responsibility to arrange for the recording. Chief Pilot Training to retain library of all recorded proficiency checks for a period of one calendar year from the date of the proficiency check.

APPENDIX "D"

RUNWAY CONDITION MONITORING

1. Description

1.1 Runway surface condition has contributed to many safety events. Investigations have revealed shortfalls in the accuracy and timeliness of the assessment and reporting methods currently in use. An issue has been identified particularly in the lack of standardisation in the way runway surface condition and braking action are assessed, reported and used by the flight crew.

1.2 Runway surface condition may be reported using several types of descriptive terms such as type and depth of contamination, readings from a runway friction measuring device, an aeroplane braking action report, or an airport vehicle braking condition report.

1.3 A discrepancy between the reported runway surface condition and the actual one may affect the performance calculations, the use of deceleration devices and the flight crew's ability to maintain directional control. Training is also necessary to ensure that the reported information is understood and used correctly by the flight crew.

2. Approach and Landing Conditions

2.1 Before commencing an approach to land, the commander shall be satisfied that, according to the information available to him/her, the weather at the aerodrome and the condition of the runway or FATO (Final Approach and Takeoff area) intended to be used should not prevent a safe approach, landing or missed approach, having regard to the performance information contained in the operations manual.

3. In-Flight Determination of the Landing Distance

3.1 The in-flight determination of the landing distance should be based on the latest available meteorological or runway state report, preferably not more than 30 minutes before the expected landing time.

3.2 Within their Safety Management System (SMS) operators should consider and be aware of the runway surface condition reporting methodology at the aerodromes to which they operate. Special consideration should be given to those aerodromes that are critical in terms of runway length, challenging weather conditions and aerodrome capability, and reliability for runway surface conditions assessment and reporting. Consideration should be given in particular to the runway surface condition reporting format and terminology in use. Operators should base their assessment at least on:

a) Information contained in the AIP;

b) In-service experience;

c) Occurrence reporting.

3.3 Operators should include in their flight crew training programme at least the following elements:

a) Description of runway surface condition reporting methods;

b) Types of runway contamination and its effects;

c) Aeroplane take-off and landing performance on wet and contaminated runways.

3.4 When substantial differences are identified at a particular aerodrome or in a particular State or region in relation to runway surface condition assessment and reporting, the operator should ensure that flight crews are properly informed on the type and format of runway surface condition reports they will get at these locations. If risks are identified at a particular aerodrome in relation to runway surface condition reporting, these should be considered in the categorization of that aerodrome for the purpose of aerodrome knowledge and familiarization,

3.5 In case of uncertainty on runway surface condition reporting, conservative assumptions should be made either in terms of aeroplane performance calculations or, when different conditions are reported for different segments of the runway, in terms of assuming the worst condition for the entire runway.

3.6 Flight crews should report the runway braking action encountered when it is not as expected according to the values previously reported to them. Flight crew reports should be consistent with the format in use at the aerodrome being operated as they may be used by the aerodrome operator to update the runway condition. They may be used also by the flight crews of subsequent flights arriving on the same runway.

APPENDIX "E"

EMERGENCY AND SAFETY PROFICIENCY CHECKING

1. The operator should develop a proficiency checking program that will cover all the emergency procedures that the crew member may be called on to use. For example, an operator that does not conduct over water operations would not need to conduct proficiency checks pertaining to the use of life jackets or rafts.

2. The proficiency check should require the applicant to demonstrate a satisfactory level of theoretical knowledge for the relevant aero-medical topics and competency in the use of the aircraft emergency systems and equipment. A comprehensive practical demonstration of all ditching procedures should be checked if flotation equipment is carried.

3. The following theoretical knowledge topics should be included as applicable:

a) the location and types of fire extinguishers carried, any limitation of their use and toxic effects that may adversely affect breathing including any other precautions to be observed when operating fire extinguishers;

b) oxygen as applicable to operations on pressurised aeroplanes including:

i) effects of altitude on respiration and the recognition and effects of hypoxia;

ii) duration of consciousness at various altitudes without supplemental oxygen, gas expansion, bubble formation and the physical phenomena of decompression; and

iii) location and use of oxygen equipment including precautions in the use of oxygen;

c) survival methods appropriate to the areas of operation (e.g. tropical, desert, remote areas, sea);

d) control of passengers during emergencies including evacuation and the handling of disabled passengers;

e) actions in the event of a hijack or attempted hijack; and

f) aero-medical topics as applicable such as:

i) hyperventilation;

ii) contamination of the skin/eyes by aviation fuel or hydraulic or other fluids;

iii) hygiene and food poisoning;

iv) malaria; and

v) effect and or side effects of medications.

4. Continued competency should be assessed in the practical operation of the following as applicable:

a) emergency evacuation procedures and operation of the emergency exit/s;

b) fitting of life jackets and location and use of equipment stowed as part of the life jacket;

c) demonstration or video of the removal, stowage and launch of the life raft including knowledge and use of equipment stowed as part of the raft.

Note: operators should use to their advantage the opportunity to inflate a raft at the time of serviceability expiry to enhance training.

d) the use of signaling equipment and survival beacon; and

e) the method of operation of applicable portable fire extinguishers.

APPENDIX “F”

ROUTE AND AERODROME COMPETENCE QUALIFICATIONS

1. Current and future Air Transport regulations place responsibility on an aeroplane operator to provide information to ensure the pilot in command is qualified and competent to conduct a proposed flight, including all relevant aspects of the route to be flown, including suitable aerodromes, alternates and facilities and search and rescue services.

2. Route qualification and competence should include knowledge of:

a) terrain and minimum safe altitudes;

b) relevant departure and arrival procedures;

c) seasonal meteorological conditions;

d) meteorological, communication and air traffic facilities, services and procedures;

e) navigational facilities associated with the route along which the flight is to take place

f) search and rescue procedures; and

g) Alternate.

APPENDIX "G"

CAA OVERSIGHT AND APPROVAL

1. ICAO defines competency-based training and assessment as "training and assessment that are characterized by a performance orientation, emphasis on standards of performance and their measurement, and the development of training to the specified performance standards." It is important to realize that these benchmark standards of performance are derived from a comprehensive job and task analysis that is the foundation upon which the design and the delivery of such a program is scientifically determined. The overall objective of this type of training is the acquisition of all the skill, knowledge, standardization and attitude requirements to competently perform all the job-related assigned duties in a safe, efficient, and effective manner under all possible circumstances.

2. In addition to the responsibility identified above, the Civil Aviation Authority should assume responsibility for all Training Program data reporting/analysis as well as approvals. Because of the potential sweeping scope of the training program, Flight Standards Directorate, PCAA should carefully review their training program approval criteria and consider the need for a designated "Program Managing Person". This would be recognized by Flight Standards Directorate, PCAA as having overall responsibility for the content and fidelity of an authorized training program. A single source with overall program responsibility becomes essential to an effective safety oversight program whenever any portion of training might be conducted, as such PCAA has the prime responsibility of oversight (training and operations both) as mandated by ICAO.

SAMPLE TRAINING MODULE

A. Training Objective	Statement of Training Objectives
B. Emergency Situation Training	Title of Subject Area
1. Crew Member Duties and Responsibilities 2. Crew Member Coordination and Company Communication 3. Aircraft Fires 4. First Aid Equipment 5. Illness, Injury and Basic First Aid 6. Ground Evacuation 7. Ditching 8. Rapid Decompression 9. Previous Aircraft Accidents Incidents 10. Crew Member Incapacitation 11. Basic Survival Training	Training Modules within a Curriculum Segment
8. Rapid Decompression a) Respiration b) Hypoxia, Hypothermia and Hyperventilation c) Time of Useful Consciousness d) Gas Expansion Bubble Formation e) Physical Phenomena and Actual Incidents	Elements within a Training Module

APPENDIX “H”

UPSET PREVENTION AND RECOVERY

Upset prevention and recovery training is a requirement of the Multi-Crew Pilot License.

1. Prevention

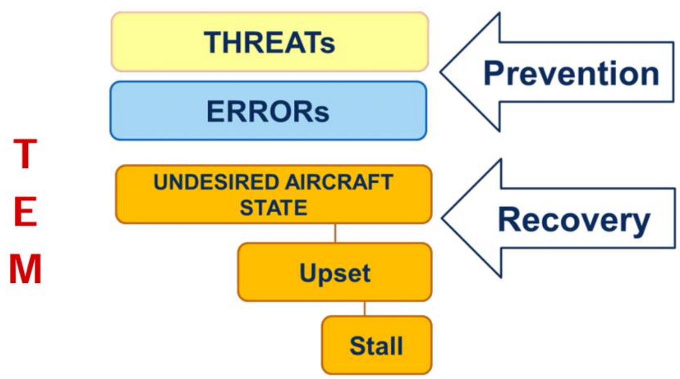
1.1 Prevention is paramount. Preventing divergence of an aircraft from its intended flight path is a continuous process accomplished by the crew through the continuous application of the airline’s set of core competencies. As it is essential for crews not to wait until an upset situation has developed, the focus of UPRT is on PREVENTION; and fixation on the RECOVERY part should be avoided.

2. Recovery

2.1 Once an Upset has occurred RECOVERY to a stabilized flight path is achieved by applying the recovery techniques from Nose-High and Nose-Low attitudes, developed by aircraft manufacturers and described as OEM Recommendations in ICAO Doc 10011 and/or by applying the type-specific STALL RECOVERY procedure.

3. Integration of Threat and Error Management (TEM)

3.1 In MPL training programs the prevention and recovery of upsets should be directly connected to TEM and be delivered in a fully integrated manner. Conceptually, TEM is integrated within UPRT as shown in the table below.



4. UPRT Instruction

4.1 UPRT-qualified instructors are essential for this task. Specific instructor training is required prior to delivering UPRT. Whether training is in an FSTD or an airplane, UPRT involves the delivery of complex concepts and UPRT-qualified instructors are essential for this task. Specific instructor training is required prior to delivering UPRT. Whether training is in an FSTD or an airplane, UPRT involves the delivery of complex concepts and relationships, often in a dynamic setting. It is essential therefore that risk be minimized through strict and disciplined operational safety management and the required instructor qualification.

4.2 FSTD instructors should have experienced on-aeroplane UPRT at least once in their career before teaching UPRT in the simulator, because simulators can only produce about 10% of the motion cues associated with upsets. Instructors must close this gap by verbally pointing out the associated psycho-physiological impact of maneuvers practiced in FSTD training. They must ensure that human factor aspects are included in FSTD training lessons.

5. Fidelity Requirements for FSTDs

5.1 UPRT conducted in FSTDs requires a set of features (the level of cueing, simulator modeling, visual, motion and environmental features) that are necessary to support UPRT in synthetic devices. Most tasks can be trained in existing modern FSTDs but certain tasks may exceed the capabilities of an FSTD because the aerodynamic modeling or motion cueing may not be able to accurately replicate the event. In order to avoid negative training, course designers must thoroughly evaluate the fidelity of the available device before using it for UPRT.

APPENDIX "I"

PERFORMANCE BASED NAVIGATION (PBN) TRAINING

1. Syllabus

1.1 The PCAA requirements for RNAV (GPS/GNSS), FPV approach and Performance Based Navigation (PBN) training is as follows:

a) Regulatory Requirements

b) Concepts of PBN (Specifications, Infrastructure, Applications)

c) PBN/RNP/RNAV Terms and Definitions

d) PBN Performance by Phase of Flight

e) PBN Benefits and Requirements (Navigational Equipment / Qualifications)

f) RNP & RNAV Concepts and Benefits

g) RNP Accuracy Requirements

h) On-board Performance Monitoring and Alerting

i) RNP and RNAV Utilisation (RNP 1, 2, 4, 5, 10, APCH, AR APCH, A-RNP)

j) GNSS Concepts

k) GNSS Accuracy and Errors

l) GNSS Accuracy Improvement Systems (SBAS/GBAS) and Coverage

m) RAIM Concept

n) PBN Airspace Requirements

o) RNP Approach Procedures and Terminology (LPV, APV, LP, VNAV)

p) Regulatory Requirements for RNP Approach Operations

q) RNP Approach Considerations including path terminator definitions

r) Temperature Compensation

s) FMS Procedures / FMGC / GNSS

t) Operational Procedures and Contingencies

u) Approach Chart Characteristics

1.2 What pilots need to know about PBN operations is whether the aircraft and flight crew are qualified to operate in the airspace, on a procedure or along an ATS route. For their part, controllers assume that the flight crew and aircraft are suitably qualified for PBN operations. However, they also require a basic understanding of area navigation concepts, the relationship between RNAV and RNP, and how their implementation affects control procedures, separation and phraseology. As importantly, an understanding of how RNAV systems work as well as their advantages and limitations are necessary for both controllers and pilots.

1.3 For pilots, one of the main advantages of using an RNAV system is that the navigation function is performed by highly accurate and sophisticated on-board equipment allowing a reduction in cockpit workload and, in some cases, increased safety. In controller terms, the main advantage of aircraft using an RNAV system is that ATS routes can be straightened, as it is not necessary for routes to pass over locations marked by conventional navaids. Another advantage is that RNAV-based arrival and departure routes can complement, and even replace, radar vectoring, thereby reducing approach and departure controller workload. Consequently, parallel ATS route networks are usually a distinctive characteristic of airspace in which RNAV and/or RNP applications are used. These parallel track systems can be unidirectional or bidirectional and can, occasionally, cater to parallel routes requiring a different navigation specification for operation along each route, e.g. an RNP 4 route alongside a parallel RNP 10 route. Similarly, RNAVSIDs and STARs are featured extensively in some terminal airspaces. From an obstacle clearance perspective, the use of RNP applications may allow or increase access to an airport in terrain-rich environments where such access was limited or not previously possible.

1.4 All PCAA AOC holders must ensure Pilots are well versed and trained accordingly. Acknowledgment of training must be endorsed in appropriate crew document.

پاکستان سول ایوی ایشن اتھارٹی

CABIN CREW MEMBER TRAINING CERTIFICATION AND UTILIZATION

AIR NAVIGATION ORDER

VERSION	**:**	**3.0**
DATE OF IMPLEMENTATION	**:**	**31-05-2018**
OFFICE OF PRIME INTEREST	**:**	**FLIGHT STANDARDS DIRECTORATE (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	MS. FARIDA SHARIQ	Cabin Safety Inspector	Signed
REVIEWED BY	CAPT. BALBAN SABIR	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Actg. Director General Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) has been issued in pursuance of Rules 4(3), 118, 196 and all other enabling provisions contained in Civil Aviation Rules, 1994 (CARs, 94).

B. PURPOSE:

B1. This ANO provides standards and procedures for Cabin Crew members deployed by the Commercial Air Transport Operators holding AOC issued by Pakistan Civil Aviation Authority to ensure safety.

C. SCOPE:

C1. This ANO contains instructions governing the Cabin Crew Member Training, Certification and Utilization used by the Commercial Air Transport Operators holding AOCs issued under CARs, 94.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 For the purpose of this ANO and in line with ICAO Standards, Recommended Practices and procedures, the following terms are defined as hereunder:

D1.1.1 **Able-bodied Passengers:** Passengers selected by crew members to assist in managing emergency situation if and as required. Non-able-bodied passengers should be removed from exit rows prior to flight. In a planned emergency, able-bodied passengers will be briefed on their responsibilities if time permits.

D1.1.2 **Accountable Manager:** A single, identifiable person having responsibility for the effective and efficient performance of the State's Safety Programme (SSP) or of the service provider's Safety Management Systems (SMS) and well established coordination with Flight Standards Directorate.

D1.1.3 **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.

D1.1.4 **Air Operator Certificate (AOC):** A certificate authorizing an operator to carry out specified commercial air transport operations.

D1.1.5 **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.

D1.1.6 **Approved Training:** Training carried out under special curricula and supervision approved by the PCAA.

D1.1.7 **Approved Person:** A person Approved by the PCAA to perform a specific job function.

D1.1.8 **Approval Certificate (CAAF- 618A/B/C):** A certificate issued by the PCAA indicating an approval of a person, document or a training centre as required.

D1.1.9 **Aviation Training Centre:** A PCAA approved Aviation Training Centre which imparts training for acquisition of a License, Certificate or a Rating in accordance with CARs, 94 and relevant ANOs.

D1.1.10 **Barostatic:** An atmospheric pressure, used in forecasting the weather and determining altitude, derived using a barometer.

D1.1.11 **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.

Note: Terminology used as "Cabin Crew Member" means the same as Cabin Attendant or Cabin Crew appearing anywhere in Civil Aviation Regulations.

D1.1.12 **Cabin Crew Competency Certificate (CCCC):** Cabin Crew Competency Certificate (CCCC) is an authorization issued by the PCAA to Cabin Crew Member to exercise the privileges of a Cabin Crew Member.

D1.1.13 **Chicago Convention:** The Convention on International Civil Aviation (ICAO Doc 7300) signed at Chicago on 7 December, 1944.

D1.1.14 **Classroom Training**: In-person, instructor-led training which may include group exercises and interactive instructional sessions.

D1.1.15 **Clean Aircraft Concept:** All critical surfaces of an aircraft must be clean of any surface contamination. The critical surfaces of an aircraft are the wings, control surfaces, rotors, propellers, horizontal stabilizers, vertical stabilizers or any other stabilizing surface. In the case of an aircraft with rear mounted engines, the upper surface of the fuselage is also a critical surface.

D1.1.16 **Clear zone:** The area of the passenger cabin immediately in front of the flight crew compartment door, including galleys and lavatories.

D1.1.17 **Cognitive:** Pertaining to cognition. Knowing, perceiving, or conceiving as an act or faculty distinct from emotion and volition.

D1.1.18 **Colicky Pain:** Denoting or resembling the pain of colic: pain relating to the colon. Spasmodic pains in the abdomen caused by spasm, obstruction or twisting.

D1.1.19 **Competency:** A combination of skills, knowledge and attitudes required to perform a task to the prescribed standard.

D1.1.20 **Competency Element:** An action that constitutes a task that has a triggering event and a terminating event that clearly defines its limits, and an observable outcome.

D1.1.21 **Competency Unit:** A discrete function consisting of a number of competency elements.

D1.1.22 **Computer-Based Training:** Training involving instructional aids, such as computers and tablets. Computer-based training may encompass the use of CD-ROMs as well as web-based training (commonly referred to as eLearning).

D1.1.23 **Crew Member:** A person assigned by an operator to perform duty on an aircraft during flight time.

D1.1.24 **Critical Phases of Flight:** The period of high workload on the flight deck, normally being the periods between the beginning of taxing until the aircraft is on the route climb phase and between the final part of descent to aircraft parking.

D1.1.25 **Cruising Level:** A level maintained during a significant portion of a flight.

D1.1.26 **Dangerous Goods:** Articles or substances which are capable of posing significant risk to health, safety or properly when transported by air.

D1.1.27 **Defences:** Specific mitigating actions, preventive controls or recovery measures put in place to prevent the realization of a hazard or its escalation into an undesirable consequence.

D1.1.28 **Designated Check Cabin Crew Member (DCCC):** A Designated Check Cabin Crew Member is an Approved Leading Cabin Crew Member who may conduct in-flight under-supervision training and in-flight competency checks of the Cabin Crew Members; subject to having undergone the required approval process and having been issued with specific authorization/s as endorsed on the Approval Certificate.

D1.1.29 **Differences Training:** Differences training is a training which comprises all the appropriate elements or components of different equipment, equipment location, or safety procedures on currently operated aircraft types or variants.

D1.1.30 **Disinfection:** The procedure whereby health measures are taken to control or kill infectious agents on a human or animal body, in or on affected parts of aircraft, baggage, cargo, goods or containers, as required, by direct exposure to chemical or physical agents.

D1.1.31 **Disinsection:** The procedure whereby health measures are taken to control or kill insects present in aircraft, baggage, cargo, containers, goods and mail.

D1.1.32 **Emergency Exit:** Door, window exit, or any other type of exit (e.g. hatch in the flight deck, tail cone exit) used as an egress point to allow maximum opportunity for cabin evacuation within an appropriate time period.

D1.1.33 **Emergency Locator Transmitter (ELT):** A generic term describing equipment which broadcast distinctive signals on designated frequencies and, depending on application, may either sense a crash and operate automatically or be manually activated. An ELT may be any of the following:

a) Automatic Fixed ELT: An ELT which is permanently attached to the aircraft.
b) Automatic Portable ELT: An ELT which is rigidly attached to an aircraft but readily removable from the aircraft after a crash.
c) Automatically Deployable ELT: An ELT which is rigidly attached to an aircraft and deployed automatically in response to a crash. Manual deployment is also provided.

d) Survival ELT: An ELT which is removable from an aircraft, stowed so as to facilitate its ready use in an emergency and activated by survivors. Automatic activation may apply.

D1.1.34 **Error:** An action or inaction by an operational person that leads to deviations from organizational or the operational person's intentions or expectations.

D1.1.35 **Error Management:** The process of detecting and responding to errors with countermeasures that reduce or eliminate the consequence of errors and mitigate the probability of further errors or undesired states.

D1.1.36 **Exanthematous Diseases:** Relating to an exanthema: a skin eruption occurring as a symptom of an acute viral or coccal disease, as in scarlet fever or measles.

D1.1.37 **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 crew member's alertness and ability to safely operate an aircraft or perform safety-related duties.

D1.1.38 **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.

D1.1.39 **Flight Crew Member:** A licensed crew member charged with duties essential to the operation of an aircraft during flight duty period.

D1.1.40 **Flight Simulation Training Device:** Any one of the following three types of apparatus in which flight conditions are simulated on the ground:

a) 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;
b) 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;
c) 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.

D1.1.41 **Ground Handling:** Services necessary for an aircraft's arrival at, and departure from, an airport, other than air traffic services.

D1.1.42 **Ground Instructor - Cabin (GIC):** An approved Instructor who can conduct initial/re-current or re-validation ground training of the Cabin Crew Member for the issue, renewal, re-validation of CCCC; and/or endorsement on Competency Certificate – Cabin Crew (CCCC).

D1.1.43 **Hands-on Exercise:** Exercise on the use of equipment/aircraft systems that is conducted without a specific context. Equipment that is removed from operation, or other representative training equipment considered acceptable by State, can be used for the purposes of this training.

D1.1.44 **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.

D1.1.45 **Human Performance:** Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

D1.1.46 **Hypoglycaemic Attack:** Pertaining to or characterized by hypoglycaemia: abnormal decrease in concentration of glucose in the circulating blood, e.g. less than the minimum of the normal range.

D1.1.47 **Hypothermia:** A subnormal body temperature significantly below 37°C.

D1.1.48 **Hypoxia:** A deficiency of oxygen in inspired gases, arterial blood or tissue, short of anoxia (almost complete absence of oxygen).

D1.1.49 **In-flight:** The period from the moment all external aircraft doors are closed following boarding through the moment when one external door is opened to allow passengers to leave the aircraft or until, if a forced landing, competent authorities take over responsibility for the aircraft and individuals and property on the aircraft.

D1.1.50 **Improvised Explosive Device:** A device, placed or delivered, and fabricated in an improvised manner incorporating explosives or destructive, lethal, noxious, pyrotechnic or incendiary chemicals designed to destroy, disfigure, distract or harass.

D1.1.51 **Lead Cabin Crew Member:** Cabin crew leader who has overall responsibility for the conduct and coordination of cabin procedures applicable during normal operations and during abnormal and emergency situations for flights operated with more than one cabin crew member.

D1.1.52 **Licensing Authority:** The Authority designated by PCAA Pakistan in accordance with CARs, 94 and relevant ANOs.

D1.1.53 **Lockdown:** The condition of the flight crew compartment door being closed and locked securely, with no traffic permitted either in or out of the flight crew compartment.

D1.1.54 **Medical Assessment:** The evidence issued by the Licensing Authority that the holder meets specific requirements of medical fitness. It is issued following an evaluation by the Licensing Authority of the report submitted by the designated medical examiner who conducted the examination of the applicant for the Licence or Certificate or Rating.

D1.1.55 **Minimum Equipment List:** 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 master minimum equipment list (MMEL) established for the aircraft type.

D1.1.56 **"MMEL"** - An abbreviation for Master Minimum Equipment List. It is a list of equipment that the regulatory body has determined may be inoperative under certain operational conditions and still provide an acceptable level of safety. The MMEL contains the conditions, limitations and procedures required for operating the aircraft with these items inoperative. The MMEL is used as a starting point in the development and review of an individual operator Minimum Equipment List.

D1.1.57 **Mock-up:** A training device that is a partial, functional replica of an actual aircraft, without motion.

D1.1.58 **Operations Manual:** A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

D1.1.59 **Operator:** A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

D1.1.60 **PCAA Inspector:** Authorized Person for the purposes of Rule-4(2) and Rule-5 of the Civil Aviation Rules, 1994 who is authorized to perform the duties and exercise the powers under said Rules.

D1.1.61 **Personnel Licensing Office (PLO):** An office that performs the Licensing functions under the Licensing Authority.

D1.1.62 **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.

D1.1.63 **Pressure-altitude:** An atmospheric pressure expressed in terms of altitude which corresponds to that pressure in the Standard Atmosphere.

D1.1.64 **Prophylaxis:** Prevention of disease or injury or a process which can lead to disease or injury.

D1.1.65 **Protective Breathing Equipment (PBE):** Breathing equipment providing full, sealed protection against smoke, fumes, etc., covering the head, the collar and upper shoulder area. Fifteen-minutes minimum oxygen supply per PBE is recommended.

D1.1.66 **Psychoactive Substances:** Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

D1.1.67 **Rating:** An authorization entered on or associated with a Licence or Certificate and forming part thereof, stating special conditions, privileges or limitations pertaining to such Licence or Certificate.

D1.1.68 **Remote On-board Areas:** Areas that are not in the passenger compartment but that are accessible to occupants, such as crew rest area(s), cargo area, or electronics compartment.

D1.1.69 **Risk Mitigation:** The process of incorporating defences or preventive controls to lower the severity and/or likelihood of a hazard's projected consequence.

D1.1.70 **Simulator:** An apparatus which provides an accurate representation of the flight deck and/or cabin of a particular aircraft type to the extent that the mechanical, electrical, electronic, etc., aircraft systems control functions, the normal environment of the flight crew members and/or cabin crew member and the performance and characteristics of that type of aircraft are realistically simulated.

D1.1.71 **Simulated Exercise:** Exercise representing a full context scenario (e.g. aircraft evacuation) where cabin crew apply the operator's procedures and associated crew responsibilities for dealing with the specific situation. This is typically conducted in a representative training device capable of reproducing the appropriate environment / equipment characteristics (e.g. cabin, flight deck, accessible cargo compartment, crew rest area, etc.), or on an actual aircraft

D1.1.72 **Safety Management System:** A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

D1.1.73 **Safety Risk:** The predicted probability and severity of the consequences or outcomes of a hazard.

D.1.1.74 **Special Categories of Passengers:** Persons who need special conditions, assistance, or equipment when travelling by air. These may include but are not limited to:

a) infants;
b) unaccompanied children;
c) persons with disabilities;
d) persons with mobility impairments;
e) persons on stretchers; and
f) inadmissible passengers, deportees or persons in custody.

D1.1.75 **Sterile Flight Deck:** During critical phases of flight and all flight operations (except cruise) conducted below 10 000 feet, no crew member may engage in any activity or conversation that is not required for safe operation of the aircraft. Non-essential cockpit-cabin communication is prohibited during this period.

D1.1.76 **Threat and Error Management (TEM):** An overarching safety concept regarding aviation operations and human performance.

D1.1.77 **Threat Management:** The process of detecting and responding to threats with countermeasures that reduce or eliminate the consequences of threats and mitigate the probability of errors or undesired states.

D1.1.78 **Unstaffed Exit:** Emergency exit for which no cabin crew member has been positioned for the flight.

D2. AGE, EDUCATION AND LANGUAGE QUALIFICATIONS:

D2.1 The following requirements shall be applicable for age, education and language proficiency:

D2.1.1 Education: Intermediate or equivalent.

D2.1.2 Age: Minimum age of 18 years.

D2.1.3 Language: Should be able to speak, read and write English and the national language.

Note: The ability to retrieve safety and emergency equipment and open and close overhead bins on the aircraft, from a standing position. The ability and strength to operate equipment/systems, as applicable to the operator's procedures. Being clear of a criminal record and passing a security background check; and meeting any other requirements, as defined by the PCAA to the operator if required by PCAA. (E.g. pass a swim test, undergo a medical assessment).

D3. MEDICAL:

D3.1. The applicant shall meet the following medical requirements:

D3.1.1 Class II Medical.

D3.1.2 Able to reach safety equipment and open and close the overhead bins in standing position in the specific aircraft.

D3.1.3 Weight: Should be proportionate to age, height ratio provided the applicant is:

a) Able to move comfortably down the aisle, single aisle, facing forward.
b) Able to pass quickly through the smallest secondary cabin emergency exit window.
c) And an appropriate height/weight ratio.

D3.1.4 Eyesight: Correct vision to appropriate standard (20/40, 60/120, 0.5 recommended).

D4. TRAINING:

D4.1 General

D4.1.1 The training shall be conducted in PCAA Approved Aviation Training Centre which shall ensure that the training is conducted in accordance with this ANO. Training Centre shall obtain a prior approval from the PCAA before commencing the initial recurrent training course

D4.1.2 Initial training is required for persons who have not been previously employed by the airline as cabin crew member. To be effective, initial training should be rapidly complemented by line indoctrination. Initial training shall ensure that each trainee acquires the knowledge necessary to fulfil the responsibilities and duties assigned to cabin crew member in the interest of safety. This will be primarily accomplished through classroom instructions complemented by a series of drills, exercises and hands-on training on safety and emergency procedures designed to provide trainees with the skills necessary to perform their duties. Operator must establish minimum time of line indoctrination, approved by PCAA Pakistan, for each aircraft in its fleet. Each trainee must complete at least one check ride of sufficient duration to permit the trainee to perform, and be checked on, all pre-flight, in-flight, pre-landing and post-landing duties. Additional training and checking may be performed on PCAA Approved training device / mock up, depending on the technical capabilities of the device; for example, exercises involving emergency lights, operable galley equipment, smoke or other technical capabilities may be performed on a training device / mock up / simulator capable of producing the appropriate environment.

D4.1.3 Line indoctrination should be accomplished with an acceptable student-to-instructor ratio; ideally one student to one instructor up to maximum of four to one. If there is more than one student per instructor, safeguards must be in place to assure proper supervision, training and evaluation by the instructor. Indoctrination must have taken place before a cabin crew member performs duties as a required crew member. Cabin Crew member on line indoctrination are on board the aircraft for training purposes and must not be considered as part of the required minimum number of cabin crew member for the flight.

D4.1.4 Basically, it is required that cabin crew member annually complete the training programme established by the operator. They also require cabin crew member to be knowledgeable about the location and operation of safety and emergency equipment for each type of aircraft on which they operate and to be trained to deal with both normal and emergency safety situations including relevant communication and crew co-ordination procedures.

D4.1.5 The period of validity of initial / recurrent training shall be 12 calendar months in addition to the remainder of the month of issue. If issued within the final 3 calendar months of validity of a previous check, the period of validity shall extend from the date of issue until 12 calendar months from the expiry date of that previous check.

D4.1.6 Aircraft type training is required in order to qualify and maintain qualification on each type of aircraft to which the crew member will be assigned to duty.

Note: The first recurrent training of the Cabin Crew should be considered as their initial training month, when they cleared their exams and drills to meet the annual requirement for the recurrent.

D4.2 Types of training (refer to Appendix 'A').

D5. TRAINING REFERENCE GUIDE FOR CABIN CREW

D5.1 Table 1-1 presents a reference guide to the subject matter to be completed during initial, recurrent and aircraft type training and the desired level of accomplishment to be achieved during initial training. Differences in types of aircraft, operational methods and, possibly, other training activities of the training school may necessitate changes in the syllabus suggested to allow for completion of the course within the period allotted for training. Instructors should, however, ensure that all sections of the syllabus are adequately covered to the degree necessary to meet the desired level of accomplishment before the students are assigned to line indoctrination.

D5.1.1 To clarify understanding of the desired level of accomplishment required, the various parts of the course, as applicable, have been marked with a coding from 1 to 4 indicating an increasing degree of expertise:

a) 1 Denotes a basic knowledge of a subject. Trainees should have a basic understanding of the subject but are not expected to apply that knowledge.

b) 2 Denotes knowledge of the subject and the ability, where applicable, to apply it in practice with the help of reference materials and instructions.

c) 3 Denotes a thorough knowledge of the subject and the ability to apply it with speed and accuracy.

d) 4 Denotes extensive knowledge of the subject and the ability to apply procedures derived from it with judgment appropriate to the circumstances.

◆ Denotes subject matter that must be covered during the specific training phase.

◇ Denotes subject matter that may need to be covered during recurrent or type training phases as a result of new equipment or newly introduced procedures.

Table 1-1. Training Reference Guide

Subject matter	Initial training	Recurrent training	A/C type training	Degree of expertise
Chapter 1 – Aviation indoctrination				
a) Regulatory aspects				
- National and International	◆	◇		2
- Company-specific	◆	◇	◇	3
b) Aviation terminology and terms of reference				
- Terminology	◆	◆		2
- Terms of reference	◆	◇		3
c) Theory of flight and aircraft operations				
- Theory of flight	◆			2
- Major aircraft components	◆		◆	1
- Critical surfaces (contamination of)	◆	◆	◇	3
- Pressurization system	◆		◆	2
- Weight and balance	◆		◆	1
- Meteorology / turbulence	◆	◇		1
- Communications equipment	◆	◇	◇	2
- Air traffic control	◆			1
d) Physiology of flight				
- Oxygen system and use	◆	◆	◆	4
- Effects of altitude	◆	◆		4
- Cabin poisoning	◆	◆		4
Chapter 2 – Duties and responsibilities				
- General responsibilities	◆	◆		4
- Pre-flight and post-flight	◆	◆	◆	4
- In-flight	◆	◆	◆	4
Chapter 3 – Emergency procedures				
- General emergency procedures and basic principles	◆	◆	◇	4
- Emergency equipment	◆	◆	◇	4
- Fire fighting	◆	◆		4
- Smoke removal procedures	◆	◆	◇	4
- Emergency lighting systems	◆	◆	◆	4
- Decompression – slow / rapid	◆	◆	◇	4
- Emergency landing preparations	◆	◆	◇	4
- Evacuation procedures	◆	◆	◇	4
- Unwarranted evacuations – water ditching	◆	◆		4
- Life – and slide-rafts (use of)	◆	◆		4
- Unlawful interference	◆	◆	◇	4
- Security Training (ANO-034-FSXX)	◆	◆	◇	4

Subject matter	Initial training	Recurrent training	A/C type training	Degree of expertise
Chapter 4 – Carriage of dangerous goods				
- General philosophy	◆	◆		4
- Prohibited goods	◆	◆		4
- Label Identification	◆	◆		4
- Exceptions	◆	◆		4
- Emergency procedures	◆	◆		4
Chapter 5 – Human Factors				
- Fundamental Human Factors concepts	◆	◇		2
- Crew resource management (CRM)	◆	◆		4
Chapter 6 – Hygiene, aviation medicine and first aid				
- Terminology	◆	◇		2
- Personal hygiene	◆	◇		4
- Tropical hygiene	◆	◇		2
- Transmissible diseases	◆	◇		4
- Quarantinable diseases	◆	◇		4
- Endemic diseases	◆	◇		4
- Food poisoning	◆	◇		4
- In-flight medical emergencies and incidents	◆	◇		4
- Artificial respiration	◆	◆		4
- Effects of drugs / intoxicants	◆	◆		4
- First-aid medical supplies				
• first-aid kits (contents and use of)	◆	◆		4
• medical kits (contents and use of)	◆	◆		4

D6. ADDITIONAL TRAINING AREAS:

a) Civil Aviation Rules, 1994, relevant Air Navigation Orders, Air Safety Circulars and other instructions issued from time to time.
b) Relevant Portions of the Operations Manual.
c) Basic indoctrination ground training.
d) Discipline, Duties and Responsibilities.
e) The training program shall include training which will enable crew members to act in the most appropriate manner to minimize the consequences of acts of unlawful interference.
f) The training program shall include training which will acquaint crew members with preventive measures and techniques in relation to passengers, baggage, mail, equipment, stores and supplies intended to be carried on an aircraft so that they can contribute to the prevention of acts of sabotage or other forms of unlawful interference.
g) Training in the location of the least risk location for a bomb on each type of aircraft operated and methods or specialized means to be employed to attenuate and direct the blast.

D7. TRAINING FACILITIES AND DEVICES:

D7.1 Facilities and Equipment for Classroom-Based Training (Refer to Appendix ‘B’)

D7.1.1. General Space requirements

D7.1.1.1 In planning for space requirements, consideration should be given to the following:

a) the trainee work stations;
b) the area required for hands-on exercises;

c) the instructor work stations; and
d) the storage area.

D8. TRAINEE-TO-INSTRUCTOR RATIO:

D8.1 In order to assess and evaluate a trainee's competency, there should be limits on the ratio of trainees per instructor. The different training environments and delivery methods, such as classroom, computer-based training and hands-on instruction will require different numbers of instructors. ICAO recommends that the operator determine a ratio of trainees per instructor which is satisfactory to the State.

D8.1.1 In order to provide for sufficient supervision and control, a maximum of 20 trainees per instructor is recommended in a classroom environment. An evaluation should be conducted and consideration should be given to subject matter, type of training (such as initial/recurrent), instructor's workload management, feedback/evaluations and size of facilities, which may prompt an adjustment of the proposed trainee to instructor ratio for classroom-based training.

D8.1.2 When facilitating computer-based training, the trainee to instructor ratio may be more flexible. A maximum of 30 trainees per instructor is recommended, assuming that the presence of the instructor is limited to providing support.

D8.1.3 When conducting practical instruction such as hands-on exercises, the trainee to instructor ratio should be more restricted to allow for better supervision. A maximum of 10 trainees per instructor is recommended. However, consideration should be given to the type of hands-on exercise being performed. Individual hands-on exercises on safety and emergency equipment versus group simulated exercises may prompt an adjustment of the proposed trainee to instructor ratio.

D9. THE CABIN CREW SAFETY TRAINING PROGRAMME (Refer to Appendix 'D"):

D9.1 The operator should maintain:

a) current training programme contents and lesson plans
b) validation of training programme and results
c) an annual programme update/review.

D9.2 Cabin Crew Safety Training Manager:

D9.2.1 A cabin crew safety training manager should be appointed by the operator, with the approval of PCAA. The cabin crew safety training manager should demonstrate a thorough understanding and knowledge of the administrative and practical responsibilities and procedures associated with the position. The cabin crew safety training manager's qualifications should be in accordance with PCAA regulations, where applicable.

D9.2.2 The cabin crew safety training manager's responsibilities may include, but are not limited to, the following:
a) assuring a current and approved cabin crew safety training programme;
b) assuring training equipment and facilities meet the required standards;
c) providing advice into the development of safety, emergency procedures and directives and notices to cabin crew members;
d) supervising cabin crew training personnel and ensuring that the appropriate guidance is provided;

e) assuming responsibilities delegated by the relevant management;
f) training of cabin crew members, in accordance with the approved training programme and maintaining cabin crew training records;
g) liaising with other company departments to ensure that cabin safety objectives are met and liaising with PCAA; and
h) in his/her absence, delegating all responsibilities to another qualified individual.

D9.2.3 Recommended qualifications should include, but are not limited to, the following:

a) five years experience as a cabin crew member;
b) management skills and temperament
c) two years experience in instructional and training skills; and
d) knowledge of applicable regulations and operator's standard operating procedures.

D9.3 Ground Instructor Cabin Crew - (GIC):

D9.3.1 A Ground Instructor – Cabin (GIC) may be approved provided he / she:

a) holds or has held CCC or an equivalent authorization.
b) has Three Years of experience of Cabin Crew Member.
c) suitable temperament and above board conduct,
d) been recommended by the Company.

Note 1: Satisfactory assessment on CAAF-624-F (Monitoring Report) by a PCAA Inspector for initial and renewal.

Note 2: PCAA Inspector will carry out surveillance check of each GIC every year.

D9.3.2 Training programmes for the instructor role should focus on development of the competencies listed in the attachment to this chapter. The competency framework consists of competency units, competency elements and performance criteria. The competency framework for instructors of cabin crew should be based on the following competency units:

a) manage safety of the training environment;
b) prepare the training environment;
c) manage and support the trainee;
d) conduct training;
e) perform trainee assessment;
f) perform course evaluation; and
g) continuously improve performance.

Note: All instructors should receive refresher training every two years.

D9.4 Designated Check Cabin Crew (DCCC):

D9.4.1 A Leading Cabin Crew Member may be designated as a DCCC provided he/she has:

a) valid Competency Certificate.
b) suitable temperament and above board conduct.
c) been recommended by the Company.
d) at least two year experience as a Leading Cabin Crew Member.

e) satisfactory assessment on CAAF- 624-F (Monitoring Report) by a PCAA Inspector for initial and recurrent on each type.

Note: PCAA Inspector will carry out surveillance check of each DCCC every year.

D9.4.2 Assessment

D9.4.2.1 Qualified and authorized DCCC may be assigned to carry out assessments, and auditing duties to determine that all required performance standards have been satisfactorily achieved. The DCCC is responsible for making a determination of the actual standards attained and any recommendation for corrective action, if necessary.

D9.4.2.2 Reliability is needed to ensure consistency in assessments conducted by DCCC. When DCCC use an assessment instrument, a process should be in place to ensure the consistency or stability of results given by a DCCC.

D9.4.2.3 If the DCCCs have to judge against criteria, reliability training comes into play since assessors need to be calibrated in how they interpret the criteria.

D9.4.2.4 Training programmes for the DCCC role should focus on development of the competencies. The competency framework consists of competency units, competency elements, and performance criteria

Note1: Operator shall ensure that adequate numbers are approved with a ratio of one GIC and one DCCC for every 50 Cabin Crew Members are available to handle the required certification task.

Note2: All DCCC should receive refresher training after every two years.

D9.5 Training Programme Developer:

D9.5.1 The training programme developer is responsible for the development of a cabin crew training programme that meets the applicable PCAA requirements. Training programme developers should demonstrate that they possess the ability to develop training in accordance with the features of a competency-based approach to training.

D9.2.2 Recommended qualifications should include, but are not limited to, the following:

a) four years experience as a cabin crew member;
b) management skills and temperament
c) one years experience in instructional and training skills; and
d) knowledge of applicable regulations and operator's standard operating procedures.

D9.5.3 The training programme developer's responsibilities include, but are not limited to, the following:

a) designing the training programme;

b) defining training objectives;
c) designing course examinations and practical evaluations;
d) designing training modules;
e) determining the training strategy;
f) selecting training media;
g) producing competency-based training and assessment materials;
h) carrying out developmental testing of competency-based training and assessment materials; and
i) improving the training programme, based on analysis of different sources of information (e.g. safety audits, trainee feedback and the operator's voluntary occurrence reporting system)

D9.6 Continuous Improvement of the Training Programme:

D9.6.1 In order to continuously improve the quality of the training programme, an evaluation process should be developed for the course, training personnel and the training material.

D9.6.2 Course evaluation

D9.6.2.1 The instructor should evaluate the effectiveness of the training system by performing a course evaluation utilizing trainee feedback and trainee performance outcomes of the training.

D9.6.2.2 Instructor performance

D9.6.2.2.1 As part of the continuous improvement of the training programme, each instructor should undergo a periodic performance review to ensure competency and standardization. In addition, each instructor should evaluate his/her effectiveness and sustain personal development.

Note: PCAA inspector will carry out surveillance check of GIC every year.

D10. <u>STANDARD OF ACCOMPLISHMENT:</u>

D10.1 Each training objective is described with a basic reference for the establishment of conditions, performance and a standard of accomplishment. The conditions describe the scenario where trainee performance will be developed and tested while indicating whether actual equipment, mock-ups, or simulators, etc. are to be used. The standard of accomplishment establishes the level of trainee performance which must be attained. Standard of accomplishment may differ from school to school depending on training equipment available.

D10.2 In measuring standard of accomplishment, the use of only two grades, pass and fail is recommended. It must, however, be noted that many training establishments prefer to use a numerical grading system as students strive harder and learn more when rewards increase. If the same grade, pass, for a 99 per cent score is given as for 75 per cent score, students may not strive for perfection. In all cases, test results should only be used as diagnostic tools to help the instructor and trainees take remedial steps to assure mastery of the subject.

D11. <u>CERTIFICATION:</u>

D11.1 Ground Training Course & Examinations

D11.2 Ground Training Course: The Aviation Training Centre shall furnish a Certificate that the ground training course has been successfully completed.

D11.3 Ground Training Assessment: GIC is to furnish the ground training assessment report on CAAF – 156 following the initial, re-current, type or re-validation training.

D11.4 Eligibility for Examinations: An applicant shall be eligible to appear in written examinations after having successfully completed the ground training course.

D11.5 Conduct of Written Examinations: Written examinations have been delegated to the Aviation Training Centres, which shall intimate the date of the examinations to Flight Standards Directorate. Flight Standards Directorate & Licensing may scrutinize the question papers, monitor the conduct of the examinations or select a few checked/marked answer sheets, at random, for scrutiny.

D11.6 Written Examinations: Each applicant shall qualify in the written examination for the issue of Competency Certificate Cabin (CCCC) as under:

d) CABIN-1 : General subjects
e) CABIN-2 : Specific on type of aircraft
f) CABIN-R : Re-validation of CCCC.

D12. <u>PCAA REGULATORY REQUIREMENT:</u>

D12.1 An operator shall establish, to the satisfaction of PCAA, the minimum number of cabin crew member(s) required for each type of aeroplane, based on seating capacity or the number of passengers carried, in order to effect a safe and expeditious evacuation of the aeroplane, 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 aeroplane.

D12.2 Each cabin crew member assigned to emergency evacuation duties shall occupy a seat provided during take-off and landing and whenever the pilot-in-command so directs.

D12.3 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.

D12.4 An operator shall establish and maintain a training programme, approved by PCAA Pakistan, to be completed by all persons before being assigned as a cabin crew member. Cabin crew members shall complete a recurrent training programme annually. These training programmes shall ensure that each person is:

D12.5 Competent, to execute those safety duties and functions which the cabin crew member is assigned to perform in the event of an emergency or in a situation requiring emergency evacuation;

D12.6 Drilled and capable in the use of emergency and life-saving equipment required to be carried, such as life jackets, life rafts, evacuation slides, emergency exits, portable fire extinguishers, oxygen equipment, first-aid and universal precaution kits, automated external defibrillators (AED optional);

D12.7 When serving on aeroplanes operated above 3 000 m (10 000 ft), knowledgeable as regards the effect of lack of oxygen and, in the case of pressurized aeroplanes, as regards physiological phenomena accompanying a loss of pressurization;

D12.8 Aware of other crew members' assignments and functions in the event of an emergency as far as is necessary for the fulfilment of the cabin crew member's own duties;

D12.9 Aware of the types of dangerous goods which may, and may not, be carried in a passenger cabin and has completed the dangerous goods training programme as required by Safe Transport of Dangerous Goods by Air, and

D12.10 Knowledgeable about human performance as related to passenger cabin safety duties including flight crew members - cabin crew members coordination.

D13. UNDER SUPERVISION FLIGHTS:

D13.1 After the completion of the ground course, a Cabin Crew Member shall perform the assigned duties of a Cabin Crew Member in at least two sectors minimum 10 hours flight time under the supervision of a DCCC before being cleared for the Proficiency Check. Detail of these under-supervision flights is to be submitted along with other documents for the issue of CCC. During the Cabin Crew Member's under-supervision flights/Proficiency Check, the applicant shall not be assigned as a required crew member on duty.

Note: After completion of minimum two under supervision flights of a trainee, if the performance of the trainee is unsatisfactory, a report is to be submitted to FSD.

D14. COMPETENCY CHECK

D14.1 The Proficiency Check for the issue of Competency Certificate shall be conducted by a PCAA Inspector or a DCCC for each type. The check for the initial issue of CCC is to be, preferably monitored, by a PCAA Inspector. CAAF-156 duly completed shall be submitted to the licensing office, along with other documents, for the necessary licensing action.

D15. RATINGS:

D15.1 There shall be two Ratings:

a) Cabin Crew Member.

b) Leading Cabin Crew Member.

D15.1.1 Cabin Crew Member

D15.1.1.1 An applicant, having met the above Training and Certification requirements, shall be endorsed with a Cabin Crew Member Rating.

D15.1.2 Leading Cabin Crew Member (LCC)

D15.1.2.1 A Cabin Crew Member shall be endorsed with a Leading Cabin Crew Member Endorsement subject to following:

a) Holds valid Competency Certificate for two years and completed an appropriate course defined in Company's Operations Manual.

b) Suitable temperament and above board conduct.

c) Recommended by the Company.

d) A satisfactory report by a PCAA Inspector or a DCCC on CAAF- 624-F (Monitoring Report).

D15.1.2.2 LCC must be assigned for the flight.

D15.1.2.2.1 LCC shall:

a) have the overall responsibility to the aircraft commander for the conduct, coordination and performance of the cabin operations and safety duties.
b) verify that all cabin crew members are fit for the flight and that they have their documents for flight duty.
c) coordinate and organize the functions and tasks of all cabin crew members (cabin crew member briefing delegate positions and working areas, in flight service duties):
    i) checking of emergency equipment, pre-flight safety briefing a reporting matters concerning safety (irregularities and malfunctions) to the Commander.
    ii) debriefing with cabin crew members when required.
    iii) ensuring efficient communication with all flight crew members, cabin crew members and ground staff.
    iv) visiting / contacting the flight deck on regular intervals.

Note1: The Incharge is a Cabin Crew leader who has overall responsibility for the conduct and coordination of cabin procedures applicable during normal operations and during abnormal and emergency situations for flights operated with more than one cabin crew member.

Note 2: In multi-cabin crew operations, the Lead cabin crew member should be designated by the operator.

Note 3: Lead Cabin Crew Training refer to Appendix "C".

D16. VALIDITY:

D16.1 Cabin Crew Competency Certificate: The Cabin Crew Competency Certificate shall remain valid for a period of twenty four months subject to following:

a) valid medical assessment.
b) has met the CCCC recurrent requirements.
c) has performed at least three flights in last six months as Cabin Crew Member.

Note 1: Re-current Training: The re-current training shall be valid for one year.

Note 2: Drills: The validity of the emergency drills shall be as follows:

i)	Wet Drill	Three Years
ii)	Evacuation Drill	One Year
iii)	Fire Drill	One Year

Note 1: Evacuation and fire drill shall be part of each recurrent training.

Note 2: Cabin Crew Members are required to wear uniform while simulating all drills.

D16.2 Medical Assessment: The validity of Medical assessment shall be two years.

D17. <u>RECENCY CHECK:</u>

D17.1 A Cabin Crew Member who has not operated any flight during last six months shall undergo a recency check. A recency check report by DCCC on CAAF-156 is to be submitted to the Licensing office for record.

D18. <u>RECURRENT REQUIREMENTS</u> (Every 12 Months):

D18.1 An applicant shall apply to the PCAA for re-currency endorsement on the CCCC with following documents:

a) Application Form – CAAF 600-1.
b) Medical Assessment.
c) Training Certificate from Approved Aviation Training Centre.
d) Cabin Competency Certificate.
e) Ground Training Report on CAAF-646 by GIC / DCCC.
f) Fee Voucher / Authorization.

D19. <u>RENEWAL REQUIREMENTS</u> (Every 24 Months):

D19.1 An applicant shall apply to the PCAA for renewal of CCCC with following documents:

a) Application Form CAAF 600-1.
b) Valid Medical Assessment.
c) Cabin Competency Certificate.
d) Certificate of training by Approved Aviation Training Centre.
e) Ground Training Report on CAAF-646 by GIC / DCCC.
f) In-flight Proficiency Report on CAAF-646 by CAA Inspector or DCCC.
g) Fee Voucher / Authorization.

D20. <u>MISCELLANEOUS ENDORSEMENTS:</u>

D20.1 For all endorsements on the CCCC, the CCCC shall be submitted to the PCAA along with the following documents:

a) Application Form – CAAF 600-1.
b) Ground Training Report on CAAF-646 by GIC / DCCC.
c) Cabin Crew Competency Certificate.
d) Certificate of Training by Approved Aviation Training Centre.
e) Fee Voucher/Authorization.

D21. PRIVILEGES:

D21.1 The privileges of a Cabin Crew Member shall be as under:

a) preserve the safety of passengers on board an aircraft and provide guidance to all persons on board during emergency.
b) safe evacuation of passengers in an emergency.
c) assist passengers in case of an injury or sickness.
d) comply with the Pilot-in-Command instructions for the safe conduct of flight.

D21.2 The privileges of a Leading Cabin Crew Member shall be as under:

a) exercise the privileges of a Cabin Crew Member.
b) exercise the privilege of supervising a group of Cabin Crew Member.

D22. UTILIZATION:

D22.1 Utilization of Cabin Crew Member by Operators

D22.1.1 PCAA Inspectors shall carry out Safety Oversight Audits of the Operators/Aviation Training Centres/Flights to ensure the following:

a) that Operator/Aviation Training Centre maintains a complete record of training of Cabin Crew Member.
b) that the Flight and Duty Time limitations are complied with as per CARs 94 and relevant ANOs.
c) that the Supervisor Cabin Crew Member detailed on wet lease aircraft can fluently express in English the instructions to Pakistani Cabin Crew Member detailed on the flight.
d) that the Cabin Crew Member hold Valid Competency Certificates.
e) that the Cabin Crew Member perform their function during the flights in accordance with PCAA Regulations.

D23. MINIMUM CREW:

D23.1 The following minimum number of Cabin Crew Member shall be assigned on the aircraft on the number of seats installed as under:

i)	19-50 seats	:	01
ii)	51-100 seats	:	02
iii)	101-150 seats	:	03

Note 1: Each additional 50 seats, or part thereof installed, require an additional cabin crew member.

Note 2: All door exits should be manned by Cabin Crew.

Note 3: Any alteration to the number of seats or removal of aircraft seats shall be subject to approval from PCAA.

D24. LIMITATIONS:

D24.1 Unless otherwise approved by PCAA, a Cabin Crew Member shall not exercise the privileges of a Cabin Crew Member on more than three aircraft at one time.

D24.2 No Cabin Crew Member shall be scheduled nor shall any Cabin Crew Member operate on any aircraft on which he/she is not currently trained, and holds valid Competency Certificates with appropriate type Endorsement.

D24.3 An operator shall ensure that all Cabin Crew Member are seated at their assigned stations, with their seat belts and shoulder harness on, during take-off and landing, and whenever deemed necessary by the pilot-in-command in the interest of safety.

D24.4 An operator shall ensure by procedures that no revenue passenger is allowed to occupy a jump seat during flight.

Note: Cabin Crew training conducted outside Pakistan shall be supervised by PCAA Inspector and the Training Centre is required to be approved by PCAA before commencement of the training.

Note2:
a) For the CRM Cabin Crew facilitator refer to ANO-014-FSXX.
b) For the Aviation Security Cabin Crew Instructor refer to ANO-034-FSXX.
c) For the Wet Leased cabin crew checks, endorsement, approval refer to ANO-022-XXLC.

D25. DEVELOPMENT OF THE COMPETENCY FRAMEWORK:

D25.1 The competency framework was developed by the ICAO. The competency-based approach to training and assessment includes the use of a job and task analysis to determine performance standards, the conditions under which the job is carried out, the criticality of tasks, and the inventory of skills and knowledge. Content should be included in training programme, the conditions under which training should be conducted, and the most suitable type of media to be used (see Appendix "E".

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS

CAAF	:	CIVIL AVIATION AUTHORITY FORMS
AC	:	ADVISORY CIRCULAR
AOC	:	AIR OPERATOR CERTIFICATE
AOR	:	AREA OF RESPONSIBILITY
ANO	:	AIR NAVIGATION ORDER
AQP	:	ADVANCED QUALIFICATION PROGRAMME
ATO	:	APPROVED TRAINING ORGANIZATION
CBR	:	CHEMICAL/BIOLOGICAL/RADIOLOGICAL
CBT	:	COMPUTER-BASED TRAINING
CPR	:	CARDIOPULMONARY RESUSCITATION
CRM	:	CREW RESOURCE MANAGEMENT
CSI	:	CABIN SAFETY INSPECTOR
CTD	:	CABIN TRAINING DEVICES
DFS	:	DIRECTOR FLIGHT STANDARDS
DG,CAA	:	DIRECTOR GENERAL, CIVIL AVIATION AUTHORITY
ELT	:	EMERGENCY LOCATOR TRANSMITTER
ELT(AF)	:	AUTOMATIC-FIXED ELT
ELT(AP)	:	AUTOMATIC-DEPLOYABLE ELT
ELT(S)	:	SURVIVAL ELT
EMK	:	EMERGENCY MEDICAL KIT
FAK	:	FIRST AID KIT
FRMS	:	FATIGUE RISK MANAGEMENT SYSTEM
FSD	:	FLIGHT STANDARDS DIRECTORATE

GIC	:	GROUND INSTRUCTOR CABIN
ISD	:	INSTRUCTIONAL SYSTEMS DESIGN
LMS	:	LEARNING MANAGEMENT SYSTEM
MEL	:	MINIMUM EQUIPMENT LIST
MMEL	:	MASTER MINIMUM EQUIPMENT LIST
PBE	:	PROTECTIVE BREATHING EQUIPMENT
PC	:	PERFORMANCE CRITERIA
PED	:	PERSONAL ELECTRONIC DEVICE
PIC	:	PILOT IN COMMAND
PLO	:	PERSONNEL LICENSING OFFICE
POI	:	PRINCIPAL OPERATIONS INSPECTOR
SARPs	:	STANDARDS AND RECOMMENDED PRACTICES
SMS	:	SAFETY MANAGEMENT SYSTEM
SSP	:	STATE SAFETY PROGRAMME
TEM	:	THREAT AND ERROR MANAGEMENT
UTC	:	COORDINATED UNIVERSAL TIME
UPK	:	UNIVERSAL PRECAUTION KIT

E2. RECORDS:

E2.1 Nil

E3. REFERENCES:

E3.1 ICAO Doc10002 – Cabin Crew Safety Manual

E3.2 ANO-022-XXLC-2.0

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 31st May, 2018 and supersedes ANO 91.0018 (Issue-2)

--S/d--

(USAID-UR-REHMAN USMANI)
Air Vice Marshal (Retd)
Actg. Director General,
Pakistan Civil Aviation Authority

Dated: - **28th May, 2018**

(CAPT. BALBAN SABIR)
O/Director Flight Standards

Dated- **11th May, 2018**
File No. HQCAA/1077/029/FSAC

APPENDIX "A"

CABIN CREW TRAINING

The following provide definitions of the different types of training that should be provided, as a minimum, to cabin crew members.

1. The types of training addressed are as follows:

1.1 Initial Training

Initial training is required for persons who have not previously operated as a cabin crew member. The goal of initial training is to ensure that each trainee acquires the competencies, knowledge and skills required to perform the duties and responsibilities related to the safety of passengers and flight during normal, abnormal and emergency situations. This is accomplished through classroom instruction and computer-based training (CBT) complemented by a series of hands-on and simulated exercises such as first aid and firefighting. Cabin crew trainees must complete initial training before they are assigned duties as cabin crew members. Initial training should include, but is not limited to the following elements:

1.1.1 aviation indoctrination;
1.1.2 duties and responsibilities;
1.2.3 normal, abnormal and emergency procedures;
1.2.4 aircraft type training;
1.2.5 dangerous goods
1.2.6 human performance
1.2.7 cabin health and first aid
1.2.8 duties and responsibilities relating to aviation security.

Note: The duration of the initial Cabin Crew Training shall be as per PCAA Flight Standards Directorate approved syllabus / Lesson Plan with suitable classroom timings.

1.2 Aircraft Type Training

1.2.1 Aircraft type training is required to gain a qualification on the aircraft model that the cabin crew member will be assigned on (e.g. B777 or A330).

1.2.2 This training should include, but is not limited to, the following elements, if applicable to the particular aircraft:

a) aircraft description
b) cabin configuration (number and distribution of cabin crew seats and number of passenger seats)
c) cabin layout (interior design, stowage compartments such as overhead bins, and closets, etc.)
d) galleys
e) lavatories
f) flight deck familiarization and egress
g) crew rest areas (normal and emergency egress) and other remote areas
h) exits (type, number, location and operation)
i) assisting evacuation means (slide, slide-raft, life raft, rope, etc.)
j) safety and emergency equipment, including location and operation
k) aircraft systems relevant to cabin crew duties are
    i) air conditioning, ventilation, and pressurization systems
    ii) communication systems and associated signalling panels
    iii) control panels

iv) electrical system (galley, lavatory, in-flight entertainment system, in-seat electrical system, circuit breaker panels, etc.)
v) evacuation alarm system
vi) fire prevention system
vii) lighting system (interior, exterior and emergency lights)
viii) oxygen system (cabin and flight deck)
ix) smoke detection system and smoke removal; and
x) water and waste systems

l) installed emergency locator transmitter
m) normal procedures and the related hands-on and/or simulated exercises;
n) abnormal and emergency procedures and the related hands-on and/or simulated exercises
o) design-related elements that may impact on normal and/or emergency procedures (stairs, smoke curtain, social areas, non-forward facing passenger seats, cargo areas if accessible from the passenger compartment during flight, etc.).

Note: The aircraft type training shall be conducted by an approved qualified Line GIC and GIC.

1.3 Aircraft Visit

1.3.1 The purpose of an aircraft visit is to familiarize each cabin crew member with the aircraft environment and its equipment. The visit is typically conducted on board a stationary aircraft. Aircraft visits should be conducted by GICs and DCCCs and in accordance with a syllabus described in the operator's operations manual.

1.3.2 The aircraft visit should provide an overview of the aircraft's exterior, interior and systems including the following, if applicable to the particular aircraft:

a) cabin crew stations
b) cabin layout (interior design, stowage compartments such as overhead bins, and closets, etc.)
c) galleys
d) lavatories
e) flight deck familiarization and egress
f) crew rest areas and any other remote areas
g) safety and emergency equipment
h) exits (location and their environment)
i) assisting evacuation means (location and stowage)
j) aircraft systems relevant to cabin crew duties
   i) communication systems and associated signalling panels
   ii) control panels
   iii) electrical system (galley, lavatory, in-flight entertainment system, in-seat electrical system, circuit breaker panels, etc.)
   iv) evacuation alarm system
   v) fire prevention system
   vi) lighting system (interior, exterior and emergency lights)
   vii) oxygen system (cabin and flight deck)
   viii) smoke detection system
   ix) water and waste systems
k) cargo areas if accessible from the passenger compartment during flight.

Note: An operator is required to have an approved checklist for aircraft visit.

1.4 Conversion Training

A Cabin Crew Member performing regular duties on one type of aircraft cannot perform duties on any other type of aircraft until he/she has undergone an approved aircraft specific training course.

Note: The conversion training shall be conducted by an approved qualified Line GIC and DCCC.

1.5 Differences Training

1.5.1 Differences training is required to gain competence before the cabin crew member is assigned to duty on an aircraft that has differences from the model or series that the crew member is previously qualified on. Examples of different models include an Airbus A320 vs. A340 or a Boeing B737 vs. B777. Examples of different series include a B777-200 vs. B777-300 or an A330-200 vs. A330-300.

1.5.2 The training should include the following as a minimum, as applicable to the particular aircraft:

a) exits (type, number, location and operation);
b) assisting evacuation means (slide, slide-raft, life raft, rope, etc.);
c) safety and emergency equipment, including location and operation;
d) aircraft systems relevant to cabin crew duties.
e) normal procedures and the related hands-on and/or simulated exercises;
f) abnormal and emergency procedures and the related hands-on and/or simulated exercises; and
g) design-related elements that may impact on normal and/or emergency procedures (stairs, smoke curtain, social areas, non-forward facing passenger seats, cargo areas if accessible from the passenger compartment during flight, etc.).

Note: This training and the associated checking should be accomplished through classroom instructions, CBT, as well as hands-on simulated exercises with a representative training devise capable of reproducing the appropriate environment/ equipment characteristics, or on actual aircraft.

1.6 Recurrent Training

1.6.1 Recurrent training is conducted annually to ensure the maintenance of competencies, knowledge and skills through a series of hands-on exercises, simulated exercises, written exams, etc. for general training elements such as first-aid as well as for training elements relevant to each aircraft type on which the cabin crew member will be assigned duties. It may also be provided to familiarize crew members with new requirements, procedures and/or equipment introduced since their last training. Recurrent training ensures that cabin crew members, by practicing most competencies and skills, maintain the level of performance required for their duties and responsibilities.

Note: Emergency drill requirements shall be met annually alongwith the recurrent training as it is a part of recurrent should be combined.

1.6.2 Recurrent training should include, as a minimum but is not limited to the following:

1.6.2.1 exits (type, number, location and operation);

1.6.2.2 assisting evacuation means (slide, slide-raft, life raft, rope, etc.);

1.6.2.3 safety and emergency equipment, including location and operation;

1.6.2.4 aircraft systems relevant to the cabin crew duties;

1.6.2.5 normal procedures and the related hands-on and/or simulated exercises;

1.6.2.6 abnormal and emergency procedures and the related hands-on and/or simulated exercises, including:
- a) firefighting (including a live firefighting exercise);
- b) smoke removal;
- c) decompression;
- d) evacuation on land and on water (including a wet drill);
- e) flight and cabin crew member incapacitation;
  - i) crew resource management;
  - ii) passenger handling and crowd control;
  - iii) aviation security procedures;
  - iv) first aid;
  - v) dangerous goods; and
  - vi) review of recent incidents and/or accidents pertinent to the operator.

1.6.2.7 This training and the associated checking should be accomplished through classroom instruction and/or CBT, and hands-on and simulated exercises with a representative training device capable of reproducing the appropriate environment/equipment characteristics, or on an actual aircraft.

1.6.2.8 Requalification programmes should be defined for cabin crew members whose qualifications have expired for any reason (e.g. prolonged absence from flying duties), as part of the process to regain qualification enabling the cabin crew member to perform the required duties and responsibilities. This is determined based on the applicable validity period(s), namely the time elapsed since the cabin crew member's last required training. The cabin crew member may need to follow a specific series of steps in order to regain qualification.

Note: Revalidation Requirements: The revalidation requirements for an expired Competency Certificate shall be as follows:

Expiry Period Not Exceeding 12 Months.
- i) Recurrent Training.
- ii) 02 days extended training.

More Than 12 Months but not more than 36 Months.
- i) Theory Examination Paper: Cabin- R.
- ii) Recurrent Training.
- iii) 05 days or more of extended training.

More Than 36 Months
- i) Theory Examination Paper - Cabin – 1.
- ii) Theory Examination Paper - Cabin – 2.
- iii) Basic Cabin Crew Member Course.

1.6.2.9 The operator should establish a process, based on the applicable validity periods of the required training, to monitor when a cabin crew member's qualification(s) expire. The cabin crew member should complete the training required for requalification prior to being assigned as part of the operating crew.

1.7 Cabin Health And First-Aid Training

1.7.1 Cabin Crew members may be required to manage medical events and administer first aid to passengers, or in some situations to other crew members. They may be exposed to travellers with a communicable disease and although the risk of becoming infected is small they should be trained to protect themselves through the application of universal precautions and to manage a suspected or actual case.

Note 1: Cabin crew should be familiar with the contents of the medical kit carried on the aircraft (refer to Annex 6, Part I, Attachment B for additional information) and be able to support a health care professional who volunteers assistance. Cabin crew may also need to use some of the equipment contained in the medical kit in the event of a health care professional not on board (e.g. thermometer, delivery pack, masks).

Note 2: Food and beverages are often provided on board and an understanding of the principles of on-board hygiene is therefore essential.

Note 3: When required by destination countries, cabin crew may need to perform cabin disinsection.

1.7.2 In order for cabin crew to perform their duties, they require an understanding of the potential stresses and health risks associated with their work, such as the effect of altitude, fatigue and exposure to communicable diseases.

1.7.3 Contents of Cabin Health And First-Aid Training

1.7.3.1 Cabin health and first-aid training should include but is not limited to the following:

a) management of on-board medical events;
b) food safety;
c) cabin disinsection;
d) altitude physiology
e) fatigue

Note: The content focuses on the development of initial training. For recurrent training, the content may vary in regards to the competency elements covered, the conditions used for training as well as the knowledge and skills that may be assessed.

1.7.3.2 Hands-on exercises and simulated exercises:

a) Classroom and/or computer-based training;
b) hands-on exercise on retrieving the first-aid kit (FAK), emergency medical kit (EMK), universal precautions kit (UPK), automated external defibrillator (AED), and telemedicine device, as available;
c) hands-on exercise on using the FAK;
d) hands-on exercise on retrieving and using the portable oxygen bottle;
e) hands-on exercise on using the EMK, UPK, telemedicine device, if applicable;
f) hands-on exercise on demonstrating cardiopulmonary resuscitation (CPR) and operating the AED, if applicable;
g) simulated exercise of an ill passenger/crew member where the cabin crew member demonstrates that he/she can recognize and respond to the

situation using the appropriate first-aid techniques to the specific illness or injury; and

h) simulated exercise in a representative training device capable of reproducing the appropriate environment/equipment characteristics (e.g. cabin, flight deck, crew rest area) where the cabin crew will apply the operator's procedures for responding to an in-flight medical event

i) demonstrate first-aid techniques appropriate to the situation. This may include, but is not limited to:
   i) assessing airway/breathing;
   ii) performing CPR, if required;
   iii) performing abdominal thrusts;
   iv) controlling bleeding;
   v) administering oxygen;
   vi) immobilizing a fracture; and
   vii) applying burn dressing;

Note Food safety and sanitation, Minimize or prevent the contamination of food and related service items, Ensure safe practices for food safety, Manage suspected food poisoning and Complete the applicable documentation.

1.7.3.3 Cabin Disinsection

a) An operator is required to establish the procedures for disinsection, including when, where, how to spray and the potential effect on smoke detectors;
b) understanding that while disinsection should not cause undue discomfort to any person, or injury to his/her health, some disinsection procedures may cause health complaints from individuals who have a possible predisposition or assumed hypersensitivity to chemicals; and
c) description of ways in which crew or passengers can limit their exposure to chemical disinsectants

1.7.3.4 Altitude Physiology

a) The atmosphere and atmospheric pressure;
b) pressurized/non-pressurized aircraft cabins;
c) physiology of respiration and circulation and the body's requirement for oxygen;
d) physiological effects of pressure changes in the body (gases, cavities, sinuses and ears, etc.);
e) hypoxia – identification of persons most susceptible to the effects of hypoxia; physiological effects of normal cabin altitude on occupants with medical conditions; signs and symptoms and means to detect and minimize its effects;
f) physiological effects of cabin altitude on crew/passengers due to a significant reduction of available oxygen in the event of a cabin pressurization problem/decompression; the potential for crew member incapacitation; use of oxygen and oxygen masks;
g) time of useful consciousness at altitude; method of protection (supplemental oxygen) and the importance of applying procedures in the case of loss of cabin pressure;
h) recognition and response to passenger or crew member hyperventilation;

i) circumstances under which carbon monoxide poisoning may occur, signs and symptoms of poisoning and means of detecting and minimizing its effects.

Note: The GIC shall undergo first aid training from a recognized first aid training centre.

1.8 Dangerous Goods Training:

1.8.1 Dangerous goods training focuses on the successful application of regulations concerning the transport of dangerous goods and the achievement of their objectives, which are greatly dependent on the appreciation by all individuals concerned of the risks involved and on a detailed understanding of the regulations.

1.8.2 Apart from certain exceptions, dangerous goods are not permitted in the passenger cabin. Nevertheless, dangerous goods may be carried into the cabin by passengers who are unaware of, or deliberately ignore, the prohibition against the carriage of these items. It is also possible that an item to which a passenger is legitimately entitled (e.g. an item for medical purposes) may cause an incident.

Note: Recurrent training must be provided within 24 months of previous training to ensure knowledge is current. However, if recurrent training is completed within the final three months of validity of previous training, the period of validity extends from the date on which the recurrent training was completed until 24 months from the expiry date of that previous training.

1.8.3 Content of dangerous goods training for cabin crew members should include, but is not limited to the following:-

a) general philosophy;
b) limitations;
c) labelling and marking;
d) recognition of undeclared dangerous goods;
e) provisions for passengers and crew; and
f) emergency procedures.

1.8.4 The requirements for the training of cabin crew members in the transport of dangerous goods are included in the Dangerous Goods Training Programme contained in Annex 18 — The Safe Transport of Dangerous Goods by Air and the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284), Part 1, Chapter 4.

Note: Requirements for instructors of initial and recurrent dangerous goods training programmes are included in the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284).

1.9 Safety Management System (SMS) Training

1.9.1 A safety management system (SMS) is defined as a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

1.9.2 SMS requirements applicable to operators of aeroplanes authorized to conduct international commercial air transport in accordance with Annex 6 Part I are addressed in Annex 19 — Safety Management.

1.9.3 Training in SMS is defined as training which focuses on the role that the individual cabin crew members play within the operator's SMS and how their contributions fit in the bigger picture of safety management at the overarching organizational level.

1.9.4 The goal of this training is to ensure that cabin crew are trained and competent to perform their duties within the SMS.

Note: Guidance on SMS and developing SMS training is contained in the Safety Management Manual (SMM) (Doc 9859).

1.9.5 Content of SMS Training

1.9.5.1 The scope of SMS training must be appropriate to each individual's roles and responsibilities within the operation. Training should follow a building-block approach. As part of the ICAO requirements, an operator must provide training to its operational personnel (including cabin crew), managers and supervisors, senior managers, and the accountable executive for the SMS.

1.9.5.2 Training should address the specific role that cabin crew members play in the operation. This includes, but is not limited to training with regards to:

a) SMS fundamentals and overview of the operator's SMS;
b) the operator's safety policy;
c) hazard identification and reporting; and
d) safety communication.

Note: Refer to ANO-032-FSXX.

1.10 Aviation Security Training

1.10.1 The goal of aviation security training is to provide crew members with the knowledge and skills to identify and respond appropriately to various security threats so as to prevent and/or minimize the consequences of acts of unlawful interference.

1.10.2 Content of Aviation Security Training. Aviation security training encompasses two primary concepts:

a) preventive measures during normal operations; and
b) response to security threat events.

1.10.3 While the main training aspects addressed in this are related to responding to a security threat, it is important that the preventive measures are not overlooked. Many of these preventive concepts are addressed in other chapters of this manual but they are referenced below as a reminder.

1.10.4 As per Annex 6 SARPs, an aviation security training programme should includes, but not limited to the following elements:

a) determination of the seriousness of any occurrence;
b) crew communication and coordination;
c) appropriate self-defence responses;
d) understanding the behaviour of terrorists so as to facilitate the ability of crew members to cope with hijacker behaviour and passenger responses;
e) live situational training exercises regarding various threat conditions;
f) flight crew compartment procedures to protect the aeroplane; and
g) aeroplane search procedures and guidance on least-risk bomb locations where practicable.

Note 1: The content of this chapter focuses on the development of initial training. For recurrent training, the content may vary in regards to the competency elements covered, the conditions used for training as well as the knowledge and skills that may be assessed.

Note 2: Security of the Flight Deck. Cabin crew should recognize that the integrity and security of the flight crew deck is essential so that the aircraft cannot be used as a weapon. Procedures must be in place to ensure that flight deck access is coordinated between the cabin crew and the flight crew. Cabin crew compliance with the access/egress procedures is an integral part of preventing unlawful interference.

Note 3: Aviation security training must be conducted in accordance with Civil Aviation Authority regulations, where applicable. Guidance on aviation security is contained in the Aviation Security Manual (Doc 8973) and the Manual on the Implementation of the Security Provisions of Annex 6 (Doc 9811).

Note 4: Refer to ANO-034-FSXX.

1.11 Fatigue Management Training

1.11.1 Definition and Goal of Fatigue Management Training.

1.11.2 Fatigue is defined as 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 crew member's alertness and ability to safely operate an aircraft or perform safety-related duties.

1.11.3 Fatigue risk management system (FRMS) is defined as 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.

1.11.4 Fatigue management requirements applicable to operators are addressed in 4.10 of Annex 6 — Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes. They require States to put in place regulations for managing fatigue based on scientific principles, either through mandatory prescriptive regulations on flight time, flight duty period, duty period and rest period limitations or optional FRMS regulations. These provisions are applicable to flight and cabin crew.

1.11.5 As part of the ICAO requirements, the Operator is required to establish:

a) flight time, flight duty period, duty period and rest period limitations that are within the prescriptive fatigue management regulations.
b) an FRMS for all operations;

Note: Regardless of the method used to comply with fatigue management requirements, the operator should address the issue of fatigue management during training. The goal of this training is to provide cabin crew members with knowledge regarding the causes and consequences of fatigue and how to manage them, as well as their own responsibility and that of the operator in managing fatigue.

1.11.6 Content of Fatigue Management Training

1.11.7 The content of the training programme will depend on whether the operator applies the prescriptive fatigue management regulations or has implemented an FRMS, applicable to cabin crew members.

a) Prescriptive Fatigue Management For Cabin Crew
b) Fatigue Risk Management Systems (Frms) For Cabin Crew
c) Recurrent Fatigue Management Training

Note 1: CRM crew member management refer to ANO-014-FSXX.

Note 2: Operator is required to develop all training syllabus as per ICAO Doc.10002.

1.12 Human Performance Training

1.12.1 Human performance training focuses on relationships between people and equipment, systems, procedures and the environment as well as personal relationships between individuals and groups. It encompasses the overall performance of cabin crew members while they carry out their duties.

1.12.2 The goal of this training is to optimize human performance and manage human error. It encompasses Human Factors principles, crew resource management and the development and application of skills, such as decisionmaking. Human performance training should be oriented towards recognizing and solving practical problems.

1.12.3 Content of Human Performance Training

Human performance training should include the following topics:

a) human factors in aviation;
b) human error;
c) cabin crew skills;
d) crew resource management;
e) threat and error management (tailored to cabin operations);
f) case studies (e.g. accidents / incidents); and
g) Fatigue Risk Management.

APPENDIX "B"

CLASSROOM FACILITIES

1. The size of classrooms is dependent on the following:

a) number of trainees in a class;
b) trainee work station size;
c) class configuration;
d) size of aisles;
e) use of media (in particular projected media); and
f) hands-on exercises (if applicable).

2. The range of recommended space for each adult in a classroom varies from 1.4 m2 to 6.7 m2. The wide range in recommended figures is due to the different classroom environments envisioned by designers, or the variance in allocation for certain spaces within the classroom, such as aisles and front setback.

3. Each trainee's work station space includes the space required to house the trainee's work surface, any additional equipment, the chair, the space for chair pushback and manoeuvrability. The concept of work station space is important when sizing rooms for classes containing different numbers of trainees. The total area allowed in a classroom for each trainee varies with the size of the class. An adequate work surface within the work space is very important.

4. Cabin crew trainees may use a large amount of reference material during training. Hence, they could require a considerable work surface.

5. The uses of media and hands-on exercises are important factors when determining the amount of common space required in a classroom. The most commonly used visual media are chalk/marker boards, projectors, PowerPoint presentations, video monitors and easels. The use of media (slides, TV, virtual simulations, etc.) should be taken into consideration when selecting a learning environment.

Note: The Training Centre approval shall be required prior to class room approval.

6. The learning environment

6.1 The key to a good learning environment is the elimination of discomforts and other undesirable characteristics. A good learning environment includes the following:

a) the temperature should be comfortable;
b) ventilation should be adequate;
c) lighting should be of adequate level for work or viewing;
d) distracting sound should be kept to a minimum;
e) work areas should be aesthetically pleasing;
f) work stations, including chairs, should be comfortable;
g) work space should be adequate;
h) work area should be clean;
i) training equipment should be adequate;
j) visual media should be visible from all angles and seats; and
k) audio media should be audible to all present.

6.2 If any of these factors are unsatisfactory, trainees may be distracted from the task at hand, by the efforts required to adapt to a poor environment.

7. Use of Instructional Aids

7.1 Instructional aids include the use of computer-based training (CBT). For the purposes of this manual CBT may encompass the use of CD-ROMs as well as web-based training (commonly referred to as eLearning). Instructional aids can be used in a classroom setting or as part of distance learning.

7.2 CBT can provide dynamic and interactive tools to address specific portions of a training programme. CBT is predominantly relevant for knowledge objectives. A knowledge objective relates to the recall of facts, the identification of policies, rules or procedures; generally committing concepts to memory. CBT is less appropriate for evaluating handson motor skills or soft skills. CBT provides flexibility, allowing trainees to study at their own pace and according to their schedule. When exploring the possibility of CBT, the operator should give consideration to the technology accessible and the equipment that is required to deliver the training.

7.3 Instructor and/or technical support are recommended for CBT. If the operator chooses to conduct the CBT as part of distance learning, the review/testing of material delivered should be considered in a classroom environment.

7.4 Regardless of the method used for CBT (classroom vs. distance learning), the training programme should contain a means of testing or evaluation to ensure training effectiveness, currency, and that training objectives have been met.

7.5 CBT should be accompanied by a learning management system (LMS). Consideration should be given to the design of the programme and to each individual module. These should be maintained accordingly.

8. Representative Training Devices

8.1 As an alternative to the use of actual aircraft and safety and emergency equipment, the operator may use representative training devices for the purpose of training cabin crew. The use of such devices should be approved by the PCAA. The following sections provide guidance on representative training devices and what they should include in order to be considered for approval by the PCAA.

8.2 Representative training devices include:

a) safety and emergency equipment;
b) cabin training devices;
c) emergency exit trainers; and
d) facilities used for firefighting and water survival training.

8.3 Safety and Emergency Equipment

8.4 Safety and emergency equipment used on the operator’s aircraft should be available during training, according to the applicable training session.

8.5 The following definitions apply for the purpose of training programmes, syllabi and the conduct of training and checking on equipment:

a) safety equipment means equipment installed/carried to be used during day-to-day normal operations for the safe conduct of the flight and protection of occupants (e.g. seat belts); and

b) emergency equipment means equipment installed/carried to be used in case of abnormal or emergency situations that demand immediate action for the safe conduct of the flight and protection of occupants, including life preservation (e.g. fire extinguisher).

8.6 Training for each piece of equipment should be based on the following, if applicable:

a) general description;
b) use;
c) location(s);
d) pre-flight serviceability check(s);
e) removal from stowage;
f) operation;
g) conditions for operation;
h) operational limitations and duration of use;
i) operation under adverse conditions;
j) precautions for use; and
k) post-use procedures (including relocation of equipment, if applicable).

8.7 Safety and emergency equipment may include, but is not limited to:

a) portable fire extinguishers;
b) axe;
c) protective gloves;
d) smoke goggles;
e) protective breathing equipment (PBE);
f) portable oxygen equipment (bottles, passenger mask, full face mask, flight deck oxygen mask);
g) emergency flashlight;
h) megaphone;
i) adult/child and infant life jackets, or other individual flotation device;
j) baby survival cots;
k) life raft;
l) survival kit;
m) installed/portable emergency signalling system (e.g. beacon, emergency locator transmitter, radio locator beacon);
n) child restraint systems;
o) extension seat belt;
p) restraining device;
q) first-aid kit, universal precaution kit, and medical kit;
r) automated external defibrillator and associated equipment (CPR masks, shields, resuscitator bags, etc.); and
s) any other equipment (including any additional equipment suited to the likely environment e.g. arctic gear).

8.8 Equipment that is removed from operation, or other representative training equipment considered acceptable by PCAA, can be used for training purposes.

9. Cabin Training Devices

9.1 Cabin training devices (CTDs) that are capable of recreating realistic situations can be used to provide effective training on safety and abnormal/emergency procedures. When applicable, a mock-up or simulator should be used to enable realistic simulation of cabin crew's duties without continuous need for use of actual aircraft.

9.2 CTDs should include parts of the cabin containing lavatories, galleys, a type of emergency exit used in an aircraft, some seat rows, cabin crew seats, attendant panels and overhead bins. It should be noted that not all of the components presented in this section may be needed in a single, stand-alone CTD. These may be found in separate devices. Components included in a CTD depend on the types of hands-on exercises that are carried out on a particular device (e.g. firefighting simulated exercise). For the purposes of emergency procedures training, CTDs should be able to create an environment which may not be created in a classroom (e.g. filling the cabin with smoke).

9.3 The following components/items should be representative of those found on an aircraft:

a) dials, handles, switches, restraint brackets, and mounting devices to be operated and the force required for their operation;
b) the weight of emergency exit hatches;
c) the direction of movement, associated forces and travel of all controls for all equipment, including the weight of emergency exits when operated without power assist, where applicable; and
d) stowage location of safety and emergency equipment, secured with representative brackets or mounting devices.

9.4 If CTDs are not available, or do not meet the criteria specified, training may be covered through other means.

9.5 A CTD used for cabin crew training should include the following features, according to the applicable scenario:

a) safety and emergency equipment currently required on an aircraft in locations and the restraint brackets representative of those installed on an aircraft;
b) aircraft systems relevant to cabin crew duties representative of those installed on an aircraft, including but not limited to:
   i) operational cabin call chimes (aural and visual indicators);
   ii) cabin crew communications equipment and associated control panels, including an operational public address/intercom system and appropriate attendant panel(s) at the cabin crew station;
   iii) normal and emergency cabin lighting, including fail features; and
   iv) deployable oxygen masks for passenger and cabin crew;
c) internal cabin markings, such as placards and exit markings;
d) emergency exit(s);
e) a flight deck door and related-security features;
f) operational ordinance signs visible from each passenger seat and cabin crew station/seat;
g) seat dimensions and seat pitch;
h) simulated cabin windows and features necessary to darken the cabin;
i) facilities and sufficient speakers to simulate sound effect/crash noises audible throughout the cabin; and
j) smoke simulation capabilities

9.6 A CTD used for emergency evacuation training should include the following features, according to the applicable scenario:

a) dimensions and layout of the cabin that are representative of an aircraft in relation to emergency exits, galley areas and safety and emergency equipment stowage;
b) cabin crew and passenger seat positioning that is representative of that on an aircraft, with particular accuracy for seats immediately adjacent to exits;
c) capability to operate exits in normal and emergency modes – particularly in relation to method of operation and forces required to operate them;
d) width, height and angle of inflated evacuation slides;
e) a minimum of two operational emergency exits (one door and one alternate exit or two doors, as applicable) – plus one operational window exit (where applicable). CTDs may be

equipped with exits representative of more than one aircraft type. However, where possible, consideration should be given to ensure the same exit device is opposite e.g. two B747 doors opposite each other as opposed to one B747 and one A330 door;

f) at least one cabin crew station located at an operational exit, and additional cabin crew stations depending on the grouping of exits contained in the trainer;
g) cabin crew stations and the associated attendant panel(s) that are representative of an aircraft;
h) simulation of an unserviceable exit(s); and
i) simulation of hazards at emergency exits (e.g. obstacle, fire, water).

10. Emergency Exit Trainer

10.1 The operator may provide training to cabin crewmembers on an emergency exit trainer instead of on an actual aircraft.

10.2 The emergency exit trainer should:

a) replicate the size, weight and operating characteristics of the exit of the aircraft type on which the cabin crew member will operate; (e.g. direction of movement of handles);
b) be designed so that the representative exit can be operated in normal and emergency modes, particularly in relation to method of operation and forces required to operate them.

10.3 Differences in exit operating characteristics between actual aircraft exits and the emergency exit trainer can be of critical importance during an emergency evacuation, especially as this may lead the cabin crew members to an incorrect assessment of the serviceability of the exit and/or to incorrectly operate that exit. When a representative training device does not replicate the actual aircraft exit operating characteristics, any differences between the operating characteristics of the actual aircraft exits and those of the emergency exit trainer should be highlighted during training.

10.4 Firefighting

10.4.1 A simulated firefighting exercise should be conducted in a confined area, to simulate cabin fire, and under the supervision of an instructor. The device used for a simulated firefighting exercise should include aircraft furnishings as found on board an aircraft, such as seats, galley units, lavatories, panels, overhead bins and waste bins. Firefighting equipment and the restraints used should be representative to those installed on an aircraft with respect to weight, dimensions, controls, types and operations.

10.4.2 Fire extinguishers used for live firefighting should be charged with the appropriate agent or with an environmentally friendly agent.

10.5 Water Survival

10.5.1 When the operator is required by the PCAA to conduct wet drills, these should be carried out in a body of water or pool of sufficient depth to realistically perform the simulated exercise.

10.5.2 A life-raft exercise should be conducted using life-saving equipment that is representative of that installed on the aircraft with respect to weight, dimensions, appearance, features and operation. The rafts may be substituted if the equipment used is similar with respect to weight, dimensions, appearance, and features. In such cases, training must address any differences in the operation of the raft.

Note: Use of Other Operator or ATO Training Devices. Where an operator arranges to use training devices owned by another operator due to non-availability of required sources, the training must comply with the approved training programme and operating procedures of the operator whose crew are being trained. If significant differences exist in terms of cabin layout and equipment, such training should be restricted accordingly and prior approval shall be taken by FSD with intimation.

APPENDIX "C"

THE LEAD CABIN CREW (LCC) TRAINING

1. The lead cabin crew member has the responsibility to the flight crew for coordination of normal, abnormal and emergency procedures specified in the operations manual and for managing situations with the other cabin crew members. Prior to being designated as Lead cabin crew member, the following criteria should be met:

1.1 Operators should develop a specific training programme for lead cabin crew members. The content of this training programme should be in accordance with PCAA regulations, where applicable. It is highly recommended that operators make this training mandatory for any cabin crew member that is designated as Lead cabin crew member.

1.2 Overall, lead cabin crew member training should cover the following topics, to address the competencies specified in the ICAO competency frameworks:

a) briefings (in normal, abnormal and emergency situations) taking due account of special circumstances of flights (e.g. weather forecast conditions, political turmoil at destination, special categories of passengers, etc.)
b) communication, cooperation and coordination with the crew and with other personnel
c) operator's procedures and legal requirements
d) administrative tasks required by the operator
e) human performance
f) reporting systems and requirements
g) fatigue management
h) leadership skills.

1.3 Briefings

1.3.1 Lead cabin crewmember training should cover the specific elements required to be obtained and disseminated during the pre-flight briefing required during an abnormal or emergency situation (e.g. anticipated emergency landing/ditching. The following topics should be discussed by the Lead Cabin Crew member but is not limited to.

a) the assignment of duties to individual cabin crew members, such as public announcements, cabin crew stations, and special categories of passengers;
b) review of safety, emergency, security and communication procedures and information
c) customized briefing for the aircraft type
d) destination-specific information
e) meteorological information
f) cabin defects

Note 1: Some of these items obtained from the flight crew shall be a part of a joint flight crew/cabin crew briefing.

Note 2: A joint pre-flight safety briefing (cockpit / cabin crew) is mandatory. Operator is required to establish the procedure.

g) communicate all required information and other relevant matters to the other cabin crew members, if additional information becomes available (e.g. changing meteorological information, short taxi time before take-off, etc.).

1.4 Communication, Cooperation and Coordination

1.4.1 Within the Crew and with other Personnel.

1.4.2 Training should address the following items:

a) the concept of the crew member's role and responsibilities and the chain of command onboard the aircraft
b) the importance of crew coordination and communication
c) awareness of multi-cultural and multi-national crews
d) procedures in the event of cabin crew and flight crew member incapacitation.

1.5 Operator's Procedures and Legal Requirements

1.5.1 Training should address the following items:

a) minimum equipment list
b) flight and duty time limitations
c) duties and responsibilities related to operator's standard operating procedures, as required by the position.

1.6 Administrative Tasks Required By the Operator

1.6.1 Training should address the administrative tasks related to safety that the lead cabin crew member must complete, as per operator procedures. This may include, but is not limited to, completing and submitting checklists, incident report forms, cabin defect log, etc.

1.7 Human Performance

1.7.1 Training should address the following items:

a) overview of Human Factors, CRM, TEM and human performance
b) review of skills and application of skills specific to lead cabin crew member: flexibility, empathy, delegation, and planning and coordinating resources and their application in the management of specific occurrences, including but not limited to:
   i) passenger management
   ii) security incidents
   iii) the management of medical diversions

c) operator's safety culture
d) CRM aspects specific to the aircraft type (e.g. narrow/wide body, single/multi deck).

Note: Where practicable, training should include a joint simulated exercise with flight crewmembers (e.g.in a representative training device).

1.8 Reporting Systems and Requirements

1.8.1 Training should address the following items:

a) participation in the operator's reporting programme (hazards, incidents, accidents and both voluntary and mandatory occurrence reporting)
b) duties and responsibilities specific to the lead cabin crew, including documentation
c) review of relevant incident/accident cases.

1.9 Fatigue Management

1.9.1 Training should address the following items:

a) application of flight and duty time limitations
b) awareness of the operator's fatigue risk management programme
c) rest requirements (i.e. in-flight and ground rest)
d) physiological aspects of fatigue and fatigue countermeasures. (e.g. basics of fatigue, sleep fundamentals, the effect of disturbing the circadian rhythms, the cause of fatigue and the effects on performance, the influence of lifestyle, including nutrition and exercise, sleep disorders, the effects of long-range operations, heavy short-range schedules, operating through and within multiple time zones, crew responsibilities, etc.)
e) operator's procedures related to allocation of in-flight crew rest where applicable and the need to remind cabin crew members of their responsibility to be well rested prior to duty.
f) the importance of reconsidering cabin crew working positions in case a cabin crew member reports fatigue before take-off or during the flight; and
g) fatigue reporting.

1.10 Leadership Skills

1.10.1 The training should address, but is not limited to, the following items:

a) leadership function
b) leadership qualities and negatives
c) recognition and appropriate application of different leadership styles for different situations
d) assertiveness
e) identification of different personality styles within the work place
f) team forming and coaching, including tools that can be used to encourage cooperation, motivation and transparency from other crew members
g) support, motivation and respect, including sensitivity towards different cultural beliefs, values and practices
h) appropriate delegation of duties and responsibilities
i) providing feedback
j) conflict management, problem solving and mediation
k) effective management of time, people and resources; and
l) stress management.

1.11 Lead Cabin Crew Member Recurrent Training:

1.11.1 Operators should ensure that lead cabin crewmembers maintain the required skills and remain proficient on the duties and responsibilities specific to that role. In order to achieve this goal, cabin crew members designated as lead cabin crew should receive recurrent training. The delivery methods used may vary: an operator may develop a stand alone Lead cabin crew member recurrent training programme or embed aspects of this programme as part of its recurrent training programme.

1.11.2 If the operator chooses to develop a stand alone recurrent training programme specific for lead cabin crew members, this should be conducted in addition to the regular annual recurrent training required for all cabin crew. It is recommended that this training programme be provided annually, it should be in accordance with PCAA regulations.

1.11.3 Training should address the following items:

a) communication, cooperation and coordination within the crew
b) human performance
c) reporting systems and requirements
d) fatigue risk management
e) leadership skills
f) safety review/reinforcement (from sources such as SMS, audit feedback, etc.);
g) operator procedural reminders and legal updates.

APPENDIX "D"

DOCUMENTATION

1. The operator should maintain the following records of their instructors, DCCC,LCC and Cabin Crew.

a) trainees folder
b) records of performance review
c) training classes conducted
d) examinations conducted
e) observation flights and relevant cabin crew documentation, if applicable;
f) checks as carried out by PCAA or the DCCC authorized by the PCAA;
g) licenses and certificates in accordance with PCAA regulations.

1.1 An operator should have and maintain a system for the management and control of all training records to ensure the content and retention of such records is in accordance with PCAA regulations, to ensure records are subjected to standardized processes for:

a) identification
b) legibility
c) maintenance
d) retrieval
e) protection and security
f) disposal, deletion (electronic records) and archiving

1.2 When utilizing an electronic system for the management and control of training records, the operator ensures the system provides for a scheduled generation of back-up record files.

1.3 The operator should maintain the following records for all of its cabin crew members. The training record should include, but not limited to:

a) training (training dates, competency assessments, test records, course content, etc.)
b) aircraft qualifications (including familiarization flights, as applicable)
c) special qualifications, if applicable (e.g. AED training, lead cabin crew member, DCCC qualification, etc.)

1.4 If a cabin crew member terminates a contract with the operator, the operator should provide the training records or copies of the records to the cabin crew member or a cabin crew member should request the records in the interest of his/her future professional development. This request may be subject to the operator's record retention policy or as per PCAA regulations, where applicable.

APPENDIX "E"

CHECKLIST
COMPETENCY FRAMEWORK FOR CABIN CREW MEMBER'S DUTIES AND RESPONSIBILITIES DURING NORMAL OPERATIONS

COMPETENCY FRAMEWORK FOR CABIN CREW MEMBER'S DUTIES AND RESPONSIBILITIES DURING NORMAL OPERATIONS

Competency unit: 1. Perform duties and responsibilities during ground and pre-flight operations

The competencies described below relate to the period which commences when the cabin crew member reports for duty, prior to pushback or taxi, at the gate, ramp, or parking area, while the aircraft is stationary.

Competency element	*Performance criteria*	*LCC Duty*	*Reference*
1.1 Perform planning duties	1.1.1 Report for duty		Operators Operations manual Company policies and procedures
	1.1.2 Obtain applicable information/documentation		
	1.1.3 Review documents required for the flight		
	1.1.4 Update documents required for the flight, if applicable	`	
	1.1.5 Check minimum cabin crew complement	X	
1.2 Participate in flight crew and cabin crew briefings joint briefing	1.2.1 Obtain flight crew briefing	X	Operators Operations manual Documentation relating to destination information Standard briefing form (if applicable)
	1.2.2 Conduct cabin crew briefing	X	
	1.2.3 Communicate all required information and other relevant matters to the cabin crew		
1.3 Perform preflight checks	1.3.1 Communicate with ground personnel	X	Operators Operations manual
	1.3.2 Check relevant documentation for cabin defects	X	
	1.3.3 Check equipment and systems		
	1.3.4 Report missing or inoperative equipment/system		
	1.3.5 Perform security checks		
	1.3.6 Update cabin crew on any additional information, if applicable	X	

1.4 Perform passenger boarding and pre-pushback duties	1.4.1 Check for AOR cabin crew complement	X	Operators Operations manual
	1.4.2 Apply procedure for ramp safety		
	1.4.3 Manage passenger boarding process		
	1.4.4 Apply procedure for refuelling with passengers on board, if applicable		
	1.4.5 Monitor cabin		
	1.4.6 Reconcile/count passengers, if applicable		
	1.4.7 Check safe stowage of carry-on baggage		
	1.4.8 Brief passengers		
	1.4.9 Check that emergency exits/aisles are not obstructed		
	1.4.10 Check condition of critical surfaces and report any contamination, if applicable		
	1.4.11 Secure galley		
	1.4.12 Secure cabin		
	1.4.13 Close aircraft door(s), if applicable		
	1.4.14 Check flight deck door is closed/secure, if applicable		
1.5 Manage abnormal or emergency situations	1.5.1 Recognize the abnormal or emergency situation		Operators Operations manual
	1.5.2 Apply the procedure for the abnormal or emergency situation		
1.6 Communicate with flight crew, other cabin crew and passengers	1.6.1 Communicate relevant information to flight crew		Operators Operations manual
	1.6.2 Communicate relevant information to other cabin crew		
	1.6.3 Communicate relevant information to passengers		

Competency unit: 2. Perform duties and responsibilities during pushback and taxi			
The competencies described below relate to the period which commences when the aircraft begins to move in the gate, ramp, or parking area, assisted by a tow vehicle, followed by the period when the aircraft moves on the aerodrome surface under its own power prior to take-off.			
Competency element	*Performance criteria*	*LCC Duty*	*Reference*
2.1 Perform pushback and taxi duties and checks	2.1.1 Arm aircraft door(s), if applicable		Operators Operations manual
	2.1.2 Check aircraft door(s) status, if applicable		
	2.1.3 Apply sterile flight deck procedure, if applicable		
	2.1.4 Check compliance with ordinance signs		
	2.1.5 Perform safety demonstration		
	2.1.6 Check cabin		
	2.1.7 Check galley		
	2.1.8 Check lavatory		
	2.1.9 Check crew rest area, if applicable		
	2.1.10 Check remote area, if applicable		
	2.1.11 Take assigned station/seat for take-off and remain secure in required position		
	2.1.12 Confirm "cabin readiness" for take-off to the flight crew	X	
	2.1.13 Comply with the pre-take-off signal		
	2.1.14 Take appropriate safety seating position for take-off (including brace, if appropriate)		
	2.1.15 Perform silent review		
2.2 Manage abnormal or emergency situations	2.2.1 Recognize the abnormal or emergency situation		Operators Operations manual
	2.2.2 Apply the procedure for the abnormal or emergency situation		
2.3 Communicate with flight crew, other cabin crew and passengers	2.3.1 Communicate relevant information to flight crew		Operators Operations manual
	2.3.2 Communicate relevant information to other cabin crew		
	2.3.3 Communicate relevant information to passengers		

Competency unit: 3. Perform duties and responsibilities during take-off			
The competencies described below relate to the period which commences when the flight crew apply take-off power, through rotation and to an altitude of 35 feet above runway elevation.			
Competency element	*Performance criteria*	*LCC Duty*	*Reference*
3.1 Perform take- off duties	3.1.1 Apply sterile flight deck procedure Operations manual		
	3.1.2 Remain in appropriate safety seating position for takeoff (including brace, if appropriate)		
	3.1.3 Perform silent review		
3.2 Manage abnormal or emergency situations	3.2.1 Recognize the abnormal or emergency situation		
	3.2.2 Perform the procedure for the abnormal or emergency Operations manual situation		

Competency unit: 4. Perform duties and responsibilities during climb			
The competencies described below relate to the period which commences when the take-off phase ends through to arrival at the initial assigned cruise altitude.			
Competency element	*Performance criteria*	*LCC Duty*	*Reference*
4.1 Communicate with flight crew, other cabin crew and passengers	4.1.1 Communicate relevant information to flight crew		Operators Operations manual
	4.1.2 Communicate relevant information to other cabin crew		
	4.1.3 Communicate relevant information to passengers		
4.2 Perform climb duties	4.2.1 Comply with ordinance signs and instructions from the flight crew		Operators Operations manual
	4.2.2 Check passenger compliance with ordinance signs and instructions		
	4.2.3 Monitor cabin		
4.3 Manage abnormal or emergency situations	4.3.1 Recognize the abnormal or emergency situation		Operators Operations manual
	4.3.2 Apply the procedure for the abnormal or emergency		

Competency unit: 5. Perform duties and responsibilities during cruise			
The competencies described below relate to the period which commences at any level flight segment after arrival at initial cruise altitude until the start of descent to the destination.			
Competency element	*Performance criteria*	*LCC Duty*	*Reference*
	5.1.1 Communicate relevant information to flight crew		
5.1 Communicate with flight crew, other cabin crew and passengers	5.1.2 Communicate relevant information to other cabin crew		Operators Operations manual
	5.1.3 Communicate relevant information to passengers		
5.2 Perform systems operations	5.2.1 Operate systems, as required		
	5.2.2 Monitor operation of systems		Operators Operations manual
5.3 Perform cruise duties	5.3.1 Apply procedures in the event of turbulence		
	5.3.2 Apply procedures for the safe use of service equipment		Operators Operations manual
	5.3.3 Check passenger compliance with ordinance signs and instructions		
	5.3.4 Monitor cabin		
	5.3.5 Monitor galley		
	5.3.6 Monitor lavatory		
	5.3.7 Monitor remote area, if applicable		
	5.3.8 Manage passengers		
5.4 Perform security procedures	5.4.1 Apply flight deck access procedures		
	5.4.2 Monitor “clear zone” outside the flight deck		Operators Operations manual
	5.4.3 Monitor cabin for security-related issues		
5.5 Manage abnormal or emergency situations	5.5.1 Recognize the abnormal or emergency situation		
	5.5.2 Apply the procedure for the abnormal or emergency situation		Operators Operations manual

Competency unit: 6. Perform duties and responsibilities during descent and approach			
The competencies described below relate to the period which commences when the aircraft leaves the level flight segment to start a controlled descent to the destination and ends with the beginning of the landing flare.			
Competency element	*Performance criteria*	*LCC Duty*	*Reference*
6.1 Communicate with flight crew, other cabin crew and passengers	6.1.1 Communicate relevant information to flight crew		Operators Operations manual
	6.1.2 Communicate relevant information to other cabin crew		
	6.1.3 Communicate relevant information to passengers		
	6.2.1 Check compliance with ordinance signs		
	6.2.2 Secure cabin		
6.2 Prepare cabin for landing	6.2.3 Secure galley		Operators Operations manual
	6.2.4 Check lavatory		
	6.2.5 Check crew rest area, if applicable		
	6.2.6 Check remote area, if applicable		
	6.2.7 Check that emergency exits/aisles are not obstructed		
	6.2.8 Comply with ordinance signs or instructions from the flight crew		
	6.2.9 Take assigned station/seat for landing and remain secure in required position		
	6.2.10 Confirm "cabin readiness" for landing to the flight crew	X	
	6.2.11 Apply sterile flight deck procedure		
	6.2.12 Comply with the pre-landing signal		
	6.2.13 Take appropriate safety seating position for landing (including brace, if appropriate)		
	6.2.14 Perform silent review		
6.3 Manage abnormal or emergency situations	6.3.1 Recognize the abnormal situation		Operators Operations manual
	6.3.2 Perform the procedure for the abnormal or emergency Situation		

Competency unit: 7. Perform duties and responsibilities during landing			
The competencies described below relate to the period which commences when the landing flare begins until aircraft exits the landing runway, comes to a stop on the runway, or when power is applied for take-off in the case of a touch and- go landing.			
Competency element	*Performance criteria*	*LCC Duty*	*Reference*
7.1 Perform landing duties	7.1.1 Apply sterile flight deck procedure		Operators Operations manual
	7.1.2 Remain in appropriate safety seating position for landing (including brace, if appropriate)		
	7.1.3 Perform silent review		
7.2 Manage abnormal or emergency situations	7.2.1 Recognize the abnormal or emergency situation		Operators Operations manual
	7.2.2 Perform the procedure for the abnormal or emergency situation		

Competency unit: 8. Perform duties and responsibilities during post-landing and post-flight operations			
The competencies described below relate to the period which commences when the aircraft exits the landing runway, continues upon arrival at the gate, ramp, apron, or parking area, when the aircraft ceases to move under its own power and ends when the cabin crew member completes his/her duties assigned for the flight.			
Competency element	*Performance criteria*	*LCC Duty*	*Reference*
8.1 Perform post landing and post flight duties	8.1.1 Remain in assigned station/seat and remain secure in required position		Operators Operations manual
	8.1.2 Comply with ordinance signs and instructions from the flight crew		
	8.1.3 Check passenger compliance with ordinance signs and instructions		
	8.1.4 Monitor cabin		
	8.1.5 Disarm aircraft door(s), if applicable		
	8.1.6 Check aircraft door(s) status, if applicable		
	8.1.7 Open aircraft door(s), if applicable		
	8.1.8 Manage passenger disembarkation process		
	8.1.9 Perform security checks, if applicable		
	8.1.10 Complete the applicable documentation		

8.2 Communicate with flight crew, other cabin crew and passengers	8.2.1 Communicate relevant information to flight crew		Operators Operations manual
	8.2.2 Communicate relevant information to other cabin crew		
	8.2.3 Communicate relevant information to passengers		
8.3 Manage abnormal or emergency situations	8.3.1 Recognize the abnormal or emergency situation		Operators Operations manual
	8.3.2 Perform the procedure for the abnormal or emergency situation		
8.4 Perform transit duties	8.4.1 Manage passenger disembarkation process		Operators Operations manual Documentation relating to destination information Standard briefing form (if applicable)
	8.4.2 Perform security checks		
	8.4.3 Obtain flight crew briefing, if applicable		
	8.4.4 Conduct cabin crew briefing, if applicable	X	
	8.4.5 Check minimum crew complement	X	
	8.4.6 Manage passenger boarding process		

ALL WEATHER OPERATIONS AND LIMITATIONS

AIR NAVIGATION ORDER

VERSION	**:**	**2.0**
DATE OF IMPLEMENTATION	**:**	**15.04.2018**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. KHALID RASHEED KHAN	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Actg. Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This ANO is issued under Rule 200 sub rule 2 of CARs 1994 by the Director General Civil Aviation Authority in pursuance of the powers vested in him under Rule-4 of Civil Aviation Rules 1994.

B. PURPOSE:

B1. This ANO provides a total system concept from information derived from related ICAO Annexes and guidance material and from States' documents and practices. It is intended that this material will be useful to a State wishing to progress the systematic development of all-weather operations, both in regard to its role as State of the Operator/State of Registry and as State of the Aerodrome. It is also intended that this material will serve aerodrome and facility planners in fostering an understanding of the methodology used by operators in establishing their aerodrome operating minima.

B2. This ANO has been developed to specify regulatory requirements and as a condition for authorizing all weather operations including low visibility take-off and landing to Air Carrier and flight crew engaged in regular public transport operations holding Air Operator Certificate (AOC) issued under Part-XI of Civil Aviation Rules, 1994.

C. SCOPE:

C1. Any taxi, take-off or landing operations in conditions where visual reference is limited by weather conditions.

C2. A State of the operator has an obligation under Annex-6, Part-1 in respect of Aerodrome Operating Minima. States can meet this obligation either by supervising the determination of Operating Minima by operators or by directly determining minima for their use.

C3. The State of the operator must ensure it has the basic legislation to provide for certification of operators, determination of minima and for inspection and revision as needed. For the supervision of all-weather operations, there must be clear and specific references in law to provide for establishment of the necessary rules to ensure safe conduct of the intended operations, such as those for take-off and landing minima, flight crew qualifications and aeroplane airworthiness.

C4. Likewise, as State of the aerodrome, it must have regulations concerning the installation and maintenance of the necessary ground facilities, the development of appropriate procedures, and the timely dissemination of information.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 For the purpose of this ANO and in line with ICAO Standards and Recommended Practices, the following terms are defined as hereunder:

D1.1.1 **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 precision approach and landing operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the category of the operation;

c) landing in approach and landing operations with vertical guidance, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H); and

d) landing in non-precision approach and landing operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions.

D1.1.2 **Alert height.** A height above the runway threshold based on the characteristics of the aeroplane and its fail operational landing system, above which a Category III operation would be discontinued and a missed approach initiated if a failure occurred in one of the redundant parts of the landing system, or in the relevant ground equipment.

D1.1.3 **All-weather operations.** Any surface movement, take-off, departure, approach or landing operations in conditions where visual reference is limited by weather conditions.

D1.1.4 **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. Alternate aerodromes include the following:

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

b) En-route alternate. An aerodrome at which an aircraft would be able to land after experiencing an abnormal or emergency condition while en route.

c) Destination alternate. An alternate aerodrome to which an aircraft may proceed 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.

D1.1.5 **Approach and landing operations using instrument approach procedures.** Instrument approach and landing operations are classified as follows:

D1.1.5.1 Non-precision approach and landing operations. An instrument approach and landing which utilizes lateral guidance but does not utilize vertical guidance.

D1.1.5.2 Approach and landing operations with vertical guidance. An instrument approach and landing which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

D1.1.5.3 Precision approach and landing operations. An instrument approach and landing using precision lateral and vertical guidance with minima as determined by the category of operation.

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

a) a ground-based navigation aid; or

b) computer generated navigation data.

D1.1.5.4 Categories of precision approach and landing operations:

a) Category I (CAT I) operation. A precision instrument approach and landing with:

   i) a decision height not lower than 60 m (200 ft); and

   ii) with either a visibility not less than 800 m or a runway visual range not less than 550 m.

b) Category II (CAT II) operation. A precision instrument approach and landing with:

   i) a decision height lower than 60 m (200 ft), but not lower than 30 m (100 ft); and

   ii) a runway visual range not less than 300 m.

c) Category IIIA (CAT IIIA) operation. A precision instrument approach and landing with:

   i) a decision height lower than 30 m (100 ft) or no decision height; and
   ii) a runway visual range not less than 175 m.

d) Category IIIB (CAT IIIB) operation. A precision instrument approach and landing with:

   i) a decision height lower than 15 m (50 ft), or no decision height; and

   ii) a runway visual range less than 175 m but not less than 50 m.

e) Category IIIC (CAT IIIC) operation. A precision instrument approach and landing with no decision height and no runway visual range limitations.

Note: Where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach and landing 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).

D1.1.6 **Approach ban point.** The point from which 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 above the aerodrome operating minima.

D1.1.7 **Automatic flight control system (AFCS) with coupled approach mode.** An airborne system which provides automatic control of the flight path of the aeroplane during approach.

D1.1.8 **Automatic landing system.** The airborne system which provides automatic control of the aeroplane during the approach and landing.

D1.1.9 **Categories of aeroplanes.** The following five categories of aeroplanes have been established based on 1.3 times the stall speed in the landing configuration at maximum certificated landing mass:

D1.1.9.1 Category A — less than 169 km/h (91 kt) IAS

D1.1.9.2 Category B — 169 km/h (91 kt) or more but less than 224 km/h (121 kt) IAS

D1.1.9.3 Category C — 224 km/h (121 kt) or more but less than 261 km/h (141 kt) IAS

D1.1.9.4 Category D — 261 km/h (141 kt) or more but less than 307 km/h (166 kt) IAS

D1.1.9.5 Category E — 307 km/h (166 kt) or more but less than 391 km/h (211 kt) IAS.

D1.1.10 **Categories of approach operations.** (See **Approach and landing operations using instrument approach procedures.**)

D1.1.11 **Ceiling.** The height above the ground or water of the base of the lowest layer of cloud below 6 000 m (20 000 ft) covering more than half the sky.

Note: The definition of ceiling may differ in some States.

D1.1.12 **Circling approach.** An extension of an instrument approach procedure which provides for visual circling of the aerodrome prior to landing.

D1.1.13 **Commercial air transport operation.** An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire.

D1.1.14 **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 manoeuvre should begin for the type of aircraft flown.

D1.1.15 **Converted meteorological visibility (CMV).** A value (equivalent to an RVR) which is derived from the reported meteorological visibility.

D1.1.16 **Decision altitude (DA)** or **decision height (DH).** A specified altitude or height in the precision approach or approach with vertical guidance at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.

Note1: 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".

D1.1.17 **Enhanced vision system (EVS).** A system to display electronic real-time images of the external scene achieved through the use of image sensors.

D1.1.18 **Fail-operational automatic landing system.** An automatic landing system is fail-operational if, in the event of a failure, the approach, flare and landing can be completed by the remaining part of the automatic system.

D1.1.19 **Fail-operational hybrid landing system.** A system which consists of two or more independent landing systems and in the event of failure of one system, guidance or control is provided by the remaining system(s) to permit completion of the landing.

Note: A fail-operational hybrid landing system may consist of a fail-passive automatic landing system with a monitored head-up display which provides guidance to enable the pilot to complete the landing manually after failure of the automatic landing system.

D1.1.20 **Fail-passive automatic landing system.** An automatic landing system is fail-passive if, in the event of a failure, there is no significant deviation of aeroplane trim, flight path or attitude but the landing will not be completed automatically.

D1.1.21 **Final approach.** That part of an instrument approach procedure which commences at the specified final approach fix or point, or where such a fix or point is not specified,

a) at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or

b) at the point of interception of the last track specified in the approach procedure; and ends at a point in the vicinity of an aerodrome from which:

1) a landing can be made; or

2) a missed approach procedure is initiated.

D1.1.22 **Final approach segment.** That segment of an instrument approach procedure in which alignment and descent for landing are accomplished.

D1.1.23 **Flight visibility.** The visibility forward from the cockpit of an aircraft in flight.

D1.1.24 **GLS.** An instrument approach operation that is based on GBAS.

D1.1.25 **Ground-based augmentation system (GBAS).** An augmentation system in which the user receives augmentation information directly from a ground-based transmitter.

D1.1.26 **Head-up display (HUD).** A display system that presents flight information into the pilot's forward external field of view.

D1.1.27 **Head-up display (HUD) approach and landing guidance system (HUDLS).** An airborne instrument system which presents sufficient information and guidance in a specific area of the aircraft windshield, superimposed for a conformal view with the external visual scene, which permits the pilot to manoeuvre the aircraft manually by reference to that information and guidance alone to a level of performance and reliability that is acceptable for the category of operation concerned.

D1.1.28 **ILS critical area.** An area of defined dimensions about the localizer and glide path antennas where vehicles, including aircraft, are excluded during all ILS operations.

Note: The critical area is protected because the presence of vehicles and/or aircraft inside its boundaries will cause unacceptable disturbance to the ILS signal-in-space.

D1.1.29 **ILS sensitive area.** An area extending beyond the critical area where the parking and/or movement of vehicles, including aircraft, is controlled to prevent the possibility of unacceptable interference to the ILS signal during ILS operations.

Note: The sensitive area is protected to provide protection against interference caused by large moving objects outside the critical area but still normally within the airfield boundary.

D1.1.30 **Instrument approach procedure.** A series of predetermined manoeuvres 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:

a) Non-precision approach (NPA) procedure. An instrument approach procedure which utilizes lateral guidance but does not utilize vertical guidance.

b) Approach procedure with vertical guidance (APV). An instrument approach procedure which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

c) Precision approach (PA) procedure. An instrument approach procedure using precision lateral and vertical guidance with minima as determined by the category of operation.

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

a) a ground-based navigation aid; or

b) computer-generated navigation data.

D1.1.31 **Instrument flight rules (IFR).** A set of rules governing the conduct of flight under instrument meteorological conditions.

Note: IFR specifications are found in Chapter 5 of ICAO Annex 2. Instrument flight rules may be followed in both IMC and VMC.

D1.1.32 **Instrument meteorological conditions (IMC).** Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling (as defined in ICAO Annex 2, 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.

D1.1.33 **Low visibility procedures (LVP).** Specific procedures applied at an aerodrome for the purpose of ensuring safe operations during Category II and III approaches and/or low visibility take-offs.

D1.1.34 **Low visibility take-off (LVTO).** A term used by the European authorities in relation to flight operations referring to a take-off on a runway where the RVR is less than 400 m.

D1.1.35 **Minimum descent altitude (MDA) or minimum descent height (MDH).** A specified altitude or height in a non-precision approach 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".

D1.1.36 **Missed approach point (MAPt).** That point in an instrument approach procedure at or before which the prescribed missed approach procedure must be initiated in order to ensure that the minimum obstacle clearance is not infringed.

D1.1.37 **Missed approach procedure.** The procedure to be followed if the approach cannot be continued.

D1.1.38 **MLS critical area.** An area of defined dimensions about the azimuth and elevation antennas where vehicles, including aircraft, are excluded during all MLS operations.

Note: The critical area is protected because the presence of vehicles and/or aircraft inside its boundaries will cause unacceptable disturbance to the guidance signals.

D1.1.39 **MLS sensitive area.** An area extending beyond the critical area where the parking and/or movement of vehicles, including aircraft, is controlled to prevent the possibility of unacceptable interference to the MLS signals during MLS operations.

Note: The sensitive area provides protection against interference caused by large objects outside the critical area but still normally within the airfield boundary.

D1.1.40 **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".

D1.1.41 **Obstacle-free zone (OFZ).** The airspace above the inner approach surface, inner transitional surfaces, and balked landing surface and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low-mass and frangible mounted one required for air navigation purposes.

D1.1.42 **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: Performance requirements are expressed in navigation specifications (RNAV specification, RNP specification) in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.

D1.1.43 **Procedure turn.** A manoeuvre in which a turn is made away from a designated track followed by a turn in the opposite direction to permit the aircraft to intercept and proceed along the reciprocal of the designated track.

Note 1: Procedure turns are designated "left" or "right" according to the direction of the initial turn.

Note 2: Procedure turns may be designated as being made either in level flight or while descending, according to the circumstances of each individual instrument approach procedure.

D1.1.44 **Required navigation performance (RNP).** A statement of the navigation performance necessary for operation within a defined airspace.

Note: Navigation performance and requirements are defined for a particular RNP type and/or application.

D1.1.45 **Runway-holding position.** A designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS critical/sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorized by the aerodrome control tower.

Note: In radiotelephony phraseologies, the expression "holding point" is used to designate the runway-holding position.

D1.1.46 **Runway visual range (RVR).** The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

D1.1.47 **Stabilized approach.** An approach which is flown in a controlled and appropriate manner in terms of configuration, energy and control of the flight path from a pre-determined point or altitude/height down to a point 50 feet above the threshold or the point where the flare manoeuvre is initiated, if higher.

D1.1.48 **State of Registry.** The State on whose register the aircraft is entered.

D1.1.49 **State of the Aerodrome.** The State in whose territory the aerodrome is located.

D1.1.50 **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.

D1.1.51 **Surveillance radar.** Radar equipment used to determine the position of an aircraft in range and azimuth.

D1.1.52 **Touchdown zone (TDZ).** The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

D1.1.53 **Vertical navigation (VNAV).** A method of navigation which permits aircraft operation on a vertical flight profile using altimetry sources, external flight path references, or a combination of these.

D1.1.54 **Visibility.** Visibility for aeronautical purposes is the greater of:

a) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognized when observed against a bright background;

b) the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background.

Note 1: The two distances have different values in air of a given extinction coefficient, and the latter b) varies with the background illumination. The former a) is represented by the meteorological optical range (MOR).

Note 2: The definition applies to the observations of visibility in local routine and special reports, to the observations of prevailing and minimum visibility reported in METAR and SPECI and to the observations of ground visibility.

D1.1.55 **Visual approach.** An approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed by visual reference to terrain.

D1.1.56 **Visual flight rules (VFR).** A set of rules governing the conduct of flight under visual meteorological conditions.

Note: VFR specifications are found in Chapter 4 of ICAO Annex 2.

D1.1.57 **Visual meteorological conditions (VMC).** Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling,2 equal to or better than specified minima.

Note: The specified minima for visual meteorological conditions are contained in Chapter 4 of ICAO Annex 2.

D2. <u>THE NEED FOR SPECIFIC RULES:</u>

D2.1 The need for specific rules and regulations is implied by the provisions of Annex 6, Part I. The basic aviation law of the State should:

D2.1.1 require commercial air transport operations to be conducted in accordance with conditions the State may consider applicable in the interests of safety;

D2.1.2 make provision for the adoption of operating regulations compatible with the provisions of the Annexes to the Convention on International Civil Aviation;

D2.1.3 make provision for the delegation to a designated official of the authority to develop and amend operating rules consistent with the operating regulations; and

D2.1.4 make provision for the enforcement of operating regulations and rules.

D2.2 In establishing aerodrome operating minima as part of a State's regulatory system, two basic prerequisites, should be understood and accepted. These are:

D2.2.1 provision, in the basic aviation law of the State, for a code of operating regulations and the promulgation thereof; and

D2.2.2 establishment by a State of an appropriate entity with the necessary powers to ensure compliance with the regulations.

D2.3 In accordance with the concepts of basic aviation law, States are empowered to formulate specific rules for the implementation of all-weather operations within their area of jurisdiction. These rules should apply to the States' operators and applicable aerodromes. While such requirements may also apply to foreign operators to the extent necessary to fulfill States' obligations under the Convention on International Civil Aviation, the primary responsibility for the safety of take-off and landing operations resides with the State of the Operator.

D2.4 The primary responsibility of the State in which the operation takes place is the provision and maintenance of facilities and services and meteorological information, and promulgation, in AIPs and NOTAMs, of information concerning instrument procedures together with obstacle information. The principal aim of these rules is to ensure an adequate level of safety, but they also establish the legal requirements and provide specific guidance to operators and aerodrome authorities proposing to participate in all weather operations. The specific rules relating to such operations form part of those which generally relate to the authorization and control of flight operations. The rules should cover:

D2.4.1 The operations, taking into account:

a) aerodrome operating minima;
b) airworthiness requirements;
c) flight crew qualification and training;
d) operating procedures and their validation.

D2.4.2 The aerodrome, taking into account:

a) adequacy of runways and taxiways;
b) availability of visual and non-visual aids;
c) control of obstacles;
d) meteorological service and assessment and dissemination of RVR; and
e) air traffic services, including surface movement control.

D2.4.3 Certification and/or authorization in relation to:

a) the aeroplane;
b) the aerodrome; and
c) the operator.

D2.4.4 Requirements for compliance with operating minima.

D3 AERODROME FACILITIES:

D3.1 An operator shall not use an airfield for any operations including CAT II and CAT III unless it is approved for such operations by the state in which the airfield is located.

D3.2 An operator shall verify that Low Visibility Procedures (LVP) has been established, and wilt be enforced, at those aerodromes where tow visibility operations are to be conducted.

D4. AIRBORNE EQUIPMENT:

D4.1 Approval of Category-I, Category-II and Category-III minima is based on installation of the equipment specified in Table 1-1. In order to perform a CAT II or CAT III approach and automatic landing, the equipment listed in the AFM is required to be operative.

D4.2 If one of these equipments/systems is listed in the airline MEL with associated dispatch conditions, the MEL must clearly indicate that CAT II or CAT III operations are not authorized.

Table 1-1
Airborne Equipment Requirements

Equipment Type/Specification	**CAT I**	**CAT II**		**CAT IIIA**		**CAT IIIB Operations**
		Manual Mode	Auto. Mode	DH 50ft or more	DH less than 50FT or on DH	
Raw data display	X	X	X	X	X	X
ILS Receiver						
Dual with dual displays	X1	X	X	X	X	X
Excess deviation warning		X	X	X	X	X
Radio Altimeters						
Single self monitored with dual display		X	X			
Dual with dual displays				X	X	X
Flight Director System (FDS)						
Single Self Monitored with dual displays	X2		X			
Dual with dual displays		X		X	X	X
Automatic Flight Control System with ILS Coupled Approach Mode		X3				
Automatic Landing System						
Fail Passive			X	X		
Fail Operational					X	
Fail Operational with Automatic Roll out						X
Automatic Go-around Mode					X	X
Auto-Throttle Mode				X	X	X

Notes to Table 1-1:

1. Single ILS or MLS receiver required.
2. Single with single display for CAT t or Automatic Flight Control System with ILS/MLS coupled approach mode.

3. Automatic Flight Control System with TLS/MLS coupled approach mode upto DH followed by manual landing or G/A.

D5 PILOT TRAINING AND QUALIFICATION:

D5.1 It is essential that flight crew are trained and qualified in all aspects of all weather operations appropriate to the intended instrument operations.

D5.2 The operator's approved training program must include training for Pilots-in-Command and Seconds-in-Commands in the following two parts:

a) Ground instruction in the background and philosophy of all-weather operations

b) Flight training, which may be carried out in approved flight simulator and/or during airborne training.

D5.3 Ground Training Program:

D5.3.1 The Ground Training Program to include the following items:

a) The characteristics and limitations of the ILS and/or MLS.
b) The characteristics of the visual aids.
c) The characteristics of fog.
d) The operational capabilities and limitations of the particular airborne system.
e) The effects of precipitation, ice accretion, low-level wind shear and turbulence.
f) The effects of specific aircraft malfunctions.
g) The use and limitations of RVR assessment system.
h) The principles of obstacle clearance requirement.
i) Recognition of and action to be taken in the event of failure of ground equipment.
j) The procedures and precautions to be followed with regard to surface movement during operations when the RVR is 400M or less.
k) The significance of decision heights based upon radio altimeters and the effect of terrain profile in the approach area on radio altimeter readings and on the automatic approach/landing system.
l) The importance and significance of alert height, when applicable and the action in the event of any failure above and below the alert height.
m) The importance of correct seating and eye position.
n) The qualification requirements for pilots to obtain and retain approval to conduct CAT 1I and CAT III operations.

D5.4 Simulator and / or Flight Training Program:

D5.4.1 The Training Program for CAT II and CAT III must include in flight or in simulator the following items:

a) Checks of satisfactory functioning of equipment, both on the ground and in flight.
b) Effect on minima caused by changes in the status of ground installations.

c) Monitoring of automatic Flight Control Systems and Auto land Status Annunciators with emphasis on the action to be taken in the event of failures of such systems.
d) Actions to be taken in the event of failures such as Engines, Electrical Systems, Hydraulics of Flight Control System.
e) The effect of known un-service abilities and use of Minimum Equipment Lists.
f) Operating limitation resulting from airworthiness certification.
g) Guidance on the visual cues required at DH together with information on maximum deviation allowed form guide path or localizer.
h) The importance and significance of AH if applicable.
i) Where take-offs are conducted in RVR of 400 M and below, training must be established to cover system failures and engine failure resulting in continued as well as rejected take-offs.

D5.4.2 The Training Program must train each Flight Crew Member to carry out his duties and the co-ordination with either Crew Member.

D5.4.3 The training must be divided into phases covering normal operation with no aircraft or equipment failures, but including all weather conditions which may be encountered and detailed scenarios of aircraft and equipment failure which could effect CAT II or CAT III operations.

D5.4.4 Incapacitation procedures appropriate to CAT II and CAT III operations shall be practiced.

D5.4.5 For aircraft with no specific simulator, operators must ensure that the initial flight training phase specific to the visual scenarios of CAT II operations is conducted in a simulator approved for that purpose by CAA. The training and procedures that are type specific shall be practiced in the aircraft.

D5.4.6 The initial CAT II and CAT III training phase will normally be conducted on completion of type conversion training and shall include at least the following exercises:

a) Approach using the appropriate flight guidance, autopilot and control system installed in the aircraft, to the appropriate DH and to include transition to visual flight and landing.
b) Approach with alt engines operating using the appropriate flight guidance systems, autopilots and control system installed in the aircraft down to the appropriate DH followed by missed approach, all without external visual reference.
c) Where appropriate, approach utilizing automatic flight system to provide automatic flare, landing and rollout.
d) Normal operation of the applicable system both with and without acquisition of visual cues at DH.
e) Approaches with engine failure at various stages on the approach.
f) Approaches with critical equipment failures (e.g. Electrical System, Auto flight Systems, ground and/or airborne ILS/MLS systems and status monitors).
g) Approaches where failures of auto flight equipment at low level require either.

    i) Reversion to manual flight to control flare, landing and rollout or missed approach.

ii) Reversion to manual flight or a downgraded automatic mode to control missed approaches from, at or below DH including those, which may result in a touchdown on the runway.

h) Failures of the systems which will result in excessive localizer and/or glide deviation, both above and below DH, in the minimum visual conditions authorized for the operation.
i) Failures and procedures specific to aircraft.
j) The Training Program must provide in handling faults which require a reversion to higher minima.
k) The Training Program is to include the handling of the aircraft when, during a fail-passive CAT III approach, the fault causes the autopilot to disconnect at or below DH when the last reported RVR is 3501'4 or less.

D5.5 Line Under Supervision Flying:

D5.5.1 An operator must ensure that:

D5.5.1.1 Where CAT II manual landings are required, a minimum of three such landings from autopilot disconnect must be carried out.

D5.5.1.2 For CAT III, a minimum of three auto land must be carried out, except that only one auto land is required when the training required in simulator has been carried out in a full flight simulator usable for zero flight time training.

D5.6 Type and Command Experience:

D5.6.1 The following additional requirements are applicable to commanders who are new to the type:

D5.6.1.1 50 hours as Pilot-in-Command on the type before performing any CAT II or CAT III operation.

D5.6.1.2 Until 100 hours as Pilot-in-Command on the type has been achieved, 50 ft. must be added to the applicable CAT II or CAT III DH unless he has previously qualified for CAT II or CAT IIT operations.

D5.7 Flight Crew Qualification:

D5.7.1 An operator must ensure that a Flight Crew Member has completed a check before conducting CAT II or CAT III operations.

D5.7.2 Successful completion of the initial simulator and/or flight training will constitute the check.

D5.8 Recurrent Training and Checking:

D5.8.1 An operator must ensure that, in conjunction with normal training and checking of Pilot Proficiency Check, a pilot knowledge and ability to perform the tasks associated with the particular Category of operation for which he is authorized is demonstrated. The required number of approaches to be conducted during such recurrent training is to be a minimum of three, one of which is to be a missed approach.

D5.9 Recency Requirements:

D5.9.1 To retain CAT II or CAT III operations recency, a pilot must participate in approved simulator cyclic and Proficiency Program and complete an auto coupled ILS approach to touchdown at least every 45 days. If an auto land using low visibility procedures has not been completed in the preceding 45 days, recency can be up-dated by:

D5.9.1.1 Completing an auto land in the aircraft in CAT I or better conditions using low visibility procedures, or

D5.9.1.2 Completing an auto land in an approved flight simulator to the approved minima, or

D5.9.1.3 Viewing a video detailing low visibility procedures. Where recency is up-dated by this method, the succeeding up-date must be in the aircraft or flight simulator.

D6 OPERATIONAL REQUIREMENTS:

D6.1 General Operating Rules

D6.1.1 No operator shall conduct Category II or III operations unless.

D6.1.1.1 Each aeroplane is certified for operations with decision height below 200 ft, or no decision height, and equipped in accordance with airworthiness ANO or an equivalent approved by the CAA.

D6.1.1.2 The operation is approved by CAA.

Note: Operator shall apply on PCAA Airworthiness Directorate prescribed form (CAAF-201-AWRG-1.0) for Airworthiness approval of specific aircraft.

D6.1.2 No operator shall conduct low visibility take-offs in less than 150 m RVR (category A, B and C aeroplanes) or 200 m RVR (category D aeroplanes) unless approved by CAA.

Note: RVR and runway facilities requirements are given in Appendix A.

D6.2 The operator's Minimum Equipment List (MEL) and Operations Manual to include the following as appropriate.

D6.2.1 The MEL should clearly define the effects of equipment redundancy on approach Category status of the aircraft.

D6.3 The Operations Manual to include, procedures, instructions and information to be used by flight crews for:

D6.3.1 All Weather Operations:

a) CAT I
b) CAT II
c) CAT III
d) Decision Height
e) Alert Height
f) Runway Visual Range
g) Operating Minima
h) Low Visibility Take-off
i) Visual Manoeuvring (Circling)

j) Visual Approach
k) Non-precision Approach
l) Effect of Failed Downgraded Ground Equipment

D6.3.2 Flight Preparation

D6.3.3 Approach Preparation

a) Aircraft Status
b) Weather
c) Approach Ban (Limitations on approach and landing)
d) ATC Calls
e) Seat Positions
f) CAT II or CAT III Crew Briefing

D6.3.4 Approach Procedures

a) Task Sharing
b) Visual References
c) Loss of Visual References
d) Flight Parameters Deviation Calls

D6.3.5 Failure and Associated Actions

a) General
b) Abnormal Procedures

D6.3.6 ATC Procedure

D7 CONTINUOUS MONITORING:

After obtaining the initial authorization, the operations must be continuously monitored by the operator to detect any undesirable trends before they become hazardous.

D7.1 An operator must prove that he can perform CAT II or CAT III operations with the appropriate success rate and level of safety. For this purpose, he must carry out a proving programme called" Operational Demonstration" or "In-service Proving" to demonstrate that, in line service, the performance and the reliability of the aircraft and its systems meet the airworthiness certification criteria. Particular attention will also be given to the flight procedures as established by the operator and to the way the operator uses pilot's reports and applies his maintenance procedures.

D7.2 Successful Approach and Landing

The SATCO, PCAA will take into account weather reports, approaching / landing aircraft and the resulting approach/landing success rate whenever prevalent weather is below ILS CAT-I minima as follows:-

Airfield	Flight No.	Approach and Landing Time	Existing Weather	Remarks

D7.2.1 Successful Approach

An approach is considered to be successful if:

a) From 500 ft to start of flare

i) Speed is maintained within + 5kt disregarding rapid functions due to turbulence.
ii) No relevant system failure occurs.

b) From 300 ft to DH

i) No excessive deviation occurs
ii) No centralized warning gives a go-around order.

D7.2.2 Successful Landing

D7.2.2.1 An automating landing is considered to be successful if:
a) No system failure occurs
b) No flare failure occurs
c) No decrab failure occurs
d) Main-wheel touchdown occurs between 150M (500 It) and 750M (2500 ft) from runway threshold,
e) Assuming a normal GS Antenna location.
f) Nose-wheel touchdown occurs within 8M (27 ft) of runway centre line
g) Touchdown vertical speed does not exceed 360 ft. /min
h) Bank angle at touchdown does not exceed 7 degrees
i) Pitch angle does not exceed to maximum value for a safe tail clearance
j) Roll out lateral deviation does not exceed 8M (27 fit)
k) No roll out failure occurs.

D7.2.3 The following information must be retained for a period of 12 months.

D7.2.3.1 The total number of approach, by aeroplane type, where the airborne Category II or III equipment was utilized to make satisfactory, actual or practice, approaches to the applicable Category II to III minima; and

D7.2.3.2 Reports of unsatisfactory approach and/or automatic landings by, aerodrome and aeroplane registration, in the following Categories:

a) Airborne Equipment Faults
b) Ground Facility Difficulties
c) ATC Factors

D7.2.4 An operator must establish a procedure to monitor the performance of the automatic landing system of each aeroplane.

D8 AERODROME OPERATING MINIMA:

D8.1 An operator shall establish, for each aerodrome planned to be used, aerodrome-operating minima which is not lower than the values given in appendix 'A'. The method of determination of such minima shall not be lower than any that may be established for such aerodromes by the state in which the aerodrome is located.

D8.2 In establishing the aerodrome operating minima, which will apply to any particular operation, an operator must take full account of:

D8.2.1 The type, performance and handling characteristics of the aeroplane;

D8.2.2 The composition of flight crew, their competence and experience;

D8.2.3 The dimensions and characteristics of the runways, which may be selected for use;

D8.2.4 The adequacy and performance of the visual and non-visual ground aids;

D8.2.5 The equipment available on the aeroplanes for the purpose of navigation and/or control of flight path, as appropriate, during take-off, the approach, the flare, the landing, roll-out and the missed approach;

D8.2.6 The obstacles in the approach, missed approach and the climb-out areas required for the execution of contingency procedures and necessary clearance;

D8.2.7 The obstacle clearance altitude/height for the instrument approach procedures; and

D8.2.8 The means to determine and report meteorological conditions.

D8.3 The aeroplane categories referred to in Para D8.2.1 must be derived in accordance with the method given in Appendix 'B' Table 10.

D9 <u>LOW VISIBILITY TAKE-OFF:</u>

D9.1 Take-off with RVR less than 400 M is considered as LVTO.

a) LVTO with RVR between 400 M and 150 M.

i) The minimum RVR in this range of value is a function of the aircraft category and of the runway equipment (as specified in appendix A table 1).
ii) No operational approval is required from CAA to perform LVTO with RVR 400 M to 150 M.
iii) Flight crew members have satisfactorily completed training in a simulator approved for this purpose.

b) LVTO with RVR between 150 H and 125 M.

i) Operational approval is required from CAA to perform LVTO with RVR 150 M to 125 M.
ii) A visual segment of 90 M is required from the cockpit during the take-off run with the minimum RVR.
iii) Low visibility procedures are in force.
iv) High intensity runway centre line lights spaced 15 M or less and high intensity edge lights spaced 60 M or less are in operation.
v) The 125 M RVR value has been achieved for all of the relevant RVR reporting points.
vi) Flight crew member have satisfactorily completed training in a simulator approved by CAA for this purpose.

D10 <u>TRANSITIONAL PERIODS:</u>

D10.1 Operators with no previous Category II or III experience.

D10.1.1 An operator without previous Category II or III operational experience may be approved for Category II or IIIA operations, having gained a minimum experience of 6 months Category I operations on the aeroplane type.

D10.1.2 On completing 6 months of Category II or IIIA operations on the aeroplane type, the operator may be approved for Category IIIB operations. When granting such an approval, the CAA may impose higher minima than the lowest applicable for an additional period.

D10.2 Operators with previous Category II or III experience

D10.2.1 An operator with previous Category II or III experience may obtain authorization for a reduced transition period by application to the CAA.

D10.2.2 Maintenance of Category II, Category III and LVTO equipment. Maintenance instructions for on-board guidance systems must be established by the operator, in liaison with the manufacturer, and included in the operator's aeroplane maintenance program, which must be approved by CAA.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

AFCS	:	AUTOMATIC FLIGHT CONTROL SYSTEM
AFM	:	AIRCRAFT FLIGHT MANUAL
AIP	:	AERONAUTICAL INFORMATION PUBLICATION
ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
APV	:	APPROACH PROCEDURE WITH VERTICAL
ATC	:	AIR TRAFFIC CONTROL
CAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
CARs	:	CIVIL AVIATION RULES, 1994
CAT I	:	CATEGORY I
CAT II	:	CATEGORY II
CAT III	:	CATEGORY III
CDFA	:	CONTINUOUS DESCENT FINAL APPROACH
CMV	:	CONVERTED METEOROLOGICAL VISIBILITY
DA	:	DECISION ALTITUDE
DA/H	:	DECISION ALTITUDE/HEIGHT
DGCAA	:	DIRECTOR GENERAL CIVIL AVIATION AUTHORITY
DH	:	DECISION HEIGHT
EVS	:	ENHANCED VISION SYSTEM
FDS	:	FLIGHT DIRECTOR SYSTEM
FSD	:	FLIGHT STANDARDS DIRECTORATE
GBAS	:	GROUND-BASED AUGMENTATION SYSTEM
GLS	:	GBAS LANDING SYSTEM
GS	:	GLIDE SLOPE
HUD	:	HEAD-UP DISPLAY
HUDLS	:	HEAD-UP DISPLAY LANDING SYSTEM
IAS	:	INDICATED AIRSPEED
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
IFR	:	INSTRUMENT FLIGHT RULES
ILS	:	INSTRUMENT LANDING SYSTEM
IMC	:	INSTRUMENT METEOROLOGICAL CONDITIONS
LVP	:	LOW VISIBILITY PROCEDURES

LVTO	:	LOW VISIBILITY TAKE-OFF
MAPT	:	MISSED APPROACH POINT
MDA	:	MINIMUM DESCENT ALTITUDE
MDA/H	:	MINIMUM DESCENT ALTITUDE/HEIGHT
MDH	:	MINIMUM DESCENT HEIGHT
MEL	:	MINIMUM EQUIPMENT LIST
METAR	:	AVIATION ROUTINE WEATHER REPORT
MLS	:	MICROWAVE LANDING SYSTEM
MOR	:	METEOROLOGICAL OPTICAL RANGE
NOTAM	:	NOTICE TO AIRMEN
NPA	:	NON-PRECISION APPROACH
OCA	:	OBSTACLE CLEARANCE ALTITUDE
OCA/H	:	OBSTACLE CLEARANCE ALTITUDE/HEIGHT
OCH	:	OBSTACLE CLEARANCE HEIGHT
OFZ	:	OBSTACLE-FREE ZONE
PA	:	PRECISION APPROACH
PBN	:	PERFORMANCE-BASED NAVIGATION
RNAV	:	AREA NAVIGATION
RNP	:	REQUIRED NAVIGATION PERFORMANCE
RVR	:	RUNWAY VISUAL RANGE
TDZ	:	TOUCHDOWN ZONE
VFR	:	VISUAL FLIGHT RULES
VMC	:	VISUAL METEOROLOGICAL CONDITIONS
VNAV	:	VERTICAL NAVIGATION

E2. RECORDS:

NIL

E3. REFERENCES:

E3.1 ICAO Annex 6 Part 1

E3.2 ICAO Doc 9365

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 15th April, 2018 and supersedes ANO 91.0019 (Issue-2).

--S/d--

(USAID-UR-REHMAN USMANI)
Air Vice Marshal
Actg. Director General,
Pakistan Civil Aviation Authority

Dated: - **30th March, 2018**

--S/d--

(CAPT. ARIF MAJEED)
O/Director Flight Standards

Dated **27th March, 2018**
File No. HQCAA/1077/030/FSAC

APPENDIX "A"

AERODROME OPERATING MINIMA

A. TAKE-OFF MINIMA:

1) General

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

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

a) Within one hour for two engines aeroplanes

b) Within two hours for four engine aeroplanes

c) Within the maximum approved diversion time for aircraft qualified for EDTO (ETOPS), but not more than two hours.

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

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

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

3) Required RVR/Visibility

i) For multi-engined aeroplanes, whose performance is such that, in the event of a critical power unit failure at any point during takeoff, the aeroplane can either stop or continue the take-off to a height of 1500 ft above the aerodrome while clearing obstacles by the required margins, the take-off minima established by an operator must be expressed as RVR/Visibility values not lower than those given in Table 1 below except as provided in paragraph (4) below:

Table 1 - RVR/Visibility for take-off

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

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

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

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

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

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

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

Take-off RVR/Visibility -flight path	
Assumed engine failure height above the take-off runway	RVR/Visibility (Note 2)
< 50 ft	200 m
51-100 ft	300 m
101 - 150 ft	400 m
201 - 300 ft	1000 m
> 300 ft	1500 m (Note 1)

Note 1: 1500 m is also applicable if no positive take-off flight path can be constructed.

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

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

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

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

a) Low Visibility Procedures are in force:
b) High intensity runway centre line lights spaced 15 m or less and high intensity edge lights spaced 60 m or less are in operations;
c) Flight crew members have satisfactorily completed training in a simulator approved for this procedure;
d) A 90 m visual segment is available from the cockpit at the start of the take-off run; and
e) The required RVR value has been achieved for all of the relevant RVR reporting points.

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

B. NON-PRECISION APPROACH:

1) System minima

i) An operator must ensure that system minima for non-precision approach procedures, which are based upon the use of ILS without glide path (LLZ only), VOR, NDB, SPA and VDF are not lower than the MDH values given in Table 3 below.

Table 3 - System minima for non-precision approach aids

System minima	
Facility	Lowest MDH
ILS (no glide path - LLZ)	250 PC
SPA (terminating at 1/2 NM)	250 fl
SPA (terminating at 1 NM)	300 PC
SPA (terminating at 2 NM)	350 ft
VOR	300 Pc
VOR/DME	250 Pc
NDB	300 Pc
VDF (QDM & QGH)	300 ft

2) Minimum Descent Height: An operator must ensure that the minimum descent height for a non-precision approach is not lower than either:
i) The OCH/OCL for the category of aeroplane; or
ii) The system minimum.

3) Visual Reference: A pilot may not continue an approach below MDA/MDH unless at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:
i) Elements of the approach light system
ii) The threshold;
iii) The threshold markings;
iv) The threshold lights;
v) The threshold identification lights;
vi) The visual Glide slope indicator;
vii) The touchdown Zone or touchdown zone markings;
viii) The touchdown zone lights;
ix) Runway edge lights; or
x) Other visual references accepted by the CAA.

4) Required RVR: The lowest minima to be used by an operator for non-precision approaches are:

Table : 4a - RVR for non-precision approach - Full facilities

Non-precision approach minima, Full facilities (Notes (1), (5), (6) and (7)				
MDH	RVR/Aeroplane Category			
	A	B	C	D
250 – 299 ft.	800 m	800 m	800 m	1200 m
330 – 449 ft.	900 m	1000 m	1000 m	1400 m
450 – 649 ft	1000 m	1200 m	1200 m	1600 m
650 ft. and Above	1200 m	1400 m	1400 m	1800 m

Table 4b - RVR for non-precision approach - Intermediate facilities

Non-precision approach minima Intermediate facilities (Notes (2), (5), (6) and (7)				
MDH	RVR/Aeroplane Category			
	A	B	C	D
250 – 299 ft.	1000 m	1100 m	1200 m	1400 m
330 – 449 ft.	1200 m	1300 m	1400 m	1600 m
450 – 649 ft	1400 m	1500 m	1600 m	1800 m
650 ft. and Above	1500 m	1500 m	1800 m	2000 m

Table 4c - RVR for non-precision approach - Basic facilities

Non-precision approach minima Basic facilities (Notes (3), (5), (6) and (7)				
MDH	RVR/Aeroplane Category			
	A	B	C	D
250 – 299 ft.	1200 m	1300 m	1400 m	1600 m
330 – 449 ft.	1300 m	1400 m	1600 m	1800 m
450 – 649 ft	1500 m	1500 m	1800 m	2000 m
650 ft. and Above	1500 m	1500 m	2000 m	2000 m

Table 4d - RVR for non-precision approach - Nil approach light facilities

Non-precision approach minima Nil Approach light facilities (Notes (4), (5), (6) and (7)				
MDH	RVR/Aeroplane Category			
	A	B	C	D
250 – 299 ft.	1500 m	1500 m	1600 m	1800 m
330 – 449 ft.	1500 m	1500 m	1800 m	2000 m
450 – 649 ft	1500 m	1500 m	2000 m	2000 m
650 ft. and Above	1500 m	1500 m	2000 m	2000 m

Note 1: Full facilities comprise runway markings, 720 m or more of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.

Note 2: Intermediate facilities comprise runway markings, 420-719 m of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.

Note 3: Basic facilities comprise runway markings, <420 m of HI/MI approach lights, any length of LI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.

Note 4: Nil approach light facilities comprise runway markings, runway edge lights, threshold lights, runway end lights or no lights at all.

Note 5: The tables are only applicable to conventional approaches with a nominal descent slope of not greater than 3.8o. Greater descent slopes will usually require, that visual glide slope guidance (e.g. PAPI) is also visible at the Minimum Descent Height.

Note 6: The above figures are either reported RVR or meteorological visibility converted to RVR as in sub-paragraph (H) below.

Note 7: The MDH mentioned in Table 4a,4b,4c and 4d refer to the initial calculation of MDH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest ten feet, which may be done for operational purposes, e.g. conversion to MDA.

5) Night operations: For night operations at least runway edge, threshold and runway end lights must be on.

C. PRECISION APPROACH - CATEGORY 1 OPERATIONS:

1) General: A Category 1 operation is a precision instrument approach and landing using TLS, MLS or PAR with a decision height not lower than 200 ft and with a runway visual range not less than 550 M.

2) Decision Height: An operator must ensure that the decision height to be used for a Category 1 precision approach is not lower than:

   i) The minimum decision height specified in the Aeroplane Flight Manual (AFM) if stated;
   ii) The minimum height to which the precision approach aid can be used without the required visual reference;
   iii) The OCH/OCL for the category of aeroplane; or
   iv) 200 ft.

3) Visual Reference: A pilot may not continue an approach below the Category 1 decision height, determined in accordance with sub-paragraph (C)(2) above, unless at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

   i) Elements of the approach light system;
   ii) The threshold;
   iii) The threshold markings;
   iv) The threshold lights;
   v) The threshold identification lights;
   vi) The visual glide slope indicator;
   vii) The touchdown zone or touchdown zone markings;
   viii) The touchdown zone lights; or
   ix) Runway edge lights;

4) Required RVR: The lowest minima to be used by an operator for Category 1 operations is given in table 5 below:

Table 5 - RVR for Cat 1 approach Vs facilities and DH

Category I minima				
Decision Height (Note 7)	Facilities/RVR (Note 5)			
	Full (Notes 1&6)	Interm. (Notes 2&6)	Basic (Notes 3&6)	Nil (Notes 4&6)
200 ft.	550 m	700 m	800 m	1000 m
201 – 250 ft.	600 m	700 m	800 m	1000 m
251 – 300 ft	650 m	800 m	900 m	1200 m
301 ft. and Above	800 m	900 m	1000 m	1200 m

Note 1: Full facilities comprise runway markings, 720 m or more of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.

Note 2: Intermediate facilities comprise runway markings, 420-719 m of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.

Note 3: Basic facilities comprise runway markings, <420 m of HI/MI approach lights, any length of LI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.

Note 4: Nil approach light facilities comprise runway markings, runway edge lights, threshold lights, runway end lights or no lights at all.

Note 5: The above figures are either the reported RVR or meteorological visibility converted to RVR in accordance with paragraph (H).

Note 6: The table is applicable to conventional approaches with a glide slope angle up to and including 3.0^o. An ILS glide path in excess of 3.0^o is used only where alternate means of satisfying obstacle clearance requirements are impractical.

Note 7: The DH mentioned in the Table 5 refers to the initial calculation of DH. When selecting the associated RVR, there is no need to take account of a roundin9 up to the nearest ten feet, which may be done for operational purposes, (e.g. conversion to DA)

D. PRECISION APPROACH - CATEGORY II OPERATIONS:

1) General: A Category II operations is a precision instrument approach and landing using ILS or MLS with:

   i) A decision height below 200 ft but not lower than 100 ft', and
   ii) A runway visual range of not less than 350 m.

2) Decision Height: An operator must ensure that the decision height for a Category II operation is not lower than:

   i) The minimum decision height specified in the AFM, if stated;
   ii) The minimum height to which the precision approach aid can be used without the required visual reference;
   iii) The OCH/OCL for the category of aeroplane;
   iv) The decision height to which the flight crew is authorized to operate; or
   v) 100 ft.

3) Visual Reference: A pilot may not continue an approach below the Category II decision height determined in accordance with sub-paragraph (D)(2) above unless visual reference containing a

segment of at least 3 consecutive lights being the centre line of the approach lights, or touchdown zone lights, or runway centre line lights, or runway edge lights, or a combination of these is attained and can be maintained. This visual reference must include a lateral element of the ground pattern, i.e. an approach lighting crossbar or the landing threshold or a barrette of the touchdown zone lighting.

4) Required RVR: The lowest minima to be used by an operator for Category II operations is given below in table 6.

Table 6 - RVR for Cat II approach Vs DH

Category II minima		
Decision Height	Auto-coupled to below DH (Note 1)	
	RVR/Aeroplane Category A,B & C	RVR/Aeroplane Category D
100 - 120 ft.	350 m	350 m
121 - 140 ft.	400 m	400 m
141 ft. and Above	450 m	450 m

Note 1: The reference to auto-coupled to below DH' in this table means continued use of the automatic flight control system down to a height which is not greater than 80% of the applicable DH. Thus airworthiness requirements may, through minimum engagement height for the automatic flight control system, affect the DH to be applied.

E. PRECISION APPROACH - CATEGORY III OPERATIONS:

1) General Category III operations are subdivided as follows.

i) Category III A operations: A precision instrument approach and landing using ILS or MLS with:
a) A decision height lower than 100 ftc; and
b) A runway visual range not less than 200 m.

ii) Category III B operations: A precision instrument approach and landing using ILS or MLS with
a) A decision height lower than 50 ft, or no decision height; and
b) A runway visual range lower than 200 m but not less than 75m.

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

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

3) No Decision Height Operations: Operations with no decision height may only be conducted if:

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

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

4) Visual Reference

i) For Category III A operations, a pilot may not continue an approach below the decision height determined in accordance with subparagraph (E)(2) above unless a visual reference containing segment of at least 3 consecutive lights being the centre line of the approach lights, touchdown zone lights, or runway centre line lights, or runway edge lights, or a combination of these is attained and can maintained.

ii) For Category Iii B operations with a decision height, a pilot may not continue an approach below the Decision Height, determined in accordance with sub-paragraph (E)(2) above, unless a visual reference containing at least one centre line light is attained and can be maintained.

iii) For Category III operations with no decision height there is no requirement for visual contact with the runway prior to touchdown

5) Required RVR: The lowest minima to be used by an operator for Category III operations is given below in table 7.

Table 7 - RVR for Cat III approach Vs flight control system and DH

Category III Minima					
		Flight Control System/RVR (metres)			
		Fail Passive	Fail Operational		
			Without roll-out system	With roll-out guidance or control system	
Approach Category	Decision Height (ft)			Fail Passive	Fail Operational
IIIA	Less than 100 ft	200 m (Note 1)	200 m	200 m	200 m
IIIB	Less than 50 ft.	Not . authorized	Not . authorized	125 m	75 m
IIIC	No DH	Not . authorized	Not . authorized	Not . authorized	75 m

Note 1: For operations to actual RVR values less than 350m, a go-around is assumed in the event of an autopilot failure at or below DH.

F. <u>CIRCLING:</u>

1) The lowest minima to be used by an operator for circling are given below in table 8.

Table 8 - Visibility and MDH for circling Vs aeroplane category

	Aeroplane Category			
	A	B	C	D
MDH	44ft.	500ft.	600ft.	700ft.
Minimum meteorological visibility	1500 ft.	1600 ft.	2400 ft.	3600 ft.

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

G. Visual Approach: An operator shall not use an P, VR of less than 800 m for a visual approach.

H. Conversion of Reported Meteorological Visibility (RVR / CMV) Practices for the Application of an Approach Ban:

1) The principle of converting reported meteorological visibilities into corresponding RVR values and the exclusive use of either reported or converted RVR values for the determination of straight-in approach minima had first been introduced in 1995 by Europe's Joint Aviation Authorities (JAA) and defined in JAR-OPS 1, Subpart E. In the years following the first publication of JAR-OPS 1, the JAA AOM concept was not only adopted by all European States but also by a large number of States outside Europe. As a result, the concept of converting reported meteorological visibilities into RVR values used for the establishment of an approach ban with straight-in approach minima has found widespread acceptance by many airline operators worldwide.

2) The evolution of the JAA AOM concept into a new AOM concept, based on CDFA and largely harmonized between Europe and the United States of America, made it necessary to develop a new term for reported meteorological visibilities converted into RVRs when these values exceed 2 000 m because, other than in the original JAA AOM concept, upper RVR values defined for straight-in approaches in the new AOM concept do not end at 2 000 m but at 5 000 m. The new term found was "converted meteorological visibility" (CMV). CMV values are derived by applying the same methodology as applied for the conversion of reported meteorological visibilities into RVR values in those cases where the resulting values exceed 2 000 m. Since its first introduction in EU-OPS in 2008, the CMV concept has been in use by all European operators and States and by many operators and States outside Europe.

3) Because runway visual range and meteorological visibility are established differently, a ratio can be established between the two. The effect of lighting intensities and background luminance plays a role when establishing a runway visual range. Table 9 indicates the relation between light intensity and day or night conditions.

Table 9. Conversion of meteorological visibility to RVR/CMV

Lighting elements in operation	RVR/CMV = reported meteorological visibility multiplied by:	
	Day	Night
High intensity approach and runway lighting	1.5	2.0
Any type of lighting installation other than above	1.0	1.5
No lighting	1.0	Not applicable
EXAMPLE: Reported visibility 600M	Day (HIALS and HIRL in use): CMV=600m x 1.5=900m Day (No lighting): CMV=600m x 1.0=600m Night (HIALS and HIRL in use): CMV=600M x 2.0=1200m	

4) An operator must ensure that a meteorological visibility to RVR/CMV conversion is not used for take-off, for calculating any other required RVR minimum less than 800 m, for visual / circling approach or when reported RVR is available.

5) When converting meteorological visibility to RVR in all other circumstances than those in 4) above, an operator must ensure that Table 9 is used.

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

APPENDIX "B"

CATEGORIES OF AIRCRAFT – ALL WEATHER OPERATIONS

CLASSIFICATION OF AEROPLANES.

1. Aircraft performance has a direct effect on the airspace and visibility needed to perform the various manoeuvres associated with the conduct of instrument approach procedures. The most significant performance factor is aircraft speed. Accordingly, the following five Categories of typical aircraft have been established, based on 1.3 times stall speed in the landing configuration at maximum certificated landing mass, to provide a standardized basis for relating aircraft manoeuvrability to specific instrument approach procedures (Table 10)

Table 10 - Aeroplane Category

Aeroplane Category	Vat
A	Less Than 91 kts
B	From 91 to 120 kts
C	From 121 to 140 kts
D	From 141 to 165 kts
E	From 166 to 210 kts.

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

2. The instrument approach chart will specify the individual categories of aircraft for which the procedure is approved. Normally, procedures will be designed to provide protected airspace and obstacle clearance for aircraft upto and including category D. However, where airspace requirements are critical, procedures may be restricted to lower speed categories. Alternately, the procedure may specify a maximum IAS for a particular segment without reference to aircraft category. In any case it is essential that pilots comply with the procedures and information depicted on instrument approach charts and the appropriate speeds shown in table II below, if the aircraft is to remain in the areas developed for obstacle clearance purpose.

Table 11 - Speed for Procedure Calculation in Knots

				Max speed for visual manoeuvring	**Max speeds for missed approach**	
Aircraft Category	**V_{AT}**	**Speeds for initial approach**	**Speeds for final approach**	**(circling)**	**Intermediate**	**Final**
A	<91	90/150 (110°)	70/100	100	100	110
B	91/120	120/180 (140°)	85/130	135	130	150
C	121/140	160/240	115/160	180	160	240
D	140/165	185/250	130/185	205	185	265
E	166/210	185/250	155/230	240	230	275

ACCIDENT PREVENTION AND FLIGHT SAFETY PROGRAM

AIR NAVIGATION ORDER

VERSION : 3.0
DATE OF IMPLEMENTATION : 01.041.2018
OFFICE OF PRIME INTEREST : Flight Standards Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. ASIF JABBAR KHAN	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR MARSHAL (RETD.) ASIM SULEIMAN	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by the Director General of the Civil Aviation Authority (CAA) in pursuance of the powers, vested under Rule 4 of Civil Aviation Rules (CARs) 1994.

A2. This ANO may be read as a supplemental information to Part XV-ACCIDENTS AND INCIDENTS of CARs 1994.

B. PURPOSE:

B1. To create procedures and programmes in order to eliminate the risk / hazard involved in the operation of aircraft.

B2. To create environment in which any chance or probability of damage to material and life has been completely eliminated.

C. SCOPE:

C1. All Air Carriers, Charter Operators (Class I and II), Executive Operators, Flying Schools, Aerial Works and all other civil flying organizations, shall on a continuing basis maintain a Flight Safety Programme.

C2. The operators listed in para C1 above shall appoint a person for managing the programme on a full or part time basis. The person should hold the qualifications as stated in Para D2.2.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 For the purpose of this ANO and in line with ICAO Standards, Recommended Practices and procedures, the following terms are defined as hereunder:

D1.1.1 "Programme Elements". The following elements shall be included in the operator's Accident Prevention and Flight Safety Programme and described in the appropriate manuals:

a) Operator's Management.
b) Qualifications of the Accident Prevention and Flight Safety Personnel.
c) Responsibilities of the Accident Prevention trod Flight Safety Personnel.
d) Training for the Accident Prevention and Flight Safety Personnel. Incident Management.
e) Flight Safety Committee.
f) Emergency Response Planning.
g) Communication and Safety Education.

D1.1.2 Furthermore, all operators are to ensure that they go through the contents of ICAO Document 9376 Chapter 3, 4, 8 and 12; and ICAO Document 9422 Chapter 5 and ICAO Document 8188 Volume I; and all relevant chapters dealing with Accident Prevention and Flight Safety Programme must be included in the Airline's Operations Manual.

D2. APPLICABILITY:

D2.1 Description of the Accident Prevention Management Plan; and Flight Safety Programme

a) The plan shall identify the management position responsible for ensuring that:

i) All necessary element of the programme have been developed, properly integrated, and coordinated.
ii) The appointee maintains a close liaison with the CAA Flight Standards, Safety Investigation Board, and Industry Associations.
iii) The organizations accident prevention and response plan is developed and maintained.
iv) Identifies flight safety deficiencies and recommendations /suggestions for corrective actions.
v) Investigation(s) and report(s) concerning incidents/accidents are developed and makes recommendations to prevent a recurrence.
vi) A flight Safety database is developed and maintained to monitor and analyse trends.
vii Recommendations to senior management on all matters pertaining to ground/flight safety issues are presented.

D2.2 Qualifications of the Accident Prevention and Flight Safely Personnel:

a) Extensive operational experience, normally achieved as flight crew member(s) or equivalent experience in aviation management; and
b) Training in accordance with Para D2.3

D2.3 Training for an Accident Prevention and Flight Safety Personnel:

Personnel responsible for safety shall successfully complete a training Course (resident or correspondent) that shall include the following subjects:

1) Flight Safety philosophy,
2) Human factors and the decision making process.
3) Accident prevention.
4) The role of the Accident Prevention and Flight Safety personnel as an advisor to senior management.
5) Risk management
6) Accident/Incident Management:

D2.4 Responsibilities of the Accident Prevention and Flight Safety Personnel:

a) The person In-charge of the Accident Prevention and Flight Safety Programme shall report directly to the Accountable Manager or equivalent for flight safety matters and not to the Director of Flight Operations. The appointee shall be responsible for managing the Accident Prevention and Flight Safety Programme by:

1) Monitoring and advising on all organizational ground/flight activities, which may have an impact on safety.
2) Establishing a reporting system, which provides for a timely and free flow of ground/flight safety related information.
3) Conducting safety surveys.
4) Soliciting and processing ground/flight safety improvement suggestions.

5) Developing and maintaining a safety awareness programme
6) Monitoring Industry ground/flight safety concerns, which may have an impact on operations.
7) Ensuring that a close liaison with aeroplane malfunctions is maintained.

D2.5 Incident Management:

a) All organizations specified in Para C1, shall be responsible for providing employees with a timely means of reporting any unsafe conditions. The appointee responsible for the Accident Prevention and Flight Safety programme shall institute and maintain an incident reporting system. This system will provide for:
   1) A process of reporting incidents.
   2) Investigation of incidents.
   3) The means of advising management; and
   4) Information feedback to employees.

D2.6 Flight Safety Committee:

a) An organizations specified in Para C1, shall establish an Accident Prevention and Flight Safety Committee for the following functions:
   1) "Responsibilities". The committee shall be able to monitor all areas of the operation, identify safety concerns and deficiencies, and make recommendations for corrective measures to senior management where applicable.
   2) "Members". The committee shall be chaired by the Operations Manager or his designate. Members shall include representatives of all operating department in the organization.
   3) "Meeting". The committee shall meet on a regular basis (at least twice a year) as established by the committee chairperson. Special meetings on urgent matters can be called by any committee member.
   4) "Minutes". Minutes of the committee meetings shall provide a record of agenda items, decisions and corrective actions taken where applicable.

D2.7 Emergency Response Planning:

a) All organizations specified in Para C1, shall develop; and maintain an Emergency Response Plan that shall include the following elements:
   1) Organization's policy.
   2) Organization's mobilization and notification to agencies.
   3) Casualty and next of kin coordination.
   4) Passenger and crewmember welfare.
   5) Accident investigation on behalf of the operator.
   6) The operator's team response to the details of accident and site.
   7) Preservation of accident evidence.
   8) Media relations.
   9) Claims and insurance procedures.
   10) Aeroplane wreckage removal.
   11) Emergency response training.

D2.8 Communication and Safety Education:

a) All organizations specified in Para C1, shall be responsible for an efficient system of distributing appropriate safety materials;
b) Ensuring that the programme is disseminated to all appropriate personnel;

c) That a detailed description of' the programme is incorporated in the appropriate operators manual;
d) That adequate programme management is established and maintained.
e) That Notification of Accidents and Incidents is accomplished efficiently. (Additional guidance contained in Part XV of CARs' 1994).

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
CARs	:	CIVIL AVIATION RULES
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 Civil Aviation Rules (CARs), 1994

E3.2 ICAO Doc 9376

E3.3 ICAO Doc 9422

E3.4 ICAO Doc 8188, Volume-I

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st January, 2018 and supersedes ANO 91.0020 (Issue-2).

--S/d--

(ASIM SULEIMAN)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **26th December, 2017**

--S/d--

(CAPT. ARIF MAJEED)
Director Flight Standards

Dated- **19th December, 2017**
File No. HQCAA/1077/031/FSAC

RECREATIONAL FLYING ACTIVITY

AIR NAVIGATION ORDER

VERSION : 3.0
DATE OF IMPLEMENTATION : 01.02.2018
OFFICE OF PRIME INTEREST : Flight Standards Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. KHALID MAHMOOD	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR MARSHAL (RETD.) ASIM SULEIMAN	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by the Director General, Civil Aviation Authority (DGCAA) in exercise of powers vested in him under Rule 4, 124, 140, 145, 360 and 363 of Civil Aviation Rules 1994 (CARs 94).

B. PURPOSE:

B1. The purpose of this ANO is to apprise the operator of regulations encompassing Recreational Flying Operations i.e. Recreational Certificate of Competency (RCC), Airworthiness requirements and Operating Rules and Regulations.

C. SCOPE:

C1. This ANO relates to the rules governing the operation of recreational flying activities within Pakistan.

C2. A person shall not fly or an approved/ licensed organization/ association shall not allow a person to fly a recreational vehicle listed in this ANO except for the purposes of training, unless he has a Recreational Certificate of Competency (RCC) as specified herein.

C3. Unless contrary intentions appear, this AN0 shall also be read in conjunction with ANO 90.0006 (Personnel Licences and Ratings General Provisions) and 92.0003 (Airworthiness and Maintenance requirements pertaining to Recreational Vehicles).

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 For the purpose of this ANO, the following definitions apply:

D1.1.1 **“Approved Person"** A person approved in writing by the Licensing Office as a Designated Examiner to conduct flight tests, checks or examinations.

D1.1.2 **"Authorized instructor”** means a person authorized by the Competent Authority for conducting training of a Person for aeronautical knowledge and flying instruction required for a RCC.

D1.1.3 **"Authorized Person"** A person authorized by the Competent Authority.

D1.1.4 **"Competent Authority"** The Civil Aviation authority of Pakistan or designated by the Director General.

D1.1.5 “**Designated Examiner"** An approved person.

D1.1.6 **"Medical Assessment”** means an assessment for the issue of a certificate of medical fitness conducted by the Chief of Aviation Medicine or a person designated by him.

D1.1.7 **"Recreational Competency Certificate " (RCC)** a certificate issued by the competent authority for piloting an uncertified vehicle upto 1200 lbs for the purpose of recreational activities. Any uncertified vehicle above 1200 lbs shall be piloted by a holder of PPL or a higher License.

D1.1.8 **"Recreational Vehicle"** means a piloting device used for the purpose of recreational activities, such as an Ultra Light, Sports Aeroplane, Hang Glider and Powered Parachute.

D1.1.9 **"Ultra Light Vehicle"** (ULV) means an aeronautical vehicle that:

a) is used or intended to be used for manned operations in the air by a maximum of two occupants;

b) if empowered, weighs less then 200 pounds; or

c) if powered:

i) weighs not more than 500 pounds empty weight, excluding fuel, floats and safety devices which are intended for deployment in a potentially catastrophic situation;

ii) has a fuel capacity not exceeding 15 US gallons;

iii) is not capable of more then 85 KCAS at full power in level flight; and,

iv) unless otherwise approved by the Competent Authority, has a power-off stall speed not exceeding 45 KCAS.

D1.1.10 **"Sports Aeroplane"** means an amateur built vehicle that:

a) has a capacity for not more than two occupants;

b) has a gross weight not exceeding 1200 lb.;

c) unless otherwise approved by the Competent Authority; has a stall speed not exceeding 52 KCAS;

D1.1.11 **"Powered Parachute"** means a parachute that allows a person to take-off, restart-in-flight and lands the parachute under power. The device:.

a) has a capacity for not more than two occupants;

b) has a gross weight not exceeding 470 lb.

c) unless otherwise approved by the Competent Authority, has a stall speed not exceeding 25 KCAS;

D1.1.12 **"Hang Glider"** means heavier-than-air vehicle that is supported in flight by the dynamic reaction of the air against its lifting surfaces and whose flight does not depend principally on an engine. The device has a capacity for not more than two occupants.

D2. RECREATIONAL "CERTIFICATE OF COMPETENCY" (RCC):

D2.1 Age, medical, language and security clearance requirements: An applicant for issuance of RCC shall:

D2.1.1 not commence flying training for any type of recreational flying activity until he has attained the age of 17 years;

D2.1.2 obtain a medical assessment certificate in accordance with the standards specified in the attached appendix, prior to commencement of training;

D2.1.3 be capable of speaking and reading English.

D2.1.4 be security cleared as specified by the Government of Pakistan.

D2.1.5 Hold an FROL.

D2.1.6 Hold an SPL, which may be issued with a Minimum of Metric of equivalent degree or having passed an English Language test conduc6ted by the Club and duly certificated.

D2.2 **Aeronautical Knowledge**: An applicant for RCC must have logged grot ad instructions from an authorised instructor, or must present evidence to the Competent Authority, showing satisfactory completion of a course of instruction in at least the areas of aeronautical knowledge determined by the Competent Authority appropriate to the competency sought, including at least the following:

D2.2.1 Applicable CARs, ANOs, Directives, Safety Circulars and procedures for RCC privileges, limitations, and flight operations that apply to the authorisation sought;

D2.2.2 Accident reporting requirements of CAA;

D2.2.3 Use of the applicable portions of the AIP;

D2.2.4 If applicable, the use of aeronautical Charts compass and magnetic;

D2.2.5 Recognition of critical Weather situations from the ground and in flight, wind shear avoidance, the applicable procurement and use of aeronautical weather reports/forecasts;

D2.2.6 The safe and efficient operation of recreational vehicles including collision avoidance, recognition and avoidance of wake turbulence;

D2.2.7 The effects of density altitude on takeoff and climb performance;

D2.2.8 Weight and balance computations;

D2.2.9 Principles of applicable aerodynamics, power plants and aircraft systems;

D2.2.10 Aeronautical decision-making and judgment;

D2.2.11 Pre-flight action as applicable to 'the rating sought;

D2.2.12 Radio communication skills (where applicable).

D2.2.13 Additional aeronautical knowledge that applies to sought, as established by the Competent Authority.

D2.2.14 Contents of USUA Pilots Manual.

Important Note:

A person / organization / association engaged in recreational activities shall be responsible to provide CAA all relevant information, documents, ground and flying training syllabus, etc. of other established Associations and CAA of Contracting States. This is to satisfy the requirements of such an activity, prior to the commencement of the activity, as may be required by the Competent Authority.

D2.3 **Aeronautical Experience:** To apply for the rating sought, the applicant's logbook must contain an appropriate endorsement by an Authorized Instructor who found the applicant proficient to operate the vehicle safely. An applicant applying for a flight check for the issue of RCC.; must accomplish and log flight time as given under, for the rating sought:

D2.3.1 **Sport Aeroplane**: At least a minimum of 30 hours of total flight time, which must include the following:

a) At least 15 hours of flight instructions from an Authorised Instructor, including a minimum of 3 takeoff and landings from other than the base airstrip;

b) At least 15 hours of solo flight in sport aeroplanes including 5 hours on type.

D2.3.2 To appear for a flight check with a CAA Inspector or a Designated Examiner, the person must have flown at least two hours in the appropriate type recreational vehicle within the preceding 90 days to the flight Check.

D2.3.3 **Ultra Light/ Hang Glider/ Powered Parachute**: A person appearing for a flight check with a Designated Examiner, must have at least a minimum of 15 hours of total flight time, including:

a) At least 8 hours of flight instructions from an Authorized Instructor,

b) At least 7 hours of 'solo'. flight time including at least 3 hours on type.

D2.3.4 To appear for a flight check, the person must have flown at least two hours in the appropriate type of recreational vehicle within the preceding 90 days to the flight check.

D2.4 **Eligibility for the issue of RCC**: The following persons holding a Valid Medical certificate, are eligible for the issue of RCC, conditional to clearing an oral examination and a flight check by CAA Inspector or a Designated Examiner after the necessary ground/flying training:

D2.4.1 A holder of RCC or its equivalent from contracting state;

D2.4.2 A PPL or higher licence holder;

D2.4.3 A qualified pilot from the Armed Forces.

D2.5 **Validity of RCC**: The Certificate (RCC) shall remain valid for period of 2 years from the date of initial issue/ renewal or as extended by the Competent Authority from time to time, subject to the medical fitness and recent experience, unless varied, suspended or cancelled earlier by the Competent Authority.

D2.6 **Renewal Requirements**: An applicant for renewal of RCC shall:

D2.6.1 Have carried out at least 5 bouts of flight time during the six months preceding the date of application or have passed the RCC renewal flight check, and

D2.6.2 Have a valid medical certificate of fitness.

D2.7 **Recent Experience Requirements**: A person holding a valid medical assessment and an RCC, would be required to have a flight review with an Authorised Instructor, if the person has not flown a minimum of two hours during the last six months on the 'Type' endorsed in his RCC.

D2.8 **Fee for Issue/Renewal of RCC**: Issue/ renewal fee of RCC shall be as prescribed by the Competent Authority in the Personnel Licensing Manual.

D2.9 **Privileges and Limitations**:

D2.9.1 A holder of valid RCC may operate the vehicle as applicable, only as endorsed on his Certificate subject to have cleared the specific type technical and flight check with authorized Instructor.

D2.9.2 A holder RCC (Sports) may exercise the privileges of RCC (ULV) subject to have cleared the specific type technical and flight check with authorized Instructor.

D2.9.3 RCC holder shall comply with the provisions given in CARs '94, ANOs and instructions issued there under.

D3. <u>REQUIREMENTS TO ACT AS AN AUTHORIZED INSTRUCTOR:</u>

D3.1 Unless otherwise approved by the Competent Authority, an applicant to act as an Authorized Instructor shall meet the following experience requirements:

D3.1.1 Hold a Valid medical assessment and a valid RCC;

D3.1.2 Have at least 100 hours aer6nautical experience as pilot of the recreational vehicle of which at least 75 hours are as pilot-in-command including 25 hours on the vehicle:

D3.1.3 Pass an approved Type Instructor course, including ground test on approved training Manual and a flight check with a CAA Inspector or Designated Examiner.

D3.1.4 A Type Instructor, having logged 10 hours as Type Instructor, will be eligible to exercise the privileges of Flight Instructor on recreational vehicle provided he has completed the approved Basic Flying Instructor Course a the flying club and a flight check with a CAA Inspector or Designated Examiner.

D3.2 **Exemptions**

D3.2.1 A Qualified Flying Instructor from a recognized institution or a Qualified Instructor from a contracting State having undergone a Transition Course and logged 10 hours as pilot on type of vehicle may exercise the privileges of a flight Instructor.

D3.2.2 A holder of a CPL or higher licence, holding an RCC, may exercise the privileges of a flight Instructor provided he has completed the Basic Flying Instructor Course, has logged 20 hours as type instructor and a flight check with a CAA Inspector or a Designated Examiner.

D4. AIRWORTHINESS REQUIREMENTS:

D4.1 Details regarding registration, Airworthiness and maintenance requirements for Recreational Vehicles may be referred to, in ANO-003-AWRG.

D5. OPERATING RULES AND RESTRICTIONS:

D5.1 The Competent Authority may at any time suspend or ban the Flying Recreational Activity if deemed appropriate.

D5.2 All operations in a recreational vehicle are to be conducted in uncontrolled airspace unless the vehicle has two-way communication with ATC.

D5.3 No person may allow an object to be dropped from a recreational vehicle without prior approval from the Competent Authority.

D5.4 Powered recreational vehicles shall yield the right-of-way to un-powered recreational vehicles.

D5.5 No person shall operate a recreational vehicle:

D5.5.1 in prohibited or restricted areas unless that person has permission from the user or controlling agency, as appropriate;

D5.5.2 except in the areas designated/approved by the A-TS division OAA, and in accordance with the limitations specified therein;

D5.5.3 over any congested area of a city, town or settlement;

D5.5.4 in a manner that creates a hazard to other persons or property.

D5.5.5 unless clear of clouds in sight of the surface and flight visibility greater than 1500 metres.

D5.5.6 the vehicle shall be flown only over land unless otherwise duly authorized by the Competent Authority.

D5.5.7 In a manner that creates a collision hazard with respect to any aircraft,

D5.5.8 except between the hours of sun, rise and sunset.

Note: The vehicle may however be operated during the twilight period 30 minutes before official sunrise and 30 minutes after official sunset, if it is equipped with an operating] anti-collision light visible from at least 3 statue miles.

D6. VARIATION SUSPENSION CANCELLATIONS AND FINANCIAL PENALTY:

D6.1 The Director General may vary, suspend, or cancel a RCC and/or impose financial penalty not exceeding Rs. 10, 000/- on a holder of such certificate for contravention of any provision of CARs or the ANOs or instructions issued there under.

D6.2 The Director General may also vary, suspend, or cancel a certificate/approval/ permission of an organisation/association and/or impose financial penalty not exceeding Rs. 40,000/- on holder of such certificate/approval/permission for contravention of any provision of CARs '94 or the ANOs or instructions issued there under.

D6.3 The Director-General may detain or impound a recreational vehicle if it is operated in violation of CARs '94 or any rules and conditions set in this ANO or any other instructions issued there under.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
ATC	:	AIR TRAFFIC CONTROLLER
CAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
CARS	:	CIVIL AVIATION RULES
DGCAA	:	DIRECTOR GENERAL CIVIL AVIATION AUTHORITY
RCC	:	RECREATIONAL COMPETENCY CERTIFICATE
ULV	:	ULTRA LIGHT VEHICLE

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 NIL

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st February, 2018 and supersedes ANO 91.0021 (Issue-2).

--S/d--

(ASIM SULEIMAN)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **24th January, 2018**

--S/d--

(CAPT. ARIF MAJEED)
Director Flight Standards

Dated- **17th January, 2018**
File No. HQCAA/1077/011/FSAC

APPENDIX "A"

MEDICAL ASSESSMENT REPORT
FOR OPERATION OF RECREATIONAL FLYING VEHICLES

Colour Photo 1" by 1"

Last Name:	First Name:	Middle Name:	Sex	Marital
Address/Telephone No.		Date of Birth	Place of Birth	

Have you ever had or have you now any of the following:
(For each yes, describe the condition in remarks below:)

	Yes	No		Yes	No
1. Eye Trouble 2. Ear Trouble 3. Nose Trouble 4. Throat Trouble 5. Heart Trouble 6. Rheumatic Fever, Rheumatism 7. Pneumonia, Pleurisy 8. Chronic Bronchitis, Asthma, other Lung Disorders 9. Stomach Trouble Severe Indigestion 10. Kidney or Bladder Disorders 11. Venereal Diseases 12. Back Ache Sciatica Slipped Disc			13. Fainting, Giddiness, Blackout Fits, Epilepsy, Convulsions 14. Motion or Travel Sickness 15. Nervous Illness, Anxiety State 16. Skin Disease, Dermatitis Eczema 17. Allergy, Migraine 18. Diabetes, Hypertension 19. Dysentery, Typhoid, Malaria 20. Severe Menstrual Disorders 21. Gynecological Problems		

Additional Remarks:

Have you ever undergone investigations or treatment in the hospital? If so give details:

Have you had a serious injury or accident? If so give details:

Is there any family h/o heart trouble, diabetes, allergies, mental disorders etc. If so give details:

I declare that all the information given is true and I hereby give consent to any doctor to communicate confidentially with my medical attendants:

Date ____________________________ Signature ____________________________

MEDICAL ASSESSMENT

Name	Age	Date of Examination

Height	Weight	B.P	Pulse	Temp	Colour of Hair/Eyes

Visual Acuity	Distant Vision/Near Vision	Colour Vision (Ishihara)
Uncorrected R L		Safe Unsafe
		Field Of Vision
Corrected R L		Normal Abnormal

Prescription of glasses/lenses in any: (va should not be outside 15.0 ds)

Hearing Performance Normal Abnormal
(Conversational voice should be within 6 feet distance)

Clinical Examination Normal/Abnormal	Clinical Examination Normal/Abnormal
1. Skin, Lymphatic, Glands 2. Head, Neck, Face 3. Ear, Drums 4. Eyes including Funscopy 5. Nose, Throat & Nasal Passages 6. Chest / Breasts 7. Respiratory System 8. Vaginal Examination	9. Heart, Blood Vessels 10. Abdomen 11. Extremities 12. Psychological Disorders 13. Neurological Disorders 14. Genitalia 15. Rectal Examination

COMMENTS ON CLINICAL EXAMINATION

INVESTIGATIONS

X-RAYS CHEST (if indicated)
ECG (above 40 years)
FBS (if indicted, DM requiring oral medication is acceptable)
OTHER TESTS (if indicated)
DEFECTS / RESTRICTIONS

RECOMMENDATIONS:
Medically Fit/Unfit for ' RECREATIONAL CERTIFICATE OF COMPETENCY '

Date ________________________ Signature of Authorized Medical Officer

FOR OFFICIAL USE
FIT / UNFIT / Referred to CAM for Accredited Medical Conclusion (AMC)

Date ________________________ Signature ________________________

PRIVATE AEROPLANE OPERATIONS

AIR NAVIGATION ORDER

VERSION : 5.0
DATE OF IMPLEMENTATION : 01.09.2019
OFFICE OF PRIME INTEREST : Flight Standards Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. KHALID MAHMOOD	Addl. Dir. Gen. Ave.	Signed
REVIEWED BY	CAPT. S. M. RAFATULLAH	Director Flight Standards	Signed
VERIFIED BY	NISAR AHMED BROHI	Addl. Director Legal (Reg.)	Signed
	Air Cdre. SYED NASIR RAZA HAMDANI	Dy. DGCAA (Regulatory)/ Director SQMS	Signed
APPROVED BY	SHAHRUKH NUSRAT	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. The Director General Civil Aviation Authority issues this Air Navigation Order (ANO), in pursuance of the powers vested in him under Rules 20, 38, 157 and 192 of the Civil Aviation Rules, 1994 (CARs 94).

B. PURPOSE:

B1. This ANO under guidance of Annex 6 part II and reference to Part I&III; provides the requirements, terms, conditions and responsibilities of the Operators/ Licensed Personnel concerning Private Aeroplane Operations.

B2. This Air Navigation Order shall be applicable to Private Operations with aeroplane as described in para B3.

B3. Para D3 to para D11 and para D25applies to all Private Aeroplane Operations, including those covered in para D12 to para D24 of this Air Navigation Order, providing additional requirements for large aeroplanes, turbojet aeroplanes and corporate aviation operations, unless otherwise specified.

C. SCOPE:

C1. All licensed persons shall comply with the instructions contained in this Air Navigation Order, all other relevant ANOs and instructions by Pakistan CAA concerning operating crew.

C2. All companies/firms/persons intending to conduct Private Aeroplane Operations shall comply with the instructions contained in this Air Navigation Order and CARs 94.

C3. All words and terms used for various persons, aeroplane etc. in this Air Navigation Order, shall be interpreted and construed as defined in the Civil Aviation Ordinances of 1960 and 1982, alongwith the Civil Aviation Rules, 1994. In all other cases shall be construed as defined and used by the International Civil Aviation Organization (ICAO).

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 The terms used in this ANO have the following meanings:

D1.1.1 **Acts of Unlawful Interference**. These are acts or attempted acts such as to jeopardize the safety of civil aviation and air transport, i.e.:

D1.1.1.1 unlawful seizure of aeroplane in flight or on the ground

D1.1.1.2 hostagetaking on board an aeroplane or on aerodromes,

D1.1.1.3 forcible intrusion on board an aeroplane, at an airport or on the premises of an aeronautical facility,

D1.1.1.4 introduction on board an aeroplane or at an airport of a weapon or hazardous device or material intended for criminal purposes, D1.1.1.5 communication of false information as to jeopardize the safety of an aeroplane in flight or on the ground, of passengers, crew, ground personnel or the general public, at an airport or on the premises of a civil aviation facility.

D1.1.2 **Aerial Work**. Means flight operations other than charter, Regular Public Transport, or private operations, for which hire or reward is given or promised to the pilot, the owner, or the operator of the aeroplane in respect of the flight or the purpose of the flight, and any reference to "aerial work" has a corresponding meaning. Aerial work operations include specialized services such as agriculture, construction, photography, surveying, observation and patrol, search and rescue, aerial advertisement, etc.

D1.1.3 **Aerodrome.**A defined area on land or water (including any buildings, installations and equipment) intended to beused either wholly or in part for the arrival, departure and surface movement of aeroplane.

D1.1.4 **Aerodrome Operating Minima**. The limits of usability of an aerodrome for:

D1.1.4.1 take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;

D1.1.4.2 landing in precision approach and landing operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the category of the operation;

D1.1.4.3 landing in approach and landing operations with vertical guidance, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H); and

D1.1.4.4 landing in non-precision approach and landing operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions.

D1.1.5 **Aeroplane.** A power-driven heavier-than-air aeroplane, deriving its lift in flight chiefly from aerodynamic reactions on surfaces, which remain, fixed under given conditions of flight.

D1.1.6 **Aircraft.**Any machine that can derive support in the atmosphere from the reactions of the air, and includes balloons, whether captive or free, airships, kites, gliders and flying machines.

D1.1.7 **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.

D1.1.8 **Air Traffic Service (ATS).** A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

D1.1.9 **Airworthy.** The status of an aeroplane, engine, propeller or part when it conforms to its approved design and is in a condition for safe operation.

D1.1.10 **Alternate Aerodrome** means an aerodrome specified in a flight plan to which a flight may proceed when it becomes either impossible or inadvisable to land at the aerodrome of intended landing. Alternate aerodrome include the following:

D1.1.10.1 **Take-off Alternate** An alternate aerodrome at which an aeroplane can land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure.

D1.1.10.2 **En-route Alternate** An aerodrome at which an aeroplane would be able to land after experiencing an abnormal or emergency condition while en route.

D1.1.10.3 **Destination Alternate**. An alternate aerodrome to which an aeroplane may proceed should it become either impossible or inadvisable to land at the aerodrome of intended landing.

D1.1.11 **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.

D1.1.12 **Approach and Landing** operations using instrument approach procedures. Instrument approach and landing operations is classified as follows:

D1.1.12.1 **Non-Precision Approach and Landing Operations** An instrument approach and landing which utilizes lateral guidance but does not utilize vertical guidance.

D1.1.12.2 **Approach and Landing Operations with Vertical Guidance**. An instrument approach and landing which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

D1.1.12.3 **Precision Approach and Landing Operations**. An instrument approach and landing using precision lateral and vertical guidance with minima as determined by the category of aircraft andoperation.

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

a) a ground-based navigation aid; or

b) computer generated navigation data.

D1.1.12.4 **Categories of Precision**approach and landing operations:

D1.1.12.4.1 **Category I (CAT I) Operation**. A precision instrument approach and landing with 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.

D1.1.12.4.2 **Category II (CAT II) Operation**. A precision instrument approach and landing with 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.

D1.1.12.4.3 **Category IIIA (CAT IIIA) Operation**. A precision instrument approach and landing with a decision height lower than 30 m (100 ft) or no decision height; and a Runway Visual Range not less than 175m.

D1.1.12.4.4 **Category IIIB (CAT IIIB) Operation**. A precision instrument approach and landing with a decision height lower than 15 m (50 ft) or no decision height; and a Runway Visual Range less than 175m but not less than 50 m.

D1.1.12.4.5 **Category IIIC (CAT IIIC) Operation**. A precision instrument approach and landing with no decision height and no Runway Visual Range limitations.

Note: Where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach and landing 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).

D1.1.13 **Area Navigation (RNAV)**. A method of navigation which permits aeroplane operation on any desired flight path within the coverage of ground-based or spaced-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.

D1.1.14 **Authorized Person** For the purpose of a provision, in which that expression occurs, means person authorized by the Federal Government or the Director General, PCAA for the purpose of that provision.

D1.1.15 **Authority**. Means the Civil Aviation Authority established under section 3 of Pakistan Civil Aviation Authority Ordinance, 1982.

D1.1.16 **CAA Flight Inspector**. Means a person employed by the Authority as a Flight Inspector.

D1.1.17 **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 aeroplane, but who shall not act as a flight crew member.

D1.1.18 **Certificate of Approval** Means a Certificate of Approval granted under rule 23 and rule 25;

D1.1.19 **Commercial Air Transport Operation**. Flight operations other than a private operation, which involves the transport of passengers, cargo or mail for remuneration or hire.

D1.1.20 **Corporate Aviation Operation**. Means non-commercial operation or use of aeroplane by a company for the carriage of passengers, or goods as an aid to the conduct of company business, flown by professional pilot(s) employed to fly the aeroplane.

D1.1.21 **Competent Authority.** Means the Director General, Civil Aviation Authority (DG PCAA) of Pakistan or authorized person.

D1.1.22 **Continuing Airworthiness.** The set of processes by which an aeroplane, engine, propeller or part complies with the applicable airworthiness requirements and remains in a condition for safe operation throughout its operating life.

D1.1.23 **Combined vision system (CVS)**.- means a system to display images from a combination of an enhanced vision system (EVS) and a synthetic vision system (SVS);

D1.1.24 **Continuous descent final approach (CDFA)** means 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 man oeuvre should begin for the type of aircraft flown;

D1.1.25 **Dangerous Goods** Means any articles or substances, capable of posing a significant risk to health, safety or property when transported by air. They are included in the classes of dangerous goods specified in the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284-AN/905) as amended from time to time, hereafter referred to in this Air Navigation Order as the Technical Instructions.

Note: Dangerous goods is classified in ICAO document, Annex 18, Chapter 3.

D1.1.26 **Decision Altitude (DA) or Decision Height (DH**) the minimum altitude or height specified by an operator in his operations manual at which an approach to landing, utilizing an Instrument Landing System or Precision Approach Radar must be discontinued if the required visual reference to continue the approach has not been established;

Note 1: Decision altitude (DA) meansreference from sea level and decision height (DH) is the reference from threshold elevation.

Note 2: The required visual reference means that section of the visual aids or of the approach area that should have been in view for sufficient time for the pilotto have made an assessment of the aeroplane 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".

D1.1.27 **Electronic flight bag (EFB)** means 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;

D1.1.28 **Emergency Locator Transmitter (ELT)**. A generic, term describing equipment that 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:

D1.1.28.1 **Automatic Fixed ELT [ELT(AF)]** An automatically activated ELT that is permanently attached to an aeroplane.

D1.1.28.2 **Automatic Portable ELT [ELT(AP)**] An automatically activated ELT that is rigidly attached to an aeroplane but readily removable from the aeroplane.

D1.1.28.3 **Automatic Deployable ELT [ELT(AD)**] An ELT that is rigidly attached to an aeroplane and is automatically deployed / activated on impact, it could also in some cases be activated by hydrostatic sensors. In all cases, manual deployment is also provided.

D1.1.28.4 **Survival ELT [ELT(S)]**. An ELT that is removable from an aeroplane, stowed so as to facilitate its ready use in an emergency, and manually activated by survivors.

D1.1.29 **Engine** A unit used or intended to be used for aeroplane propulsion. It consists of at least those components and equipment necessary for functioning and control, but excludes the propeller/rotors (if applicable).

D1.1.30 **Enhanced Vision System (EVS*)*** A system to display electronic real-time images of the external scene achieved through the uses of image sensors.

D1.1.31 **Explanation Operation** means an aircraft operation other than a commercial air transport operation or an aerial work operation

D1.1.32 **Extended Flight over Water** A flight operated over water at a distance of more than 93 km (50 NM), or 30 minutes at normal cruising speed, whichever is the lesser, away from land suitable for making an emergency landing.

D1.1.33 **Fatigue** A physiological state of reduced mental or physical performance capability resulting from sleep loss, extended wakefulness, circadian phase, and / or workload (mental and/or physical activity) that can impair a person's alertness and ability to perform safety related operational duties.

D1.1.34 **Flight Crew Member** means a licensed crew member charged with duties essential to the operation of an aeroplane during flight duty period and any reference to "flight crew" has a corresponding meaning;

D1.1.35 **Flight Manual** Means a manual or other documents issued by the manufacturer of an aeroplane and approved by the Director General stating the limitations within which the aeroplane is considered airworthy as defined by the appropriate airworthiness requirements and additional instructions and information necessary for the safe operation of the aeroplane.

D1.1.36 **Flight Plan** Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aeroplane.

D1.1.37 **Flight Recorder** Any type of recorder installed in the aeroplane for purpose of complementing accident/incident investigation.

D1.1.37.1 **Automatic Deployable Flight Recorder (ADFR)** A combination flight recorder installed on the aircraft, which iscapable of automatically deploying from the aircraft.

D1.1.38 **Flight Simulation Training Device** Any one of the following three types of apparatus in which flight conditions is simulated on the ground:

D1.1.38.1 A **flight simulator,** which provides an accurate representation of the flight deck of a particular aeroplane type to the extent that the mechanical, electrical, electronic, etc. aeroplane systems, control functions, the normal environment of flight crew members, and the performance and flight characteristics of that type of aeroplane are realistically simulated;

D1.1.38.2 A **flight procedures trainer** provides a realistic flight deck environment, and which simulates instrument responses, simple control functions of mechanical, electrical, electronic, etc. aeroplane systems, and the performance and flight characteristics of aeroplane of a particular class;

D1.1.38.3 A **basic instrument flight trainer** is equipped with appropriate instruments, and which simulates the flight deck environment of an aeroplane in flight in instrument flight conditions.

D1.1.39 **Flight Time — Aeroplane** The period of time from the moment an aeroplane first moves (after removing it's chock including push back if involved and engines starting) preparatory to take-off until the moment it comes to rest after landing, its engines are switched-off and chocks are placed in front of its' wheels.

Note: Flight time as here defined is synonymous with the term "block to block" time or "chock to chock" time.

D1.1.40 **Head-up Display (HUD)** A display system that presents flight information into the pilot's forward field of view.

D1.1.41 **Industry Codes of Practice** Guidance material developed by an industry body, for a particular sector of the aviation industry to comply with the requirements of the International Civil Aviation Organization's Standards and Recommended Practices, other aviation safety requirements and the best practices deemed appropriate.

Note: Some States accept and reference industry codes of practice in the development of regulations to meet the requirements of Annex 6, Part II, and make available, for the industry codes of practice, their sources and how they may be obtained.

D1.1.42 **Instrument Meteorological Conditions (IMC**) Meteorological conditions in terms of visibility and cloud amount worse than those that will permit compliance with the Visual Flight Rules.

Note: Specific minima for Visual Meteorological conditions is defined in Chapter 4 of Annex 2. Refer to AIP Pakistan in this regards.

D1.1.43 **Instrument approach operations** means an approach and landing using instruments for navigation guidance based on an instrument approach procedure. There are two methods for executing instrument approach operations.

D1.1.43.1 a two-dimensional (2D) instrument approach operation, using lateral navigation guidance only; and

D1.1.43.2 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

D1.1.43.2.1 a ground-based radio navigation aid; or

D1.1.43.2.2 computer-generated navigation data from ground-based, space- based, self-contained navigation aids or a combination of these.

D1.1.44 **Instrument approach procedure (IAP)** means a series of predetermined manoeuvres 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:

D1.1.44.1 **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 vertical navigation (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.

D1.1.44.2 **Approach procedure with vertical guidance (APV)** means a performance-based navigation (PBN) instrument approach procedure designed for 3D instrument approach operations Type A;
Precision approach (PA) procedure means 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 Aerodrome Operating Minima for instrument approach operation types.

D1.1.45 **Large Aeroplane** An aeroplane of a maximum certificated take-off mass of over 5700 kg.

D1.1.40 **Licensing Authority** means the authority established by the Competent Authority as responsible for licensing of personnel under CARs 94.

D1.1.41 **Maintenance** means:

D1.1.41.1 in relation to an aeroplane:

D1.1.41.1.1 The doing of any work (includinga modification or repair) on the aeroplane that may affect the safety of the aeroplane or cause the aeroplane to become a danger to person or property; or

D1.1.41.1.2 The making of a test or an inspection for the purpose of ascertaining whether, the aeroplane is in a fit state for flying; or

D1.1.41.2 In relation to an aeroplane component or aeroplane material:

D1.1.41.2.1 The doing of any work (including a modification or repair) on the aeroplane component or aeroplane material that may affect the safety of the aeroplane or cause the aeroplane to become a danger to a person or property; or

D1.1.41.2.2 the making of a test or an inspection for the purpose of ascertaining whether the aeroplane component or aeroplane material is sound or functioning correctly.

D1.1.42 **Maintenance Programme** A document that 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 aeroplane to which it applies.

D1.1.43 **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.

D1.1.44 **Meteorological Information** All classes of meteorological reports, analysis, forecasts, warnings, advises and revisions or amendments thereto which may be required in connection with the operation of air routes.

D1.1.42 **Minimum Descent Altitude (MDA)** or **Minimum Descent Height (MDH**) The minimum height or altitude specified by an operator in his operations manual at which an approach to landing which has been carried out by means of a non-precision approach aid must be discontinued if the required visual reference to continue the approach has not been established.

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

Note 2: The required visual reference means that section of the visual aids or of the approach area that should have been in view for sufficient time for the pilot to have made an assessment of the aeroplane 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".

D1.1.45 **Navigation Specification** A set of aeroplane and flight crew requirements needed to support performance-based navigation operations within a defined airspace. There are two kinds of navigation specifications:

D1.1.45.1 Required Navigation Performance **(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.

D1.1.45.2 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 **(PBN)** Manual (Doc 9613), Volume II, contains detailed guidance on navigation specifications.

Note.2: The term RNP as previously defined as "a statement of the navigation performance, necessary for operations within a defined airspace" has been removed as the concept of RNP has been overtaken by the concept of PBN. The term RNP in this Air Navigation Order is now solelyused in context of navigation specifications that require performance monitoring and alerting e.g. RNP 4 refers to the aeroplane and operating requirements, including a 4 NM lateral performance with on board performance monitoring and alerting that are detailed in the PBN Manual (Doc 9613).

D1.1.46 **Night** Means 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 centre of the sun's disc is 6 degrees below the horizon and begins in the morning when the centre of the sun's disc is 6 degrees below the horizon.

D1.1.47 **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 isreference to mean sea level and obstacle clearance height is reference 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 2m (7ft) below the aerodrome elevation. An obstacle clearance height for a circling approach has reference 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 as "OCA/H".

D1.1.48 **Operating Base** The location from which operational control is exercised.

Note: An operating base is normally the location where personnel involved in the operation of the aeroplane work and the records associated with the operation are located. An operating base has a degree of permanency beyond that of a regular point of call.

D1.1.49 **Operational Control** The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aeroplane and the regularity and efficiency of the flight.

D1.1.50 **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.

D1.1.51 **Operations Manual** A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

D1.1.52 **Operator** The person, organization or enterprise engaged in or offering to engage in an aeroplane operation.

Note 1: In the context of this Air Navigation Order, the operator is not engaged in the transport of passengers, cargo or mail for remuneration or hire.

Note 2: Replace instances of "An Operator" with "The Operator" as applicable.

D1.1.53 **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 functionality needed for the proposed operation in the context of a particular airspace concept.

D1.1.54 **Performance-Based Navigation (PBN)** Area navigation based on performance requirements for aeroplane operating along an ATS route, on an instrument approach procedure or in a designated airspace.

Note: Performance requirements are expressed in navigation specifications (RNAV specification, RNP specification) in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.

D1.1.55 **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.

D1.1.56 **Pilot-in-Command** The Pilot designated by the operator or the owner as being in command and charged with the safe conduct of a flight.

D1.1.57 **Point of No Return** The last possible geographic point at which an aircraft can proceed to the destination aerodrome as well as to an available en route alternate aerodrome for a given flight.

D1.1.58 **Private Aircraft Operations License (PAOL)** Means License issued to Private Operators as per DAT E & R ANO – 001-ATNR-3.0 dated 30 May, 2019

D 1.1.58.1 **Private Operations** means flight operations, other than aerial work, charter or regular public transport, in which no remuneration, hire or reward is given to the pilot, the owner or the operator of the aeroplane in respect of that flight or for the purpose of that flight.

D1.1.59 **Psychoactive Substances** Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psycho stimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

D1.1.60 **RCP Type** A label (e.g. RCP 240) that represents the values assigned to RCP parameters for communication transaction time, continuity, availability and integrity.

D1.1.61 **Repair** The restoration of an aeronautical product to an airworthy condition to ensure that the aeroplane continues to comply with the design aspects of the appropriate airworthiness requirements used for the issuance of the type certificate for the respective aeroplane type, after it has been damaged or subjected to wear.

D1.1.62 **Required Communication Performance (RCP)** A statement of the performance required for operational communication in support of specific ATM functions.

D1.1.63 **Required Communication Performance (RCP) Specification** A set of requirements for air traffic service provision and associated ground equipment, aircraft capability, and operations needed to support performance-based communication.

D1.1.64 **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.

D1.1.65 **"Rules"** means the Civil Aviation Rules – 1994

D1.1.66 **Runway Visual Range (RVR)** The distance that pilot of an aeroplanecan see on the centre line of a runway, the markings or the lights delineating the runway. In case of an aeroplane in flight, the distance communicated to the pilot-in-command of aeroplane by the Air Traffic Service unit at an aerodrome shall be taken to be the runway visual range at that aerodrome.

D1.1.67 **Safety management system** A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

D1.1.68 **Sport Aeroplane** means an uncertified amateur built vehicle that has a gross weight more than 300 KG but not exceeding 580 Kg has a single engine and unless otherwise approved by the Competent Authority, has a stall speed not exceeding 52 KCAS.

D1.1.69 **State of Registry** The State on whose register the aeroplane is entered.

Note: In the case of the registration of aeroplane 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 that, 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 Aeroplane Operated by International Operating Agencies thatcan be found in policy and guidance Material on the Economic Regulation of International Air Transport (Doc 9587).

D1.1.70 **Target Level of Safety (TLS**) A general term representing the level of risk that is considered acceptable in particular circumstances.

D1.1.71 **Total Vertical Error** The vertical geometric difference between the actual altitude flown by an aeroplane and the assigned pressure altitude (flight level).

D1.1.72 **Visual Meteorological Conditions (VMC)** Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.

D1.1.73 **Approved Persons**: means persons i.e. CP/DFO/TRE/SFE/TRI/SFI duly approved by PCAA as per laid down regulations

D2. RULE GOVERNING PRIVATE AEROPLANE OPERATIONS:

D2.1 The Operator is to apply and obtain from DAT E&R Private Aircraft Operations License as per relevant ANO-001-ATNR-3.0, detailing minimum fleet requirement, form No and conditions to be met.

D2.2 The Operator Operations is to comply with Annex 1 and 6 and other relevant PCAA Rules and Regulations, andwould be subjected to Ops audit every two years.

D2.3 The Pilot undertaking a private aeroplane operation shall comply with all relevant rules of the CARs 94, relevant Air Navigation Orders(ANOs) and instructions issued from time to time

D3. COMPLIANCE WITH LAWS, REGULATIONS AND PROCEDURES:

D3.1 The pilot-in-command shall comply with the laws, regulations and procedures of those States in which operations are conducted.

Note: Information for pilots on flight procedure parameters and operational procedures is contained in PANS-OPS, Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS, 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.

D3.2 The pilot-in-command shall be familiar with the laws, regulations and procedures, pertinent to the performance of his or her duties, prescribed for the areas to be traversed, the aerodromes to be used and the air navigation facilities relating thereto. The pilot-in-command shall ensure that other members of the flight crew are familiar with such laws, regulations and procedures as are pertinent to the performance of their respective duties in the operation of the aeroplane.

D3.3 The pilot in command shall have responsibility for operational control.

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

D3.4 If an emergency situation which endangers the safety or security 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 State of Registry of the aeroplane. Such reports shall be submitted as soon as possible and normally within ten days.

D3.5 The pilot-in-command should have available on board the aeroplane the essential information concerning the search and rescue services in the area over which the aeroplane will be flown.

D3.6 The pilot-in-command shall ensure that flight crew members demonstrate the ability to speak and understand the language used for aeronautical radiotelephony communications and it is endorsed on their licences.

D3.7 Dangerous goods Provisions for carriage of dangerous goods are contained ICAO Annex 18 and also describes certain classes of cargo restrictions.

D3.8 Use of psychoactive substances.

Note: Provisions concerning the use of psychoactive substances are contained in Annex 1, 1.2.7 and Annex 2,

D4. <u>FLIGHT OPERATIONS:</u>

D4.1 Operating Facilities

D4.1.1 The pilot-in-command shall ensure that a flight is not commenced, unless it has been ascertained by every reasonable means available that the ground and/or water facilities are available, andare adequate for the type of operation under which the flight is to be conducted.This includes communication facilities and navigation aids available and directly required on such flight, for the safe operation of the aeroplane,

Note: "Reasonable means" in this Air Navigation Order isintended to denote the use, at the point of departure, of information available to the pilot-in-command either through official information published by the aeronautical information services or readily obtainable from other sources.

D4.2 Operational Management

D4.2.1 **Operating Instructions — General** An aeroplane shall not be taxied on the movement area of an aerodrome unless the person at the controls is an appropriately licensed and qualified pilot or:

D4.2.1.1 has been duly authorized by the owner or in the case where it is leased the lessee, or a designated agent;

D4.2.1.2 is fully competent to taxi the aeroplane;

D4.2.1.3 is qualified to use the radio if radio communications are required; and

D4.2.1.4 has received instruction from a competent person in respect of aerodrome layout, and where appropriate, information on routes, signs, marking, lights, ATC signals and instructions, phraseology and procedures, and is able to conform to the operational standards required for safe aeroplane movement at the aerodrome.

D4.2.2 **Aerodrome Operating Minima**

D4.2.2.1 The pilot-in-command shall not operate to or from an aerodrome using operating minima lower than those which may be established for that aerodrome by the State in which it is located, except with the specific approval of that State.

***Note*:** This Regulation does not require Civil Aviation Authority toestablish aerodrome operating minima.

D4.2.2.1 The Civil Aviation Authority may approve operational credit(s) for operations with aeroplanes equipped with 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 (Para D4.4.1), a minima below the aerodrome operating minima;
b. reducing or satisfying the visibility requirements; or
c. requiring fewer ground facilities as compensated for by airbornecapabilities.

Note 2: Guidance on operational credit for aircraft equipped with aHUD or equivalent displays, EVS, SVS and CVS is contained in 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).

D4.2.2.2 Instrument approach operations shall be classified based on the designed lowest operating minima below which an approach operation shall only becontinued with the required visual reference as follows:

Type A: a minimum descent height or decision height at or above 75m 250ft);
Type B: a decision height below 75m (250ft) Type B instrument approach operations are categorized as:

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 RVR not less than 550 m;
Category II (CAT II)
a decision height lower than 60 m (200 ft)but not lower than 30 m (100 ft) and a RVR not less than 300 m;
Category IIIA (CAT IIIA)
a decision height lower than 30 m(100 ft) or no decision height and a RVR notless than 175 m;

Category IIIB (CAT IIIB)
a decision height lower than 15 m(50 ft) or no decision height and a runway visual range lessthan 175 m but not less than 50 m; and
Category IIIC (CAT IIIC)
no decision height and no RVR limitations.

Note 1: Where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach operationwould be conducted in accordance with the requirements of the mostdemanding category. For examplean 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 RVRin the range of CAT I would be considered a CAT II operation.

Note 2: The required visual reference means that section of the visualaids or of the approach area which should have been in view for sufficient timefor the pilot to have made an assessment of the aircraft position and rate of changeof position, in relation to the desired flight path. In the case of a circling approachoperation, 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 inthe Manual of All-Weather Operations (Doc 9365).

D4.2.2.3 The operating minima for 2D instrument approach operations usinginstrument approach procedures shall be determined by establishing a minimumdescent altitude (MDA) or minimum descent height (MDH), minimum visibilityand, if necessary, cloud conditions.

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

D4.2.2.4 The operating minima for 3D instrument approach operations using instrument approach procedures shall be determined by establishing a decisionaltitude (DA) or decision height (DH) and the minimum visibility or RVR.

D4.2.3 **Passengers**

D4.2.3.1 The pilot-in-command shall ensure that passengers are made familiar with the location and use of:

D4.2.3.1.1 seat belts;
D4.2.3.1.2 emergency exits;
D4.2.3.1.3 life jackets, if the carriage of life jackets is prescribed;
D4.2.3.1.4 oxygen dispensing equipment; and
D4.2.3.1.5 other emergency equipment provided for individual use, including passenger emergency briefing cards.

D4.2.3.2 The pilot-in-command shall ensure that all persons on board are aware of the location and general manner of use of the principal emergency equipment carried for collective use.

D4.2.3.3 In an emergency during flight, the pilot-in-command shall ensure that passengers are instructed in such emergency action as may be appropriate to the circumstances.

D4.2.3.4 The pilot-in-command shall ensure that, during take-off and landing and whenever considered necessary by reason ofturbulence 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.

D4.3 Flight preparation

D4.3.1 A flight shall not be commenced until the pilot-in-command is satisfied that:

D4.3.1.1 the aeroplane is airworthy, duly registered and that appropriate certificates with respect thereto are aboard the aeroplane;

D4.3.1.2 the instruments and equipment installed in the aeroplane are appropriate, taking into account the expected flight conditions;

D4.3.1.3 any necessary maintenance has been performed in accordance with paras D7.2 to D8.4 of this Air Navigation Order;

D4.3.1.4 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;

D4.3.1.5 any load carried is properly distributed and safely secured;

D4.3.1.6 the aeroplane operating limitations, contained in the flight manual, or its equivalent, will not be exceeded.

D4.3.1.7 details of the weight and balance for that flight are satisfactory;

D4.3.1.8 maps and charts required for that flight are available;

D4.3.1.9 the certificate of airworthiness has been issued in respect of that aeroplane;

D4.3.1.10 the certificate of maintenance is issued in respect of that aeroplane;

D4.3.1.11 the aeroplane Flight Manual or equivalent certification document are current; and

D4.3.1.12 the licences issued in respect of the radio equipment installed in the aeroplane.

D4.3.2 The pilot-in-command should have sufficient information on climb performance with all engines operating to enable determination of the climb gradient that can be achieved during the departure phase for the existing take-off conditions and intended take-off technique.

D4.3.3 **Flight planning** Before commencing a flight the pilot-in-command shall be familiar with all available meteorological information appropriate to the intended flight. Preparation for a flight away from the vicinity of the place of departure, and for every flight under the instrument flight rules, shall include:

D4.3.3.1 a study of available current weather reports and forecasts; and

D4.3.3.2 the planning of an alternative course of action to provide for the eventuality that the flight cannot be completed as planned, because of weather or other un-expected conditions.

Note: The requirements for flight plans are contained in Annex 2 Rules of the Air and Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444). Refer to CARs 94 and AIP Pakistan.

D4.3.4 **Metrological conditions**

D4.3.4.1 A pilot-in-command shall not commence a visualflight rules flight unless current meteorological reports or a combination ofcurrent reports and forecasts indicate that the meteorological conditions along theroute or that part of the route to be flown under the visual flight rules will, atthe appropriate time, be such as to enable compliance with these rules.

D4.3.4.2 A pilot-in-command shall not commence an instrument flight rules flightunless:

D4.3.4.2.1 take off from the departure aerodrome unless the meteorologicalconditions, at the time of use, are at or above the aerodrome operatingminima for that operation; and

D4.3.4.2.2 take off or continue beyond the point of in-flight re-planning unless at theaerodrome of intended landing or at each alternate aerodrome to beselected in compliance with Para D4.3.3.4 below, current meteorological reportsor a combination of current reports and forecasts indicate that themeteorological conditions will be, at the estimated time of use, at or abovethe aerodrome operating minima for that operation.

D4.3.4.3 The Civil Aviation Authority shall establish criteria to be used for theestimated time of use of an aerodrome including a margin of time.

Note: Private operator in the operations manual may have, for flight planning purposes, higher minima for an aerodrome when nominated as adestination alternate than for the same aerodrome when planned as that ofintended landing.

Note 2: A widely accepted time margin for “estimated time of use” isone hour before and after the earliest and latest time of arrival. Additional considerations can be found in the Flight Planning and Fuel Management (FPFM) Manual (Doc 9976).

D4.3.4.4 **Flight operating in icing condition**

D4.3.4.4.1 A person shall not commence or/and operate a flight in known or expected icing conditions unless the aeroplane is certificated and equipped to cope with such conditions.

D4.3.4.4.2 Subject to sub regulation (1) a flight to be planned or expected to operate insuspected or known ground icing conditions shall not take off unless the aeroplane has been inspected for icing and, if necessary, has been givenappropriate e-icing/anti-icing treatment. Accumulation of ice or other naturally occurring contaminants shall be removed so that the aeroplane is kept in anairworthy condition prior to take-off.

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

D4.3.5 **Alternate aerodromes**

D4.3.5.1 **Destination alternate aerodromes** 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 flight plans, unless:

D4.3.5.1.1 the duration of the flight and the meteorological conditions prevailing are such that there is reasonable certainty that, at the estimated time of arrival at the aerodrome of intended landing, and for a reasonable period before and after such time, the approach and landing may be made under visual meteorological conditions; or

D4.3.5.1.2 the aerodrome of intended landing is isolated and there is no suitable destination alternate aerodrome; and

a) a standard instrument approach procedure is prescribed for the aerodrome of intended landing; and

b) available current meteorological information indicates that the following meteorological conditions will exist from two hours before time of arrival:

i) a cloud base of at least 300m (1000ft) above the minimum associated with the instrument approach procedure; and

ii) visibility of at least 5.5km or of 4km more than the minimum associated with the procedure.

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

D4.3.6 **Fuel and Oil Supply** A flight shall not be commenced unless, taking into account both the meteorological conditions and any delays that are expected in flight, the aeroplane carries sufficient fuel and oil to ensure that it can safely complete the flight. The amount of fuel to be carried must permit:

D4.3.6.1 when the flight is conducted in accordance with the instrument flight rules and a destination alternate aerodrome is not required in accordance with D4.3.5, flight to the aerodrome of intended landing, and after that, for at least 45 minutes at normal cruising altitude; or

D4.3.6.2 when the flight is conducted in accordance with the instrument flight rules and a destination alternate aerodrome is required, flight from the aerodrome of intended landing to an alternate aerodrome, and after that, for at least 45 minutes at normal cruising altitude; or

D4.3.6.3 when the flight is conducted in accordance with the visual flight rules by day, flight to the aerodrome of intended landing, and after that, for at least 30 minutes at normal cruising altitude; or

D4.3.6.4 when the flight is conducted in accordance with the visual flight rules by night, flight to the aerodrome of intended landing and thereafter for at least 45 minutes at normal cruising altitude.

Note: Nothing in D4.3.6 precludes amendment of a flight plan in flight in order to re-plan the flight to another aerodrome, provided that the requirements of D4.3.6can be complied with from the point where the flight is re-planned.

D4.3.7 **Refueling with Passengers on Board**

D4.3.7.1 An aeroplane should not be refueled when passengers are embarking, on board or disembarking unless it is attended by the pilot-in-command or other qualified personnel ready to initiate and direct an evacuation of the aeroplane by the most practical and expeditious means available.

D4.3.7.2 When refueling with passengers embarking, on board or disembarking, two-way communications should be maintained by the aeroplane's intercommunication system or other suitable means between the ground crew supervising the refueling and the pilot-in-command or other qualified personnel required by D4.3.7.1.

Note 1: The provisions of D4.3.7.1 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 aeroplane refueling are contained in 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.

D4.3.8 **Oxygen supply** The pilot-in-command shall ensure that breathing oxygen is available to crew members and passengers in sufficient quantities for all flights at such altitudes where a lack of oxygen might result in impairment of the faculties of crew members or harmfully affect passengers as required by rules 250, 258 and 267 of CAR 94.

Note 1: Guidance on the carriage and use of oxygen is given in Appendix C.

Note 2: Approximate altitudes in the Standard Atmosphere corresponding to the values of absolute pressure used in the text of Appendix C are as follows:

Absolute pressure	Meters	Feet
700 hPa	3000	10,000
620 hPa	4000	13,000
376 hPa	7600	25,000

D4.4 In-Flight Procedures

D4.4.1 **Aerodrome operating minima**

D4.4.1.1 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 D4.2.2.

D4.4.1.2 An instrument approach shall not be continued beyond the outer marker fix in case of precision approach, or below 300 m (1 000 ft) above the aerodrome in case of non-precision approach, unless the reported visibility or controlling RVR is above the specified minimum.

Note- Criteria for Final Approach segment is contained PAN OPS (DOC 8168) Vol: II

D4.4.1.3 If, after passing the outer marker fix in case of precision approach, or after descending below 300 m (1 000 ft) above the aerodrome in case of non-precision approach, 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 beyond a point at which the limits of the aerodrome operating minima would be infringed.

Note: Controlling RVR means the reported values of one or more RVR reporting locations (touchdown, midpoint 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.

D4.4.2 **Weather reporting by pilots**. When weather conditions, likely to affect the safety of other aeroplane are encountered, they should be reported as soon as possible.

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

D4.4.3 **Hazardous flight conditions**. Hazardous flight conditions encountered, other than those associated with meteorological conditions, should be reported to the appropriate aeronautical station as soon as possible. The reports so rendered should give such details as may be pertinent to the safety of other aeroplane.

D4.4.4 **Flight crew members at duty stations**

D4.4.4.1 **Take-off and landing**. All flight crew members required to be on flight deck duty shall be at their stations.

D4.4.4.2 **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, provided at least one qualified flight crew member is at the control.

D4.4.4.3 **Seat belts**. All flight crew members shall keep their seat belts fastened when at their stations.

D4.4.4.4 **Safety harness**. When safety harnesses are provided, any flight crew member occupying a pilots' 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 strap(s) and a seat belt which may be used independently.

D4.4.5 **Use of oxygen**. 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 prescribed in D 4.3.8.

D4.4.6 **Safeguarding of cabin crew and passengers in pressurized aeroplanes in the event of loss of pressurization**. Cabin crew should be safeguardedto 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. Such devices or operational procedures as will ensure reasonable probability of their surviving the effects of hypoxia in the event of loss of pressurization should safeguard passengers.

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.

D4.4.7 In-flight fuel management.-

D4.4.7.1 The pilot-in-command shall monitor the amountof usable fuel remaining on board to ensure it is not less than the fuel required toproceed to an aerodrome where a safe landing can be made with the planned finalreserve fuel remaining.

D4.4.7.2The pilot-in-command shall advise Air Traffic Control unit of a minimumfuel state by declaring MINIMUM FUEL when, having committed to land at aspecific aerodrome, the pilot calculates that any change to the existingclearance to that aerodrome, or other air traffic delays, may result in landing withless than the planned final reserve fuel.

Note 1.—The declaration of MINIMUM FUEL informs ATC that allplanned aerodrome options have been reduced to a specific aerodrome ofintended landing and any change to the existing clearance, or air traffic delays,may result in landing with less than the planned final reserve fuel. This is not anemergency but an indication that an emergency is possibleshould any additional delay occur.

D4.4.7.3 The pilot-in-command shall declare a situation of fuel emergency by broadcasting MAYDAY MAYDAYMAYDAY FUEL, when the calculated usablefuel estimated to be available upon landing at the nearest aerodrome where asafe landing could be made is less than the planned final reserve fuel.

Note 1.— The planned final reserve fuel refers to the value calculated inRegulation 15 and is the minimum amount of fuel required upon landing atany aerodrome.

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

D4.4.8 **Instrument approach procedures**

D4.4.8.1 One or more instrument approach procedures designed in accordance with the classification of instrument approach and landing operations shall be approved and promulgated by the State in which the aerodrome is located to serve each instrument runway or aerodrome utilized for instrument flight operations.

D4.4.8.2 Aeroplanes operated in accordance with the instrument flight rules shall comply with the instrument approach procedures approved by the State in which the aerodrome is located.

Note 1: Definitions for the classification of instrument approach and landing operations are in definitions.

Note 2: Information for pilots on flight procedure parameters and operational procedures is contained in PANS-OPS, Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS, 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.

D4.5 Duties of pilot-in-command

D4.5.1 The pilot-in-command shall be responsible for the operation, safety and security of the aeroplane and the safety of all crewmembers, passengers and cargo on board.

D4.5.2 The pilot-in-command shall be responsible for ensuring that a flight:

D4.5.2.1 will not be commenced if any flight crew member is incapacitated from performing duties by any cause such as injury, sickness, fatigue, the effects of any psychoactive substance or by a period of fasting; and

D4.5.2.2 will not be continued beyond the nearest suitable aerodrome when flight crewmembers' capacity to perform functions is significantly reduced by impairment of faculties from causes such as fatigue, sickness or lack of oxygen.

D4.5.3 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 Annex 13.

D4.6 Cabin baggage (take-off and landing). The pilot-in-command shall ensure that all baggage carried onto an aeroplane and taken into the passenger cabin is securely stowed

D5. AEROPLANE PERFORMANCE OPERATING LIMITATIONS:

D5.1 General

D5.1.1 An aeroplane shall be operated:

D5.1.1.1 in compliance with the terms of its airworthiness certificate or equivalent approved document;

D5.1.1.2 within the operating limitations prescribed by the certificating authority of the State of Registry; and

D5.1.1.3 if applicable, within the mass limitations imposed by compliance with the applicable noise certification Standards in, 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.

D5.1.2 Placards, listings, instrument markings, or combinations thereof, containing those operating limitations prescribed by the certificating authority **of the State of Registry for visual presentation, shall be displayed in the** aeroplane.

D5.1.3 The pilot-in-command shall determine that aeroplane performance will permit the take-off and departure to be carried out safely.

D6. AEROPLANE INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENTS:

Note: Specifications for the provision of aeroplane communication and navigation equipment are contained in D7.

D6.1 General

D6.1.1 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 acceptable to the State of Registry.

D6.2 Aeroplanes on all flights.

D6.2.1 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.

D6.2.2 Aeroplanes on all flights shall be equipped with:

D6.2.2.1 an accessible first-aid kit;

D6.2.2.2 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:

D6.2.2.2.1 the pilot's compartment; and

D6.2.2.2.2 each passenger compartment that is separate from the pilot's compartment and not readily accessible to the pilot or co-pilot;

D6.2.2.3 a) a seat or berth for each person over an age of two years; and

b) a seat belt for each seat and restraining belts for each berth;

D6.2.2.4 the following manuals, charts and information:

D6.2.2.4.1 the flight manual or other documents or information concerning any operating limitations prescribed for the aeroplane by the certificating authority of the State of Registry, required for the application of para D5;

D6.2.2.4.2 current and suitable charts for the route of the proposed flight and all routes along which it is reasonable to expect that the flight may be diverted;

D6.2.2.4.3 procedures, as prescribed in Annex 2, for pilots-in-command of intercepted aeroplane;

D6.2.2.4.4 visual signals for use by intercepting and intercepted aeroplane, as contained in Annex 2; and

D6.2.2.4.5 the journey log book for the aeroplane;

D6.2.2.5 where the aeroplane is fitted with fuses that are accessible in flight, spare electrical fuses of appropriate ratings for replacement of those fuses.

D6.2.2.6 Aeroplanes on all flights should be equipped with the ground-air signal codes for search and rescue purposes.

D6.2.2.7 Aeroplanes on all flights should be equipped with a safety harness for each flight crew member seat.

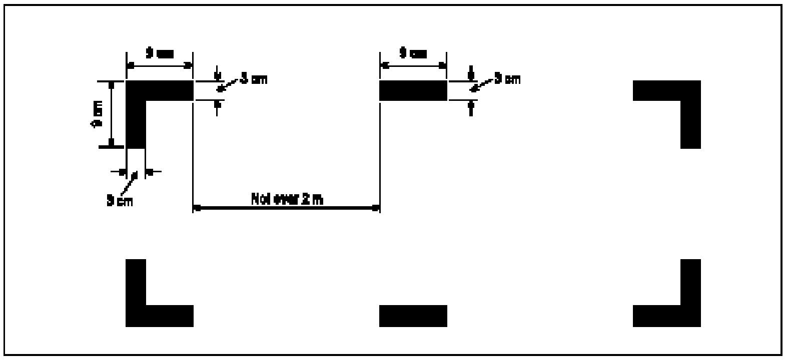
Note: Safety harness includes shoulder strap(s) and a seat belt which may be used independently.

D6.2.3 **Marking of break-in points**

D6.2.3.1 If areas of the fuselage suitable for break-in by rescue crews in emergency are marked on an aeroplane such areas shall be marked as shown below (see figure following). The colour of the markings shall be red or yellow, and if necessary they shall be outlined in white to contrast with the background.

D6.2.3.2 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 Air Navigation Order does not require any aeroplane to have break-in areas.



Marking of Break in points (see para D6.2.3)

Note: This Air Navigation Order does not require any aeroplane to have break-in areas.

D6.3 Aeroplanes Operated as VFR Flights.

D6.3.1 Aeroplanes when operated as VFR flights shall be equipped with:

D6.3.1.1 a means of measuring and displaying:

D6.3.1.1.1 magnetic heading;

D6.3.1.1.2 the time in hours, minutes and seconds;

D6.3.1.1.3 pressure altitude;

D6.3.1.1.4 indicated airspeed; and

D6.3.1.2 such additional equipment as may be prescribed by the appropriate authority.

D6.3.2 VFR flights which are operated as controlled flights should be equipped in accordance with D6.7.

D6.4 Aeroplanes on Flights Over Water

D6.4.1 Seaplanes. Seaplanes for all flights shall be equipped with:

D6.4.1.1 one life jacket, or equivalent individual floatation device, for each person on board, stowed in a position readily accessible from the seat or berth;

D6.4.1.2 equipment for making the sound signals prescribed in the International Regulations for Preventing Collisions at Sea, where applicable;

D6.4.1.3 one anchor; and

D6.4.1.4 one sea anchor (drogue), when necessary to assist in maneuvering.

Note: "Seaplanes" includes amphibians operated as seaplanes.

D6.4.2 **Landplanes**

D6.4.2.1 Single-engine landplanes. All single-engine landplanes:

D6.4.2.1.1 when flying en route over water beyond gliding distance from the shore; or

D6.4.2.1.2 when taking off or landing at an aerodrome where, in the opinion of the pilot-in-command, 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;

should carry one life jacket or equivalent individual floatation 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.

D6.4.3 **Aeroplanes on extended flights over water**

D6.4.3.1 All aeroplanes operated on extended flights over water shall be equipped with, at a minimum, one life jacket or equivalent individual floatation 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.

D6.4.3.2 The pilot-in-command of an aeroplane operated on an extended flight over water shall determine the risks to survival of the occupants of the aeroplane in the event of a ditching. The pilot-in-command shall take into account the operating environment and conditions such as, but not limited to, sea state and sea and air temperatures, the distance from land suitable for making an emergency landing, and the availability of search and rescue facilities. Based upon the assessment of these risks, the pilot-in-command shall, in addition to the equipment required in D6.4.3.1, ensure that the aeroplane is equipped with:

D6.4.3.2.1 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; and

D6.4.3.2.2 equipment for making the distress signals described in Annex 2.

D6.5 **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 over flown.

D6.6 Aeroplanes on high altitude flights

D6.6.1 Aeroplanesintended to be operated at high altitudes shall be equipped with oxygen storage and dispensing apparatus capable of storing and dispensing the oxygen supplies required in para D4.3.8.

D6.6.2 Aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 1990. Pressurized aeroplanesintended 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.

D6.6.3 Aeroplanes for which the individual certificate of airworthiness was first issued before 1 January 1990. Pressurized aeroplanes 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.

D6.7 Aeroplanes operated in accordance with the instrument flight rules

D6.7.1 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:

D6.7.1.1 a means of measuring and displaying:

D6.7.1.1.1 magnetic heading (standby compass);

D6.7.1.1.2 the time in hours, minutes and seconds;

D6.7.1.1.3 pressure altitude;

D6.7.1.1.4 indicated airspeed, with a means of preventing malfunctioning due to either condensation or icing;

D6.7.1.1.5 turn and slip;

D6.7.1.1.6 aeroplane attitude; and

D6.7.1.1.7 stabilized aeroplane heading;

Note: The requirements of D6.7.1.1.5, D6.7.1.1.6 and D6.7.1.1.7 may be met by combination of instruments or by integrated flight director systemprovided that the safeguards against total failure, inherent in the three separate instruments, are retained.

D6.7.1.1.8 power to the gyroscopic instruments is adequate;

D6.7.1.1.9 the outside air temperature;

D6.7.1.1.10 rate-of-climb and descent; and

D6.7.1.2 such additional instruments or equipment as may be prescribed by the appropriate authority.

D6.8 Aeroplanes when operated at night

D6.8.1 Aeroplanes, when operated at night, shall be equipped with:

D6.8.1.1 the equipment specified in D6.7; and

D6.8.1.2 the lights required by Annex 2 for aeroplane in flight or operating on the movement area of an aerodrome;

Note: Specifications for lights meeting the requirements of Annex 2 for navigation lights are contained in Appendix A. The general characteristics of lights are specified in Annex 8. Detailed specifications for lights meeting the requirements of Annex 2 for aeroplane in flight or operating on the movement area of an aerodrome are contained in the Airworthiness Manual (Doc 9760).

D6.8.1.3 a landing light;

D6.8.1.4 illumination for all flight instruments and equipment that are essential for the safe operation of the aeroplane that are used by the flight crew;

D6.8.1.5 lights in all passenger compartments; and

D6.8.1.6 an independent portable light for each crew member station.

D6.9 Aeroplanes complying with the noise certification Standards. An aeroplane shall carry a document attesting noise certification.

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

D6.10 Mach number indicator. Aeroplanes with speed limitations expressed in terms of Mach number shall be equipped with a means of displaying Mach number.

D6.11 Aeroplanes required tobe equipped with Ground Proximity Warning Systems (GPWS) or Electronic Ground Proximity Warning Systems (EGPWS).

D6.11.1 All turbine-engine 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.

D6.11.2 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.

D6.11.3 A ground proximity warning system shall provide, at a minimum, warnings of at least the following circumstances:

D6.11.3.1 excessive descent rate;

D6.11.3.2 excessive altitude loss after take-off or go-around; and

D6.11.3.3 Unsafe terrain clearance.

D6.11.4 A ground proximity warning system should provide, as a minimum, warnings of at least the following circumstances:

D6.11.4.1 excessive descent rate;

D6.11.4.2 excessive terrain closure rate;

D6.11.4.3 excessive altitude loss after take-off or go-around;

D6.11.4.4 unsafe terrain clearance while not in landing configuration;

D6.11.4.4.1 landing gears not locked down;

D6.11.4.4.2 flaps not in a landing position; and

D6.11.4.5 Excessive descent below the instrument glide path.

D6.11.5 A ground proximity warning system installed in turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5,700 kgs or authorized to carry more than nine passengers for which the individual certificate of airworthiness was first issued after 1 January 2011 shall provide, as a minimum, warnings of at least the following circumstances:

D6.11.5.1 excessive descent rate;

D6.11.5.2 excessive terrain closure rate;

D6.11.5.3 excessive altitude loss after take-off or go-around;

D6.11.5.4 unsafe terrain clearance while not in landing configuration;

D6.11.5.4.1 gear not locked down;

D6.11.5.4.2 flaps not in a landing position; and

D6.11.5.5 excessive descent below the instrument glide path.

D6.12 Emergency Locator Transmitter (ELT)

D6.12.1 All aeroplanes should carry an automatic ELT.

D6.12.2 Except as provided for in D6.12.3, from 1 July 2008, all aeroplanesshall be equipped with at least one ELT of any type.

D6.12.3 All aeroplanes for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with at least one automatic ELT.

D6.12.4 ELT equipment carried to satisfy the requirements of D6.12.1, D6.12.2 and D6.12.3 shall operate in accordance with the relevant provisions of Annex 10, Volume III.

Note: The judicious choice of numbers of ELTs, their type and placement on aeroplane, and associated floatable life support systems, will ensure the greatest chance of ELT activation in the event of an accident for aeroplane 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.

D6.13 Aeroplanes required tobe equipped with a pressure-altitude reporting transponder

D6.13.1 Aeroplanes shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of Annex 10, Volume IV.

D6.13.2 Unless exempted by the appropriate authorities, aeroplanes operating as VFR flights shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provision of Annex 10, Volume IV.

Note: These provisions are intended to support the effectiveness of ACAS as well as to improve the effectiveness of air traffic services.

D6.14 Microphones. When operating under the instrument flight rules all flight crew members required to be on flight deck duty should communicate through boom or throat microphones below the transition level/altitude.

D6.15 Aeroplanes equipped with head-up displays (HUD) and/or enhanced vision systems (EVS). Where aeroplanes are equipped with HUD and/or EVS, the use of such systems to gain operational benefits shall be approved by the State of Registry.

Note: Guidance on HUD and EVS is contained in Appendix G to this ANO.

D7. AEROPLANE COMMUNICATION AND NAVIGATION EQUIPMENT:

D7.1 Communication equipment

D7.1.1 An aeroplane to be operated in accordance with the instrument flight rules or at night shall be provided with radio communication equipment.Such equipment shall be capable of conducting two-way communication with those aeronautical stations and on those frequencies prescribed by the appropriate authority.

Note: The requirements of D7.1.1 are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.

D7.1.2 When compliance with D7.1.1 requires that more than one communication equipment unit be provided, each shall be independent of the other or others to the extent that a failure in any one will not result in failure of any other.

D7.1.3 An aeroplane to be operated in accordance with the visual flight rules, but as a controlled flight, shall, unless exempted by the appropriate authority, be provided with radio communication equipment capable of conducting two-way communication at any time during flight with such aeronautical stations and on such frequencies as may be prescribed by the appropriate authority.

D7.1.4 An aeroplane to be operated on a flight to which the provisions of D6.4.3.1 or D6.5 apply shall, unless exempted by the appropriate authority, be provided with radio communication equipment capable of conducting two-way communication at any time during flight with such aeronautical stations and on such frequencies as may be prescribed by the appropriate authority.

D7.1.5 The radio communication equipment required in accordance with D7.1.1 to D7.1.4shall provide for communication on the aeronautical emergency frequency 121.5 MHz.

D7.1.6 For flight operations in defined portions of airspace or on routes where an RCP type has been prescribed, an aeroplane shall, in addition to the requirements specified in D7.1.1 to D7.1.5:

D7.1.6.1 be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP type(s); and

D7.1.6.2 be authorized by the State of Registry for such operations.

Note: Information on RCP and associated procedures, and guidance concerning the approval process, are contained in the Manual on Required Communication Performance (RCP) (Doc 9869). This document also contains references to other documents produced by States and international bodies concerning communication systems and RCP.

D7.2 Navigation Equipment

D7.2.1 An aeroplane shall be provided with navigation equipment which will enable it to proceed:

D7.2.1.1 in accordance with the flight plan; and

D7.2.1.2 in accordance with the requirements of air traffic services;

except when, if not so precluded by the appropriate authority, navigation for flights under the visual flight rules is accomplished by visual reference to landmarks.

D7.2.2 For operations where a navigation specification for performance-based navigation has been prescribed, an aeroplane shall, in addition to the requirements specified in 30.1:

D7.2.2.1 be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specification(s); and

D7.2.2.2 be authorized by the State of Registry for such operations.

Note: Information on performance-based navigation, and guidance concerning the implementation and operational approval process, are contained in the Performance-based Navigation Manual (Doc 9613). This document also contains a comprehensive list of references to other documents produced by States and international bodies concerning navigation systems.

D7.2.3 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:

D7.2.3.1 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

D7.2.3.2 has been authorized by the State of Registry 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).

D7.2.4 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 fts) is applied between FL 290 and FL 410 (both inclusive) of an aeroplane:

D7.2.4.1 shall be provided with equipment which is capable of:

D7.2.4.1.1 indicating to the flight crew the flight level being flown;

D7.2.4.1.2 automatically maintaining a selected flight level;

D7.2.4.1.3 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

D7.2.4.1.4 automatically reporting pressure altitude; and

D7.2.4.2 shall be authorized by the State of Registry for operation in the airspace concerned.

D7.2.4.3 shall demonstrate a vertical navigation performance in accordance with Appendix B to this ANO.

D7.2.5 Prior to granting the RVSM approval required in accordance with D7.2.3.2, the State shall be satisfied that:

D7.2.5.1 the vertical navigation performance capability of the aeroplane satisfies the requirements specified in Appendix B to this Air Navigation Order;

D7.2.5.2 the owner/operator has instituted appropriate procedures in respect of continued airworthiness (maintenance and repair) practices and programmes; and

D7.2.6.3 the owner/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.

D7.2.6 The State of Registry shall ensure that, in respect of those aeroplanes mentioned in D7.2.4, adequate provisions exist for:

D7.2.6.1 receiving the reports of height-keeping performance issued by the monitoring agencies established in accordance with Annex 11, 3.3.5.1; and

D7.2.6.2 taking immediate corrective action for individual aeroplane, or aeroplane type groups, identified in such reports as not complying with the height-keeping requirements for operation in airspace where RVSM is applied.

D7.2.7 The State of Registry that has issued an RVSM approval to an owner/operator shall establish a requirement which ensures that a minimum of two aeroplanes of each aeroplane type grouping of the owner/operator have their height-keeping performance monitored, at least once every two years or within intervals of 1000 flight hours per aeroplane, whichever period is longer. If an owner/operator aeroplane 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 Annex 11, 3.3.5.2, may be used to satisfy the requirement.

D7.2.8 All States that are responsible for airspace where RVSM has been implemented, or have issued RVSM approvals to owners/operators within their State, shall establish provisions and procedures which ensure that appropriate action will be taken in respect of aeroplane and owners/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 aeroplane in question was operating without approval in the airspace of the State, and the situation where an owner/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 Implementation of a 300 m (1,000 fts) Vertical Separation Minimum Between FL 290 and FL 410 both inclusive (Doc 9574).

D7.2.9 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 D7.2.1 and where applicable D7.2.2 to D7.2.4.

Note 1: This requirement may be met by means other than the duplication of equipment.

Note 2: Guidance material relating to aeroplane equipment necessary for flight in airspace where a 300 m (1 000 ft) VSM is applied above FL 290 is contained in the Manual on Implementation of a 300 m (1,000 fts) Vertical Separation Minimum Between FL 290 and FL 410 both inclusive (Doc 9574).

D7.2.10 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.

D8. AEROPLANE MAINTENANCE:

Note 1: For the purpose of this chapter "aeroplane" includes: power plants, propellers, components, accessories, instruments, equipment and apparatus including emergency equipment.

Note 2: Guidance on continuing airworthiness requirements is contained in the Airworthiness Manual (Doc 9760).

Note 3: States are encouraged to conduct a risk assessment when approving a maintenance programme not based on the type certificate holder's maintenance recommendations.

D8.1 Owner's Maintenance Responsibilities

D8.1.1 The owner of an aeroplane, or in the case where it is leased, the lessee, shall ensure that, in accordance with procedures acceptable to the State of Registry:

D8.1.1.1 the aeroplane is maintained in an airworthy condition;

D8.1.1.2 the operational and emergency equipment necessary for an intended flight is serviceable; and

D8.1.1.3 the certificate of airworthiness of the aeroplane remains valid.

D8.1.2 The owner or the lessee shall not operate the aeroplane unless it is maintained and released to service under a system acceptable to the State of Registry.

D8.1.3 When the maintenance release is not issued by an approved maintenance organization in accordance with Annex 6, Part I, 8.7, the person signing the maintenance release shall be licensed in accordance with Annex 1.

D8.1.4 The owner or the lessee shall ensure that the maintenance of the aeroplane is performed in accordance with a maintenance programme acceptable to the State of Registry.

D8.2 Maintenance Records

D8.2.1 The owner of an aeroplane, or in the case where it is leased, the lessee, shall ensure that the following records are kept for the periods mentioned in D8.2.2:

D8.2.1.1 the total time in service (hours, calendar time and cycles, as appropriate) of the aeroplane and all life limited components;

D8.2.1.2 the current status of compliance with all applicable mandatory continuing airworthiness information;

D8.2.1.3 appropriate details of modifications and repairs;

D8.2.1.4 the time in service (hours, calendar time and cycles, as appropriate) since the last overhaul of the aeroplane or its components subject to a mandatory overhaul life;

D8.2.1.5 the current status of the aeroplane's compliance with the maintenance programme; and

D8.2.1.6 the detailed maintenance records to show that all requirements for the signing of a maintenance release have been met.

D8.2.2 The records in D8.2.1.1 to D8.2.1.5shall be kept for a minimum period of 90 days after the unit to which they refer has been permanently withdrawn from service and the records in D8.2.1.6 for a minimum period of one year after the signing of the maintenance release.

D8.2.3 In the event of a temporary change of owner or lessee, the records shall be made available to the new owner or lessee. In the event of any permanent change of owner or lessee, the records shall be transferred to the new owner or lessee.

Note 1: Maintenance records or related documents, other than a valid certificate of airworthiness, need not be carried in the aeroplane during international flights.

Note 2: In the context of D8.2.3, a judgment on what should be considered as a temporary change of owner or lessee will need to be made by the State of Registry in the light of the need to exercise control over the records, which will depend on access to them and the opportunity to update them.

D8.3 Modifications and Repairs. All modifications and repairs shall comply with airworthiness requirements acceptable to the State of Registry. Procedures shall be established to ensure that the substantiating data supporting compliance with the airworthiness requirements are retained.

D8.4 Maintenance Release

D8.4.1 A maintenance release shall be completed and signed, as prescribed by the State of Registry, to certify that the maintenance work performed has been completed satisfactorily and in accordance with data and procedures acceptable to the State of Registry.

D8.4.2 A maintenance release shall contain a certification including:

D8.4.2.1 basic details of the maintenance performed;

D8.4.2.2 the date such maintenance was completed;

D8.4.2.3 when applicable, the identity of the approved maintenance organization;and

D8.4.2.4 the identity of the authorized person or persons signing the release.

D9. AEROPLANE FLIGHT CREW:

D9.1 Composition of The Flight Crew. The number and composition of the flight crew shall not be less than that specified in the flight manual or other documents associated with the certificate of airworthiness.

D9.2 Qualifications

D9.2.1 The pilot-in-command shall:

D9.2.1.1 ensure that each flight crew member holds a valid licence issued by the State of Registry, or if issued by another ContractingState, rendered valid by the State of Registry;

D9.2.1.2 ensure that flight crew members are properly rated; and

D9.2.1.3 be satisfied that flight crew members have maintained competency.

D9.2.2 The pilot-in-command of an aeroplane equipped with an airborne collision avoidance system (ACAS II) shall ensure that each flight crew member has been appropriately trained to competency in the use of ACAS II equipment and the avoidance of collision.

Note 1: Procedures for the use of ACAS II equipment are specified in the Procedures for Air Navigation Services —Aeroplane Operations (PANS-OPS, Doc 8168), Volume I — Flight Procedures. ACAS II Training Guidelines for Pilots are provided in PANS-OPS, Volume I, Attachment to Part III, Section 3, Chapter 3.

Note 2: Appropriate training, to the satisfaction of the State, to competency in the use of ACAS II equipment and the avoidance of collisions may be evidenced, for example, by:

a) possession of a type rating for an aeroplane equipped with ACAS II, where the operation and use of ACAS II are included in the training syllabus for the type rating; or

b) possession of a document issued by a training organization or person approved by the State to conduct training for pilots in the use of ACAS II, indicating that the holder has been trained in accordance with the guidelines referred to in Note 1; or

c) a comprehensive pre-flight briefing by a pilot who has been trained in the use of ACAS II in accordance with the guidelines referred to in Note 1.

D10. MAMUALS, LOGS AND RECORDS:

Note: The documents D10.1 to D10.3 are associated with this Air Navigation Order but details are not included D10.1 to D10.3: for Maintenance records see D8.2.

D10.1 Flight Manual

Note: The aeroplane flight manual contains the information specified in Annex 8.

D10.1.1 The aeroplane flight manual shall be updated by implementing changes made mandatory by the State of Registry.

D10.2 Journey Log Book

D10.2.1 A journey log book shall be maintained for every aeroplane engaged in international air navigation in which shall be entered particulars of the aeroplane, its crew and each journey.

D10.2.2 The aeroplane journey log should contain the following items:

D10.2.2.1 aeroplane nationality and registration;

D10.2.2.2 date;

D10.2.2.3 crew member names and duty assignments;

D10.2.2.4 departure and arrival points and times;

D10.2.2.5 purpose of flight;

D10.2.2.6 observations regarding the flight; and

D10.2.2.7 signature of the pilot-in-command.

D10.3 Records Of Emergency And Survival Equipment Carried. The owner of the aeroplane, or in the case where it is leased, the lessee, shall at all times have available for immediate communication to rescue coordination centers, lists containing information on the emergency and survival equipment carried on board the aeroplane engaged in international air navigation. The information shall include, as applicable, the number, colour and type of life rafts and pyrotechnics, details of emergency medical supplies, water supplies and the type and frequencies of the emergency portable radio equipment.

D11. SECURITY:

D11.1 Security of Aeroplane. The pilot-in-command shall be responsible for the security of the aeroplane during its operation.

D11.2 Reporting acts of unlawful interference. Following an act of unlawful interference, the pilot-in-command shall submit a report of such an act to the designated local authority.

Note: In the context of this Chapter, the word "security" is used in the sense of prevention of acts of unlawful interference against civil aviation.

D12. LARGE AND TURBOJET AEROPLANES:

D12.1 Applicability

D12.1.1 The following operations shall be subject to the para D3 to para D10.3, and those of para D13 to para D24, Private Aeroplane operations with:

D12.1.1.1 aeroplanes with a maximum certificated take-off mass exceeding 5,700 kg; or

D12.1.1.2 aeroplanes equipped with one or more turbojet engines or

D12.1.1.3 An operation involving an aeroplane with a seating configuration of more than 9 passenger seats.

D13. CORPORATE AVIATION OPERATIONS:

D13.1 A corporate aviation operation aeroplane that are operated by pilots employed for the purpose of flying the aeroplane should be conducted in accordance with requirements of para D12.

Note: The term "aeroplane" is used to indicate that a corporate aviation operation using a mix of aeroplanes and helicopters is be subject to this para as long as at least one aeroplane is involved.

D14. GENERAL:

D14.1 Compliance With Laws, Regulations And Procedures

D14.1.1 An operator shall ensure that all employees know that they must comply with the laws, regulations and procedures of those States in which operations are conducted.

Note: Information for pilots on flight procedure parameters and operational procedures is contained in PANS-OPS, Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS, 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.

D14.1.2 An 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.

D14.1.3 The pilot-in-command is responsible for operational control. An operator shall describe the operational control system in the operations manual and identify the roles and responsibilities of those involved with the system.

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.

D14.1.4 An operator shall ensure that the pilot-in-command has available on board the aeroplane all the essential information concerning the search and rescue services in the area over which the aeroplanewill be flown.

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

D14.1.5 An operator shall ensure that flight crew members demonstrate the ability to speak and understand the language used for aeronautical radiotelephony communications.

D14.2 Safety Management System

D14.2.1 An operator shall establish and maintain a safety management system that is appropriate to the size and complexity of the operation.

D14.2.2 The safety management system should as minimum include:

D14.2.2.1 a process to identify actual and potential safety hazards and assess the associated risks;

D14.2.2.2 a process to develop and implement remedial action necessary to maintain an acceptable level of safety; and

D14.2.2.3 provision for continuous monitoring and regular assessment of the appropriateness and effectiveness of safety management activities.

Note: Guidance on safety management systems is contained in the Safety Management Manual (SMM) (Doc 9859) and industry codes of practice.

D15. FLIGHT OPERATIONS:

D15.1 Operating Facilities. An 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 including communication facilities and navigation aids available and directly required on such flight, for the safe operation of the aeroplane, are adequate for the type of operation under which the flight is to be conducted.

Note: "Reasonable means" in this Air Navigation Order 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.

D15.2 Operational Management

D15.2.1 **Operator Notification**

D15.2.1.1 If an operator has an operating base in a State other than the State of Registry, the operator shall notify the State in which the operating base is located.

D15.2.1.2 Upon notification in accordance with D15.2.1, safety and security oversight shall be coordinated between the State in which the operating base is located and the State of Registry.

D15.2.2 **Operations Manual**. An operator shall provide, for the use and guidance of personnel concerned, an operations manual containing all the instructions and information necessary for operations personnel to perform their duties. 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.

Note 1: States may reference accepted and recognized industry codes of practice as the basis for the development of an operations manual.

Note 2: Appendix D contains guidance on the organization and content of an operations manual.

D15.2.3 **Operating instructions — General**

D15.2.3.1 An 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.

D15.2.3.2 An operator should issue operating instructions and provide information on aeroplane climb performance 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.

D15.2.4 **In-flight simulation of emergency situations.**An operator shall ensure that when passengers are being carried, no emergency or abnormal situations shall be simulated.

D15.2.5 **Checklists.**Checklists shall be used by flight crews prior to, during and after all phases of operations, and in emergencies, to ensure compliance with the operating procedures contained in the aeroplane operating manual and the aeroplane flight manual or other documents associated with the certificate of airworthiness and otherwise in the operations manual, are followed. 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).

D15.2.6 **Minimum Flight Altitudes**. An operator shall specify, for flights which are to be conducted in accordance with the instrument flight rules, the method of establishing terrain clearance altitudes.

D15.2.7 **Aerodrome Operating Minima**. An operator shall ensure that no pilot-in-command operates to or from an aerodrome using operating minima lower than those which may be established for that aerodrome by the State in which it is located, except with the specific approval of that State.

Note— This Regulation does not require Civil Aviation Authority to establish aerodrome-operating minima.

D15.2.7.1 The Civil Aviation Authority may approve operational credit(s) for operations with aeroplanes equipped with 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 (Para D4.4.1), 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 a HUD or equivalent displays, EVS, SVS and CVS is contained in 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).

D15.2.7.2 Instrument approach operations shall be classified based on the designed lowest operating minima below which an approach operation shall only becontinued with the required visual reference as follows:

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

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

i. **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 RVR not less than 550 m;

ii. **Category II (CAT II):** a decision height lower than 60 m (200 ft)but not lower than 30 m (100 ft) and a RVR not less than 300 m;

iii. **Category IIIA (CAT IIIA):** a decision height lower than 30 m(100 ft) or no decision height and a RVR notless than 175 m;

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

v. **Category IIIC (CAT IIIC):** no decision height and no RVR limitations.

Note 1.—Where decision height (DH) and runway visual range (RVR)fall into different categories of operation, the instrument approach operationwould be conducted in accordance with the requirements of the mostdemanding category. For examplean operation with a DH in the range of CAT IIIA butwith an RVR in the range of CAT IIIB would be considered a CAT IIIBoperation, or an operation with a DH in the range of CAT II but with an RVRin the range of CAT I would be considered a CAT II operation.

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

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

D15.2.7.3 The operating minima for 2D instrument approach operations usinginstrument approach procedures shall be determined by establishing a minimumdescent altitude (MDA) or minimum descent height (MDH), minimum visibilityand, if necessary, cloud conditions.

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

D15.2.7.4 The operating minima for 3D instrument approach operations usinginstrument approach procedures shall be determined by establishing a decisionaltitude (DA) or decision height (DH) and the minimum visibility or RVR.

Note: It is the practice in some States to declare, for flight planning purposes, higher minima for an aerodrome when nominated as an alternate, than for the same aerodrome when planned as that of intended landing.

D15.2.8 **Fatigue Management Programme.** An operator shall establish and implement a fatigue management programme that ensures all operator personnel involved in the operation and maintenance of aeroplane do not carry out their duties when fatigued. The programme shall address flight and duty times and be included in the operations manual. Refer to ANO 12 of FSD, PCAA on FDTL.

D15.2.9 **Passengers.**

D15.2.9.1 An operator shall ensure that passengers are made familiar with the location and use of:

D15.2.9.1.1 seat belts;

D15.2.9.1.2 emergency exits;

D15.2.9.1.3 life jackets, if the carriage of life jackets is prescribed;

D15.2.9.1.4 oxygen dispensing equipment, if the provision of oxygen for the use of passengers is prescribed; and

D15.2.9.1.5 other emergency equipment provided for individual use, including passenger emergency briefing cards.

D15.2.9.2 An operator shall ensure that all persons on board are aware of the location and general manner of use of the principal emergency equipment carried for collective use.

D15.2.9.3 An operator shall ensure that in an emergency during flight, passengers are instructed in such emergency action as may be appropriate to the circumstances.

D15.2.9.4 An 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 are secured in their seats by means of the seat belts or harnesses provided.

D15.3 Flight Preparation

D15.3.1 The operator shall develop procedures to ensure that a flight isnot commenced unless:

D15.3.1.1 the aeroplane is airworthy, duly registered and that appropriate certificates with respect thereto are aboard the aeroplane;

D15.3.1.2 the instruments and equipment installed in the aeroplane are appropriate, taking into account the expected flight conditions;

D15.3.1.3 any necessary maintenance has been performed in accordance with paras D19.1 to D19.5;

D15.3.1.4 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;

D15.3.1.5 any load carried is properly distributed and safely secured; and

D15.3.1.6 the aeroplane operating limitations, contained in the flight manual, or its equivalent, will not be exceeded.

D15.3.2 The operator should make available sufficient information on climb performance with all engines operating to enable determination of the climb gradient that can be achieved during the departure phase for the existing take-off conditions and intended take-off technique.

D15.3.3 Operational flight planning. An operator shall specify flight planning procedures to provide 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. These procedures shall be included in the operations manual.

D15.3.4 **Alternate Aerodromes**

D15.3.4.1 Take-off alternate aerodrome

D15.3.4.1.1 A take-off alternate aerodrome shall be selected and specified in the flight plan if the weather conditions at the aerodrome of departure are at or below the applicable aerodrome operating minima or it would not be possible to return to the aerodrome of departure for other reasons.

D15.3.4.1.2 The take-off alternate aerodrome shall be located within the following distance from the aerodrome of departure:

a) aeroplanes having two power-units. Not more than a distance equivalent to a flight time of one hour at the single-engine cruise speed in still air; and

b) aeroplanes having three or more power-units. Not more than a distance equivalent to a flight time of two hours at the one-engine inoperative cruise speed.

D15.3.4.1.3 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 aerodrome operating minima for that operation.

D15.3.5 **Refueling with passengers on board**

D15.3.5.1 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.

D15.3.5.2 When refueling with passengers embarking, on board or disembarking, two-way communication shall be maintained by the aeroplane's intercommunication 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 D15.3.5.1 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 aeroplane refueling are contained in 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.

D15.3.6 **Oxygen supply**

D15.3.6.1 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:

D15.3.6.1.1 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

D15.3.6.1.2 the crew and passengers for any period that the atmospheric pressure in compartments occupied by them will be less than 620 hPa.

D15.3.6.2 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.

D15.4 In-Flight Procedures

D15.4.1 Instrument approaches

D15.4.1.1 In the aeroplane operating manual as in D17.1.2, an operator should include operating procedures for conducting instrument approaches.

D15.4.2 **Use of oxygen**

D15.4.2.1 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 D15.3.6.1 or D15.3.6.2.

D15.4.2.2 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.

D15.4.3 **Aeroplane operating procedures for noise abatement**

D15.4.3.1 Aeroplane operating procedures for noise abatement should comply with the provisions of PANS-OPS (Doc 8168), Volume I.

D15.4.3.2 Noise abatement procedures specified by an operator for any one aeroplane type should be the same for all aerodromes.

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

D15.4.4 Unless otherwise specified in an air traffic control instruction.To avoid unnecessary airborne collision avoidance system (ACAS II) resolution advisories in aeroplane at or approaching adjacent altitudes or flight levels, pilots should consider using appropriate procedures. It is to ensure that a rate of climb or descent of less than 8 m/sec or 1500 ft/min (depending on the instrumentation available) is achieved throughout the last 300 m (1000 ft) of climb or descent to the assigned altitude or flight level, when made aware of another at or approaching an adjacent altitude or flight level.

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

D15.5 Duties of pilot-in-command

D15.5.1 The pilot-in-command shall ensure that the checklists specified in D15.2.5are complied with in detail.

D15.5.2 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. In the event that the pilot-in-command is in-capacitated the operator shall take the forgoing action.

Note: A definition of the term “serious injury” is contained in Annex 13.

D15.5.3 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.

D15.5.4 The pilot-in-command shall be responsible for the journey log book or the general declaration containing the information listed in D10.2.

Note: By virtue of Resolution A10-36 of the Tenth Session of the Assembly “the General Declaration, 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 Contracting States to be an acceptable form of journey log book".

D15.6 **Cabin baggage (take-off and landing)**. An operator shall specify procedures to ensure that all baggage carried onto an aeroplane and taken into the passenger cabin is secured and adequately stowed.

D16. AEROPLANE PERFORMANCE OPERATING LIMITATIONS:

D16.1 **General**. Aeroplanes for which Parts IIIA and IIIB of Annex 8 are not applicable because of the exemption provided for in Article 41 of the Convention, the State of Registry should ensure that the level of performance specified in D16.2below should be met as far as practicable.

D16.2 Applicable to aeroplanes certificated in accordance with Parts IIIA and IIIB of Annex 8.

D16.2.1 The requirements contained in D16.2.2 to D16.2.9 inclusive are applicable to the aeroplanes to which Parts IIIA and IIIB of Annex 8 are applicable.

Note: The Standards of Annex 8 — Airworthiness of Aeroplane, Parts IIIA and IIIB, apply to all aeroplanes of over 5 700 kg maximum certificated take-off mass intended for the carriage of passengers or cargo or mail in international air navigation.

D16.2.2 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.

D16.2.3 The State of Registry 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.

D16.2.4 A flight shall not be commenced unless the performance information provided in the flight manual indicates that the requirements of D16.2.5 to D16.2.9 can be complied with for the flight to be undertaken.

D16.2.5 In applying the provisions of this Air Navigation Order, account shall be taken of all factors that significantly affect the performance of the aeroplane (such as: mass, operating procedures, the pressure altitude appropriate to the elevation of the aerodrome, temperature, wind, runway gradient and condition of runway, i.e. presence of 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.

D16.2.6 **Mass Limitations**

D16.2.6.1 The mass of the aeroplane at the start of take-off shall not exceed the mass at which D16.2.7 is complied with, nor the mass at which D16.2.8 and D16.2.9 are complied with, allowing for expected reductions in mass as the flight proceeds, and for such fuel jettisoning as is envisaged in applying D16.2.8 and D16.2.9, and in respect of alternate aerodromes D16.2.3 and D16.2.9.

D16.2.6.2 In no case shall the mass at the start of takeoff 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.

D16.2.6.3 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.

D16.2.6.4 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 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.

D16.2.7 **Take-off**. The aeroplane shall be able, in the event of a critical power-unit failing at any point in the take-off, either to discontinue the take-off and stop within either the accelerate-stop distance available or the runway available, or to continue the take-off and clear all obstacles along the flight path by an adequate margin until the aeroplane is in a position to comply with D16.2.8.

D16.2.7.1 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.

D16.2.8 **En route — one power-unit inoperative**. The aeroplane shall be able, in the event of the critical engine becoming inoperative at any point along the route or planned diversions there from, to continue the flight to an aerodrome at which the requirements of D16.2.9can be met, without flying below the minimum obstacle clearance altitude at any point.

D16.2.9 **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.

D17. AEROPLANE INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENTS:

Note: Specifications for the provision of aeroplane communication and navigation equipment are contained in paras D18.1 to D18.3.

D17.1 General

D17.1.1 Where a master minimum equipment list (MMEL) is established for the aeroplane type, the operator shall include in the operations manual a minimum equipment list (MEL) approved by the State of Registry of the aeroplane 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.

Note: Appendix E contains guidance on the minimum equipment list.

D17.1.2 An operator should provide operations staff and flight crew with an aeroplane operating manual, for each aeroplane type operated, containing the normal, abnormal and emergency procedures relating to the operation of the aeroplane. The manual should be consistent with the aeroplane flight manual and checklists to be used. The design of the manual should 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).

D17.2 Aeroplanes on all flights

D17.2.1 In addition to the requirements contained in D6.2.2, an aeroplane shall be equipped with:

D17.2.1.1 accessible and adequate medical supplies appropriate to the number of passengers the aeroplaneis authorized to carry.

D17.2.1.2 Medical supplies should comprise one or more first-aid kits.

Note: Guidance on the types, number, location and contents of the medical supplies is given in Attachment B to Annex 6, Part I.

D17.1.1.3 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;

D17.1.1.4 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.

D17.1.1.5 means of ensuring that the following information and instructions are conveyed to passengers:

D17.1.1.5.1 when seat belts are to be fastened;

D17.1.1.5.2 when and how oxygen equipment is to be used if the carriage of oxygen is required;

D17.1.1.5.3 restrictions on smoking;

D17.1.1.5.4 location and use of life jackets or equivalent individual flotation devices where their carriage is required;

D17.1.1.5.5 location of emergency equipment; and

D17.1.1.5.6 location and method of opening emergency exits.

D17.2.2 An aeroplane shall carry:

D17.2.2.1 the operations manual prescribed in D15.2.2, or those parts of it that pertain to flight operations;

D17.2.2.2 the flight manual for the aeroplane, or other documents containing performance data required for the application of para D16.1 and D16.2 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

D17.2.2.3 the checklists to which D15.2.5 refers.

D17.3 Flight recorders

Note 1: Crash protected flight recorders comprise four systems: a flight data recorder (FDR), a cockpit voice recorder (CVR), an airborne image recorder (AIR) and 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 four systems: an aeroplane data recording system (ADRS), a cockpit audio recording system (CARS), an airborne image recording system (AIRS) and 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 Appendix F.

D17.3.1 Flight data recorders and aeroplane data recording systems

Note 1: FDR and AIR performance requirements are as contained in the EUROCAE ED-112, Minimum Operational Performance Specification (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.

Note 2: ADRS performance requirements are as contained in the EUROCAE ED-155, Minimum Operational Performance Specification (MOPS) for Lightweight Flight Recording Systems, or equivalent documents.

Note 3: Parameters to be recorded are listed in Tables 6-1and 6-2 of Appendix F.

D17.3.1.1 **Types**

D17.3.1.1.1 Types I and IA FDRs shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power, configuration and operation.

D17.3.1.1.2 Type II FDRs shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power and configuration of lift and drag devices.

D17.3.1.2 **Operation**

Note: Airborne image recorders classification is defined in 4.1 of Appendix F.

D17.3.1.2.1 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 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 6-3 of Appendix F.

D17.3.1.2.2 All aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the individual certificateof airworthiness is first issued on or after 1 January 2005 shall be equipped with a Type IA FDR.

D17.3.1.2.3 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.

D17.3.1.2.4 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, should be equipped with a Type II FDR.

D17.3.1.2.5 All aeroplanes for which a type certificate is first issued on or after 1 January 2016 and which are required tobe fitted with an FDR, shall record the following parameters at a maximum recording interval of 0.125 seconds:

a) Pilot input and/or control surface position – primary controls (pitch, roll, yaw).

Note 1: 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.

Note 2: Type certificate first issued refers to the date of issuance of the original "Type Certificate" for the aeroplane type, not the date of certification of particular aeroplane variants or derivative models.

D17.3.1.3 **Discontinuation**

D17.3.1.3.1 The use of analogue FDRs using frequency modulation (FM) have already been discontinued by 1 January 2012.

D17.3.1.3.2 The use of magnetic tape FDRs have already been discontinued by 1 January 2011.

D17.3.1.3.3 The use of magnetic tape FDRs have already been discontinued by 1 January 2016.

D17.3.1.4 **Duration.** All FDRs in service shall be capable of retaining the information recorded during at least the last 25 hours of their operation.

D17.3..2 **Cockpit voice recorders and cockpit audio recording systems**

D17.3.2.1 **Operation**

D17.3.2.1.1 All turbine-engined aeroplanes for which a type certificate is first issued on or after 1 January 2016andrequired to be operated by more than one pilot shall be equipped with either a CVR or a CARS.

D17.3.2.1.2 All turbine-engined aeroplanes 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.

D17.3.2.1.3 All aeroplanes of a maximum certificated take-off mass of over 27 000 kg for which the individual certificateof airworthiness is first issued on or after 1 January 1987 shall be equipped with a CVR.

D17.3.2.1.4 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 1987, should be equipped with a CVR.

D17.3.2.2 **Discontinuation**

D17.3.2.2.1 The use of magnetic tape and wire CVRs have already been discontinued by 1 January 2016.

D17.3.2.2.2 The use of magnetic tape and wire CVRs should be discontinued.

D17.3.2.3 **Duration**

D17.3.2.3.1 All CVRs shall be capable of retaining the information recorded during at least the last 30 minutes of theiroperation.

D17.3.2.3.2 From 1 January 2016, all CVRs shall be capable of retaining the information recorded during at least the lasttwo hours of their operation.

D17.3.2.3.3 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.

D17.3.3 **Data link recorders**

D17.3.3.1 **Applicability**

D17.3.3.1.1 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 5.1.2 of Appendix F and are required to carry acockpit voice recorder (CVR), shall record on a flight recorder all data link communications messages.

D17.3.3.1.2 All aeroplanes which are modified on or after 1 January 2016 to install and utilize any of the data linkcommunications applications listed in 5.1.2 of Appendix Fand are required to carry a CVR, shall record on a flight recorderthe data link communications messages.

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

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.

D17.3.3.2 **Duration.** The minimum recording duration shall be equal to the duration of the CVR.

D17.3.3.3 **Correlation.** Data link recording shall be able to be correlated to the recorded cockpit audio.

D17.3.4 **Flight recorders — general**

D17.3.4.1 **Construction and installation**. Flight recorders shall be constructed, located and installed so as to provide maximum practical protection for the recordings inorder that the recorded information may be preserved, recovered and transcribed. Flight recorders shall meet the prescribedcrashworthiness and fire protection specifications.

Note 1: Industry crashworthiness and fire protection specifications for FDR, CVR, AIR and DLR are as contained in the EUROCAE ED-112, Minimum Operational Performance Specification (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.

Note 2: Industry crashworthiness and fire protection specifications for ADRS and CARS are as contained in the EUROCAE ED-155,Minimum Operational Performance Specifications (MOPS) for Lightweight Flight Recording Systems, or equivalent documents.

D17.3.4.2 **Operation**

D17.3.4.2.1 Flight recorders shall not be switched off during flight time.

D17.3.4.2.2 To preserve flight recorder records, flight recorders shall be deactivated upon completion of flight timefollowing an accident or incident. The flight recorders shall not be reactivated before their disposition as determined inaccordance with Annex 13.

Note 1: The need for removal of the flight recorder records from the aeroplane 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 pilot-in-command's responsibilities regarding the retention of flight recorder records are contained in D17.3.4.3.

D17.3.4.3 **Flight recorder records**. The pilot-in-command, and/or the owner/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 flightrecorders, and their retention in safe custody pending their disposition as determined in accordance with Annex 13.

D17.3.4.4 **Continued serviceability**. Operational checks and evaluations of recordings from the flight recorder systems shall be conducted to ensure the continuedserviceability of the recorders.

Note: Procedures for the inspections of the flight recorder systems are given in Appendix F.

D17.3.4.5 **Flight recorder electronic documentation**

D17.3.4.5.1 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.

D17.3.4.6ELECTRONIC FLIGHT BAGS (EFBS)

Note.—Guidance on EFB equipment, functions and stablishing criteriafor their operational use is contained in the Manual on Electronic Flight Bags(Doc 10020).

D17.3.4.6.1 EFB equipment.-Where portable EFBs are used on board an aeroplane, the pilot - incommand and/or theoperator/owner shall ensure that they do not affect the performance of the aeroplane systems, equipment or the ability to operate the aeroplane.

D17.3.4.6.2 EFB functions.-Where EFBs are used on board an aeroplane the pilot-incommand and/or the owner/operator shall:

D17.3.4.6.2.1. assess the safety risk(s) associated with each EFB function. Establish the procedures for the use of, and training requirements for, thedevice and each EFB function. Ensure that, in the event of an EFB failure, sufficient information is readilyavailable to the flight crew for the flight to be conducted safely.

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

D17.3.4.6.3 EFB operational criteria.-In establishing operational criteria for the use of EFBs,The State of Registry shall establish criteria for the operational use of EFBfunctions to be used for the safe operation of aeroplanes. The State of Registry shall ensure that:

a. the EFB equipment and its associated installation hardware, including interaction with aeroplane systems if applicable, meet the appropriateairworthiness certification requirements;

b. the operator/owner has assessed the risks associated with the operationssupported by the EFB function(s);

c. the operator/owner has established requirements forredundancy of theinformation (if appropriate) contained in and displayed by the EFBfunction(s);

d. the operator/owner has established and documented procedures forthe management of the EFB function(s) including any databases it mayuse; and
e. the operator/owner has established and documented the procedures for theuse of, and training requirements for, the EFB function(s).

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

D17.3.4.7 **Combination recorders**

D17.3.4.7.1 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).

D17.3.5 **Aeroplanes on long-range over-water flights**

D17.3.5.1 The operator of an aeroplane operated on an extended flight over water shall determine the risks to survival ofthe occupants of the aeroplane in the event of a ditching. The operator shall take into account the operating environment andconditions such as, but not limited to, sea state and sea and air temperatures, the distance from land suitable for making anemergency landing, and the availability of search and rescue facilities. Based upon the assessment of these risks, the operatorshall, in addition to the equipment required in D6.2.2, ensure that the aeroplane is appropriately equipped with:

D17.3.5.1.1 life-saving rafts in sufficient numbers to carry all persons on board, stowed so as to facilitate their ready use inemergency, provided with such lifesaving equipment, including means of sustaining life, as is appropriate to the flight to be undertaken; and

D17.3.5.1.2 equipment for making the distress signals described in Annex 2.

D17.3.5.2 Each life jacket and equivalent individual flotation device, when carried in accordance with D6.4.3, shall beequipped with a means of electric illumination for the purpose of facilitating the location of persons, except where therequirement of D6.4.3.1is met by the provision of individual flotation devices other than life jackets.

D17.3.6 Aeroplanes for which the individual certificate of airworthinesswas first issued before 1 January 1990.

D17.3.6.1 Pressurized aeroplanes intended to be operated at flight altitudes at which the atmospheric pressure is less than376 hPa shall be equipped with a device to provide positive warning to the flight crew of any dangerous loss of pressurization.

D17.3.6.2 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 theoxygen supplies required in D15.3.6.1.

D17.3.6.3 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 D15.3.6.2.

D17.4 Aeroplanes in icing conditions. 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.

D17.5 Aeroplanes operated in accordance with the instrument flight rules

D17.5.1 In addition to the requirements contained in D6.7, 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 two independent altitude measuring and display systems.

D17.5.2 **Aeroplanes over 5,700 kg** — Emergency power supply for electrically operated attitude indicating instruments.

D17.5.2.1 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 electric 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 electric generating system and clear indication shall be given on the instrument panel that the attitude indicator(s) is being operated by emergency power.

D17.5.2.2 Aeroplane with advanced cockpit automation systems (glass cockpits) should have system redundancy that provides the flight crew with attitude, heading, airspeed and altitude indications in case of failure of the primary system or display.

D17.5.2.3 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.

D17.6 Pressurized aeroplanes when carrying passengers — weather-detecting equipment. Pressurized aeroplanes when carrying passengers shall be equipped with operative weather-detecting equipment capable of detecting thunderstorms whenever such aeroplanes are being operated in areas where such conditions may be expected to exist along the route either at night or under instrument meteorological conditions.

D17.7 **Aeroplanes operated above 15 000 m (49 000 ft) — radiation indicator**. Aeroplanes intended to be primarily operated above 15 000 m (49 000 ft) should 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 CAA Pakistan.

D17.8 Aeroplanes required to be equipped with ground proximity warning systems (GPWS) or Electronic Ground Proximity Warning Systems. All aeroplanes shall be equipped in accordance with para D6.11.

D17.9 Aeroplanes carrying passengers — cabin crew seats

D17.9.1 Aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 1981. Aeroplanes shall be equipped with a forward or rearward facing seat (within 15 degrees of the longitudinal axis of the aeroplane), fitted with a safety harness for the use of each cabin crew member required to satisfy the intent of D23.1 in respect of emergency evacuation.

D17.9.2 Aeroplanes for which the individual certificate of airworthiness was first issued before 1 January 1981.

D17.9.2.1 Aeroplanes should be equipped with a forward or rearward facing seat (within 15 degrees of the longitudinal axis of the aeroplane), fitted with a safety harness for the use of each cabin crew member required to satisfy the intent of D23.1 in respect of emergency evacuation.

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

D17.9.2.2 Cabin crew seats provided in accordance with D17.9.1 or D17.9.2.1 shall be located near floor level and other emergency exits as required by the State of Registry for emergency evacuation.

D17.10 Aeroplanes required to be equipped with ACAS (airborne collision avoidance system)

D17.10.1 All turbine-enginedaeroplanes of a maximum certificated take-off mass in excess of 15,000 kg, or authorized to carry more than 30 passengers, for which the individual airworthiness certificate is first issued after 24 November 2005, should be equipped with an airborne collision avoidance system (ACAS II).

D17.10.2 All turbine-enginedaeroplanes of a maximum certificated take-off mass in excess of 15,000 kg or authorized to carry more than 30 passengers, for which the individual airworthiness certificate is first issued after 1 January 2007, shall be equipped with an airborne collision avoidance system (ACAS II).

D17.10.3 All turbine-enginedaeroplanes of a maximum certificated take-off mass in excess of 5,700 kg but not exceeding 15 000 kg, or authorized to carry more than 19 passengers, for which the individual airworthiness certificate is first issued after 1 January 2008, should be equipped with an airborne collision avoidance system (ACAS II).

D17.11 Aeroplanes required to be equipped with a pressure-altitude reporting transponder. Aeroplanes shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of Annex 10, Volume IV.

Note: This provision is intended to improve the effectiveness of air traffic services as well as airborne collision avoidance systems.

D17.12 Microphones. All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones below the transition level/altitude.

D18. AEROPLANE COMMUNICATION AND NAVIGATION EQUIPMENT:

D18.1 Communication equipment. In addition to the requirements of D7.1.1 to D7.10.5, an aeroplane shall be provided with radio communication equipment capable of:

D18.1.1 conducting two-way communication for aerodrome control purposes;

D18.1.2 receiving meteorological information at any time during flight; and

D18.1.3 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 para D17.12 are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.

D18.2 Installation. The equipment installation shall be such that the failure of any single unit required for either communications or navigation purposes or both will not result in the failure of another unit required for communications or navigation purposes.

D18.3 Electronic navigation data management

D18.3.1 An operator of an aeroplane shall not employ electronic navigation data products that have been processed for application in the air and on the ground unless the State of Registry 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 equipment that will use them.The State of Registry shall ensure that the operator continues to monitor both 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.

D18.3.2 An operator shall implement procedures that ensure the timely distribution and insertion of current and unaltered electronic navigation data to all aeroplanes that require it.

D19. AEROPLANE MAINTENANCE:

D19.1 Operator's maintenance responsibilities

D19.1.1 An operator shall comply with the requirements of D8.1.

D19.1.2 An operator should ensure that all maintenance personnel receive initial and continuation training acceptable to the State of Registry and appropriate to their assigned tasks and responsibilities. This should include Human Factors and coordination with other maintenance personnel and flight crew.

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

D19.2 Operator's maintenance control manual. An operator should provide a maintenance control manual, as specified in D22.1, for the use and guidance of maintenance and operations personnel.

Note: States may provide guidance material as outlined in D22.2 or reference accepted industry codes of practice.

D19.3 Maintenance programme

D19.3.1 An operator shall provide, for the use and guidance of maintenance and operational personnel concerned, a maintenance programme, acceptable to the State of Registry, containing the information required by D22.2.The design and application of the operator's maintenance programme shall observe Human Factors principles according to the State of Registry's guidance material.

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

D19.3.2 Copies of all amendments to the maintenance programme shall be furnished promptly to all organizations or persons to whom the maintenance programme has been issued.

D19.4 Continuing airworthiness information. An operator of an aeroplane of a maximum certificated take-off mass in excess of 5 700 kg shall, as prescribed by the State of

Registry, ensure that the information resulting from maintenance and operational experience with respect to continuing airworthiness, is transmitted as required by Annex 8, Part II, 4.2.3 and 4.2.4.

D19.5 Maintenance release

D19.5.1 A maintenance release shall be completed and signed, as prescribed by the State of Registry, to certify that the maintenance work has been performed in accordance with the maintenance programme or other data and procedures acceptable to the State of Registry.

D19.5.2 A maintenance release shall contain a certification including:

D19.5.2.1 basic details of the maintenance performed;

D19.5.2.2 the date such maintenance was completed;

D19.5.2.3 when applicable, the identity of the approved maintenance organization; and

D19.5.2.4 the identity of the person or persons signing the release.

D20. AEROPLANE FLIGHT CREW

D20.1 Composition of the flight crew

D20.1.1 **Designation of pilot-in-command**. For each flight the operator shall designate a pilot to act as pilot-in-command.

D20.1.2 **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.

D20.2 Flight crew member emergency duties. An 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. Recurrent 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.

D20.3 Flight crew member training programmes

D20.3.1 An operator shall establish and maintain a training programme that is designed to ensure that a person who receives training acquires and maintains the competency to perform assigned duties, including skills related to human performance. Ground and flight training programmes shall be established, either through internal programmes or through a training services provider, and shall include or make reference to a syllabus for those training programmes in the company operations manual. The training programme shall include training to competency for all equipment installed.

D20.3.2 Flight simulators should be used to the maximum extent practicable for initial and annual recurrent training.

D20.4 Qualifications

D20.4.1 Flight crew member licensing

D20.4.1.1 An operator shall:

D20.4.1.1.1 ensure that each flight crew member assigned to duty holds a valid licence issued by the State of Registry, or if issued by another ContractingState, rendered valid by the State of Registry;

D20.4.1.1.2 ensure that flight crew members are properly rated; and

D20.4.1.1.3 be satisfied that flight crew members are competent to carry out assigned duties.

D20.4.1.2 The operator of an aeroplane equipped with an airborne collision avoidance system (ACAS II) shall ensure that each flight crew member has been appropriately trained to competency in the use of ACAS II equipment and the avoidance of collisions.

Note 1: Procedures for the use of ACAS II equipment are specified in the Procedures for Air Navigation Services — Aeroplane Operations (PANS-OPS, Doc 8168), Volume I — Flight Procedures. ACAS II Training Guidelines for Pilots are provided in PANS-OPS, Volume I, Attachment to Part III, Section 3, Chapter 3.

Note 2: Appropriate training, to the satisfaction of the State, to competency in the use of ACAS II equipment and the avoidance of collisions may be evidenced, for example, by:

a) possession of a type rating for an aeroplane equipped with ACAS II, where the operation and use of ACAS II are included in the training syllabus for the type rating; or
b) possession of a document issued by a training organization or person approved by the State to conduct training for pilots in the use of ACAS II, indicating that the holder has been trained in accordance with the guidelines referred to in Note 1; or

c) a comprehensive pre-flight briefing by a pilot who has been trained in the use of ACAS II in accordance with the guidelines referred to in Note 1.

D20.4.2 **Recent experience** — pilot-in-command. An operator shall not assign a pilot to act as pilot-in-command of an aeroplane unless that pilot has made 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.

D20.4.3 **Recent experience** — co-pilot. An operator shall not assign a co-pilot to operate at the flight controls of an aeroplane during take-off and landing unless that pilot has made 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.

D20.4.4 **Pilot proficiency checks**. An operator shall ensure that piloting technique and the ability to execute emergency procedures is checked periodically in such a way as to demonstrate the pilot's competence. Where the operation may be conducted under the instrument flight rules, an operator shall ensure that the pilot's competence to comply with such rules is demonstrated to either a check pilot of the operator or a representative of the State issuing the pilot licence.

Note: The periodicity of the checks referred to in D20.4.4 is dependent upon the complexity of both the aeroplane and the operation.

D21. FLIGHT OPERATIONS OFFICER / FLIGHT DISPATCHER:

D21.1 An operator should ensure that any person assigned as a flight operations officer/flight dispatcher is trained and maintains familiarization with all features of the operation that are pertinent to their duties, including knowledge and skills related to Human Factors.

D22. MANUALS, LOGS AND RECORDS:

D22.1 Operator's maintenance control manual

D22.1.1 An operator's maintenance control manual provided in accordance with D19.2, which may be issued in separate parts, should be developed according to industry codes of practice or to the State of Registry's guidance material, and should at a minimum contain information about:

D22.1.1.1 the means for complying with the procedures required by D19.1.1;

D22.1.1.2 the means of recording the names and duties of the person or persons required by D19.1.1;

D22.1.1.3 the maintenance programme required by D22.2 or D 19.3.1;

D22.1.1.4 the methods used for the completion and retention of the operator's maintenance records required by D19.5;

D22.1.1.5 the procedures for complying with the service information reporting requirements of Annex 8, Part II, 4.2.3 and 4.2.4;

D22.1.1.6 the procedures for implementing action resulting from mandatory continuing airworthiness information;

D22.1.1.7 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;

D22.1.1.8 the aeroplane types and models to which the manual applies;

D22.1.1.9 the procedures for ensuring that unserviceabilities affecting airworthiness are recorded and rectified; and

D22.1.1.10 procedures for advising the State of Registry of significant in-service occurrences.

D22.2 Maintenance programme

D22.2.1 A maintenance programme for each aeroplane as required by D22.1 or 19.3 shall contain the following information:

D22.2.1.1 maintenance tasks and the intervals at which these are to be performed, taking into account the anticipated utilization of the aeroplane;

D22.2.1.2 when applicable, a continuing structural integrity programme;

D22.2.1.3 procedures for changing or deviating from D22.2.1.1 and D22.2.1.2 above as approved by the State of Registry; and

D22.2.1.4 when applicable and approved by the State of Registry, condition monitoring and reliability programme descriptions for aeroplane systems, components and power plants.

D22.2.2 Maintenance tasks and intervals that have been specified as mandatory in approval of the type design, or approved changes to the maintenance programme, shall be identified as such.

D22.2.3 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.

D22.3 Flight recorder records. The owner of the aeroplane, or in the case where it is leased, the lessee, 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 Annex 13.

D23. <u>CABIN CREW:</u>

D23.1 Assignment of emergency duties. The requirement for cabin crew for each type of aeroplane shall be determined by the operator, based on seating capacity or the number of passengers carried, in order to effect a safe and expeditious evacuation of the aeroplane, 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 aeroplane.

D23.2 Cabin crew at emergency evacuation stations. When cabin crew are required as per Air Navigation Order , each cabin crew member assigned to emergency evacuation duties shall occupy a seat provided in accordance with D17.9 during take-off and landing and whenever the pilot-in-command so directs.

D23.3 Protection of cabin crew during flight. Each cabin crew member shall be seated with seat belts or, when provided, safety harnesses fastened during take-off and landing and whenever the pilot-in-command so directs.

D23.4 Training

D23.4.1 An operator shall ensure that a training programme is completed by all persons before being assigned as a cabin crew member.

D23.4.2 An operator should establish and maintain a cabin crew trainingprogramme that is designed to ensure that persons who receive training acquire the competency to perform their assigned duties and includes or makes reference to a syllabus for the training programme in the company operations manual. The training programme should include Human Factors training.

Note: Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual (Doc 9683) and ANO-017-FSXX.

D24. SECURITY:

D24.1 Security programme. Each entity conducting Private operations, including corporate operator aviation operations, using aeroplane with a maximum take-off mass greater than 5 700 kg, shall establish, implement and maintain a written operator security programme that meets the requirements of the national civil aviation security programme.

Note: Accepted industry codes of practice may be used as the basis for development of a written operator security programme.

D25. MISCELLANEOUS:

D25.1 Flight Time Limitations

D25.1.1 In agricultural spray operations, flight time on any type of aeroplane irrespective of weight category, shall not exceed 4 hours during a consecutive period of 24 hours.

D25.1.1.1 In operations involving flight below 1500 feet AGL, the flight time shall not exceed 4 hours, or 5.5 hours if an airborne air conditioning system is in use, during a consecutive period of 24 hours.

D25.1.2 Every flight crewmember shall be given a minimum rest period of 10 hours. The maximum flight and duty time limit during a consecutive period of 24 hours shall be as follows.

Crew Compliment	Flight Hours	Duty Hours
Single Pilot	6	9
Two or more pilots	9	12

D25.1.3 After every duty period, each crewmember shall be given a minimum rest period of 10 hours or double the flight time, whichever is more.

D25.1.4 Each crew member shall be provided with a rest period of not less than twenty-four hours in each period of seven consecutive days.

D25.1.5 Any rest period provided under this ANO shall not include time spent as a passenger for positioning or as supernumerary.

D25.1.6 No crew shall act as a crewmember of a flight if the Flight and duty time is likely to exceed.

D25.1.7 Duty hours include time spent in the office, ground / air positioning before or after flight to and from home / hotel etc. or any official commitment.

D25.2 Recent Flight Experience

D25.2.1 A person shall not fly as pilot of a private aeroplane unless:

D25.2.1.1 The person has, in the preceding ninety day carried out three take-offs and three landings in the same type of aeroplane and

D25.2.1.2 The person has, in the preceding six months, or such greater period as may be agreed by the Director-General, demonstrated the ability to execute the emergency procedures specified in the aeroplane flight manual;

D25.2.1.3 The person has in the preceding twelve months demonstrated that he/she has an adequate knowledge of the route to be flown and the aerodrome which are to be used; and

D25.2.1.4 The person has in the preceding twelve months made an approach and landing as member of the flight crew, or as an observer on the flight deck, at each aerodrome of landing on the route, or has qualified in another manner approved by the DG, or

D25.2.1.5 If a qualified co-pilot, has carried out a recency-check with an appropriately qualified flight crew, consisting of three take-offs and landing if not flown during the last 90 days.

D25.3 Training of PCAA Flight Inspectors

D25.3.1 Where an operator/person has decided to import an aeroplane, which is not available on Pakistan Civil Aviation register, or there is no inspector currently trained on certain type of aeroplane, the operator/owner shall arrange training of one PCAA Flight Inspector from Flight Standards at Operator/owner's expense. The operator/owner shall also arrange recurrent training of Flight Inspector periodically.

D25.4 Preparation - Operations Manual

D25.4.1 Operator /owner/lessee shall be responsible to produce an operations manual and submit it to Flight Standards Directorate. The preparation of operations manual should be in accordance with para D15.2.2 of this Air Navigation Order and ANO-003-FSXX.

D25.5 Inspection by PCAA

D25.5.1 The Director Flight Standards or person authorized by him, may carry out inspection of aeroplane, before import, at no cost to PCAA and a surveillance check of the establishment and operation, to see if the provisions of CARs, ANOs, PCAA instructions/directives and Flight Safety requirements are being adhered to.

D25.6 Exercise Privileges of a Lower Pilot Licence

D25.6.1 A pilot may exercise the privileges of the lower licence if higher licence stands expired provided he/she has a valid medical fitness certificate of an appropriate class, appropriate endorsement and recent experience. PIC may exercise this authority for the rest of period of validity of his/her lower licence. For example, if an ATPL of a pilot has lapsed, he/she may exercise the privileges of his/her CPL and PPL for a period of validation of respective licence. Similarly, a holder of a lapsed Private Pilot Licence or above may exercise the privileges of a valid Student Pilot licence provided his/her medical assessment is valid.

D25.7 Withholding, Suspension and Cancellation of Certificate/Licence

D25.7.1 The Competent Authority may refuse to grant or renew the Certificate/Licence or suspend/ cancel the same under Part XIX of CARs 94.

D25.7.2 If the applicant has committed a financial breach of not paying any CAA's outstanding dues, his/her certificate/Licence is liable to be withheld, suspended or cancelled.

D25.7.3 For the purpose of enforcement, compliance of the Rules or the requirement of this Air Navigation Order or with any direction issued under the Rules, provided that the purpose is to secure the safety of the operations, the Director General Civil Aviation Authority may:

D25.7.3.1 Suspend or vary the certificate/Licence for such a period or time he may consider necessary and/or

D25.7.3.2 Cancel such certificate/Licence provided that in each case the holder of the certificate/Licence shall be informed in writing of the facts and circumstances that in the opinion of the Competent Authority warrant suspension, variation or cancellation of the certificate/Licence. The holder of the Certificate/licence is to be given an opportunity to show cause as to why such an action should not be taken against him/her.

D25.8 Penalties

D25.8.1 A person who contravenes or fails to comply with the provision of the CARs 94, this Air Navigation Order or instructions issued by the competent authority or an authorized person is guilty of an offence, which may lead to suspension, cancellation and penal deduction or variation of the certificate/Licence under the provisions of CARs 94.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

AC	:	ALTERNATING CURRENT
ANO	:	AIR NAVIGATION ORDER
APU	:	AUXILIARY POWER UNITS
CARs	:	CIVIL AVIATION RULES
CMP	:	CONFIGURATION MAINTENANCE AND PROCEDURES
ETOPS	:	EXTENDED TWIN-ENGINE OPERATIONS
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
MEL	:	MINIMUM EQUIPMENT LIST
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY

E2. RECORDS:

E2.1 NIL

E2.2

E3. REFERENCES:

E3.1 "AOC Guide – Commercial Air Operations" CAAD-617; (MNL-005-FSXX-3.0)

E3.2 ICAO Annex 6 Part-I,II,III.

E3.3 FSD/PLO ANOs Relevant to Licensed Personnel/ Operators as applicable.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st September, 2019 and supersedes ANO 91.0022 (Issue-4).

--S/d--

(SHAHRUKH NUSRAT)
Director General,
Pakistan Civil Aviation Authority

Dated: **23rd October, 2019**

-- S/d--

(CAPT. S. M. RAFATULLAH)
Director Flight Standards

Dated- **22nd October, 2019**
File No. HQCAA/1071/038/FSAS

APPENDIX "A"

LIGHTS TO BE DISPLAYED BY AEROPLANES

(Supplementary to para D6.8)

Terminology

1. When the following terms are used in this Appendix, they have the following meanings:

2. **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.

3. **Horizontal plane**. The plane containing the longitudinal axis and perpendicular to the plane of symmetry of the aeroplane.

4. **Longitudinal axis of the aeroplane**. A selected axis parallel to the direction of flight at a normal cruising speed, and passing through the centre of gravity of the aeroplane.

5. **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.

6. **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.

7. **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.

8. **Vertical planes**. Planes perpendicular to the horizontal plane.

9. **Visible**. Visible on a dark night with a clear atmosphere.

Note: The lights specified herein are intended to meet the requirements of ICAO, for navigation lights. Navigation lights to be displayed in the air.

10. As illustrated in Figure 1, the following unobstructed navigation lights shall be displayed:

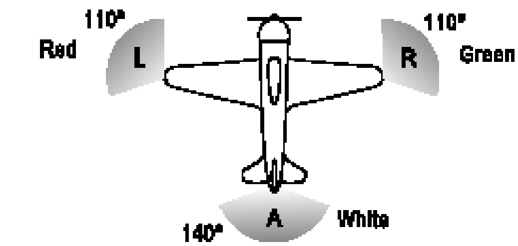


Figure 1

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.

Lights to be displayed on the water

11. **General.** The lights specified herein are intended to meet the requirements of ICAO, 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.

12. The lights required by aeroplanes in each case are described below.

13. 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 a), b) and c) should be visible at a distance of at least 3.7 km (2 NM). The light described in 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.

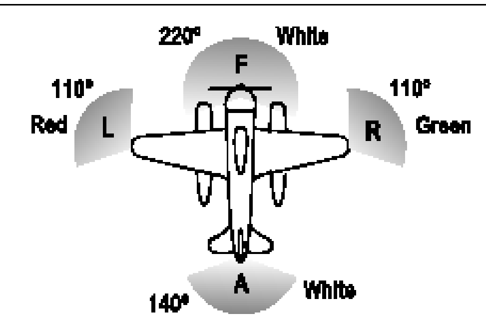


Figure 2

14. When towing another vessel or aeroplane. As illustrated in Figure 3, the following appearing as steady, unobstructed lights:

a) The lights described in 13 above;
b) a second light having the same characteristics as the light described in 13 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 13 c) and mounted in a vertical line at least 2 m above it.

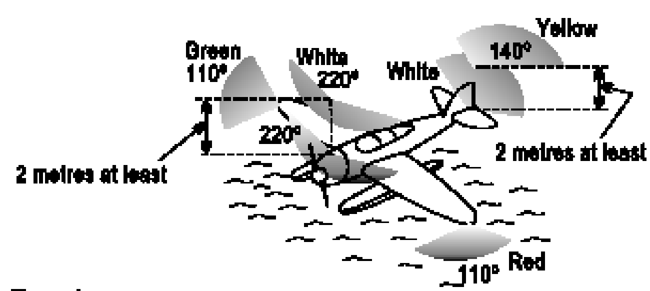


Figure 3

15. When being towed. The lights described in 13 a), b) and c) appearing as steady, unobstructed lights.

16. 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).

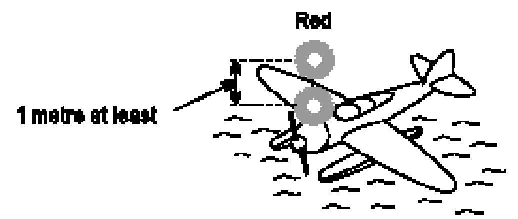


Figure 4

17. When making way but not under command. As illustrated in Figure 5, the lights described in 16 plus the lights described in 13 a), b) and c).

Note: The display of lights prescribed in 16 and 17 above is to be taken by other aeroplane 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.

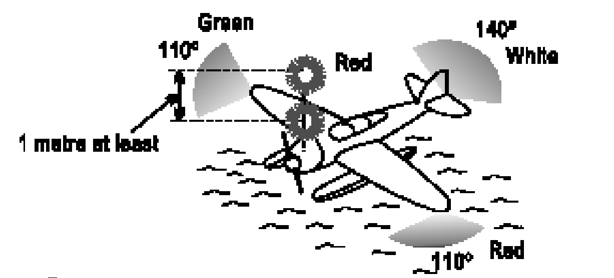


Figure 5

18. When at anchor

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
d) visible, so far as practicable, all around the horizon at a distance of at least 1.9 km (1 NM).

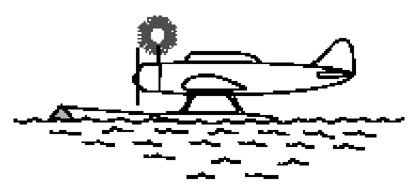


Figure 6

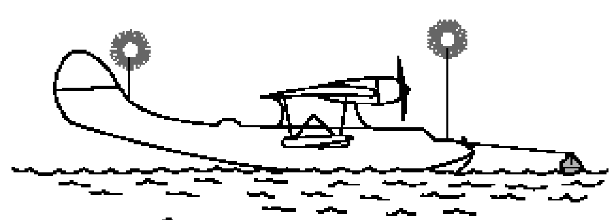
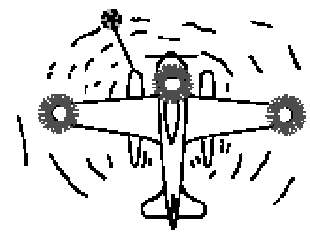
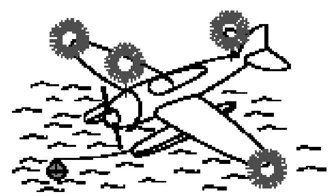


Figure 7



Less than 50 metres in length; 50 metres or more in span

Figure 8



50 metres or more in length; 50 metres or more in span

Figure 9

19. When aground. The lights prescribed in 18 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 "B"

ALTIMETRY SYSTEM PERFORMANCE REQUIREMENTS FOR OPERATIONS IN RVSM AIRSPACE

(See para D7.2.4.2 and D7.2.5.1)

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 < z < 25 when z is the magnitude of the mean TVE in meters, or 92 – 0.004z2 for 0 < z < 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 "C"

CARRIAGE AND USE OF OXYGEN

(Supplementary to para D4.3.8)

Introduction

1. The performance of crew members and the well-being of passengers during flights at such altitudes where a lack of oxygen might result in impairment of faculties are of major concern. Research conducted in altitude chambers or by exposure to mountain elevations indicates that human tolerance could be related to the altitude concerned and the exposure time. The subject is dealt with in detail in the Manual of Civil Aviation Medicine (Doc 8984). In the light of the above and to further assist the pilot-in-command in providing the oxygen supply intended by para D6, the following guidelines, which take into account the requirements already established in Annex 6, Part I, are considered relevant.

Oxygen supply

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

a) all crew members and at least 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) all crew members and passengers for any period that the atmospheric pressure in compartments occupied by them will be less than 620 hPa.

3. A flight to be operated with a pressurized aeroplane should not be commenced unless a sufficient quantity of stored breathing oxygen is carried to supply all 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.

Use of oxygen

4 All flight crew members, when engaged in performing duties essential to the safe operation of an aeroplane in flight, should use breathing oxygen continuously whenever the circumstances prevail for which its supply has been indicated to be necessary in 2 or 3.

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

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

Absolute pressure	Meters	Feet
700 hPa	3000	10000
620 hpa	4000	13000
376 hPa	7600	25000

APPENDIX “D”

COMPANY OPERATIONS MANUAL

Supplementary to D15.2.2

The following is the content of a company operations manual (ANO-003.FSXX). It may be issued in separate parts corresponding to specific aspects of an operation. It should include the instructions and information necessary to enable the personnel concerned to perform their duties safely and shall contain at least the following information:

a) table of contents;
b) amendment control page and list of effective pages, unless the entire document is reissued with each amendment and the document has an effective date on it;
c) Organogram. duties, responsibilities and succession of management, approved persons and operating personnel;
d) operator safety management system;
e) operational control system;
f) MEL procedures (where applicable);
g) normal flight operations;
h) SOPs;
i) weather limitations;
j) flight and duty time limitations;
k) emergency operations;
l) accident/incident considerations;
m) personnel qualifications and training;
n) record keeping;
o) a description of the maintenance control system;
p) security procedures (where applicable);
q) performance operating limitations;
r) use/protection of FDR/CVR records (where applicable); and
s) handling of dangerous goods.

APPENDIX "E"

MINIMUM EQUIPMENT LIST (MEL)

Supplementary to D17.1.1

1. If deviations from the requirements of States in the certification of aeroplanewere not permitted, an aeroplane 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 State 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 State of the Operator, is therefore necessary for each aeroplane, based on the master minimum equipment list established for the aeroplane type by the organization responsible for the type design in conjunction with the State of Design.

4. The State of the Operator should require the operator to prepare a minimum equipment list designed to allow the operation of an aeroplane 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 aeroplane 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 aeroplane 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 should 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 State of the Operator 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 aeroplane 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 deactivate 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.

APPENDIX "F"

FLIGHT RECORDERS

(Supplementary to para D17.3)

1. **Introduction.** The material in this Appendix concerns flight recorders intended for installation in aeroplanes engaged in international air navigation. Crash protected flight recorders comprise four systems: a flight data recorder (FDR), a cockpit voice recorder(CVR), an airborne image recorder (AIR) and a data link recorder (DLR). Lightweight flight recorders comprise fours systems: an aeroplane data recording system (ADRS), a cockpit audio recording system (CARS), an airborne image recording system(AIRS) and a data link recording system (DLRS).

2. **General requirements.**

2.1 **T**he flight recorder systems 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.

2.2 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 thedevice during flight time or crash impact.

2.3 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.

2.4 Means shall be provided for an accurate time correlation between the recorder systems recordings.

2.5 The manufacturer shall provide the appropriate certificating authority with the following information in respect of theflight recorder systems:

a) manufacturer's operating instructions, equipment limitations and installation procedures; and
b) manufacturer's test reports.

3. **Flight data recorder (FDR).** 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.

3.1 **Parameters to be recorded.** Flight data recorders shall be classified as Type I, TypeIA and Type II depending upon the number of parameters tobe recorded.

3.2 The parameters that satisfy the requirements for FDRs are listed in the paragraphs below. The number ofparameters 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.

3.3 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*

3.4. The following parameters shall satisfy the requirements for attitude:
- — Pitch attitude
- — Roll attitude
- — Yaw or sideslip angle*
- — Angle of attack*

3.5. 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 leverposition, N3

3.6. 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 brakeselection
- — 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*

3.7. 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/auto throttle/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, bothcautions 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 1.— Parameter guidance for range, sampling, accuracy and resolution are as contained in the EUROCAE ED-112*Minimum Operational Performance Specification (MOPS) for Crash Protected Airborne Recorder Systems*, or equivalent documents.*

Note 2.— It is not intended that aeroplanes issued with an individual certificate of airworthiness before 1 January 2016 bemodified to meet the range, sampling, accuracy or resolution guidance detailed in this Appendix.

4.. Types of FDR.

4.1 **Type IA FDR**. This FDR shall be capable of recording, as appropriate to the aeroplane, at least the 78 parametersin Table 6-1.

4.2. **Type I FDR**. This FDR shall be capable of recording, as appropriate to the aeroplane, at least the first 32parameters in Table 6-1.

4.3. **Type II FDR.** This FDR shall be capable of recording, as appropriate to the aeroplane, at least the first 15parameters in Table 6-1.

4.4. The parameters that satisfy the recommendations for flight path and speed as displayed to the pilot(s) are listedbelow. The parameters without an (*) are mandatory parameters which shall be recorded. In addition, the parameters designated by an (*) are to 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*

5. **Additional information**

5.1 A Type IIA FDR, in addition to a 30-minute recording duration, shall retain sufficient information from thepreceding take-off for calibration purposes.

5.2 The measurement range, recording interval and accuracy of parameters on installed equipment shall be verified bymethods approved by the appropriate certificating authority.

5.3 Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability/maintenance information shall be maintained by the operator/owner. The documentation shall be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.

6. Cockpit voice recorder (CVR) and cockpit audio recording system (CARS). Signals to be recorded;

6.1 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 toengine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of theflight.

6.2 The CVR shall record on four separate channels, or more, at least the following:

i. voice communication transmitted from or received in the aeroplane by radio;
ii. aural environment on the flight deck;

iii. voice communication of flight crew members on the flight deck using the aeroplane interphone system, if installed;
iv. voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and
v. digital communications with ATS, unless recorded by the FDR.

6.3 The CARS shall record on two separate channels, or more, at least the following:
i. voice communication transmitted from or received in the aeroplane by radio;
ii. aural environment on the flight deck; and
iii. voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed.

6.4 The recorder shall be capable of recording on at least four channels simultaneously except for the recorder. On a tape-based CVR, to ensure accurate time correlation between channels, the recorder shall record in an in-lineformat. If a bi-directional configuration is used, the in-line format and channel allocation shall be retained in both directions.

6.5 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 andis specified because the outer edges of the tape have a higher risk of damage than the middle. It is not intended to preclude useof alternative recording media where such constraints may not apply.

7. Airborne image recorder (AIR)

7.1 Classes

7.1.1 A Class A AIR captures the general cockpit area in order to provide data supplemental to conventional flightrecorders.

Note 1: To respect crew privacy, the cockpit area view may be designed as far as practical to exclude the head andshoulders of crew members whilst seated in their normal operating position.

Note 2: There are no provisions for Class A AIRs in this document.

7.1.2 A Class B AIR captures data link message displays.

7.1.3 A Class C AIR captures instruments and control panels.

Note: A Class C AIR may be considered as a means for recording flight data where it is not practical or is prohibitivelyexpensive to record on an FDR, or where an FDR is not required.

7.1.4 The AIR must start to record prior to the aeroplane moving under its own power and record continuously until thetermination of the flight when the aeroplane is no longer capable of moving under its own power. In addition, depending on theavailability of electrical power, the

AIR must start to record as early as possible during the cockpit checks prior to engine startat the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

8. Data link recorder (DLR)

8.1 Applications to be recorded

8.1.1 Where the aeroplane flight path is authorized or controlled through the use of data link messages, all data linkmessages, both uplinks (to the aeroplane) and downlinks (from the aeroplane), shall be recorded on the aeroplane. As far as practicable, 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 messageswere displayed to the flight crew is needed to determine an accurate sequence of events on board the aeroplane.

8.1.2 Messages applying to the applications listed below shall be recorded. Applications without the asterisk (*) aremandatory applications which shall be recorded regardless of the system complexity. Applications with an (*) shall be recordedonly 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 6-2.

9. Aeroplane data recording systems (ADRS)

9.1 Parameters to be recorded

9.1.1 ADRS shall be capable of recording, as appropriate to the aeroplane, at least the essential (E) parameters in Table 6-3.

9.2 Additional information

9.2.1 The measurement range, recording interval and accuracy of parameters on installed equipment is usually verifiedby methods approved by the appropriate certificating authority.

9.2.2 Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability/maintenance information shall be maintained by the operator/owner. The documentation shall be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.

10. Inspections of flight recorder systems

10.1 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.

10.2 Annual 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 thenominal duration of the recording;

b) the analysis of the FDR shall evaluate the quality of the recorded data to determine if the bit error rate (including thoseerrors introduced by recorder, the acquisition unit, the source of the data on the aeroplane and by the tools used toextract the data from the recorder) is within acceptable limits and to determine the nature and distribution of the errors;

c) a complete flight from the FDR shall be examined in engineering units to evaluate the validity of all recordedparameters. Particular attention shall be given to parameters from sensors dedicated to the FDR. Parameters taken from the aeroplane electrical bus system need not be checked if their serviceability can be detected by other aeroplane systems;

d) the readout facility shall have the necessary software to accurately convert the recorded values to engineering unitsand to determine the status of discrete signals;

e) an annual examination of the recorded signal on the CVR shall be carried out by replay of the CVR recording. While installed in the aeroplane, the CVR shall record test signals from each aeroplane source and from relevant external sourcesto ensure that all required signals meet intelligibility standards;

f) where practicable, during the annual examination, a sample of in-flight recordings of the CVR shall be examined forevidence that the intelligibility of the signal is acceptable; and

g) an annual examination of the recorded images on the AIR shall be carried out by replay of the AIR recording. While installed in the aeroplane, the AIR shall record test images from each aeroplane source and from relevant external sourcesto ensure that all required images meet recording quality standards.

10.3 Flight recorder systems shall be considered unserviceable if there is a significant period of poor quality data un-intelligible signals, or if one or more of the mandatory parameters is not recorded correctly.

10.4 A report of the annual inspection shall be made available on request to regulatory authorities for monitoringpurposes.

10.5 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 thatparameters 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 shallbe a recalibration performed as recommended by the sensor manufacturer, or at least every two years.

Table 6-1 Parameter Guidance for Flight Data Recorders

S. No.	Parameter	Measurement range	Maximum sampling And recording interval (seconds)	Accuracy limits (Sensor input Compared To FDR readout)	Recording resolution
01.	Time (UTC when available Otherwise relative time count Or GPS time sync)	24 hours	4	±0.125% per hour	1 second
02.	Pressure altitude	-300 m (-1 000 ft) to maximum certificated altitude of aeroplane+1500 ft)	1	±30 m ±200 m (±100 ft to ±700 ft)	1.5 m (5 ft)
03.	Indicated airspeed of calibrated airspeed	95 Km/h (50 Kt) to max V_{SO} (Note 1) V_{SO} to 1.2 V_O (Note 2)	1	±05	1 kt (0.5 kt recommended)
04.	Heading (primary flight crew reference	360^0	1	$±02^0$	0.5^0
05.	Normal acceleration (Note 3)	-3 g to +6 g	0.125	±1% of maximum range excluding datum error of ±5%	0.004 g
06.	Pitch attitude	$±75^0$ or usable range whichever is greater	0.25	$±02^0$	0.5^0
07.	Roll altitude	$±180^0$	0.25	$±02^0$	0.5^0
08.	Radio transmission keying	On-off (one discrete)	1		
09.	Power on each engine (Note 4)	Full range	1 (per engine)	±2%	±0.2% of full range or the resolution required to operate the aeroplane
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 aeroplane
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 aeroplane

S. No.	Parameter	Measurement range	Maximum sampling And recording interval (seconds)	Accuracy limits (Sensor input Compared To FDR readout)	Recording resolution
12*	Thrust reverser position	Stowed, to 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	±02^{0}C	±0.3^{0}C
15*	Autopilot/auto throttle/AFCS	A suitable combination of discretes	1		
Note:- The preceding 15 parameters satisfy the requirements for a Type II FDR.					
16	Longitudinal acceleration (Note 3)	±1g	0.25	±0.015 g excluding a datum error or ±0.015 g	0.004 g
17.	Lateral acceleration (Note 3)	±1g	0.25	±0.015 g excluding a datum error or ±0.015 g	0.004 g
18.	Pilot input and control surface position-primary controls (pitch, roll, yaw) (Notes 3 and 5)	Full range	0.25	±2^{0} 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 (1ft) + 0.5% of full range above 150 m (500 ft)
21*	Vertical beam deviation (ILS/GPL/GLS glide path MLS elevation. IRNAV/IAN vertical deviation)	Signal range	1	±3%	0.3% of full range

S. No.	Parameter	Measurement range	Maximum sampling And recording interval (seconds)	Accuracy limits (Sensor input Compared To FDR readout)	Recording resolution
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 6)	Full range	4	As installed	
26*	DME 1 and 2 distance (includes distance to runway threshold (FLS) and distance to missed approach point (IRNAV/IAN) (Notes 6 and 7)	0-370 km (0-200 NM)	4	As installed	1852 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 (low pressure)	Discrete	2		0.5% of full range
31*	Navigation data (latitude/longtitude, ground speed and drift angle) (Note 8)	As installed	1	As installed	
32*	Landing gear and gear selector position	Discrete	4	As installed	

Note:- The preceding 32 parameters satisfy the requirements for a Type I FDR.

S. No.	Parameter	Measurement range	Maximum sampling And recording interval (seconds)	Accuracy limits (Sensor input Compared To FDR readout)	Recording resolution
33*	Groundspeed	As installed	1	Data should be obtained from the most accurate system	1 kt
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, DGT, 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	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 heading (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	As installed

S. No.	Parameter	Measurement range	Maximum sampling And recording interval (seconds)	Accuracy limits (Sensor input Compared To FDR readout)	Recording resolution
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	2% of full range
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
56*	Fuel quantity in CG trim tank	As installed	64	As installed	1% of full range
57*	Head-up display	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	

S. No.	Parameter	Measurement range	Maximum sampling And recording interval (seconds)	Accuracy limits (Sensor input Compared To FDR readout)	Recording resolution
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 uniquelyrequired	0.3% of full range
68*	Yaw or sideslip angle	Full range	1	±5%	0.5^0
69*	De-icing and / or anti-icing systems selection	Discretes	4		
70*	Hydraulic pressure (each system)	Full range	2	±5%	100psi
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 (±85lbf), (±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	

Note:- The preceding 78 parameters satisfy the requirements for a Type IA FDR

Notes:-

1. $V_o$design diving speed.
2. Refer to D17.3.1.2.5 for increased recording requirements.

3. Record sufficient inputs to determine power.

4. 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 system in which movement of a control surface will not back drive the pilot's control, "and" applies. In aeroplanes with split surface, a suitable combination of inputs is acceptable in lieu of recording each surface separately.

5. If signal available in digital form.

6. Recording of latitude and longitude from INS or other navigation system is a preferred alternative.

7. 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 aeroplane 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 auto flight system engagement and mode indication if not recorded from another source;
   2) display system selection/status, e.g. SECTOR, PLAN, ROSE, NAV, WXR, COMPOSITE, COPY:
   3) warnings and alerts;
   4) the identity of displayed pages for emergency procedures and checklists;

b) retardation information including brake application for use in the investigation of landing overruns and rejected take-offs.

Table 6-2 Description of Applications for Data Link Recorders

Item No.	Application Type	Application description	Recording Content
1.	Data link initiation	This includes any applications used to logon to or initiate data link service. In FANS-1/A and ATN, these are ATS Facilities Notification (AFN) and Context Management (CM), respectively	C
2.	Controller/Pilot Communication	This includes any application used to exchange requests, clearances, instructions and reports between the flight crew and controllers on the ground. In FANS-1/A and ATN, this includes the CPDLC application. It also includes applications used for the exchange of oceanic (OCL) and departure clearances (DCL) as well as data link delivery of taxi clearances.	C
3.	Addressed Surveillance	This includes any surveillance application in which the ground sets up contracts for delivery of surveillance data. In FANS-1/A ATN, this includes the Automatic Dependent Surveillance (ADS-C) application. Where parametric data are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	C
4.	Flight Information	This includes any service used for delivery of Flight Information to specific aeroplane. This includes, for example, D-METAR, D-ATIS, D-NOTAM and other textual data link services.	C
5.	Aeroplane Broadcast Surveillance	This includes Elementary and Enhanced Surveillance Systems, as well as ADS-B output data. Where parametric data sent by the aeroplane are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	M*
6.	Aeronautical Operational Control Data	This includes any application transmitting or receiving data used for AOC purposes (per the ICAO definition of AOC).	M*

Key:

C: Complete contents recorded.
M: Information that enables correlation to any associated records stored separately from the aeroplane.
*: Application that are to be recorded only as far as is practicable given the architecture of the system.

Table 6-3 Parameter Guidance for Flight Data Recording System

No.	Parameter Name	Parameter Category	Min recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
1.	Heading (Magnetic or True)	R*	±180 degrees	1	±2 degrees	0.5 degrees	*If not available, record rates
2.	Pitch altitude	E*	±90 degrees	0.25	±2 degrees	0.5 degrees	* If not available, record rates
3.	Roll altitude	E*	±180 degrees	0.25	±2 degrees	0.5 degrees	* If not available, record rates
4.	Yaw rate	E*	±300 degrees	0.25	±1% + drift of 360^0/hr	2 degree/s	* Essential if no heading available
5.	Pitch rate	E*	±300 degrees	0.25	±1% + drift of 360^0/hr	2 degree/s	* Essential if no pitch attitude available
6.	Roll rate	E*	±300 degrees	0.25	±1% + drift of 360^0/hr	2 degree/s	* Essential if no roll altitude available.
7.	Positioning system: latitude/longi tude:	E	Latitude:± 90 degrees Longitude: ±180 degrees	2 (1 if available)	As installed (0.00015 degree recommended)	0.00005 degree	
8.	Positioning system estimated error	E*	Available rage	2 (1 if available)	As installed	As installed	*If available
9.	Positioning system: altitude	E	-300 m (-1 000 ft) to maximum certificate d altitude of aeroplane +1 500 m (5 000 ft)	2 (1 if available)	As installed ±15 m (±50 ft) recommended)	1.5 m (5 ft)	
10.	Positioning system: time*	E	24 hours	1	±0.5 second	0.1 second	*UTC time preferred where available
11.	Positioning system: ground speed	E	0 -1 000 kt	2 (1 if available)	As installed ±5 ktrecommended)	1 kt	

No.	Parameter Name	Parameter Category	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
12.	Positioning system: channel	E	0-360 degrees	2 (1 if available)	As installed (±2 degrees recommended)	0.5 degrees	
13.	Normal acceleration	E	-3 g to +6 g(*)	0.25 (0.125 if available)	As installed (±0.09 g excluding a datum error of (±0.45 g recommended)	0.004 g	
14.	Longitudinal acceleration	E	±1g (*)	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
15.	Lateral acceleration	E	±1g (*)	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
16.	External static pressure (or pressure altitude)	R	34.4 mb (3.44 in Hg) to 310.2 Mb (31.02 in Hg) or available sensor range	1	As installed (±1mb 0.1 in Hg) or ±30 m (±100 ft) to (±210 m (±700 ft (recommended)	0.1 mb (0.01 to Hg) or 1.5 m (5 ft)	
17.	Outside air temperature (or total air temperature	R	-50^{0} to + 90^{0} C or available sensor range	2	As installed ($\pm 2^{0}$ C recommended)	1^{0} C	
18.	Indicated air speed	R	As the installed pilot display measuring system or available sensor range	1	As installed (±3% recommended)	1 kt (0.5 kt recommen ded)	
19.	Engine RPM	R	Full range	Each engine Each second	As installed	0.2% of full range	

No.	Parameter Name	Parameter Category	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
20.	Engine oil pressure	R	Full range	Each engine Each second	As installed (5% of full range recommended)	2% of full range	
21.	Engine oil temperature	R	Full range	Each engine Each second	As installed (5% of full range recommended)	2% of full range	
22.	Fuel flow or pressure	R	Full range	Each engine Each second	As installed (5% of full range recommended)	2% of full range	
23.	Manifold pressure	R	Full range	Each engine Each second	As installed	0.2% of full range	
24.	Engine thrust/power/ torque parameters required to determine propulsive thrust / power*	R	Full range	Each engine Each second	As installed	0.1% of full range	*Sufficient parameters e.g EPR/N1 or torque/NP as appropriate to the particular engine shall be recorded to determine power in both normal and reverse thrust. A margin for possible over speed should be provided.
25.	Engine gas generator speed (Ng)	R	0-150%	Each engine Each second	As installed	0.2% of full range	
26.	Free power turbine speed (Nf)	R	0-150%	Each engine Each second	As installed	0.2% of full range	
27.	Coolant temperature	R	Full range	1	As installed ($\pm 5^0$ C recommended)	1^0 C	
28.	Main Voltage	R	Full range	Each engine Each second	As installed	1 Volt	
29.	Cylinder head Temperature	R	0-150%	Each Cylinder Each second	As installed	2% of full range	

No.	Parameter Name	Parameter Category	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
30.	Flaps position	R	Full range or each discrete position	2	As installed	0.5 degree	
31.	Primary flight control surface position	R	Full range	0.25	As installed	0.2% of full range	
32.	Fuel quantity	R	Full range	4	As installed	1% of full range	
33.	Exhaust gas temperature	R	Full range	Each engine Each second	As installed	2% of full range	
34.	Emergency Voltage	R	Full range	Each engine Each second	As installed	1 Volt	
35.	Trim surface position	R	Full range or each discrete position	1	As installed	0.3% of full range	
36.	Landing gear position	R	Each discrete position*	Each gear every two seconds	As installed		*Where available, record up-and-locked and down-and-locked position
37.	Novel/unique aeroplane features	R	As required	As required	As required	As required	

Key:
E: Essential parameters
R: Recommended parameters

APPENDIX "G"

HEAD-UP DISPLAYS (HUD) AND ENHANCED VISION SYSTEMS (EVS)

(Supplementary to Para D6.15 to this ANO)

Introduction

The material in this Appendix provides guidance for HUD and EVS intended for installation and operational use in aeroplane engaged in international air navigation. HUD and EVS may be installed and operated to enhance situational awareness or to obtain an operational credit such as lower minima for approach and landing operations. HUD and EVS may be installed separately or together as part of a hybrid system. Any use of these systems and any operational credit gained from their use requires approval from the State of the Operator.

Note.— Operational credit can only be granted within the limits of the design approval.

1. HUD

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 A variety of flight information may be presented on a HUD depending on the intended flight operation, flight conditions, systems capabilities and operational approval. A HUD may include, but is not limited to, the following:

a) airspeed;
b) altitude;
c) heading;
d) vertical speed;
e) angle of attack;
f) flight path or velocity vector;
g) attitude with bank and/or pitch references;
h) course and glidepath with deviation indications;
i) status indications (navigation sensor, autopilot, flight director, etc.); and
j) alerts and warning displays (ACAS, wind shear, ground proximity warning, etc.).

1.2 **HUD operational applications**

1.2.1 Flight operations with 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 visual and instrument references as meteorological conditions change. Flight operations applications may include the following:

a) enhanced situational awareness during all flight operations, but especially during taxi, take-off, approach and landing;
b) reduced flight technical error during take-off, approach and landing especially in all-weather operations; and
c) improvements in performance due to precise prediction of touchdown area, tail strike awareness/warning and rapid recognition and recovery from unusual attitudes.

1.2.2 HUD may be used for the following purposes:

a) to supplement conventional flight deck instrumentation in the performance of a particular task or operation. The primary cockpit instruments remain the primary means for manually controlling or maneuvering the aeroplane; and

b) as a primary flight display;

i) information presented by the HUD may be used by the pilot in lieu of scanning head-down displays. Operational approval of a HUD for such use allows the pilot to control the aeroplane by reference to the HUD for approved ground or flight operations; and

ii) information presented by the HUD may be used as a means to achieve additional navigation or control performance. The required information is displayed on the HUD. Operational credit, in the form of lower minima, for HUD used for this purpose may be approved for a particular aeroplane or automatic flight control system. Additional credit may also be allowed to conduct operations with HUD in situations where automated systems are otherwise used.

1.3 HUD training

1.3.1 Training requirements should be established, monitored and approved by the State of the Operator. These training requirements should include requirements for recent experience if the State determines those requirements are significantly different than current requirements for the use of conventional head-down instrumentation.

1.3.2 HUD training should address all flight operations for which the HUD is designed and operationally approved. Some training elements may require adjustments based on whether the aeroplane has a single or dual HUD installation. Training should include contingency procedures required in the event of head-up display degradation or failure. HUD training should include the following elements as applicable to the intended use:

a) an understanding of the HUD, its flight path and energy management concepts, and symbology. This should include operations during critical flight events (ACAS TA/RA, upset and wind shear recovery, engine or system failure, etc.);

b) HUD limitations and normal procedures, including maintenance and operational checks performed to ensure normal system function prior to use. These checks include pilot seat adjustment to attain and maintain appropriate viewing angles and verification of HUD operating modes;

c) HUD use during low visibility operations, including taxi, take-off, instrument approach and landing in both day and night conditions. This training should include the transition from head-down to head-up and head-up to head-down operations;

d) failure modes of the HUD and the impact of the failure modes or limitations upon crew performance;

e) crew coordination, monitoring and verbal call out procedures for single HUD installations with head-down monitoring for pilot-not-equipped with HUD and head-up monitoring for pilot-equipped with HUD;

f) crew coordination, monitoring and verbal call-out procedures for dual HUD installations with use of HUD by the pilot flying the aeroplane and either head-up or head-down monitoring by the other pilot;

g) consideration of the potential for loss of situational awareness due to "tunnel vision" (also known as cognitivetunnelling or attention tunnelling);

h) any effects that weather, such as low ceilings and visibilities, may have on the performance of a HUD; and
i) HUD airworthiness requirements.

2. EVS

2.1 General

2.1.1 EVS present a real-time electronic image of the external scene through the use of image sensors. This information should be displayed on a head-up or head-down display. When enhanced vision imagery is displayed on a HUD, it should be presented to the pilots' forward external field of view without significantly restricting that external view.

2.1.2 A variety of image sensors may be used individually or in combination to present a real-time electronic image of the external scene. Image sensors may include sensors using low-level light intensification, thermal emissions, radar or other electronic emissions.

2.2 Operational applications

2.2.1 Flight operations with enhanced vision image sensors allow the pilot to view an image of the external scene obscured by darkness or other visibility restrictions. When the external scene is partially obscured, enhanced vision imaging may allow the pilot to acquire an image of the external scene earlier than with natural or unaided vision. The improved acquisition of an image of the external scene may improve situational awareness.

2.2.1.1 This enhanced imagery may also allow pilots to detect terrain or obstructions on the runway or taxiways. An enhanced image can also provide visual cues to enable earlier runway alignment and a more stabilized approach.

2.2.1.2 The enhanced vision images may also be used to obtain approval to use reduced visibility minima when the images are presented into the pilot's external field of view on a HUD without significantly restricting that view. The approval also requires specific aeroplane performance parameters and navigation guidance to be presented on the HUD. The combined display of aeroplane performance, guidance and imagery may allow the pilot to maintain a more stabilized approach and smoothly transition from enhanced visual references to standard visual references. This increased capability has enabled some States to approve approach and landing operations for operators using approved HUD with enhanced vision imagery when reported visibilities are less than normal published requirements.

2.3 EVS approval

2.3.1 Approval requirements differ based on whether the intended function of the system is to increase situational awareness or to obtain operational credit.

2.3.1.1 When enhanced vision imagery is used to improve situational awareness, operational approval requirements may be limited. An example of this type of operation may include an EVS on a head-down display that is only used 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 EVS operations do not interfere with normal procedures or the operation or use of other aeroplane systems. In some cases, modifications to these normal procedures, other systems or equipment may be necessary to ensure compatibility.

2.3.1.2 When enhanced vision imagery is used for operational credit, operational approvals may require that the imagery be combined with flight guidance and presented on a HUD. Operational approvals may also require that this information be presented on a head-down display. A pilot could use this system to continue an instrument approach below published minimum altitudes using the enhanced visual imagery combined with flight guidance on the HUD. When EVS is used for operational credit, operational approval standards should ensure the credit for the individual image sensor or combination of sensors is appropriate. Operational credit may be applied for any flight operation, but credit for instrument approach and landing operations is most common.

2.4 EVS training

2.4.1 Training requirements should be established, monitored and approved by the State of the Operator. These training requirements should include recency of experience requirements if the State of the Operator determines those requirements are significantly different than current requirements for the use of HUD without enhanced vision imagery or conventional head-down instrumentation.

2.4.2 EVS training should address all flight operations for which the enhanced vision display is approved. This training should include contingency procedures required in the event of system degradation or failure. Training for EVS used for situational awareness should not interfere with other required operations. Training for EVS used for operational credit should also require training for the applicable HUD used to present the enhanced visual imagery. EVS training should include the following elements as applicable:

a) an understanding of the system characteristics and operational constraints. Normal procedures, controls, modes, and system adjustments;
b) EVS limitations;
c) EVS airworthiness requirements;
d) enhanced vision display during low visibility operations, including taxi, take-off, instrument approach and landing. System use for instrument approach procedures in both day and night conditions;
e) failure modes of the EVS and the impact of the failure modes or limitations upon crew performance, in particular, for two-pilot operations;
f) crew coordination and monitoring procedures and pilot call-out responsibilities;
g) transition from enhanced imagery to visual conditions during the runway visual acquisition;
h) rejected landing: loss of visual cues of the landing area, touchdown zone, or rollout area; and
i) any effects that weather, such as low ceilings and visibilities, may have on the performance of an EVS.

Note: LED runway lighting may not be visible to crews using HUD/EVS due to the fact that LEDs are non-incandescent lights. The effect of LED runway lighting on HUD/EVS is being evaluated.

CRITERIA FOR THE QUALIFICATION OF FLIGHT SIMULATION TRAINING DEVICE (FSTD)

AIR NAVIGATION ORDER

VERSION	**:**	**4.0**
DATE OF IMPLEMENTATION	**:**	**19.07.2021**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

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TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO)		
STATUS OF DOCUMENT	CONTROLLED		

PART-I

CRITERIA FOR THE QUALIFICATION / APPROVAL OF FLIGHT SIMULATION TRAINING DEVICE AIRCRAFT (FSTD-A)

A. AUTHORITY:

A1. This Air Navigation Order is issued by the Director General of the Civil Aviation Authority (PCAA) in pursuance of the powers vested under Rule 4, Civil Aviation Rules 1994 (CARs 94).

B. PURPOSE:

B1. The ANO is intended to provide guidance and means for PCAA to qualify a flight simulator, subsequent to a request by an applicant, through initial and recurrent evaluations of the flight simulator. Further, the ANO is intended to provide the means for the authorities of other States to accept the qualifications granted by PCAA which conducted the initial and recurrent evaluation of a flight simulator, without repetitive evaluations, when considering approval of the use of that flight simulator by applicants from their own State.

C. SCOPE:

C1. This ANO establishes the performance and documentation requirements for the evaluation of aeroplane flight simulators used for training and checking of flight crew members. This ANO also addresses the use of flight simulators representing aeroplanes. It does not consider the use of flight simulators in association with other types of aircraft, nor does this ANO consider the use of synthetic flight training devices other than flight simulators equipped with, at minimum, a visual system and the equivalent of a six degree-of-freedom motion system.

C2. It applies to all simulators/training devices used by Pakistani operators wherever located. Specific approval/validation by PCAA is required for each Pakistani operator for each simulator before it can be used by the operator for any training or checking.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 The terms used in this ANO have the following meanings:

D1.1.1 **Aeroplane Performance Data.** Data used to certify the aeroplane performance. The data are generally for a normalized representation of the aeroplane fleet with a margin to ensure that the values represent the least performing case.

D1.1.2 **Air Operator**. A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

D1.1.3 **Altitude.** Pressure altitude (ft) unless otherwise specified.

D1.1.4 **Automatic Testing.** FSTD testing wherein all stimuli are under computer control.

D1.1.5 **Breakout Force.** The force required at the pilot's primary controls to achieve initial movement of the control position.

D1.1.6 **Closed Loop Testing.** A test method for which the flight control stimuli are generated by controllers which drive the FSTD to follow a pre-defined target response.

D1.1.7 **Computer Controlled Aeroplane (CCA).** An aeroplane in which pilot inputs to the control surfaces are transferred and augmented via computers.

D1.1.8 **Control Sweep.** Movement of the appropriate pilot controller from neutral to an extreme limit in one direction (forward, aft, right or left), a continuous movement back through neutral to the opposite extreme position and then a return to the initial position.

D1.1.9 **Convertible FSTD.** An FSTD in which significant hardware or software, or a combination of both, are changed so that the device replicates a different model, type or variant, usually of the same aeroplane. The same FSTD platform, motion system, visual system, computers and necessary peripheral equipment can thus be used in more than one simulation.

D1.1.10 **Critical Engine Parameter.** The engine parameter that is the most appropriate measure of propulsive force for that engine.

D1.1.11 **Damping.**

D1.1.11.1 Critical Damping. That minimum damping of a second order system such that no overshoot occurs in reaching a steady state value after being displaced from a position of equilibrium and released. This corresponds to a relative damping ratio of 1.0.

D1.1.11.2 Overdamped. That damping of a second order system such that it has more damping than is required for critical damping as described above. This corresponds to a relative damping ratio of more than 1.0.

D1.1.11.3 Underdamped. That damping of a second order system such that a displacement from the equilibrium position and free release results in one or more overshoots or oscillations before reaching a steady state value. This corresponds to a relative damping ratio of less than 1.0.

D1.1.12 ‘**Deadband.** The amount of movement of the input for a system for which there is no reaction in the output or state of the system observed.

D1.1.13 **Driven.** A test method where the input stimulus or variable is driven or deposited by automatic means, generally a computer input.

D1.1.14 **Engineering Simulator Validation Data.** Validation data generated by an engineering simulation or engineering simulator that is acceptable to the PCAA.

D1.1.15 **Evaluation (FSTD).** The careful appraisal of an FSTD by the PCAA to ascertain whether or not the criteria required for a specified qualification level are met.

D1.1.16 **Flight Simulation Training Device (FSTD).** A synthetic training device that is in compliance with the minimum requirements for FSTD qualification as described in this manual.

D1.1.17 **Flight Test Data.** Actual aeroplane data obtained by the aeroplane manufacturer (or other approved supplier of data) during an aeroplane flight test programme.

D1.1.18 **Free Response.** The hands-off response of the aeroplane after completion of a control input or disturbance.

D1.1.19 **Frozen/Locked.** A test condition where a variable is held constant over time.

D1.1.20 **FSTD Approval.** Declaration of the extent to which an FSTD of a specified qualification type may be used by an FSTD operator or training organization as agreed by the PCAA. It takes account of differences between aeroplanes and FSTDs and of the operating and training ability of the organization.

D1.1.21 **FSTD Data.** The various types of data used by the FSTD manufacturer and the applicant to design, manufacture and test the FSTD.

D1.1.22 **FSTD Operator.** The person, organization or enterprise directly responsible to the PCAA for requesting and maintaining the qualification of a particular FSTD.

D1.1.23 **FSTD Qualification Level.** The level of technical capability of an FSTD.

D1.1.24 **Full Sweep.** See definition for “Control Sweep”.

D1.1.25 **Functional Performance.** An operation or performance that can be verified by objective data or other suitable reference material that may not necessarily be flight test data.

D1.1.26 **Functions Test.** A quantitative and/or qualitative assessment of the operation and performance of an FSTD by a suitably qualified evaluator. The test should include verification of correct operation of controls, instruments and systems of the simulated aeroplane under normal and non-normal conditions.

D1.1.27 **Ground Effect.** A change in aerodynamic characteristics due to modification of the airflow pattern past the aeroplane, caused by proximity to the ground.

D1.1.28 **Hands-off.** A test manoeuvre conducted or completed without pilot control inputs.

D1.1.29 **Hands-on.** A test manoeuvre conducted or completed with pilot control inputs.

D1.1.30 **Highlight Brightness.** The maximum displayed brightness.

D1.1.31 **Icing Accountability.** Refers to changes from normal (as applicable to the individual aeroplane design) in take-off, climb (en-route, approach or landing) or landing operating procedures or performance data, in accordance with the Aeroplane Flight Manual, for flight in icing conditions or with ice accumulation on unprotected surfaces.

D1.1.32 **Integrated Testing.** Testing of the FSTD such that all aeroplane system models are active and contribute appropriately to the results.

D1.1.33 **Irreversible Control System.** A control system in which movement of the control surface will not back drive the pilot's control on the flight deck.

D1.1.34 **Latency.** Additional time, beyond that of the basic perceivable response time of the aeroplane, due to the response of the FSTD.

D1.1.35 **Manual Testing.** FSTD testing wherein the pilot conducts the test without computer inputs except for initial set-up. All modules of the simulation should be active.

D1.1.36 **Master Qualification Test Guide (MQTG).** The PCAA approved test guide that incorporates the results of tests acceptable to the authorities at the initial qualification. The MQTG, as amended, serves as the reference for future evaluations. It may have to be re-established if any approved changes occur to the device, but should still be compliant with the approved data.

D1.1.37 **Night Visual.** A visual system capable of producing, as a minimum, all features applicable to the twilight scene (see "twilight (dusk/dawn) visual") with the exception of the need to portray reduced ambient intensity, therefore lacking ground cues that are not self-illuminating or illuminated by ownship lights (e.g. landing lights).

D1.1.38 **Non-Normal Control.** A state where one or more of the intended control, augmentation or protection functions are not fully available. Used in reference to computer-controlled aeroplanes.

Note: Specific terms, such as alternate, direct, secondary or back-up, may be used to define an actual level of degradation used in reference to computer-controlled aeroplanes.

D1.1.39 **Normal Control.** A state where the intended control, augmentation and protection functions are fully available. Used in reference to computer-controlled aeroplanes.

D1.1.40 **Objective Test.** A quantitative assessment based on comparison to data.

D1.1.41 **Protection functions.** Systems functions designed to protect an aeroplane from exceeding its flight and manoeuvre limitations.

D1.1.42 **Pulse Input.** A step input to a control followed by an immediate return to the initial position.

D1.1.43 **Qualification Test Guide (QTG).** The primary reference document used for the evaluation of an FSTD. It contains test results, statements of compliance and the other prescribed information to enable the evaluator to assess whether the FSTD meets the test criteria described in this ANO.

D1.1.44 **Reversible Control System.** A control system in which movement of the control surface will back drive the pilot's control on the flight deck.

D1.1.45 **Snapshot.** Presentation of one or more variables at a given instant in time.

D1.1.46 **Statement of Compliance (SOC).** A declaration that specific requirements have been met.

D1.1.47 **Step Input.** An abrupt input held at a constant value.

D1.1.48 **Subjective Test.** A qualitative assessment based on established standards as interpreted by a suitably qualified person.

D1.1.49 **Throttle Lever Angle (TLA).** The angle of the pilot's primary engine control lever(s) on the flight deck, which also may be referred to as TLA or power lever angle or throttle angle.

D1.1.50 **Time History.** The presentation of the change of a variable with respect to time.

D1.1.51 **Transport Delay.** The FSTD system processing time required for an input signal from a pilot primary flight control until motion system, visual system and instrument response. It is a measure of the time from the flight control input through the hardware/software interface, through each of the host computer modules and back through the software/hardware interface to the motion system, flight instrument and visual system. Each of these three processing times excludes the aeroplane dynamic response and represents the transport delay for that particular system. It is the overall time delay incurred from signal input until output response and is independent of the characteristic delay of the aeroplane being simulated.

D1.1.52 **Twilight (Dusk/Dawn) Visual.** A visual system capable of producing, as a minimum, full-colour presentations of reduced ambient intensity and sufficient surfaces with appropriate textural cues that include self-illuminated objects such as road networks, ramp lighting and airport signage.

D1.1.53 **Upgrade.** The improvement or enhancement of an FSTD for the purpose of achieving a higher qualification type.

D1.1.54 **Validation Data.** Data used to prove that the FSTD performance corresponds to that of the aeroplane.

D1.1.55 **Validation Flight Test Data.** Performance, stability and control, and other necessary test parameters, electrically or electronically recorded in an aeroplane using a calibrated data acquisition system of sufficient resolution and verified as accurate to establish a reference set of relevant parameters to which like FSTD parameters can be compared.

D1.1.56 **Validation Test.** A test by which FSTD parameters can be compared to the relevant validation data.

D1.1.57 **Visual Ground Segment.** The visible distance on the ground, between the lower cut-off of the aeroplane cockpit and the furthest visible point, as limited by the prevailing visibility.

D2. <u>FSTD QUALIFICATION:</u>

D2.1 The FSTD should be evaluated by the PCAA taking into consideration the aeroplane manufacturer's recommended training practices. Qualification is achieved by comparing the FSTD performance against the criteria specified in the Qualification Test Guide (QTG) for the qualification level sought.

D2.2 The validation, functions and subjective tests required for the QTG enable the PCAA to "spot check" the performance of the FSTD in order to confirm that it represents the aeroplane in some significant training and testing or checking areas. Without such spot checking using the QTG, FSTD performance cannot be verified in the time normally available for the regulatory evaluation. It should be clearly understood that the QTG does not provide for a rigorous examination of the quality of the simulation in all areas of flight and systems operation. The full testing of the FSTD is intended to have been completed by the FSTD manufacturer and its operator prior to the FSTD being submitted for the regulatory evaluation and prior to the delivery of the results in the QTG. This "in depth" testing is a fundamental part of the whole cycle of testing and is normally carried out using documented acceptance test procedures in which the test results are recorded. These procedures will test the functionality and performance of many areas of the simulation that are not addressed in the QTG as well as such items as the instructor operating station.

D2.3 Once the FSTD has been qualified, the authority responsible for oversight of the activities of the user of the FSTD can approve what training tasks can be carried out. This determination should be based on the FSTD qualification, the availability of FSTDs, the experience of the FSTD user, the training programme in which the FSTD is to be used and the experience and qualifications of the pilots to be trained. This latter process results in the approved use of an FSTD within an approved training programme.

D3. <u>TESTING FOR FSTD QUALIFICATION:</u>

D3.1 The FSTD should be assessed in those areas which are essential to completing the flight crew member training and testing or checking process. This includes the FSTD's longitudinal and lateral-directional responses; performance in take-off, climb, cruise, descent, approach and landing; all-weather operations; control checks; and pilot, flight engineer and instructor station functions checks. The motion, visual and sound systems should be evaluated to ensure their proper operation.

D3.2 The intent is to evaluate the FSTD as objectively as possible. Pilot acceptance, however, is also an important consideration. Therefore, the FSTD should be subjected to the validation tests listed in Appendix B and the functions and subjective tests in Appendix C. Validation tests are used to objectively compare FSTD and aeroplane data to ensure that they agree within specified tolerances. Functions tests are objective tests of systems using aeroplane documentation. Subjective tests provide a basis for evaluating the FSTD capability to perform over a typical training period and to verify correct operation and handling characteristics of the FSTD.

D3.3 Tolerances listed for parameters in Appendix B should not be confused with FSTD design tolerances and are the maximum acceptable for FSTD qualification.

D3.4 The validation testing for initial and recurrent evaluations listed in Appendix B should be conducted in accordance with the FSTD type against approved data.

D3.4.1 Where the fidelity level is S, the initial and recurrent evaluations should be based on objective evaluation against approved data. For evaluation of FSTDs representing a specific aeroplane type, the aeroplane manufacturer's validation flight test data are preferred. Data from other sources may be used, subject to the review and concurrence of the PCAA responsible for the qualification. The tolerances listed in Appendix B are applicable for the initial evaluation.

D3.4.2 Where the fidelity level is R, the initial and recurrent validation will be based on objective evaluation against approved data for a class of aeroplane with the exception of aeroplane type specific FSTDs (Type V sound system and Type VII sound and motion systems) where these evaluations are against aeroplane type-specific data. For initial evaluation of FSTDs representing a class of aeroplane, the aeroplane manufacturer's validation flight test data are preferred. Data from other sources may be used, subject to the review and concurrence of the PCAA.

D3.4.2.1 For motion and sound systems, where approved subjective development is submitted for the initial evaluation, the QTG should contain both:

a) the original objective test results showing compliance to the validation flight test data; and

b) the "improved" results, based upon approved subjective development against the validation flight test data. If approved subjective development is used, the MQTG result for those particular cases will become the reference data standard. Recurrent validations should be objectively measured against the reference data standard.

D3.4.2.2 The tolerances listed in Appendix B are applicable for both initial and recurrent evaluations except where approved subjective development is used for motion and sound systems.

D3.4.3 Where the fidelity level is G, the initial validation will be based on evaluation against approved data, where available, complemented if necessary by approved subjective development, to determine a reference data standard. Correct trend and magnitude (CT&M) tolerances can be used for the initial evaluation only. Recurrent validations should be objectively measured against the reference data standard. The tolerances listed in Appendix B are applicable for recurrent evaluations and should be applied to ensure the device remains at the standard initially qualified.

D3.5 Requirements for generic or representative FSTD data are defined below.

D3.5.1 Generic or representative data may be derived from a specific aeroplane within the class of aeroplanes the FSTD is representing or it may be based on information from several aeroplanes within the class. With the concurrence of the PCAA, it may be in the form of a manufacturer's previously approved set of validation data for the applicable FSTD. Once the set of data for a specific FSTD has been accepted and approved by the PCAA, it will become the validation data that will be used as reference for subsequent recurrent evaluations with the application of the stated tolerances.

D3.5.2 The substantiation of the set of data used to build validation data should be in the form of a "Reference Data" engineering report and should show that the proposed validation data are representative of the aeroplane or the class of aeroplanes modelled. This report may include flight test data, manufacturer's design data, information from the aeroplane flight manual (AFM) and maintenance manuals, results of approved or commonly accepted simulations or predictive models, recognized theoretical results, information from the public domain, or other sources as deemed necessary by the FSTD manufacturer to substantiate the proposed model.

D3.6 In the case of new aeroplane programmes, the aeroplane manufacturer's data, partially validated by flight test data, may be used in the interim qualification of the FSTD. However, the FSTD should be re-qualified following the release of the manufacturer's data obtained during the type certification of the aeroplane. The re-qualification schedule should be as agreed by the PCAA, the FSTD operator, the FSTD manufacturer and the aeroplane manufacturer. For additional information, see Attachment A.

D3.7 FSTD operators seeking initial or upgrade evaluation of an FSTD should be aware that performance and handling data for older aeroplanes may not be of sufficient quality to meet some of the test standards contained in this manual. In this instance it may be necessary for an FSTD operator to acquire additional flight test data.

D3.8 During FSTD evaluation, if a problem is encountered with a particular validation test, the test may be repeated to ascertain if test equipment or personnel error caused the problem. Following this, if the test problem persists, an FSTD operator should be prepared to offer alternative test results which relate to the test in question.

D3.9 Validation tests which do not meet the test criteria should be satisfactorily rectified or a rationale should be provided with appropriate engineering judgment.

D4. QUALIFICATION TEST GUIDE (QTG):

D4.1 The QTG is the primary reference document used for the evaluation of an FSTD. It contains FSTD test results, statements of compliance and other information to enable the evaluator to assess if the FSTD meets the test criteria described in this ANO.

D4.2 The applicant should submit a QTG which includes:

D4.2.1 a title page including (as a minimum) the:

D4.2.1.1 FSTD operator's name;

D4.2.1.2 aeroplane model and series or class, as applicable, being simulated;

D4.2.1.3 FSTD qualification level;

D4.2.1.4 PCAA FSTD identification number;

D4.2.1.5 FSTD location;

D4.2.1.6 FSTD manufacturer's unique identification or serial number; and

D4.2.1.7 provision for dated signature blocks:

a) one for the FSTD operator to attest that the FSTD has been tested using a documented acceptance testing procedure covering flight deck layout, all simulated aeroplane systems and the Instructor Operating Station, as well as the engineering facilities, the motion, visual and other systems, as applicable;

b) one for the FSTD operator to attest that all manual validation tests have been conducted in a satisfactory manner using only procedures as contained in the QTG manual test procedure;

c) one for the FSTD operator to attest that the functions and subjective testing in accordance with Appendix C have been conducted in a satisfactory manner; and

d) one for the FSTD operator and the PCAA indicating overall acceptance of the QTG;

D4.2.2 an FSTD information page providing (as a minimum):

D4.2.2.1 applicable regulatory qualification standards;

D4.2.2.2 the aeroplane model and series or class, as applicable, being simulated;

D4.2.2.3 the aerodynamic data revision;

D4.2.2.4 the engine model(s) and its(their) data revision(s);

D4.2.2.5 the flight control data revision;

D4.2.2.6 the avionic equipment system identification and revision level when the revision level affects the training and testing or checking capability of the FSTD;

D4.2.2.7 the FSTD manufacturer;

D4.2.2.8 the date of FSTD manufacture;

D4.2.2.9 the FSTD computer identification;

D4.2.2.10 the visual system type and manufacturer;

D4.2.2.11 the motion system type and manufacturer;

D4.2.2.12 three or more designated qualification visual scenes; and

D4.2.2.13 supplemental information for additional areas of simulation which are not sufficiently important for the PCAA to require a separate QTG;

D4.2.3 a table of contents to include a list of all QTG tests including all sub-cases, unless provided elsewhere in the QTG;

D4.2.4 a log of revisions and/or list of effective pages;

D4.2.5 a listing of reference and source data for FSTD design and test;

D4.2.6 a glossary of terms and symbols used;

D4.2.7 a statement of compliance (SOC) with certain requirements; SOCs should refer to sources of information and show compliance rationale to explain how the referenced material is used, applicable mathematical equations and parameter values and conclusions reached (see the “Comments” column of Appendices A and B for SOC requirements);

D4.2.8 recording procedures and required equipment for the validation tests;

D4.2.9 the following items for each validation test designated in Appendix B:

D4.2.9.1 Test number. The test number which follows the numbering system set out in Appendix B;

D4.2.9.2 Test title. Short and definitive based on the test title referred to in Appendix B;

D4.2.9.3 Test objective. A brief summary of what the test is intended to demonstrate;

D4.2.9.4 Demonstration procedure. A brief description of how the objective is to be met. It should describe clearly and distinctly how the FSTD will be set up and operated for each test when flown manually by the pilot and, when required, automatically tested;

D4.2.9.5 References. References to the aeroplane data source documents including both the document number and the page/condition number and, if applicable, any data query references;

D4.2.9.6 Initial conditions. A full and comprehensive list of the FSTD initial conditions;

D4.2.9.7 Test parameters. A list of all parameters driven or constrained during the automatic test;

D4.2.9.8 Manual test procedures. Procedures should be self-contained and sufficient to enable the test to be flown by a qualified pilot, by reference to flight deck instrumentation. Reference to reference data or test results is encouraged for complex tests, as applicable. Manual tests should be capable of being conducted from either pilot seat, although the cockpit controller positions and forces may not necessarily be available from the other seat;

D4.2.9.9 Automatic test procedures. A test identification number for automatic tests should be provided;

D4.2.9.10 Evaluation criteria. The main parameter(s) under scrutiny during the test;

D4.2.9.11 Expected result(s). The aeroplane result, including tolerances and, if necessary, a further definition of the point at which the information was extracted from the source data;

D4.2.9.12 Test result. FSTD validation test results obtained by the FSTD operator from the FSTD. Tests run on a computer, which is independent of the FSTD, are not acceptable. The results should:

a) be computer generated;

b) be produced on appropriate media acceptable to the PCAA conducting the test;

c) be time histories unless otherwise indicated and:

i) should plot for each test the list of recommended parameters contained in the Aeroplane Flight Simulator Evaluation Handbook, Volume I;

ii) be clearly marked with appropriate time reference points to ensure an accurate comparison between FSTD and aeroplane;

iii) the FSTD result and validation data plotted should be clearly identified; and

iv) in those cases where a “snapshot” result in lieu of a time history result is authorized, the FSTD operator should ensure that a steady state condition exists at the instant of time captured by the “snapshot”;

d) be clearly labelled as a product of the device being tested;

e) have each page reflect the date and time completed;

f) have each page reflect the test page number and the total number of pages in the test;

g) have parameters with specified tolerances identified, with tolerance criteria and units given. Automatic flagging of “out-of-tolerance” situations is encouraged; and

h) have incremental scales on graphical presentations that provide the resolution necessary for evaluation of the tolerance parameters shown in Appendix B;

D4.2.9.13 Validation data.

a) Computer-generated displays of flight test data overplotted with FSTD data should be provided. To ensure authenticity of the validation data, a copy of the original validation data, clearly marked with the document name, page number, the issuing organization and the test number and title as specified D4.2.8 and D4.2.9 above, should also be provided;

b) aeroplane data documents included in the QTG may be photographically reduced only if such reduction will not cause distortions or difficulties in scale interpretation or resolution; and

c) validation data variables should be defined in a nomenclature list along with sign convention. This list should be included at some appropriate location in the QTG;

D4.2.9.14 Comparison of results. The accepted means of comparing FSTD test results to the validation data is overplotting;

D4.2.10 a copy of the applicable regulatory qualification standards, or appropriate sections as applicable, used in the initial evaluation; and

D4.2.11 a copy of the validation data roadmap (VDR) to clearly identify (in matrix format only) sources of datafor all required tests including sound and vibration data documents.

D4.3 The QTG will provide the documented proof of compliance with the FSTD validation tests in Appendix B. FSTD test results should be labelled using terminology common to aeroplane parameters as opposed to computer software identifications. These results should be easily compared with the supporting data by employing overplotting or other acceptable means. For tests involving time histories, the overplotting of the FSTD data to aeroplane data is essential to verify FSTD performance in each test. The evaluation serves to validate the FSTD test results given in the QTG.

D5. MASTER QUALIFICATION TEST GUIDE (MQTG):

D5.1 During the initial evaluation of an FSTD, the MQTG is created. This is the master document, as amended in agreement with the PCAA, to which FSTD recurrent evaluation test results are compared.

D5.2 After the initial evaluation, the MQTG is available as the document to use for recurrent or special evaluations and is also the document that any PCAA can use as proof of an evaluation and current qualifications of an FSTD when approval for the use of the particular FSTD is requested for a specific training task.

D6. ELECTRONIC QUALIFICATION TEST GUIDE (eQTG):

D6.1 Use of an eQTG may reduce costs, save time and improve timely communication, and is becoming a common practice. ARINC Report 436 provides guidelines for an eQTG.

D7. QUALITY MANAGEMENT SYSTEM AND CONFIGURATION MANAGEMENT:

D7.1 A Quality Management System which is acceptable to the PCAA should be established and maintained by the FSTD operator to ensure the correct maintenance and performance of the FSTD. The quality management system may be based upon established industry standards.

D7.2 A Configuration Management System should be established and maintained to ensure the continued integrity of the hardware and software as from the original qualification standard, or as amended or modified through the same system.

D8. TYPES OF EVALUATIONS:

D8.1 An initial evaluation is the first evaluation of an FSTD to qualify it for use. It consists of a technical review of the QTG and a subsequent on-site validation of the FSTD to ensure it meets all the requirements of this ANO.

D8.2 Recurrent evaluations are those that may be accomplished periodically to ensure that the FSTD continues to meet its qualification level.

D8.3 Special evaluations are those that may be accomplished resulting from any of the following circumstances:

D8.3.1 a major hardware and/or software change which may affect the handling qualities, performance or systems representations of the FSTD;

D8.3.2 a request for an upgrade for a higher qualification level;

D8.3.3 the discovery of a situation that indicates the FSTD is not performing at its initial qualification standard;

D8.3.4 re-location;

D8.3.5 change of ownership; and

D8.3.6 re-entry into service following a prolonged shut-down.

Note: Some of the above circumstances may require establishing revised tests leading to an amendment of the MQTG.

D9. CONDUCT OF EVALUATIONS:

Note: The Manual on the Approval of Training Organizations (Doc 9841) contains guidance on the recognition by other States of an FSTD qualification issued by a State, including for the initial qualification of an FSTD that already holds a qualification issued by another State.

D9.1 Initial FSTD evaluations

D9.1.1 An FSTD operator seeking qualification of an FSTD should make the request for an evaluation to the PCAA of the State in which the FSTD will be located.

D9.1.2 A copy of the FSTD's QTG, with annotated test results, should accompany the request. Any QTG deficiencies raised by the PCAA should be corrected prior to the start of the evaluation.

D9.1.3 The request for evaluation should also include a statement that the FSTD has been thoroughly tested using a documented acceptance testing procedure covering flight deck layout, all simulated aeroplane systems and the instructor operating station as well as the engineering facilities, motion, visual and other systems, as applicable. In addition, a statement should be provided that the FSTD meets the criteria described in this manual. The applicant should further certify that all the QTG tests for the requested qualification level have been satisfactorily conducted.

D9.2 Modification of an FSTD

D9.2.1 An update is a result of a change to the existing device where it retains its existing qualification level. The change may be approved through a recurrent evaluation or a special evaluation if deemed necessary by the PCAA, according to the applicable regulations in effect at the time of initial qualification.

D9.2.2 If such a change to an existing device would imply that the performance of the device could no longer meet the requirements at the time of initial qualification, but that the result of the change would, in the opinion of the PCAA, clearly mean an improvement to the performance and training capabilities of the device altogether, then the PCAA may accept the proposed change as an update while allowing the device to retain its original qualification level.

D9.2.3 An upgrade is defined as the raising of the qualification level of a device, which can only be achieved by undergoing a special qualification according to the latest applicable regulations.

D9.2.4 In summary, as long as the qualification level of the device does not change, all changes made to the device should be considered to be updates pending approval by the PCAA. An upgrade and consequent initial qualification according to latest regulations is only applicable when the FSTD operator requests a higher qualification level for the FSTD.

D9.3 Temporary deactivation of a currently qualified FSTD

D9.3.1 In the event an FSTD operator plans to remove an FSTD from active status for a prolonged period, the PCAA should be notified and suitable controls established for the period the FSTD is inactive.

D9.3.2 An understanding should be arranged with the PCAA to ensure that the FSTD can be restored to active status at its originally qualified level.

D9.4 Moving an FSTD to a new location

D9.4.1 In instances where an FSTD is to be moved to a new location, the PCAA should be advised of the planned activity and provided with a schedule of events related thereto.

D9.4.2 Prior to returning the FSTD to service at the new location, the FSTD operator should agree with the PCAA which of the validation and functional tests from the QTG should be performed to ensure that the FSTD performance meets its original qualification standard. A copy of the test documentation should be retained with the FSTD records for review by the PCAA.

D9.5 Composition of an evaluation team

D9.5.1 For the purposes of qualification of an FSTD, an evaluation team is usually led by a pilot inspector from the PCAA along with engineers and a type-qualified pilot.

D9.5.2 The applicant should provide technical assistance in the operation of the FSTD and the required test equipment. The applicant should make available a suitably knowledgeable person to assist the evaluation team as required.

D9.5.3 On an initial evaluation, the FSTD manufacturer and/or aeroplane manufacturer should have technical staff available to assist as required.

D9.6 FSTD recurrent evaluations

D9.6.1 Following satisfactory completion of the initial evaluation and qualification tests, a system of periodic evaluations should be established to ensure that FSTDs continue to maintain their initially qualified performance, functions and other characteristics.

D9.6.2 The PCAA should establish the time interval between recurrent evaluations.

D10. EVALUATION HANDBOOKS:

D10.1 The Aeroplane Flight Simulator Evaluation Handbook, as amended, is a useful source of guidance for conducting the tests required to establish that the FSTD under evaluation complies with the criteria set out in this ANO (This two volume document can be obtained through the Royal Aeronautical Society).

D11. GUIDANCE ON “GRANDFATHERED” RIGHTS:

D11.1 The regulatory standards for the qualification of FSTDs will continue to develop to cater for: changing training needs; data revisions; relocations; the introduction of new equipment, procedures and technologies; and mandated measures to address safety issues. The introduction of changes to the regulatory standards should not necessarily result in making existing qualified FSTDs obsolete. To enable accredited training to continue on them, "grandfathering" of the qualification should be applied. This allows continued training on the device provided it continues to meet the qualification standard achieved at its initial qualification.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

A_d	:	TOTAL INITIAL DISPLACEMENT OF PILOT CONTROLLER (INITIAL DISPLACEMENT TO FINAL RESTING AMPLITUDE)
A_n	:	SEQUENTIAL AMPLITUDE OF OVERSHOOT AFTER INITIAL X-AXIS CROSSING (E.G. A_1 = FIRST OVERSHOOT)
AFM	:	AEROPLANE FLIGHT MANUAL
ANO	:	AIR NAVIGATION ORDER
CARs	:	CIVIL AVIATION RULES
CCA	:	COMPUTER-CONTROLLED AEROPLANE
CT&M	:	CORRECT TREND AND MAGNITUDE
eQTG	:	ELECTRONIC QUALIFICATION TEST GUIDE
FSD	:	FLIGHT STANDARDS DIRECTORATE
FSTD	:	FLIGHT SIMULATION TRAINING DEVICE
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
kt	:	KNOTS CALIBRATED AIRSPEED UNLESS OTHERWISE SPECIFIED (1 KNOT = 0.5144 m/s OR 1.688 ft/s)
MQTG	:	MASTER QUALIFICATION TEST GUIDE
N1	:	LOW-PRESSURE ROTOR REVOLUTIONS PER MINUTE, EXPRESSED IN PERCENT OF MAXIMUM

N2	:	HIGH-PRESSURE ROTOR REVOLUTIONS PER MINUTE, EXPRESSED IN PERCENT OF MAXIMUM
P_0	:	TIME FROM 90 PERCENT OF THE INITIAL CONTROLLER DISPLACEMENT UNTIL INITIAL X-AXIS CROSSING (X-AXIS DEFINED BY THE RESTING AMPLITUDE)
P_1	:	PERIOD OF FIRST FULL CYCLE OF OSCILLATION AFTER THE INITIAL X-AXIS CROSSING
P_2	:	PERIOD OF SECOND FULL CYCLE OF OSCILLATION AFTER THE INITIAL X-AXIS CROSSING
P_f	:	IMPACT OR FEEL PRESSURE
P_n	:	SEQUENTIAL PERIOD OF OSCILLATION
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
QTG	:	QUALIFICATION TEST GUIDE
SOC	:	STATEMENT OF COMPLIANCE
T_f	:	TOTAL TIME OF THE FLARE MANOEUVRE DURATION
T_i	:	TOTAL TIME FROM INITIAL THROTTLE MOVEMENT UNTIL A 10 PERCENT RESPONSE OF A CRITICLA ENGINE PARAMETER
T_t	:	TOTAL TIME FROM INITIAL THROTTLE MOVEMENT TO A 90 PERCENT INCREASE OR DECREASE IN THE POWER LEVEL SPECIFIED
T(A)	:	TOLERANCE APPLIED TO AMPLITUDE
$T(A_d)$	:	TOLERANCE APPLIED TO RESIDUAL AMPLITUDE
TLA	:	THROTTLE (THRUST) LEVEL ANGLE
V_1	:	DECISION SPEED
V_2	:	TAKE-OFF SAFETY SPEED
V_{eas}	:	EQUIVALENT AIRSPEED
V_{mca}	:	MINIMUM CONTROL SPEED (AIR)
V_{mcg}	:	MINIMUM CONTROL SPEED (GROUND)
V_{mcl}	:	MINIMUM CONTROL SPEED (LANDING)
V_{mo}	:	MAXIMUM OPERATING SPEED
V_{mu}	:	MINIMUM UNSTICK SPEED
V_r	:	ROTATE SPEED
V_s	:	STALL SPEED OR MINIMUM SPEED IN THE STALL
V_{ss}	:	STICK SHAKER ACTIVATION SPEED
VDR	:	VALIDATION DATA ROADMAP

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 ICAO Annex 6 Part 1

E3.2 ICAO Document 9625 Edition 2

APPENDIX "A"

FLIGHT SIMULATOR CRITERIA

Introduction: This appendix describes the minimum flight simulator requirements for qualifying flight simulators to the highest international level. The validation and functions tests listed in Appendices B and C shall also be consulted when determining the requirements of a flight simulator qualified to the highest international level. Certain requirements included in this appendix shall be supported with a statement of compliance (SOC) and, in some designated cases, an objective test. The SOC will describe how the requirement was met, such as gear modelling approach, coefficient of friction sources, etc. The test results should show that the requirement has been attained. In the following tabular listing of flight simulator criteria, requirements for SOCs are indicated in the comments column.

	Requirements	Comments
1.	**General**	
1.1	Flight deck, a full-scale replica of the aeroplane simulated. Direction of movement of controls and switches identical to that in the aeroplane. Equipment for operation of the cockpit windows should be included in the flight simulator, but the actual windows need not be operable. **Note:** The flight deck, for flight simulator purposes, consists of all that space forward of a cross section of the fuselage at the most extreme aft setting of the pilots' seats. Additional required flight crew member duty stations and those required bulkheads aft of the pilots' seats are also considered part of the flight deck and shall replicate the aeroplane.	Flight deck observer seats are not considered to be additional flight crew member duty stations and may be omitted (See 1.6.) Bulkheads containing items such as switches, circuit breakers, supplementary radio panels, etc., to which the flight crew may require access during any event after pre-flight cockpit preparation is complete are considered essential and may not be omitted. Bulkheads containing only items such as landing gear pin storage compartments, fire axes or extinguishers, spare light bulbs, aircraft document pouches, etc., are not considered essential and may be omitted. Such items, or reasonable facsimile, shall still be available in the flight simulator but may be relocated to a suitable location as near as practical to the original position. Fire axes and any similar purpose instruments need only be represented in silhouette.

1.2	Circuit breakers that affect procedures and/or result in observable flight deck indications properly located and functionally accurate.	
1.3	Flight dynamics model that accounts for various combinations of drag and thrust normally encountered in flight corresponding to actual flight conditions, including the effect of change in aeroplane attitude, thrust, drag, altitude, temperature, gross mass, moments of inertia, centre of gravity location and configuration.	
1.4	All relevant instrument indications involved in the simulation of the applicable aeroplane to automatically respond to control movement by a flight crew member or external disturbance to the simulated aeroplane, i.e. turbulence or wind shear.	Numerical values shall be presented in accordance with ICAO Annex 5.
1.5	Communications, navigation, and caution and warning equipment corresponding to that installed in the applicant's aeroplane with operation within the tolerances prescribed for the applicable airborne equipment.	
1.6	In addition to the flight crew member duty stations, three suitable seats for the instructor/observer and authority inspector. The authority will consider options to this requirement based on unique flight deck configurations. The location of these seats shall provide an adequate view of the pilots' panels and forward windows. Observer seats need not represent those found in the aeroplane but shall be adequately secured to the floor of the flight simulator, fitted with positive restraint devices and of sufficient integrity to safely restrain the occupant during any known or predicted motion system excursion.	
1.7	Flight simulator systems to simulate the applicable aeroplane system operation, both on the ground and in flight. Systems shall be operative to the extent that all normal, abnormal and emergency operating procedures can be accomplished.	
1.8	Instructor controls to enable the operator to control all required system variables and insert abnormal or emergency conditions into the aeroplane systems.	
1.9	Control forces and control travel which correspond to that of the replicated aeroplane. Control forces should react in the same manner as in the aeroplane under the same flight conditions.	
1.10	Ground handling and aerodynamic programming to include:	SOC required. Tests required.
1.10.1	Ground effect. For example: round-out, flare and touchdown. This requires data on lift, drag, pitching moment, trim and power in ground effect.	
1.10.2	Ground reaction. Reaction of the aeroplane upon contact with the runway during landing to include strut deflections, tire friction, side forces and other appropriate data, such as weight and speed, necessary to identify the flight condition and configuration.	

1.10.3	Ground handling characteristics. Steering inputs to include crosswind, braking, thrust reversing, deceleration and turning radius.	
1.11	Wind shear models which provide training in the specific skills required for recognition of wind shear phenomena and execution of required manoeuvres. Such models shall be representative of measured or accident derived winds, but may include simplifications which ensure repeatable encounters. For example, models may consist of independent variable winds in multiple simultaneous components. Wind models should be available for the following critical phases of flight: 1) prior to take-off rotation; 2) at lift-off; 3) during initial climb; 4) short final approach.	Tests required.
1.12	Representative crosswinds and instructor controls for wind speed and direction.	
1.13	Representative stopping and directional control forces for at least the following runway conditions based on aeroplane related data: 1) dry; 2) wet; 3) icy; 4) patchy wet; 5) patchy icy; 6) wet on rubber residue in touchdown zone.	SOC required. Objective tests required for 1), 2) and 3). Subjective check for 4), 5) and 6).
1.14	Representative brake and tire failure dynamics (including antiskid) and decreased braking efficiency due to brake temperatures based on aeroplane related data.	SOC required. Subjective tests required for decreased braking efficiency.
1.15	A means for quickly and effectively conducting daily testing of flight simulator programming and hardware.	SOC required.
1.16	Flight simulator computer capacity, accuracy, resolution and dynamic response to fully support the overall flight simulator fidelity.	SOC required.
1.17	Control feel dynamics which replicate the aeroplane simulated.Free response of the controls shall match that of the aeroplane within tolerance given in Appendix B. Initial and upgrade evaluations will include control-free response (pitch, roll and yaw controllers) measurements recorded at the controls. The measured responses shall correspond to those of the aeroplane in take-off, cruise and landing configurations.	Tests required.
1.17.1	For aeroplanes with irreversible control systems, measurements may be obtained on the ground if proper pitot static inputs are provided to represent conditions typical of those encountered in flight. Engineering validation or aeroplane manufacturer rationale shall be submitted as justification to ground test or to omit a configuration.	

1.17.2	For simulators requiring static and dynamic tests at the controls, special test fixtures will not be required during initial evaluations if the QTG shows both test fixture results and alternate test method results, such as computer data plots, which were obtained concurrently. Repeat of the alternate method during initial evaluation may then satisfy this requirement.	
1.18	Relative response of the visual system, flight deck instruments and initial motion system coupled closely to provide integrated sensory cues. Visual scene changes from steady state disturbance (i.e. the start of the scan of the first video field containing different information) shall occur within the system dynamic response limit of 150 milliseconds (ms). Motion onset shall also occur within the system dynamic response limit of 150 ms. While motion onset should occur before the start of the scan of the first video field containing different information, it must occur before the end of the scan of the same video field. The test to determine compliance with these requirements shall include simultaneously recording the output from the pilot's pitch, roll and yaw controllers, the output from the accelerometer attached to the motion system platform located at an acceptable location near the pilots' seats, the output signal to the visual system display (including visual system analog delays) and the output signal to the pilot's attitude indicator or an equivalent test approved by the authority. The following two methods are acceptable means to prove compliance with the above requirement:	Test required.
1.18.1	Transport delay: A transport delay test may be used to demonstrate that the flight simulator system response does not exceed 150 ms. This test shall measure all the delays encountered by a step signal migrating from the pilot's control through the control loading electronics and interfacing through all the simulation software modules in the correct order, using a handshaking protocol, finally through the normal output interfaces to the motion system, to the visual system and instrument displays. A recordable start time for the test should be provided by a pilot flight control input. The test mode shall permit normal computation time to be consumed and shall not alter the flow of information through the hardware/software system. The transport delay of the system is then the time between the control input and the individual hardware responses. It need only be measured once in each axis.	
1.18.2	Latency: The visual system, flight deck instruments and initial motion system response shall respond to abrupt pitch, roll and yaw inputs from the pilot's position within 150 ms of the time, but not before the time, when the aeroplane would respond under the same conditions. The objective of the test is to compare the recorded response of the flight simulator to that of the actual aeroplane data in the take-off, cruise and landing configuration for rapid control inputs in all three rotational axes.	
1.19	Aerodynamic modelling, that includes, for aeroplanes issued an original type certificate after June 1980, low altitude level flight	SOC required. The SOC shall address each of these items.

	ground effect, Mach effect at high altitude, normal and reverse dynamic thrust effect on control surfaces, aeroelastic effect and representations of non-linearities due to side-slip based on aeroplane flight test data provided by the aeroplane manufacturer.	Separate tests for thrust effects and an SOC are required.
1.20	Modelling that includes the effects of airframe and engine icing.	SOC shall be provided
1.21	Aerodynamic and ground reaction modelling for the effects of reverse thrust on directional control.	SOC required. Tests required.
1.22	Realistic implementation of aeroplane mass properties, including mass, centre of gravity and moments of inertia as a function of payload and fuel loading.	SOC required with a range of tabulated target
1.23	Self-testing for simulator hardware and programming to determine compliance with the simulator performance tests as prescribed in Appendix B. Evidence of testing must include flight simulator number, date, time, conditions, tolerances and the appropriate dependent variables portrayed in comparison to the aeroplane data.	SOC required. Tests required
1.24	Timely permanent update of flight simulator hardware and programming subsequent to aeroplane modification.	
1.25	Daily pre-flight documentation either in the daily log or in a location easily accessible for review.	
2.	**MOTION SYSTEM**	
2.1	Motion cues perceived by the pilot representative of aeroplane motions (e.g. touchdown cues should be a function of the simulated rate of descent).	
2.2	A motion system which produces cues at least equivalent to those of a six-degree-of-freedom synergistic platform motion system.	SOC required. Tests required.
2.3	A means of recording the motion response time as required.	
2.4	Motion effects programming to include:	
2.4.1	Effects of runway rumble, oleo deflections, ground speed, uneven runway, centre line lights and taxiway characteristics;	
2.4.2	Buffets on the ground due to spoiler/speed-brake extension and thrust reversal;	
2.4.3	Bumps associated with the landing gear;	
2.4.4	Buffet during extension and retraction of landing gear;	
2.4.5	Buffet in the air due to flap and spoiler/speed-brake extension;	
2.4.6	Approach-to-stall buffet;	

2.4.7	Touchdown cues for main and nose gear;	
2.4.8	Nosewheel scuffing;	
2.4.9	Thrust effect with brakes set;	
2.4.10	Mach and manoeuvre buffet;	
2.4.11	Tire failure dynamics;	
2.4.12	Engine malfunction and engine damage; and	
2.4.13	Tail and pod strike.	
2.5	Motion vibrations: Tests with recorded results that allow the comparison of relative amplitudes versus frequency are required.	SOC required. Tests required.
2.5.1	Characteristic motion vibrations that result from operation of the aeroplane, in so far as vibration marks an event or aeroplane state that can be sensed at the flight deck, shall be present. The flight simulator shall be programmed and instrumented in such a manner that the characteristic vibration modes can be measured and compared to aeroplane data.	
2.5.2	Aeroplane data are also required to define flight deck motions when the aeroplane is subjected to atmospheric disturbances. General purpose disturbance models that approximate demonstrable flight test data are acceptable. Tests with recorded results that allow the comparison of relative amplitudes versus frequency are required.	
3.	**VISUAL SYSTEMS**	
3.1	Visual system capable of meeting all the standards of this ANO and Appendices B and C.	An SOC is acceptable in place of this test. Consideration should be given to optimizing the vertical field of view for the respective aeroplane cut-off angle.
3.2	Continuous, cross-cockpit, minimum collimated visual field of view providing each pilot with 180 degrees horizontal and 40 degrees vertical field of view. Application of tolerances requires the field of view to be not less than a total of 176 measured degrees horizontal field of view (including not less than ±88 measured degrees either side of the centre of the design eye point) and not less than a total of 36 measured degrees vertical field of view from the pilot's and co-pilot's eye points.	
3.3	A means of recording the visual response time for visual systems as required.	
3.4	Visual textural cues to assess sink rate and depth perception during take-off and landing.	SOC required.
3.5	Horizon and attitude correlated to the simulated attitude indicator.	SOC required containing calculations confirming
3.6	A min of ten levels of occulting. SOC required.	

3.7	Surface resolution demonstrated by a test pattern of objects shown to occupy a visual angle of not greater than 2 arc minutes in the visual display used on a scene from the pilot's eye point.	SOC required
3.8	Light-point size — not greater than 5 are minutes.	
3.9	Light-point contrast ratio — not less than 25:1.	SOC required.
3.10	Daylight, twilight (dusk/dawn) and night visual capability as defined by terms in Para D1.1.37. A raster drawn test pattern filling the entire visual scene (three or more channels) shall consist of a matrix of black and white squares no larger than 10 degrees and no smaller than 5 degrees per channel with a white square in the centre of each channel.	System objective tests are required.
4.	**SOUND SYSTEM**	
4.1	Significant flight deck sounds corresponding to those of the aeroplane which result from pilot actions.	
4.2	Sound of precipitation, rain removal equipment and other significant aeroplane noises perceptible to the pilot during normal and abnormal operations and the sound of a crash when the simulator is landed in excess of limitations.	SOC required.
4.3	Comparable amplitude and frequency of flight deck noises, including engine and airframe sounds. The sounds shall be coordinated with the required weather.	
4.4	The volume control shall have an indication of sound level setting which meets all qualification requirements.	

APPENDIX "B"

FSTD VALIDATION TESTS

1. INTRODUCTION:

1.1 FSTD performance and system operation should be objectively evaluated by comparing the results of tests conducted in the FSTD to validation data, unless specifically noted otherwise. The validation, functions and subjective tests required for the QTG enable the evaluator to "spot check" the performance of the FSTD in order to confirm that it represents the aeroplane in some significant training or testing and checking areas. Without such spot checking using the QTG, FSTD performance cannot be verified in the time normally available for the regulatory evaluation. It should be clearly understood that the QTG does not provide for a rigorous examination of the quality of the simulation in all areas of flight and systems operation. The full testing of the FSTD simulation is intended to have been completed by the FSTD manufacturer's and the FSTD operator's personnel prior to the FSTD being submitted for the regulatory evaluation and prior to the delivery of the results in the QTG. This "in depth" testing is a fundamental part of the whole cycle of testing and is normally carried out using documented acceptance test procedures in which the test results are recorded. These procedures will test the functionality and performance of many areas of the simulation that are not addressed in the QTG as well as such items as the instructor operating station. To facilitate the validation of the FSTD using the QTG, an appropriate recording device acceptable to the PCAA should be used to record each validation test result. These recordings should then be compared to the validation data. The QTG validation tests should be documented, considering the following:

a) the FSTD QTG should describe clearly and distinctly how the FSTD will be set up and operated for each test. Use of a driver programme designed to automatically accomplish the tests is required. It is not the intent, nor is it acceptable, to test each FSTD sub-system independently. Overall integrated testing of the FSTD, with test inputs at the pilot controls, should be accomplished to assure that the total FSTD system meets the prescribed standards;

b) to ensure compliance with this intent, QTGs should contain explanatory material which clearly indicates how each test (or group of tests) is executed, e.g. which parameters are driven/free/constrained and the use of closed/open loop drivers; and

c) all QTG validation tests based on flight test data should also be able to be run manually in order to validate the automatic test results. Short-term tests with simple inputs should be easily reproduced manually. Longer term tests with complex inputs are unlikely to be easily duplicated.

1.2 Certain visual and motion tests in this appendix are not necessarily based upon validation data with specific tolerances. However, these tests are included here for completeness, and the required criteria should be fulfilled instead of meeting a specific tolerance.

1.3 A manual test procedure with explicit and detailed steps for completion of each test should also be provided. The function of the manual test procedure is to confirm that the results obtained when using an automated driver are the same as those that would be experienced by a pilot flying the same test and using the same control inputs as were used by the pilot in the aeroplane from which the validation flight test data was recorded. The manual test results should be able to be achieved using the same tolerances as those utilized for the automatic test. Manual test results may not meet the tolerances; however the PCAA evaluator should be confident they could meet the tolerances if enough effort was spent trying to reproduce the pilot inputs exactly.

1.4 Submission for approval of data other than flight test should include an explanation of validity with respect to available flight test information. Tests and tolerances in this appendix should be included in the FSTD QTG. For aeroplanes certificated after 1 January 2002, the QTG should be supported by a validation data roadmap (VDR) as described in Attachment D. Data providers are encouraged to supply a VDR for older aeroplanes.

1.5 The table of FSTD validation tests in this appendix indicates the required tests. Unless noted otherwise, FSTD tests should represent aeroplane performance and handling qualities at operating mass and centre of gravity (cg) positions typical of normal operation. If a test is supported by aeroplane data at one extreme mass or cg position, another test supported by aeroplane data at mid-conditions or as close as possible to the other extreme should be included. Certain tests which are relevant only at one extreme mass or cg position need not be repeated at the other extreme. Tests of handling qualities should include validation of augmentation devices.

1.6 For the testing of computer-controlled aeroplane (CCA) FSTDs, flight test data are required for both the normal (N) and non-normal (NN) control states, as indicated in the validation requirements of this appendix. Tests in the non-normal state will always include the least augmented state. Tests for other levels of control state degradation may be required as detailed by the PCAA at the time of definition of a set of specific aeroplane tests for FSTD data. Where applicable, flight test data should record:

a) pilot controller deflections or electronically generated inputs including location of input; and

b) flight control surface positions unless test results are not affected by, or are independent of, surface positions.

1.7 The recording requirements of 1.6 a) and b) apply to both normal and non-normal states. All tests in the table of FSTD validation tests require test results in the normal control state unless specifically noted otherwise in the comments section following the CCA designation. However, if the test results are independent of control state, non-normal control data may be substituted.

1.8 Where non-normal control states are required, test data should be provided for one or more non-normal control states including the least augmented state.

1.9 Tests affected by normal, non-normal or other degraded control states not possible in the approved operating envelope of the aeroplane being simulated, and for which results cannot be provided, should be addressed in the QTG by an appropriate rationale included from the aeroplane manufacturer's VDR.

2. TEST REQUIREMENTS:

2.1 The ground and flight tests required for qualification are listed in the table of FSTD validation tests. Computer-generated FSTD test results should be provided for each test. The results should be produced on an appropriate recording device acceptable to the PCAA. Time histories are required unless otherwise indicated in the table of FSTD validation tests.

2.2 In cases where the objective test results authorize a "snapshot test" or a "series of snapshot tests" in lieu of a time history, the data provider should ensure that a steady state condition exists at the instant of time captured by the "snapshot". This is often verified by showing that a steady state condition existed from some period prior to, through some period following, the snapshot. The time period most frequently used is from 5 seconds prior to, through 2 seconds following, the instant of time captured by the snapshot. This paragraph is primarily addressing the validation data and the method by which the data provider ensures that the steady state condition for the snapshot is representative.

2.3 Flight test data which exhibit rapid variations of the measured parameters may require engineering judgement when making assessments of FSTD validity. Such judgement should not be limited to a single parameter. All relevant parameters related to a given manoeuvre or flight condition should be provided to allow overall interpretation. When it is difficult or impossible to match FSTD to aeroplane data throughout a time history, differences should be justified by providing a comparison of other related variables for the condition being assessed.

2.4 Parameters, tolerances and flight conditions. The table of FSTD validation tests describes the parameters, tolerances and flight conditions for FSTD validation. When two tolerance values are given for a parameter, the less restrictive may be used unless indicated otherwise. Regardless, the test should exhibit correct trends. FSTD results should be labelled using the tolerances and units given, considering the following:

a) the tolerances for some of the objective tests have been reduced to "Correct Trend and Magnitude" (CT&M). The use of CT&M is not to be taken as an indication that certain areas of simulation can be ignored. For such tests, the performance of the device should be appropriate and representative of the simulated designated aeroplane and should under no circumstances exhibit characteristics that could lead to negative training;

b) the tolerances listed for tests noted as CT&M are applicable for recurrent evaluations and should be applied to ensure the device remains at the standard initially qualified. Where CT&M is noted, it is required that an automatic recording system be used to "footprint" the baseline results thereby avoiding the effects of possible divergent subjective opinions during recurrent evaluations;

c) for parameters that have units of per cent, or parameters normally displayed in the cockpit in units of per cent (e.g. N_1, N_2, engine torque or power), then a percentage tolerance will be interpreted as an absolute tolerance unless otherwise specified (i.e. for an observation of 50 per cent N_1 and a tolerance of 5 per cent, the acceptable range would be from 45 per cent to 55 per cent); and

d) for parameters not displayed in units of per cent, a tolerance expressed only as a percentage will be interpreted as the percentage of the current reference value of that parameter during the test, except for parameters varying around a zero value for which a minimum absolute value should be agreed with the PCAA.

2.5 Flight condition verification. When comparing the parameters listed to those of the aeroplane, sufficient data should also be provided to verify the correct flight condition. For example, to show the control force is within ±2.2 daN (5 lbf) in a static stability test, data to show correct airspeed, power, thrust or torque, aeroplane configuration, altitude, and other appropriate datum identification parameters should also be given. If comparing short-period dynamics, normal acceleration may be used to establish a match to the aeroplane, but airspeed, altitude, control input, aeroplane configuration, and other appropriate data should also be given. All airspeed values should be clearly annotated as to indicated, calibrated, etc., and like values used for comparison.

2.6 Flight condition definitions. The flight conditions specified in the table of FSTD validation tests, sections 1 (Performance) and 2 (Handling Qualities) are defined as follows:

a) Ground — on ground, independent of aeroplane configuration;
b) Take-off — gear down with flaps in any certified take-off position;
c) Second segment climb — gear up with flaps in any certified take-off position;
d) Clean — flaps and gear up;
e) Cruise — clean configuration at cruise altitude and airspeed;

f) Approach — gear up or down with flaps at any normal approach position as recommended by the aeroplane manufacturer; and

g) Landing — gear down with flaps in any certified landing position.

3. INFORMATION FOR VALIDATION TESTS:

3.1 Engines

3.1.1 Tests are required to show the response of the critical engine parameter to a rapid throttle movement for an engine acceleration and an engine deceleration. The procedure for evaluating the response is illustrated in Figures B-1 and B-2.

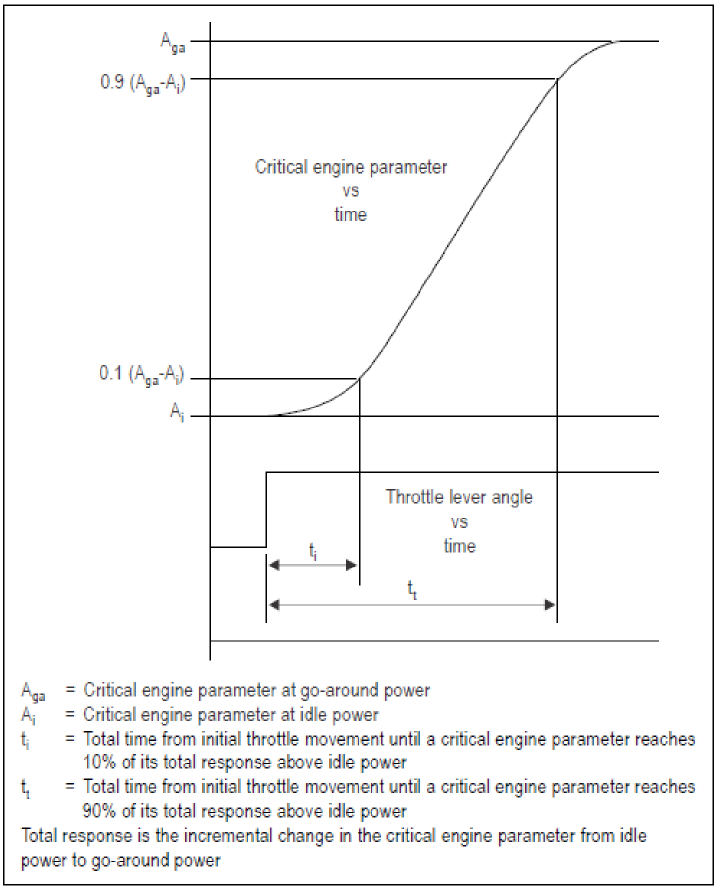

Figure B-1. Engine acceleration

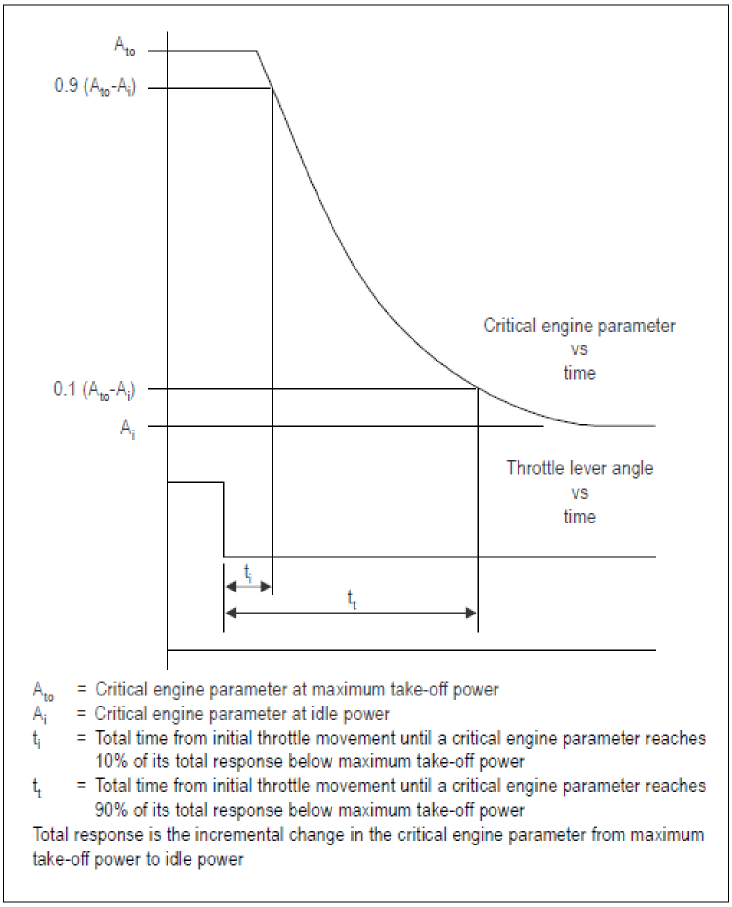

Figure B-2. Engine deceleration

3.2 Control dynamics

3.2.1 General. The characteristics of an aeroplane flight control system have a major effect on handling qualities. A significant consideration in pilot acceptability of an aeroplane is the "feel" provided through the flight controls. Considerable effort is expended on aeroplane feel system design so that pilots will be comfortable and will consider the aeroplane desirable to fly. In order for an FSTD to be representative, it too should present the pilot with the proper feel: that of the aeroplane being simulated. Compliance with this requirement should be determined by comparing a recording of the control feel dynamics of the FSTD to actual aeroplane measurements in the take-off, cruise and landing configurations.

3.2.1.1 Recordings such as free response to a pulse or step function are traditionally used to estimate the dynamic properties of electromechanical systems. In any case, the dynamic properties can only be estimated since the true inputs and responses are also only estimated. Therefore, it is imperative that the best possible data be collected since close matching of the FSTD control loading system to the aeroplane systems is essential.

3.2.1.2 Control dynamics characteristics are usually assessed by measuring the free response of the controls using a step input or pulse input to excite the system. The procedure should be accomplished in the take-off, cruise and landing flight conditions and configurations.

3.2.1.3 For aeroplanes with irreversible control systems, measurements may be obtained on the ground if proper pitot-static inputs are provided to represent airspeeds typical of those encountered in flight. Likewise, it may be shown that for some aeroplanes, take-off, cruise and landing configurations have like effects. Thus, one configuration may suffice. If either or both considerations apply, engineering validation or aeroplane manufacturer rationale should be submitted as justification for ground tests or for eliminating a configuration. For FSTDs requiring static and dynamic tests at the controls, special test fixtures will not be required during initial and upgrade evaluations if the QTG shows both test fixture results and the results of an alternate approach, such as computer plots which were produced concurrently and show satisfactory agreement. Repeat of the alternate method during the initial evaluation would then satisfy this test requirement.

3.2.2 Control dynamics evaluation. The dynamic properties of control systems are often stated in terms of frequency, damping and a number of other traditional measurements which can be found in various documents available on control systems. In order to establish a consistent means of validating test results for FSTD control loading, criteria are needed that will clearly define the interpretation of the measurements and the tolerances to be applied. Criteria are needed for underdamped, critically damped and overdamped systems. In the case of an underdamped system with very light damping, the system may be quantified in terms of frequency and damping. In critically damped or overdamped systems, the frequency and damping are not readily measured from a response time history. Therefore, some other measurement should be used.

3.2.2.1 Tests to verify that control feel dynamics represent the aeroplane should show that the dynamic damping cycles (free response of the controls) match those of the aeroplane within specified tolerances. The method of evaluating the response and the tolerance to be applied is described for the underdamped and critically damped cases. The response is as follows:

a) Underdamped response. Two measurements are required for the period: the time to first zero crossing (in case a rate limit is present) and the subsequent frequency of oscillation. It is necessary to measure cycles on an individual basis in case there are non-uniform periods in the response. Each period will be independently compared to the respective period of the aeroplane control system and, consequently, will enjoy the full tolerance specified for that period.

   The damping tolerance should be applied to overshoots on an individual basis. Care should be taken when applying the tolerance to small overshoots since the significance of such overshoots becomes questionable. Only those overshoots larger than 5 per cent of the total initial displacement should be considered. The residual band, labelled $T(A_d)$ on Figure B-3, is ±5 per cent of the initial displacement amplitude A_d from the steady state value of the oscillation, or ±0.5 per cent of the total control travel (stop to stop). Only oscillations outside the residual band are considered significant. When comparing FSTD data to aeroplane data, the process should begin by overlaying or aligning the FSTD and aeroplane displacement values and then comparing amplitudes of oscillation peaks, the time to the first zero crossing and individual periods of oscillation. The FSTD should show the same number of significant overshoots to within one when compared against the aeroplane data. This procedure for evaluating the response is illustrated in Figure B-3.

b) Critically damped and overdamped response. Due to the nature of critically damped and overdamped responses (no overshoots), the time to travel from 90 per cent of the initial displacement to 10 per cent of the steady state (neutral point) value should be the same as the aeroplane within ±10 per cent or ±0.05 s. Figure B-4 illustrates the procedure.

c) Special considerations. Control systems which exhibit characteristics other than traditional over damped or under damped responses should meet specified tolerances. In addition, special consideration should be given to ensure that significant trends are maintained.

3.2.2.2 Tolerances. The following table summarizes the tolerances, T for underdamped systems. See Figure B-3 for an illustration of the referenced measurements.

$T(P_0)$ ±10 per cent of P_0 or ±0.05 s.
$T(P_1)$ ±20 per cent of P_1 or ±0.05 s.
$T(P_2)$ ±30 per cent of P_2 or ±0.05 s.
$T(P_n)$ ±10(n+1) per cent of P_n or ±0.05 s.
$T(A_n)$ ±1 per cent of A_{max}, where A_{max} is the largest amplitude or ±0.5 per cent of the total control travel (stop to stop).
$T(A_d)$ ±5 per cent of A_d = residual band or ±0.5 per cent of the maximum control travel = residual band.

±1 significant overshoots (minimum of 1 significant overshoot).
Steady state position within residual band.

Note 1: Tolerances should not be applied on period or amplitude after the last significant overshoot.

Note 2: Oscillations within the residual band are not considered significant and are not subject to tolerances.

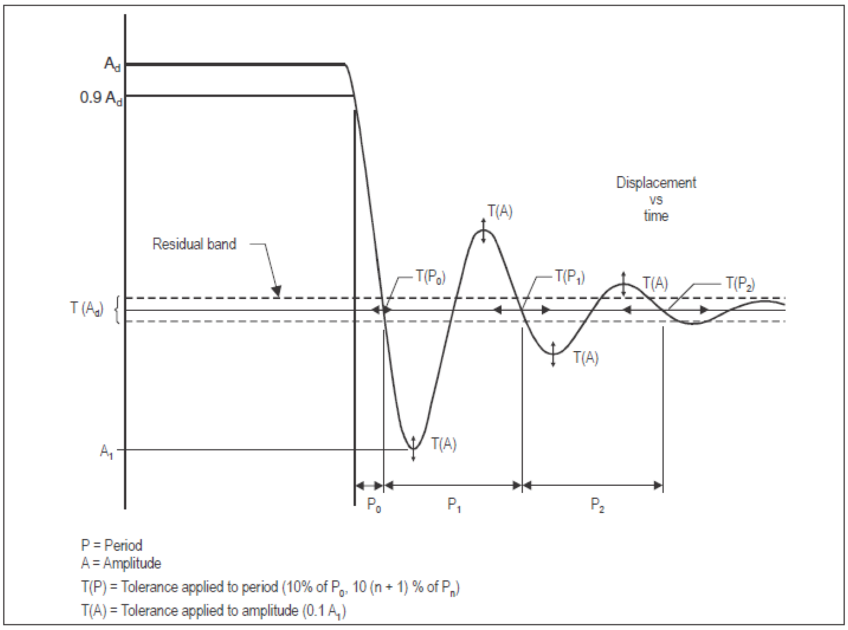

Figure B-3 Under damped step response

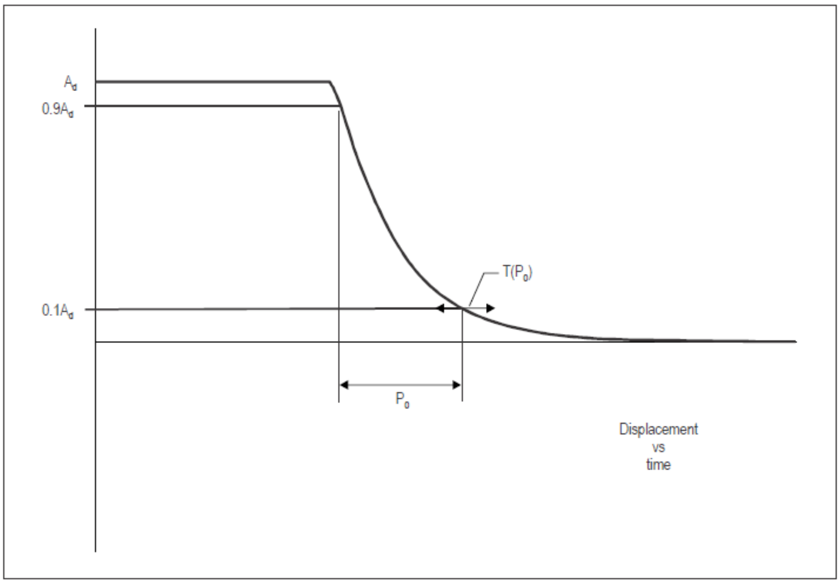

Figure B-4 Critically damped step response

The following tolerance applies only to the overdamped and critically damped systems (see Figure B-4 for an illustration of the reference measurement):

$T(P_0)$ ±10 per cent of P_0 or ±0.05 s.

3.2.3 Alternate method for control dynamics evaluation of irreversible flight controls. One aeroplane manufacturer has proposed, and its PCAA has accepted, an alternate means for dealing with control dynamics. The method applies to aeroplanes with hydraulically powered flight controls and artificial feel systems. Instead of free response measurements, the system would be validated by measurements of control force and rate of movement.

3.2.3.1 These tests should be conducted under typical taxi, take-off, cruise and landing conditions. For each axis of pitch, roll and yaw, the control should be forced to its maximum extreme position for the following distinct rates:

a) Static test. Slowly move the control such that approximately 100 seconds are required to achieve a full sweep. A full sweep is defined as movement of the controller from neutral to the stop, usually aft or right stop, then to the opposite stop, then to the neutral position.

b) Slow dynamic test. Achieve a full sweep in approximately 10 seconds.

c) Fast dynamic test. Achieve a full sweep in approximately 4 seconds.

Note: Dynamic sweeps may be limited to forces not exceeding 44.5 daN (100 lbf).

3.2.3.2 Tolerances.

a) Static test. Items 2.a.1, 2.a.2 and 2.a.3 of the table of FSTD validation tests.

b) Dynamic test. ±0.9 daN (2 lbf) or ±10 per cent of dynamic increment above static test.

3.2.3.3 PCAAs are open to alternative means such as the one described in 3.2.3. Such alternatives should, however, be justified and appropriate to the application. For example, the method described here may not apply to all manufacturers' systems and certainly not to aeroplanes with reversible control systems. Hence, each case should be considered on its own merit on an ad hoc basis. Should the PCAA find that alternative methods do not result in satisfactory performance, more conventionally accepted methods should then be used.

3.2.4 Alternate method for control dynamics evaluation of flight controls with atypical response. Dynamic responses exhibiting atypical behaviour, as frequently seen on reversible controls, may be evaluated using an alternate reference line better suited for such cases. This alternate line is based on the dynamic response itself and attempts to better approximate the true rest position of the control throughout the step response. A full discussion on how to compute the alternate reference line is provided in Attachment N. Figure B-5 shows the final result and how to apply the tolerances using the new reference.

3.2.5 A flight control dynamic response is considered atypical when it does not exhibit classic second order system behaviour. For underdamped systems, the key features of such a behaviour are a constant period, decaying overshoots (an overshoot is always smaller than the previous one) and a fixed steady state position. Overdamped systems show a control position that will demonstrate a smooth exponential decay from its initial displacement towards a fixed steady state position.

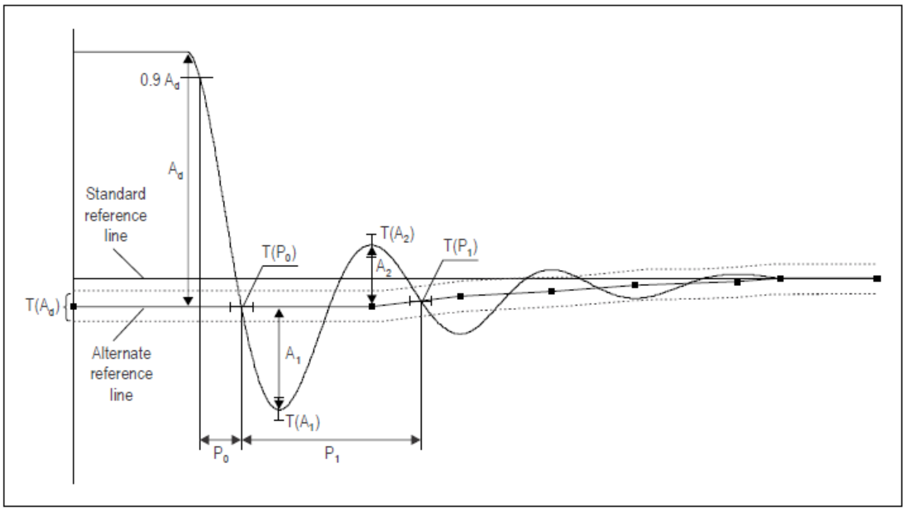

Figure B-5 Tolerances applied using the alternate reference line

3.3 Ground effect

3.3.1 An FSTD to be used for take-off and landing should faithfully reproduce the aerodynamic changes which occur in ground effect. The parameters chosen for FSTD validation should be indicative of these changes. A dedicated test which will validate the aerodynamic ground effect characteristics should be undertaken. The choice of the test method and procedures to validate ground effect rests with the organization performing the flight tests; however, the duration of the flight test performed near the ground should be sufficient to validate the ground-effect model.

3.3.2 Acceptable tests for validation of ground effect should include one of the following:

a) Level fly-bys. The level fly-bys should be conducted at a minimum of three heights within the ground effect, including one at no more than 10 per cent of the wingspan above the ground, one each at approximately 30 per cent and 50 per cent of the wingspan, where height refers to main gear tire height above the ground. In addition, one level-flight trim condition should be conducted out of ground effect, e.g. at 150 per cent of the wingspan.

b) Shallow approach landing. The shallow approach landing should be performed at a glide slope of approximately one degree with negligible pilot activity until flare.

If other methods are proposed, rationale should be provided to conclude that the tests performed do validate the ground-effect model.

3.3.3 The lateral-directional characteristics are also altered by ground effect. For example, because of changes in lift, roll damping is affected. The change in roll damping will affect other dynamic modes usually evaluated for FSTD validation. In fact, Dutch roll dynamics, spiral stability and roll rate for a given lateral control input are altered by ground effect. Steady heading sideslips will also be affected. These effects should be accounted for in the simulator modelling. Several tests such as “crosswind landing”, “one engine inoperative landing” and “engine failure on take-off” serve to validate lateral-directional ground effect since portions of them are accomplished while transiting heights at which ground effect is an important factor.

3.4 Engineering simulator validation data

3.4.1 When a fully flight test validated simulation is modified as a result of changes to the simulated aeroplane configuration, a qualified aeroplane manufacturer may, with the prior agreement of the relevant PCAA:

a) supply validation data from an audited engineering simulator/simulation to selectively supplement flight test data. This arrangement is confined to changes that are incremental in nature and which are both easily understood and well defined; or

b) support the most recent data package using engineering simulator validation data, and track only the latest version of test requirements.

When the FSTD operator receives appropriate validation data from the approved data provider and receives approval from the PCAA, the FSTD operator may adopt tests and associated tolerances described in the current qualification standards as the tests and tolerances applicable for the continuing qualification of a previously qualified FSTD. The updated test(s) and tolerance(s) should be made a permanent part of the MQTG.

3.4.2 To be qualified to supply engineering simulator validation data, an aeroplane manufacturer, or other approved data supplier, should:

a) have a proven track record of developing successful data packages;

b) have demonstrated high-quality prediction methods through comparisons of predicted and flight test validated data;

c) have an engineering simulator that:

1) has models which run in an integrated manner;

2) uses the same models as those released to the training community (which are also used to produce stand-alone proof-of-match and check-out documents);

3) is used to support aeroplane development and certification;

e) use the engineering simulation to produce a representative set of integrated proof-of-match cases;and

e) have an acceptable configuration control system in place covering the engineering simulator and all other relevant engineering simulations.

3.4.3 Aeroplane manufacturers seeking to take advantage of this alternative arrangement should contact the PCAA at the earliest opportunity.

3.4.4 For the initial application, each applicant should demonstrate its ability to qualify to the satisfaction of the PCAA, in accordance with the means provided in this appendix and Attachment B.

3.5 Motion system

3.5.1 General

3.5.1.1 Pilots use continuous information signals to manage the state of the aeroplane. In concert with the instruments and outside-world visual information, whole-body motion feedback is essential in assisting the pilot to control the aeroplane’s dynamics, particularly in the presence of external disturbances. The motion system should therefore meet objective performance criteria as well as be subjectively tuned at the pilot’s seat position to represent the linear and angular accelerations of the aeroplane during a prescribed minimum set of manoeuvres and conditions. Moreover, the response of the motion cueing system should be repeatable.

3.5.1.2 The objective validation tests presented in this appendix are intended to qualify the FSTD motion cueing system from both a mechanical performance standpoint and a motion cueing fidelity perspective.

3.5.2 Motion system checks. The intent of tests 3.a (frequency response) and 3.b (turn-around check), as described in the table of FSTD validation tests, is to demonstrate the performance of the motion system hardware and to check the integrity of the motion set-up with regard to calibration and wear. These tests are independent of the motion cueing software and should be considered as robotic tests.

3.5.3 Motion cueing fidelity tests

3.5.3.1 Frequency-domain based objective motion cueing test

3.5.3.1.1 Background. This test quantifies the response of the motion cueing system from the output of the flight model to the motion platform response. Other motion tests, such as the motion system frequency response, concentrate on the mechanical performance of the motion system hardware alone. The intent of this test is to provide quantitative frequency response records of the entire motion system for specified degree-of-freedom transfer relationships over a range of frequencies. This range should be representative of the manual control range for that particular aeroplane type and the FSTD as set up during qualification. The measurements of this test should include the combined influence of the motion cueing algorithm, the motion platform dynamics, and the transport delay associated with the motion cueing and control system implementation. Specified frequency responses describing the ability of the FSTD to reproduce aeroplane translations and rotations, as well as the cross-coupling relations, are required as part of these measurements. When simulating forward aeroplane acceleration, the FSTD is accelerated momentarily in the forward direction to provide the onset cueing. This is considered the direct transfer relation. The FSTD is simultaneously tilted nose-up due to the low-pass filter in order to generate a sustained specific force. The tilt associated with the generation of the sustained specific force, and the angular rates and angular accelerations associated with the initiation of the sustained specific force, are considered cross-coupling relations. The specific force is required for the perception of the aeroplane sustained specific force, while the angular rates and accelerations do not occur in the aeroplane and should be minimized.

3.5.3.1.2 Frequency response test. This test requires the frequency response to be measured for the motion cueing system. Reference sinusoidal signals are inserted at the pilot reference position prior to the motion cueing computations (see Figure B-6). The response of the motion platform in the corresponding degree-of-freedom (the direct transfer relations), as well as the motions resulting from cross-coupling (the cross-coupling relations), are recorded. These are given in Table B-1. These are the tests that are important to pilot motion cueing and are general tests applicable to all types of aeroplanes. These tests can be run at any time deemed acceptable to the PCAA prior to and/or during the initial qualification. The test requirement can be satisfied by a statement of compliance (SOC) supported with the relevant objective tests and which should be provided by the FSTD manufacturer following factory testing. It should not be necessary to run these tests for evaluations at the FSTD operator site unless changes are made to the motion cueing algorithms and associated parameters.

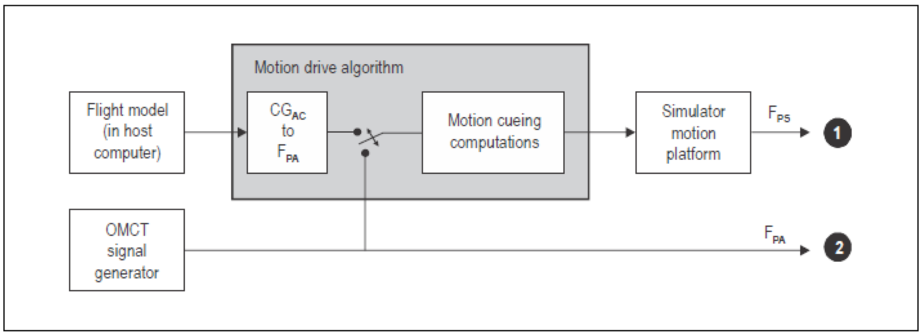

Figure B-6. Schematic of measured input ❶ and output ❷ relation for frequency-domain motion cueing test.

Table B-1. Motion cueing system transfer test matrix

	FSTD response output					
Aircraft input signal	**Pitch**	**Roll**	**Yaw**	**Surge**	**Sway**	**Heave**
Pitch	1			2		
Roll		3			4	
Yaw			5			
Surge	7			6		
Sway		9			8	
Heave						10

3.5.3.1.3 The frequency responses describe the relations between aeroplane motions and simulator motions as defined in Table B-1. The relations are explained below per individual test. Tests 1, 3, 5, 6, 8 and 10 show the direct transfer relations, while tests 2, 4, 7 and 9 show the cross-coupling relations.

1) FSTD pitch response to aeroplane pitch input;

2) FSTD surge acceleration response due to aeroplane pitch acceleration input;

3) FSTD roll response to aeroplane roll input;

4) FSTD sway specific force response due to aeroplane roll acceleration input;

5) FSTD yaw response to aeroplane yaw input;

6) FSTD surge response to aeroplane surge input;

7) FSTD pitch response to aeroplane surge specific force input;

8) FSTD sway response to aeroplane sway input;

9) FSTD roll response to aeroplane sway specific force input; and

10) FSTD heave response to aeroplane heave input.

3.5.3.1.4 Frequencies. The tests should be conducted by introducing sinusoidal inputs at discrete input frequencies entered at the output of the flight model, transformed to the pilot reference position just before the motion cueing computations, and measured at the response of the FSTD platform. The twelve discrete frequencies for these tests range from 0.100 rad/s to 15.849 rad/s and are given in Attachment F, Table F-1 of ICAO Doc. 9625, Volume-I. The relationship between the frequency and corresponding measured modulus and phase defines the system transfer function. This test requires that, for each degree-of-freedom, measurements at the twelve specified frequencies should be taken.

3.5.3.1.5 Input signal amplitudes. The tests applied here to the motion cueing system are intended to qualify its response to normal control inputs during manoeuvring (i.e. not aggressive or excessively hard control inputs). It is necessary to excite the system in such a manner that the response is measured with a high signal-to-noise ratio, and that the possible non-linear elements in the motion cueing system are not overly excited. The sinusoidal input signal amplitudes are defined in Attachment F, Tables F-2 and F-4 of ICAO Doc. 9625, Volume-I.

3.5.3.1.6 Data recording. The measured parameters for each test should include the modulus and phase as prescribed in Attachment F, 2.2 of ICAO Doc. 9625, Volume-I, for the tests delineated in Table B-1. The modulus indicates the amplitude ratio of the output signal divided by the input signal, expressed in non-dimensional terms in case of the direct transfer relations (1, 3, 5, 6, 8, and 10) and in dimensional terms in the case of the cross-coupling relations (2, 4, 7, and 9). The phase describes the delay at that frequency between the output signal and the input signal, and is expressed in degrees.

3.5.3.1.7 Frames of reference. Measurements of the FSTD response should be transformed to estimated measurements at the pilot reference frame. This is defined as being attached to the FSTD in the plane of symmetry of the cab, at a height approximately 35 cm below pilot eye height. The x-axis points forward and the z-axis points downward. The frames of reference are defined in Attachment F, 8.4 of ICAO Doc. 9625, Volume-I.

3.5.3.1.8 Aeroplane characteristics. The tests should be conducted in the FSTD configuration representing the motion drive algorithm during the flight mode. If the motion drive algorithm parameters are different in the ground mode (for example during taxi or take-off roll), the tests should be repeated for this configuration. If to be performed, the recommended conditions on ground are low speed taxi at 10 kt and approach to take-off speed at 80 kt.

3.5.3.1.9 Presentation of results. The measured modulus and phase should be tabulated for the twelve discrete frequencies and for each of the transfer relations given in Table B-1. The results should also be plotted for each component in bode plots. The modulus and phase should be presented as a function of frequency in rad/s. The modulus should be presented in a log-log plot, the phase in a semi-log plot. An example is shown in Figure B-7.

3.5.3.1.10 Tolerances. The boundaries of the criteria for the ten tests are presented in Attachment F, section 7 of ICAO Doc. 9625, Volume-I.

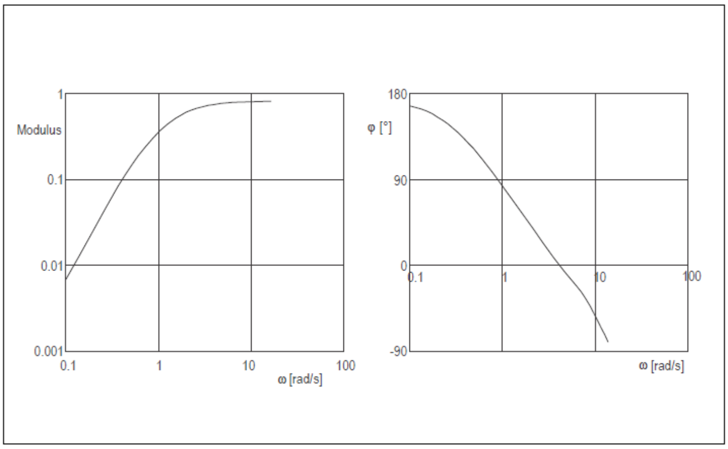

Figure B-7. Example bode plots of the frequency response derived from OMCT measurements

3.5.3.2 Time-domain based objective motion cueing test

A time-domain based objective motion cueing test, which would complement the frequency-domain test in 3.5.3.1, is currently being tested and evaluated by the TDWS. This test will help quantify the response of the motion cueing system. The testing methodology, criteria and tolerances for this test will be implemented into this section after more testing and when sufficient experience is gained.

3.5.4 Motion system repeatability. The intent of this test is to ensure that the motion system software and motion system hardware have not degraded or changed over time. This will allow an improved ability to determine changes that have adversely affected the training value of the motion as was accepted during the initial qualification. The following information delineates the methodology that should be used for this test:

a) Conditions:
   1) one test case on ground: to be determined by the FSTD operator; and

   2) one test case in flight: to be determined by the FSTD operator.

b) Input. The inputs should be such that both rotational accelerations/rates and linear accelerations are inserted before the transfer from the aeroplane cg to the pilot reference point with a minimum amplitude of 5 $°/s^2$, 10 °/s and 0.3 g, respectively, to provide adequate analysis of the output.

c) Recommended output:

   1) actual platform linear accelerations; the output will comprise accelerations due to both the linear and rotational motion acceleration; and

   2) motion actuators position.

3.5.5 Motion vibrations

3.5.5.1 Presentation of results. The characteristic motion vibrations are a means to verify that the FSTD can reproduce the frequency content of the aeroplane when flown in specific conditions. The test results should be presented as a power spectral density (PSD) plot with frequencies on the horizontal axis and amplitude on the vertical axis. The aeroplane data and FSTD data should be presented in the same format with the same scaling, for frequencies up to at least

20 Hz. The algorithms used for generating the FSTD data should be the same as those used for the aeroplane data. If they are not the same, the algorithms used for the FSTD data should be proven to be sufficiently comparable. As a minimum, the results along the vertical and lateral axes should be presented. Longitudinal axis should be presented if either the aeroplane's or FSTD's vibrations are significant and, if the longitudinal axis is not presented, a rationale should be provided.

3.5.5.2 Interpretation of results. The overall trend of the PSD plot should be considered while focusing on the dominant frequencies. Less emphasis should be placed on the differences at the high frequency and low amplitude portions of the PSD plot. During the analysis, it should be considered that certain structural components of the FSTD have resonant frequencies that are filtered and thus may not appear in the PSD plot. If such filtering is required, the notch filter bandwidth should be limited to 1 Hz to ensure that the buffet feel is not adversely affected. In addition, a rationale should be provided to explain that the characteristic motion vibration is not being adversely affected by the filtering. The amplitude should match aeroplane data as per the following description; however, if for subjective reasons the PSD plot was altered, a rationale should be provided to justify the change. If the plot is on a logarithmic scale, it may be difficult to interpret the amplitude of the buffet in terms of acceleration. A 1×10^{-3} $(g_{rms})^2$/Hz would describe a heavy buffet and may be seen in the deep stall regime. On the other hand, a 1×10^{-6} $(g_{rms})^2$/Hz buffet is almost not perceivable but may represent a flap buffet at low speed. The previous two examples differ in magnitude by 1 000. On a PSD plot this represents three decades (one decade is a change in order of magnitude of 10; two decades is a change in order of magnitude of 100; etc.).

3.6 Visual System (Refer ICAO Doc . 9625, Volume-I, Part-II, Appendix-B, Section 4)

3.6.1 General. Visual systems should be tested in accordance with the table of FSTD validation tests.

3.6.2 Visual ground segment.

a) Height and RVR for the assessment have been selected in order to produce a visual scene that can be readily assessed for accuracy (RVR calibration) and where spatial accuracy (centre line and G/S) of the aeroplane being simulated can be readily determined using approach/runway lighting and flight deck instruments.

b) The QTG should indicate the source of data, i.e. published decision height, aerodrome and runway used, ILS G/S antenna location (aerodrome and aeroplane), pilot's eye reference point, flight deck cut-off angle, etc., used to accurately make visual ground segment (VGS) scene content calculations (see Figure B-8).

c) Automatic positioning of the simulated aeroplane on the ILS is encouraged. If such positioning is accomplished, diligent care should be taken to ensure that the correct spatial position and aeroplane attitude are achieved. Flying the approach manually or with an installed autopilot should also produce acceptable results.

3.6.3 Image geometry.

The geometry of the final image as displayed to each pilot should meet the criteria defined. This assumes that the individual optical components have been tested to demonstrate a performance that is adequate to achieve this end result.

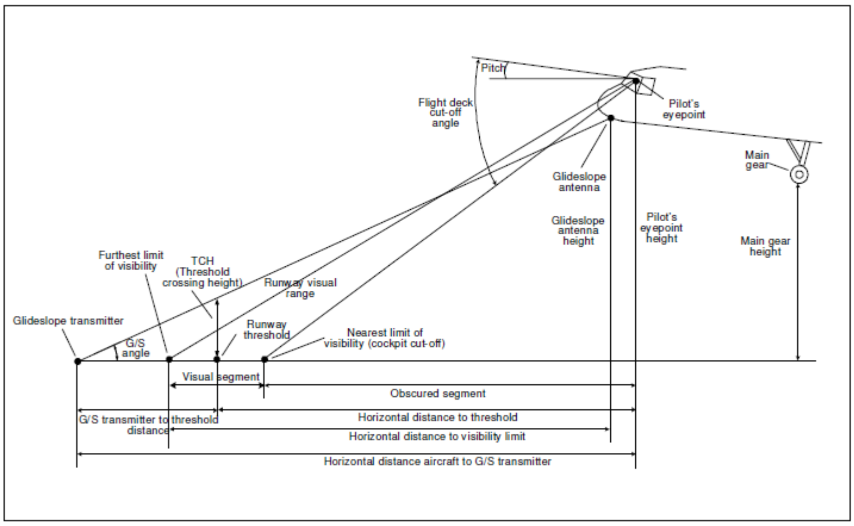

Figure B-8. VGS scene content calculations

3.6.3.1 Image position.

3.6.3.1.1 When measured from the pilot's and co-pilot's eyepoint the centre of the image should be positioned horizontally between 0 degrees and 2 degrees inboard and within ±0.25 degree vertically relative to the FSTD centerline taking into account any designed vertical offset.

3.6.3.1.2 The differential between the measurements of horizontal position between each eyepoint should not exceed 1 degree.

Note: The tolerances are based on eye spacing of up to ±53.3 cm (±21 inches). Greater eye spacing should be accompanied by an explanation of any additional tolerance required.

3.6.3.2 Image absolute geometry.

The absolute geometry of any point on the image should not exceed 3 degrees from the theoretical position. This tolerance applies to the central 200 degrees by 40 degrees. For larger fields of view, there should be no distracting discontinuities outside this area.

3.6.3.3 Image relative geometry.

3.6.3.3.1 The relative geometry check is intended to test the displayed image to demonstrate that there are no significant changes in image size over a small angle of view. With high detail visual systems, the eye can be a very powerful comparator to discern changes in geometric size. If there are large changes in image magnification over a small area of the picture the image can appear to "swim" as it moves across the mirror.

3.6.3.3.2 The typical Mylar-based mirror system will naturally tend to form a "bathtub" shape. This can cause magnification or "rush" effects at the bottom and top of the image. These can be particularly distracting in the lower half of the mirror when in the final approach phase and hence should be minimized. The tolerances are designed to try to keep these effects to an acceptable level while accepting that the technology is limited in its ability to produce a perfect spherical shape.

3.6.3.3.3 The 200°× 40° FOV is divided up into three zones to set tolerances for relative geometry as shown in Figure B-9.

3.6.3.3.4 Testing of the relative geometry should proceed as follows:

a) from the pilot's eye position, measure every visible 5-degree point on the vertical lines and horizontal lines. Also, at —90, —60, —30, 0 and +15 degrees in azimuth, measure all visible 1-degree points from the —10°point to the lowest visible point;

Note: Not all points depicted on the pattern are measured, but they may be measured if observation suggests a problem.

b) from the co-pilot's eye position, measure every visible 5 degree point on the vertical lines and horizontal lines. Also, at +90, +60, +30, 0 and -15 degrees in azimuth, measure all visible 1-degree points from the —10°point to the lowest visible point;

Note: Not all points depicted on the pattern are measured, but they may be measured if observation suggests a problem.

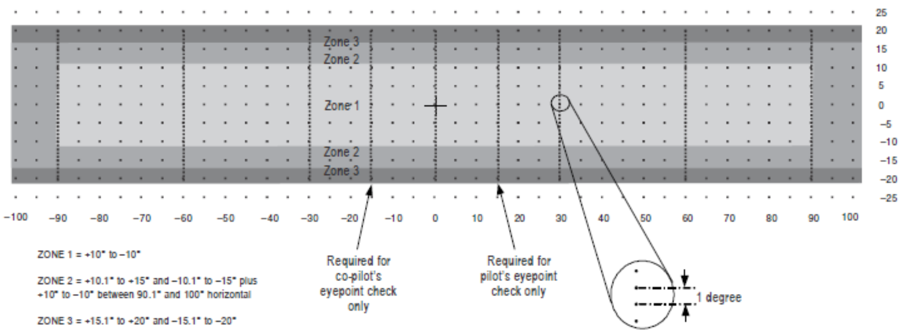

Figure B-9. Relative geometry test pattern showing zones.

c) the relative spacing of points should not exceed the following tolerances when comparing the gap between one pair of dots with the gap between an adjacent pair:

Zone 1 < 0.075 degree/degree,

Zone 2 < 0.15 degree/degree,

Zone 3 < 0.2 degree/degree;

d) where 5 degree gaps are being measured the tolerances should be multiplied by 5, e.g. one 5 degree gap should not be more than (5*0.075) = 0.375 degree more or less than the adjacent gap when in zone 1; and

e) for larger fields of view, there should be no distracting discontinuities outside this area.

3.6.3.3.5 For recurrent testing, the use of an optical checking device is encouraged. This device should typically consist of a hand-held go/no go gauge to check that the relative positioning is maintained.

3.6.4 Laser speckle contrast ratio (laser projection system).

The objective measure of speckle contrast that is described in the following paragraphs considers the grainy structure of speckle and concentrates on the variations of brightness inherently introduced by speckle. Speckle contrast is quite commonly measured in many applications. However, speckle contrast does not take into account the size of the grains, i.e. the spatial wavelength of the speckle pattern.

3.6.4.1 Definition of speckle contrast ratio

3.6.4.1.1 Due to its noisy character, one adequate measure to quantify speckle is the root mean square (RMS) deviation derived from statistical theory: in a random distribution, the RMS deviation quantifies the amount of variation from the mean value.

3.6.4.1.2 When applied to the intensity profile of an illuminated surface, the speckle contrast C is the RMS deviation normalized to the mean value.

3.6.4.1.3 Given the intensity profile I(x, y) in the considered field of view, the speckle contrast C can be defined as:

$$C = \frac{\sqrt{\langle I^2 \rangle - \langle I \rangle^2}}{\langle I \rangle},$$

where the average operator < > operating on a profile I(x, y) is defined as:

$$\langle I \rangle := \frac{1}{A} \cdot \int_{FOV} I(x, y)\, dA$$

Hence:

$$C = \frac{\sqrt{A \cdot \int_{FOV} (I(x,y))^2\, dA - \left(\int_{FOV} I(x,y)\, dA \right)^2}}{\int_{FOV} I(x,y)\, dA}$$

3.6.4.2 Speckle measurement

3.6.4.2.1 The intensity profile I(x, y) can be measured with a charge-coupled device (CCD) camera. The setup of the measurement (selection of lenses and CCD array) ensures that the granularity of the speckle can easily be resolved; hence, the granularity on the CCD chip should therefore be larger than the pixel size.

3.6.4.2.2 With the discrete nature of the CCD chip, I(x, y) translates into an array $I_{m,n}$, while

$$\frac{1}{A} \cdot \int_{FOV} I(x, y)\, dA$$

translates into:

$$\frac{1}{m \cdot n} \cdot \sum_{FOV} I_{m,n}$$

Therefore,

$$C = \frac{\sqrt{m \cdot n \cdot \sum_{FOV} I_{m,n}^2 - \left(\sum_{FOV} I_{m,n} \right)^2}}{\sum_{FOV} I_{m,n}}$$

where:

Symbol or Notation	Description	Units
Σ	Summation operator	N/A
A	Area	Arbitrary unit
C	Speckle contrast	Per cent
FOV	Field of view	Degrees
I	Intensity	Arbitrary units
m	Number of pixel rows within FOV	N/A
n	Number of pixel columns within FOV	N/A

3.6.4.2.3 Since the definition of C is also sensitive to the profile's low-frequency variations across the FOV, either the illumination together with the reflectivity of the screen should be homogeneous, or the measured intensity profile should be corrected for these variations. This can be accomplished by applying a suitable high-pass filter, for example by evaluating on sufficiently small FOVs in which low-frequency variations are negligible.

3.6.4.2.4 To take into account the subjective nature of speckle, the f-number (or f# which is sometimes called the focal ratio expressing the diameter of the entrance pupil D divided by the focal length f, i.e. D/f) of the lens should be used as close as possible to that of the human eye. The recommended f# is 1/16.

3.6.4.3 Speckle tolerance

If the speckle contrast is more than 10 per cent the image begins to appear disturbed. The distractive modulation as an overlay of the image reduces the perceptibility of the projected image and then degrades the perceived resolution. With a speckle contrast below 10 per cent, the resolution and focus are not affected.

3.6.5 Solid-state illuminators

3.6.5.1 Projectors using solid-state illuminators, such as LEDs or lasers, exhibit improved lifetimes over those illuminated by lamps. However, current LED and laser illuminators lose this lifetime improvement when required to achieve 30 cd/m^2 (8.8 ft-lamberts) light-point intensity. This limitation is considered acceptable when measured against the benefits of solid-state illuminators. Such devices should therefore only be required to achieve 20 cd/m^2 (5.8 ft-lamberts) light-point brightness.

3.6.5.2 As soon as technology allows solid-state illuminators to achieve the full 8.8 ft-lamberts that capability should be employed. This is further emphasised by current advances in solid-state illuminators which show that this waiver for the limitation will soon be unnecessary.

3.7 Sound system

3.7.1 General. The total sound environment in the aeroplane is very complex and changes with atmospheric conditions, aeroplane configuration, airspeed, altitude, power settings, etc. Thus, flight deck sounds are an important component of the flight deck operational environment and as such provide valuable information to the flight crew. These aural cues can either assist the crew, as an indication of an abnormal situation, or hinder the crew, as a distraction or nuisance. For effective training, the FSTD should provide flight deck sounds that are perceptible to the pilot during normal, abnormal and emergency operations and that are comparable to those of the aeroplane. Accordingly, the FSTD operator should carefully evaluate background noises in the location being considered. To demonstrate compliance with the sound requirements, the objective or validation tests in this appendix have been selected to provide a representative sample of normal static conditions typical of those experienced by a pilot. Due to the nature of sound, objective criteria may have been regularly disregarded during previous evaluations. Adhering to the objective criteria is an important component of the total sound.

3.7.2 Alternate propulsion. For FSTDs with multiple propulsion configurations, any condition listed in section 5 (Sound systems) of this appendix that is identified by the aeroplane manufacturer as significantly different, due to a change in propulsion system (engine or propeller), should be presented for evaluation as part of the QTG.

3.7.3 Data and data collection system.

3.7.3.1 Information provided to the FSTD manufacturer should comply with the current edition of the IATA document Flight Simulator Design and Performance Data Requirements. This information should contain calibration and frequency response data.

3.7.3.2 The system used to perform the tests listed in section 5 of this appendix, should meet or exceed the following standards:

a) ANSI S1.11-2004, as amended — Specification for Octave, Half-Octave and Third Octave Band Filter Sets; and

b) IEC 61094-4-1995, as amended — Measurement microphones — Frequency response of the microphone used to record the FSTD sounds should be at least as good as the one used to record the approved dataset sounds.

3.7.4 Headsets. If headsets are used during normal operation of the aeroplane they should also be used during the FSTD evaluation.

3.7.5 Playback equipment. It is recommended that playback equipment such as a laptop and headphones and recordings from the approved dataset be available during initial evaluations in order to enable subjective comparison between FSTD results and the approved data.

3.7.6 Volume Level. The FSTD is qualified at the full volume level, which corresponds to the actual volume level in the approved dataset. When full volume is not selected, an indication of abnormal setting should be provided to the instructor to prevent inadvertent operation at this setting.

3.7.7 Background noise.

3.7.7.1 Background noise includes the noise in the FSTD due to the FSTD's cooling and hydraulic systems that are not associated with the aeroplane and the extraneous noise from other locations in the building. Background noise can seriously impact the correct simulation of aeroplane sounds, so the goal should be to keep the background noise below the aeroplane sounds. In some cases, the sound level of the simulation can be increased to compensate for the background noise. However, this approach is limited by the specified tolerances and by the subjective acceptability of the sound environment to the evaluation pilot.

3.7.7.2 The acceptability of the background noise levels is dependent upon the normal sound levels in the aeroplane or class of aeroplane being represented. Background noise levels that fall below the lines defined by the following points may be acceptable (see Figure B-10):

a) 70 dB @ 50 Hz;

b) 55 dB @ 1 000 Hz; and

c) 30 dB @ 16 kHz.

These limits are for unweighted 1/3 octave band sound levels. Meeting these limits for background noise does not ensure an acceptable FSTD. Aeroplane sounds which fall below this limit require careful review and may require lower limits on the background noise.

3.7.7.3 The background noise measurement may be rerun at the recurrent evaluation as per 3.7.9. The tolerances to be applied are that recurrent 1/3 octave band amplitudes cannot differ by more than ±3 dB when compared to the initial results.

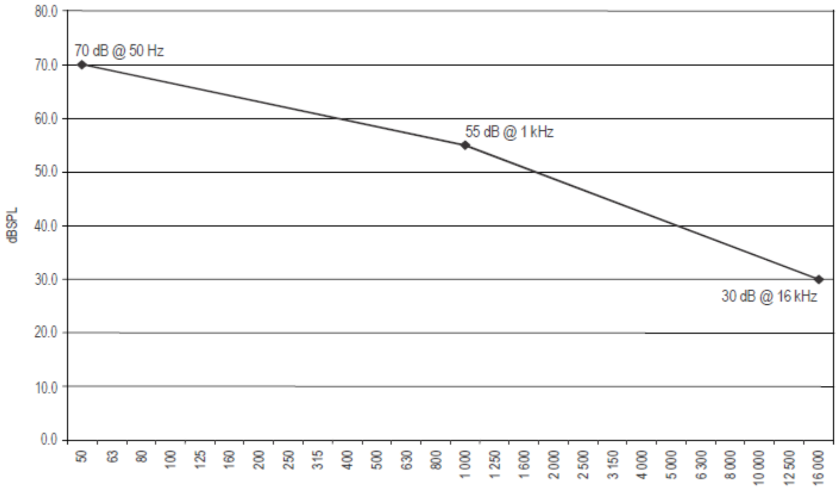

Figure B-10. 1/3 octave band frequency (Hz).

3.7.8 Frequency response. Frequency response plots for each channel should be provided at initial evaluation. These plots may be rerun at the recurrent evaluation as per 3.7.9. The tolerances to be applied are:

a) recurrent 1/3 octave band amplitudes cannot differ by more than ±5 dB for three consecutive bands when compared to the initial results; and

b) the average of the sum of the absolute differences between initial and recurrent results over all bands cannot exceed 2 dB (see Table B-2).

3.7.9 Initial and recurrent evaluations. If recurrent frequency response and FSTD background noise results are within tolerance, respective to initial evaluation results, and the FSTD operator can prove that no software or hardware changes have occurred that will affect the aeroplane cases, it is not required to rerun those cases during recurrent evaluations. If aeroplane cases are rerun during recurrent evaluations, the results may be compared against initial evaluation results rather than aeroplane master data.

3.7.10 Validation testing. Deficiencies in aeroplane recordings should be considered when applying the specified tolerances to ensure that the simulation is representative of the aeroplane. Examples of typical deficiencies are:

a) variation of data between tail numbers;

b) frequency response of microphones;

c) repeatability of the measurements; and

d) extraneous sounds during recordings.

Note: Atmospheric pressure differences between data collection and reproduction may play a role in subjective perceptions.

Table B-2. Example of recurrent frequency response test tolerance

Band centre frequency	Initial results (dBSPL)	Recurrent results (dBSPL)	Absolute Difference
50	75.0	73.8	1.2
63	75.9	75.6	0.3
80	77.1	76.5	0.6
100	78.0	78.3	0.3
125	81.9	81.3	0.6
160	79.8	80.1	0.3
200	83.1	84.9	1.8
250	78.6	78.9	0.3
315	79.5	78.3	1.2
400	80.1	79.5	0.6
500	80.7	79.8	0.9
630	81.9	80.4	1.5
800	73.2	74.1	0.9
1000	79.2	80.1	0.9
1250	80.7	82.8	2.1
1600	81.6	78.6	3.0
2000	76.2	74.4	1.8
2500	79.5	80.7	1.2
3150	80.1	77.1	3.0
4000	78.9	78.6	0.3
5000	80.1	77.1	3.0
6300	80.7	80.4	0.3
8000	84.3	85.5	1.2
10000	81.3	79.8	1.5
12500	80.7	80.1	0.6
16000	71.1	71.1	0.0
		Average	1.1

APPENDIX “C”

FUNCTIONS AND SUBJECTIVE TESTS

1. INTRODUCTION:

1.1 Accurate replication of aeroplane systems functions should be checked at each flight crew member position. This includes procedures using the AFM and checklists. Handling qualities, performance and FSTD systems operation as they pertain to the actual aeroplane, as well as FSTD cueing (e.g. visual cueing and motion cueing) and other supporting systems (e.g. IOS), should be subjectively assessed. Prior coordination with the CAA responsible for the evaluation is essential to ensure that the functions tests are conducted in an efficient and timely manner and that any skills, experience or expertise required by the evaluation team are available.

1.2 The necessity of functions and subjective tests arises from the need to confirm that the simulation has produced a totally integrated and acceptable replication of the aeroplane. Unlike the objective tests listed in Appendix B, subjective testing should cover areas of the flight envelope that may reasonably be reached by a trainee. Like the validation tests, the functions and subjective tests conducted during the initial evaluation are only a “spot check” and not a rigorous examination of the quality of the simulation in all areas of flight and systems operation. The FSTD operator should have completed the acceptance testing of the FSTD with support from the FSTD manufacturer prior to the device being submitted for the initial evaluation to be conducted by the CAA evaluator(s).

1.3 At the request of an FSTD operator, the FSTD may be assessed for a special aspect of a relevant training programme during the functions and subjective portion of an evaluation. Such an assessment may include a portion of a line-oriented flight training (LOFT) scenario or special emphasis items in the training programme. Unless directly related to a requirement for the current qualification level, the results of such an evaluation would not affect the FSTD’s current qualification status.

1.4 Functions tests should be run in a logical flight sequence at the same time as performance and handling assessments. This also permits the FSTD to run for two to three hours in real time, without repositioning of flight or position freeze, thereby permitting proof of reliability.

1.5 The FSTD should be assessed to ensure that repositions, resets and freezes support efficient and effective training.

1.6 At the time of writing, simulated ATC environment was still in the early stages of its development and adoption. As a result, training approval and device qualification for this subject has not yet been proven by experience. Until such a time, it is envisaged that the evaluation of FSTD simulated ATC environment capability will be conducted via training approval and not as part of FSTD qualification.

1.7 The FSTD should be assessed to ensure that simulated ATC environment supports the specific training task (for example, as needed for MPL/ab initio training) in an efficient and effective manner. Emphasis should be on the approval of those functions that support key training objectives, rather than those that attempt to provide a high fidelity synthetic representation of real-world operations.

1.8 Since the requirements for simulated ATC environment are intentionally non-prescriptive, assessment will be largely subjective. The qualification of the FSTD should not be withheld, restricted or simulated ATC environment annotated as a “non-qualified task” as a result of non-compliance. However, if the system does not meet the criteria of a largely subjective evaluation, the training task should not be approved.

1.9 Further guidance on approval and qualification will be published in subsequent updates or amendments to this document when sufficient experience has been gathered by industry.

2. TEST REQUIREMENTS:

2.1 The ground and flight tests and other checks required for qualification are listed in the following Table of Functions and Subjective Tests. The table includes manoeuvres and procedures (both conventional and performance based navigation) to ensure that the FSTD functions and performs appropriately for use in pilot training and testing or checking in the manoeuvres and procedures normally required of an approved training programme.

2.2 Some manoeuvres and procedures include pilot techniques and features of advanced technology aeroplanes and innovative training programmes. For example, "continuous descent final approach technique" and "high angle of attack manoeuvring" are included to provide an alternative to "dive and drive final approaches" and "approach to stall", respectively. For the latter, such an alternative is necessary for aeroplanes employing flight envelope limiting technology.

2.3 A representative selection of systems functions should be assessed for normal and, where appropriate, alternate operations. Normal, abnormal and emergency procedures associated with a flight phase should be assessed during the evaluation of manoeuvres or events within that flight phase. The effects of the selected malfunctions should be sufficient to correctly exercise the aeroplane-related procedures, normally contained in a quick reference handbook (QRH). Systems are listed separately under "any flight phase" to ensure appropriate attention to system checks.

3. TABLE OF FUNCTIONS AND SUBJECTIVE TESTS:

Note: "Other" means any other test as applicable to the aeroplane being simulated and as applicable to the FSTD type.

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
1	**PREPARATION FOR FLIGHT.**							
1.a	**Pre-Flight.** Accomplish a functions check of all switches, indicators, systems and equipment at all crew members' and instructors' stations and determine that:							
1.a.1	The flight deck design and functions are identical to that of the aeroplane being simulated.					✓		✓
1.a.2	The flight deck design and functions represent those of the simulated class of aeroplanes.	✓		✓			✓	
1.a.3	The flight deck design and functions are aeroplane-like and generic but recognizable as within a class of aeroplanes.		✓		✓			
2	**SURFACE OPERATIONS (PRE-FLIGHT).**							
2.a	**Engine start.**							
2.a.1	Normal start.	✓	✓	✓	✓	✓	✓	✓
2.a.2	Alternate start procedures.			✓	✓	✓	✓	✓
2.a.3	Abnormal starts and shutdowns (hot start, hung start, tail pipe fire, etc.).	✓		✓	✓	✓	✓	✓

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
2.b	**Taxi.**							
2.b.1	Pushback / powerback.			✓	✓	✓	✓	✓
2.b.2	Thrust response.	✓	✓	✓	✓	✓	✓	✓
2.b.3	Power lever friction.	✓	✓	✓	✓	✓	✓	✓
2.b.4	Ground handling.	✓	✓	✓	✓	✓	✓	✓
2.b.5	Nosewheel scuffing.						✓	✓
2.b.6	Taxi aids (e.g. taxi camera, moving map).					✓	✓	✓
2.b.7	Low visibility (taxi route, signage, lighting, markings, etc.).					✓	✓	✓
2.c	**Brake Operations.**							
2.c.1	Normal, automatic and alternate / emergency operation.	✓	✓	✓	✓	✓	✓	✓
2.c.2	Brake fade.					✓	✓	✓
2.d	**Other.**							
3.	**TAKE-OFF.** Note: Only those take-off tests relevant to the type or class of the aeroplane being simulated should be selected from the following list, where tests should be made with limiting wind velocities, wind shear and with relevant system failures.							
3.a	**Normal.**							
3.a.1	Aeroplane / engine parameter relationships, including run-up.	✓	✓	✓	✓	✓	✓	✓
3.a.2	Nosewheel and rudder steering.	✓	✓	✓	✓	✓	✓	✓
3.a.3	Crosswind (maximum demonstrated).	✓	✓	✓	✓	✓	✓	✓
3.a.4	**Special Performance.**							
3.a.4.a	Reduced V_1.			✓	✓	✓	✓	✓
3.a.4.b	Maximum engine de-rate.			✓	✓	✓	✓	✓
3.a.4.c	Soft surface.	✓		✓		✓	✓	✓
3.a.4.d	Short field / Short Take-Off and Landing (STOL) operations.	✓		✓		✓	✓	✓
3.a.4.e	Obstacle (performance over visual obstacle).	✓		✓		✓	✓	✓
3.a.5	Low visibility take-off.		✓	✓	✓	✓	✓	✓
3.a.6	Landing gear, wing flap and leading edge device operation.	✓	✓	✓	✓	✓	✓	✓
3.a.7	Contaminated runway operations.	✓		✓		✓	✓	✓
3.a.8	Other.							
3.b	**Abnormal / Emergency.**							
3.b.1	Rejected take-off.	✓	✓	✓	✓	✓	✓	✓
3.b.2	Rejected special performance take-off (e.g. reduced V_1, maximum eingine de-rate, soft field, short field / short take-off and landing (STOL) operations, etc.).	✓		✓		✓	✓	✓
3.b.3	Rejected take-off with contaminated runway.	✓		✓		✓	✓	✓
3.b.4	Continued take-off with failure of most critical engine at most critical point.			✓	✓	✓	✓	✓
3.b.5	Flight control system failures, reconfiguration modes, manual reversion and associated handling.					✓		✓
3.b.6	Other.							

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
4.	**CLIMB.**							
4.a	Normal.	✓	✓	✓	✓	✓	✓	✓
4.b	One or more engine(s) inoperative.		✓	✓	✓	✓	✓	✓
4.c	Approach climb in icing (for aeroplanes with icing accountability).					✓	✓	✓
4.d	Other.							
5.	**CRUISE.**							
5.a	**Performance characteristics (speed versus power, configuration and attitude).**							
5.a.1	Straight and level flight.	✓	✓	✓	✓	✓	✓	✓
5.a.2	Change of airspeed.	✓	✓	✓	✓	✓	✓	✓
5.a.3	High-altitude handling.			✓	✓	✓	✓	✓
5.a.4	High-Mach number handling (Mach tuck, Mach buffet) and recovery (trim change).					✓	✓	✓
5.a.5	Overspeed warning (in excess of V_{mo} or M_{mo}).			✓	✓	✓	✓	✓
5.a.6	High-IAS handling.			✓	✓	✓	✓	✓
5.a.7	Other.							
5.b	**Manoeuvres.**							
✓	✓	✓	✓	✓	✓	✓	✓	✓
5.b.1.b	High angle of attack, approach to stall, stall warning, buffet, g-break/pitch break and stick pusher response (take-off, cruise, approach and landing configuration). Aeroplane automation (such as autopilot and autothrottle) response to stall warning, stall and stick pusher.							✓
5.b.2	Slow flight.	✓		✓		✓	✓	✓
5.b.3	Upset recognition and recovery manoeuvres within the FSTD's validated envelope as defined on the statement of compliance.							✓
5.b.4	Flight envelope protection (high angle of attack, bank limit, overspeed, etc.).			✓	✓	✓	✓	✓
5.b.5	Turns with/without speedbrake/spoilers deployed.			✓	✓	✓	✓	✓
5.b.6	Normal and standard rate turns.	✓	✓	✓	✓	✓	✓	✓
5.b.7	Steep turns.	✓	✓	✓	✓	✓	✓	✓
5.b.8	Performance turn.	✓	✓	✓	✓	✓	✓	✓
5.b.9	In-flight engine shutdown and restart (assisted and windmill).			✓	✓	✓	✓	✓
5.b.10	Manoeuvring with one or more engines inoperative.			✓	✓	✓	✓	✓
5.b.11	Specific flight characteristics (e.g. direct lift control).			✓	✓	✓	✓	✓
5.b.12	Flight control system failures, reconfiguration modes, manual reversion and associated handling.					✓		✓
5.b.13	Gliding to a forced landing.	✓		✓		✓	✓	✓
5.b.14	**Visual resolution and FSTD handling and performance for the following:**							
5.b.14.a	Terrain accuracy for forced landing area selection.	✓		✓		✓	✓	✓
5.b.14.b	Terrain accuracy for VFR Navigation.	✓		✓		✓	✓	✓
5.a.14.c	Eights on pylons (visual resolution).	✓		✓		✓	✓	✓
5.a.14.d	Turns about a point.	✓		✓		✓	✓	✓
5.a.14.e	S-turns about a road or section line.	✓		✓		✓	✓	✓
5.a.15	Other							

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
6.	**DESCENT.**							
6.a	Normal.	✓	✓	✓	✓	✓	✓	✓
6.b	Maximum rate/emergency (clean, with speed brakes, etc.).			✓	✓	✓	✓	✓
6.c	With autopilot.	✓	✓	✓	✓	✓	✓	✓
6.d	Flight control system failures, reconfiguration modes, manual reversion and associated handling.					✓		✓
6.e	Other.							
7.	**INSTRUMENT APPROACHES OPERATIONS.** Note: Only those instrument approach and landing tests relevant to the type or class of the aeroplane being simulated should be selected from the following list, where tests should be made with limiting wind velocities, wind shear (except for the CAT II and III precision approaches) and with relevant system failures.							
7.a	**3D operations on precision approach procedures.**							
7.a.1	**CAT I published approaches (all types).**							
7.a.1.a	Manual approach with/without flight director including landing.		✓	✓	✓	✓	✓	✓
7.a.1.b	Autopilot/autothrottle coupled approach and manual landing.		✓	✓	✓	✓	✓	✓
7.a.1.c	Autopilot/autothrottle coupled approach, engine(s) inoperative.		✓	✓	✓	✓	✓	✓
7.a.1.d	Manual approach, engine(s) inoperative.		✓	✓	✓	✓	✓	✓
7.a.1.e	HUD/EFVS.			✓	✓	✓	✓	✓
7.a.2	**CAT II published approaches.**							
7.a.2.a	Autopilot/autothrottle coupled approach to DH and landing (manual and autoland).				✓	✓	✓	✓
7.a.2.b	Autopilot/autothrottle coupled approach with one-engine-inoperative approach to DH and go-around (manual and autopilot).				✓	✓	✓	✓
7.a.2.c	HUD/EFVS.				✓	✓	✓	✓
7.a.3	**CAT III published approaches.**							
7.a.3.a	Autopilot/autothrottle coupled approach to landing and roll-out (if applicable) guidance (manual and autoland).				✓	✓	✓	✓
7.a.3.b	Autopilot/autothrottle coupled approach to DH and go-around (manual and autopilot).				✓	✓	✓	✓
7.a.3.c	Autopilot/autothrottle coupled approach to land and roll-out (if applicable) guidance with one engine inoperative (manual and autoland).				✓	✓	✓	✓
7.a.3.d	Autopilot/autothrottle coupled approach to DH and go-around with one engine inoperative (manual and autopilot).				✓	✓	✓	✓
7.a.3.e	HUD/EFVS.				✓	✓	✓	✓
7.a.4	**Autopilot / autothrottle coupled approach (to a landing or to a go-around):**							
7.a.4.a	With generator failure.				✓	✓	✓	✓
7.a.4.b	With maximum tail wind component certified or authorized.				✓	✓	✓	✓
7.a.4.c	With maximum crosswind component demonstrated or authorized.				✓	✓	✓	✓

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
7.a.5	PAR approach, all engine(s) operating and with one or more engine(s) inoperative.		✓	✓	✓	✓	✓	✓
7.a.6	MLS, GBAS, all engine(s) operating and with one or more engine(s) inoperative.		✓	✓	✓	✓	✓	✓
7.b	**2D and 3D operations on non-precision approach procedures.**							
7.b.1	Surveillance radar approach, all engine(s) operating and with one or more engine(s) inoperative.		✓	✓	✓	✓	✓	✓
7.b.2	NDB approach (with and without CDFA), all engine(s) operating and with one or more engine(s) inoperative.		✓	✓	✓	✓	✓	✓
7.b.3	VOR, VOR/DME, TACAN approach (with and without CDFA), all engines(s) operating and with one or more engine(s) inoperative.		✓	✓	✓	✓	✓	✓
7.b.4	RNP APCH approach procedures (with and without CDFA) — localizer performance (LP) and lateral navigation (LNAV) minima (at nominal and minimum authorized temperatures), all engine(s) operating and with one or more engine(s) inoperative.		✓	✓	✓	✓	✓	✓
7.b.5	ILS localizer only (LOC), and ILS localizer back course (LOC-BC) approaches (with and without CDFA), all engine(s) operating and with one or more engine(s) inoperative.		✓	✓	✓	✓	✓	✓
7.b.6	ILS offset localizer approach, all engine(s) operating and with one or more engine(s) inoperative.		✓	✓	✓	✓	✓	✓
7.c	**3D operations on approach procedures with vertical guidance (APV), e.g. SBAS, flight path vector.**							
7.c.1	RNP APCH Baro VNAV approach procedures (LNAV/VNAV minima), all engine(s) operating and with one or more engine(s) inoperative.		✓	✓	✓	✓	✓	✓
7.c.2	RNP APCH approach procedures based on SBAS (LPV minima), all engine(s) operating and with one or more engine(s) inoperative.		✓	✓	✓	✓	✓	✓
7.c.3	RNP AR APCH approach procedures with Baro-VNAV (RNP 0.3-0.1 minima), all engine(s) operating and with one or more engine(s) inoperative.		✓	✓	✓	✓	✓	✓
8.	**VISUAL APPROACHES (SEGMENT) AND LANDINGS.**							
8.a	Manoeuvring, normal approach and landing all engines operating, with and without visual and navigational approach aid guidance.	✓		✓	✓	✓	✓	✓
8.b	Approach and landing with one or more engine(s) inoperative.	✓		✓	✓	✓	✓	✓
8.c	Operation of landing gear, flap/slats and speedbrakes (normal and abnormal).	✓		✓	✓	✓	✓	✓
8.d	Approach and landing with crosswind (maximum demonstrated crosswind component).	✓		✓	✓	✓	✓	✓
8.e	Approach and landing with flight control system failures (for reconfiguration modes, manual reversion and associated handling with the most significant degradation which is probable).					✓		✓
8.f	Approach and landing with standby (minimum) electrical/hydraulic power.				✓	✓	✓	✓

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
8.g	Approach and landing from circling conditions (circling approach). Note: For Types III, V, VI and VII, this test requires as a minimum a representative airport scene that can provide a heading difference of 90° or more, and 180° or less, between approach and landing runways. Any associated hazard lights or any other visual aids for use as part of the published circling procedure should be included in the correct position(s) and be of the appropriate colour(s), directionality and behaviour. For Type II and Type IV, a generic airport model to be consistent with published data used for aeroplane operations may be used and should contain both the approach and landing runways and have the capability to light both at the same time. Any associated hazard lights or any other visual aids for use as part of the published circling procedure need to be included in the correct position(s) and be of the appropriate colour(s) and behaviour.		✓	✓	✓	✓	✓	✓
8.h	Approach and landing from a visual traffic pattern.	✓		✓	✓	✓	✓	✓
8.i	Approach and landing from a non-precision approach.		✓	✓	✓	✓	✓	✓
8.j	Approach and landing from a precision approach.		✓	✓	✓	✓	✓	✓
8.k	Approach and landing from published visual approach (including those that use PBN).		✓	✓	✓	✓	✓	✓
8.l	Other.							
	Note: An FSTD with a visual system, which permits completing a special approach procedure in accordance with applicable regulations, may be approved for that particular approach procedure.							
9.	**MISSED APPROACH.**							
9.a	All engines operating, manual and autopilot.	✓	✓	✓	✓	✓	✓	✓
9.b	One or more engine(s) inoperative, manual and autopilot.	✓	✓	✓	✓	✓	✓	✓
9.c	Rejected landing.	✓	✓	✓	✓	✓	✓	✓
9.d	With auto-flight, flight control system failures, reconfiguration modes and manual reversion.					✓		✓
10.	**SURFACE OPERATIONS (LANDING, AFTER-LANDING AND POST-FLIGHT).**							
10.a	**Landing roll and taxi.**							
10.a.1	HUD/EFVS.			✓	✓	✓	✓	✓
10.a.2	Spoiler operation.	✓	✓	✓	✓	✓	✓	✓
10.a.3	Reverse thrust operation.	✓	✓	✓	✓	✓	✓	✓
10.a.4	Directional control and ground handling, both with and without reverse thrust.	✓	✓	✓	✓	✓	✓	✓
10.a.5	Reduction of rudder effectiveness with increased reverse thrust (rear pod-mounted engines).			✓	✓	✓	✓	✓
10.a.6	**Brake and anti-skid operation.**							
10.a.6.a	Brake and anti-skid operation with dry, wet, icy, patchy wet, patchy ice, wet on rubber residue in touchdown zone conditions.					✓		✓

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
10.a.6.b	Brake and anti-skid operation with dry and wet conditions.	✓		✓			✓	
10.a.6.c	Brake and anti-skid operation with dry conditions.		✓		✓			
10.a.6.d	Auto-braking system operation.			✓	✓	✓	✓	✓
10.a.7	Other.							
10.b	**Engine shutdown and parking.**							
10.b.1	Engine and systems operation.	✓	✓	✓	✓	✓	✓	✓
10.b.2	Parking brake operation.	✓	✓	✓	✓	✓	✓	✓
10.b.3	Other.							
11.	**ANY FLIGHT PHASE.**							
11.a	**Aeroplane and engine systems operation (where fitted).**							
11.a.1	Air conditioning and pressurisation (Environmental Control System).			✓	✓	✓	✓	✓
11.a.2	De-icing/anti-icing.			✓	✓	✓	✓	✓
11.a.3	Auxiliary engine/auxiliary power unit (APU).			✓	✓	✓	✓	✓
11.a.4	Communications.	✓	✓	✓	✓	✓	✓	✓
11.a.5	Electrical.	✓	✓	✓	✓	✓	✓	✓
11.a.6	Fire and smoke detection and suppression.			✓	✓	✓	✓	✓
11.a.7	Flight controls (primary and secondary).	✓	✓	✓	✓	✓	✓	✓
11.a.8	Fuel and oil.	✓	✓	✓	✓	✓	✓	✓
11.a.9	Hydraulic.	✓	✓	✓	✓	✓	✓	✓
11.a.10	Pneumatic.	✓	✓	✓	✓	✓	✓	✓
11.a.11	Landing gear.	✓	✓	✓	✓	✓	✓	✓
11.a.12	Oxygen.			✓	✓	✓	✓	✓
11.a.13	Engine.	✓	✓	✓	✓	✓	✓	✓
11.a.14	Airborne radar.			✓	✓	✓	✓	✓
11.a.15	Autopilot and flight director.	✓	✓	✓	✓	✓	✓	✓
11.a.16	Terrain awareness warning systems and collision avoidance systems (e.g. EGPWS, GPWS, TCAS).	✓	✓	✓	✓	✓	✓	✓
11.a.17	Flight control computers including stability and control augmentation.			✓	✓	✓	✓	✓
11.a.18	Flight display systems.	✓	✓	✓	✓	✓	✓	✓
11.a.19	Flight management systems.	✓	✓	✓	✓	✓	✓	✓
11.a.20	Head-up displays (including EFVS, if appropriate).			✓	✓	✓	✓	✓
11.a.21	Navigation systems.	✓	✓	✓	✓	✓	✓	✓
11.a.22	Stall warning/avoidance.			✓	✓	✓	✓	✓
11.a.23	Wind shear avoidance/recovery guidance equipment.					✓		✓
11.a.24	Flight envelope protections.					✓		✓
11.a.25	Electronic flight bag.					✓	✓	✓
11.a.26	Automatic checklists (normal, abnormal and emergency procedures).					✓	✓	✓
11.a.27	Runway alerting and advisory system.					✓	✓	✓
11.a.28	Other.							
11.b	**Airborne procedures.**							
11.b.1	Holding (conventional and RNAV).	✓	✓	✓	✓	✓	✓	✓
11.b.2	Air hazard avoidance (traffic, weather, including visual correlation).			✓	✓	✓	✓	✓
11.b.3	**Wind shear:**							
11.b.3.a	Prior to take-off rotation.	✓		✓		✓	✓	✓
11.b.3.b	At lift-off.	✓		✓		✓	✓	✓

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
11.b.3.c	During initial climb.	✓		✓		✓	✓	✓
11.b.3.d	On final approach, below 150 m (500 ft) AGL.	✓		✓		✓	✓	✓
12.	**VISUAL SYSTEM.** This section is written in the context of the FSTD operator presenting models of real-world airports, serviced by the aeroplane type being simulated, for use in completion of the functions and subjective tests described in this appendix. The models should also be airports that are used regularly in the training programme(s) and, as applicable, may be presented for approval of circling approaches. However, where the requirement for the device visual system fidelity level allows, the FSTD operator may elect to use demonstration models for use during the device initial qualification which need not be fully up to date nor replicate any particular airport (fictitious airport). During recurrent evaluations, the CAA may select any visual scene used in the air operator's training programme(s) for completion of the functions and subjective tests, provided these visual scenes were modelled with the features required.							
12.a	**Functional test content requirements.** The following are the minimum airport model content requirements to satisfy visual capability tests, and provide suitable visual cues to allow completion of all functions and subjective tests described in this appendix. FSTD operators are encouraged to use the model content described below for the functions and subjective tests.							
12.a.1	**Airport scenes.**							
12.a.1.a	A minimum of three real-world airport models to be consistent with published data used for aeroplane operations and capable of demonstrating all the visual system features below. Each model should be in a different visual scene to permit assessment of FSTD automatic visual scene changes. Each model should be selectable from the IOS.					✓	✓	✓
12.a.1.b	A minimum of one real-world airport model to be consistent with published data used for aeroplane operations. This model should be acceptable to the FSTD operator's CAA and selectable from the IOS.	✓		✓				
12.a.1.c	A minimum of one generic airport model to be consistent with published data used for aeroplane operations. This model should be acceptable to the FSTD operator's CAA and selectable from the IOS.		✓		✓			
12.a.2	**Visual scene fidelity.**							
12.a.2.a	The visual scene should correctly represent the parts of the airport and its surroundings used in the training programme.					✓	✓	✓
12.a.2.b	The fidelity of the visual scene should be sufficient for the flight crew to: visually identify the airport; determine the position of the aeroplane being simulated; successfully accomplish take-offs, approaches and landings; and manoeuvre around the airport on the ground as necessary.	✓		✓				

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
12.a.2.c	The fidelity of the visual scene should be sufficient for the flight crew to successfully accomplish take-offs, approaches and landings.		✓		✓			
12.a.3	**Runways and taxiways.**							
12.a.3.a	The airport runways and taxiways.						✓	✓
12.a.3.b	Representative runways and taxiways.	✓		✓		✓		
12.a.3.c	Generic runways and taxiways.		✓		✓			
12.a.4	If appropriate to the airport, two parallel runways and one crossing runway displayed simultaneously; at least two runways should be capable of being lit simultaneously.						✓	✓
12.a.5	Runway threshold elevations and locations should be modelled to provide correlation with aeroplane systems (e.g. HUD, GPS, compass, altimeter).	✓	✓	✓	✓	✓	✓	✓
12.a.6	Slopes in runways, taxiways and ramp areas should not cause distracting or unrealistic effects, including pilot eyepoint height variation.						✓	✓
12.a.7	**Runway surface and markings for each "in-use" runway should include the following, if appropriate:** Note: The feature, if required, should be representative for Types I and III and generic for Types II and IV.							
12.a.7.a	Threshold markings.	✓	✓	✓	✓	✓	✓	✓
12.a.7.b	Runway numbers.	✓	✓	✓	✓	✓	✓	✓
12.a.7.c	Touchdown zone markings.	✓		✓		✓	✓	✓
12.a.7.d	Fixed distance markings.	✓		✓		✓	✓	✓
12.a.7.e	Edge markings.	✓		✓		✓	✓	✓
12.a.7.f	Centre line markings.	✓	✓	✓	✓	✓	✓	✓
12.a.7.g	Distance remaining signs.						✓	✓
12.a.7.h	Signs at intersecting runways and taxiways.						✓	✓
12.a.7.i	Windsock that gives appropriate wind cues.	✓	✓	✓	✓	✓	✓	✓
12.a.8	**Runway lighting of appropriate colours, directionality, behaviour and spacing for each "in-use" runway including the following, if appropriate:** Note: The feature, if required, should be representative for Types I and III and generic for Types II and IV.							
12.a.8.a	Threshold lights.	✓	✓	✓	✓	✓	✓	✓
12.a.8.b	Edge lights.	✓	✓	✓	✓	✓	✓	✓
12.a.8.c	End lights.	✓	✓	✓	✓	✓	✓	✓
12.a.8.d	Centre line lights.	✓	✓	✓	✓	✓	✓	✓
12.a.8.e	Touchdown zone lights.	✓	✓	✓	✓	✓	✓	✓
12.a.8.f	Lead-off lights.					✓	✓	✓
12.a.8.g	Appropriate visual landing aid(s) for that runway.	✓	✓	✓	✓	✓	✓	✓
12.a.8.h	Appropriate approach lighting system for that runway.	✓	✓	✓	✓	✓	✓	✓
12.a.9	**Taxiway surface and markings (associated with each "in-use" runway) should include the following, if appropriate:** Note: The feature, if required, should be representative for Types I and III and generic for Types II and IV.							
12.a.9.a	Edge markings.	✓	✓	✓	✓	✓	✓	✓
12.a.9.b	Centre line markings.	✓	✓	✓	✓	✓	✓	✓
12.a.9.c	Runway holding position markings.	✓	✓	✓	✓	✓	✓	✓

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
12.a.9.d	ILS critical area markings.		✓		✓	✓	✓	✓
12.a.9.e	All taxiway markings, lighting and signage to taxi, as a minimum, from a designated parking position to a designated runway and return, after landing on the designated runway, to a designated parking position; a low-visibility taxi route (e.g. surface movement guidance control system, follow-me truck, daylight taxi lights) should also be demonstrated for operations authorized in low visibility. The designated runway and taxi routing should be consistent with that airport for operations in low visibility.						✓	✓
12.a.10	**Taxiway lighting of appropriate colours, directionality, behaviour and spacing (associated with each "in-use" runway) should include the following, if appropriate:** Note: The feature, if required, should be representative for Types I and III and generic for Types II and IV.							
12.a.10.a	Edge lights.	✓	✓	✓	✓	✓	✓	✓
12.a.10.b	Centre line lights.	✓	✓	✓	✓	✓	✓	✓
12.a.10.c	Runway holding position and ILS critical area lights.	✓	✓	✓	✓	✓	✓	✓
12.a.11	**Required visual model correlation with other aspects of the airport environment simulation.**							
12.a.11.a	The airport model should be properly aligned with the navigational aids that are associated with operations at the runway "in-use".	✓	✓	✓	✓	✓	✓	✓
12.a.11.b	The simulation of runway contaminants should be correlated with the displayed runway surface and lighting.						✓	✓
12.a.12	**Airport buildings, structures and lighting.**							
12.a.12.a	**Buildings, structures and lighting.**							
12.a.12.a.1	The airport buildings, structures and lighting.						✓	✓
12.a.12.a.2	Representative airport buildings, structures and lighting.	✓		✓		✓		
12.a.12.a.3	Generic airport buildings, structures and lighting.		✓		✓			
12.a.12.b	At least one useable gate, set at the appropriate height (required only for aeroplanes that typically operate from terminal gates).						✓	✓
12.a.12.c	Representative moving and static airport clutter (e.g. other aeroplanes, power carts, tugs, fuel trucks, additional gates).				✓	✓	✓	✓
12.a.12.d	Gate/apron markings (e.g. hazard markings, lead-in lines, gate numbering), lighting and gate docking aids or a marshaller.						✓	✓
12.a.13	**Terrain and obstacles.**							
12.a.13.a	Terrain and obstacles within 46 km (25 NM) of the reference airport.						✓	✓
12.a.13.b	Representative depiction of terrain and obstacles within 46 km (25 NM) of the reference airport.	✓		✓		✓		

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
12.a.14	**Significant, identifiable natural and cultural features and moving airborne traffic.**							
12.a.14.a	Significant, identifiable natural and cultural features within 46 km (25 NM) of the reference airport. Note: This refers to natural and cultural features that are typically used for pilot orientation in flight. Outlying airports not intended for landing need only provide a reasonable facsimile of runway orientation.						✓	✓
12.a.14.b	Representative depiction of significant and identifiable natural and cultural features within 46 km (25 NM) of the reference airport. Note: This refers to natural and cultural features that are typically used for pilot orientation in flight. Outlying airports not intended for landing need only provide a reasonable facsimile of runway orientation.	✓		✓		✓		
12.a.14.c	Representative moving airborne traffic (including the capability to present air hazards, e.g. airborne traffic on a possible collision course).		✓		✓	✓	✓	✓
12.b	**Visual scene management.**							
12.b.1	Airport runway, approach and taxiway lighting and cultural feature lighting intensity for any approach should be capable of being set to six different intensities (0 to 5); all visual scene light points should fade into view appropriately.						✓	✓
12.b.2	Airport runway, approach and taxiway lighting and cultural feature lighting intensity for any approach should be set at an intensity representative of that used in training for the visibility set; all visual scene light points should fade into view appropriately.	✓	✓	✓	✓	✓		
12.b.3	The directionality of strobe lights, approach lights, runway edge lights, visual landing aids, runway centre line lights, threshold lights and touchdown zone lights on the runway of intended landing should be realistically replicated.						✓	✓
12.c	**Visual feature recognition.** Note: The following are the minimum distances at which runway features should be visible. Distances are measured from runway threshold to an aeroplane aligned with the runway on an extended 3° glide slope in suitable simulated meteorological conditions. For circling approaches, all tests below apply both to the runway used for the initial approach and to the runway of intended landing.							
12.c.1	Runway definition, strobe lights, approach lights and runway edge white lights from 8 km (5 sm) of the runway threshold.	✓	✓	✓	✓	✓	✓	✓
12.c.2	**Visual approach aids lights.**							
12.c.2.a	Visual approach aids lights from 8 km (5 sm) of the runway threshold.						✓	✓
12.c.2.b	Visual approach aids lights from 4.8 km (3 sm) of the runway threshold.	✓	✓	✓	✓	✓		
12.c.3	Runway centre line lights and taxiway definition from 4.8 km (3 sm).	✓	✓	✓	✓	✓	✓	✓

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
12.c.4	Threshold lights and touchdown zone lights from 3.2 km (2 sm).	✓	✓	✓	✓	✓	✓	✓
12.c.5	Runway markings within range of landing lights for night scenes; as required by the surface resolution test on day scenes.						✓	✓
12.c.6	For circling approaches, the runway of intended landing and associated lighting should fade into view in a non-distracting manner.		✓		✓	✓	✓	✓
12.d	**Selectable airport visual scene capability for:**							
12.d.1	Night.				✓	✓	✓	✓
12.d.2	Twilight.				✓	✓	✓	✓
12.d.3	Day.	✓	✓	✓	✓	✓	✓	✓
12.d.4	Dynamic effects — the capability to present multiple ground and air hazards such as another aeroplane crossing the active runway or converging airborne traffic; hazards should be selectable via controls at the instructor station.		✓		✓	✓	✓	✓
12.d.5	Illusions — operational visual scenes which portray representative physical relationships known to cause landing illusions, for example short runways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path and unique topographic features. Note: Illusions may be demonstrated at a generic airport or at a specific airport.						✓	✓
12.e	**Correlation with aeroplane and associated equipment.**							
12.e.1	Visual cues to relate to actual aeroplane responses.	✓	✓	✓	✓	✓	✓	✓
12.e.2	**Visual cues during take-off, approach and landing.**							
12.e.2.a	Visual cues to assess sink rate and depth perception during landings.	PPL			✓	✓	✓	✓
12.e.2.b	Visual cueing sufficient to support changes in approach path by using runway perspective. Changes in visual cues during take-off, approach and landing should not distract the pilot.	MPL1 CPL	✓	✓			✓	✓
12.e.3	Accurate portrayal of environment relating to aeroplane attitudes.	✓	✓	✓	✓	✓	✓	✓
12.e.4	The visual scene should correlate with integrated aeroplane systems, where fitted (e.g. terrain, traffic and weather avoidance systems and HUD/EFVS).			✓	✓	✓	✓	✓
12.e.5	The effect of rain removal devices should be provided.						✓	✓
12.f	**Scene quality.**							
12.f.1	**Quantization.**							
12.f.1.a	Surfaces and textural cues should be free from apparent quantization (aliasing).					✓	✓	✓
12.f.1.b	Surfaces and textural cues should not create distracting quantization (aliasing).	✓	✓	✓	✓			
12.f.2	System capable of portraying full colour realistic textural cues.	✓	✓	✓	✓	✓	✓	✓
12.f.3	The system light points should be free from distracting jitter, smearing or streaking.	✓	✓	✓	✓	✓	✓	✓
12.f.4	System capable of providing focus effects that simulate rain.							✓

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
12.f.5	System capable of providing light point perspective growth.	✓		✓		✓	✓	✓
12.g	**Environmental effects.**							
12.g.1	The displayed scene should correspond to the appropriate surface contaminants and include runway lighting reflections for wet, partially obscured lights for snow, or suitable alternative effects.						✓	✓
12.g.2	Special weather representations which include the sound, motion and visual effects of light, medium and heavy precipitation near a thunderstorm on take-off, approach and landings at and below an altitude of 600 m (2 000 ft) above the airport surface and within a radius of 16 km (10 sm) from the airport.						✓	✓
12.g.3	One airport with a snow scene, if appropriate to the air operator's area of operations, to include terrain snow and snow-covered taxiways and runways.						✓	✓
12.g.4	In-cloud effects such as variable cloud density, speed cues and ambient changes should be provided.						✓	✓
12.g.5	The effect of multiple cloud layers representing few, scattered, broken and overcast conditions giving partial or complete obstruction of the ground scene.						✓	✓
12.g.6	Gradual break-out to ambient visibility/RVR, defined as up to 10% of the respective cloud base or top, 6 m (20 ft) ≤ transition layer ≤ 61 m (200 ft); cloud effects should be checked at and below a height of 600 m (2 000 ft) above the airport and within a radius of 16 km (10 sm) from the airport. Transition effects should be complete when the IOS cloud base or top is reached when exiting and start when entering the cloud, i.e. transition effects should occur within the IOS defined cloud layer.						✓	✓
12.g.7	Visibility and RVR measured in terms of distance. Visibility/RVR should be checked at and below a height of 600 m (2 000 ft) above the airport and within a radius of 16 km (10 sm) from the airport. Note: RVR only required for Types V, VI and VII.	✓	✓	✓	✓	✓	✓	✓
12.g.8	Patchy fog (sometimes referred to as patchy RVR) giving the effect of variable RVR. The lowest RVR should be that selected on the IOS, i.e. variability is only > IOS RVR.						✓	✓
12.g.9	Effects of fog on airport lighting such as halos and defocus.						✓	✓
12.g.10	Effect of ownship lighting in reduced visibility, such as reflected glare, to include landing lights, strobes and beacons.						✓	✓
12.g.11	Wind cues to provide the effect of blowing snow or sand across a dry runway or taxiway should be selectable from the instructor station.						✓	✓

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
13.	**MOTION AND VIBRATION EFFECTS.** The following specific motion and vibration effects are required to indicate the threshold at which a flight crew member should recognize an event or situation. Where applicable below, the FSTD pitch, side loading and directional control characteristics, as well as the vibration characteristics, should be representative of the aeroplane. There is a need for motion objective tests to be validated against data.							
13.a	Taxiing effects such as lateral, longitudinal and directional cues resulting from steering and braking inputs.						✓	✓
13.b	Effects of runway rumble, oleo deflections, ground speed, uneven runway, runway centre line lights, runway contamination with associated anti-skid and taxiway characteristics.						✓	✓
13.c	Buffets on the ground due to spoiler/speedbrake extension and thrust reversal.						✓	✓
13.d	Bumps associated with the landing gear.						✓	✓
13.e	Buffet during extension and retraction of landing gear.						✓	✓
13.f	Buffet in the air due to flap and spoiler/speedbrake extension.						✓	✓
13.g	Buffet due to atmospheric disturbances.						✓	✓
13.h	Approach to stall buffet.						✓	✓
13.i	Touchdown cues for main and nose gear.						✓	✓
13.j	Nosewheel scuffing.						✓	✓
13.k	Thrust effect with brakes set.						✓	✓
13.l	Mach and manoeuvre buffet.						✓	✓
13.m	Tire failure dynamics.						✓	✓
13.n	Engine failures, malfunction, engine and airframe structural damage.						✓	✓
13.o	Tail, engine pod/propeller, wing strikes.						✓	✓
13.p	Other.							
14.	**SOUND SYSTEM.**							
14.a	Precipitation.					✓	✓	✓
14.b	Rain removal equipment.						✓	✓
14.c	Significant aeroplane noises perceptible to the pilot during normal operations, such as noises from engine, propeller, flaps, gear, anti-skid, spoiler extension/retraction and thrust reverser, to a comparable level of that found in the aeroplane.	✓	✓	✓	✓	✓	✓	✓
14.d	Abnormal operations for which there are associated sound cues including, but not limited to, engine malfunctions, landing gear/tire malfunctions, tail and engine pod/propeller strike and pressurization malfunctions.	✓	✓	✓	✓	✓	✓	✓
14.e	Sound of a crash when the FSTD is landed in excess of limitations.	✓	✓	✓	✓	✓	✓	✓
15.	**SPECIAL EFFECTS.**							
15.a	Braking dynamics (normal and anti-skid, failure dynamics for brakes and anti-skid, reduced efficiency due to high temperature, etc.).						✓	✓
15.b	Effects of airframe and engine icing.		✓		✓	✓	✓	✓

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
16.	**SIMULATED AIR TRAFFIC CONTROL (ATC) ENVIRONMENT.** Note 1: Automated simulation of standard ATC communications to the ownship is not mandated by this document, but is nevertheless strongly recommended. If the FSTD operator has elected to use the instructor to provide all ATC communications to the ownship, the evaluator will need to review the following functions list taking this into consideration. Note 2: Features that are unrealistic or could potentially disrupt training (for example, issues with the visual representation of other traffic, ATC communication errors and incorrect clearances) should be corrected or removed.							
16.a	**Automated weather reporting.**							
16.a.1	Instructor control.	✓	✓		✓	✓	✓	✓
16.a.2	Automated weather reporting.							
16.a.2.a	Multiple stations.						✓	✓
16.a.2.b	Single station.	✓	✓		✓	✓		
16.a.3	**Message format and regional characteristics.**							
16.a.3.a	Regional.						✓	✓
16.a.3.b	ICAO message format.	✓	✓		✓	✓	✓	✓
16.a.4	Provided by data link.						✓	✓
16.b	**Other traffic.**							
16.b.1	**Aircraft behaviour.**							
16.b.1.a	Airport specific.						✓	✓
16.b.1.b	**Aircraft behaviour.**							
16.b.1.b.1	Appropriate routing.	✓	✓		✓	✓	✓	✓
16.b.1.b.2	Representative performance.	✓	✓		✓	✓	✓	✓
16.b.2	Airport clutter.						✓	✓
16.b.3	**Traffic flow and separation.**							
16.b.3.a	Scalable, if required.						✓	✓
16.b.3.b	Sufficient intensity, representative separation.	✓	✓		✓	✓	✓	✓
16.b.4	Traffic type (airport specific).						✓	✓
16.b.5	Traffic call sign and livery.	✓	✓		✓	✓	✓	✓
16.b.6	Runway incursion.						✓	✓
16.c	**Background radio traffic.**							
16.c.1	**Background radio traffic.**							
16.c.1.a	No obviously erroneous information.	✓	✓		✓	✓	✓	✓
16.c.1.b	Frequency specific messages.	✓	✓		✓	✓	✓	✓
16.c.1.c	No overstepping (normally).	✓	✓		✓	✓	✓	✓
16.c.1.d	Reasonable frequency access.	✓	✓		✓	✓	✓	✓
16.c.2	**Other traffic radio communications.**							
16.c.2.a	Intrusive, if required.						✓	✓
16.c.2.b	Non-intrusive.	✓	✓		✓	✓	✓	✓
16.c.3	**ATC radio communications**.							
16.c.3.a	Location-specific procedures and nomenclature.						✓	✓
16.c.3.b	**ATC radio communications.**							
16.c.3.b.1	Consistent with other traffic movements.	✓	✓		✓	✓	✓	✓
16.c.3.b.2	Continuous across sector boundaries.	✓	✓		✓	✓	✓	✓
16.c.3.b.3	ICAO standard phraseology (as per Doc 4444, PANS-ATM).	✓	✓		✓	✓	✓	✓
16.c.4	**Overstepping on frequency.**							
16.c.4.a	Basic ATC notification.	✓	✓		✓	✓	✓	✓
16.c.4.b	Indication at the IOS.	✓	✓		✓	✓	✓	✓

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
16.d	**Airport and airspace modelling.**							
16.d.1	**Simulated ATC environment modelled areas.**							
16.d.1.a	Minimum of one specific and two generic (or higher fidelity) airport models.						✓	✓
16.d.1.b	Minimum of two generic (or higher fidelity) airport models.	✓	✓		✓	✓	✓	✓
16.d.2	**Runways.**							
16.d.2.a	Multiple.						✓	✓
16.d.2.b	Single.	✓	✓		✓	✓	✓	✓
16.d.3	Data synchronization.	✓	✓		✓	✓	✓	✓
16.e	**Weather.**							
16.e.1	Reference runway.	✓	✓		✓	✓	✓	✓
16.e.2	Other traffic separation.						✓	✓
16.e.3	Low visibility operations.						✓	✓
16.f	**ATC — ownship communications.**							
16.f.1	Time synchronization.	✓	✓		✓	✓	✓	✓
16.f.2	ATC radio communications.	✓	✓		✓	✓	✓	✓
16.f.3	**Message triggering.**							
16.f.3.a	Automatic.						✓	✓
16.f.3.b	Manual.	✓	✓		✓	✓		
16.f.4	“Standby” and “say again”.	✓	✓		✓	✓	✓	✓
16.f.5	Readback and acknowledgements.	✓	✓		✓	✓	✓	✓
16.f.6	Clearance deviations.						✓	✓
16.g	**Language and phraseology.**							
16.g.1	English.	✓	✓		✓	✓	✓	✓
16.g.2	Standard phraseology.	✓	✓		✓	✓	✓	✓
16.h	**Ownship radio operation.**							
16.h.1	Multi-frequency radio operation.	✓	✓		✓	✓	✓	✓
16.i	**System correlation.**							
16.i.1	Visual system.	✓	✓		✓	✓	✓	✓
16.i.2	TCAS.						✓	✓
16.i.3	Cockpit traffic displays, if installed.	✓	✓		✓	✓	✓	✓
16.i.4	IOS.	✓	✓		✓	✓	✓	✓
16.j	**Data link communications.**							
16.j.1	ATS clearances.						✓	✓
16.j.2	ATS weather.						✓	✓
16.j.3	DLIC.						✓	✓
16.j.4	Connection management.						✓	✓
16.j.5	CPDLC.						✓	✓
16.j.6	ADS-C.						✓	✓
16.j.7	AOC/DSP.						✓	✓
16.j.8	Service failures.						✓	✓
16.k	**ATC voice characteristics.**							
16.k.1	**Voice assignment.**							
16.k.1.a	Multiple ATC voices.						✓	✓
16.k.1.b	Single ATC voice.	✓	✓		✓	✓		
16.k.2	Gender and accents.						✓	✓
16.l	**Instructor controls.**							
16.l.1	Access to radio communications.	✓	✓		✓	✓	✓	✓
16.l.2	Simulator functions.	✓	✓		✓	✓	✓	✓
16.l.3	Disable.	✓	✓		✓	✓	✓	✓

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
16.l.4	Mute (background radio traffic).	✓	✓		✓	✓	✓	✓
16.m	**Other.**							
17.	**INSTRUCTOR OPERATING STATION.**							
17.a	**Repositions** Note: Repositions should be in-trim at the appropriate speed and configuration for the point.							
17.a.1	Ramp/gate.	✓	✓	✓	✓	✓	✓	✓
17.a.2	Take-off position.	✓	✓	✓	✓	✓	✓	✓
17.a.3	Approach position (at least three positions at 1.8, 5.5 and 9.3 km (1.3 and 5 NM) from the runway threshold.	✓	✓	✓	✓	✓	✓	✓
17.a.4	Other.							
17.b	**Resets.**							
17.b.1	System.	✓	✓	✓	✓	✓	✓	✓
17.b.2	Temperature.	✓	✓	✓	✓	✓	✓	✓
17.b.3	Fluids and agents.	✓	✓	✓	✓	✓	✓	✓
17.c	**Environment.**							
17.c.1	**Weather presets.**							
17.c.1.a	Unlimited, CAVOK, VFR, non-precision, APV, precision (CAT I, CAT II, CAT III), EFVS (if appropriate).					✓	✓	✓
17.c.1.b	Unlimited, CAVOK, VFR.	✓	✓	✓	✓		✓	✓
17.c.2	**Visual effects.**							
17.c.2.a	Time of day (day, dusk, night); clouds (bases, tops, layers, types, density); visibility in kilometres/statute miles; RVR in metres/feet; and special effects (precipitation, thunderstorms, blowing snow, sand, etc.).						✓	✓
17.c.2.b	Time of day (day, dusk, night); clouds (bases, tops, layers, types, density); visibility in kilometres/statute miles; RVR in metres/feet; and special effects (precipitation, thunderstorms, etc.).					✓		
17.c.2.c	Time of day (day, dusk, night); clouds (bases, tops); visibility in kilometres/statute miles.	✓	✓	✓	✓			
17.c.3	**Wind.**							
17.c.3.a	Surface.	✓	✓	✓	✓	✓	✓	✓
17.c.3.b	Intermediate levels.					✓	✓	✓
17.c.3.c	Typical gradient.					✓	✓	✓
17.c.3.d	Gust with associated heading and speed variance.					✓	✓	✓
17.c.3.e	Turbulence.	✓	✓	✓	✓	✓	✓	✓
17.c.4	Temperature — surface.	✓	✓	✓	✓	✓	✓	✓
17.c.5	Atmospheric pressure (QNH, QFE).	✓	✓	✓	✓	✓	✓	✓
17.d	**Airport.**							
17.d.1	**Runway selection.**							
17.d.1.a	To include active runway selection, and as appropriate to the airport, should be able to light at least one additional parallel or crossing runway.					✓	✓	✓
17.d.1.b	To include active runway selection.	✓	✓	✓	✓			
17.d.2	**Airport lighting.**							
17.d.2.a	Airport lighting including variable intensity and control of progressive low visibility taxiway and stop bar lighting, as appropriate.					✓	✓	✓
17.d.2.b	Airport lighting.	✓	✓	✓	✓			

Number	Functions and Subjective Tests	Type						
		I	II	III	IV	V	VI	VII
17.d.3	Dynamic effects including ground and flight traffic.		✓		✓	✓	✓	✓
17.e	Aeroplane configuration (fuel, weight, cg, etc.).	✓	✓	✓	✓	✓	✓	✓
17.f	FMS — reloading of programmed data unless precluded by installed equipment.	✓	✓	✓	✓	✓	✓	✓
17.g	Plotting and recording (take-off and approach).		✓		✓	✓	✓	✓
17.h	Malfunctions (inserting and removing).	✓	✓	✓	✓	✓	✓	✓

APPENDIX "D"

	CIVIL AVIATION AUTHORITY **SIMULATOR QUALIFICATION APPROVAL APPLICATION FORM**	**PCAAF-078-FSXX-1.0**
	Flight Standards Directorate	

Note: Please read the instructions on last page carefully before filling and filing this Application Form. The quality and accuracy of information provided by you on these pages has a direct impact on the assessment and completion time of Simulator Qualification Approval process.

1. Company/Operator Name:

2. Name of the owner (s):

3. Address(es) with Tele., Fax No. and E-mail:

4. Complete Details/Definition of the Simulator:

5. Aircraft Type & Variant with Engine versions:

6. Master Qualification Test Guide Details :

7. Qualification Test Guide Details:

8. Type of flight simulator approval Required(Tick as applicable):

- **a) Initial Evaluation**
- **b) Recurrent Evaluation**
- **c) Modification of Flight Simulator**
- **d) Post Temporary De-activation**
- **e) Post Movement to New Location**

9. Testing Completion certificate with applicable details:

Flight simulator testing has been completed and it is declare that it meets the applicable requirements of ICAO Doc 9625 edition 2 and ANO-023-FSXX, except as noted below:

List of Test Discrepancies:

a) ..
b) ..
c) ..

Name and designation: Signature: Date:

10. Conformance to Aircraft Cockpit Configuration:

It is attested that this Flight Simulator conforms to the aircraft cockpit configuration of --------------(type of aircraft) and that the simulated systems and sub-systems function equivalently to those in that aircraft with the exception:

a) ----
b) ….
c) ….

Name and designation: Signature: Date:

11. Previous Assessment Record

a) Date of Assessment:
b) Name and designation of the Assessor:
c) Organization:

12. Additional Comments (if any)

Name and Designation: Signature: Date:

13. Application received at Flight Standards Directorate by:

Name and designation: Signature: Date:

INSTRUCTIONS RELATED TO THE APPLICATION

1. It is important for you to know that PCAA may refuse to consider an application or to consider it further from beyond a point while there are requirements that the applicant has not or cannot comply with. Rule 340 of CARs 94 is referred to which states:

   "(1) The Director-General may refuse to grant or to renew certificate on one or more of the following grounds:
   (a) The applicant has failed to satisfy a requirement prescribed by or specified under these rules in relation to the granting of the certificate;
   (b) The applicant has made a false or misleading statement in his application, or in connection with his application;
   (c) The applicant is the holder of a licence that is suspended;
   (d) The applicant was the holder of a licence that has been cancelled; or
   (e) The applicant is not a fit and proper person to have the responsibilities and to exercise the functions and duties of a holder of the certificate for which the application was made."

2. FSD, PCAA strongly recommends that ICAO Document 9625 and ANO-023-FSXX may be followed in true spirit. These documents provide comprehensive information on requirements and processes for flight simulator approval. Following the required procedures while complying with the requirements given therein shall expedite the whole process.

3. Application shall not be considered "complete" if all the information as specified is not provided at the time of its submission to FSD, PCAA.

4. Application submission date shall be the day when completed application is submitted. Count down shall start from that date for further processes.

5. Application Form shall be signed either by the Head of Organization or the person authorised by PCAA.

6. No column of this Application Form shall be left blank.

7. Reverse side of Form pages may be used for the data spillover.

8. Extra sheets may be used where required.

9. Where a copy of any document has to be attached, it shall be an attested true copy of the original.

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PART-II

CRITERIA FOR THE QUALIFICATION / APPROVAL OF FLIGHT SIMULATION TRAINING DEVICE HELICOPTER (FSTD-H)

A. AUTHORITY:

A1. The Part-II of ANO-023-FSXX-4.0 is intended to provide guidance and means for PCAA to qualify a flight simulator, subsequent to a request by an applicant, through initial and recurrent evaluations of the flight simulator. Further, the document is intended to provide the means for the authorities of other States to accept the qualifications granted by PCAA which conducted the initial and recurrent evaluation of a flight simulator, without repetitive evaluations, when considering approval of the use of that flight simulator by applicants from their own State.

B. PURPOSE

B1. The document provides an acceptable means but not the only means, for the approval of helicopter simulators to be installed / used in **Pakistan by Civil Aviation Authority (PCAA)**. Criteria specified in this Part-II are those used by PCAA to determine whether a simulator is qualified for such training and checking and, if so, the qualification level. These guidelines are derived from extensive PCAA and industry experience in determining compliance with the pertinent PCAA rules.

B2. Mandatory terms used herein such as “shall” or “must” are used to ensure compliance with the criteria set forth when the acceptable method of compliance described herein is used. Applicable regulations must also be referenced to ensure compliance with the provisions therein. This document does not change regulatory requirements or create additional ones, and does not authorize changes in, or deviations from, regulatory requirements. The Part-II applies only to the evaluation of helicopter simulators by Flight Standard Directorate (FSD).

B3. More recently, however, rapid technological advances have permitted and encouraged the expanded use of flight simulators in the training and checking of flight crewmembers. In addition, the complexity, operating costs, and operating environment of modem Helicopter have lead to the increasing use of advanced simulator technology. Extensive experience has proven that modern simulators can provide more in-depth training than can be accomplished in the Helicopter as well as provide a very high transfer of learning and behavior from the simulator to the Helicopter. Their use, in lieu of Helicopter, results in safer flight training and cost reductions for the operators, while achieving fuel conservation and a significant reduction in environmental impact.

B4. The same factors that have led to the widespread use and acceptance of airplane simulators, such as technological advancements, aircraft complexity, operating cost, operating environment, enhanced training, safety, environmental impact, etc., have recently spurred a dramatic increase in interest in helicopter simulators. It is anticipated that the use of helicopter simulators will expand rapidly and that applicable regulations will be amended to extend formal credit to the use of helicopter simulators in approved training programs.

B5. Evaluation and qualification of simulators and flight training devices are the responsibility of the **Flight Standard Directorate (FSD)**. The FSD is also responsible for the development of standards guidance and policy concerning these devices.

C. SCOPE:

C1. This ANO establishes the performance and documentation requirements for the evaluation of Helicopter flight simulators used for training and checking of flight crew members. This ANO also addresses the use of flight simulators representing Helicopters. It does not consider the use of flight simulators in association with other types of aircraft, nor does this ANO consider the use of synthetic flight training devices other than flight simulators equipped with, at minimum, a visual system and the equivalent of a six degree-of-freedom motion system.

C2. It applies to all simulators / training devices used by Pakistani operators wherever located. Specific approval / validation by PCAA is required for each Pakistani operator for each simulator before it can be used by the operator for any training or checking.

D. DESCRIPTION:

D1. QUALIFICATION BASIS

D1.1 Any FSTD-H submitted for initial evaluation shall be evaluated against applicable FSTD-H criteria for the qualification levels applied for. Recurrent evaluations of an FSTD-H shall be based on the same version of FSTD-H that was applicable for its initial evaluation. An upgrade shall be based on the currently applicable version of FSTD-H.

D1.2 An FSTD-H shall be assessed in those areas that are essential to completing the flight crew member training, testing and checking process as applicable.

D1.3 The FSTD shall be subjected to:

D1.3.1 Validation tests; and

D1.3.2 Functions & subjective tests.

D1.4 The QTG, including all data, supporting material and information should be submitted in a format to allow efficient review and evaluation before the FSTD-H can gain a qualification level. Where applicable, the QTG should be based on the Helicopter validation data as defined by the operational suitability data (OSD) established.

D2. FULL FLIGHT SIMULATORS HELICOPTER (FFS-H)

D2.1 A FFS is a high fidelity full size replica of a specific type or make, model and series Helicopter flight deck which can represent the Helicopter in ground and flight operations. A FFS has a visual system providing an out of the flight deck view, and a force cueing motion system (at least 3 axis).

D2.2 **Definition**: A replica of a specific type, make, model, or series aircraft. It includes the equipment and computer programs necessary to represent Helicopter operations in ground and flight conditions, a visual system providing an out-of-the-flight deck view, a system that provides cues at least equivalent to those of a three-degree-of-freedom motion system, and has the full range of capabilities of the systems installed in the device.

D2.3 FFS's is further categorized into four levels:

D2.3.1 **Level A** - 3 axis motion / night visuals.

D2.3.2 **<u>Level B</u>** - 3 axis motion / night visuals / ground handling simulation (lowest level of helicopter simulator).

D2.3.3 **<u>Level C</u>** - 6 axis motion / night & dusk visuals / dynamic control loading / higher fidelity.

D2.3.4 **<u>Level D</u>** - 6 axis motion / night, dusk & day visuals / dynamic control loading / highest fidelity.

D3. TERMINOLOGY:

Because of the technical complexity of FSTD qualification, it is essential that standard terminology is used throughout. The following principal terms and abbreviations should be used:-

D3.1 **<u>Full Flight Simulator (FFS)</u>'** Means a full size replica of a specific type or make, model and series aircraft flight deck/cockpit, including the assemblage of all equipment and computer programs necessary to represent the aircraft in ground and flight operations, a visual system providing an out of the flight deck/cockpit view, and a force cueing motion system. It is in compliance with the minimum standards for FFS qualification.

D3.2 **<u>'Flight Training Device (FTD)'</u>** Means a full size replica of a specific aircraft type's instruments, equipment, panels and controls in an open flight deck/cockpit area or an enclosed aircraft flight deck/cockpit, including the assemblage of equipment and computer software programs necessary to represent the aircraft in ground and flight conditions to the extent of the systems installed in the device. It does not require a force cueing motion or visual system. It is in compliance with the minimum standards for a specific FTD level of qualification.

D3.3 **<u>'Flight and Navigation Procedures Trainer (FNPT)'</u>** Means a training device which represents the flight deck/cockpit environment including the assemblage of equipment and computer programs necessary to represent an aircraft or class/type of aircraft in flight operations to the extent that the systems appear to function as in an aircraft. It is in compliance with the minimum standards for a specific FNPT level of qualification.

D3.4 **<u>'Other Training Device (OTD)'</u>** Means a training aid other than an FSTD which provides for training where a complete flight deck / cockpit environment is not necessary.

D3.5 **<u>'Flight Simulation Training Device Qualification (FSTD Qualification)'</u>** Means the level of technical ability of FSTD as defined in the compliance document.

D3.6 **<u>'Qualification Test Guide (QTG)'</u>** Means a document designed to demonstrate that the performance and handling qualities of an FSTD are within prescribed limits with those of the aircraft, class of aero plane or type of helicopter and that all applicable requirements have been met. The QTG includes both the data of the aircraft, or type of helicopter and FSTD-H data used to support the validation.

D3.7 In addition to the principal terms defined in the requirement itself, additional terms used in the context of FSTD-H have the following meanings:

D3.7.1 **'Acceptable Change'** means a change to configuration, software etc., which qualifies as a potential candidate for alternative approach to validation.

D3.7.2 **'Aircraft Performance Data'** means performance data published by the aircraft manufacturer in documents such as the aircraft flight manual (AFM), operations manual, performance engineering manual, or equivalent.

D3.7.3 **'Audited Engineering Simulation'** means an aircraft manufacturer's engineering simulation which has undergone a review by the appropriate competent authorities and been found to be an acceptable source of supplemental validation data.

D3.7.4 **'Automatic Testing'** means FSTD testing wherein all stimuli are under computer control.

D3.7.5 **'Baseline'** means a fully flight test validated production aircraft simulation. May represent a new aircraft type or a major derivative.

D3.7.6 **'Breakout'** means the force required at the pilot's primary controls to achieve initial movement of the control position.

D3.7.7 **'Closed Loop Testing'** means a test method for which the input stimuli are generated by controllers which drive the FSTD to follow a pre-defined target response.

D3.7.8 **'Computer Controlled Aircraft'** means an aircraft where the pilot inputs to the control surfaces are transferred and augmented via computers.

D3.7.9 **'Control Sweep'** means a movement of the appropriate pilot's control from neutral to an extreme limit in one direction (forward, aft, right, or left), a continuous movement back through neutral to the opposite extreme position, and then a return to the neutral position.

D3.7.10 **'Convertible FSTD'** means an FSTD in which hardware and software can be changed so that the FSTD becomes a replica of a different model or variant, usually of the same type aircraft. The same FSTD platform, cockpit shell, motion system, visual system, computers, and necessary peripheral equipment can thus be used in more than one simulation.

D3.7.11 **'Critical Engine Parameter'** means the engine parameter which is the most appropriate measure of the engine power delivered.

D3.7.12 **'Damping (critical)'** means that minimum damping of a second order system such that no overshoot occurs in reaching a steady state value after being displaced from a position of equilibrium and released. This corresponds to a relative damping ratio of 1:0.

D3.7.13 **'Damping (over-damped)'**: an 'over-damped' response is that damping of a second order system such that it has more damping than is required for critical damping, as described above. This corresponds to a relative damping ratio of more than 1:0.

D3.7.14 **'Damping (under-damped)'**: an 'under-damped' response is that damping of a second order system such that a displacement from the equilibrium position and free release results in one or more overshoots or oscillations before reaching a steady state value. This corresponds to a relative damping ratio of less than 1:0.

D3.7.15 **'Daylight Visual'** means a visual system capable of meeting, as a minimum, system brightness, contrast ratio requirements and performance criteria appropriate for the level of qualification sought. The system, when used in training, should provide full colour presentations and sufficient surfaces with appropriate textural cues to successfully conduct a visual approach, landing and airport movement (taxi).

D3.7.16 **'Deadband'** means the amount of movement of the input for a system for which there is no reaction in the output or state of the system observed.

D3.7.17 **'Driven'** means a state where the input stimulus or variable is 'driven' or deposited by automatic means, generally a computer input. The input stimulus or variable may not necessarily be an exact match to the flight test comparison data – but simply driven to certain predetermined values.

D3.7.18 **'Engineering Simulation'** means an integrated set of mathematical models representing a specific aircraft configuration, which is typically used by the aircraft manufacturer for a wide range of engineering analysis tasks including engineering design, development and certification. It is also used to generate data for checkout, proof-of-match/validation and other training FSTD data documents.

D3.7.19 **'Engineering Simulator'** means the aircraft manufacturer's simulator which typically includes a full-scale representation of the simulated aircraft flight deck/cockpit, operates in real time and can be flown by a pilot to subjectively evaluate the simulation. It contains the engineering simulation models, which are also released by the aircraft manufacturer to the industry for FSTDs. The engineering simulator may or may not include actual on-board system hardware in lieu of software models.

D3.7.20 **'Engineering Simulator Data'** means data generated by an engineering simulation or engineering simulator, depending on the aircraft manufacturer's processes.

D3.7.21 **'Engineering Simulator Validation Data'** means validation data generated by an engineering simulation or engineering simulator.

D3.7.22 **'Essential Match'** means a comparison of two sets of computer-generated results for which the differences should be negligible because essentially the same simulation models have been used (also known as a virtual match).

D3.7.23 **'Flight Test Data'** means actual aircraft data obtained by the aircraft manufacturer (or other supplier of acceptable data) during an aircraft flight test program.

D3.7.24 **'Free Response'** means the response of the aircraft after completion of a control input or disturbance.

D3.7.25 **'Frozen/ Locked'** means a state where a variable is held constant with time.

D3.7.26 **'FSTD Data'** means the various types of data used by the FSTD manufacturer and the applicant to design, manufacture, test and maintain the FSTD.

D3.7.27 **'FSTD Evaluation'** means a detailed appraisal of an FSTD by the competent authority to ascertain whether or not the standard required for a specified qualification level is met.

D3.7.28 **'FSTD Operator'** means that organization directly responsible to the competent authority for requesting and maintaining the qualification of a particular FSTD.

D3.7.29 **'Full Sweep'** means the movement of the controller from neutral to a stop, usually the aft or right stop, to the opposite stop and then to the neutral position.

D3.7.30 **'Functional Performance'** means an operation or performance that can be verified by objective data or other suitable reference material that may not necessarily be flight test data.

D3.7.31 **'Functions Test'** means a quantitative and/or qualitative assessment of the operation and performance of an FSTD by a suitably qualified evaluator. The test can include verification of correct operation of controls, instruments, and systems of the simulated aircraft under normal and non-normal conditions. Functional performance is that operation or performance that can be verified by objective data or other suitable reference material which may not necessarily be flight test data.

D3.7.32 **'Ground Effect'** means the change in aerodynamic characteristics due to modification of the air flow past the aircraft caused by the presence of the ground.

D3.7.33 **'Hands-off Maneuver'**; means a test maneuvers conducted or completed without pilot control inputs.

D3.7.34 **'Hands-on Maneuvers'** means a test maneuver conducted or completed with pilot control inputs as required.

D3.7.35 **'Heavy'** means with operational mass at or near maximum for the specified flight condition.

D3.7.36 **'Highlight Brightness'** means the maximum displayed brightness, which satisfies the appropriate brightness test.

D3.7.37 **'Icing Accountability'** means a demonstration of minimum required performance whilst operating in maximum and intermittent maximum icing conditions of the applicable airworthiness requirement. Refers to changes from normal (as applicable to the individual aircraft design) in take-off, climb (en-route, approach, landing) or landing operating procedures or performance data, in accordance with the AFM, for flight in icing conditions or with ice accumulation on unprotected surfaces.

D3.7.38 **'Integrated Testing'** means testing of the FSTD such that all aircraft system models are active and contribute appropriately to the results. None of the aircraft system models should be substituted with models or other algorithms intended for testing only. This may be accomplished by using controller displacements as the input. These controllers should represent the displacement of the pilot's controls and these controls should have been calibrated.

D3.7.39 **'Irreversible Control System'** means a control system in which movement of the control surface will not back drive the pilot's control in the cockpit.

D3.7.40 **'Latency'** means the additional time beyond that of the basic perceivable response time of the aircraft due to the response time of the FSTD.

D3.7.41 **'Light' Means** with operational mass at or near minimum for the specified flight condition.

D3.7.42 **'Line Oriented Flight Training (LOFT)'** refers to flight crew training which involves full mission simulation of situations which are representative of line operations, with special emphasis on situations which involve communications, management and leadership. It means 'real-time', full-mission training.

D3.7.43 **'Manual Testing'** means FSTD testing where the pilot conducts the test without computer inputs except for initial setup. All modules of the simulation should be active.

D3.7.44 **'Master Qualification Test Guide (MQTG)'** means the competent authority-approved QTG which incorporates the results of tests witnessed by the competent authority. The MQTG serves as the reference for future evaluations.

D3.7.45 **'Night Visual'** means a visual system capable of meeting, as a minimum, the system brightness and contrast ratio requirements and performance criteria appropriate for the level of qualification sought. The system, when used in training, should provide, as a minimum, all features applicable to the twilight scene, as defined below, with the exception of the need to portray reduced ambient intensity that removes ground cues that are not self-illuminating or illuminated by own ship lights (e.g. landing lights).

D3.7.46 **'Nominal'** means the normal operational weight, configuration, speed etc. for the flight segment specified.

D3.7.47 **'Non-normal Control'** is a term used in reference to computer controlled aircraft. Non-normal control is the state where one or more of the intended control, augmentation or protection functions are not fully available.

Note: Specific terms such as ALTERNATE, DIRECT, SECONDARY, BACKUP, etc., may be used to define an actual level of degradation).

D3.7.48 **'Normal Control'** is a term used in reference to computer controlled aircraft. Normal control is the state where the intended control, augmentation and protection functions are fully available.

D3.7.49 **'Objective Test (Objective Testing)'** means a quantitative assessment based on comparison with data.

D3.7.50 **'One Step'** refers to the degree of changes to an aircraft that would be allowed as an acceptable change, relative to a fully flight test validated simulation. The intention of the alternative approach is that changes would be limited to one, rather than a series, of steps away from the baseline configuration. It is understood, however, that those changes which support the primary change (e.g. weight, thrust rating and control system gain changes accompanying a body length change) are considered part of the 'one step'.

D3.7.51 **'Predicted Data'** means data derived from sources other than type-specific aircraft flight tests.

D3.7.52 **'Primary Reference Document'** means any regulatory document which has been used by a competent authority to support the initial evaluation of an FSTD.

D3.7.53 **'Proof-of-match (POM)'** means a DOCUMENT that shows agreement within defined tolerances between model responses and flight test cases at identical test and atmospheric conditions.

D3.7.54 **'Protection Functions'** means systems functions designed to protect an aircraft from exceeding its flight and maneuver limitations.

D3.7.55 **'Pulse Input'** means an abrupt input to a control followed by an immediate return to the initial position.

D3.7.56 **'Reversible Control System'** means a partially powered or unpowered control system in which movement of the control surface will back drive the pilot's control on the cockpit and/or affect its feel characteristics.

D3.7.57 **'Robotic Test'** means a basic performance check of a system's hardware and software components. Exact test conditions are defined to allow for repeatability. The components are tested in their normal operational configuration and may be tested independently of other system components.

D3.7.58 **'Snapshot'** means a presentation of one or more variables at a given instant of time.

D3.7.59 **'Statement of Compliance (SOC)'** means a declaration that specific requirements have been met.

D3.7.60 **'Step Input'** means an abrupt input held at a constant value.

D3.7.61 **'Subjective Test (Subjective Testing)'** means a qualitative assessment based on established standards as interpreted by a suitably qualified person.

D3.7.62 **'Time History'** means a presentation of the change of a variable with respect to time.

D3.7.63 **'Transport Delay'** means the total FSTD system processing time required for an input signal from a pilot primary flight control until the motion system, visual system, or instrument response. It is the overall time delay incurred from signal input until output response. It does not include the characteristic delay of the aircraft simulated.

D3.7.64 **'Twilight (Dusk / Dawn) Visual'** means a visual system capable of meeting, as a minimum, the system brightness and contrast ratio requirements and performance criteria appropriate for the level of qualification sought. The system, when used in training, should provide, as a minimum, full color presentations of reduced ambient intensity (as compared with a daylight visual system), sufficient to conduct a visual approach, landing and airport movement (taxi).

D3.7.65 **'Validation Data'** means data used to prove that the FSTD performance corresponds to that of the aircraft, class of aero plane or type of helicopter

D3.7.66 **'Validation Flight Test Data'** means performance, stability and control, and other necessary test parameters electrically or electronically recorded in an aircraft using a calibrated data acquisition system of sufficient resolution and verified as accurate by the organization performing the test to establish a reference set of relevant parameters to which like FSTD parameters can be compared.

D3.7.67 **'Validation Test'** means a test by which FSTD parameters can be compared with the relevant validation data.

D3.7.68 **'Vibration'** means a permanent effect resulting from airframe interaction with rotor, engine or transmission, as opposed to buffet which is a transient vibration effect resulting from either pilot action or aerodynamic effect on the airframe.

D3.7.69 **'Visual Ground Segment Test'** means a test designed to assess items impacting the accuracy of the visual scene presented to the pilot at a decision height (DH) on an ILS approach.

D3.7.70 **'Visual System Response Time'** means the interval from an abrupt control input to the completion of the visual display scan of the first video field containing the resulting different information.

D3.7.71 **'Well-understood Effect'** means an incremental change to a configuration or system which can be accurately modeled using proven predictive methods based on known characteristics of the change.

D4. GENERAL:

The procedures and criteria for simulator evaluation and qualification are contained in Part-II of this document. There are currently three levels of complexity of helicopter simulators, levels B, C, and D, which are comparable in complexity. A simulator, qualified by the FSD / PCAA in accordance with the guidance and standards herein, will be recommended for approval for use within the operator's training program.

D4.1 If it is used as part of the PCAA-approved training program by the operator in the course of conducting the Pilot-in-Command Proficiency Check required, the issuance of an airline transport pilot License (ATPL) certificate or type rating shall be in accordance with the provisions of PCAA.

D4.2 The simulator is evaluated for a specific operator by **PCAA Simulator Evaluation Team (SET).** Based on a successful evaluation, the FSD will certify that the simulator meets the criteria of a specific level of qualification. Evaluations may be conducted otherwise as deemed appropriate by the competent authority on a case-by-case basis. Operators who contract to use simulators already qualified and approved for the sponsoring operator at a particular level for a helicopter type are not subject to the qualification process. However, they are required to obtain PCAA approval to use the simulator in their approved training programs.

D5. EVALUATION POLICY:

D5.1 The methods, procedures, and standards defined in here provide means, acceptable to the FSD, to evaluate and qualify a simulator. If an applicant chooses to utilize the approach described here, he must adhere to all of the methods, procedures, and standards herein. The simulator is evaluated in those areas that are essential to completing the crew member training and checking process as required by regulation and by the sponsoring operator's approved training program. This may include the following:

D5.1.1 Aerodynamic responses performance in hover, takeoff, climb, cruise, descent, emergencies, approach, and landing;

D5.1.2 Flight control checks; cockpit functions checks; and additional requirements depending upon the complexity or qualification level of the simulator.

D5.1.3 The motion system, instructor station functions, and visual system will also be evaluated to ensure their proper operation.

D5.1.4 Six to eight (6 to 8) hours of flight evaluation may be planned or as necessary to complete all the checks and procedures.

D5.2 The intent is to evaluate the simulator as objectively as possible. Pilot acceptance, however, is also an important consideration. Therefore, the simulator will be subjected to validation, and to the functions and subjective tests. These tests include a qualitative assessment of the simulator by a PCAA Flight Inspector pilot (Helicopter) who maybe qualified in the respective helicopter and/ or as nominated by the competent authority.

D5.3 Validation tests are used to compare simulator and helicopter data objectively to ensure that they agree within specified tolerances. Functions tests are designed to provide a basis for evaluating simulator capability to perform over a typical training period and to verify correct operation of the simulator controls, instruments, and systems.

D5.4 Tolerances, listed for parameters in Appendix 2, should not be confused with design tolerances specified for simulator manufacture. Tolerances for the parameters listed in Appendix 2 are the maximum acceptable to FSD for simulator validation.

D5.5 A convertible simulator will be addressed as a separate simulator for each model and series to which it will be converted and for which PCAA qualification will be sought for each configuration. A PCAA evaluation is required, for example, if an operator seeks qualification for two models of a helicopter type using a convertible simulator, two QTG's or a supplemented QTG and two evaluations are required.

D5.6 If a problem with a validation test result is detected by the PCAA **SET**, the test may be repeated. If it still does not meet the test criteria, the operator may demonstrate alternative test results which relate to the test in question. In the event a validation test(s) does not meet specified criteria, but the criteria are not considered critical to the level of evaluation being conducted, the FSD may conditionally qualify the simulator at that level. The operator will be given a specified period of time to correct the problem and submit the QTG changes to the FSD for evaluation. Alternatively, if it is determined that the results of a validation test would have a detrimental effect on the level of qualification being sought or if the test outcome is a firm regulatory requirement, the FSD may qualify the simulator to a lesser level or restrict maneuvers based upon the evaluation completed. For example, if a Level D evaluation is requested and the simulator fails to meet hover test criteria, it could be qualified at Level B.

D5.7 Evaluation dates will not be established until the QTG has been reviewed by the FSD and determined to be acceptable. Within 10 working days of receiving an acceptable QTG, the FSD will coordinate with the operator and evaluation team to set a mutually acceptable date for the evaluation at **NO COST TO PCAA**. To avoid unnecessary delays, the operator is encouraged to work closely with the FSD during the QTG development process prior to making formal application. At the discretion of the PCAA **SET**, the operator's pilots may assist in completing the functions and validation tests during evaluations. However, only PCAA qualified inspector and/or as designated by the competent Authority should manipulate the pilot controls during the functions check portion of PCAA evaluation.

D6. INITIAL OR UPGRADE EVALUATION AND QUALIFICATION:

The operator seeking simulator initial or upgrade evaluation and qualification pursuant to Part-II of ANO-023-FSXX-3.0 of this document must submit a request in writing to the competent authority. This request must contain a certificate that the simulator meets all of the provisions of Part-II of ANO-023-FSXX-3.0. This shall include a certification that the cockpit configuration of the simulator conforms to that of the helicopter; the specific hardware and software configuration control procedures have been established; and that the simulator is representative of the helicopter in all functional test areas, as confirmed by the operator's designated pilots. The operator shall submit a QTG which includes the following:

D6.1 A title page with the operator and PCAA approval signature blocks.

D6.2 A simulator information page, for each configuration in the case of convertible simulators providing the following:

D6.2.1 Operator's simulator identification number or code.

D6.2.2 Helicopter model and series being simulated.

D6.2.3 Aerodynamic model and data revisions (as applicable).

D6.2.4 Engine model and its data revision.

D6.2.5 Flight control model and data revisions (as applicable).

D6.2.6 Flight Management System identification and revision level.

D6.2.7 Simulator model and manufacturer.

D6.2.8 Date of simulator manufacture.

D6.2.9 Simulator computer identification.

D6.2.10 Visual system model and manufacturer.

D6.2.11 Motion system type and manufacturer.

D6.3 Table of contents.

D6.4 Log of revision and/or list of effective pages.

D6.5 Listing of all reference source data.

D6.6 Glossary of terms and symbols used.

D6.7 SOC's that shall provide references that include sources of information for showing compliance; rationale to explain how the referenced material is used; mathematical equations and parameter values used; and conclusions reached.

D6.8 Recording procedures or a list of equipment required or the validation tests.

D6.9 The following for each validation test designated:

D6.9.1 Name of the test.

D6.9.2 Objective of the test.

D6.9.3 Initial conditions.

D6.9.4 Manual test procedures.

D6.9.5 Automatic test procedures (if applicable).

D6.9.6 Method for evaluating simulator validation test result.

D6.9.7 Tolerances for relevant parameters.

D6.9.8 Simulator Validation Test Results, as obtained by the operator.

D6.9.9 A means, acceptable to the FSD / PCAA, of easily comparing the simulator test results to Helicopter.

D6.10 The operator's simulator validation test results must be recorded on a multichannel recorder, line printer, or other appropriate recording media acceptable to the FSD / PCAA. Simulator results shall be labeled using terminology common to helicopter parameters instead of computer software identifications. These results shall be easily compared to the supporting data by employing cross plotting, overlays, transparencies, over plotting of manufacturer data, or other acceptable means. Helicopter data documents included in a QTG may be photographically reduced only if such reduction will not alter the graphic scaling or cause difficulties in scale interpretation or resolution. Incremental scales on graphical presentations must provide the resolution necessary for evaluation of the parameters.

D6.11 The test guide will provide the documented proof of compliance with the simulator validation tests. In the case of a simulator upgrade, the operator must run all validation tests needed for the requested qualification level. Validation test results offered in a test guide for a previous initial or upgrade evaluation should not be offered to validate the simulator performance in a test guide offered for a current upgrade. For tests involving time histories, the flight test data sheets or transparencies thereof and the results of the simulator tests shall be marked clearly with the appropriate reference points to ensure an accurate comparison between simulator and helicopter data with respect to time. Operators using line printers to record time histories shall clearly mark that information taken from the line printer data output for cross-plotting on the helicopter data. The cross plotting of the operator's simulator data to helicopter data is essential to verify simulator performance in each test. During an evaluation, the PCAA will perform a detailed check of selected tests from the QTG.

D6.12 The PCAA evaluation serves to validate the operator's simulator test results. The completed QTG and the operator's compliance letter and request for the evaluation shall be submitted through FSD. The QTG will be reviewed and determined to be acceptable prior to scheduling an evaluation of the simulator. A copy of a QTG for each type simulator by each simulator manufacturer will be required for the FSD's file. The FSD may elect not to retain copies of the QTG for subsequent simulators of the same type by a particular manufacturer, but will determine the need for copies on a case-by-case basis. Data updates to an original QTG shall be provided to the FSD in order to keep PCAA file copies current. The operator may elect to accomplish the QTG validation tests while the simulator is at the manufacturer's facility. Tests at the manufacturer's facility should be accomplished at the latest practical time prior to disassembly and shipment. The operator must then validate simulator performance at the final location by repeating at least half of the validation tests in the QTG and submitting those tests to the FSD. After review of these tests, the PCAA will schedule an initial evaluation. The QTG must be clearly annotated to indicate when and where each test was accomplished. In the event an operator moves a simulator to a new location and its level of qualification is not changed, the following procedures shall apply:

D6.12.1 The operator should advise the FSD of the move.

D6.12.2 Before returning the simulator to service at the new location, the operator shall perform a typical recurrent validation and functions test. The results of such tests will be retained by the operator and be available for inspection by the PCAA at the next evaluation or as requested.

D6.12.3 The FSD may schedule an evaluation prior to return to service.

D6.13 When there is a change of operator, the new operator must accomplish all required administrative procedures including the submission of the approved MQT Guide (MQTG) through the FSD. The QTG must be identified with the new operator by displaying the operator's name or logo. The simulator may, at the discretion of the FSD, be subject to an evaluation in accordance with the original qualification criteria. The scheduling priority for initial and upgrade evaluations will be based on the sequence in which acceptable QTG's and evaluation requests are received by the FSD. The QTG will be approved after the completion of the initial or upgrade evaluation and after all discrepancies in the QTG have been corrected. This Part-II of ANO-023-FSXX-3.0, after inclusion of the PCAA witnessed test results, becomes the MQTG. The MQTG will then remain in the custody of the operator for use in future recurrent evaluations.

D6.14 **<u>Recurrent Evaluations</u>**

D6.14.1 For a simulator to retain its qualification pursuant to Part-II of ANO-023-FSXX-3.0, it will be evaluated on a recurrent basis using the approved MQTG. Unless otherwise determined by the FSD, recurring evaluations will be accomplished **twice a year**. The **Initial inspection** will be carried out by the **SET** and thereafter on yearly basis. The second inspection or the recurrent evaluations will be carried out by the **FI (Helicopter)** PCAA or the **Authorized Person** (designated by the competent authority) alone after six months of the initial evaluation. Each recurrent evaluation, normally scheduled for 6 hours of simulator time, will consist of functions tests and approximately half of the validation tests in the MQTG. The entire MQTG will, therefore, be completed on an annual basis.

D6.14.2 Normally, dates of recurrent evaluations will not be scheduled beyond 30 days of the date due. Exceptions to this policy will be considered by the FSD on a case-by-case basis to address extenuating circumstances.

D6.14.3 In the interest of conserving simulator time, the following Optional Test Program (OTP) is an alternative to the recurrent evaluation procedure:

D6.14.3.1 The operator of a simulator having the appropriate automatic recording and plotting capabilities may apply for evaluation of that simulator under the OTP.

D6.14.3.2 The operator must notify the FSD in writing of its intent to enter the OTP. If the FSD determines that the evaluation can be accommodated with 4 hours or less of simulator time, recurrent evaluations for that simulator will be planned for 04 hours. If the 04 hours period is or will be exceeded and the operator cannot extend the period, then the evaluation will be terminated and must be completed within 30 days to maintain qualification status. The FSD will then reassess the appropriate necessity of the OTP.

D6.14.3.3 Under the OTP, at least half of all the validation tests will be performed and certified by the operator between PCAA recurrent evaluations.

D6.14.3.4 Completion of all validation tests will be required through any two consecutive recurrent evaluations. This information will be reviewed by the SET or FI Helicopter or the designated person at the outset of each evaluation. These tests should be accomplished within the 30 days prior to the scheduled evaluation or accomplished on an evenly distributed basis during the 6-month period preceding the scheduled evaluation. Twenty percent of those tests performed by the operator for each recurrent evaluation will then be selected and repeated along with 10 percent of those tests not performed by the operator.

D6.14.4 Prior to arrival for an on-site evaluation, the PCAA inspector will notify the operator if any tests are planned to be run that may require special equipment or technicians. These tests would include latencies, control dynamics, sounds and vibrations, or motion system tests.

D6.14.5 If the operator plans to remove a simulator from active status for a prolonged period, the following procedures shall apply to re-qualify the simulator pursuant to Part-II of ANO-023-FSXX-3.0:

D6.14.5.1 The FSD shall be advised in writing. The notice shall contain an estimate of the period in which the simulator will be inactive.

D6.14.5.2 Recurrent evaluations will not be scheduled during the inactive period. The FSD will remove the simulator from qualified status on a mutually established date no later than the date on which the next recurrent evaluation would have been scheduled.

D6.14.5.3 Before a simulator can be restored to PCAA qualified status, it will require an evaluation by the FSD. The evaluation content and time required for accomplishment will be based on the number of recurrent evaluations missed during the inactive period. For example, if the simulator were out of service for 1 year, it would be necessary to complete all tests contained in the test guide since, under the recurrent evaluation program, all validation tests in the MQTG are to be completed annually.

D6.14.5.4 The operator shall notify the FSD of any changes to the originally scheduled time out of service.

D6.14.5.5 Normally, the simulator will be re-qualified using the PCAA-approved MQTG and criteria that were in effect prior to its removal from qualification. Inactive periods exceeding 1 year or failure to adhere to the preceding procedures will require a review of the qualification basis. In general, convertible simulators will be evaluated in alternating model configurations so that only one model configuration is evaluated during any one recurrent evaluation. This policy is dependent upon a high degree of commonality between model configurations and is subject to review by the FSD on a case-by-case basis.

D6.15 <u>Special Evaluations</u>

D6.15.1 Between recurring evaluations, if deficiencies are discovered or it becomes apparent that the simulator is not being maintained to initial qualification standards a, special evaluation of the simulator may be conducted by the **SET / FSD** to verify its status.

D6.15.2 The FI (Helicopter) shall advise the operator and the FSD if a deficiency is jeopardizing training requirements.

D6.15.3 Arrangements shall then be made to resolve the deficiency in the most effective manner, which may include the withdrawal of approval by the FI (Helicopter).

D6.16 <u>Modification of Simulators, Motion Systems and Visual Systems</u>

D6.16.1 The operator must notify the FI (Helicopter) and FSD at least 21 calendar working days prior to making software program or hardware changes which might impact flight or ground dynamics of the simulator. A complete list and description of these planned changes, including dynamics related to the motion and visual systems, must be provided in writing. Any necessary updates to the MQTG shall also be identified. Operators should maintain a configuration control system to ensure the continued integrity of the simulator as qualified and to account for changes incorporated. The configuration control system may be examined by the FSD / PCAA on request.

D6.16.2 Modifications which impact flight or ground dynamics, systems functions, and significant QTG revisions may require FSD evaluation of the simulator.

D6.17 <u>Simulator Qualification Basis</u>

The PCAA requires that the simulator must maintain its approved performance, functions, and other characteristics. All initial, upgrade, and recurrent evaluations of any simulator qualified according to the acceptable methods of compliance described will be conducted in accordance with the provisions of Part-II of ANO-023-FSXX-3.0.

D6.18 **Loss of Qualification / Withdrawal Of Approval**

D6.18.1 The simulator will lose its qualification under Part-II of ANO-023-FSXX-3.0 if the FSD determines that it no longer meets the original simulator validation criteria based on a recurrent or special evaluation.

D6.18.2 While not a loss of qualification, the PCAA on the advice of FSD may withdraw approval for the use of the simulator in the approved training program, pursuant to Part-II of ANO-023-FSXX-3.0, when a deficiency is jeopardizing training requirements.

D6.18.3 SET
Composition of the SET members will depend upon the type of qualification required i.e. if **Initial Approval** then maximum possible representation of all the directorates as of AOC inspection. For the **Recurrent Evaluations** or **Special Evaluations** FI (Helicopter) or any other authorized person(s) as designated by competent authority may carry out inspection / evaluation.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

A	:	AMPLITUDE
AC	:	ADVISORY CIRCULAR
Ad	:	TOTAL INITIAL DISPLACEMENT OF PILOT CONTROLLER (INITIAL DISPLACEMENT TO FINAL ADF = AUTOMATIC DIRECTION FINDER RESTING AMPLITUDE)
AFM	:	AIRCRAFT FLIGHT MANUAL
AFCS	:	AUTOMATIC FLIGHT CONTROL SYSTEM
AGL	:	ABOVE GROUND LEVEL
An	:	SEQUENTIAL AMPLITUDE OF OVERSHOOT AFTER INITIAL X AXIS CROSSING, E.G. A1 = 1ST OVERSHOOT.
APU	:	AUXILIARY POWER UNIT
ASR	:	AIRPORT SURVEILLANCE RADAR
C	:	CENTIGRADE
CAT – I	:	CATEGORY – I APPROACH
CAT – II	:	CATEGORY – II APPROACH
CAT – A	:	CATEGORY – A TAKEOFF OR LANDING
CAT – B	:	CATEGORY – B TAKEOFF OR LANDING
CDP	:	CRITICAL DECISION POINT
CG	:	CENTER OF GRAVITY
DaN	:	DECANEWTONS
DOF	:	DEGREES OF FREEDOM
FI (Heli)	:	FLIGHT INSPECTOR (HELICOPTER)
FSD	:	FLIGHT STANDARD DIRECTORATE
Fpm	:	FEET PER MINUTE
Ft	:	FOOT OR FEET
G	:	GRAVITY
G/S	:	GLIDESLOPE
IGE	:	IN GROUND EFFECT
ILS	:	INSTRUMENT LANDING SYSTEM
In	:	INCHES
K	:	KILOMETERS
Kt	:	KNOT(S)

Lb	:	POUND(S)
LDP	:	LANDING DECISION POINT
LOFT	:	LINE ORIENTED FLIGHT TRAINING
LOS	:	LINE ORIENTED SIMULATOR SCENARIOS
M	:	METER(S)
MLS	:	MICROWAVE LANDING SYSTEM
Mm	:	MILLIMETER(S)
MQTG	:	MASTER QUALIFICATION TEST GUIDE
m/sec	:	METER(S) PER SECOND
NDB	:	NON-DIRECTIONAL BEACON
OGE	:	OUT OF GROUND EFFECT
OSD	:	OPERATIONAL SUITABILITY DATA
OTP	:	OPTIONAL TEST PROGRAM
P	:	PERIOD
PAPI	:	PRECISION APPROACH PATH INDICATOR
PAR	:	PRECISION APPROACH RADAR
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
POI	:	PRINCIPAL OPERATIONS INSPECTOR
QTG	:	QUALIFICATION TEST GUIDE
ROD	:	RATE OF DESCENT
RNAV	:	AREA NAVIGATION
RPM	:	REVOLUTIONS PER MINUTE
RVR	:	RUNWAY VISUAL RANGE
SCIG	:	SIMULATOR COMPONENT INOPERATIVE GUIDE
Sec	:	SECOND(S)
SET	:	SIMULATOR EVALUATION TEAM
SOC	:	STATEMENT OF COMPLIANCE
TACAN	:	TACTICAL AIR NAVIGATION
T(A)	:	TOLERANCE APPLIED TO AMPLITUDE
T(P)	:	TOLERANCE APPLIED TO PERIOD
TBD	:	TO BE DECIDED
VASI	:	VISUAL APPROACH SLOPE INDICATOR
VGS	:	VISUAL GROUND SEGMENT
VOR	:	VERY HIGH FREQUENCY OMNI DIRECTIONAL RANGE

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 ICAO Annex 6 Part-III

E3.2 ICAO Document 9625 Volume-II

E3.3 FAA Document AC-120-63

E3.4 CS-FSTD ((H) EASA ED Decision 2012/011/R

APPENDIX "A"

SIMULATOR STANDARDS

1. **General**. This appendix describes the minimum simulator requirements for qualifying Level B, Level C, and Level D helicopter simulators under Part-II of ANO-023-FSXX-3.0. Appropriate rules and regulations must be consulted when considering particular simulator requirements. The validation and functions tests listed in Appendices 2 and 3 must also be consulted when determining the requirements of a specific level simulator. For Levels C and D qualification, certain simulator and visual system requirements included in this appendix must be supported with a Statement of Compliance and, in some designated cases, an objective test. Statements of Compliance will describe how the requirement is met. The test should show that the requirement has been attained in the following tabular listing of simulator standards, required Statements of Compliance are indicated in the "Comments" column.

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SER	**SIMULATOR STANDARDS**	**SIMULATOR LEVEL**				**COMMENTS**
		A	**B**	**C**	**D**	
1.	**GENERAL**					
a.	Cockpit, a full-scale replica of the helicopter simulated. Direction and movement of controls and switches identical to that in the helicopter. The cockpit, for simulator purposes, consists of all that space forward of a cross-section of the fuselage at the most extreme aft setting of the pilots' seats. Additional required crewmember duty stations and those required bulkheads aft of the pilots' seats are also considered part of the cockpit and must replicate the helicopter.		X	X	X	
b.	Circuit breakers that affect procedures and/or result in observable cockpit indications shall be properly located and functionally accurate.		X	X	X	
c.	Effect of aerodynamic changes for various combinations of drag and thrust normally encountered in flight corresponding to actual flight conditions, including the effect of change in helicopter attitude, aerodynamic and propulsive forces and moments, altitude, temperature, gross weight, center of gravity location, and configuration to include external load operations, if applicable.		X	X	X	
d.	All relevant cockpit instrument indications automatically respond to control movement by a crewmember, simulated helicopter performance, or external simulated environmental effects upon the simulated helicopter, e.g., turbulence or wind shear.		X	X	X	

e.	Communications and navigation equipment representing that installed in the operator's helicopter and operable within the tolerances prescribed for the applicable airborne equipment.		X	X	X	
f.	In addition to the flight crewmember stations, two suitable seats for the Instructor / & check monitoring PCAA Inspector. The FSD will consider options to this standard based on unique cockpit configurations. These seats must provide adequate vision to the instrument panel and visual system. These seats need not represent those found in the helicopter but must be equipped with positive restraint devices similar to those found in the helicopter.		X	X	X	
g.	Simulator systems must simulate the applicable helicopter system operation, both on the ground and in flight. Three systems must be operative to the extent that normal, abnormal, and emergency operating procedures appropriate to the simulator application can be accomplished.		X	X	X	
h.	Instructor controls to enable the instructor to control all required system variables and insert abnormal or emergency conditions into the helicopter systems.		X	X	X	
i.	Static control forces and control travel which correspond to that of the replicated helicopter. Control forces should react in the same manner as in the helicopter under the same flight conditions.		X	X	X	
j.	Significant cockpit sounds which result from pilot actions corresponding to those of the helicopter.		X	X	X	
k.	Sound of precipitation, windshield wipers, and other significant helicopter noises perceptible to the pilot during normal operations and the sound of a crash when the simulator is landed in excess of landing gear limitations.			X	X	Statement of Compliance. For Level D, appropriate weather related sounds shall be coordinated with the weather representations.
l.	Realistic amplitude and frequency of cockpit noises and sounds, including engine, transmission, rotor, and airframe sounds.				X	Tests required for noises and sounds that originate from the helicopter or helicopter systems.

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m.	Ground handling and aerodynamic programming to include the following: (1) Ground effect--for example: flare, and touchdown from a running landing as well as in ground effect (IGE) hover Programming*		X	X	X	Statement of Compliance. Tests required. Level B does not require hover programming.
	(2) Ground reaction--reaction of the helicopter upon contact with the landing surface during landing to include strut deflections, tire or skid friction, side forces, and other appropriate data, such as weight and speed, necessary to identify the flight condition and configuration. (3) Ground handling characteristics--control inputs to include crosswind, braking, deceleration, and turning radius.					
n.	Representative crosswinds and instructor controls for wind speed and direction.		X	X	X	
o.	Representative stopping and directional control forces for at least the following landing surface conditions based on helicopter related data, for a running landing. (1) Dry (2) Wet (3 ICY (4) Patchy Wet (5) Patchy Icy			X	X	Statement of Compliance. Objective tests required for (1); subjective check for (2), (3), (4) and (5).
p.	Representative brake and tire failure dynamics and decreased brake efficiency due to brake temperatures based on helicopter related data.			X	X	Statement of Compliance. Tests required.
q.	Simulator computer capacity, accuracy, resolution, and dynamic response sufficient for the qualification level sought.		X	X	X	Statement of Compliance
r.	Cockpit control dynamics which replicate the helicopter simulated. Free response of the controls shall match that of the helicopter within the tolerance given in Appendix 2. Initial and upgrade evaluation will include control free response (cyclic, collective, and pedal) measurements recorded at the controls. The measured responses must correspond to those of the helicopter in ground operations, hover, climb, cruise, and autorotation.			X	X	Test required
	(1) For helicopters with irreversible control systems, measurements may be obtained on the ground. Proper pitot static inputs (if applicable) must be provided to represent conditions typical of those encountered in			X	X	

	flight. Engineering validation or helicopter manufacturer rationale will be submitted as justification to ground test or to omit a configuration.					
	(2) For simulators requiring static and dynamic tests at the controls, special test fixtures will not be required during initial evaluations if the operator's QTG shows both test fixture results and alternate test method results, such as computer data plots, which were obtained concurrently. Repeat of the alternate method during the initial evaluation may then satisfy this test requirement.					
s.	Relative responses of the motion system, visual system, and cockpit instruments shall be coupled closely to provide integrated sensory cues. These systems shall respond to abrupt pitch, roll and yaw inputs at the pilot's position within 100 / 150 milliseconds of the time, but not before the time, when the helicopter would respond under the same conditions.		X			Tests required. For Level B, response must be within 150 milliseconds.
	Visual change may start before motion response, but motion acceleration must occur before completion of visual scan of first video field containing different information. The test to determine compliance with these requirements should include simultaneously recording the analog output from the pilot's cyclic, collective, and pedals, the output from an accelerometer attached to the motion system platform located at an acceptable location near the pilots' seats, the output signal to the visual system display (including visual system analog delays), and the output signal to the pilot's attitude indicator or an equivalent test approved by the Administrator. The test results in a comparison of a recording of the simulator's response to actual helicopter response data in hover (Levels C and D only), climb, cruise, and autorotation. For helicopter response, acceleration in the appropriate rotational axis is preferred. As an alternative, a transport delay test may be used to demonstrate that the simulator systems do not exceed the specified limit of 100 / 150 ms. This test shall measure all the delay encountered by a step signal migrating from the pilots' control			X	X	

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	through the control loading electronics and interfacing through all the simulation software modules in the correct order, using a handshaking protocol, finally through the normal output interfaces to the motion system, to the visual system and instrument displays. A recordable start time for the test should be provided by a pilot flight control input. The test mode shall permit normal computation time to be consumed and shall not alter the flow of information through the hardware/software system. The transport delay of the system is then the time between the control input and the individual system responses. It need only be measured once in each axis, being independent of flight conditions.					
t.	Aerodynamic modeling which, includes ground effect, effects of airframe icing (if applicable), aerodynamic interference effects between the rotor wake and fuselage, influence of the rotor on control and stabilization systems, and representations of nonlinearities due to sideslip based on helicopter flight test data provided by the manufacturer				X	Statement of Compliance. Tests required. Nonlinearities due to sideslip are normally included in the simulator aerodynamic model, but the Statement of Compliance must address each of them. Separate tests for aerodynamic interference effects and rotor influence. A Statement of Compliance and demonstration of icing effects (if applicable) are required.
u.	A means for quickly and effectively testing simulator programming and hardware. This may include an automated system which could be used for conducting at least a portion of the tests in the QTG.			X	X	Statement of Compliance
v.	Self-testing for simulator hardware programming to determine compliance with simulator performance tests as prescribed in Appendix 2. Evidence of testing must include simulator number, date, time, conditions, tolerances, and appropriate dependent variables portrayed in comparison to the helicopter standard. Automatic flagging of "out-of-tolerance" situations is encouraged.				X	Statement of Compliance Test Required
w.	Diagnostic analysis printouts of simulator malfunctions sufficient to determine compliance with the Simulator Component Inoperative				X	Statement of Compliance

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	Guide (SCIG). These printouts shall be retained by the operator between recurring FAA simulator evaluations as part of the daily discrepancy log.					
x.	Timely permanent update of simulator hardware and programming subsequent to helicopter modification.		X	X	X	
y.	Daily preflight documentation either in the daily log or in a location easily accessible for review.		X	X	X	
3.	**MOTION SYSTEM**					
a.	Motion (acceleration) cues perceived by the pilot, representative of the helicopter motions, e.g., touchdown cues should be a function of .the simulated rate of descent		X	X	X	Motion tests to demonstrate that each axes onset cues are properly phased with pilot input and helicopter response.
b.	A motion system which produces cues in three degrees of freedom (DOF).		X			
c.	A motion system which produces cues in six DOF.			X	X	Statement of Compliance Tests required
d.	A means for recording the motion response time for comparison with helicopter data.		X	X	X	See 2 S of this Appendix
e.	Special effects programming to include the following: (1) Runway rumble, oleo deflections, effects of groundspeed and uneven surface characteristics. (2) Buffet due to transverse flow effect. (3) Buffet during extension and retraction of landing gear. (4) Buffet due to retreating blade stall. (5) Buffet due to settling with power. (6) Representative cues resulting from touchdown. (7) Rotor vibrations.		X	X	X	
f.	Characteristic buffet motions that result from operation of the helicopter (for example, retreating blade stall, extended landing gear, settling with power) which can be sensed at the flight deck. The simulator must be programmed and instrumented in such a manner that the characteristic buffet modes can be measured and compared to helicopter data. Helicopter data are also required to define flight deck motions when the helicopter is subjected to atmospheric disturbances. General purpose disturbance models that approximate demonstrable flight test data are acceptable. Tests with recorded results which allow the comparison of relative amplitudes versus frequency are required.				X	Statement of Compliance Tests required

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4.	**VISUAL SYSTEMS**					
a.	Visual system capable of meeting all the standards of this appendix and Appendices 2 and 3 (Validation and Functions and Subjective Tests Appendices) as applicable to the level of qualification requested by the applicant.		X	X	X	
b.	Visual system capable of providing at least a 75 degrees horizontal and 30 degrees vertical field of view simultaneously for each pilot.		X			
c.	Continuous minimum collimated (or equivalent) visual field of view of 150 degrees horizontal and 40 degrees vertical available to each pilot.			X		Horizontal field of view is to be centered on the 0 degree azimuth line relative to the aircraft fuselage.
d.	Continuous minimum collimated (or equivalent) visual field of view of 180 degrees horizontal and 60 degrees vertical available to each pilot. In addition, operational chin windows representative of those found in the helicopter model simulated are required.				X	Horizontal field of view must be centered on the 0 degree azimuth line relative to the aircraft fuselage.
e.	A means for recording the visual system response time.		X	X	X	
f.	Verification of visual ground segment and visual scene content on landing approach. The QTG should contain appropriate calculations and a drawing showing the pertinent data used to establish the helicopter location and visual ground segment. Such data should include, but is not limited to the following: (1) Airport and runway used. (2) Glideslope transmitter location for the specified runway. (3) Position of the glideslope receiver antenna relative to the helicopter main landing gear. (4) Approach and runway light intensity setting. (5) Helicopter pitch angle. The above parameters should be presented for the helicopter in landing configuration and a main gear height of 100 feet (30 m.) above the touch-down zone. The visual ground segment and scene content should be determined for a runway visual range of 1,200 feet or 350 meters		X	X	X	
g.	Visual cues to assess rate of change of height, height AGL, translational displacements and		X			

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	rates, during takeoff and landing.					
h.	Visual cues to assess rate of change of height, height AGL, translational displacements and rates, during takeoff, low Altitude / low airspeed maneuvering, hover, and landing.			X	X	
i.	Test procedures to quickly confirm visual system color, visibility, focus, intensity, level horizon, and attitude as compared to the simulator attitude indicator.			X	X	Statement of Compliance Tests required
j.	Dusk scene to enable identification of a visible horizon and typical terrain characteristics such as fields, roads, and bodies of water.			X	X	Statement of Compliance Tests required
k.	A minimum of ten levels of occulting. This capability must be demonstrated by a visual model through each channel			X	X	Statement of Compliance Tests required
l.	Daylight, dusk, and night visual scenes with sufficient scene content to recognize heliports, airports, the terrain, and major landmarks around the landing area and to successfully accomplish low airspeed / low altitude maneuvers to include hover, translational flight, and landing. The daylight visual scene must be part of a total daylight cockpit environment which at least represents the amount of light in the cockpit on an overcast day. Daylight visual system is defined as a visual system capable of producing, as a minimum, full color presentations, scene content comparable in detail to that produced by 4,000 edges or 2,000 polygons for daylight and 4,000 light points for night and dusk scenes, &foot lamberts of light as measured at the pilot's eye position (highlight brightness), 3 arc-minutes resolution for the field of view at the pilot's eye, and a display which is free of apparent quantization and other distracting visual effects while the simulator is in motion. The simulator cockpit ambient lighting shall be dynamically consistent with the visual scene displayed. For daylight scenes, such ambient lighting shall neither "washout" the displayed visual scene nor fall below S-foot lamberts of light as reflected from an approach plate at knee height at the pilot's station. All brightness and resolution requirements must be validated by an objective test and **will be retested at least yearly by the FSD**. Testing may be				X	Statement of Compliance Tests required

	accomplished more frequently if there are indications that the performance is degrading					
	on an accelerated basis. Compliance of the brightness capability may be demonstrated with a test pattern of white light using a spot photometer. (1) **Contrast Ratio**. A raster drawn test pattern filling the entire visual scene (three or more channels) shall consist of a matrix of black and white squares no larger than 10 degrees and no smaller than 5 degrees per square with a white square in the center of each channel. Measurement shall be made on the center white square for each channel using a 1 degree spot photometer. This value shall have a minimum brightness of 2-foot lamberts. Measure any adjacent dark square. The contrast ratio is the bright square value divided by dark square value. Minimum test contrast ratio result is 5:1. **NOTE** Cockpit ambient light levels should be maintained at Level D requirements. (2) Highlight Brightness Test. Maintaining the full test pattern described above, superimpose a highlight area on the center white square of each channel and measure the brightness using the 1 degree spot photometer. Light points or light point arrays are not acceptable. Use of calligraphic capabilities to enhance raster brightness is acceptable. (3) Resolution shall be demonstrated by a test pattern of objects shown to occupy a visual angle of 3-arc minutes in the visual scene from the pilot's eye point. This shall be confirmed by calculations in the Statement of Compliance. (4) Light point size shall be not greater than 6 arc-minutes measured in a test pattern consisting of a single row of light points reduced in length until modulation is just discernible, a row of 40 lights shall form a 4degree angle or less. (5) Light point contrast ratio shall be not less than					

APPENDIX "B"

SIMULATOR VALIDATION TESTS

1. General.

1.1 Simulator performance and system operation must be objectively evaluated by comparing the results of tests conducted in the simulator to helicopter data unless specifically noted otherwise. To facilitate the validation of the simulator, a multichannel recorder, line printer, or other appropriate recording device acceptable to the FSD should be used to record each validation test result. These recordings should then be compared to the helicopter source data. The QTG provided by the operator must describe clearly and distinctly how the simulator will be set up and operated for each test. Use of a driver program designed to automatically accomplish the tests is encouraged for all simulators. Overall integrated testing of the simulator must be accomplished to ensure that the total simulator system meets the prescribed standards. A manual test procedure with explicit and detailed steps for completion of each test must also be provided. The tests and tolerances contained in this appendix must be included in the operator's QTG. Levels B, C, and D simulators must be compared to flight test data except as otherwise specified. An operator may, after reasonable attempts have failed to obtain suitable flight test data, indicate in the QTG where flight test data are unavailable or unsuitable for a specific test. For such a test, alternative data should be submitted to the FSD for approval. Submittals for approval of data other than flight test must include an explanation of validity with respect to available flight test information.

1.2 The Table of Validation Tests of this appendix generally indicates the test results required. Unless noted otherwise, simulator tests shall represent helicopter performance and handling qualities at operating weights and centers of gravity (CG) typical of normal operation. If a test is supported by helicopter data at one extreme weight or CG, another test supported by helicopter data at mid conditions or as close as possible to the other extreme should be included. Where multiple gross weights and/or CG's are specified, these data should be presented for conditions as close as possible to the operational extremes of the flight envelope. Certain tests which are relevant only at one extreme CG or weight condition need not be repeated at the other extreme. Tests of handling qualities must include validation of stability and control augmentation devices. Simulators for augmented helicopters will be validated both in the un-augmented configuration (or failure state with the maximum permitted degradation in handling qualities) and the augmented configuration. Where various levels of handling qualities result from failure states, validation of the effect of the failure is necessary. For those performance and static handling qualities tests where the primary concern, in the un-augmented configuration, is control position, un-augmented data are not required if the design of the system precludes any affect on control position. In those instances where the un-augmented helicopter response is divergent and non-repeatable, it may not be feasible to meet the specified tolerances. Alternative requirements for testing will be mutually agreed to between the operator and the FSD on a case-by-case basis.

2. Test Requirements

2.1 The ground and flight tests required for qualification are listed in the Table of Validation Tests. Computer generated simulator test results should be provided for each test. The results should be produced on a multichannel recorder, line printer, or other appropriate recording device acceptable to the FSD / PCAA. Time histories are required unless otherwise indicated in the Table of Validation Tests. Flight test data which exhibit rapid variations of the measured parameters may require engineering judgment when making assessments of simulator validity. Such judgment must not be limited to a single parameter.

2.2 All relevant parameters related to a given maneuver or flight condition must be provided to allow overall interpretation. When it is difficult or impossible to match simulator to helicopter data throughout a time history, differences must be justified by providing a comparison of other related variables for the condition being assessed.

2.3 **Parameters, Tolerances, and Flight Conditions** The Table of Validation Tests of this appendix describes the parameters, tolerances, and flight conditions for simulator validation. These tolerances are intended to account for the inexactness of modeling and reference data. When two tolerance values are given for a parameter, the percentage tolerance applies to the recorded value of that parameter. The less restrictive of the two tolerance values may be used unless otherwise indicated. In those cases where a tolerance is expressed only as a percentage, the tolerance applies to the maximum value of that parameter within its normal operating range as measured from the neutral or zero position unless otherwise indicated. If a flight condition or operating condition is shown which does not apply to the qualification level sought, it should be disregarded. Simulator results must be labeled using the tolerances and units given.

2.4 **Flight Condition Verification**. When comparing the parameters listed to those of the helicopter, sufficient data must also be provided to verify the correct flight condition. For example, to show that control force is within 0.5 pound (0.223 decaNewton (daN)) in a static stability test, data to show the correct airspeed, power, thrust or torque, helicopter configuration, altitude, and other appropriate datum identification parameters should also be given. If comparing short period dynamics, normal acceleration may be used to establish a match to the helicopter, but airspeed, altitude, control input, helicopter configuration, and other appropriate data must also be given. All airspeed values should be clearly annotated as to indicated, calibrated, etc., and like values must be used for comparison.

2.5 **Alternate Method for Dynamic Handling Qualities Tests**. The FSD is open to alternative means for dealing with dynamic handling qualities tests. One method that has been suggested is frequency response testing. Such alternatives must be justified and appropriate to the application. Each case must be considered on its own merit on an adhoc basis. Should the PCAA find that alternative methods do not result in satisfactory simulator performance, more conventionally accepted methods must be used.

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TABLE OF VALIDATION TESTS

TESTS	TOLERANCE	FLIGHT CONDITIONS	QUALIFICATION REQUIREMENTS				COMMENTS
1. Performance **a. Engine Assessment** (1) start Operations (a) Engine Start and acceleration (transient)	Light Off Time ± 10% or ±1 second Torque ±5% Rotor Speed ± 3% Fuel Flow -±10% Gas Generator Speed ± 5% Power Turbine speed ± 5% Turbine Gas Temp- 30°C	Ground Rotor Brake Used/ Not Used		X	X	X	The histories of each engine from initiation of start sequence to steady state idle and from steady state idle to operating RPM.
(b) Steady state Idle and operating RPM Conditions	Torque ±3% Rotor Speed- ± 11.5% Fuel Flow ± 5% Gas Generator Speed ± 2% Power Turbine Speed ± 2% Turbine Gas Temp ± 20°C	Ground		X	X	X	Present data for both steady state idle and operating RPM conditions. May be a snap shot test.
(2) Power Turbine SpeedTrim	± 10 % of total change of power turbine speed	Ground		X	X	X	Time history of engine response to trim system actuation (both directions).
(3) Engine and Rotor Speed Governing	Torque ±5% Rotor Speed ± 1.5%	Climb / Descend		X	X	X	Collective step inputs. Can be conducted concurrently with climb and descent performance tests.
b. Ground Operations (1) Minimum Radius turn	± 3 ft (0.9m) or 20% of helicopter turn Radius	Ground		X	X	X	If differential braking is used, brake force must be set at the helicopter flight test value.
(2) Rate of Turn vs.	± 10 % or ± 2° /Sec	Ground		X	X	X	

pedal Deflection or Nosewheel Angle	Turn Rate						
(3) Taxi	Pitch Attitude ±1.5° Torque - ± 3% Longitudinal Control Position - ± 5% Lateral Control Position - ± 5% Directional Control Position - ± 5% Collective Control Position - ± 5%	Ground		X	X	X	Control position and pitch attitude during ground taxi for a specific ground speed, wind speed and direction, and density altitude.
(4) Brake Effectiveness	± 10% of the time & distance	Ground		X	X	X	
c. Takeoff **(1) All Engines**	Airspeed - ± 3 kt Altitude - ± 20 ft (6.1 m) Torque - ± 3% Rotor Speed - ± 1.5% Vertical Velocity - ± 100 fpm (0.50 m/set) or 10% Pitch Attitude - ± 1.5 Bank Attitude - ± 2° Heading ti - ± 2° Longgitudinal Control Position - ±10% Lateral Control Position - ±10% Directional Control Position - ±10% Collective Control Position - ±10%	Ground Takeoff and initial segment of Climb		X	X	X	Time history of takeoff Flight path as appropriate to helicopter model simulated [running takeoff for Level B, takeoff from a hover far Levels C and D]. For Level B, criteria apply only to those segments at airspeeds above effective translational lift. Record data to at least 200 ft (61 meters) AGL.
(2) One Engine Inoperative	Airspeed - ± 3 kt Altitude - ± 20 ft (6.1 m) Torque - ± 3% Rotor Speed - ± 1.5% Vertical Velocity - ± 100 fpm (0.50 m/set) or 10% Pitch Attitude - ± 1.5 Bank Attitude - ± 2°			X	X	X	Time history of takeoff flight path as appropriate to helicopter model simulated. Record data to at least 200 ft (61

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	Heading ti - ± 2° Longitudinal Control Position - ±10% Lateral Control Position - ±10% Directional Control Position - ±10% Collective Control Position - ±10%						meters) AGL.
d. Hover Performance	Torque - ± 3% Pitch Attitude - ± 1.5 Bank Attitude - ± 1.5° Longitudinal Control Position - ±5% Lateral Control Position - ±5% Directional Control Position - ±5% Collective Control Position - ±5%	In Ground Effect (IGE) Out of Ground Effect (OGE)			X	X	Light/heavy gross weights. May be a snapshot test.
e. Vertical Climb Performance	Vertical Velocity - ± 100 fpm (0.50 m/sec) or 10% Directional Control Position - ± 5% Collective Control Position - ± 5%	From OGE Hover			X	X	Light/heavy gross weights. May be a snapshot test.
f. Level Flight Performance and Trimmed Flight Control Positions	Torque - ± 3% Pitch Attitude - ± 1.5 Sideslip Angle - ± 2° Bank Attitude - ± 1.5° Longitudinal Control Position - ±5% Lateral Control Position - ±5% Directional Control Position - ±5% Collective Control Position - ±5%	Cruise Augmentation On/Off		X	X	X	Two gross weight/CG combinations. Vary trim speeds throughout airspeed envelope. May be a snapshot
g. Climb Performance and Trimmed Flight Control Positions	Vertical Velocity - ± 100 fpm (0.50 m/sec) or 10% Pitch Attitude - ± 1.5 Sideslip Angle - ± 2° Longitudinal Control Position - ±5% Lateral Control Position - ±5% Directional Control	All Engines Operating One Engine Inoperative Augmentation On/Off		X	X	X	Two gross weight /CG combinations. Data presented at normal climb power conditions. May be a snapshot test

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	Position - ± 5% Collective Control Position - ± 5%						
h. Descent (1) Descent Performance and Trimmed Flight Control Positions	Torque - ± 3% Pitch Attitude - ± 1.5 Sideslip Angle - ± 2° Longitudinal Control Position - ±5% Lateral Control Position - ±5% Directional Control Position - ±5% Collective Control Position - ±5%	At or near 1,OOO fpm Rate of Descent (ROD) at normal approach speed. Augmentation On/Off		X	X	X	Two gross weight/CG combinations. Maybe a snapshot test
(2) Autorotation Performance and Trimmed Flight Control Positions	Vertical Velocity - ± 100 fpm (0.50 m/sec) or 10% Rotor Speed - ± 1.5% Pitch Attitude - ± 1.5 Sideslip Angle - ± 2° Longitudinal Control Position - ±5% Lateral Control Position - ±5% Directional Control Position - ± 5% Collective Control Position - ± 5%	Steady Descents Augmentation On/Off		X	X	X	Two Gross weights At normal operating RPM. Rotor speed tolerance only applies if collective control position is full down.
i. Autorotational Entry	Rotor Speed - ± 13% Pitch Attitude - ± 2° Roll Attitude - ± 3° Yaw Attitude - ± 5° Airspeed - ± 5 Kts Vertical Velocity - ± 200 fpm (1.00 m/sec) or 10%	Cruise or Climb			X	X	Time history of vehicle response to a rapid throttle reduction to idle. If cruise, data should be presented for the maximum range airspeed. If climb, data should be presented for the maximum rate of climb airspeed at or near maximum

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							continuous power.
j. Landing (1) All engines	Airspeed - ± 5 Kts Altitude - ± 20 ft (6.1m) Torque - ± 3% Rotor Speed - ± 1.5% Pitch Attitude - ± 1.5° Bank Attitude - ± 1.5° Heading - ± 2° Longitudinal Control Position - ± 10% Lateral Control Position - ± 10% Directional Control Position - ± 10% Collective Control Position - ± 10%	Approach / Landing		X	X	X	Time history of approach and landing profile as appropriate to helicopter model simulated (running landing for Level B, approach to a hover for Levels C and D). For Level B, criteria apply only to those segments at airspeeds above effective translational Lift
(2) One Engine Inoperative	Airspeed - ± 5 Kts Altitude - ± 20 ft (6.1m) Torque - ± 3% Rotor Speed - ± 1.5% Pitch Attitude - ± 1.5° Bank Attitude - ± 1.5° Heading - ± 2° Longitudinal Control Position - ± 10% Lateral Control Position - ± 10% Directional Control Position - ± 10% Collective Control Position - ± 10%			X	X	X	Include data far both Category-A and Category-B approaches and landing as appropriate to helicopter model simulated For Level B, criteria apply only to those segments at airspeeds above effective translational lift.
(3) Balked Landing	Airspeed - ± 5 Kts Altitude - ± 20 ft (6.1m) Torque - ± 3% Rotor Speed - ± 1.5% Pitch Attitude - ± 1.5° Bank Attitude - ± 1.5° Heading - ± 2° Longitudinal Control Position - ± 10% Lateral Control Position - ± 10%			X	X	X	From a stabilized Approach at the landing decision point (LDP).

	Directional Control Position - ± 10% Collective Control Position - ± 10%						
(4) Autorotational Landing	Torque - ± 3% Rotor Speed - ± 3% Vertical Velocity - ± 100 fpm (0.50 m/sec) or 10% Pitch Attitude - ± 2° Bank Attitude - ± 2° Heading - ± 5° Longitudinal Control Position - ± 10% Lateral Control Position - ± 10% Directional Control Position - ± 10% Collective Control Position - ± 10%	Approach / Landing			X	X	Time history of autorotational deceleration and landing from a stabilized autorotational descent,
2. Handling Qualities **a. control System Mechanical** Characteristics (1) Cyclic**	Breakout ± 0.25 lb (0.1 12 daN) or 25% Force ± 0.5 lb (0.224 daN) or 10%	Ground / Static Trim on / off Friction Off Augmentation On/Off		X	X	X	Uninterrupted control sweeps. Does not apply to aircraft hardware modular controllers.
(2) Collective/Pedals**	Breakout ± 0.5 lb (0.224 daN) or 25% Force ± 1.0 lb (0.448 daN) or 10%	Ground / Static Trim on / off Friction Off Augmentation On/Off		X	X	X	Uninterrupted control Sweeps
**Cyclic, collective, and pedal position vs. force shall be measured at the control. The force and position data from this instrumentation can be directly recorded and matched to the helicopter data. Such a permanent installation could be used without requiring any time for installation of external devices.							
(3) Brake Pedal Force vs. Position	± 5 lb (2.224 daN) or 10%	Ground Static		X	X	X	Simulator computer output results may be used to show compliance.
(4) Trim System Rate (all applicable axes)	Rate ± 10%	Ground / Static Trim on Friction Off		X	X	X	Control dynamics for irreversible control systems may be evaluated
(5) Control Dynamics	± 10% of time for first	Hover / Cruise			X	X	Control

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(all axes)	zero crossing and ±10 (N+I)% Of period thereafter ± 10% amplitude of first overshoot ±20% of amplitude of 2nd and subsequent overshoots greater than 5% of initial displacement ±1 overshoot	Trim On Friction Off Augmentation On/Off					dynamics for irreversible control systems may be evaluated
(6) Freeplay	± 0.10 in	Ground / Static friction Off		X	X	X	Applies to all controls
b. Low Airspeed Handling Qualities (1) Trimmed Flight Control Positions	Torque - ± 3% Pitch Attitude - ± 1.5° Bank Attitude - ± 2° Heading - ± 5° Longitudinal Control Position - ± 5% Lateral Control Position - ± 5% Directional Control Position - ± 5% Collective Control Position - ± 5%	Translational Flight IGE Sideward / rearward / forward Augmentation On/Off			X	X	Several airspeed increments to translational airspeed limits and 45 kt forward. May be a snapshot test
(2) Critical Azimuth	Torque - ± 3% Pitch Attitude - ± 1.5° Bank Attitude - ± 2° Heading - ± 5° Longitudinal Control Position - ± 5% Lateral Control Position - ± 5% Directional Control Position - ± 5% Collective Control Position - ± 5%	Stationary Hover Augmentation On / Off			X	X	May be a snapshot test. Present data for three relative wind directions (including the most critical case) in the critical quadrant.
(3) Control Response (a) Longitudinal	Pitch Rate - ± 10% or ± 2°/Sec Pitch Attitude change - ± 10% or ± 1.5°/Sec	Hover Augmentation On / Off			X	X	Step control input. Off axis response must show correct trend for un-augmented cases.
(b) Lateral	Roll Rate - ± 10% or ± 3°/Sec Roll Attitude change - ± 10% or ± 3°/Sec	Hover Augmentation On / Off			X	X	Step control input. Off axis response must show correct

							trend for un-augmented cases.
(c) Directional	Yaw Rate - ± 10% or ± 2°/Sec Heading change - ± 10% or ± 2°/Sec	Hover Augmentation On / Off			X	X	Step control input. Off axis response must show correct trend for un-augmented cases.
(d) Vertical	Normal Acceleration - ± 0.1g	Hover			X	X	Step control input. Off axis response must show correct trend for un-augmented cases.
c. Longitudinal Handling Qualities							Two cruise airspeeds to include minimum power required speed.
(1) Control Response	Pitch Rate - ± 10% or ± 2°/Sec Pitch Attitude change - ± 10% or ± 1.5°/Sec	Cruise Augmentation On / Off		X	X	X	Step control input. Off axis response must show correct trend for un-augmented cases.
(2) Static Stability	Longitudinal Control Position - ± 10% of change from trim or ± 0.25 in (6.3mm) or Longitudinal Control force ± 0.5lb (0.223 daN) or ± 10%	Cruise or Climb Autorotation Augmentation On / Off		X	X	X	Minimum of two speeds on each side of the trim speed. May be a snap shot test.
(3) Dynamic Stability (a) Long Term Response	± 10% of Calculated Period ± 10% of Time to l/2 or Double Amplitude or ± .02 of Damping Ratio	Cruise Augmentation On / Off		X	X	X	Test should include three full cycles (6 overshoots after input completed) or that sufficient to determine time to l/2 or double amplitude, whichever is less. For non-

							periodic response the time history should be matched
(b) Short Term Response	± 1.5° Pitch or ± 2°/sec Pitch Rate ± 0.1 g Normal Acceleration	Cruise or Climb Augmentation On / Off		X	X	X	Two Airspeeds
(4) Maneuvering Stability	Longitudinal Control Position - ± 10% of change from trim or ± 0..25 in (6.3 mm) or Longitudinal Control Force - ± 0.5 lb (0.223 daN) or ± 10%	Cruise or Climb Augmentation On / Off		X	X	X	Force may be a cross plot for irreversible systems. Two airspeeds. May be a snapshot test. Approximately 30°and 45° bank attitude data should be presented.
(5) Landing Gear Operating Time	± 1 Sec	Takeoff (Retraction) Approach (Extension		X	X	X	
d. Lateral and Directional Handling Qualities (1) Control Response (a) Lateral	Roll Rate - ± 10% or ± 3°/sec Roll Attitude Change - ± 10% or ± 3°/sec	Cruise Augmentation On/Off		X	X	X	Two airspeeds to include at or near the minimum power required speed. Step control input. Off axis response must show correct trend for un-augmented cases
(b) Directional	Yaw Rate - ± 10% or ± 2°/sec Yaw Attitude Change - ± 10% or ± 2°/sec	Cruise Augmentation On/Off		X	X	X	Two airspeeds to include at or near the minimum power required speed. Step control input. Off axis response must show correct

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						trend for un-augmented cases
(2) Directional Static Stability	Lateral Control Position - + 10% of change from trim or + 0.25 in (6.3 mm) or Lateral Control Force - + 0.5 lb (0.223 daN) or 10% Roll Attitude - + 1.5° Directional Control Position - + 10% of change from trim or + 0.25 in (6.3 mm) or Directional Control Force - + 1 lb (0.448 daN) or 10% Longitudinal Control Position - + 10% of change from trim or + 0.25 in (6.3 mm) Vertical Velocity - + 100 fpm (0.50 m/set) or 10%	Cruise or climb / Descent Augmentation On/Off		X	X	X	Steady heading sideslip. Minimum of two sideslip angles on either side of the trim point. Force may be a cross plot for irreversible control systems. May be a snapshot test.
(3) Dynamic Lateral and Directional Stability							
(a) Lateral Directional Oscillations	+ 0.5 sec or + 10% of Period + 10% of Time to l/2 or Double Amplitude or + .02 of Damping Ratio + 20% or 1 sec of Time Difference Between Peaks of Bank and Sideslip	Cruise or climb / Augmentation On/Off		X	X	X	Two Airspeeds. Excite with cyclic or pedal doublet. Test should include six full cycles (12 overshoots after input completed) or that sufficient to determine time to l/2 or double amplitude, whichever is less. For non periodic response, time history should be

							matched.
(b) Spiral Stability	Correct Trend - ± 2° Bank or ± 10% in 20 sec	Cruise or climb / Augmentation On/Off		X	X	X	Time history of release from pedal only or cyclic only turns in both directions
(c) Adverse / Proverse Yaw	Correct Trend - ± 2° Transient sideslip angle	Cruise or climb / Augmentation On/Off		X	X	X	Time history of initial entry into cyclic only turns in both directions. Use moderate cyclic input rate.
3. Motion System** **a. Motion Envelope** (1) Pitch (a) Displacement ± TBD° ± 25° (b) Velocity ± TBD°/sec ± 20°/sec (c) Acceleration ± TBD°/sec^2 ± 20°/sec^2				X X X	X X X	X X X	

**It is assumed that the three degrees of freedom (DOF) for a Level B simulator are pitch, roll, and vertical. If the installed system has more than three DOF, but less than six, or three DOF different from pitch, roll, and vertical, the motion performance will have to be established on a per case basis. Level B simulator with a six-DOF system shall comply with Level C and Level D motion performance.

(2) Roll **(a) Displacement -** ± TBD° ± 25° (b) Velocity ± TBD°/sec ± 20°/sec (c) Acceleration ± TBD°/sec^2 ± 100°/sec^2				X X X	X X X	X X X	

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(3) Yaw (a) Displacement ± 25° (b) Velocity ± 20°/sec (c) Acceleration ± 100°/sec^2		N/A			X X X	X X X	
(4) Vertical (a) Displacement ± TBD in ± 34 in (b) Velocity ± TBD in ± 24 in/sec (c) Acceleration ± TBD g ± 0.8 g				X X X	X X X	X X X	
(5) Lateral (a) Displacement± 45 in (b) Velocity ± 28 in/sec (c) Acceleration± 0.6 g					X X X	X X X	
(6) Longitudinal (a) Displacement ± 34 in (b) Velocity ± 28 in/sec (c) Acceleration± 0.6 g					X X X	X X X	
(7) Initial Rotational Acceleration Ratio, All axes TBD°/sec^2 /sec				X	X	X	
(8) Initial Linear Acceleration Rate (a) Vertical ± TBD g/sec (b) Lateral ± 3 g/sec (c) Longitudinal ± 3 g/sec				X	X X X	X X X	
b. Frequency Response **Band, Hz Phase, deg** 0.1 to 0.5 -15 to -20 0.51 to 1.0 -15 to -20 1.1 to 2.0 -20 to -40	Amplitude Ratio, db ± 2 ± 2 ± 4 ± 4	N/A		X	X	X	

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2.1 to 5.0 -40 to -100							
c. Leg Balance	1.5°			X	X	X	The phase shift between a datum jack and any other jack shall be measured using a heave (vertical) signal of 0.5Hz at + 0.25g
d. Turn Around	0.005g	N/A		X	X	X	The motion base shall be driven sinusoidal in heave through a displacement of 6 in (150 mm) peak to peak at a frequency of 0.5 Hz. Deviation from the desired sinusoidal acceleration shall be measured.
e. Motion Cue Repeatability				X	X	X	See Para 4 of this Appendix
4. Visual System (NOTE: Refer to Appendix 3 for additional visual tests.) **a. Visual Ground Segment (VGS)**	+ 20% of calculated VGS. Threshold lights must be visible if they are in the visual segment (see example under comments").	Static at 100 ft (30.5 m) wheel height above touchdown zone on glide slope		X	X	X	The QTG should indicate the source of data i.e., ILS G/S antenna location, pilot eye reference point, cockpit cutoff angle, etc., used to make visual scene ground segment content calculations.
b. Visual System Color	Demonstrated Model				X	X	
c. Visual RVR Calibration	Demonstrated Model				X	X	
d. Visual display Focus & Intensity	Demonstrated Model				X	X	

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e. Visual Attitude vs. Sim Attitude indicator (pitch & Roll of Horizon)	Demonstrated Model				X	X	
f. Demonstrate 10 Levels of Occulting through Each Channel of System	Demonstrated Model				X	X	
5. Simulator Systems **a. Visual, Motion, and Cockpit Instrument Response** (1) Visual, Motion, Instrument System response to an abrupt pilot controller input, compared to helicopter response for a similar input (2) Transport Delay	100 milliseconds or less after helicopter response 150 milliseconds or less after helicopter response 100 milliseconds or less after control movement 150 milliseconds or less after control movement	Climb, Cruise, Descent, Hover Takeoff, Climb, Descent Pitch, Roll, Yaw Pitch, Roll, Yaw		X X	X X	X X	One test is required in each axis (pitch, roll, and yaw) for each of the 4 conditions (3 conditions, Level B) compared to helicopter data for a simulator input. (Total 12 tests) (Total 9 tests, Level B) One test is required in each axis. (Total 3 tests)
b. Sound (1) Realistic amplitude and frequency of cockpit noises and sounds, including transmission, rotor, and airframe sounds.						X	Test results must show a comparison of the amplitude and frequency content of the sounds that originate from the helicopter or helicopter systems. Sound data should be presented in one-third octave band or continuous frequency spectrum.
c. Diagnostic Testing (1) A means for quickly and effectively testing					X	X	

simulator programming and hardware. This could include an automated system which could be used for conducting at least a portion of the tests in the QTG.						X	
(2) Self testing of simulator hardware and programming.						X	
(3) Diagnostic analysis printout of simulator malfunctions sufficient to determine compliance with the SCIG.							

3. CONTROL DYNAMICS

3.1 The characteristics of a helicopter flight control system have a major effect on the handling qualities. A significant consideration in pilot acceptability of a helicopter is the "feel" provided through the cockpit controls. Considerable effort is expended on helicopter feel system design in order to deliver a system with which pilots will be comfortable and consider the helicopter desirable to fly. In order for a simulator to be representative, it too must present the pilot with the proper feel; that of the respective helicopter. Recordings such as free response to an impulse or step function are classically used to estimate the dynamic properties of electromechanical systems. In any case, it is only possible to estimate the dynamic properties as a result of only being able to estimate true inputs and responses. Therefore, it is imperative that the best possible data be collected since close matching of the simulator control loading system to the helicopter systems is essential. The required control feel dynamic tests are described in 2.a.(5) of the Table of Validation Tests of this section.

3.2 For initial and upgrade evaluations, it is required that control dynamic characteristics be measured at and recorded directly from the cockpit controls. This procedure is usually accomplished by measuring the free response of the controls using a step or pulse input to excite the system. The procedure must be accomplished in hover, climb, cruise, and autorotation. For helicopters with irreversible control systems, measurements may be obtained on the ground. Proper pitot-static inputs (if applicable) must be provided to represent conditions typical of those encountered in flight. Likewise, it may be shown that for some helicopters, hover, climb, cruise, and autorotation may have like effects. Thus, one may suffice for another. If either or both considerations apply, engineering validation or helicopter manufacturer rationale must be submitted as justification for ground tests or for eliminating a flight condition. For simulators requiring static and dynamic tests at the controls, special test fixtures will not be required during initial and upgrade evaluations if the operator's QTG shows both test fixture results and the results of an alternate approach, such as computer plots which were produced concurrently and show satisfactory agreement. Repeat of the alternate method during the initial evaluation would then satisfy this test requirement.

3.2.1 **Control Dynamics Evaluation**. The dynamic properties of control systems are often stated in terms of frequency, damping, and a number of other classical measurements which can be found in texts on control systems. In order to establish a consistent means of validating test results for simulator control loading, criteria are needed that will clearly define the interpretation of the measurements and the tolerances to be applied. Criteria are needed for both the under damped system and the over damped system, including the critically damped case. In the case of an under damped system with very light damping, the system may be quantified in terms of frequency and damping. In critically damped or over damped systems, the frequency and damping is not readily measured from a response time history. Therefore, some other measurement must be used.

3.2.2 **For Levels C and D Simulators**. Tests to verify that control feel dynamics represent the helicopter must show that the dynamic damping cycles (free response of the control) match that of the helicopter within specified tolerances. The method of evaluating the response and the tolerance to be applied are described below for the under damped and critically and over damped cases.

3.2.2.1 **Under Damped Response**. Two measurements are required for the period, the time to first zero crossing (in case a rate limit is present) and the subsequent frequency of oscillation. It is necessary to measure cycles on an individual basis in case there are non uniform periods in the response. Each period will be independently compared to the respective period of the helicopter control system and, consequently, will enjoy the full tolerance specified for that period. The damping tolerance shall be applied to overshoots on an individual basis. Care should be taken when applying the tolerance to small overshoots since the significance of such overshoots becomes questionable. Only those overshoots larger than 5 percent of the total initial displacement should be considered significant. The residual band, labeled $T(A_d)$ on figure 1 is $\pm$ 5 percent of the initial displacement amplitude & from the steady state value of the oscillation. Oscillations within the residual band are considered insignificant. When comparing simulator data to helicopter data, the process should begin by overlaying or aligning the simulator and helicopter steady state values and then comparing amplitudes of oscillation peaks, the time of the first zero crossing, and individual periods of oscillation. The simulator should show the same number of significant overshoots to within one when compared against the helicopter data. This procedure for evaluating the response is illustrated in figure 1.

3.2.2.2 **Critically Damped and Over damped Response**. Due to the nature of critically damped responses (no overshoots), the time to reach 90% of the steady state (neutral point) value should be the same as the helicopter within $\pm$ 10%. The simulator response should be critically damped also. Figure 2 illustrates the procedure.

3.2.3 **Tolerances**. The following table summarizes the tolerances (T). See figures 1 and 2 for an illustration of the referenced measurements.

$T(P_O)$	$\pm$ 10% of P_O
$T(P_1)$	$\pm$ 20% of P_1
$T(P_2)$	$\pm$ 30% of P_2
$T(P_n)$	$\pm$ 10 (n+1)% of P_n
$T(A_n)$	$\pm$ 10% of A_1, $\pm$ 20% of Subsequent peaks
$T(A_d)$	$\pm$ 5% of A_d = Residual Band
Overshoots	$\pm$ 1

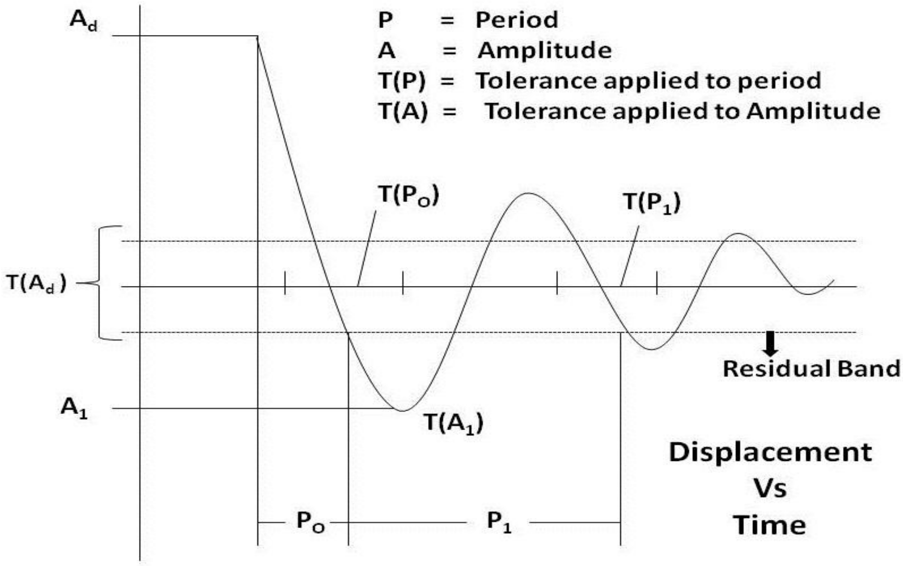

Figure – 1 Underdamped step response

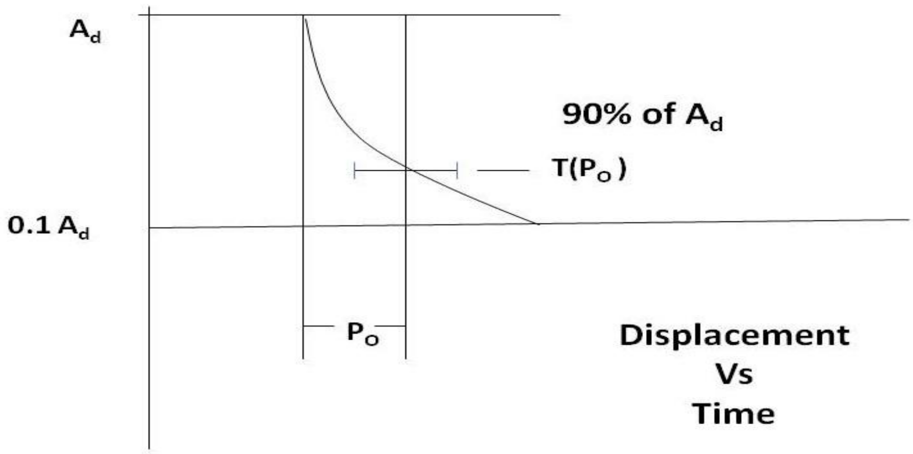

Figure – 2 Critically damped step response

4. MOTION TESTING

4.1 **Motion Cue Repeatability Testing**. The motion system characteristics in the Table of Validation Tests address basic system capability, but not pilot cuing capability. Until there is an objective procedure for determination of the motion cues necessary to support pilot tasks and stimulate the pilot response which occurs in an aircraft for the same tasks, motion systems will continue to be "tuned" subjectively. Having tuned a motion system, however, it is important to involve a test to ensure that the system continues to perform as originally qualified. Any motion performance change from the initially qualified baseline can be measured objectively. An objective assessment of motion performance change will be accomplished at least annually using the following testing procedure:

4.1.1 The current performance of the motion system shall be assessed by comparison with the initial recorded test data.

4.1.2 The parameters to be recorded shall be the outputs of the motion drive algorithms and the jack position transducers.

4.1.3 The test input signals shall be inserted at an appropriate point prior to the integrations in the equations of motion (see figure 3).

4.1.4 The characteristics of the test signal (see figure 4) shall be adjusted to ensure that the motion is exercised through approximately 2/3 of the maximum displacement capability in each axis. The time TI must be of sufficient duration to ensure steady initial conditions.

Note: If the simulator weight changes for any reason, (i.e., visual change, or structural change) then the motion system baseline performance repeatability tests must be rerun and the new results used for future comparison.

ACCELERATION TEST SIGNALS

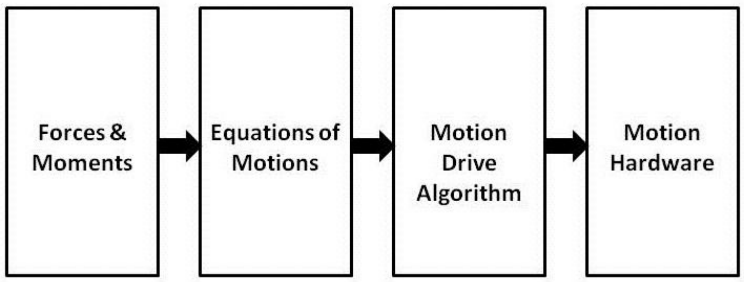

Figure – 3

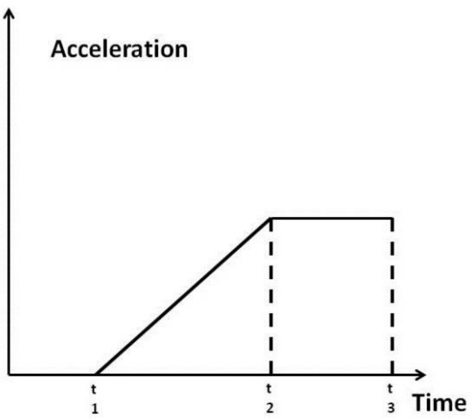

Figure – 4

4.2 **Alternative Method for Motion Systems Testing**. An alternative to the procedures described and specified in Section 3.a. and b. of the Table of Validation Tests and in paragraph 4.a. of this appendix is “end to end” testing of the motion system and its associated washout, drive, and servo systems. An acceptable procedure to conduct the end to end test is, for convenience described as follows:-

4.2.1 At the point at which the accelerations from the equation of motion normally excite the motion system, including the washout algorithms, a sinusoidal input would be used to excite the motion system (see figure 5). Acceleration at the pilot station would be measured as the output. The test would be done independently in each of the six DOF and the response measured to determine frequency response. The resulting frequency response measured in each axis must comply with the following specification:

Gain	**± 2db**	**0.5 Hz – 5.0 Hz**
Phase	**0± 2 deg**	**1.0 Hz – 2 Hz**

Note: This procedure does not account for the correctness of the algebraic sign between input and output. Consequently, care must be exercised to ensure that the signs are correct.

4.2.2 Motion systems demonstrated by end to end testing must also comply with the displacements delineated in above.

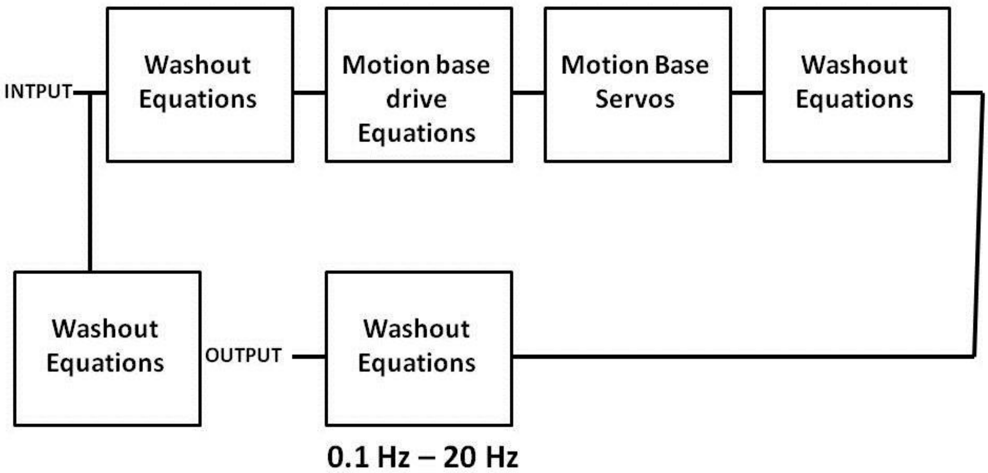

Figure – 5

APPENDIX "C"

FUNCTIONS AND SUBJECTIVE TESTS

1. General

Accurate replication of helicopter systems functions will be checked at each flight crewmember position by FI (Heli) or any authorized person designated by competent authority. This includes procedures using the operator's approved aircraft manuals and checklists. Handling qualities, performance, and simulator systems operation will be subjectively assessed by FI (Heli) or any authorized person designated by competent authority. This assessment is subject to include operations under the full range of environmental conditions (winds, density altitudes, etc.) in which the helicopter would normally be expected to perform. The SET may assess the simulator for a special aspect of an operator's training program during the functions and subjective portion of a recurrent evaluation. Such an assessment may include a portion of a Line Oriented Flight Training (LOFT) scenario or special emphasis items in the operator's training program. Unless directly related to a requirement for the current qualification level, the results of such an evaluation would not affect the simulator's current status. Operational systems and the associated electronic display systems will be evaluated. The SET will include in their report the effect of the system operation and system limitations.

2. Test Requirements

The ground and flight tests and other checks used for simulator qualification are listed in the Table of Functions and Subjective Tests. The table includes maneuvers and procedures to ensure that the simulator functions and performs appropriately for use in pilot training and checking in the maneuvers and procedures delineated in herein and other regulatory provisions. The portion of the table addressing pilot functions and maneuvers is divided by flight phases. Visual systems tests are listed separately as are special effects. Where a number of similar procedures are listed, such as in approaches to landing, it is not intended that the simulator have equipment installed to perform all of the listed types of approaches. However, the simulator must have equipment required by the helicopter type design and for the type of operation intended. Systems functions will be assessed for normal and, where appropriate, alternate operations. Normal, abnormal, and emergency procedures associated with a flight phase will be assessed during the evaluation of maneuvers or events within that flight phase. Systems are listed separately under ''Any Flight Phase" to ensure appropriate attention to systems checks.

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ser	**SIMULATOR STANDARDS**	**SIMULATOR LEVEL**				**COMMENTS**
		A	**B**	**C**	**D**	
1.	**FUNCTIONS AND MANEUVERS**					
a.	**Preparation for Flight** (1) **Preflight** Accomplish a functions check of all switches, indicators, systems, and equipment at all cockpit crewmembers' and instructors' stations and determine that the cockpit design and functions are identical to that of the helicopter simulated. (2) APU/Engine start and runup. (a) Normal start procedures. (b) Alternate start procedures. (c) Abnormal starts and shutdowns (hot start, hung start, etc.) (d) Rotor engagement. (e) Systems checks. (f) Other.		X	X	X	
b.	**Ground Taxi** (1) Power required to taxi. (2) Brake effectiveness. (3) Ground handling. (4) Abnormal/emergency procedures, for example: (a) Brake system failure. (b) Ground resonance. (c) Other.		X	X	X	
c.	**Hover** (1) Takeoff to a hover. (2) Instrument response. (a) Engine instruments. (b) Flight instruments. (3) Hovering turns. (4) Hover power checks. (a) In ground effect (IGE). (b) Out of ground effect (OGE). (5) Crosswind/tailwind hover. (6) Abnormal/emergency procedures, for example: (a) Engine failure. (b) Hovering autorotation. (c) Fuel governing system failure. (d) Settling with power (OGE). (e) Stability system failure. (f) Directional control malfunction. (g) Other. (7) Translating tendency. (8) External load operations. (a) Hookup. (b) Release. (9) Winch operations.			X	X	

d.	**Translational Flight**			X	X	
	(1) Forward.					
	(2) Sideward.					
	(3) Rearward.					
e.	**Takeoff**					
	(1) Normal.					
	(a) From ground.			X	X	
	(b) From hover.			X	X	
	i. CAT A					
	ii. CATB		X	X	X	
	(c) Running.		X	X	X	
	(d) Crosswind/tailwind.			X	X	
	(e) Maximum performance.			X	X	
	(f) Instrument.			X	X	
	(g) Confined area.			X	X	
	(h) Pinnacle/platform.			X	X	
	(i) Slope.			X	X	
	(i) External load operations .					
	(2) Abnormal/emergency procedures, for example.		X	X	X	
	(a) Takeoff with engine failure before and after critical decision point CDP).					
	i. CAT A		X	X	X	
	ii. CATB					
	(b) Rejected takeoff.		X	X	X	
	i. Land					
	ii. Water (if float equipped)					
	(c) Other.					
f.	**Climb**			X	X	
	(I) Normal.		X	X	X	
	(2) Obstacle clearance.		X	X	X	
	(3) Vertical.		X	X	X	
	(4) One engine inoperative.		X	X	X	
	(5) Other.					
g.	**Cruise**					
	(1) Performance.		X	X	X	
	(2) Plying qualities.		X	X	X	
	(3) Turns.		X	X	X	
	(a) Timed.					
	(b) Normal.					
	(c) Steep.		X	X	X	
	(4) Accelerations and decelerations.		X	X	X	
	(5) High airspeed vibrations.			X	X	
	(6) External load operations.		X	X	X	
	(7) Abnormal/emergency procedures, for example:					
	(a) Engine fire.					
	(b) Engine failure.					
	(c) In flight engine shutdown and restart.					
	(d) Fuel governing system failures.					
	(e) Directional control malfunction.					

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	(f) Hydraulic failure.					
	(g) Stability system failure.					
	(h) Rotor vibrations.					
	(i) Other.					
h.	**Descent**		X	X	X	
	(1) Normal.					
	(2) Maximum rate.					
	(3) Autorotative.					
	(a) Straight in.					
	(b) With turn.					
	(4) Other.					
i.	**Approach**					
	(1) **Non-precision**					
	(a) ‘All engines operating.					
	(b) One or more engines inoperative.					
	(c) Approach procedures, for example:					
	1. NDB					
	2. VOR, RNAV, TACAN					
	3. ASR					
	4. Circling (if requested by operator)					
	5. Helicopter only					
	6. Other					
	(d) Missed approach.					
	i. All engines operating		X	X	X	
	ii. One or more engines inoperative					
	(2) **Precision**					
	(a) All engines operating.					
	(b) One or more engines inoperative.					
	(c) Approach procedures, for example:					
	i. PAR					
	ii. MLS					
	iii. ILS					
	-- Manual (raw data)					
	-- Flight director only					
	-- Auto pilot coupled					
	-- CAT I					
	-- CAT II					
	iv. Other					
	(d) Missed approach.		X	X	X	
	i. All engines operating		X	X	X	
	ii. One or more engines inoperative		X	X	X	
	(3) **Visual**		X	X	X	
	(a) Normal.		X	X	X	
	(b) Steep.					
	(c) Shallow.					
	(d) CAT A profile.					
	(e) CAT B profile.					
	(f) External load.			X	X	
	(g) Visual segment from precision approach.		X	X	X	

	(h) Visual segment from circling approach.		X	X	X	
	(i) Abnormal/emergency procedures, for example:		X	X	X	
	i. Directional control failure		X	X	X	
	ii. Hydraulics failure		X	X	X	
	iii. Fuel governing failure					
	iv. Autorotation					
	v. Stability system failure					
	vi. Other					
j.	**Landing**					
	(1) Normal.			X	X	
	(a) From a hover.			X	X	
	(b) Running.		X	X	X	
	(c) Pinnacle/platform.			X	X	
	(d) Confined ~IWL			X	X	
	(e) Slope.		X	X	X	
	(f) Crosswind Tailwind.			X	X	
	(2) Abnormal/emergency procedures, for example:			X	X	
	(a) From autorotation.		X	X	X	
	(b) One engine inoperative.			X	X	
	(c) Directional control failure.		X	X	X	
	(d) Hydraulics failure.		X	X	X	
	(e) Stability system failure.		X	X	X	
	(f) Other.					
k.	**Any Flight Phase**					
	(1) Helicopter and power plant systems operation.		X	X	X	
	(a) Air conditioning.					
	(b) Anti-icing/deicing.					
	(c) Auxiliary power-plant.					
	(d) Communications.					
	(e) Electrical.					
	(f) Fire detection and suppression.					
	(g) Stabilizer.					
	(h) Flight controls.					
	(i) Fuel and oil.					
	(j) Hydraulic.					
	(k) Landing gear.					
	(l) Oxygen.					
	(m) Pneumatic.					
	(n) Power plant.					
	(0) Flight control computers.					
	(p) Stability and control augmentation.		X	X	X	
	(q) Other.					
	(2) Flight management and guidance system.					
	(a) Airborne radar.					
	(b) Automatic landing aids.					

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	(c) Autopilot. (d) Collision avoidance system. (e) Plight data displays. (f) Plight management computers. (g) Head-up displays. (h) Navigation systems. (i) Other. (3) Airborne procedures. (a) Holding. (b) Air hazard avoidance. (c) Retreating blade stall recovery. (d) Mast bumping. (e) Other.		X	X	X	
I.	**Engine Shutdown and Parking** (1) Engine and systems operation. (2) Parking brake operation. (3) Rotor brake operation. (4) Abnormal/emergency procedures		X	X	X	
2.	**VISUAL SYSTEM**					
a.	Accurate portrayal of environment relating to simulator attitudes and position.		X	X	X	
b.	The distances at which airport/heliport features are visible should not be less than those listed below. Distances are measured from runway threshold to a helicopter aligned with the runway on an extended 3degree glide slope. (1) Runway definition, strobe lights, approach lights, runway edge white lights and VASI / PAPI lights from 5 statute miles (8 kilometers) of the runway threshold. (2) Runway centerline lights, helipad perimeter lights, and taxiway definition from 3 statute miles (4.8 kilometers). (3) Threshold lights and touchdown zone lights from 2 statute miles (3.2 kilometers). (4) Runway and helipad markings within range of landing lights for night scenes; as required by 3 arc-minute resolution on day scenes.		X	X	X	
c.	Representative airport/heliport scene content including the following: (1) Airport runways, helipads, and taxiways. (2) Runway/helipad definition. (a) Runway/helipad surface. (b) Lighting for the runway in use, including runway edge and centerline lighting, touchdown zone, VASI, and approach lighting of appropriate colors. (c) Helipad perimeter and taxiway lights.		X	X	X	
d.	Operational landing lights.		X	X	X	

e.	Instructor controls of the following: (1) Cloud base-cloud tops. (2) Visibility in statute miles (km) and RVR in feet (meters). (3) Airport/heliport selection. (4) Airport/heliport lighting.		X	X	X	
f.	Visual system compatibility with vehicle mathematical model.		X	X	X	
g.	Visual cues to assess sink rate, translational rates, and height AGL during landings.		X	X	X	
h.	Dusk and night visual scene capability. (1) Surface on runways/helipads, taxiways, and ramps			X	X	
i.	Minimum of three specific airport/heliport scenes. (1) Surfaces and markings on runways, helipads, taxiways, and ramps. (2) Lighting of appropriate color for all landing areas including runway edge, centerline, VASI/PAPI, and approach lighting for the runway in use. (3) Helipad perimeter and taxiway lighting. (4) Ramps and terminal buildings and vertical objects which correspond to an operator's LOFT and Line Oriented Simulator scenarios (LOS).			X	X	
j.	General terrain characteristics and significant landmarks.			X	X	
k.	At and below an altitude of 2,000 ft. (610 m) height above the airport/heliport and within a radius of 10 miles (16.1 kilometers) from the airport/heliport, weather representations, including the following: (1) Variable cloud density. (2) Partial obscuration of ground scenes; the effect of a scattered to broken cloud deck. (3) Gradual break out. (4) Patchy fog. (5) The effect of fog on airport/heliport lighting.			X	X	
l.	A capability to present ground and air hazards such as another aircraft crossing the active runway and converging airborne traffic.			X	X	
m.	Operational visual scenes which provide a cue rich environment sufficient for precise low airspeed/low altitude maneuvering and landing.			X	X	
n.	Operational visual scenes which portray representative physical relationships known to cause landing illusions such as short runways, landing approaches over water, uphill or downhill landing areas, rising terrain on the approach path, and unique topographic features.				X	
o.	Special weather representations of light, medium, and heavy precipitation near a thunderstorm on takeoff,				X	

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	approach, and landing at and below an altitude of 2,000 feet (610 m) above the airport/heliport surface and within a radius of 10 miles (16.1 kilometers) from the airport/heliport.					
p.	Wet and snow-covered landing areas including runway/ helipad lighting reflections for wet, partially obscured lights for snow, or suitable alternative effects.				X	
q.	Realistic color and directionality of airport/heliport lighting.				X	
r.	Weather radar presentations in helicopters where radar information is presented on the pilot's navigation instruments. Radar returns should correlate to the visual scene.				X	
s.	Dynamic visual representation of rotor disk tip path plane.				X	
3.	**SPECIAL EFFECTS**					
a.	Buffet rumble, oleo deflections, effects of groundspeed and uneven surface characteristics.		X	X	X	
b.	Buffet due to transverse flow effect.		X	X	X	
c.	Buffet during extension and retraction of landing gear.		X	X	X	
d.	Buffet due to retreating blade stall.		X	X	X	
e.	Buffet due to settling with power.		X	X	X	
f.	Representative touchdown cues for landing gear.		X	X	X	
g.	Rotor vibrations.		X	X	X	
h.	Representative brake and tire failure dynamics and decreased brake efficiency due to high brake temperatures based on helicopter related data. These representations must be realistic enough to cause pilot identification of the problem and implementation of appropriate procedures. Simulator pitch, side loading, and directional control characteristics should be representative of the helicopter.			X	X	
i.	Sound of precipitation and significant helicopter noises perceptible to the pilot during normal operations and the sound of a crash when the simulator is landed in excess of landing gear limitations. Significant helicopter noises should include engine, rotor, transmission, landing gear, and other airframe sounds to a comparable level as that found in a helicopter. The sound of a crash should be related in some logical manner to landing in an unusual attitude or in excess of the structural gear limitations of the helicopter.			X	X	

APPENDIX "D"

	CIVIL AVIATION AUTHORITY **SIMULATOR QUALIFICATION APPROVAL APPLICATION FORM**	**PCAAF-071-FSXX-1.0**
	Flight Standards Directorate	

Note: Please read the instructions at the end carefully before filling and filing this Application Form. The quality and accuracy of information provided by you on these pages has a direct impact on the assessment and completion time of Simulator Qualification Approval process.

1. Company/Operator Name:

2. Name of the owner (s):

3. Address(es) with Tele., Fax No. and E-mail:

4. Complete Details/Definition of the Simulator:

5. Helicopter Type & Variant :

6. Master Qualification Test Guide Details :

7. Qualification Test Guide Details:

8. Type of flight simulator approval Required (Tick as applicable):

Initial Evaluation	
Recurrent Evaluation	
Modification of Flight Simulator	
Post Temporary De-activation	
Post Movement to New Location	

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9. Testing Completion certificate with applicable details:

Flight simulator testing has been completed and it is declare that it meets the applicable requirements of ICAO Doc 9625 edition 2 and Part-II of ANO-023-FSXX-3.0, except as noted below:

List of Test Discrepancies:

a) ..
b) ..
c) ..

Name and designation: Signature: Date:

10. Conformance to Helicopter Cockpit Configuration:

It is attested that this Flight Simulator conforms to the Helicopter cockpit configuration of ________________________ (type of aircraft) and that the simulated systems and sub-systems function equivalently to those in that Helicopter with the exception:

a) ----
b) ….
c) ….

Name and designation: Signature: Date:

11. Previous Assessment Record

a) Date of Assessment:
b) Name and designation of the Assessor:
c) Organization:

12. Additional Comments (if any)

Name and Designation: Signature: Date:

13. Application received at Flight Standards Directorate by:

Name and designation: Signature: Date:

	CIVIL AVIATION AUTHORITY SIMULATOR QUALIFICATION APPROVAL APPLICATION FORM	PCAAF-071-FSXX-1.0
	Flight Standards Directorate	

INSTRUCTIONS RELATED TO THE APPLICATION

1. It is important for you to know that PCAA may refuse to consider an application or to consider it further from beyond a point while there are requirements that the applicant has not or cannot comply with. Rule 340 of CARs 94 is referred to which states:
   "(1) The Director-General may refuse to grant or to renew certificate on one or more of the following grounds:
   (a) The applicant has failed to satisfy a requirement prescribed by or specified under these rules in relation to the granting of the certificate;
   (b) The applicant has made a false or misleading statement in his application, or in connection with his application;
   (c) The applicant is the holder of a license that is suspended;
   (d) The applicant was the holder of a license that has been cancelled; or
   (e) The applicant is not a fit and proper person to have the responsibilities and to exercise the functions and duties of a holder of the certificate for which the application was made."

2. FSD, PCAA strongly recommends that ICAO document 9625 and Part-II of ANO-023-FSXX-3.0 may be followed in true spirit. These documents provide comprehensive information on requirements and processes for flight simulator approval. Following the required procedures while complying with the requirements given therein shall expedite the whole process.

3. Application shall not be considered "complete" if all the information as specified is not provided at the time of its submission to FSD, PCAA.

4. Application submission date shall be the day when completed application is submitted. Count down shall start from that date for further processes.

5. Application Form shall be signed either by the Head of Organization or the person authorized by PCAA.

6. No column of this Application Form shall be left blank.

7. Reverse side of Form pages may be used for the data spillover.

8. Extra sheets may be used where required.

9. Where a copy of any document has to be attached, it shall be an attested true copy of the original.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 19th July, 2021 and supersedes ANO-023-FSXX-3.0.

--S/d--

(KHAQAN MURTAZA)
Director General,
Pakistan Civil Aviation Authority

Dated:- **16th July, 2021**

--S/d--

(CAPT. S. M. RAFATULLAH)
Director Flight Standards

Dated:- **12th July, 2021**
File No. HQPCAA/1077/032/FSAC

COMMERCIAL AIR TRANSPORT OPERATIONS AEROPLANES

AIR NAVIGATION ORDER

VERSION	**:**	**8.0**
DATE OF IMPLEMENTATION	**:**	**15-04-2021**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. NADEEM HANIF	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. S.M. RAFATULLAH	Director Flight Standards	Signed
VERIFIED BY	NADIR SAFI DAR	Dy. Director General (Regulatory)	Signed
APPROVED BY	KHAQAN MURTAZA	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO)		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY

A1. This Air Navigation Order (ANO) is issued by Director General, Civil Aviation Authority in pursuance of powers vested in him under Rule 4 of Civil Aviation Rules – 1994.

B. PURPOSE

B1. This ANO provides the standards and recommended practices as applicable to the operations of aeroplanes by Operators authorized to conduct Commercial, Charter and Aerial Work operations for requirements or hire.

C. SCOPE

C1. This ANO applies to all persons, organization or enterprises who are either the applicant for the Air Operator Certificate or the holder of an AOC for Commercial Flight Operations involving transportation of passengers, cargo or mail, for remuneration or hire.

C2. Standards and Recommended Practices adopted by the PCAA under the provisions of the Chicago Convention. They are defined as follows:

a) **Standard:** Any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation and to which Contracting States will conform in accordance with the Convention.

b) **Recommended Practice:** Any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States will endeavor to conform in accordance with the Convention.

D. DESCRIPTION:

D1. DEFINITIONS:

When the following terms are used in this ANO, they have the following meanings:

D1.1 **Accelerate-Stop Distance Available (ASDA).** The length of the take-off run available plus the length of stopway, if provided.

D1.2 **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.

D1.3 **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.

D1.4 **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.

D1.5 **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.

D1.6 **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.

D1.7 **Aircraft Operating Manual.** A manual, acceptable to PCAA, 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.

D1.8 **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.

D1.9 **Air Operator Certificate (AOC).** A certificate authorizing an Operator to carry out specified commercial air transport operations.

D1.10 **Air Traffic Service (ATS).** A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

D1.11 **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.

D1.12 **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:

a) 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.
b) 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.
c) 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.

D1.13 **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.

D1.14 ***Appropriate airworthiness requirements***. The comprehensive and detailed airworthiness codes established, adopted or accepted by a Contracting State for the class of aircraft, engine or propeller under consideration.

D1.15 **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.

D1.16 **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.

D1.17 **COMAT**. Operator material carried on an Operator’s aircraft for the Operator’s own purposes.

D1.18 **Combined Vision System (CVS).** A system to display images from a combination of an enhanced vision system (EVS) and a synthetic vision system (SVS).

D1.19 **Commercial Air Transport Operation.** An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire.

D1.20 **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.

D1.21 **Contaminated runway.** 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 Annex 14, Volume I - Definitions.

D1.22 **Continuing Airworthiness.** The set of processes by which an aircraft, engine, propeller or part complies with the applicable airworthiness requirements and remains in a condition for safe operation throughout its operating life.

D1.23 **Continuing airworthiness records.** Records which are related to the continuing airworthiness status of an aircraft, engine, propeller or associated part.

D1.24 **Continuous Descent Final Approach (CDFA).** A technique, consistent with stabilized approach procedures, for flying the final approach segment (FAS) of an instrument non-precision approach (NPA) 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 begins for the type of aircraft flown; for the FAS of an NPA procedure followed by a circling approach, the CDFA technique applies until circling approach minima (circling OCA/H) or visual flight maneuver altitude/height are reached.

D1.25 **Crew Member.** A person assigned by an Operator to duty on an aircraft during a flight duty period.

D1.26 **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.

D1.27 **Cruising Level.** A level maintained during a significant portion of a flight.

D1.28 **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 Annex 18, Chapter 3.

D1.29 **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".

D1.30 **Dry runway.** A runway is considered dry if its surface is free of visible moisture and not contaminated within the area intended to be used.

D1.31 **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.

D1.32 **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.

D1.33 **EDTO (Extended Diversion Time Operations)**. 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 PCAA.

D1.34 **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.

Note: Attachment C contains guidance on EDTO Critical Fuel scenarios.

D1.35 **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.

D1.36 **Electronic Flight Bag (EFB).** An electronic information system, comprised of equipment and applications, for flight crew which allows for storing, updating, displaying and processing of EFB functions to support flight operations or duties.

D1.37 **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:

a) Automatic Fixed ELT (ELT(AF)). An automatically activated ELT which is permanently attached to an aircraft.
b) Automatic Portable ELT (ELT(AP)). An automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft.
c) 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.
d) Survival ELT (ELT(S)). An ELT which is removable from an aircraft, stowed so as to facilitate its ready use in an emergency, and manually activated by survivors.

D1.38 **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).

D1.39 **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 Night Vision Imaging Systems (NVIS).

D1.40 **Fatigue.** A physiological state of reduced mental or physical performance capability resulting from sleep loss, extended wakefulness, circadian phase, and / or workload (mental and/or physical activity) that can impair a person's alertness and ability to perform safety related operational duties.

D1.41 **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.

D1.42 **Final Approach Segment (FAS)**. That segment of an instrument approach procedure in which alignment and descent for landing are accomplished.

D1.43 **Flight Crew Member.** A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

D1.44 **Flight Data Analysis.** A process of analyzing recorded flight data in order to improve the safety of flight operations.

D1.45 **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.

D1.46 **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.

D1.47 **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.

D1.48 **Flight Plan.** Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft.

D1.49 **Flight recorder.** Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation.

a) **Automatic Deployable Flight Recorder (ADFR).** A combination flight recorder installed on the aircraft which is capable of automatically deploying from the aircraft.

D1.50 **Flight Safety Documents System.** A set of interrelated 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.

D1.51 **Flight Simulation Training Device.** Any one of the following three types of apparatus in which flight conditions are simulated on the ground:

a) 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;

b) 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;

c) 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.

D1.52 **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.

D1.53 **General Aviation Operation.** An aircraft operation other than a commercial air transport operation or an aerial work operation.

D1.54 **Ground Handling.** Services necessary for an aircraft’s arrival at, and departure from, an airport, other than air traffic services.

D1.55 **Head-Up Display (HUD).** A display system that presents flight information into the pilot’s forward external field of view.

D1.56 **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.

D1.57 **Human Performance.** Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

D1.58 **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:

a) a ground-based radio navigation aid; or

b) computer-generated navigation data from ground-based, space-based, self-contained navigation aids or a combination of these.

D1.59 **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:

a) 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 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 II, Section 5.

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

c) **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 D4.2.8.3 for instrument approach operation types.

D1.60 **Instrument Meteorological Conditions (IMC).** Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling (As defined in ICAO Annex 2), 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.

D1.61 **Isolated aerodrome.** A destination aerodrome for which there is no destination alternate aerodrome suitable for a given aeroplane type.

D1.62 **Landing Distance Available (LDA).** The length of runway which is declared available and suitable for the ground run of an aeroplane landing.

D1.63 **Large Aeroplane.** An aeroplane of a maximum certificated take-off mass of over 5700 kg.

D1.64 **Low-visibility operations (LVO).** Approach operations in RVRs less than 550 m and/or with a DH less than 60 m (200 ft) or take-off operations in RVRs less than 400 m.

D1.65 **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.

D1.66 **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.

D1.67 **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.

D1.68 **Maintenance Release.**
A document which contains a certification confirming that the maintenance work to which it relates has been completed in a satisfactory manner in accordance with appropriate airworthiness requirements..

D1.69 **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.

D1.70 **Maximum Diversion Time**. Maximum allowable range, expressed in time, from a point on a route to an en-route alternate aerodrome.

D1.71 **Maximum Mass.** Maximum certificated take-off mass.

D1.72 **Minimum Descent Altitude (MDA)** or **Minimum Descent Height (MDH).** A specified altitude or height in a 2D instrument approach operation or circling approach operation 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”.

D1.73 **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.

D1.74 **Modification.** A change to the type design of an aircraft, engine or propeller.

Note: A modification may also include the embodiment of the modification which is a maintenance task subject to a maintenance release. Further guidance on aircraft maintenance - modification and repair is contained in the Airworthiness Manual (Doc 9760).

D1.75 **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 specifications:

a) Required Navigation Performance (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.
b) 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 (PBN) Manual (ICAO 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 ANO as the concept of RNP has been overtaken by the concept of PBN. The term RNP in this ANO 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 ICAO Doc 9613.

D1.76 **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 centre of the sun's disc is 6 degrees below the horizon and begins in the morning when the centre of the sun's disc is 6 degrees below the horizon.

D1.77 **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 approach procedures 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 procedure 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".

D1.78 **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.

D1.79 **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.

D1.80 **Operations Manual.** A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

D1.81 **Operations Specifications**. The authorizations, conditions and limitations associated with the air Operator certificate and subject to the conditions in the operations manual.

D1.82 **Operator.** The person, organization or enterprise engaged in or offering to engage in an aircraft operation.

D1.83 **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.

D1.84 **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 functionality needed for the proposed operation in the context of a particular airspace concept.

D1.85 **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: Performance requirements are expressed in Navigation Specifications (RNAV Specification, RNP Specification) in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.

D1.86 **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.

D1.87 **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.

D1.88 **Point of No Return**. The last possible geographic point at which an aircraft can proceed to the destination aerodrome as well as to an available en route alternate aerodrome for a given flight.

D1.89 **Pressure-Altitude.** An atmospheric pressure expressed in terms of altitude which corresponds to that pressure in the Standard Atmosphere (As defined in ICAO Annex 8).

D1.90 **Psychoactive Substances.** Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psycho stimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

D1.91 **Repair.**

The restoration of an aircraft, engine, propeller or associated part to an airworthy condition in accordance with the appropriate airworthiness requirements, after it has been damaged or subjected to wear.

D1.92 **Required Communication Performance (RCP) Specification.** A set of requirements for air traffic service provision and associated ground equipment, aircraft capability, and operations needed to support performance-based communication.

D1.93 **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.

D1.94 **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.

D1.95 **Runway Visual Range (RVR).** The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

D1.96 **Safe Forced Landing.** Unavoidable landing or ditching with a reasonable expectancy of no injuries to persons in the aircraft or on the surface.

D1.97 **Safety Management System (SMS).** A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

D1.98 **Small Aeroplane.** An aeroplane of a maximum certificated take-off mass of 5700 kg or less.

D1.99 **Specific approval.** An approval which is documented in the operations specifications for commercial air transport operations or in the list of specific approvals for general aviation operations.

Note: The terms authorization, specific approval, approval and acceptance are further described in Attachment D.

D1.100 **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 (ICAO Doc 9587).

D1.101 **State of the Aerodrome.** The State in whose territory the aerodrome is located.

D1.102 **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.

D1.103 **Synthetic Vision System (SVS).** A system to display data-derived synthetic images of the external scene from the perspective of the flight deck.

D1.104 **Target Level of Safety (TLS).** A generic term representing the level of risk which is considered acceptable in particular circumstances.

D1.105 **Threshold Time**. The range, expressed in time, established by PCAA to an en-route alternate aerodrome, whereby any time beyond requires a specific approval for EDTO from PCAA.

D1.106 **Total Vertical Error (TVE).** The vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level).

D1.107 **Visual Meteorological Conditions (VMC).** Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling (As defined in ICAO Annex 2), equal to or better than specified minima.

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

D1.108 **Wet runway.** The runway surface is covered by any visible dampness or water up to and including 3 mm deep within the intended area of use.

D2. APPLICABILITY:

The Standards and Recommended Practices contained in this ANO shall be applicable to the operation of aeroplanes by Operators authorized to conduct International Commercial Air Transport Operations.

Note 1: Standards and Recommended Practices applicable to International General Aviation Operations with aeroplanes are to be found in ICAO Annex 6, Part II./ ANO-91-0022 (Issue-4).

Note 2: Standards and Recommended Practices applicable to International Commercial Air Transport Operations or International General Aviation Operations with helicopters are to be found in ANO-025-FSXX-2.0

Note 3: Para 3.5 applicable on and after 8th November, 2018.

D3. GENERAL:

D3.1 **Compliance with Laws, Regulations and Procedures**:

D3.1.1 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.

D3.1.2 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 (ICAO Doc 8168, Volume I). Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (ICAO 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.

D3.1.3 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.

D3.1.4 Responsibility for operational control shall be delegated only to the pilot-in-command and to a flight operations officer / flight dispatcher if an 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 (ICAO 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 (ICAO Doc 9376). The requirements for age, skill, knowledge and experience for licensed flight operations officers/flight dispatchers are contained in ICAO Annex 1.

D3.1.5 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 D4.6.2 shall include, where necessary, notification to the appropriate authorities of the nature of the situation without delay, and requests for assistance if required.

D3.1.6 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 PCAA. Such reports shall be submitted as soon as possible and normally within ten days.

D3.1.7 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.

D3.1.8 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.

D3.2 **Compliance by a Foreign Operator with Laws, Regulations and Procedures of Pakistan and PCAA**:

D3.2.1 When PCAA identifies a case of non-compliance or suspected non-compliance by a foreign Operator with laws, regulations and procedures applicable within the territory of Pakistan, or a similar serious safety issue with that Operator, PCAA will immediately notify the Operator and, if the issue warrants it, the PCAA. Where the PCAA and the State of Registry are different, such notification will also be made to the State of Registry, if the issue falls within the responsibilities of that State and warrants a notification.

D3.2.2 In the case of notification to States as specified in D3.2.1, if the issue and its resolution warrant it, the State in which the operation is conducted will engage in consultations with the PCAA 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 (ICAO 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 D6.2.2, 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.

D3.3 **Safety Management:**

Note: Annex 19 includes Safety Management Provisions for air Operators. Further guidance is contained in the Safety Management Manual (SMM) (ICAO Doc 9859).

D3.3.1 **Recommendation:** The Operator of an aeroplane of a certificated take-off mass in excess of 20000 kg should establish and maintain a flight data analysis programme as part of its Safety Management System.

D3.3.2 The Operator of an aeroplane of a maximum certificated take-off mass in excess of 27000 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.

D3.3.3 As of 7 November 2019, a flight data analysis programme shall contain adequate safeguards to protect the source(s) of the data in accordance with Appendix 3 to Annex 19.

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

D3.3.4 As of 7 November 2019, States shall not allow the use of recordings or transcripts of CVR, CARS, Class A AIR and Class A AIRS for purposes other than the investigation of an accident or incident as per Annex 13, except where the recordings or transcripts are:

a) related to a safety-related event identified in the context of a safety management system; are restricted to the relevant portions of a de-identified transcript of the recording; and are subject to the protections accorded by Annex 19;
b) sought for use in criminal proceedings not related to an event involving an accident or incident investigation and are subject to the protections accorded by Annex 19; or
c) used for inspections of flight recorder systems as provided in Section 7 of Appendix 8.

Note: Provisions on the protection of safety data, safety information and related sources are contained in Appendix 3 to Annex 19. When an investigation under Annex 13 is instituted, investigation records are subject to the protections accorded by Annex 13.

D3.3.5 As of 7 November 2019, States shall not allow the use of recordings or transcripts of FDR, ADRS as well as Class B and Class C AIR and AIRS for purposes other than the investigation of an accident or incident as per Annex 13, except where the recordings or transcripts are subject to the protections accorded by Annex 19 and are:

a) used by the operator for airworthiness or maintenance purposes;

b) used by the operator in the operation of a flight data analysis programme required in this Annex;
c) sought for use in proceedings not related to an event involving an accident or incident investigation;
d) de-identified; or
e) disclosed under secure procedures.

Note: Provisions on the protection of safety data, safety information and related sources are contained in Appendix 3 to Annex 19.

D3.3.6 As of 7 November 2019, 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.

D3.4 **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.

D3.5 **Aircraft Tracking (applicable on and after 8th November, 2018):**

D3.5.1 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 (Cir 347).

D3.5.2 **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 27000 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 Annex-11, Chapter 2 for coordination between the operator and air traffic services provisions regarding position report messages.

D3.5.3 The operator shall track the position of an aeroplane through automated reporting at least every 15 minutes for the portion(s) of the in-flight operation(s) that is planned in an oceanic area(s) under the following condition:
a) The aeroplane has a maximum certificated take-off mass of over 45500 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 1: Oceanic area – for the purpose of aircraft tracking is the airspace which overlies waters outside the territory of a State.

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

D3.5.4 Notwithstanding the provisions in D3.5.2 and D3.5.3, the PCAA may, based on the results of an approved risk assessment process implemented by the operator, allow for variations to automated reporting intervals. The process shall demonstrate how risks to the operation resulting from such variations can be managed and shall include at least the following:

a) Capability of the operator's operational control systems and processes, including those for contracting ATS units;
b) Overall capability of the aeroplane and its system;
c) Available means to determine the position of, and communicate with, the aeroplane;
d) Frequency and duration of gaps in automated reporting;
e) Human factors consequences resulting from changes to flight crew procedures; and
f) Specific mitigation measures and contingency procedures.

Note: Guidance on development, implementation and approval of the risk assessment process which allows for variations to the need for automatic reporting and the required interval, including variation examples, is contained in the Aircraft Tracking Implementation Guidelines (Cir 347).

D3.5.5 The operator shall establish procedures, approved by PCAA, for the retention of aircraft tracking data to assist SAR in determining the last known position of the aircraft.

Note: Refer to D4.2.1.3.1 for operator responsibilities when using third parties for the conduct of aircraft tracking under D3.5.

D4. FLIGHT OPERATIONS:

D4.1 Operating Considerations and Facilities:

D4.1.1 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: "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.

D4.1.2 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.

Note 1: "Reasonable means" in this Standard is intended to denote the use, at the point of departure or while the aircraft is in flight, of information available to the operator either through official information published by the aeronautical information services or readily obtainable from other sources.

Note 2: Guidance on safety risk assessments is contained in the Safety Management Manual (SMM) (Doc 9859).

Note 3: The Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones (Doc 10084) contains further guidance on risk assessment for air operators when flying over or near conflict zones.

D4.1.3 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.

D4.1.4 The Operator shall, as part of its Safety Management System, assess the level of rescue and fire fighting 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.

D4.1.5 Information related to the level of RFFS protection that is deemed acceptable by the Operator shall be contained in the operations manual.

Note: Annex 19 includes safety management provisions for air operators. Further guidance is contained in the Safety Management Manual (SMM) (Doc 9859).

D4.1.6 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 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 Annex 14, Volume I, for aerodromes.

D4.2 Operational Certification and Supervision:

D4.2.1 The Air Operator Certificate:

D4.2.1.1 An Operator shall not engage in commercial Air Transport Operations unless in possession of a valid Air Operator Certificate issued by PCAA.

D4.2.1.2 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 D4.2.1.5 and D4.2.1.6.

D4.2.1.3 The issue of an Air Operator Certificate by PCAA will 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: AOC Guide (PCAAD-617) contains guidance on the issue of an Air Operator Certificate.

D4.2.1.3.1 An Operator shall develop policies and procedures for third parties that perform work on its behalf.

D4.2.1.4 The continued validity of an air Operator certificate will depend upon the Operator maintaining the requirements of D4.2.1.3 under the supervision of PCAA.

D4.2.1.5 The Air Operator Certificate shall contain at least the following information and shall follow the layout of Appendix 5, Para 2:

a) the PCAA 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.

D4.2.1.6 The Operations Specifications associated with the Air Operator Certificate shall contain at least the information listed in Appendix 5, Para 3, and, shall follow the layout of Appendix 5, Para 3.

Note: Attachment D, Para 3.2.2, contains additional information that may be listed in the Operations Specifications associated with the Air Operator Certificate.

D4.2.1.7 Air Operator certificates and their associated Operations Specifications first issued from 20 November 2008 shall follow the layouts of Appendix 5, Paras 2 and 3.

D4.2.1.8 PCAA has established a system for both the certification and the continued surveillance of the Operator in accordance with ICAO requirements specified in ICAO Annex-6, Part-I, Appendix 5 and Appendix 1 to ICAO Annex 19 to ensure that the required standards of operations established in D4.2 are maintained.

D4.2.2 **Surveillance of Operations by a Foreign Operator:**

D4.2.2.1 Contracting States 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 ANO and in ICAO Annex 19.

D4.2.2.2 PCAA has established a programme with procedures for the surveillance of operations in Pakistan by a foreign Operator and for taking appropriate action when necessary to preserve safety.

D4.2.2.3 An Operator shall meet and maintain the requirements established by the States in which the operations are conducted.

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 (ICAO Doc 8335).

D4.2.3 **Operations Manual**:

D4.2.3.1 An Operator shall provide, for the use and guidance of operations personnel concerned, an operations manual in accordance with Appendix 2 and ANO-003-FSXX. 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.

D4.2.3.2 The Operator shall 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 PCAA may require.

Note 1: Requirements for the organization and content of an Operations Manual are provided in Appendix 2 and ANO-003-FSXX.

Note 2: Specific items in the operations manual require the approval of PCAA in accordance with the Standards in D4.2.8, D6.1.3, D9.3.1, D12.4 and D13.4.1.

D4.2.4 **Operating Instructions — General:**

D4.2.4.1 An 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.

D4.2.4.2 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.

D4.2.4.3 **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.

D4.2.5 **In-flight Simulation of Emergency Situations:**

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

D4.2.6 **Checklists:**

The checklists provided in accordance with D6.1.4 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, are followed. 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 (ICAO Doc 9683).

D4.2.7 **Minimum Flight Altitudes:**

D4.2.7.1 An Operator is 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 State, provided that they shall not be less than those established by that State.

D4.2.7.2 An 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 State flown over or the responsible State, 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.

D4.2.7.3 **Recommendation:** The method for establishing the minimum flight altitudes will be approved by PCAA.

D4.2.7.4 **Recommendation:** PCAA will 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.

D4.2.8 **Aerodrome Operating Minima:**

D4.2.8.1 The Operator shall establish aerodrome operating minima for each aerodrome to be used in operations and the method of determination of such minima. Such minima shall be approved by PCAA and will 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 minima.

D4.2.8.1.1 PCAA 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 (D4.4.1.2), 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 HI 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).

D4.2.8.2 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; and any conditions or limitations stated in the flight manual;
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.
i) the conditions prescribed in the operations specifications; and
j) any minima that may be promulgated by the State of the Aerodrome

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

D4.2.8.3 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:
    i) 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;
    ii) 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;
    iii) 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; visual range less than 300 m or no runway visual range limitations
    iv) 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
    v) 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). This does not apply if the RVR and/or DH has been approved as operational credits.

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 All Weather Operations Manual (ICAO Doc 9365).

D4.2.8.4 The PCAA shall issue a specific approval for instrument approach operations in low visibility which shall only be conducted when RVR information is provided.

Note: Guidance on low visibility operations is contained in the Manual of All-Weather Operations (Doc 9365).

D4.2.8.5 For take-off in low visibility, the PCAA shall issue a specific approval for the minimum take-off RVR.

Note: In general, visibility for take-off is defined in terms of RVR. An equivalent horizontal visibility may also be used.

D4.2.8.6 **Recommendation:** For instrument approach operations, aerodrome operating minima below 800 m visibility should not be authorized unless RVR information is provided.

D4.2.8.7 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 (ICAO Doc 8168), Volume I, Part II Section 5

D4.2.8.8 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.

D4.2.9 **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.

D4.2.10 **Fuel and Oil Records:**

D4.2.10.1 The Operator shall maintain fuel records to enable PCAA to ascertain that, for each flight, the requirements of D4.3.6 and D4.3.7.1 have been complied with.

D4.2.10.2 The Operator shall maintain oil records to enable PCAA to ascertain that trends for oil consumption are such that an aeroplane has sufficient oil to complete each flight.

D4.2.10.3 Fuel and oil records shall be retained by the Operator for a period of three months.

D4.2.11 **Crew:**

D4.2.11.1 Pilot-in-command. For each flight, the Operator shall designate one pilot to act as pilot-in-command.

D4.2.11.2 For each flight of an aeroplane above 15000 m (49000 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 ICAO Circular 126 – Guidance Material on SST Aircraft Operations.

D4.2.12 **Passengers:**

D4.2.12.1 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.

D4.2.12.2 The Operator shall inform the passengers of the location and general manner of use of the principal emergency equipment carried for collective use.

D4.2.12.3 The operator shall ensure that in an emergency during flight, passengers are instructed in such emergency action as may be appropriate to the circumstances.

D4.2.12.4 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.

D4.3 **Flight Preparation:**

D4.3.1 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 onboard the aeroplane;
b) the instruments and equipment prescribed in Para D6, for the particular type of operation to be undertaken, are installed and are sufficient for the flight;
c) a maintenance release as prescribed in Para D8.8 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 Para D5 can be complied with for the flight to be undertaken; and
g) the Standards of Para D4.3.3 relating to operational flight planning have been complied with.

D4.3.2 Completed flight preparation forms shall be kept by an Operator for a period of three months.

D4.3.3 **Operational Flight Planning**

D4.3.3.1 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 Para D4.6.

D4.3.3.2 The Operations Manual must describe the content and use of the operational flight plan.

D4.3.4 **Alternate Aerodromes:**

D4.3.4.1 Take-off Alternate Aerodrome:

D4.3.4.1.1 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.

D4.3.4.1.2 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-engine 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.

D4.3.4.1.3 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.

D4.3.4.2 **En-route Alternate Aerodromes:**

En-route alternate aerodromes, required by D4.7 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.

D4.3.4.3 **Destination Alternate Aerodromes:**

D4.3.4.3.1 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, reasonable certainty exists that:
   i) the approach and landing may be made under visual meteorological conditions; and
   ii) 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 D4.3.6.3 d) 4);
   i) for each flight into an isolated aerodrome a point of no return shall be determined; and
   ii) 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 Manual (ICAO Doc 9976).

D4.3.4.3.2 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.

D4.3.4.4 Notwithstanding the provisions in D4.3.4.1, D4.3.4.2, and D4.3.4.3; PCAA 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, are contained in the Flight Planning and Fuel Management Manual (ICAO Doc 9976) and the Safety Management Manual (SMM) (ICAO Doc 9859).

D4.3.5 **Meteorological Conditions:**

D4.3.5.1 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.

D4.3.5.2 A flight to be conducted in accordance with the instrument flight rules;

a) shall not 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 D4.3.4, 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.

D4.3.5.3 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, acceptable to PCAA, for height of cloud base and visibility 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 Manual (ICAO Doc 9976).

D4.3.5.4 PCAA 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 Manual (ICAO Doc 9976).

D4.3.5.5 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.

D4.3.5.6 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 (ICAO Doc 9640).

D4.3.6 **Fuel Requirements:**

D4.3.6.1 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.

D4.3.6.2 The amount of usable fuel to be carried shall, as a minimum, be based on:

a) the following data:
   i) current aeroplane-specific data derived from a fuel consumption monitoring system, if available; or
   ii) if current aeroplane-specific data is not available, data provided by the aeroplane manufacturer; and

b) the operating conditions for the planned flight including:
   i) anticipated aeroplane mass;
   ii) Notices to Airmen;
   iii) current meteorological reports or a combination of current reports and forecasts;
   iv) air traffic services procedures, restrictions and anticipated delays; and
   v) the effects of deferred maintenance items and/or configuration deviations.

D4.3.6.3 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 takeoff or the point of in-flight re-planning until landing at the destination aerodrome taking into account the operating conditions of D4.3.6.2 b);

c) contingency fuel, which shall be the amount of fuel required to compensate for unforeseen factors. It shall be 5 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 (1500 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 D4.3.6.3 d) i), 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 (1500 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 engine 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:

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

ii) for a turbine engine aeroplane, the amount of fuel required to fly for 30 minutes at holding speed at 450 m (1500 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 D4.3.6.3 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 (1500 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 PCAA;

3) meet additional requirements not covered above;

Note 1: Fuel planning for a failure that occurs at the most critical point along a route (D4.3.6.3 f) i)) may place the aeroplane in a fuel emergency situation based on D4.3.7.2.

Note 2: Guidance on EDTO critical fuel scenarios are contained in Attachment C;

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

D4.3.6.4 **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.

D4.3.6.5 A flight shall not commence unless the usable fuel on board meets the requirements in D4.3.6.3 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 D4.3.6.3 b), c), d), e) and f) if required.

D4.3.6.6 Notwithstanding the provisions in D4.3.6.3 a), b), c), d), and f); PCAA 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 for 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 Manual (ICAO Doc 9976).

D4.3.6.7 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 Manual (ICAO Doc 9976).

D4.3.7 **In-Flight Fuel Management**:

D4.3.7.1 An Operator shall establish policies and procedures, approved by PCAA, to ensure that in-flight fuel checks and fuel management are performed.

D4.3.7.2 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 Manual (ICAO Doc 9976).

D4.3.7.2.1 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.

D4.3.7.2.2 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 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 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 Manual (ICAO Doc 9976).

D4.3.7.2.3 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 D4.3.6.3 e) i) or ii) 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 ICAO Annex 10, Volume II, para 5.3.2.1, b) 3.

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

D4.3.8 **Refueling with Passengers on Board:**

D4.3.8.1 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.

D4.3.8.2 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 D4.3.8.1 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, (ICAO 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.

D4.3.9 **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	Meters	Feet
700 hPa	3000	10000
620 hPa	4000	13000
376 hPa	7600	25000

D4.3.9.1 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.

D4.3.9.2 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.

D4.3.10 **Time Capability of Cargo Compartment Fire Suppression System:**

D4.3.10.1 **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 PCAA.

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 Para D4.7 and Attachment B for considerations of time capability of cargo compartment fire suppression systems for aeroplanes engaged in EDTO.

D4.4 **In-Flight Procedures:**

D4.4.1 **Aerodrome Operating Minima:**

D4.4.1.1 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 D4.2.8.1.

D4.4.1.2 An instrument approach shall not be continued below 300 m (1000 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.

D4.4.1.3 If, after entering the final approach segment or after descending below 300 m (1000 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 PCAA criteria.

D4.4.2 **Meteorological Observations:**

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

D4.4.2.1 As of 4 November 2021,the pilot-in-command shall report the runway braking action special air-report (AIREP) when the runway braking action encountered is not as good as reported.

Note: The procedures for making special air-reports regarding runway braking action are contained in the PANS-ATM (Doc 4444), Chapter 4 and Appendix 1.

D4.4.3 **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.

D4.4.4 **Flight Crew Members at Duty Stations:**

D4.4.4.1 Take-off and landing. All flight crew members required to be on flight deck duty shall be at their stations.

D4.4.4.2 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.

D4.4.4.3 Seat belts. All flight crew members shall keep their seat belts fastened when at their stations.

D4.4.4.4 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.

D4.4.5 **Use of Oxygen:**

D4.4.5.1 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 D4.3.9.1 or D4.3.9.2.

D4.4.5.2 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.

D4.4.6 **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.

D4.4.7 **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.

D4.4.8 **Instrument Flight Procedures**:

D4.4.8.1 One or more instrument approach procedures designed to support instrument approach operations shall be approved and promulgated by CAA Pakistan in which the aerodrome is located to serve each instrument runway or aerodrome utilized for instrument flight operations.

D4.4.8.2 All aeroplanes operated in accordance with instrument flight rules shall comply with the instrument flight procedures approved by CAA Pakistan in which the aerodrome is located.

Note 1: See D4.2.8.3 for instrument approach operation classifications.

Note 2: Information for pilots on flight procedure parameters and operational procedures is contained in PANS-OPS (ICAO Doc 8168), Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (ICAO 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).

D4.4.9 **Aeroplane Operating Procedures for Noise Abatement:**

D4.4.9.1 **Recommendation:** Aeroplane operating procedures for noise abatement should comply with the provisions of PANS-OPS (ICAO Doc 8168), Volume I.

D4.4.9.2 **Recommendation:** Noise abatement procedures specified by an Operator for any one aeroplane type should be the same for all aerodromes.

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

D4.4.10 **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 1500 ft/min (depending on the instrumentation available) throughout the last 300 m (1000 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 (ICAO Doc 8168) Volume I, Part III, Section 3, Chapter 3.

D4.4.11 **Aeroplane operating procedures for landing performance**
(As of 4th November, 2021)
An approach to land shall not be continued below 300 m (1 000 ft) above aerodrome elevation unless the pilot-in-command is satisfied that, with the runway surface condition information available, the aeroplane performance information indicates that a safe landing can be made.

Note 1: The procedures used by aerodromes to assess and report runway surface conditions are contained in the PANS-Aerodromes (Doc 9981) and those for using runway surface condition information on board aircraft are in the Aeroplane Performance Manual (Doc 10064).

Note 2: Guidance on development of aeroplane performance information is contained in the Aeroplane Performance Manual (Doc 10064).

D4.5 **Duties of Pilot-in-Command:**

D4.5.1 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.

D4.5.2 The pilot-in-command shall ensure that the checklists specified in D4.2.6 are complied with in detail.

D4.5.3 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.

D4.5.4 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.

D4.5.5 The pilot-in-command shall be responsible for the journey log book or the general declaration containing the information listed in D11.4.1.

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 will be an acceptable form of journey log book”.

D4.6 **Duties of Flight Operations Officer / Flight Dispatcher:**

D4.6.1 A flight operations officer / flight dispatcher in conjunction with a method of control and supervision of flight operations in accordance with D4.2.1.3 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.

D4.6.2 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.

D4.7 **Additional requirements for operations by aeroplanes with turbine engines beyond 60 minutes to an en-route alternate aerodrome including Extended Diversion Time Operations (EDTO):**

D4.7.1 Requirements for operations beyond 60 minutes to an en-route alternate aerodrome

D4.7.1.1 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.

D4.7.1.2 In addition to the requirements in D4.7.1.1, 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.

D4.7.2 **Requirements for Extended Diversion Time Operations (EDTO)**

D4.7.2.1 Unless the PCAA has issued a specific approval for EDTO, 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 State. The specific approval shall identify the applicable threshold time established for each particular aeroplane and engine combination.

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 are contained in Attachment C and in the Extended Diversion Time Operations (EDTO) Manual (Doc 10085).

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

D4.7.2.2 The maximum diversion time, for an Operator of a particular aeroplane type engaged in extended diversion time operations shall be approved by PCAA.

Note: Guidance on the conditions to be used when converting diversion times to distances are contained in Attachment C and in the Extended Diversion Time Operations (EDTO) Manual (Doc 10085).

D4.7.2.3 When approving the appropriate maximum diversion time for an Operator for a particular aeroplane type engaged in extended diversion time operations, PCAA ensures 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.

D4.7.2.3.1 Notwithstanding the provisions in D4.7.2.3 a); PCAA 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 for the specific safety risk assessment is contained in Attachment C and in the Extended Diversion Time Operations (EDTO) Manual (Doc 10085).

D4.7.2.4 For aeroplanes engaged in EDTO, the additional fuel required by D4.3.6.3 f) ii) shall include the fuel necessary to comply with the EDTO critical fuel scenario as established by PCAA.

Note: Guidance on compliance with the requirements of this provision is in Attachment C and in the Extended Diversion Time Operations (EDTO) Manual (Doc 10085).

D4.7.2.5 A flight shall not proceed beyond the threshold time in accordance with D4.7.2.1 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.

D4.7.2.6 PCAA will 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 (ICAO Doc 9760) contains guidance on the level of performance and reliability of aeroplane systems intended by D4.7.2.6, as well as guidance on continuing airworthiness aspects of the requirements of D4.7.2.6.

D4.7.2.7 **Recommendation.** PCAA will give consideration to permitting an Operator to continue on a route which prior to 25th 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 D4.7.2.1 should give consideration to permitting such an operation to continue on that route after that date.

D4.8 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.

D4.9 Additional requirements for Single Pilot Operations under the Instrument Flight Rules (IFR) or at Night:

D4.9.1 An aeroplane shall not be operated under the IFR or at night by a single pilot unless approved by PCAA.

D4.9.2 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 5700 kg;
e) the aeroplane is equipped as described in D6.23; and
f) the pilot-in-command has satisfied requirements of experience, training, checking and recency described in D9.4.5.

D4.10 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).

D4.10.1 PCAA has established regulations for the purpose of managing fatigue. These regulations are 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, PCAA has established:

a) regulations for flight time, flight duty period, duty period and rest period limitations; and
b) where authorizing an Operator to use a Fatigue Risk Management System (FRMS) to manage fatigue, FRMS regulations.

D4.10.2 PCAA requires that the Operator, in compliance with D4.10.1 and for the purposes of managing its fatigue-related safety risks, establish either:

a) flight time, flight duty period, duty period and rest period limitation that are within the prescriptive fatigue management regulations established by PCAA; or
b) a Fatigue Risk Management System (FRMS) in compliance with D4.10.6 for all operations; or
c) an FRMS in compliance with D4.10.6 for part of its operations and the requirements of D4.10.2 a) for the remainder of its operations.

Note: Complying with the prescriptive fatigue management regulations does not relieve the operator of the responsibility to manage its risks, including fatigue-related risks, using its safety management system (SMS) in accordance with the provisions of Annex 19.

D4.10.3 Where the Operator adopts prescriptive fatigue management regulations for part or all of its operations, PCAA 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.

D4.10.4 PCAA will approve an 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.

D4.10.5 Consequent to approval, an 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, PCAA 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 PCAA;
b) mandates 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) approves 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.

D4.10.6 Where an 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 1: As of 7 November 2019, detailed requirements for an FRMS are in Appendix 7.

Note 2: As of 7 November 2019, provisions on the protection of safety data, safety information and related sources are contained in Appendix 3 to Annex 19.

D4.10.7 **Recommendation.** It is required that, where an 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 (ICAO Doc 9966).

D4.10.8 An 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 PCAA.

D5. AEROPLANE PERFORMANCE OPERATING LIMITATIONS:

D5.1 General:

D5.1.1 Aeroplanes shall be operated in accordance with code of performance established vide ANO-029-FSXX by PCAA.

D5.1.2 Except as provided in D5.4, 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.

D5.1.3 **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 State of Registry should ensure that the level of performance specified in D5.2 should be met as far as practicable.

D5.2 Applicable to Aeroplanes Certificated in accordance with Parts IIIA and IIIB of ICAO Annex 8:

D5.2.1 The Standards contained in D5.2.2 to D5.2.11 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 D5.1.1, they are to be supplemented by national requirements prepared by Contracting States.

D5.2.2 The level of performance defined by the appropriate parts of the comprehensive and detailed national code referred to in D5.1.1 for the aeroplanes designated in D5.2.1 shall be at least substantially equivalent to the overall level embodied in the Standards of Para D5.

Note: Attachment B contains guidance material which indicates the level of performance intended by the Standards and Recommended Practices of Para D5.

D5.2.3 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.

D5.2.4 PCAA will 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 Para D5.

D5.2.5 A flight shall not be commenced unless the performance information provided in the flight manual, supplemented as necessary with other data acceptable to PCAA, indicates that the Standards of D5.2.6 to D5.2.11 can be complied with for the flight to be undertaken

D5.2.6 Until 3 November 2021, 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..

D5.2.7 As of 4th November 2021 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 runway slope, the ambient temperature, the wind, and surface conditions of the runway at the expected time of use, 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

Note: Guidelines for using runway surface condition information on board aircraft in accordance with 4.4.11 are contained in the Aeroplane Performance Manual (Doc 10064).

D5.2.8 **Mass limitations:**

a) The mass of the aeroplane at the start of take-off shall not exceed the mass at which D5.2.9 is complied with, nor the mass at which D5.2.10, D5.2.11 and D5.2.12 are complied with, allowing for expected reductions in mass as the flight proceeds, and for such fuel jettisoning as is envisaged in applying D5.2.10 and D5.2.11 and, in respect of alternate aerodromes, D5.2.8 c) and D5.2.12.

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.

D5.2.9 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 D5.2.10. 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: Attachment B contains guidance on the vertical and horizontal distances that are considered adequate to show compliance with this Standard.

D5.2.9.1 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.

D5.2.10 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 there from, to continue the flight to an aerodrome at which the Standard of D5.2.12 can be met, without flying below the minimum flight altitude at any point.

D5.2.11 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 para 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.

D5.2.12 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: As of 4 November 2021, guidelines on appropriate margins for the "at time of landing" distance assessment is contained in the Aeroplane Performance Manual (Doc 10064).

D5.3 **Obstacle data:**

D5.3.1 Obstacle data shall be provided to enable the operator to develop procedures to comply with 5.2.10.

Note: See Annex 4 and Annex 15, Chapter 5 and Appendix 1 and the Procedures for Air Navigation Services - Aeronautical Information Management (PANS-AIM), Chapter 5 for methods of presentation of certain obstacle data.

D5.3.2 The Operator shall take account of charting accuracy when assessing compliance with D5.2.9.

D5.4 **Additional requirements for Operations of Single-Engine Turbine-Powered Aeroplanes at Night and/or in Instrument Meteorological Conditions (IMC):**

D5.4.1 In approving operations by single-engine turbine-powered aeroplanes at night and/or in IMC, PCAA will 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 Appendix 3.

D5.4.2 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.

D6. AEROPLANE INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENTS:

Note: Specifications for the provision of aeroplane communication and navigation equipment are contained in Para D7.

D6.1 **General:**

D6.1.1 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 Paras 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 PCAA

D6.1.2 An aeroplane shall carry a certified true copy of the Air Operator Certificate specified in D4.2.1, 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 PCAA 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 D4.2.1.5 and D4.2.1.6.

D6.1.3 The Operator shall include in the Operations Manual a Minimum Equipment List (MEL), approved by PCAA 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. Where the PCAA is not the State of Registry, the PCAA shall ensure that the MEL does not affect the aeroplane's compliance with the airworthiness requirements applicable in the State of Registry.

Note: ANO-007-FSXX and Attachment E contains guidance on the Minimum Equipment List.

D6.1.4 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.

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

D6.1.5 **Aeroplane operated under an Article 83 *bis* agreement**

Note: Guidance concerning the transfer of responsibilities by the State of Registry to the PCAA in accordance with Article 83 bis is contained in the Manual on the Implementation of Article 83 bis of the Convention on International Civil Aviation (Doc 10059).

D6.1.5.1 An aeroplane, when operating under an Article 83 bis agreement entered into between the State of Registry and the PCAA, shall carry a certified true copy of the agreement summary, in either an electronic or hard copy format. When the summary is issued in a language other than English, an English translation shall be included.

Note: Guidance regarding the agreement summary is contained in the Manual on the Implementation of Article 83 bis of the Convention on International Civil Aviation (Doc 10059).

D6.1.5.2 The agreement summary of an Article 83 bis agreement shall be accessible to a civil aviation safety inspector to determine which functions and duties are transferred under the agreement by the State of Registry to the PCAA, when conducting surveillance activities, such as ramp checks.

Note: Guidance for the civil aviation safety inspector conducting an inspection of an aeroplane operated under an Article 83 bis agreement is contained in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335).

D6.1.5.3 The agreement summary shall be transmitted to ICAO together with the Article 83 bis agreement for registration with the ICAO Council by the State of Registry or the PCAA.

Note: The agreement summary transmitted with the Article 83 bis agreement registered with the ICAO Council contains the list of all aircraft affected by the agreement. However, the certified true copy to be carried on board, as per 6.1.5.1, will need to list only the specific aircraft carrying the copy.

D6.1.5.4 **Recommendation.**— The agreement summary should contain the information in Appendix 10 for the specific aircraft and should follow the layout of Appendix 10, paragraph 2

D6.2 **All Aeroplanes on all Flights:**

D6.2.1 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 manoeuvres and observe the operating limitations of the aeroplane in the expected operating conditions.

D6.2.2 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 Attachment A.

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;

   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 D6.2.2.1 for fire extinguishing agents.

c) 1) a seat or berth for each person over an age of two years;
   2) a seat belt for each seat and restraining belts for each berth; and
   3) 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;

   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:
   1) when seat belts are to be fastened;
   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

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

D6.2.2.1 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 PCAA; 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, Annex A, Group II..

   Note: Information concerning extinguishing agents is contained in the UNEP HALON 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 HALON for Aircraft Fire Suppression Systems.

D6.2.3 **An aeroplane shall carry:**

a) the Operations Manual prescribed in D4.2.3, 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 Para D5 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

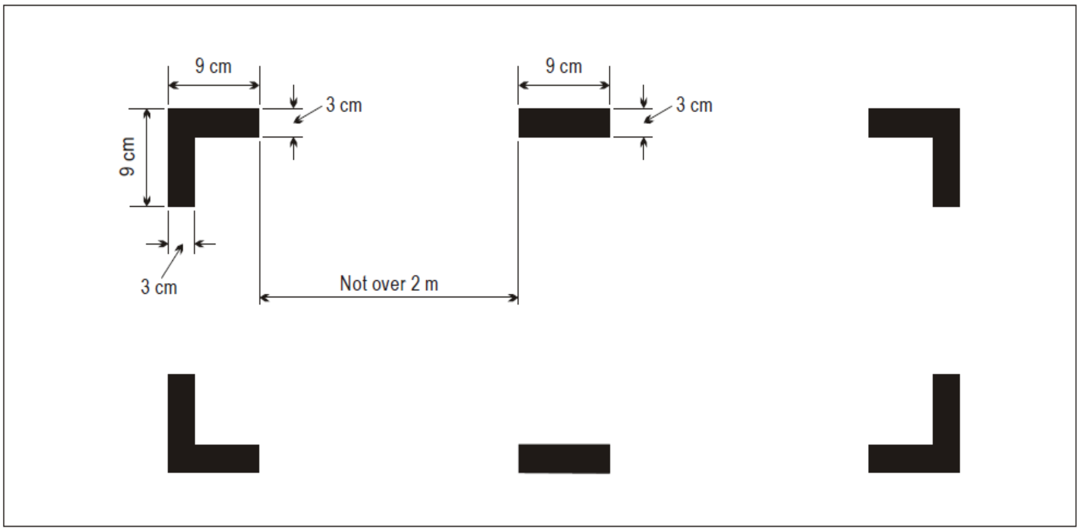
c) current and suitable charts to cover the route of the proposed flight and any route along which it is reasonable to expect that the flight may be diverted.

D6.2.4 **Marking of Break-In Points:**

D6.2.4.1 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 colour of the markings shall be red or yellow, and if necessary they shall be outlined in white to contrast with the background.

D6.2.4.2 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 D6.2.4)

D6.3 **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 Appendix 7.

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: As of 7 November 2019, Chapter 3 contains requirements for States regarding the use of voice, image and/or data recordings and transcripts.

D6.3.1 **Flight data recorders and aircraft data recording systems:**

Note: Parameters to be recorded are listed in Tables A8-1 and A8-3 of Appendix 7.

D6.3.1.1 Applicability

D6.3.1.1.1 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) an FDR which shall record at least the first 16 parameters listed in Table A8-1 of Appendix 8; or
b) a Class C AIR or AIRS which shall record at least the flight path and speed parameters displayed to the pilot(s), as defined in 2.2.3 of Appendix 8; or
c) an ADRS which shall record at least the first 7 parameters listed in Table A8-3 of Appendix 8.

Note 1: "The application for type certification is submitted to a Contracting State" 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 6.2 of Appendix 8.

D6.3.1.1.2 **Recommendation:** All turbine-engined aeroplanes of a maximum certificated take-off mass of 5700 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 Appendix 7.

D6.3.1.1.3 All aeroplanes of a maximum certificated take-off mass of over 27000 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.

D6.3.1.1.4 All aeroplanes of a maximum certificated take-off mass of over 5700 kg, up to and including 27000 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1989, shall be equipped with an FDR which shall record at least the first 16 parameters listed in Table A8-1 of Appendix 8.

D6.3.1.1.5 **Recommendation.—** All multi-engine aeroplanes of a maximum certificated take-off mass of 5700 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 1990 should be equipped with an FDR which should record at least the first 16 parameters listed in Table A8-1 of Appendix 8.

D6.3.1.1.6 All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued before 1 January 1989, with a maximum certificated take-off mass of over 5 700 kg, except those in 6.3.1.1.8, shall be equipped with an FDR which shall record at least the first 5 parameters listed in Table A8-1 of Appendix 8.

D6.3.1.1.7 **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 6.3.1.1.8, should be equipped with an FDR which should record at least the first 9 parameters listed in Table A8-1 of Appendix 8.

D6.3.1.1.8 All turbine-engine 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 27000 kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 shall be equipped with an FDR which shall record at least the first 16 parameters listed in Table A8-1 of Appendix 8

D6.3.1.1.9 **Recommendation. -** All turbine-engine aeroplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987, with a maximum certificated take-off mass of over 27000 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.

D6.3.1.1.10 All aeroplanes of a maximum certificated take-off mass of over 5700 kg for which the individual certificate of airworthiness is first issued after 1 January 2005 shall be equipped with a Type an FDR which shall record at least the first 78 parameters listed in Table A8-1 of Appendix 8.

D6.3.1.2.11 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 2023 shall be equipped with an FDR capable of recording at least the 82 parameters listed in Table A8-1 of Appendix 8.

D6.3.1.1.12 **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 2023 shall be equipped with an FDR capable of recording at least the 82 parameters listed in Table A8-1 of Appendix 8.

6.3.1.2 **Recording technology**

FDRs or ADRS shall not use engraving metal foil, frequency modulation (FM), photographic film or magnetic tape.

D6.3.1.3 **Duration:**

All FDRs shall retain the information recorded during at least the last 25 hours of their operation, with the exception of those installed on aeroplanes referenced in 6.3.1.1.5 for which the FDR shall retain the information recorded during at least the last

30 minutes of its operation, and, in addition, sufficient information from the preceding take-off for calibration purposes.

D6.3.2 **Cockpit Voice Recorders and Cockpit Audio Recording Systems:**

D6.3.2.1 **Applicability:**

D6.3.2.1.1 All turbine-engine aeroplanes of a maximum certificated take-off mass of over 2250 kg, up to and including 5700 kg for which type certification is issued 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.

D6.3.2.1.2 **Recommendation.** All turbine-engine aeroplanes of a maximum certificated take-off mass of 5700 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.

D6.3.2.1.3 All aeroplanes of a maximum certificated take-off mass of over 5700 kg for which the individual certificate of airworthiness is first issued on or after 1 January 1987, shall be equipped with a CVR

D6.3.2.1.4 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.

D6.3.2.1.5 **Recommendation.** All turbine-engine aeroplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987, with a maximum certificated take-off mass of over 5700 kg up to and including 27000 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.

D6.3.2.2 **Recording technology**
CVRs and CARS shall not use magnetic tape or wire.

D6.3.2.3 **Duration:**

D6.3.2.3.1 All CVRs shall be capable of retaining the information recorded during at least the last 2 hours of their operation.

D6.3.2.3.2 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 2022 shall be equipped with a CVR capable of retaining the information recorded during at least the last twenty-five hours of its operation.

D6.3.2.3.3 All aeroplanes that are required to be equipped with CARS, and for which the individual certificate of airworthiness is first issued on or after 1 January 2025, shall be equipped with a CARS which shall retain the \ information recorded during at least the last two hours of their operation

D6.3.2.4 **Cockpit Voice Recorder Alternate Power:**

D6.3.2.4.1 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.

D6.3.2.4.2 All aeroplanes of a maximum certificated take-off mass of over 27000 kg for which the application for type certification is submitting to contracting state on or after 1 January 2018 shall be provided with an alternate power source, as defined in D6.3.2.4.1, that powers the forward CVR in the case of combination recorders.

D6.3.2.4.3 **Recommendation**. All aeroplanes of a maximum certificated take-off mass of over 27000 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 D6.3.2.4.1, that powers at least one CVR.

D6.3.3 **Data Link Recorders:**

D6.3.3.1 **Applicability**

D6.3.3.1.1 All aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January

2016, which use any of the data link communications applications referred to in 5.1.2 of Appendix 8 and are required to carry a CVR, shall record the data link communications messages on a crash-protected flight recorder..

D6.3.3.1.2 All aeroplanes for which the individual certificate of airworthiness was first issued before 1 January 2016,that are required to carry a CVR and are modified on or after 1 January 2016 to use any of the data link communications applications referred to in 5.1.2 of Appendix 8, shall record the data link communications messages on a crash-protected flight recorder, unless the installed data link communications equipment is compliant with a type certificate issued or aircraft modification first approved prior to 1 January 2016

Note 1: Refer to Table L-5 in Attachment L for examples of data link communication recording requirements.

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.

Note 3*:* The "aircraft modifications" refer to modifications to install the data link communications equipment on the aircraft (e.g. structural, wiring).

D6.3.3.1.3 **Recommendation**. - All aeroplanes for which the individual certificate of airworthiness was first issued before 1 January 2016, that are required to carry a CVR and are modified on or after 1 January 2016 to use any of the data link communications applications referred to in 5.1.2 of Appendix 8 should record the data link communications messages on a crash-protected flight recorder.

D6.3.3.2 **Duration:**
The minimum recording duration shall be equal to the duration of the CVR.

D6.3.3.3 **Correlation:**
Data link recording shall be able to be correlated to the recorded cockpit audio.

D6.3.4 **Flight crew-machine interface recordings**

D6.3.4.1 **Applicability**

D6.3.4.1.1 All aeroplanes of a maximum take-off mass of over 27000 kg for which the application for type certification is submitted to a Contracting State on or after 1 January 2023 shall be equipped with a crash-protected flight recorder which shall record the information displayed to the flight crew from electronic displays, as well as the operation of switches and selectors by the flight crew as defined in Appendix 8.

D6.3.4.1.2 **Recommendation** All aeroplanes of a maximum take-off mass of over 5 700 kg, up to and including 27 000 kg, for which the application for type certification is submitted to a Contracting State on or after 1 January 2023 should be equipped with a crash-protected flight recorder which should record the information displayed to the flight crew from electronic displays, as well as the operation of switches and selectors by the flight crew, as defined in Appendix 8.

D6.3.4.2 **Duration**

The minimum flight crew-machine interface recording duration shall be at least for the last two hours.

D6.3.4.3 **Correlation**

Flight crew-machine interface recordings shall be able to be correlated to the recorded cockpit audio.

D6.3.5 **Flight Recorders — General:**

D6.3.5.1 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.

D6.3.5.2 Operation:

D6.3.5.2.1 Flight recorders shall not be switched off during flight time.

D6.3.5.2.2 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 D11.6.

D6.3.5.3 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 Appendix 7.

D6.3.5.4 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.

D6.3.5.5 **Combination Recorders:**

D6.3.5.5.1 **Recommendation:** All aeroplanes of a maximum certificated take-off mass of over 5700 kg for which the application for type certification is submitted to PCAA 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).

D6.3.5.5.2 All aeroplanes of a maximum certificated take-off mass of over 15000 kg for which type certification is issued 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.

D6.3.5.5.3 **Recommendation:** All aeroplanes of a maximum certificated take-off mass over 5700 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 D3.3.4.5 may be satisfied by equipping the aeroplanes with two combination recorders (one forward and one aft) or separate devices.

D6.3.5.5.4 **Recommendation:** All multi-engined turbine-powered aeroplanes of a maximum certificated take-off mass of 5700 kg or less, are required to be equipped with an FDR and/or a CVR, may alternatively be equipped with one combination recorder (FDR/CVR).

D6.3.6 **Flight Recorder Data Recovery**

D6.3.6.1 All aeroplanes of a maximum certificated take-off mass of over 27000 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 PCAA, to recover flight recorder data and make it available in a timely manner.

D6.3.6.2 In approving the means to make flight recorder data available in a timely manner, the PCAA shall take into account the following:

a) the capabilities of the operator;
b) overall capability of the aeroplane and its systems as certified by 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).

D6.4 **All aeroplanes operated as VFR flights:**

D6.4.1 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.

D6.4.2 VFR flights which are operated as controlled flights shall be equipped in accordance with D6.9.

D6.5 **All aeroplanes on flights over water**:

D6.5.1 **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.

D6.5.2 **Landplanes**:

D6.5.2.1 Landplanes shall carry the equipment prescribed in D6.5.2.2:

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 D5.2.9 or D5.2.10;
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 PCAA, 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.

D6.5.2.2 The equipment referred to in D6.5.2.1 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 1: "Landplanes" includes amphibians operated as landplanes.

Note 2: Life jackets accessible from seats or berths located in crew rest compartments are required only if the seats or berths concerned are certified to be occupied during take-off and landing.

D6.5.3 **All Aeroplanes on Long-Range Over-Water Flights:**

D6.5.3.1 In addition to the equipment prescribed in D6.5.1 or D6.5.2 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 D5.2.9 or D5.2.10, 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 27000 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 Underwater Locating

Devices (Acoustic) (Self-Powered), or equivalent documents.

D6.5.3.2 Each life jacket and equivalent individual flotation device, when carried in accordance with D6.5.1 a), D6.5.2.1 and D6.5.2.2, shall be equipped with a means of electric illumination for the purpose of facilitating the location of persons, except where the requirement of D6.5.2.1 c) is met by the provision of individual flotation devices other than life jackets.

D6.6 **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.

D6.7 **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	Meters	Feet
700 hPa	3000	10000
620 hPa	4000	13000
376 hPa	7600	25000

D6.7.1 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 D4.3.9.1.

D6.7.2 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 D4.3.9.2.

D6.7.3 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.

D6.7.4 **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.

D6.7.5 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 D4.3.9.2. The total number of oxygen dispensing units shall exceed the number of passenger and cabin crew seats by at least 10 per cent.

D6.7.6 **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 D4.3.9.2. The total number of oxygen dispensing units should exceed the number of passenger and cabin crew seats by at least 10 per cent.

D6.8 **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.

D6.9 **All Aeroplanes operated in accordance with Instrument Flight Rules:**

D6.9.1 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 D6.9.1 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 D6.9.1 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.

D6.9.2 All aeroplanes over 5700 kg — Emergency power supply for electrically operated attitude indicating instruments

D6.9.2.1 All aeroplanes of a maximum certificated take-off mass of over 5700 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.

D6.9.2.2 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.

D6.10 All Aeroplanes when operated at Night:

All aeroplanes, when operated at night shall be equipped with:

a) all equipment specified in D6.9;
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 Appendix 1. 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 D6.10 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.

D6.11 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.

D6.12 All Aeroplanes operated above 15000 m (49000 ft) — Radiation Indicator:

All aeroplanes intended to be operated above 15000 m (49000 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 PCAA.

D6.13 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.

D6.14 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.

D6.15 Aeroplanes required to be equipped with Ground Proximity Warning Systems (GPWS):

D6.15.1 All turbine-engine aeroplanes of a maximum certificated take-off mass in excess of 5700 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.

D6.15.2 The operator shall implement database management procedures that ensure the timely distribution and update of current terrain and obstacle data to the ground proximity warning system.

D6.15.3 **Recommendation.—** All turbine-engine aeroplanes of a maximum certificated take-off mass of 5700 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 D6.15.6 a) and c), warning of unsafe terrain clearance and a forward looking terrain avoidance function.

D6.15.4 All piston-engine aeroplanes of a maximum certificated take-off mass in excess of 5700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system which provides the warnings in D6.15.6 a) and c), warning of unsafe terrain clearance and a forward looking terrain avoidance function.

D6.15.5 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.

D6.15.6 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.

D6.16 Aeroplanes carrying Passengers — Cabin Crew Seats:

D6.16.1 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 D12.1 in respect of emergency evacuation.

D6.16.2 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 D12.1 in respect of emergency evacuation.

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

D6.16.3 Cabin crew seats provided in accordance with D6.16.1 and D6.16.2 shall be located near floor level and other emergency exits as required by the State of Registry for emergency evacuation.

D6.17 Emergency Locator Transmitter (ELT):

D6.17.1 Recommendation.— All aeroplanes should carry an automatic ELT.

D6.17.2 Except as provided for in D6.17.3, all aeroplanes authorized to carry more than 19 passengers shall be equipped with at least one automatic ELT or two ELTs of any type.

D6.17.3 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 D6.18.

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

D6.17.4 Except as provided for in D6.17.5, all aeroplanes authorized to carry 19 passengers or less shall be equipped with at least one ELT of any type.

D6.17.5 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.

D6.17.6 ELT equipment carried to satisfy the requirements of D6.17.1, D6.17.2, D6.17.3, D6.17.4 and D6.17.5 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.

D6.18 **Location of an Aeroplane in Distress:**

D6.18.1 All aeroplanes of a maximum certificated take-off mass of over 27000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2023, 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 Appendix 9.

D6.18.2 Recommendation.— All aeroplanes of a maximum certificated take-off mass of over 5700 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2023, should autonomously transmit information from which a position can be determined at least once every minute, when in distress, in accordance with Appendix 9.

D6.18.3 The operator shall make position information of a flight in distress available to the appropriate organizations, as established by the PCAA.

Note: Refer to Para D4.2.1.3.1 for operator responsibilities when using third parties.

D6.19 Aeroplanes required to be equipped with an Airborne Collision Avoidance System (ACAS II):

D6.19.1 All turbine-engine aeroplanes of a maximum certificated take-off mass in excess of 5700 kg or authorized to carry more than 19 passengers shall be equipped with an airborne collision avoidance system (ACAS II).

D6.19.2 **Recommendation:** All aeroplanes should be equipped with an airborne collision avoidance system (ACAS II).

D6.19.3 An airborne collision avoidance system shall operate in accordance with the relevant provisions of ICAO Annex 10, Volume IV.

D6.20 **Requirements for Pressure-Altitude Reporting Transponders:**

D6.20.1 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.

D6.20.2 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.

D6.20.3 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.

D6.20.4 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.

D6.21 **Microphones:**

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

D6.22 **Turbo-Jet Aeroplanes — Forward-Looking Wind Shear Warning System:**

D6.22.1 Recommendation: All turbo-jet aeroplanes of a maximum certificated take-off mass in excess of 5700 kg or authorized to carry more than nine passengers should be equipped with a forward-looking wind shear warning system.

D6.22.2 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 manoeuvre 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.

D6.23 **All Aeroplanes operated by a single pilot under the Instrument Flight Rules (IFR) or at Night:**

For approval in accordance with D4.9.1, 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.

D6.24 **Aeroplanes equipped with automatic landing systems, a head-up displays (HUD) or equivalent displays, enhanced vision systems (EVS), synthetic vision systems (SVS) and/or combined vision systems (CVS):**

D6.24.1 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 PCAA.

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

D6.24.2 In approving the operational use of automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, the PCAA 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) (ICAO Doc 9859).

Note 2: Guidance on operational approvals is contained in Attachment H.

D6.25 **Electronic Flight Bags (EFBs):**

Note: Guidance on EFB equipment, functions and operational approval is contained in the Manual on EFBs (ICAO Doc 10020).

D6.25.1 EFB equipment:

D6.25.1.1 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.

D6.25.2 EFB functions:

D6.25.2.1 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) (ICAO Doc 9859).

D6.25.2.2 PCAA will approve the operational use of EFB functions to be used for the safe operations of aeroplanes.

D6.25.3 **EFB Specific approval:**

D6.25.3.1 In approving the use of EFBs, PCAA 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) (ICAO Doc 9859).

D7. AEROPLANE COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT

D7.1 Communication Equipment:

D7.1.1 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 D7.1.1 are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.

D7.1.2 The radio communication equipment required in accordance with D7.1.1 shall provide for communications on the aeronautical emergency frequency 121.5 MHz

D7.1.3 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 D7.1.1:

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).

D7.1.4 The PCAA 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.

D7.1.5 The PCAA shall ensure that, in respect of those aeroplanes mentioned in D7.1.3, adequate provisions exist for:

a) receiving the reports of observed communication performance issued by monitoring programmes established in accordance with 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.

D7.2 **Navigation Equipment**:

D7.2.1 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.

D7.2.2 For operations where a navigation specification for Performance-Based Navigation (PBN) has been prescribed, an aeroplane shall, in addition to the requirements specified in D7.2.1:
a) be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specification(s); and
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 State of Registry; 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).

D7.2.3 The PCAA 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 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.

D7.2.4 The PCAA 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).

D7.2.5 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 PCAA 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 (ICAO Doc 7030).

D7.2.6 For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, a reduced vertical separation minimum (RVSM) of 300 m (1000 ft) is applied between FL 290 and FL 410 inclusive,

a) an aeroplane 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) the PCAA shall issue a specific approval for RVSM operations.

D7.2.7 Prior to granting the RVSM approval required in accordance with D7.2.6 b), the PCAA will be satisfied that:

a) the vertical navigation performance capability of the aeroplane satisfies the requirements specified in Appendix 4;
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.

D7.2.8 PCAA, in consultation with the State of Registry if appropriate, will ensure that, in respect of those aeroplanes mentioned in D7.2.6, 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.

D7.2.9 The PCAA that has issued an RVSM specific 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.

D7.2.10 RVSM has been implemented in Pakistan airspace and PCAA issues approvals to Operators. PCAA will take appropriate action according to PCAA Rules in respect of aircraft and Operators found to be operating in RVSM airspace without valid RVSM approval. Same action will be taken against Pakistani Operator who is found to be operating without the required approval in the airspace of another state.

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).

D7.2.11 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 D7.2.1 and, where applicable, D7.2.2, D7.2.5 and D7.2.6.

Note: Guidance material relating to aircraft equipment necessary for flight in airspace where RVSM is applied is contained in the Manual on Implementation of a 300 m (1000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive (ICAO Doc 9574).

D7.2.12 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.

D7.3 **Surveillance Equipment:**

D7.3.1 An aeroplane shall be provided with surveillance equipment which will enable it to operate in accordance with the requirements of air traffic services.

D7.3.2 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 D7.3.1:

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).

D7.3.3 The PCAA 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.

D7.3.4 The PCAA shall ensure that, in respect of those aeroplanes mentioned in D7.3.2, adequate provisions exist for:

a) receiving the reports of observed surveillance performance issued by monitoring programmes established in accordance with 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.

D7.4 **Installation:**

The equipment installation shall be such that the failure of any single unit required for either communications, navigation or surveillance purposes or any combination thereof will not result in the failure of another unit required for communications, navigation or surveillance purposes.

D7.5 **Electronic Navigation Data Management:**

D7.5.1 An Operator shall not employ electronic navigation data products that have been processed for application in the air and on the ground unless the PCAA 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 equipment that will use them. The Operator shall continue to monitor both process and products.

Note: Guidance relating to the processes that data suppliers may follow is contained in RTCA DO200A/EUROCAE ED-76 and RTCA DO201A/EUROCAE ED-77.

D7.5.2 An Operator shall implement procedures that ensure the timely distribution and insertion of current and unaltered electronic navigation data to all aircraft that require it.

D8. <u>AEROPLANE CONTINUING AIRWORTHINESS</u>

Note 1: For the purpose of this Para, "aeroplane" includes: engines, propellers, components, accessories, instruments, equipment and apparatus including emergency equipment.

Note 2: Reference is made throughout this Para to the requirements of the State of Registry. When the PCAA is not the same as the State of Registry, it may be necessary to consider any additional requirements of the PCAA.

Note 3: Guidance on continuing airworthiness requirements is contained in the Airworthiness Manual (ICAO Doc 9760).

D8.1 **Operator's Continuing Airworthiness Responsibilities**

D8.1.1 Operators shall ensure that, in accordance with procedures acceptable to the State of Registry:

a) each aeroplane they operate is maintained in an airworthy condition;
b) the operational and emergency equipment necessary for an intended flight is serviceable; and
c) the certificate of airworthiness of each aeroplane they operate remains valid.

D8.1.2 As of 5 November 2020, the operator shall not operate an aeroplane unless maintenance on the aeroplane, including any associated engine, propeller and part, is carried out:

a) by an organization complying with Annex 8, Part II, Chapter 6 that is either approved by the State of Registry of the aeroplane or is approved by another Contracting State and is accepted by the State of Registry; or
b) by a person or organization in accordance with procedures that are authorized by the State of Registry; and there is a maintenance release in relation to the maintenance carried out.

D8.1.3 When the State of Registry accepts an equivalent system, the person signing the maintenance release shall be licensed in accordance with ICAO Annex 1.

D8.1.4 The Operator shall employ a person or group of persons to ensure that all maintenance is carried out in accordance with the maintenance control manual.

D8.1.5 The Operator shall ensure that the maintenance of its aeroplanes is performed in accordance with the maintenance programme.

D8.2 **Operator's Maintenance Control Manual:**

D8.2.1 The Operator shall provide, for the use and guidance of maintenance and operational personnel concerned, a maintenance control manual, acceptable to PCAA, in accordance with the requirements of D11.2. The design of the manual shall observe Human Factors principles.

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

D8.2.2 The Operator shall ensure that the maintenance control manual is amended as necessary to keep the information contained therein up to date.

D8.2.3 Copies of all amendments to the Operator's maintenance control manual shall be furnished promptly to all organizations or persons to whom the manual has been issued.

D8.2.4 The Operator shall provide the PCAA and the State of Registry with a copy of the Operator's maintenance control manual, together with all amendments and/or revisions to it and shall incorporate in it such mandatory material as the PCAA or the State of Registry may require.

D8.3 **Maintenance Programme:**

D8.3.1 The Operator shall provide, for the use and guidance of maintenance and operational personnel concerned, a maintenance programme, approved by the State of Registry, containing the information required by D11.3. The design and application of the Operator's maintenance programme shall observe Human Factors principles.

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

D8.3.2 Copies of all amendments to the maintenance programme shall be furnished promptly to all organizations or persons to whom the maintenance programme has been issued.

D8.4 **Continuing Airworthiness Records.**

D8.4.1 An Operator shall ensure that the following records are kept for the periods mentioned in D8.4.2:

a) the total time in service (hours, calendar time and cycles, as appropriate) of the aeroplane and all life-limited components;
b) the current status of compliance with all mandatory continuing airworthiness information;
c) appropriate details of modifications and repairs;
d) the time in service (hours, calendar time and cycles, as appropriate) since the last overhaul of the aeroplane or its components subject to a mandatory overhaul life;
e) the current status of the aeroplane's compliance with the maintenance programme; and
f) the detailed maintenance records to show that all requirements for the signing of a maintenance release have been met.

D8.4.2 The records in D8.4.1 a) to e) shall be kept for a minimum period of 90 days after the unit to which they refer has been permanently withdrawn from service, and the records in D8.4.1 f) for a minimum period of one year after the signing of the maintenance release.

D8.4.3 In the event of a temporary change of Operator, the records shall be made available to the new Operator. In the event of any permanent change of Operator, the records shall be transferred to the new Operator.

Note: In the context of D8.4.3, a judgment on what should be considered as a temporary change of Operator will need to be made by the State of Registry in the light of the need to exercise control over the records, which will depend on access to them and the opportunity to update them.

8.4.4 As of 5 November 2020, records kept and transferred in accordance with 8.4 shall be maintained in a form and format that ensures readability, security and integrity of the records at all times.

Note1 The form and format of the records may include, for example, paper records, film records, electronic records or any combination thereof.

Note2. Guidance regarding electronic aircraft continuing airworthiness records is included in the Airworthiness Manual (Doc 9760).

D8.5 **Continuing Airworthiness Information:**

D8.5.1 The Operator of an aeroplane over 5700 kg maximum certificated take-off mass shall monitor and assess maintenance and operational experience with respect to continuing airworthiness and provide the information as prescribed by the State of Registry and report through the system specified in ICAO Annex 8, Part II, 4.2.3 f) and 4.2.4.

D8.5.2 The Operator of an aeroplane over 5700 kg maximum certificated take-off mass shall obtain and assess continuing airworthiness information and recommendations available from the organization responsible for the type design and shall implement resulting actions considered necessary in accordance with a procedure acceptable to the State of Registry.

Note: Guidance on the interpretation of “the organization responsible for the type design” is contained in the Airworthiness Manual (ICAO Doc 9760).

D8.6 **Modifications and Repairs:**

All modifications and repairs shall comply with airworthiness requirements acceptable to the State of Registry. Procedures shall be established to ensure that the substantiating data supporting compliance with the airworthiness requirements are retained.

D8.7 **Approved Maintenance Organization:**
As of 5 November 2020, an approved maintenance organization shall comply with Annex 8, Part II, Chapter 6 – Maintenance organization approval.

D8.7.1 **Issue of approval:**

D8.7.1.1 The issue of a maintenance organization approval by PCAA will be dependent upon the applicant demonstrating compliance with the requirements of D8.7 to this ANO and the relevant provisions contained in ICAO Annex 19 for such organizations.

D8.7.1.2 The approval document shall contain at least the following:
a) organization’s name and location;
b) date of issue and period of validity;
c) terms of approval.

D8.7.1.3 The continued validity of the approval shall depend upon the organization remaining in compliance with the requirements of D8.7 to this ANO and with the relevant provisions contained in ICAO Annex 19 for an Approved Maintenance Organization.

D8.7.2 **Maintenance Organization’s Procedures Manual:**

D8.7.2.1 The maintenance organization shall provide for the use and guidance of maintenance personnel concerned a procedures manual which may be issued in separate parts containing the following information:

a) a general description of the scope of work authorized under the organization's terms of approval;
b) a description of the organization's procedures and quality or inspection system in accordance with D8.7.4;
c) a general description of the organization's facilities;
d) names and duties of the person or persons required by D8.7.6.1;
e) a description of the procedures used to establish the competence of maintenance personnel as required by D8.7.6.3;
f) a description of the method used for the completion and retention of the maintenance records required by D8.7.7;
g) a description of the procedures for preparing the maintenance release and the circumstances under which the release is to be signed;
h) the personnel authorized to sign the maintenance release and the scope of their authorization;
i) a description, when applicable, of the additional procedures for complying with an Operator's maintenance procedures and requirements;
j) 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; and
k) a description of the procedure for receiving, assessing, amending and distributing within the maintenance organization all necessary airworthiness data from the type certificate holder or type design organization.

D8.7.2.2 The maintenance organization shall ensure that the procedures manual is amended as necessary to keep the information contained therein up to date.

D8.7.2.3 Copies of all amendments to the procedures manual shall be furnished promptly to all organizations or persons to whom the manual has been issued.

D8.7.3 **Safety Management:**

Note: ICAO Annex 19 includes safety management provisions for approved maintenance organizations. Further guidance is contained in the Safety Management Manual (SMM) (ICAO Doc 9859).

D8.7.4 **Maintenance Procedures and Quality Assurance System**:

D8.7.4.1 The maintenance organization shall establish procedures, acceptable to PCAA which ensure good maintenance practices and compliance with all relevant requirements of Para D8.

D8.7.4.2 The maintenance organization shall ensure compliance with D8.7.4.1 by either establishing an independent quality assurance system to monitor compliance with and adequacy of the procedures, or by providing a system of inspection to ensure that all maintenance is properly performed.

D8.7.5 **Facilities:**

D8.7.5.1 The facilities and working environment shall be appropriate for the task to be performed.

D8.7.5.2 The maintenance organization shall have the necessary technical data, equipment, tools and material to perform the work for which it is approved.

D8.7.5.3 Storage facilities shall be provided for parts, equipment, tools and material. Storage conditions shall be such as to provide security and prevent deterioration of and damage to stored items.

D8.7.6 **Personnel:**

D8.7.6.1 The maintenance organization shall nominate a person or group of persons whose responsibilities include ensuring that the maintenance organization is in compliance with the requirements of D8.7 for an approved maintenance organization.

D8.7.6.2 The maintenance organization shall employ the necessary personnel to plan, perform, supervise, inspect and release the work to be performed.

D8.7.6.3 The competence of maintenance personnel shall be established in accordance with a procedure and to a level acceptable to the PCAA. The person signing a maintenance release shall be qualified in accordance with ICAO Annex 1.

D8.7.6.4 The maintenance organization shall ensure that all maintenance personnel receive initial and continuation training appropriate to their assigned tasks and responsibilities. The training programme established by the maintenance organization shall include training in knowledge and skills related to human performance, including coordination with other maintenance personnel and flight crew.

Note: Guidance material to design training programmes to develop knowledge and skills in human performance can be found in the Human Factors Training Manual (ICAO Doc 9683).

D8.7.7 **Records:**

D8.7.7.1 The maintenance organization shall retain detailed maintenance records to show that all requirements for the signing of a maintenance release have been met.

D8.7.7.2 The records required by D8.7.7.1 shall be kept for a minimum period of one year after the signing of the maintenance release.

D8.8 **Maintenance Release:**

D8.8.1 As of 5 November 2020, when maintenance is carried out by an approved maintenance organization, the maintenance release shall be issued by the approved maintenance organization in accordance with the provisions of Annex 8, Part II, Chapter 6, 6.8.

D8.8.2 As of 5 November 2020, when maintenance is not carried out by an approved maintenance organization, the maintenance release shall be completed and signed by a person appropriately licensed in accordance with Annex 1 to certify that the maintenance work performed has been completed satisfactorily and in accordance with approved data and procedures acceptable to the State of Registry.

D8.8.3 As of 5 November 2020, when maintenance is not carried out by an approved maintenance organization, the maintenance release shall include the following:

a) basic details of the maintenance carried out including detailed reference of the approved data used;
b) the date such maintenance was completed; and
c) the identity of the person or persons signing the release.

D9. AEROPLANE FLIGHT CREW:

D9.1 **Composition of the Flight Crew**:

D9.1.1 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.

D9.1.2 **Radio Operator:**

The flight crew shall include at least one member who holds a valid license, issued or rendered valid by the State of Registry, authorizing operation of the type of radio transmitting equipment to be used.

D9.1.3 **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.

D9.1.4 **Flight navigator:**

The flight crew shall include at least one member who holds a flight navigator license in all operations where, as determined by PCAA, navigation necessary for the safe conduct of the flight cannot be adequately accomplished by the pilots from the pilot station.

D9.2 **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.

D9.3 **Flight Crew Member Training Programmes**:

D9.3.1 The Operator shall establish and maintain a ground and flight training programme, approved by PCAA, 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 PCAA;
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, 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 PCAA and shall include an assessment of competence.

Note 1: Para D4.2.5 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 PCAA, be given in flight simulation training devices approved by PCAA for that purpose.

Note 3: The scope of the recurrent training required by D9.2 and D9.3 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 PCAA, be utilized in meeting the requirements for periodic ground training.

Note 5: For more information on dangerous goods operational requirements see Para D14.

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 (ICAO Doc 9683).

Note 7: Information for pilots and flight operations personnel on flight procedure parameters and operational procedures is contained in PANS-OPS (ICAO Doc 8168), Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (ICAO 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, ICAO 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, ICAO 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 (ICAO Doc 10011).

D9.3.2 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 PCAA, of flight simulation training devices approved by PCAA for that purpose; or
b) the completion within the appropriate period of the proficiency check required by D9.4.4 in that type of aeroplane.

D9.4 Qualifications

Note: See the Manual of Procedures for the Establishment of a State's Personnel Licensing System (ICAO Doc 9379) for guidance of a general nature on cross-crew qualification, mixed-fleet flying and cross-credit.

D9.4.1 Recent Experience — Pilot-in-Command and Co-pilot:

D9.4.1.1 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.

D9.4.1.2 When a pilot-in-command or a co-pilot is flying several variants of the same type of aeroplane, PCAA has decided under which conditions the requirements of D9.4.1.1 for each variant or each type of aeroplane can be combined, refer to Personnel Licensing ANOs.

D9.4.2 Recent Experience — Cruise Relief Pilot:

D9.4.2.1 An 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.

D9.4.2.2 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, PCAA shall decide under which conditions the requirements of D9.4.2.1 for each variant or each type of aeroplane can be combined.

D9.4.3 **Pilot-in-Command Area, Route and Aerodrome Qualification:**

D9.4.3.1 An 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 D9.4.3.2 and D9.4.3.3.

D9.4.3.2 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.

D9.4.3.3 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 PCAA 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.

D9.4.3.4 The Operator shall maintain a record, sufficient to satisfy PCAA of the qualification of the pilot and of the manner in which such qualification has been achieved.

D9.4.3.5 An 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 PCAA 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.

D9.4.3.6 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 D9.4.3.2 and D9.4.3.3.

D9.4.4 **Pilot Proficiency Checks**:

D9.4.4.1 An 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, an Operator shall ensure that the pilot's competence to comply with such rules is demonstrated to either a check pilot of the Operator, DCP of PCAA or to a PCAA Inspector. 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 PCAA 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 (ICAO Doc 9625).

D9.4.4.2 When an 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, PCAA will decide under which conditions the requirements of D9.4.4.1 for each variant or each type of aeroplane can be combined.

D9.4.5 **Single pilot operations under the instrument flight rules (IFR) or at night:**

D9.4.5.1 PCAA has prescribed requirements of experience, recency and training applicable to single pilot operations intended to be carried out under the IFR or at night.

D9.4.5.2 **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-Para 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-Para 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 D9.3, passenger briefing with respect to emergency evacuation, autopilot management, and the use of simplified in-flight documentation.

D9.4.5.3 The initial and recurrent flight training and proficiency checks indicated in D9.3.1 and D9.4.4 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.

D9.5 **Flight Crew Equipment:**

A flight crew member assessed as fit to exercise the privileges of a license, subject to the use of suitable correcting lenses, shall have a spare set of the correcting lenses readily available when exercising those privileges.

D10. FLIGHT OPERATIONS OFFICER / FLIGHT DISPATCHER:

D10.1 When the PCAA 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 Annex 1.

D10.2 In accepting proof of qualifications, PCAA, in accordance with the approved method of control and supervision of flight operations, requires that, as a minimum, such persons meet the requirements specified in 91.0003 for the flight operations officer/flight dispatcher license.

D10.3 A flight operations officer/flight dispatcher shall not be assigned to duty unless that person has:

a) satisfactorily completed an Operator-specific training course that addresses all the specific components of its approved method of control and supervision of flight operations specified in D4.2.1.3;

Note: Guidance on the composition of such training syllabi is provided in the Training Manual (ICAO 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;
   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 D4.6.

D10.4 **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.

Note: Guidance material to design training programmes to develop knowledge and skills in human performance can be found in the Human Factors Training Manual (ICAO Doc 9683).

D10.5 **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 D10.3 are met.

D11. MANUALS, LOGS AND RECORDS:

Note: The following additional manuals, logs and records are associated with this ANO but are not included in this para:
Fuel and oil records — see D4.2.10
Maintenance records — see D8.4
Flight time records — see D4.10.8
Flight preparation forms — see D4.3
Operational flight plan — see D4.3.3.1
Pilot-in-command route and airport qualification records — see D9.4.3.4.

D11.1 **Flight Manual:**

Note: The flight manual contains the information specified in ICAO Annex 8. The flight manual shall be updated by implementing changes made mandatory by the State of Registry.

D11.2 **Operator's Maintenance Control Manual:**
The Operator's maintenance control manual provided in accordance with D8.2, which may be issued in separate parts, shall contain the following information:

a) a description of the procedures required by D8.1.1 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 D8.1.4;
c) a reference to the maintenance programme required by D8.3.1;
d) a description of the methods used for the completion and retention of the Operator's maintenance records required by D8.4;
e) a description of the procedures for monitoring, assessing and reporting maintenance and operational experience required by D8.5.1;
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 D8.5.2;
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 State of Registry of significant in-service occurrences.

D11.3 **Maintenance Programme:**

D11.3.1 A maintenance programme for each aeroplane as required by D8.3 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.

D11.3.2 Maintenance tasks and intervals that have been specified as mandatory in approval of the type design shall be identified as such.

D11.3.3 **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.

D11.4 **Journey Log Book:**

D11.4.1 **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.

D11.4.2 **Recommendation:** Entries in the journey log book should be made currently and in ink or indelible pencil.

D11.4.3 **Recommendation:** Completed journey log book should be retained to provide a continuous record of the last six months' operations.

D11.5 **Records of Emergency and Survival Equipment Carried:**

Operators shall at all times have available for immediate communication to rescue coordination centre's, 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, colour 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.

D11.6 **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.

D12. CABIN CREW:

D12.1 **Assignment of Emergency Duties:**

The Operator shall establish, to the satisfaction of PCAA, the minimum number of cabin crew required for each type of aeroplane, based on seating capacity or the number of passengers carried, in order to effect a safe and expeditious evacuation of the aeroplane, 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 aeroplane.

D12.2 **Cabin Crew at Emergency Evacuation Stations:**

Each cabin crew member assigned to emergency evacuation duties shall occupy a seat provided in accordance with D6.16 during take-off and landing and whenever the pilot-in-command so directs.

D12.3 **Protection of Cabin Crew During Flight:**

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 and landing.

D12.4 **Training:**

The Operator shall establish and maintain a training programme, approved by PCAA, to be completed by all persons before being assigned as a cabin crew member. Cabin crew members shall complete a recurrent training programme annually. These training programmes shall ensure that each person is:

a) competent to execute those safety duties and functions which the cabin crew member is assigned to perform in the event of an emergency or in a situation requiring emergency evacuation;
b) drilled and capable in the use of emergency and life-saving equipment required to be carried, such as life jackets, life rafts, evacuation slides, emergency exits, portable fire extinguishers, oxygen equipment, first-aid and universal precaution kits, and automated external defibrillators;
c) when serving on aeroplanes operated above 3000 m (10000 ft), knowledgeable as regards the effect of lack of oxygen and, in the case of pressurized aeroplanes, as regards physiological phenomena accompanying a loss of pressurization;
d) aware of other crew members’ assignments and functions in the event of an emergency so far as is necessary for the fulfillment of the cabin crew member’s own duties;
e) aware of the types of dangerous goods which may, and may not, be carried in a passenger cabin; and
f) knowledgeable about human performance as related to passenger cabin safety duties including flight crew-cabin crew coordination.

Note 1: Requirements for the training of cabin crew members in the transport of dangerous goods are included in the Dangerous Goods Training Programme contained in ICAO Annex 18 — The Safe Transport of Dangerous Goods by Air and the Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Doc 9284).

Note 2: For more information on dangerous goods operational requirements see Para D14.

Note 3: Guidance material to design training programmes to develop knowledge and skills in human performance can be found in the Cabin Crew Safety Training Manual (ICAO Doc 10002).

D13. SECURITY*:

* In the context of this Para, the word "security" is used in the sense of prevention of illicit acts against civil aviation.

D13.1 **Domestic Commercial Operations:**

Recommendation: International Standards and Recommended Practices set forth in this Para are also applicable in case of domestic commercial operations (air services).

D13.2 **Security of the Flight Crew Compartment:**

D13.2.1 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.

D13.2.2 All passenger-carrying aeroplanes:

a) of a maximum certificated take-off mass in excess of 54 500 kg; or
b) of a maximum certificated take-off mass in excess of 45 500 kg with a passenger seating capacity greater than 19; or
c) 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.

D13.2.3 In all aeroplanes which are equipped with a flight crew compartment door in accordance with D13.2.2:

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.

D13.2.4 **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.

D13.2.5 **Recommendation:** In all aeroplanes which are equipped with a flight crew compartment door in accordance with D13.2.4:

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.

D13.3 **Aeroplane Search Procedure Checklist:**

An 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.

D13.4 **Training Programmes:**

D13.4.1 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 PCAA;
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.

D13.4.2 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.

D13.5 **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.

D13.6 **Miscellaneous:**

D13.6.1 **Recommendation:** Specialized means of attenuating and directing the blast should be provided for use at the least-risk bomb location.

D13.6.2 **Recommendation:** Where an 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.

D14. DANGEROUS GOODS:

D14.1 **State Responsibilities:**

Note 1: 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 2: Operator responsibilities for the transport of dangerous goods are contained in Chapters 8, 9 and 10 of Annex 18. Part 7 of the Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Doc 9284) (Technical Instructions) contains the Operator's responsibilities and requirements for incident and accident reporting.

Note 3: 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 4: 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).

D14.2 Operators with no operational approval to transport dangerous goods as cargo:

The PCAA will ensure that Operators not approved to transport dangerous goods have:

a) Established a dangerous goods training programme that meets the requirements of Annex18, the applicable requirements of the Technical Instructions, Part 1, Chapter 4 and the requirements of the State's regulations, as appropriate. Details of the dangerous goods training programme shall be included in the Operator's operations manuals;

b) Established dangerous goods policies and procedures in its operations manual to meet, at a minimum, the requirements of Annex 18, the Technical Instructions and the State's regulations to allow Operator personnel to:

1) identify and reject undeclared dangerous goods, including COMAT classified as dangerous goods; and
2) report to the appropriate authorities of the PCAA and the State in which it occurred any;

i) occasions when undeclared dangerous goods are discovered in cargo or mail; and

ii) dangerous goods accidents and incidents.

D14.3 **Operators transporting dangerous goods as cargo:**

The PCAA will approve the transport of dangerous goods and ensure that the Operator:

a) establishes a dangerous goods training programme that meets the requirements in the Technical Instructions, Part 1, Chapter 4, Table 1-4 and the requirements of the State regulations, as appropriate. Details of the dangerous goods training programme shall be included in the Operator's operations manuals.

b) establishes dangerous goods policies and procedures in its operations manual to meet, at a minimum, the requirements of Annex 18, the Technical Instructions and the State's regulations to enable Operator personnel to:

1) identify and reject undeclared or mis-declared dangerous goods, including COMAT classified as dangerous goods;
2) report to the appropriate authorities of the PCAA and the State in which it occurred any;

i) occasions when undeclared or mis-declared dangerous goods are discovered in cargo or mail; and

ii) dangerous goods accidents and incidents;

3) report to the appropriate authorities of the PCAA and the State of Origin any occasions when dangerous goods are discovered to have been carried;

i) when not loaded, segregated, separated or secured in accordance with the Technical Instructions Part 7, Chapter 2; and

ii) without information having been provided to the pilot-in-command;

4) accept, handle, store, transport, load and unload dangerous goods, including COMAT classified as dangerous goods as cargo on board an aircraft; and

5) provide the pilot-in-command with accurate and legible written or printed information concerning dangerous goods that are to be carried as cargo.

Note: Article 35 of the Convention refers to certain classes of cargo restrictions.

D14.4 **Provision of information:**

The Operator shall ensure that all personnel, including third-party personnel, involved in the acceptance, handling, loading and unloading of cargo are informed of the Operator's operational approval and limitations with regard to the transport of dangerous goods.

D14.5 **Domestic commercial air transport operations**:

Recommendation**.—** International Standards and Recommended Practices set forth in this chapter should be applied by all Contracting States also in the case of domestic commercial air transport operations.

Note: Annex 18 contains a similar provision in this regard.

D15. CARGO COMPARTMENT SAFETY

Note: Guidance on the hazards associated with the transport of items in the cargo compartment, the conduct of a specific safety risk assessment in accordance with the Safety Management Manual (SMM) (Doc 9859), and the responsibilities for the transport of dangerous goods, is contained in the Guidance for Safe Operations Involving Cargo Compartments (Doc10102).

D15.1 Transport of Items in the Cargo Compartment

D15.1.1 The PCAA shall ensure that the operator establishes policies and procedures for the transport of items in the cargo compartment, which include the conduct of a specific safety risk assessment. The risk assessment shall include at least the:

a) hazards associated with the properties of the items to be transported;
b) capabilities of the operator;
c) operational considerations (e.g. area of operations, diversion time);
d) capabilities of the aeroplane and its systems (e.g. cargo compartment fire suppression capabilities);
e) containment characteristics of unit load devices;
f) packing and packaging;
g) safety of the supply chain for items to be transported; and
h) quantity and distribution of dangerous goods items to be transported.

Note: Additional operational requirements for the transport of dangerous goods are contained in Chapter 14.

D15.2 Fire Protection

D15.2.1 The elements of the cargo compartment(s) fire protection system, as approved by the State of Design or State of Registry, and a summary of the demonstrated cargo compartment fire protection certification standards, shall be provided in the aeroplane flight manual or other documentation supporting the operation of the aeroplane.

Note: Guidance on the elements of cargo compartment fire protection and associated demonstrated standards are provided in the Guidance for Safe Operations Involving Cargo Compartments (Doc 10102).

D15.2.2 The Operator shall establish policies and procedures that address the items to be transported in the cargo compartment. These shall ensure, to a reasonable certainty, that in the event of a fire involving those items, it can be detected and sufficiently suppressed or contained by the elements of the aeroplane design associated with cargo compartment fire protection, until the aeroplane makes a safe landing.

Note: Guidance on policies and procedures that address the items to be transported in the cargo compartment are provided in the Guidance for Safe Operations Involving Cargo Compartments (Doc 10102).

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

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 Engine Operative
AFCS	Automatic flight control system
AGA	Aerodromes, air routes and ground aids
AIG	Accident investigation and prevention
AIR	Airbone Image Recorder
AIRS	Airbone 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
cm	Centimeter
CDL	Configuration deviation list
CFIT	Controlled flight into terrain
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	Device control
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
ECAM	Electronic Centralized Aircraft Monitor
EDTO	Extended Diversion Time Operations
EFB	Electronic Flight Bag
EFIS	Electronic flight instrument system
EGT	Exhaust Gas Temperature
EICAS	Engine Indication and Crew Alerting System
ELT	Emergency Locator Transmitter
ELT(AD)	Automatic Deployable ELT
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 Programs
FDAU	Flight Data Acquisition Unit
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
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
Inttg	Inch of mercury
INS	Inertial Navigation System
ISA	International Standard Atmosphere
kg	Kilogram
kg/m^2	Kilogram per meter 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	Meter
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 Specifications
MOPS	Minimum Operational Performance Specification
m/s	Meters per second
m/s^2	Meters per second squared
N	Newton
N_1	Low pressure compressor speed (two-stage compressor); fan speed (three-stage compressor)
N_2	High pressure compressor speed (two-stage compressor); intermediate pressure compressor speed (three-stage compressor)
N_3	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
PCAA	Pakistan Civil Aviation Authority
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

SICASP	Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel
SOP	Standard Operating Procedures
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
TODA	Take-off Distance Available
TORA	Take-off run Available
TVE	Total Vertical Error
UTC	Coordinated Universal Time
V_D	Design Diving Speed
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
V_{MC}	Minimum control speed with the critical engine inoperative
VOR	VHF Omnidirectional Radio Range
V_{s0}	Stalling speed or the minimum steady flight speed in the landing configuration
V_{s1}	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

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 Amendments 39, 40A and 41 to ICAO Annex 6 Part 1.

Implementation

This Air Navigation Order shall be implemented with effect from 15th April, 2021 and it repeals ANO-024-FSXX-7.0 dated 01st January, 2018.

--S/d--

(KHAQAN MURTAZA)
Director General,
Pakistan Civil Aviation Authority

Dated: **05th April, 2021**

--S/d--

(CAPT. S. M. RAFATULLAH)
Director Flight Standards

Dated- **31st March, 2021**
File No. HQCAA/1077/033/FSAC

APPENDIX - 1

LIGHTS TO BE DISPLAYED BY AEROPLANES

(Note.— See Para D6.10)

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 centre 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 man oeuvres 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.

2.1 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.

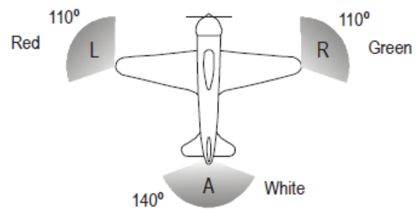


Figure 1

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.

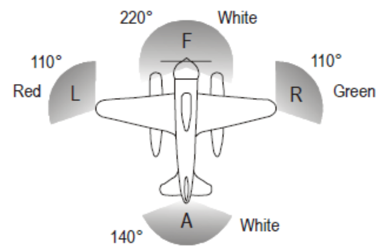


Figure 2

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.

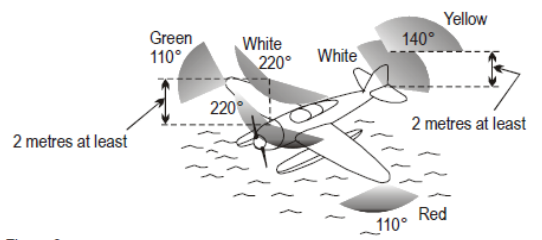


Figure 3

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.

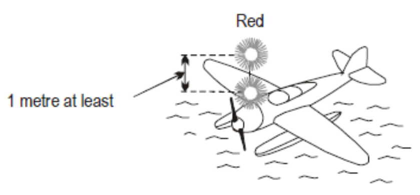


Figure 4

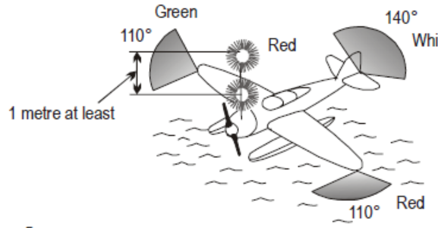


Figure 5

3.7 **When at Anchor**
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).

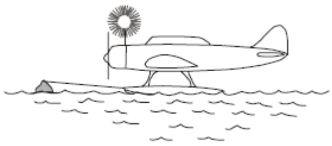


Figure 6

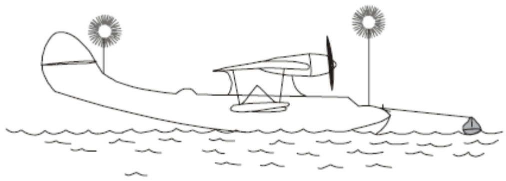
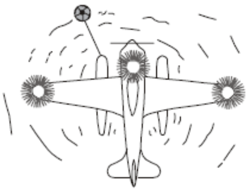
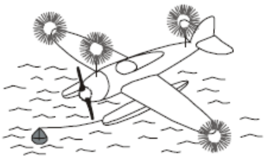


Figure 7



Less than 50 metres in length; 50 metres or more in span

Figure 8



50 metres or more in length; 50 metres or more in span

Figure 9

3.8 **When At ground**

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

(See Para D4.2.3.1)

1. Organization

1.1 An operations manual, which may be issued in separate parts corresponding to specific aspects of operations, provided in accordance with Para D.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 1.1 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 Para D4.10.2 a); and
b) policy and documentation pertaining to the Operator’s FRMS in accordance with Appendix 6.

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 Para D4.3.9.2.

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 (SOP) 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 (ICAO Doc 8168), Volume I, and in PANS-ATM (ICAO 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 15000 m (49000 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 Para D14, 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 (ICAO Doc 9481).

2.1.36 Security instructions and guidance.

2.1.37 The search procedure checklist provided in accordance with Para D13.3.

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 Para D6.1.4.

2.2.3 Operating instructions and information on climb performance with all engines operating, if provided in accordance with Para D4.2.4.3.

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 Para D6.1.4.

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 Para D9.3.

2.4.2 Details of the cabin crew duties training programme as required by Para D12.4.

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 Para D4.2.1.

Note: Details of the flight operations officer/flight dispatcher training programme are contained in Para D10.2.

APPENDIX - 3

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

(See Para D5.4.1)

Airworthiness and operational requirements provided in accordance with Para D5.4.1, 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.)

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 minimum equipment list of an Operator approved in accordance with Para D5.4 shall 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 PCAA who in turn will notify the State of Design.

5.2 PCAA 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. PCAA 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 PCAA.

6.2 An 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 Para D5.1.2, is not required by Appendix 3, 6.1 and 6.2 for aeroplanes approved in accordance with Para D5.4. 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 PCAA 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 singleengine 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 PCAA 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 PCAA.

Note: Guidance on the airworthiness and operational requirements is contained in Attachment G.

APPENDIX - 4

ALTIMETRY SYSTEM PERFORMANCE REQUIREMENTS FOR OPERATIONS IN RVSM AIRSPACE

(Note.— See Para D7.2.7)

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 ≤ z ≤ 25 when z is the magnitude of the mean TVE in meters, or 92 – 0.004z2 for 0 ≤ z ≤ 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 Para 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

(Note.— See Para D4, D 4.2.1.8, refers)

Note 1: Appendix 1 to 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 PCAA 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 PCAA 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 PCAA shall ensure that the authority is responsible for the safety oversight of air operators.

3.2 The PCAA 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 PCAA 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 PCAA 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 PCAA 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 PCAA 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 PCAA 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 PCAA 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 contains further information in this regard.

7. CONTINUED SURVEILLANCE OBLIGATIONS

The PCAA 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 Annex 19.

APPENDIX - 6

AIR OPERATOR CERTIFICATE (AOC)

(Note. — See Para D4.2.1.5 and D4.2.1.6)

1. Purpose and scope

1.1 The AOC and its associated model specific operations specifications shall contain the minimum information required in Paras 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 an Operator is authorized.

Note: Attachment D, Para 3.2.2, contains additional information that may be listed in the operations specifications associated with the air Operator certificate.

2. AOC template
Please see ANO-001-FSXX, Appendix-A.

Note: Para D6.1.2, requires a certified true copy of the AOC to be carried aboard.

3. Operations specifications for each aircraft model

Note: Para D6.1.2, 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 ANO-002-FSXX, Appendix-A.

Note: The MEL constitutes an integral part of the operations manual.

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 (ICAO Doc 9966).

A Fatigue Risk Management System (FRMS) established in accordance with Para D4.10.6, 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) (ICAO 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 (ICAO 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 Attachment B to the first edition of 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

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.

2.2.1 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**

2.3.1 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

3.1 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 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

4.1 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

(Note. — See Para D6.3)

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:
— a flight data recorder (FDR),
— a cockpit voice recorder (CVR),
— an airborne image recorder (AIR),
— a data link recorder (DLR).

When image or data link information is required to be recorded on a crash-protected flight recorder, it is permissible to record it on either the CVR or the FDR.

Lightweight flight recorders comprise one or more of the following:
— an aircraft data recording system (ADRS),
— a cockpit audio recording system (CARS),
— an airborne image recording system (AIRS),
— a data link recording system (DLRS).

When image or data link information is required to be recorded on a lightweight flight recorder, it is permissible to record it on either the CARS or the ADRS.

1. General requirements

1.1 Non-deployable flight recorder containers shall be painted a distinctive orange colour.

1.2 Non-deployable crash-protected flight recorder containers shall:
a) carry reflective material to facilitate their location; and
b) 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.

1.3 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.

1.4 The flight recorder systems shall be installed so that:
a) the probability of damage to the recordings is minimized;
b) there is an aural or visual means for pre-flight checking that the flight recorder systems are operating properly; and
c) if the flight recorder systems have an erasure device, the installation shall be designed to prevent operation of the device during flight time or crash impact; and
d) for aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 2023, a flight crew-operated erase function shall be provided on the flight deck which, when activated, modifies the recording of a CVR and AIR so that it cannot be retrieved using normal replay or copying techniques. The installation shall be designed to prevent activation during flight. In addition, the probability of an inadvertent activation of an erase function during an accident shall also be minimized.

Note: The erase function is intended to prevent access to CVR and AIR recordings by normal replay or copying means, but would not prevent accident investigation authorities access to such recordings by specialized replay or copying techniques.

1.5 The crash-protected flight recorders shall be installed so that they receive electrical power from a bus that provides the maximum reliability for operation of the flight recorders without jeopardizing service to essential or emergency loads.

1.6 The lightweight flight recorders shall be connected to a power source having the characteristics which ensure proper and reliable recording in the operational environment.

1.7 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.

1.8 Means shall be provided for an accurate time correlation between the flight recorder systems recordings.

1.9 The manufacturer shall provide the appropriate certificating authority with the following information in respect of the flight recorder 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) and Aircraft Data Recording Systems (ADRS)

2.1 **Start and stop logic**

The FDR and ADRS 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**

Note: In previous editions of Annex 6, Part I, types of recorders were defined to capture the first evolutions of FDRs

2.2.1 The parameters that satisfy the requirements for FDRs are listed in the Paras 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 If further FDR recording capacity is available, recording of the following additional information shall 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; and
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.

2.2.3 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*

2.2.4 The parameters that satisfy the requirements for ADRS are the first 7 parameters in Table A8-3.

2.2.5 If further ADRS recording capacity is available, the recording of any parameters from 8 onwards defined in Table A8-3 shall be considered.

2.3 **Additional information**

2.3.1 The measurement range, recording interval and accuracy of parameters on installed equipment shall be verified by methods approved by the appropriate certificating authority.

2.3.2 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.**3.**

3. Cockpit Voice Recorder (CVR) and Cockpit Audio Recording System (CARS)

3.1 **Start and stop logic**
The CVR or 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 or 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.

3.2 **Signals to be recorded**

3.2.1 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

3.2.2 The preferred CVR audio allocation should be as follows:
a) pilot-in-command audio panel;
b) co-pilot audio panel;
c) additional flight crew positions and time reference; and
d) cockpit area microphone.

3.2.3 The CARS shall record simultaneously 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

3.2.4 The preferred CARS audio allocation should be as follows:
a) voice communication; and
b) aural environment on the flight deck.

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 requirements of D6.18.

5. Data link recorder (DLR)

5.1 Applications to be recorded

5.1.1 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.

5.1.2 Messages applying to the applications listed in Table A8-2 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.

6. FLIGHT CREW-MACHINE INTERFACE RECORDINGS

6.1 Start and stop logic

The AIR or AIRS 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 AIR or AIRS 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.

6.2 Classes

6.2.1 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.

6.2.2 A Class B AIR or AIRS captures data link message displays.

6.2.3 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.

6.3 Applications to be recorded

6.3.1 The operation of switches and selectors and the information displayed to the flight crew from electronic displays shall be captured by sensors or other electronic means.

6.3.2 The recording of operation of switches and selectors by the flight crew shall include the following:

— any switch or selector that will affect the operation and the navigation of the aircraft; and
— selection of normal and alternate systems.

6.3.3 The recording of the information displayed to the flight crew from electronic displays shall include the following:
— primary flight and navigation displays;
— aircraft system monitoring displays;
— engine indication displays;
— traffic, terrain, and weather displays;
— crew alerting systems displays;
— stand-by instruments; and
— installed EFB to the extent it is practical.

6.3.4 If image sensors are used, the recording of such images shall not capture the head and shoulders of the flight crew members while seated in their normal operating position.

7. Inspections of flight recorder systems

7.1 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.

7.2 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.

7.3 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 the 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 from the FDR or the 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 the 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 the 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.

7.4 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.

7.5 A report of the recording system inspection shall be made available on request to regulatory authorities for monitoring purposes.

7.6 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.

Table A8-1
Parameter Guidance for Crash Protected Flight Data Recorders

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 (–1000 ft) to maximum certificated altitude of aircraft +1500 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 VD (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 discrete	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
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

Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
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	
Note: The preceding 32 parameters satisfy the requirements for a Type I FDR.					
33*	Groundspeed	As installed	1	Data should be obtained from the most accurate system	1 kt
34	Brakes (left and right brake pressure, left and right brake pedal position)	(Maximum metered brake range, discrete 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)	Discrete	1	As installed	
37*	Windshear 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	

Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
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
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	
Note:	The preceding 78 parameters satisfy the requirements for a Type IA FDR.				

Notes:

1. V_{So} stalling speed or minimum steady flight speed in the landing configuration is in Section “Abbreviations and Symbols”.
2. V_D design diving speed.
3. Refer to D6.3.1.2.11 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 D6.3.1.2.12 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.

Table A8-2
Description of Applications for Data Link Recorders

Item No.	Application Type	Application Description	Recording Content
1	Data link Initiation	This includes any applications used to logon to or initiate data link service. In FANS-1/A and ATN, these are ATS Facilities Notification (AFN) and Context Management (CM) respectively.	C
2	Controller/Pilot Communication	This includes any application used to exchange requests, clearances, instructions and reports between the flight crew and controllers on the ground. In FANS-1/A and ATN, this includes the CPDLC application. It also includes applications used for the exchange of oceanic (OCL) and departure clearances (DCL) as well as data link delivery of taxi clearances.	C
3	Addressed Surveillance	This includes any surveillance application in which the ground sets up contracts for delivery of surveillance data. In FANS-1/A and ATN, this includes the Automatic Dependent Surveillance (ADS-C) application. Where parametric data are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	C
4	Flight Information	This includes any service used for delivery of flight information to specific aircraft. This includes, for example, D-METAR, D-ATIS, D-NOTAM and other textual data link services.	C
5	Aircraft Broadcast Surveillance	This includes Elementary and Enhanced Surveillance Systems, as well as ADS-B output data. Where parametric data sent by the aeroplane are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	M *
6	Aeronautical Operational Control Data	This includes any application transmitting or receiving data used for AOC purposes (per the ICAO definition of AOC).	M *

Key:

C: Complete contents recorded.

M: Information that enables correlation to any associated records stored separately from the aeroplane.

*: Applications to be recorded only as far as is practicable given the architecture of the system.

Table A8-3
Parameter Guidance for Aircraft Data Recording Systems

No.	Parameter Name	Parameter Category	Minimum Recording Range	Maximum Recording Interval in Seconds	Minimum Recording Accuracy	Minimum Recording Resolution	Remarks
1	Heading (Magnetic or True)	R*	±180 degrees	1	±2 degrees	0.5 degree	* If not available, record rates
2	Pitch attitude	E*	±90 degrees	0.25	±2 degrees	0.5 degree	* If not available, record rates
3	Roll attitude	E*	±180 degrees	0.25	±2 degrees	0.5 degree	* If not available, record rates
4	Yaw rate	E*	±300 degrees/s	0.25	±1% + drift of 360°/hr	2 degree/s	* Essential if no heading available
5	Pitch rate	E*	±300 degrees/s	0.25	±1% + drift of 360°/hr	2 degree/s	* Essential if no pitch attitude available
6	Roll rate	E*	±300 degrees/s	0.25	±1% + drift of 360°/hr	2 degree/s	* Essential if no roll attitude available
7	Positioning system: latitude/longitude	E	Latitude:±90 degrees Longitude:±180 degrees	2 (1 if available)	As installed (0.00015 degree recommended)	0.00005 degree	
8	Positioning system estimated error	E*	Available range	2 (1 if available)	As installed	As installed	* If available
9	Positioning system: altitude	E	–300 m (–1000 ft) to maximum certificated altitude of aeroplane +1500 m (5 000 ft)	2 (1 if available)	As installed (±15 m (±50 ft) recommended)	1.5 m (5 ft)	
10	Positioning system: time*	E	24 hours	1	±0.5 second	0.1 second	* UTC time preferred where available.
11	Positioning system: ground speed	E	0–1000 kt	2 (1 if available)	As installed (±5 kt recommended)	1 kt	
12	Positioning system: channel	E	0–360 degrees	2 (1 if available)	As installed (± 2 degrees recommended)	0.5 degrees	
13	Normal acceleration	E	–3 g to + 6 g (*)	0.25 (0.125 if available)	As installed (± 0.09 g excluding a datum error of ±0.45 g recommended)	0.004 g	
14	Longitudinal acceleration	E	±1 g (*)	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
15	Lateral acceleration	E	±1 g (*)	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
16	External static pressure (or pressure altitude)	R	34.4 mb (3.44 in-Hg) to 310.2 mb (31.02 in-Hg) or available sensor range	1	As installed (±1 mb (0.1 in-Hg) or ±30 m (±100 ft) to ±210 m (±700 ft) recommended)	0.1 mb (0.01 in-Hg) or 1.5 m (5 ft)	
17	Outside air temperature (or total air temperature)	R	–50° to +90°C or available sensor range	2	As installed (±2°C recommended)	1°C	
18	Indicated air speed	R	As the installed pilot display measuring system or available sensor range	1	As installed (±3 % recommended)	1 kt (0.5 kt recommended)	
19	Engine RPM	R	Full range including overspeed condition	Each engine each second	As installed	0.2% of full range	
20	Engine oil pressure	R	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	

No.	Parameter Name	Parameter Category	Minimum Recording Range	Maximum Recording Interval in Seconds	Minimum Recording Accuracy	Minimum Recording Resolution	Remarks
21	Engine oil temperature	R	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
22	Fuel flow or pressure	R	Full range	Each engine each second	As installed	2% of full range	
23	Manifold pressure	R	Full range	Each engine each second	As installed	0.2% of full range	
24	Engine thrust/power/torque parameters required to determine propulsive thrust/power*	R	Full range	Each engine each second	As installed	0.1% of full range	* Sufficient parameters e.g. EPR/N1 or torque/Np as appropriate to the particular engine shall be recorded to determine power in both normal and reverse thrust. A margin for possible overspeed should be provided.
25	Engine gas generator speed (Ng)	R	0-150%	Each engine each second	As installed	0.2% of full range	
26	Free power turbine speed (Nf)	R	0-150%	Each engine each second	As installed	0.2% of full range	
27	Coolant temperature	R	Full range	1	As installed (±5°C recommended)	1 degree Celsius	
28	Main voltage	R	Full range	Each engine each second	As installed	1 Volt	
29	Cylinder head temperature	R	Full range	Each cylinder each second	As installed	2% of full range	
30	Flaps position	R	Full range or each discrete position	2	As installed	0.5 degree	
31	Primary flight control surface position	R	Full range	0.25	As installed	0.2 % of full range	
32	Fuel quantity	R	Full range	4	As installed	1% of full range	
33	Exhaust gas temperature	R	Full range	Each engine each second	As installed	2% of full range	
34	Emergency voltage	R	Full range	Each engine each second	As installed	1 Volt	
35	Trim surface position	R	Full range or each discrete position	1	As installed	0.3% of full range	
36	Landing gear position	R	Each discrete position*	Each gear every two seconds	As installed		* Where available, record up-andlocked and down-and-locked position
37	Novel/unique aircraft features	R	As required	As required	As required	As required	

Key:

E: Essential parameters
R: Recommended parameters

APPENDIX - 9

LOCATION OF AN AEROPLANE IN DISTRESS

(Note. — See Para D6.18)

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 behaviour 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 behaviour 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 function 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 PCAA 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 Annex 11 for emergency phase criteria.

Note 2: Refer to 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 de-activated 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.

APPENDIX 10

ARTICLE 83 *bis* AGREEMENT SUMMARY

(Chapter 6, 6.1.5.4, refers)

Note: Chapter 6, 6.1.5.1, requires a certified true copy of the agreement summary to be carried on board.

1. Purpose and scope

Recommendation. The Article 83 bis agreement summary should contain the Information in the template at paragraph 2, in a standardized format.

2. Article 83 *bis* Agreement Summary

ARTICLE 83 *bis* AGREEMENT SUMMARY		
Title of the Agreement:		
State of Registry:		Focal point:
PCAA:		Focal point:
Date of signature:	By State of Registry[1]:	
	By PCAA[1]:	
Duration:	Start Date[1]:	End Date (if applicable)[2]:
Languages of the Agreement:		
ICAO Registration No.:		
Umbrella Agreement (if any) with ICAO Registration number:		

Convention on International Civil Aviation	ICAO Annexes affected by the transfer of responsibility in respect of certain functions and duties to the PCAA		
Article 12: Rules of the air	Annex 2, all chapters	Yes ☐ No ☐	
Article 30 a): Aircraft radio equipment	Annex 2 (radio station licence)	Yes ☐ No ☐	
Articles 30 b) and 32 a): Licenses of personnel	Annex 1, Chapters 1, 2, 3 and 6; and Annex 6, Part I , Radio Operator; or Annex 6, Part II (qualifications and/or flight crew member licensing); or Annex 6, Part III, Section II, (composition of the flight crew) (radio operator); and/or Annex 6, Part III, Section III, (qualifications)	Yes ☐ No ☐	Annex 6: [Specify Part and paragraph][3]
Article 31: Certificates of airworthiness	Annex 6 Part I or Part III, Section II	Yes ☐ No ☐	[Specify Part and chapters][3]
	Annex 6 Part II or Part III, Section III	Yes ☐ No ☐	[Specify Part and chapters][3]
	Annex 8 Part II, Chapters 3 and 4	Yes ☐ No ☐	[Specify chapters][3]

Aircraft affected by the transfer of responsibilities to the PCAA					
Aircraft make, model, series	Nationality and registration marks	Serial No.	AOC No. (Commercial air transport)	Dates of transfer of responsibilities	
				From[1]	To (if applicable)[2]

Notes:

dd/mm/yyyy.

dd/mm/yyyy or N/A if not applicable.

Square brackets indicate information that needs to be provided.

ATTACHMENT - A

MEDICAL SUPPLIES

Supplementary to Para D6.2.2 a)

TYPES, NUMBER, LOCATION ANDCONTENTS 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, or pharyngeal (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 1:1000
— 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 1:10000 (can be a dilution of epinephrine 1:1000)

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 5700 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 stop way, 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.)

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

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

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).

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

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 night vision imaging systems (NVIS).

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.

V_{so} A stalling speed or minimum steady flight speed in the landing configuration. (*Note.— See Example 1, 2.4.)*

V_{s1} 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”, “V_1”, “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 PCAA should be used.

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

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

3. General

3.1 The provisions of 4 to 7 should be complied with, unless deviations therefrom are specifically authorized by PCAA 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 PCAA 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 he 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 *(ICAO 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 takeoff distance available.

4.3.4 When showing compliance with 4.3 the same value of V_1 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 (1000 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 (3000 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 PCAA 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 PCAA.

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 (1500 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 (1000 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 (2000 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 (2000 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 (1500 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 (1500 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 PCAA.

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 PCAA 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 Para D5 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-engine and four-engine aeroplanes over a mass range from approximately 4200 kg to 70000 kg over a stalling speed range, VS0 from approximately 100 to 175 km/h (55 to 95 kt) and over a wing loading range from approximately 120 to 360 kg/m2. Cruising speeds range over 555 km/h (300 kt). 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 Para D5, 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 1.4 V_{S1}. 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/s_2 (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 V_{so}

V_{so} 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 V_{s1}

V_{s1} 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 = 1500 ft) and 15.2 + 0.01 [D – 500] m (50 + 0.01 [D – 1500] 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 1500 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 (1000 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 (2000 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 (1000 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, V_{MC} 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, V_{MC}, 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 kt) 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 V_{s0} ;
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 V_{s0}. When the aeroplane is on the landing surface and the airspeed has fallen to less than 0.9 V_{s0}, 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 favourable 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 Para D5 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.

* 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.

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, V_{s0}, from approximately 110 to 170 km/h (60 to 90 kt) and over a wing loading range from approximately 120 to 350 kg/m2. Cruising speeds range up to 740 km/h (400 kt). Those aeroplanes have been used in 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 Para D5, 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.

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 1500 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 Para D4.2.6) 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 (1500 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 there from, 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 (1000 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 Para D4.2.6), 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; associated with
c) power failure point criterion, e.g. airspeed indicator reading; 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, V_{MC}, established as prescribed in 2.3;
d) the minimum speed prescribed in 2.9.7.6;

where V_{s1} is appropriate to the take-off configuration.

Note: See Example 1 for definition of V_{s1}.

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: Para 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 (1500 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 kt) 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 (1500 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 (1500 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;

7 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 kt) 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 V_{s0};

   Note: See Example 1 for definition of V_{s0}.

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 0.9 V_{s0}. When the aeroplane is on the landing surface and the airspeed has fallen to less than 0.9 V_{s0}, 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 there from, are entered in the flight manual.

ATTACHMENT - C

GUIDANCE FOR OPERATIONS BY TURBINE ENGINE AEROPLANES BEYOND 60 MINUTES TO AN EN-ROUTE ALTERNATE AERODROME INCLUDING EXTENDED DIVERSION TIME OPERATIONS (EDTO)

(Supplementary to Para D4.7)

1. **Introduction**

1.1 The purpose of this Attachment is to provide guidance on the general provisions relating to operations by turbine engine aeroplanes beyond 60 minutes flying time to an en-route alternate aerodrome and extended diversion time operations contained in Para D4.7. The guidance will also assists in establishing a threshold time and approving the maximum diversion time for a given Operator with a specific aeroplane type. The provisions in Para D4.7 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 PCAA, 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 PCAA will grant approval. When approving the Operator's maximum diversion time, States will need to consider not only the capable range of the aircraft, taking into consideration any limitation of the aeroplanes type certificate, but also the Operator's previous experience on similar aircraft types and routes.

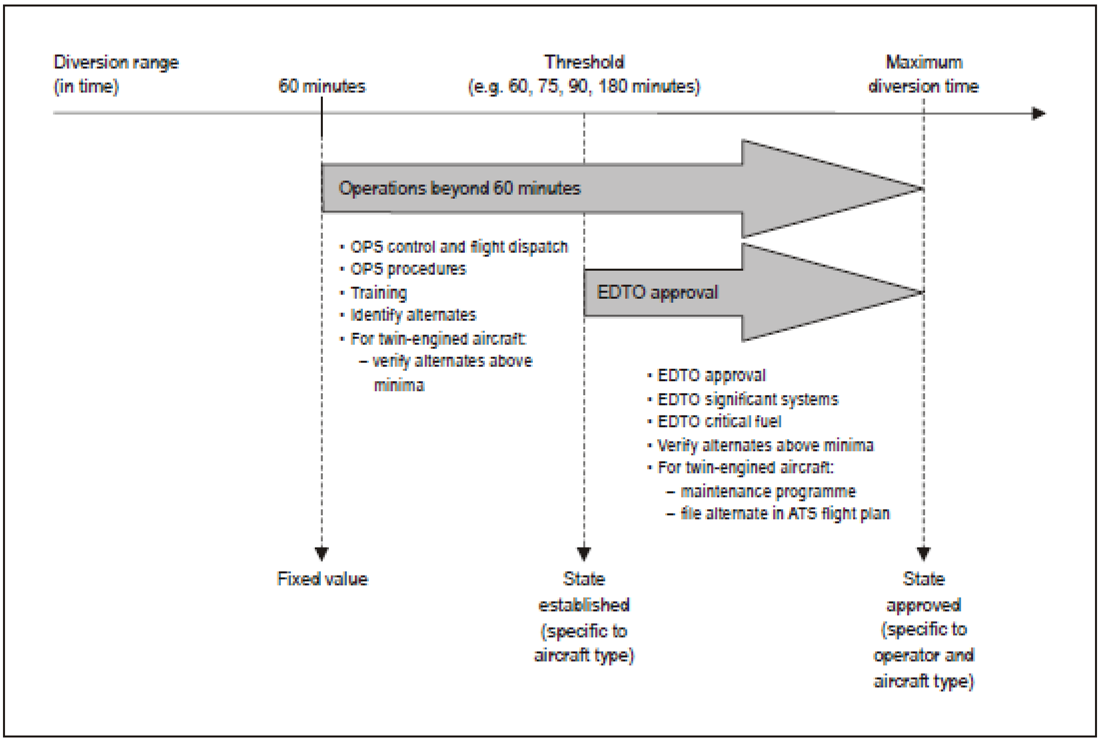
1.3 The material in this Attachment is organized to address guidance on operations beyond 60 minutes to an en-route alternate aerodrome for all airplanes with turbine engines (Section 2) and guidance for extended diversion time operations (Section 3). The EDTO section is further divided into general 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 two engine and more than two engine aeroplane sections are organized 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 Section 2, 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 Para D4.7, 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 PCAA except if they engage in extended diversion time operations.

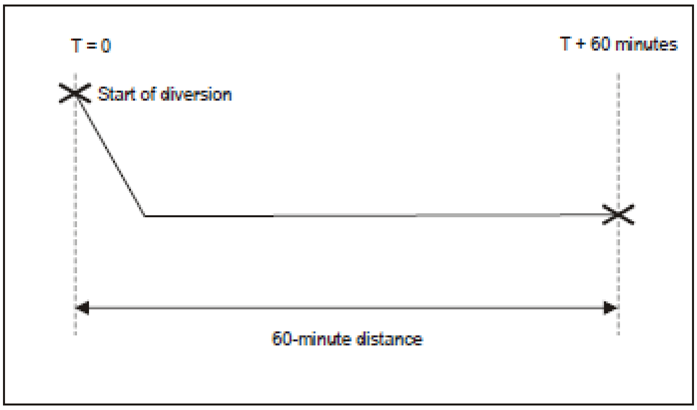
2.2 Conditions to be used when converting diversion times to distances

2.2.1 For the purpose of this guidance, an “approved one-engine-inoperative (OEI) speed” or “approved all-engine-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 one-engine-inoperative (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 the Figure C-2 below. For the purposes of computing distances, credit for drift down may be taken.

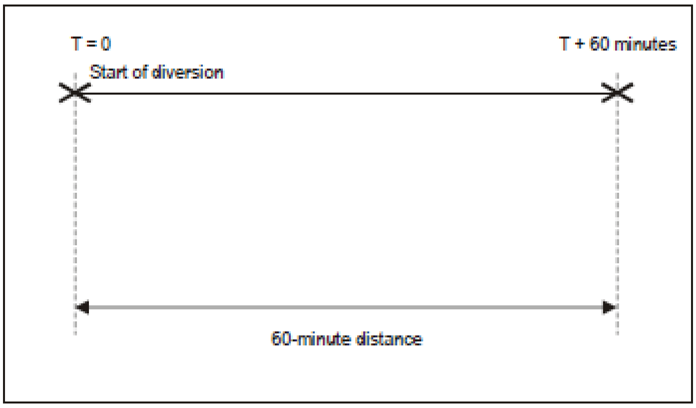
Figure C-2. Sixty-minute distance — aeroplanes with two turbine engines



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 all-engine-operative (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 the Figure C-3 below.

Figure C-3. Sixty-minute distance — aeroplanes with more than two turbine engines



2.3 Training

2.3.1 Training programmes should ensure requirements of Para D9.4.3.2 are complied with such as but not limited to, route qualification, flight preparation, concept of extended diversion time operations and criteria for diversions.

2.4 Flight dispatch and operational requirements

2.4.1 In applying the general flight dispatch requirements of Para D4 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, reduced flight altitude, etc. For compliance with the requirement of Para D4.7, at least the following aspects should be considered:

a) identify en-route alternate airports;
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 airports 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 This section addresses provision that apply in addition to those in Section 2 of this Attachment 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 PCAA (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 which 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's Flight Manual directly or by reference, reduced with an operational safety margin, commonly 15 minutes, specified by PCAA.

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 Para D4.7.2.3.1 should be based on the safety risk management guidance contained in the Safety Management Manual (ICAO 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) is 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) to 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 program 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 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 Para D4.7 is not an operating limit. It is a flight time to an en-route alternate aerodrome, which is established by PCAA 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 Para D4.7 should take into consideration the most limiting EDTO significant system time limitation, if any, indicated in the Aeroplane's 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.

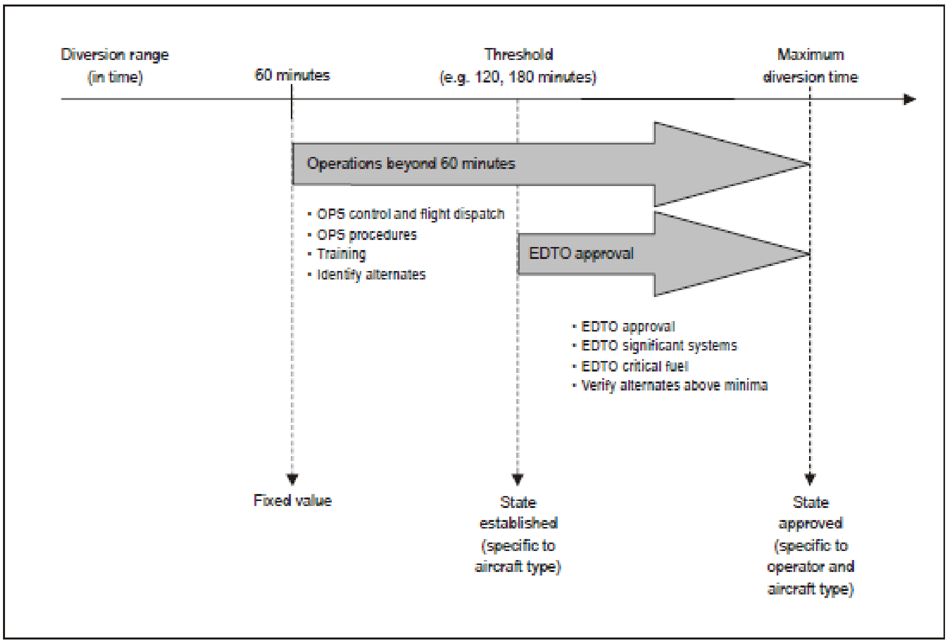
3.2 EDTO for aeroplanes with more than two turbine engines

3.2.1 General

3.2.1.1 This section addresses provision that apply in addition to those in Sections 2 and 3.1 of this Attachment 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, an Operator and pilot-in-command, should ensure that:

a) when planning an EDTO flight, 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 he 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), 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 results 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 Section 3.2.6 of this Attachment. This EDTO critical fuel corresponds to the additional fuel that may be required to comply with Para D4.3.6.3 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 all-engine operative 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 (ICAO Doc 9976).

3.2.2.3 The following factors may be considered in determining if a landing at a give aerodrome is the more appropriate course of action:

a) aeroplane configuration, weight, 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, weather, wind and terrain, in proximity of the en-route alternate aerodrome;
d) instrument approaches and approach/runway lighting available, rescue and fire fighting 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 States 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.

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 Section 3.2.8 of this Attachment.

3.2.4 Maximum diversion time

3.2.4.1 In approving the maximum diversion time, PCAA would take into consideration the aeroplane's EDTO significant systems (e.g. limiting time limitation, if any, and relevant to that particular operations) 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 Section 3.2.8 of this Attachment.

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's Flight Manual reduced by an operational safety margin, commonly 15 minutes, specified by PCAA.

3.2.5 EDTO significant systems

3.2.5.1 In addition to the provisions in section 3.1.1 of this Attachment, 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 PCAA, the Operator should consider, at time of dispatch and as outlined below, the most limiting EDTO significant system time limitation, if any, indicated in the Aeroplane's 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 with an operational safety margin, commonly 15 minutes, specified by PCAA.

3.2.5.2.3 The maximum diversion time subject to cargo fire suppression time limitations are considered in 3.3.5.2.2.

3.2.5.2.4 For that purpose, the Operator should consider the approved speed as described in Section 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 PCAA.

3.2.6 En-route alternate aerodromes

3.2.6.1 In addition to the en-route alternate aerodrome provisions described in Section 2.5 of this Attachment the following apply:

a) for route planning purposes, identified en-route alternate aerodromes need to be located at a distance within the maximum diversion time from the route and which could be used if necessary; 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 an Operator with a particular aeroplane type for extended diversion time operations, PCAA would 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 PCAA);
b) the Operator's past experience and compliance record is satisfactory and the Operator establishes the processes necessary for successful and reliable extended diversion time operations and shows 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's Flight Manual directly or by reference; or
    2) any other condition which PCAA 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 all-engine-operative (AEO) speed is any all-engine-operative speed within the certified flight envelope of the aeroplane.

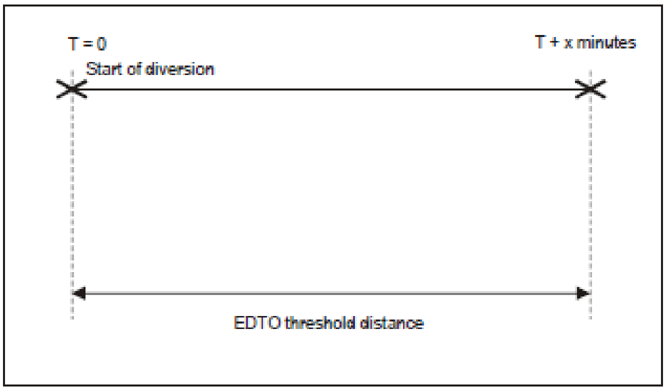
Note: See Section 3.2.5.2.2 of this Attachment for operational considerations.

3.2.8.2 When applying for EDTO an Operator should identify, and PCAA would 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 of 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 PCAA as shown on the Figure C-5 below.

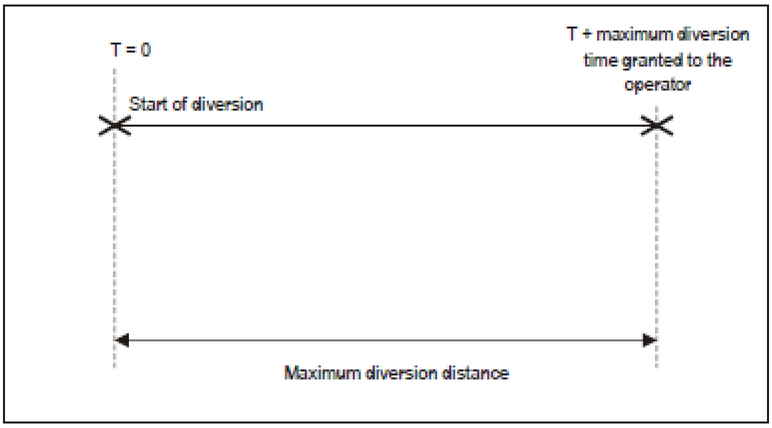
Figure C-5. Threshold distance — aeroplanes with more than two turbine engines



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 PCAA, as shown of the Figure C-6 below.

Figure C-6. Maximum diversion distance — aeroplanes with more than two turbine engines



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:

a) specific flight dispatch requirements are met;
b) necessary in-flight operational procedures are established; and
c) specific operational approval is granted by PCAA.

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 On establishing the appropriate threshold and approved maximum diversion time for an Operator with a particular aeroplane type, PCAA would 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 Operators 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 those considerations and are taken from actual State requirements:

a) State A: This State has established the threshold time based on the capability of the Operator and the aeroplane type for an aeroplane with more than two engines at 180 minutes and 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 (all-engine-operative (AEO) speed in ISA and still air conditions), remain within 240 minutes to an en-route alternate airport and meet the requirements in Para D4.7.1 to D4.7.2.4.

   If that Operator with the particular aeroplane type plans a route within the threshold time established by PCAA (in the above example this is 180 minutes) to an en-route alternate aerodrome, that Operator would not require any additional approval from PCAA and only need to comply with the requirements in Para D4.7.1 if the operation was conducted beyond 60 minutes from en en-route alternate aerodrome.

b) State B: The CAA is approached by an Operator who is in the process of expansion, having acquired aeroplane(s) 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 Operator B should be limited to 120 minutes and approves a maximum diversion time of 180 minutes.

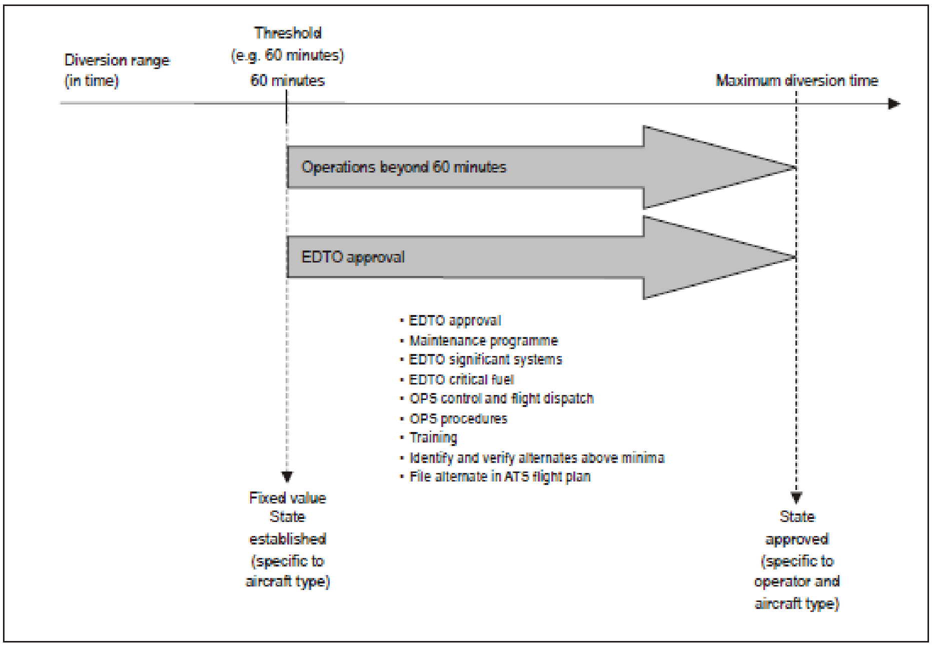
      As the Operator gains experience with the operation and the procedures over time, the State may amend the initially established threshold time and approved maximum diversion time.

3.3 EDTO for aeroplanes with two turbine engines

3.3.1 General

3.3.1.1 This section addresses provision that apply in addition to those in Sections 2 and 3.1 of this Attachment in particular to aeroplanes with two turbine engines (See Figure C-7).

Figure C-7. Generic EDTO graphical representation for aeroplanes with two turbine engines



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, an Operator and pilot in command, should normally ensure that:

a) when planning an EDTO flight, the minimum equipment list, the communications and navigation facilities, fuel and oil supply, en-route alternate aerodromes or aeroplane performance, are appropriately considered;
b) if an aeroplane engine shutdown, 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
c) in the event of a single or multiple failure of an EDTO significant systems or systems (excluding engine failure), 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 results 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 Section 3.3.6 of this Attachment. This EDTO critical fuel corresponds to the additional fuel that may be required to comply with Para D4.3.6.3 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-engine-operative diversion (i.e. depressurization alone) may be different from the approved one-engine-inoperative speed used to determine the EDTO threshold and maximum diversion distance (see 3.3.8);
   2) the speed selected for the one-engine-inoperative diversions (i.e. engine failure alone and combined engine failure and depressurization) should be the approved one-engine-inoperative 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 (ICAO 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, weight, 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, weather, wind, and terrain, in proximity of the en-route alternate aerodrome;
d) instrument approaches and approach/runway lighting available, rescue and fire fighting services (RFFS) at the en-route alternate aerodrome;
e) 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.

3.3.3 Threshold time

3.3.3.1 In establishing the appropriate threshold time and to maintain the required level of safety, it is necessary for States 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.

3.3.3.2 For determining whether a point on a route is beyond the EDTO threshold to an enroute alternate aerodrome, the Operator should use the approved speed as described in Section 3.3.8 of this Attachment.

3.3.4 Maximum diversion time

3.3.4.1 In approving the maximum diversion time, PCAA would take into consideration the EDTO certified capability of the aeroplane, the aeroplanes 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 Section 3.3.8 of this Attachment.

3.3.4.3 The Operator's approved maximum diversion time should not exceed the EDTO certified capability of the aeroplane nor the most limiting EDTO significant system time limitation identified in the Aeroplane's Flight Manual reduced by an operational safety margin specified, commonly 15 minutes, by PCAA.

3.3.5 EDTO significant systems

3.3.5.1 In addition to the provisions in section 3.1.1 of this Attachment, this section address 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 failures from independent causes is assessed as provided in the Airworthiness Manual (ICAO 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 PCAA, 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's Flight Manual (directly or by reference) and relevant to that particular operations.

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 Section 3.3.8.2 does not exceed the most limiting EDTO significant system time limitation, other than the cargo fire suppression system, reduced with an operational safety margin, commonly 15 minutes, specified by PCAA.

3.3.5.2.3 The Operator should check that from any point on the route, the maximum diversion time, at all engine operating cruise speed, considering ISA and still air conditions, does not exceed the cargo fire suppression system time limitation reduced with an operational safety margin, commonly 15 minutes, specified by PCAA.

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 above 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 PCAA.

3.3.6 En-route alternate aerodromes

3.3.6.1 In addition to the en-route alternate aerodrome provisions described in Section 2.5 of this Attachment the following apply:

a) for route planning purposes, identified en-route alternate aerodromes need to be located at a distance within the maximum diversion time from the route and which could be used if necessary; 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 with in 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 should be provided to the flight crew on the identified en-route alternate aerodromes, including operational status and meteorological conditions.

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 an Operator with a particular aeroplane type for extended diversion time operations, PCAA would 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 PCAA);
b) the Operator's past experience and compliance record is satisfactory and the Operator establishes the processes necessary for successful and reliable extended diversion time operations and shows 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's 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 PCAA 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 one-engine-inoperative (OEI) speed" is any one-engine-inoperative speed within the certified flight envelope of the aeroplane.

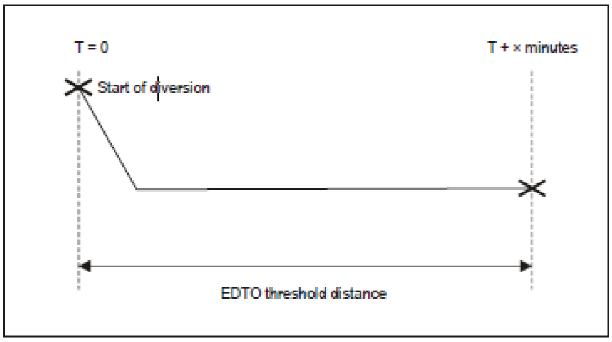
Note: See Section 3.3.5.2.2 of this Attachment for operational considerations.

3.3.8.2 When applying for EDTO an Operator should identify, and PCAA would approve the OEI speed(s) that will be used to calculate the threshold and maximum diversion distances considering ISA and still air conditions. 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 minutes and EDTO thresholds.

3.3.8.3 Determination of the EDTO threshold

3.3.8.3.1 For determining whether a point of 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 PCAA as shown on the Figure C-8 below. For the purposes of computing distances, credit for drift down may be taken.

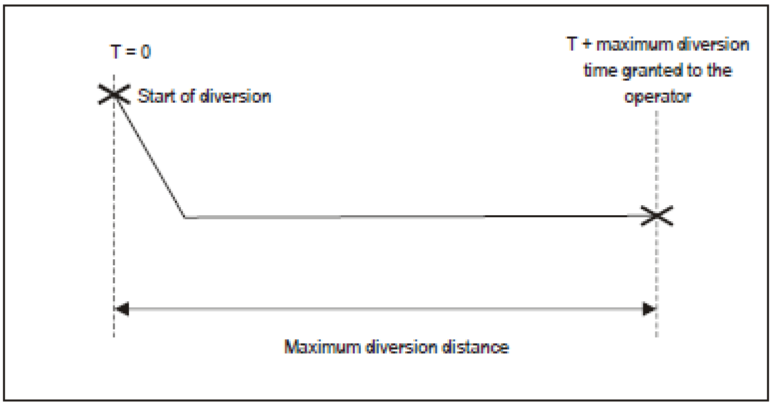
Figure C-8. Threshold distance — aeroplanes with two turbine engines



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 PCAA, as shown in the Figure C-9 below. For the purposes of computing distances, credit for drift down may be taken.

Figure C-9. Maximum diversion distance — aeroplanes with two turbine engines



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 aeroplanes EDTO significant systems. Information or procedures specifically related to extended diversion time operations should be incorporated into the Aeroplane's Flight Manual, Maintenance Manual, EDTO CMP (configuration, maintenance and procedure) document or other appropriate document.

3.3.9.2 Aeroplane manufacturers should supply data specifying the aeroplanes EDTO significant systems and where appropriate, any time-limiting factors associated with those systems.

Note 1: Criteria for aeroplane systems performance and reliability for extended diversion time operations are contained in the Airworthiness Manual (ICAO 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 system design and reliability aspects;
b) the reliability of the propulsion system is such that the risk of double engine failures from independent causes is extremely remote, assessed as provided in the Airworthiness Manual (ICAO Doc 9760) and found acceptable to support the diversion time being approved;
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) specific operational approval is granted by PCAA.

Note 1: The airworthiness considerations applicable to extended diversion time operations are provided in the Airworthiness Manual (ICAO Doc 9760) Part IV, Chapter 2.

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 State of Registry and, where applicable, to PCAA;
b) any changes to maintenance and training procedures, practices or limitations established in the qualification for extended diversion time operations are submitted to PCAA 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 is 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 of maintenance tasks, performing and/or supervising maintenance by a different technician, or verifying

maintenance correction actions prior to the airplane entering an EDTO threshold.

Note: The maintenance considerations applicable to extended diversion time operations are provided in the Airworthiness Manual (ICAO Doc 9760).

3.3.12 Examples

3.3.12.1 On establishing the appropriate threshold and approved maximum diversion time for an Operator with a particular aeroplane type, PCAA would 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 those considerations and are taken from actual State requirements:

a) State A: This State has established the threshold time based on the capability of the Operator and the aeroplane type for a twin engine aeroplane at 60 minutes and 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 conditions and still air at the one-engine inoperative cruise speed), remain within 180 minutes to an en-route alternate airport and meet the requirements in Para D4.7.1 to D4.7.2.6.

   If that Operator with the particular aeroplane type plans a route within the threshold time established by PCAA (in the above example this is 60 minutes) to an en-route alternate airport, 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 Para D4.7.

b) State B: This State has established the threshold time based on the capability of the Operator and the aeroplane type for a twin engine aeroplane at 90 minutes and 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 conditions and still air at the one-engine inoperative cruise speed), remain within 180 minutes to an en-route alternate airport and meet the requirements in Para D4.7.1 to D4.7.2.6.

   If that Operator with the particular aeroplane type plans a route within the threshold time established by PCAA (in the above example this is 90 minutes) to an en-route alternate airport, that Operator would not require any additional approval from PCAA and only need to comply with the requirements in Para D4.7.1 and in particular D4.7.1.1 b).

c) The same State B; This State is approached by an Operator who is in a process of expansion, having acquired twin engine aeroplane(s) 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 State may amend the initially established threshold time and approved maximum diversion time.

ATTACHMENT - D

AIR OPERATOR CERTIFICATION AND VALIDATION

Supplementary to Para D4.2.1

1. Purpose and scope

1.1 **Introduction**

The purpose of this Attachment is to provide guidance concerning actions required by PCAA in connection with the Operator certification requirements in Para D4.2.1, particularly the means of accomplishing and recording those actions.

1.2 **Prior certification required**

In accordance with Standard D4.2.1.3, the issuance of an air Operator certificate (AOC) is "dependent upon the Operator demonstrating" to the PCAA 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 PCAA'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**

PCAA as required by Standard D4.2.1.8 has established a certification system to ensure compliance with the required standards for the type of operation to be conducted.

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 PCAA on matters submitted for its review. The actions can be categorized as approvals or acceptances depending on the nature of the response by PCAA to the matter submitted for its review.

2.1.2 A specific approval is an approval which is documented in the Operations Specifications for Commercial Air Transport.

2.1.3 An approval is an active response by PCAA 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 PCAA.

2.1.4 An acceptance does not necessarily require an active response by PCAA to a matter submitted for its review. PCAA may accept a matter submitted to it for review as being in compliance with the applicable standards if PCAA does not specifically reject all or a portion of the matter under review, usually after some defined period of time after submission.

2.1.5 The phrase "approved by the State" 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 State occur even more frequently in ICAO Annex 6, Part I. In addition to these specific phrases, ICAO Annex 6, Part I, contains numerous references to requirements which would, as a minimum, create the need for at least a technical review by the State.

2.1.6 PCAA has made/ or arranged 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 D4.2.1.3 obligates PCAA, prior to certification of an Operator, to require sufficient demonstrations by the Operator to enable PCAA 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 PCAA 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 The certification, approval and acceptance actions of PCAA are adequately documented ,therefore PCAA will issue a written instrument, such as a letter or formal document, as an official record of the action. These written instruments would 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 an Operator and provide proof in the event that PCAA and the Operator disagree on the operations that the Operator is authorized to conduct.

2.3.2 PCAA collects 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 These certification records are persuasive evidence that PCAA 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 will evaluate the operational procedures, training and qualifications. Airworthiness specialists will evaluate the aircraft, equipment reliability and maintenance procedures. These evaluations may be accomplished separately, but are coordinated to ensure that all aspects necessary for safety have been addressed before any approval is issued.

2.5 **PCAA 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 PCAA. ICAO Annex 6, Part I, also requires the PCAA to consider or act in accordance with various approvals and acceptances by the State of Registry. Under these provisions, the PCAA 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 PCAA 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 PCAA 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 PCAA 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 PCAA 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 *(ICAO Doc 8335). Guidance concerning the transfer of State of Registry responsibilities to the PCAA 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. AUTHORIZATIONS

3.1 **Specific approval actions**

3.1.1 The term "specific approval" indicates a formal action on the part of the State of the Operator which results in an addition to the operations specification.

3.1.2 The following provisions make explicit reference to the need for a specific approval:

a) operational credits for HUD, EVS, SVS, CVS, automatic landing systems, when used for low visibility operations [4.2.8.1.1];

b) low visibility operations [4.2.8.4 and 4.2.8.5];

c) extended diversion time operations [4.7.2.2];

d) electronic flight bags [6.25.3];

e) AR navigation specifications for PBN operations [7.2.4];

f) reduced vertical separation minima [7.2.6]; and

g) dangerous goods [14.3].

3.1.3 An example of an Operations Specification template is provided in Appendix 6.

3.2 **Air Operator certificate (AOC)**

3.2.1 The AOC required by Para D4.2.1, is a formal instrument. Para D4.2.1.5, lists the information to be included in the AOC.

3.2.2 In addition to the items in Appendix 5, Para 3, 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 Approval actions

3.3.1 The term “approval” implies a more formal action on the part of the State 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.

3.3.2 Provisions that require an approval

The following provisions require or encourage approval by specified States. The approval of the PCAA 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 PCAA should take the necessary steps to ensure that Operators for which it is responsible comply with any applicable approvals issued by the State of Registry and/or State of Design, in addition to its own requirements.

Note: Items that require a specific approval are not included here. Refer to 3.1.2 of this attachment for a list of these provisions.

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) Fatigue management (4.10);
g) **EDTO configuration, maintenance and procedure (CMP) document for aeroplanes with two turbine engines (4.7.2);
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) Use of HUD, EVS, SVS or CVS (6.24);

k) Performance-based navigation operations (7.2.2 b));
l) MNPS operations (7.2.5 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); *[applicable until 4 November 2020]*
o) *Approved maintenance organization (Annex 8, Part II, Chapter 6, 6.2); *[applicable as of 5 November 2020]*
p) *Maintenance quality assurance methodology (8.7.4.1); *[applicable until 4 November 2020]*
p) *Maintenance quality assurance methodology (Annex 8, Part II, Chapter 6, 6.4.1); *[applicable as of 5 November2020]*
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).
y) Security training programmes (13.4).

3.4 **Provisions that require a technical evaluation**

PCAA makes technical evaluations under the provisions in ICAO Annex 6, Part . These provisions contain the phrases “acceptable to the PCAA”, “satisfactory to the PCAA”, “determined by the PCAA”, “deemed acceptable by the PCAA”, and “prescribed by the PCAA”. 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);
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); *[applicable until 4 November 2020]*
p) *minimum competence level of maintenance personnel (Annex 8, Part II, Chapter 6, 6.6.4); *[applicable as of 5 November 2020]*
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 PCAA (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);
aa) minimum number of flight attendants assigned to a specific aircraft (12.1);
bb) altimetry system performance requirements for operations in RVSM airspace (Appendix 4, 1 and 2);

Single-engine operations

cc) 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);
dd) systems and equipment (Appendix 3, 2);
ee) minimum equipment list (Appendix 3, 3);
ff) flight manual information (Appendix 3, 4);
gg) event reporting (Appendix 3, 5);
hh) Operator planning (Appendix 3, 6);
ii) flight crew experience, training and checking (Appendix 3, 7);
jj) route limitations over water (Appendix 3, 8); and
kk) Operator certification or validation (Appendix 3, 9).

3.5. Acceptance actions

3.5.1 Acceptance

3.5.1.1 The actual extent of the PCAA's technical evaluation of an Operator's readiness to conduct certain flight operations should be much broader than just those Standards which require or imply approval. During certification, the PCAA ensures that an Operator will be in compliance with all requirements of ICAO Annex 6, Part I, prior to conducting international commercial air transport operations.

3.5.1.2 The concept of "acceptance" is used as a formal method of ensuring that all critical aspects of Operator certification are reviewed prior to the formal issuance of the AOC. In this manner PCAA exercises it's 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.

3.5.2 Conformance report

PCAA may 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 PCAA regulations. This type of document is referenced in ICAO Doc 8335 and the *Airworthiness Manual* (ICAO 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 PCAA in the Operator's policies and procedures. Then a final conformance report is included in the PCAA'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.

3.5.3 Operations and maintenance manuals

3.5.3.1 Operations and maintenance manuals, and any subsequent amendments should be submitted to the PCAA (D4.2.3.2, D8.1.1, D8.2.4, D8.3.2, and D8.7.2.3). PCAA has established minimum contents for these manuals (D11.2, D11.3, D11.4 and Appendix 2). The pertinent portions of an Operator's manual for evaluation should be identified in the PCAA's technical guidance, e.g. operations policy manual, operating manual, cabin crew manual, route guide, and training manual.

3.5.3.2 PCAA's technical evaluation will, 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) should provide the step-by-step completion guidance necessary for compliance with D4.3 concerning the content and retention of these plans.

3.5.3.3 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 PCAA'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.

4. 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 PCAA. 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) contents of the journey log book (11.4.1); and
n) content of the security training programme (13.4).

5. Validation of the standard of operations

Standard D4.2.1.4 requires that the validity of an AOC shall depend upon the Operator maintaining the original certification standards (D4.2.1.3) under the supervision of the PCAA. This supervision requires that a system of continued surveillance be established to ensure the required standards of operations are maintained (D4.2.1.8). 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.

6. Amendment of air Operator certificates

The certification of an 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 an

Operator to change aircraft models and seek approval for new operational areas requiring other additional capabilities. Additional technical evaluations are required by PCAA 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 PCAA’s impending evaluation before issuing the formal instrument.

ATTACHMENT - E

MINIMUM EQUIPMENT LIST (MEL)

Supplementary to Para D6.1.2

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 State 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 PCAA, 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. PCAA requires 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 PCAA 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 Para D4.3.1.

ATTACHMENT - F

FLIGHT SAFETY DOCUMENTS SYSTEM

Supplementary to Para D3.5

1. Introduction

1.1 The following material provides guidance on the organization and development of an 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 an Operator's flight safety documents system development process, with the aim of ensuring compliance with Para D3.5. 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 PCAA, 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 an Operator's policies and procedures;

d) changes in an 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 Para D5.4 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 Para D5.4 and Appendix 3, 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 Para D5.4.1 and Appendix 3 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 20000 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 PCAA 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 State 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 State 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 Para D5.4.

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 PCAA 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, Para 1);
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, Para 2;
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, Para 2.

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. States 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 DISPLAYS (HUD), EQUIVALENT DISPLAYS AND VISION SYSTEMS

Supplementary to Para D4.2.8.1.1 and Para D6.24

Introduction

The material in this attachment provides guidance for certified Automatic Landing Systems, HUD, 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 to obtain operational credits. Automatic Landing Systems, HUD 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 PCAA.

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 a HUD.

Note 4: More detailed information and guidance on automatic landing systems, HUD, 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

1.3.1 Training and recent experience requirements for operations using HUD or equivalent displays should be established by the PCAA. Training programmes should be approved by the PCAA and the implementation of the training should be subject to oversight by that State. 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 (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

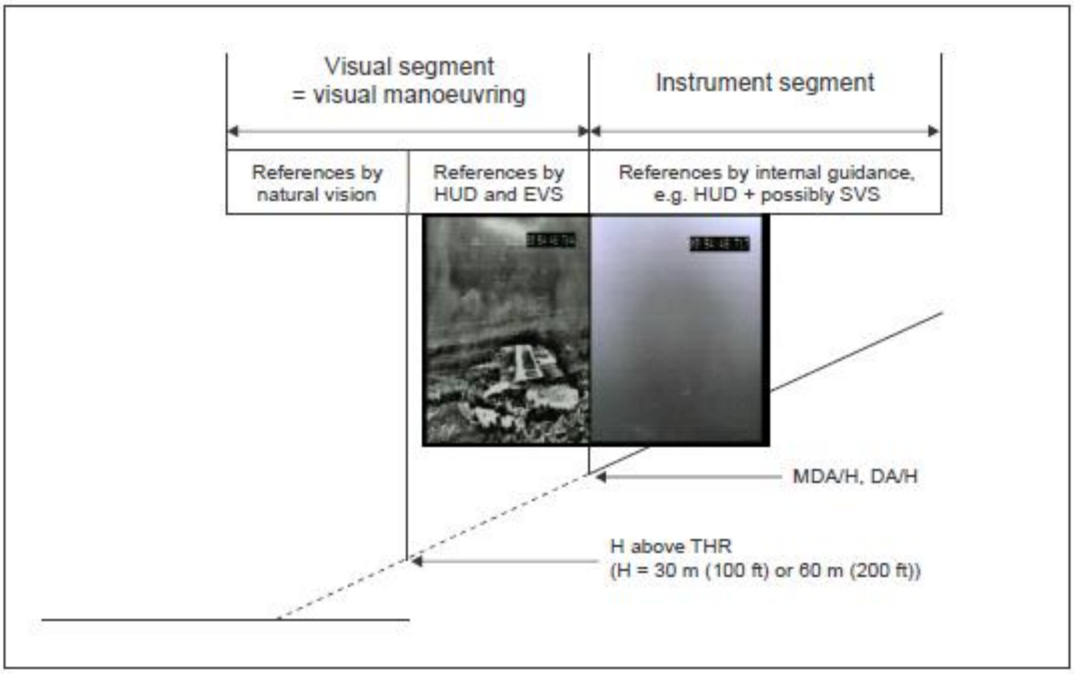
2.2.1 Flight operations with EVS allow the pilot to view an image of the external scene obscured by darkness or other visibility restrictions. The use of EVS will also allow acquisition of an image of the external scene earlier than with natural, unaided vision, hence providing for a smoother transition 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 PCAA 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 a the vision system in combination with natural vision 21 (see Figure H-1).

Figure H-1. EVS operations — transition from instrument to visual references



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 PCAA. 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

2.4.1 Training and recent experience requirements should be established by the PCAA. Training programmes should be approved by the PCAA and the implementation of the training should be subject to oversight by that State. 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 Para 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

3.1 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 were not available at the time when the criteria for aerodrome operating minima were originally established.

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

5.1 In accordance with Para D6.24.2 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 PCAA.

6.1.1 An 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 27 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 Para D6.23.1, requires that the use of an automatic landing system, a HUD, an equivalent display, EVS, SVS or CVS or any combination of those systems into a hybrid system, should be approved by the PCAA when those systems are used "for the safe operation of an aeroplane". When operational credits have been granted by the PCAA as per Para D4.2.8.1.1, 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 holders, the company name, AOC number and e-mail.
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 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 Para D4.1.4

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 relates 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 fire fighting 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 Para D4.1.4. It is not intended that this guidance limit or regulate the operation of an aerodrome.

2. Glossary of terms

2.1 **Aerodrome RFFS category**. The RFFS category for a given aerodrome, as published in the appropriate Aeronautical Information Publication (AIP).

2.2 **Aeroplane RFFS category**. The category derived from ICAO Annex 14, Volume I, Table 9-1 for a given aeroplane type.

2.3 **RFFS category**. Rescue and fire fighting services category as defined in ICAO Annex 14, Volume I, Chapter 9.

2.4 **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, an 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.

Table I-1
Minimum acceptable aerodrome category for rescue and fire fighting

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, 9.2 but not lower than Category 4 for aeroplanes with maximum certificated take-off mass of over 27000 kg and not lower than Category 1 for other aeroplanes.
Departure and destination aerodrome in case of temporary downgrade and Take-off alternate, destination alternate and en-route alternate aerodromes	**Two** categories below the aeroplane RFFS category, but not lower than Category 4 for aeroplanes with maximum certificated take-off mass of over 27000 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 27000 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.

(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 fire fighting according to Para D9.2.5 and Para D9.2.6 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

3.2.1 In flight, the pilot-in-command may decide to land at an aerodrome regardless of the RFFS category if, in the pilot's judgment after due consideration of all prevailing circumstances, to do so would be safer than to divert.

ATTACHMENT - J

DANGEROUS GOODS

(Supplementary to Para D14)

1. Purpose and scope

The material in this attachment provides guidance regarding the carriage of dangerous goods as cargo. Para D14, 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 Annex 6, there are other requirements in 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 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 PCAA should indicate in the operations specification if an Operator is approved or is not approved to transport dangerous goods as cargo. When an 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 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 An 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 Para D4.2.2.3.

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 D 6.18)

Guidance for location of an aeroplane in distress

1. Introduction

1.1 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 km^2 /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 km^2 , 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 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 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

3.1 The advent 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.

Table K-1. Examples of compliance	
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 timely manner

Note: A system from which a position can be determined used to comply with Para D6.18, may replace one of the ELTs required by Para D6.17.

ATTACHMENT - L

GUIDE TO CURRENT FLIGHT RECORDER PROVISIONS

(Supplementary to Para D6.38)

1. INTRODUCTION

Since 1973, and the inclusion in Annex 6 of SARPs for the carriage of flight recorders, new and revised requirements were introduced concerning flight recorders. These amendments include an update of the provisions pertaining to flight recorders, recording of digital communications, FDR requirements for new aircraft, revised parameter listings; two-hour duration CVRs. Through the years, the applicability date and the carriage of flight recorders to be installed, as defined by the SARPs, were complex.

The tables below summarize the current flight recorders carriage requirements.

Table L-1. FDR/AIR/ADRS/AIRS Installation SARPs

<table>
<tr><th rowspan="3">Date</th><th colspan="9">MCTOM</th></tr>
<tr><th colspan="3">Over 27 000 kg</th><th colspan="3">Over 5 700 kg</th><th colspan="3">5 700 kg and below</th></tr>
<tr><th>All aeroplanes new type certificate</th><th>All aeroplanes first certificate of airworthiness</th><th>All turbine aeroplanes first certificate of airworthiness</th><th>All aeroplanes new type certificate</th><th>All aeroplanes first certificate of airworthiness</th><th>All turbine aeroplanes first certificate of airworthiness</th><th>All turbine aeroplanes new type certificate</th><th>All turbine aeroplanes first certificate of airworthiness</th><th>Multi-turbine aeroplanes first certificate of airworthiness</th></tr>
<tr><td></td><td rowspan="5"></td><td rowspan="2"></td><td>6.3.1.1.6
6.3.1.1.9</td><td rowspan="5"></td><td rowspan="2"></td><td>6.3.1.1.6</td><td rowspan="5"></td><td rowspan="5"></td><td rowspan="3"></td></tr>
<tr><td>1987 ⇒</td><td>6.3.1.1.8</td><td>6.3.1.1.7</td></tr>
<tr><td>1989 ⇒</td><td rowspan="2">6.3.1.1.3</td><td rowspan="4"></td><td rowspan="2">6.3.1.1.4</td><td rowspan="4"></td></tr>
<tr><td>1990 ⇒</td><td rowspan="2">6.3.1.1.5</td></tr>
<tr><td>2005 ⇒</td><td rowspan="2">6.3.1.1.10</td><td rowspan="2">6.3.1.1.10</td></tr>
<tr><td>2016 ⇒</td><td>Table A8-1 (Some parameters are sampled at an increased frequency)</td><td>Table A8-1 (Some parameters are sampled at an increased frequency)</td><td>6.3.1.1.1</td><td>6.3.1.1.2</td><td></td></tr>
<tr><td>2023 ⇒</td><td>6.3.1.1.11</td><td>6.3.1.1.12</td><td></td><td>6.3.1.1.11</td><td>6.3.1.1.12</td><td></td><td></td><td></td><td></td></tr>
</table>

Table L-2. CVR/CARS Installation SARPs

<table>
<tr><th rowspan="3">Date</th><th colspan="6">MCTOM</th></tr>
<tr><th colspan="2">Over 27 000 kg</th><th colspan="2">Over 5 700 kg</th><th colspan="2">Over 2 250 kg</th></tr>
<tr><th>All aeroplanes</th><th>All turbine aeroplanes first certificate of airworthiness</th><th>All aeroplanes first certificate of airworthiness</th><th>All turbine aeroplanes first certificate of airworthiness</th><th>All turbine aeroplanes more than 1 pilot new type certificate</th><th>All turbine aeroplanes more than 1 pilot first certificate of airworthiness</th></tr>
<tr><td></td><td rowspan="3"></td><td rowspan="5">6.3.2.1.4</td><td></td><td>6.3.2.1.5</td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>1987 ⇒</td><td rowspan="4">6.3.2.1.3</td><td rowspan="3"></td></tr>
<tr><td>2003 ⇒</td></tr>
<tr><td>2016</td><td>6.3.2.3.1</td><td rowspan="2">6.3.2.1.1</td><td rowspan="2">6.3.2.1.2</td></tr>
<tr><td>2021</td><td>6.3.2.3.2</td><td></td></tr>
</table>

Table L-3. Combination Recorder Installation SARPs

<table>
<tr><td rowspan="3">Date</td><td colspan="4">MCTOM</td></tr>
<tr><td>Over
15 000 kg</td><td colspan="2">Over
5 700 kg</td><td>Less than
5 700 kg</td></tr>
<tr><td>All aeroplanes new type certificate requiring CVR and FDR</td><td>All aeroplanes new type certificate requiring CVR and FDR</td><td>All aeroplanes requiring CVR and FDR</td><td>All multi-engined turbine-powered aeroplanes requiring FDR and/or CVR</td></tr>
<tr><td>2016
⇒</td><td>6.3.5.5.2</td><td>6.3.5.5.1</td><td>6.3.5.5.3</td><td>6.3.5.5.4</td></tr>
</table>

Table L-4. Flight Crew-Machine Interface Recordings

<table>
<tr><td rowspan="3">Date</td><td colspan="2">MCTOM</td></tr>
<tr><td>Over 27 000 kg</td><td>Over 5 700 kg</td></tr>
<tr><td>All aeroplanes new type certificate</td><td>All aeroplanes first certificate of airworthiness</td></tr>
<tr><td>2023
⇒</td><td>6.3.4.1.1</td><td>6.3.4.1.2</td></tr>
</table>

Table L-5. Data Link Communications (DLC) Recording Installation Clarification

Rows	Date individual certificate of airworthiness was first issued	Date aircraft type certificate issued or modification for DLC equipment first approved	Date of activation for use of DLC equipment	DLC recording required	SARPs reference
1	On or after 1 January 2016	On or after 1 January 2016	On or after 1 January 2016	Yes	6.3.3.1.1
2	On or after 1 January 2016	Before 1 January 2016	On or after 1 January 2016	Yes	6.3.3.1.1
3	Before 1 January 2016	On or after 1 January 2016	On or after 1 January 2016	Yes	6.3.3.1.2
4	Before 1 January 2016	Before 1 January 2016	Before 1 January 2016	No	6.3.3.1.2
5	Before 1 January 2016	Before 1 January 2016	On or after 1 January 2016	No[1]	6.3.3.1.2 *6.3.3.1.3*

2. TABLE HEADINGS

2.1 *Date individual certificate of airworthiness* was first issued is self-explanatory.

2.2 *Date aircraft type certificate issued or modification for DLC equipment first approved* is the date that allows the installation of DLC equipment on the aircraft and refers to the airworthiness approval of the installation of aircraft components, such as the structural and wiring provisions with which the DLC equipment needs to be compliant. These airworthiness approvals are usually in a form of a type certificate, a supplemental type certificate or an amended type certificate.

2.2.1 It is not uncommon for original customers of an aircraft that have airworthiness approvals related to DLC capability to choose not to install the DLC equipment or choose not to have it activated even if the aircraft is prepared for it.

2.3 *Date of activation for use of DLC equipment* refers to the date that a DLC application referred to in 5.1.2 of Appendix 8 was first activated for use.

2.3.1 Datalink communication (DLC) equipment as used in these provisions, refer to the physical unit(s) (e.g. box(es)) that was approved to a minimum performance standard issued by a certification authority (e.g. TSO or ETSO).

2.3.2 The activation of DLC functions refer to approved software activation of DLC functions or software updates.

2.4 *DLC recording required* refers to the requirement to record DLC messages in accordance with provisions 6.3.3.1.1, 6.3.3.1.2 and 6.3.3.1.3.

3. GENERAL

3.1 It is the date on which the CVR capabilities of the aircraft were approved that determines the DLC recording requirement. The date in which the DLC equipment was approved to a minimum performance standard is not relevant for CVR recording requirement purposes.

3.2 For the DLC equipment to be compliant with an airworthiness approval, it needs to be able to use, without modification, the installed aircraft components that are necessary to provide the DLC function, such as the:

a) datalink router (e.g. hosted in the communications management unit);
b) radios (e.g. VHF, HF datalink, SATCOM) and related antennas.

3.3 Approved software updates to installed equipment or software activation of functions normally do not alter the DLC equipment compliance with the rest of the aircraft systems.

4. EXAMPLES

4.1 For rows 1 and 2:

- The recording requirement is driven by Standard 6.3.3.1.1 which is based on when the individual certificate of airworthiness was first issued. Any subsequent airworthiness modifications related to DLC capability do not exempt the aircraft from the requirement to record DLC messages.

4.2 For rows 3 to 5 — General:

- The recording requirement is driven by Standard 6.3.3.1.2 and is based on whether or not the aircraft has an airworthiness approval for DLC capabilities and the date of its issue.
- Since there was no requirement to record DLC messages prior to 1 January 2016, airworthiness approvals related to DLC capability issued before that date did not necessarily include this function.

4.3 For row 3:

- The recording requirement applies regardless of when the certificate of airworthiness was issued because an airworthiness approval related to DLC capability was issued on or after 1 January 2016. The date of installation of the equipment would typically be after the airworthiness approval.

4.4 For row 4:

- The recording requirement does not apply because the aircraft’s certificate of airworthiness and an airworthiness approval related to DLC capability was issued before 1 January 2016. The date of installation of DLC equipment is not a factor for DLC message recording requirements, as long as the equipment is compliant with that airworthiness approval.

4.5 For row 5:

- The recording requirement does not apply because the aircraft’s certificate of airworthiness and an airworthiness approval related to DLC capability was issued before 1 January 2016. The date of installation of DLC equipment is not a factor for DLC message recording requirements, as long as the equipment is compliant with that airworthiness approval. Notwithstanding the above, if the activation for use of the DLC equipment is on or after 1 January 2016, DLC messages should be recorded in accordance with Recommendation 6.3.3.1.3.

OPERATIONS OF HELICOPTERS

AIR NAVIGATION ORDER

VERSION	**:**	**3.0**
DATE OF IMPLEMENTATION	**:**	**31-07-2021**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. ARSALAN ATTIQUE	Flight Inspector Pilot Helicopter	Signed
REVIEWED BY	CAPT. S. M. RAFATULLAH	Director Flight Standards	Signed
VERIFIED BY	NADIR SHAFI DAR	Dy. DG (Regulatory)	Signed
APPROVED BY	KHAQAN MURTAZA	Director General Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO)		
STATUS OF DOCUMENT	CONTROLLED		

TABLE OF CONTENTS		
Ser	Subject	Page No

ABBREVIATIONS & SYMBOLS	
ACAS	Air Borne Collision Avoidance System
ADRS	Aircraft Data Recording System
ADS-B	Automatic Dependant Surveillance – Broadcast
ADS-C	Automatic Dependant Surveillance – Contract
AFCS	Automatic Flight Control System
AIR	Airborne Image Recorder
AIRS	Airborne Image Recoding System
AOC	Air Operator Certificate
APCH	Approach
AR	Authorization Required
ATC	Air Traffic Control
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATS	Air Traffic Services
CAA	Civil Aviation Authority
CARS	Cockpit Audio Recording System
CAT I	Category – I
CAT II	Category – II
CAT III	Category – III
CFIT	Controlled Flight into Terrain
Cm	Centimeter
CPDLC	Controller-Pilot Data Link Communications
CVR	Cockpit Voice Recorder
CVS	Combined Vision System
DA	Decision Altitude
DA/H	Decision Altitude/Height
DH	Decision Height
DLR	Data Link Recorder
DLRS	Data Link Recorder System
DME	Distance Measuring Equipment
EFB	Electronic Flight Bag
EFIS	Electronic Flight Instrument System
EGT	Exhaust Gas Temperature
EICAS	Engine Indicating Crew Alerting System
ELT	Emergency Locator Transmitter
ELT (AD)	Automatic Deployable ELT
ELT (AF)	Automatic Fixed ELT
ELT (AP)	Automatic Potable 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
FATO	Final Approach and Takeoff
FDR	Flight Data Recorder
FM	Frequency Modulation

Ft	Foot
G	Normal Acceleration
GEA	Ground Effect Area
hPa	Hectopascal
HEMS	Helicopter Emergency Medical Services
HLS	Helicopter Landing Site
HUD	Heads-up Display
IFR	Instrument Flight Rule
ILS	Instrument Landing System
IMC	Instrument Meteorological Condition
inHg	Inches of Mercury
Kg	Kilogram
Km	Kilometer
kN	Kilonewton
Kt	Knot
LDAH	Landing Distance Available
LDP	Landing Decision Point
LDRH	Landing Distance Required
LED	Light Emitting Diode
LLA	Landing and Liftoff Area
M	Meter
Mb	Millibars
MDA	Minimum Descend Altitude
MDA/H	Minimum Descend Altitude/Height
MDH	Minimum Descend Height
MEL	Minimum Equipment List
MHz	Megahertz
MLS	Microwave Landing Distance Available
MMEL	Master Minimum Equipment List
MOPS	Minimum Operational Performance Required
N1	Low Pressure Compressor Speed (Two stage Compressor)
NM	Nautical Mile
NVIS	Night Vision Imaging System
OCA	Obstacle Clearance Altitude
OC/H	Obstacle Clearance / Height
OCH	Obstacle Clearance Height
PANS	Procedures for Air Navigation Services
PBC	Performance Based Communication
PBS	Performance Based Navigation
PBN	Performance Based Surveillance
PNR	Point of No Return
Psi	Pounds per Square Inches
R	Rotor Radius
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
SI	International System of Units
SOP	Standard Operating Procedures
SVS	Synthetic Vision System
T4	Engine Exhaust Gas Temperature
TDP	Takeoff Decision Point
TIT	Turbine Inlet Temperature
TLOF	Touchdown and Lift-off Area
TODAH	Takeoff Distance Available
TODRH	Takeoff Distance Required
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VNAV	Vertical Navigation
V_{TOSS}	Takeoff Safety Speed
VY	Best Rate of Climb Speed
°C	Degree Celsius
%	Per cent

A. AUTHORITY:

A1. This Air Navigation Order (ANO) Pakistan has been issued by the Director General Pakistan Civil Aviation Authority (PCAA) in pursuance of Rules 4, 5, 180, 187, 189, 360, all other enabling provisions of the Civil Aviation Rules'1994 (CARs'94) and Annex – 6 Part – III of ICAO.

B. PURPOSE:

B1. The purpose of this Air Navigation Order is to establish requirement for various operational and safety related matters pertaining to the safe operation of helicopters in general. Safety of passengers, crew, operational staff and the public is expected to be achieved by meeting the minimum standards stipulated in this ANO. However, the operators are encouraged to set higher standards for operations, training, minima etc.

C. SCOPE:

C1. This Air Navigation Order comprises regulations / standards governing commercial, general aviation and private operations of helicopters within Pakistan.

D. DESCRIPTION:

D1. DEFINITIONS:

The following terms when used in this ANO have the meanings assigned to them respectively. Any term used in this ANO but not defined herein shall carry the same meaning as given in Civil Aviation Ordinance, 1960, Pakistan Civil Aviation Ordinance, 1992 and Civil Aviation Rules, 1994 (CARs'94).

D1.1 **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.

D1.2 **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.

D1.3 **Agreement Summary**

When an aircraft is operating under an Article 83 bis agreement between the State of Registry and another State, the agreement summary is a document transmitted with the Article 83 bis Agreement registered with the ICAO Council that identifies succinctly and clearly which functions and duties are transferred by the State of Registry to that other State.

Note: The other State in the above definition refers to either the State of the Operator for commercial air transport operations or, for general aviation operations, to the State of the principal location of a general aviation operator.

D1.4 **Aircraft**

Any machine, which can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

D1.5 **Aircraft Operating Manual**

A manual, acceptable to the PCAA 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.

D1.6 **Air Operator Certificate (AOC)**

A certificate authorizing an operator to carry out specified commercial air transport operations.

D1.7 **Air Taxi**

Means the airborne movement of a helicopter at low speeds and at height normally associated with ground effect.

D1.8 **Air Taxiway**

A defined path on the surface established for the air taxiing of helicopters.

D1.9 **Air Traffic Service (ATS)**

A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

D1.10 **Air Transit**

Means airborne movement of a helicopter that is:

a) For the purpose of going from one place within a HLS to another place within the HLS.

b) At or below 100 feet above the surface of the HLS; and

c) At speeds greater than those used in air taxiing.

D1.11 **Air Transit Route**

A defined path on the surface established for the air transiting of helicopters.

D1.12 **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.

D1.13 **Alternate Heliport**

A heliport to which a helicopter may proceed when it becomes either impossible or in advisable to proceed to or to land at the heliport 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 heliports include the following:

a) **Take-Off Alternate**

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

b) **En-Route Alternate**

An alternate heliport at which a helicopter would be able to land in the event that a diversion becomes necessary while en-route.

c) **Destination Alternate**

An alternate heliport at which a helicopter would be able to land should it become either impossible or inadvisable to land at the heliport of intended landing.

Note: The heliport from which a flight departs may bean en-route or a destination alternate heliport for that flight.

D1.14 **Approach and Departure Path**

Means the track of a helicopter as it approaches or takes off and departs from the FATO of a HLS.

D1.15 **Approach and Landing Operations Using Instrument Approach Procedures**

Instrument approach and landing operations are classified as follows:

a) **Non-Precision approach and Landing Operations**

An instrument approach and landing which utilizes lateral guidance but does not utilize vertical guidance.

b) **Approach and Landing Operations With Vertical Guidance**

An instrument approach and landing which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

c) **Precision Approach and Landing Operations**

An instrument approach and landing using precision lateral and vertical guidance with minima as determined by the category of operation.

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

a) A ground-based navigation aid: or

b) Computer generated navigation data.

D1.16 **Basic HLS**

A place that may be used as an aerodrome for infrequent, opportunity and short-term basis for all types of operations other than RPT, by day under helicopter VMC.

D1.17 **Building**

Includes any elevated structure on land, whether or not fixed to land.

D1.18 **Categories of Precision Approach and Landing Operations**

a) **Category I (CAT I) Operation**

A precision instrument approach and landing with a decision height not lower than 60 m (200 ft) and with either a visibility not less than 800 in or a runway visual range not less than 550 m.

b) **Category II (CAT – II) Operation**

A precision instrument approach and landing with a decision height lower than 60 in (200 ft), but not lower than 30 in (100 ft), and a runway visual range not less than 350 m.

c) **Category IIIA (CAT – III) Operation**

A precision instrument approach and landing with a decision height lower than 30 m (100 ft) or no decision height and a runway visual range not less than 200 m.

d) **Category IIIB (CAT – IIIB) Operation**

A precision instrument approach and landing with a decision height lower than 15 in (50 ft) or no decision height: and a runway visual range less than 200 m but not less than 50 m.

e) **Category IIIC (CAT – IIIC) Operation**

A precision instrument approach and landing with no decision height and no runway visual range limitations. Where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach and landing 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)

D1.19 **Approach and Landing Phase — Helicopters**

That part of the flight from 300 m (1000 ft) above the elevation of the FATO, if the flight is planned to exceed this height, or from the commencement of the descent in the other cases, to landing or to the balked landing point.

D1.20 **Appropriate Airworthiness Requirements**

The comprehensive and detailed airworthiness codes established, adopted or accepted by a Contracting State for the class of aircraft, engine or propeller under consideration.

D1.21 **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. Area navigation includes performance-based navigation as well as other operations that do not meet the definition of performance-based navigation.

D1.22 **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.

D1.23 **Combined Vision System (CVS)**

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

D1.24 **Commercial Air Transport Operation**

An aircraft operation involving the transport of passengers, cargo and / or mail for remuneration or hire.

D1.25 **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.

D1.26 **Congested Area**

In relation to a city, town or settlement, any area which is substantially used for residential, commercial or recreational purposes.

D1.27 **Congested Hostile Environment**

A hostile environment within a congested area.

D1.28 **Continuing Airworthiness**

The set of processes by which an aircraft, engine, rotor or part complies with the applicable airworthiness requirements and remains in a condition for safe operation throughout its operating life.

D1.29 **Continuing Airworthiness Records**

Records which are related to the continuing airworthiness status of an aircraft, engine, rotor or associated part.

D1.30 **Continuous Descent Final Approach (CDFA)**

A technique, consistent with stabilized approach procedures, for flying the final approach segment (FAS) of an instrument non-precision approach (NPA) 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 begins for the type of aircraft flown; for the FAS of an NPA procedure followed by a circling approach, the CDFA technique applies until circling approach minima (circling OCA/H) or visual flight maneuver altitude/height are reached.

D1.31 **Crew Member**

A person assigned by an operator to perform duty on an aircraft during a flight duty period.

D1.32 **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 Annex 18, Chapter 3 of ICAO.

D1.33 **Decision Altitude (DA) or Decision Height (DH)**

A specified altitude or height in a three-dimensional (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".

D1.34 **Declared Distances – Heliports**

a) **Take-Off Distance Available (TODAH)**

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

b) **Rejected Take-Off Distance Available (RTODAH)**

The length of the final approach and take-off area declared available and suitable for performance class-1 helicopters to complete a rejected take-off.

c) **Landing Distance Available (LDAH)**

The length of the final approach and take-off area plus any additional area declared available and suitable for helicopters to complete the landing maneuver from a defined height.

D1.35 **Defined Point After Take-Off (DPATO)**

The point, within the take-off and initial climb phase, before which the helicopter's ability to continue the flight safely, with one engine inoperative, is not assured and a forced landing may be required.

Note: Defined points apply to helicopters operating in performance Class 2 only.

D1.36 **Defined Point Before Landing (DPBL)**

The point, within the approach and landing phase, after which the helicopter's ability to continue the flight safely, with one engine inoperative, is not assured and a forced landing may be required.

Note: Defined points apply to helicopters operating in performance Class 2 only.

D1.37 **Duty**

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

D1.38 **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.

D1.39 **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

D1.40 **Elevated Heliport**

A heliport located on a raised structure on land.

D1.41 **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:

a) **Automatic Fixed ELT (ELT – AF)**

An automatically activated ELT, which is permanently attached to an aircraft.

b) **Automatic Portable ELT (ELT – AP)**

An automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft.

c) **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.

d) **Survival ELT (ELT – S)**

An ELT which is removable from an aircraft, stowed so as to facilitate its ready use in an emergency, and manually activated by survivors.

D1.42 **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).

D1.43 **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 night vision imaging systems (NVIS).

D1.44 **En-Route Phase**

That part of the flight from the end of the take-off and initial climb phase to the commencement of the approach and landing phase.

Note: Where adequate obstacle clearance cannot be guaranteed visually, flights must be planned to ensure that obstacles can be cleared by an appropriate margin. In the event of failure of the critical engine, operators may need to adopt alternative procedures.

D1.45 **Fatigue**

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

D1.46 **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.

D1.47 **Final Approach and Take-Off Area (FATO)**

A defined area over which the final phase of the approach maneuver to hover or landing is completed and from where the take-off maneuvers, is commenced. Where the FATO is to be used by helicopters operating in performance Class 1, the defined area includes the rejected take-off area available.

D1.48 **Final Approach Segment (FAS)**

That segment of an instrument approach procedure in which alignment and descent for landing are accomplished.

D1.49 **Flight Crewmember**

A licensed crewmember charged with duties essential to the operation of an aircraft during a flight duty period.

D1.50 **Flight Duty Period**

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

D1.51 **Flight Manual**

A manual or other documents 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 crewmember for the safe operation of the aircraft.

D1.52 **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 Annex 1, who supports, briefs, and/or assists the pilot-in-command in the safe conduct of the flight.

D1.53 **Flight Plan**

Specified information provided to an Air Traffic Services units, relative to an intended flight or portion of a flight of an aircraft.

D1.54 **Flight Recorder**

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

a) Automatic Deployable Flight Recorder (ADFR)

A combination flight recorder installed on the aircraft which is capable of automatically deploying from the aircraft.

D1.55 **Flight Safety Documents System**

A set of interrelated 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 operators maintenance control manual.

D1.56 **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**

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 crewmembers, and the performance and flight characteristics of that type of aircraft are realistically simulated.

b) **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.

c) **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.

D1.57 **Flight Time — Helicopters**

The total time from the moment a helicopter's rotor blades start turning until the moment the helicopter finally comes to rest at the end of the flight, and the rotor blades are stopped.

Note: The Operator may seek guidance in those cases where the definition of flight time does not describe or permit normal practices. e.g., crew change without stopping the rotors: and rotors running engine wash procedure following a flight. In any case, the time when rotors are running between sectors of a flight is included within the calculation of flight time. This definition is intended only for the purpose of flight and duty time regulations.

D1.58 **General Aviation Operation**

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

D1.59 **Ground Effect Area (GEA)**

In relation to a HLS, means an area that provides ground effect for a helicopter rotor system.

D1.60 **Ground Emergency Service Personnel**

Any ground emergency service personnel (such as policemen, firemen etc.) involved with HEMS and whose tasks are to any extent pertinent to helicopter operations.

D1.61 **Ground Handling**

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

D1.62 **Ground Taxiing**

Means movement of a helicopter under its own power and or on its undercarriage wheels.

D1.63 **Head-Up Display (HUD)**

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

D1.64 **Helicopter**

A heavier-than-air aircraft supported in flight chiefly by the reactions of the air on one or more power-driven rotors on substantially vertical axes.

Note: The term "rotorcraft" can be used as an alternative to "helicopter".

D1.65 **Helicopter Clearway**

A defined area on the ground or water under the control of the appropriate authority selected and/or prepared as a suitable area over which a performance class-1 helicopter may accelerate and achieve a specific height.

D1.66 **Helicopter Emergency Medical Service (HEMS) Flight**

A flight by a helicopter operating under a HEMS, the purpose of which is to facilitate emergency medical assistance, where immediate and rapid transportation is essential, by carrying:

a) Medical personnel; or

b) Medical supplies (equipment, blood, organs, drugs); or

c) Sick or injured persons and other persons directly involved.

D1.67 **Helideck**

A heliport located on a floating or fixed offshore structure.

D1.68 **HEMS Crew Member**

A person who is assigned to a HEMS flight for the purpose of attending to any person in need of medical assistance carried in the helicopter and assisting the pilot during the mission. The operator will be responsible for the specific training of the complete HEMS crew.

D1.69 **HEMS Operating Base**

A heliport at which the HEMS crew members and the HEMS helicopter may be on standby for HEMS operations.

D1.70 **HEMS Operating Site**

A site selected by the PIC during a HEMS flight for landing and takeoff.

D1.71 **Heliport**

An aerodrome or a defined area on a structure intended to be used, wholly or in part for the arrival, departure and surface movement of helicopters.

Note 1: Whenever the term “heliport” Is used, it is intended that the term also applies to aerodromes primarily meant for the use of aero-planes.

Note 2: Helicopters may be operated to and from areas other than heliports.

D1.72 **Heliport Operating Minima**

The limits of usability of a heliport for:

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

b) Landing in 2D instruments approach operations, expressed in terms of visibility and/or runway visual range and minimum decision altitude/height (MDA/H) and if necessary clouds condition; 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.

D1.73 **Helipad**

A stand which provides for parking a helicopter and where air taxiing operations are contemplated, the helicopter touchdown and lift-off.

D1.74 **Hostile Environment**

An environment in which:

a) A safe forced landing cannot be accomplished because the surface and surrounding environment are inadequate; or

b) The helicopter occupants cannot be adequately protected from the elements; or

c) Search and rescue response/capability is not provided consistent with anticipated exposure; or

d) There is an unacceptable risk of endangering persons or property on the ground.

D1.75 **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.

D1.76 **Human Performance**

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

D1.77 **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:

a) A ground-based radio navigation aid; or

b) Computer-generated navigation data from ground-based, space-based, self-contained navigation aids or a combination of these.

D1.78 **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:

a) **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 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 (ICAO Doc 8168), Volume I, Part II, Section 5.

b) **Approach Procedure With Vertical Guidance (APV)**

A performance-based navigation (PBN) instrument approach procedure designed for 3D instrument approach operations Type A.

c) **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 Section II, Chapter 2, 2.2.8.3 of Annex 6, Part-III for instrument approach operation types.

D1.79 **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 Annex 2 of ICAO.

D1.80 **Integrated Survival Suit**

A survival suit, which meets the combined requirements of the survival suit and life jacket.

D1.81 **Landing Decision Point (LDP)**

The point used in determining landing performance from which, a power-unit failure occurring at this point, the landing may be safely continued or a balked landing initiated.

Note: LDP applies only to helicopters operating in performance Class I.

D1.82 **Low-Visibility Operations (LVO)**

Approach operations in RVRs less than 550 m and/or with a DH less than 60 m (200 ft) or take-off operations in RVRs less than 400 m.

D1.83 **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.

D1.84 **Maintenance††**

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

D1.85 **Maintenance Organization's Procedures Manual**

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

D1.86 **Maintenance Program**

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

D1.87 **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.

D1.88 **Maintenance Release ††**

A document which contains a certification confirming that the maintenance work to which it relates has been completed in a satisfactory manner in accordance with appropriate airworthiness requirements.

D1.89 **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.

D1.90 **Maximum Mass**

Maximum certificated take-off mass of a Helicopter.

D1.91 **Medical Passenger**

A medical person carried in a helicopter during a HEMS flight, including but not limited to doctors, nurses and paramedics. This passenger shall receive a briefing.

D1.92 **Minimum Descent Altitude (MDA) Or Minimum Descent Height (MDH)**

A specified altitude or height in a non-precision approach 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”.

D1.93 **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.

D1.94 **Modification**

A change to the type design of an aircraft, engine or propeller.

Note: A modification may also include the embodiment of the modification which is a maintenance task subject to a maintenance release. Further guidance on aircraft maintenance, modification and repair is contained in the Airworthiness Manual (ICAO Doc 9760).

D1.95 **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 specifications:

a) **Required Navigation Performance (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.

b) **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. RNAV1.

Note 1: The performance based Navigation (PBN) Manual (ICAO Doc 9613), Volume II, contains detailed guidance on navigation specifications.

Note 2: The term RNP as previously defined as “a statement of the navigation performance, necessary for operation within a defined airspace, has been removed from this Annex as the concept of RNP has been overtaken by the concept of PBN. The term RNP in this Annex is now solely used in 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 the PBN Manual (ICAO Doc 9613).

D1.96 **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 DG PCAA.

Note: Civil twilight ends in the evening when the centre of the sun‘s disc is 6 degrees below the horizon and begins in the morning when the centre of the sun‘s disc is 6 degrees below the horizon.

D1.97 **Non- Congested Hostile Environment**

A hostile environment outside a congested area.

D1.98 **Non- Hostile Environment**

An environment In which:

a) A safe forced landing can be accomplished because the surface and surrounding environment are adequate;

b) The helicopter occupants can be adequately protected from the elements;

c) Search and rescue response/capability is provided consistent with anticipated exposure; and

d) The assessed risk of endangering persons or property on the ground is acceptable.

<u>Note</u>: Those parts of a congested area satisfying the above requirements are considered non-hostile.

D1.99 **<u>Obstacle Clearance Altitude or Obstacle Clearance Height</u>**

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 2m (7ft) 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”.

D1.100 **<u>Offshore Operations</u>**

Operations which routinely have a substantial proportion of the flight conducted over sea areas to or from offshore locations. Such operations include. but are not limited to, support of offshore oil, gas and mineral exploitation and sea-pilot transfer.

D1.101 **<u>Operation</u>**

An activity or a group of activities, which are subject to the same or similar hazards and which require a set of equipment to be specified, or the achievement and maintenance of a set of pilot competencies. To eliminate or mitigate the risk of such hazardous activities.

Note: Such activities could include, but would not be limited to, offshore operations, hell-hoist operations or emergency medical service.

D1.102 **<u>Operational Control</u>**

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.

D1.103 **<u>Operational Flight Plan</u>**

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

D1.104 **<u>Operations In Performance Class – 1</u>**

Operations with performance such that. In the event of a critical power-unit failure, performance is available to enable the helicopter to safely continue the flight to an appropriate landing area, unless the failure occurs prior to reaching the take-off decision point (TDP) or after passing the landing decision point (LDP) in which cases the helicopter must be able to land within the rejected take-off or landing area.

D1.105 **<u>Operations In Performance Class – 2</u>**

Operations with performance such that, in the event of critical power-unit failure, performance is available to enable the helicopter to safely continue the flight to an appropriate landing area, except when the failure occurs early during the take-off maneuver or late in the landing maneuver. In which cases a forced landing may be required.

D1.106 **Operations In Performance Class – 3**

Operations with performance such that, in the event of a power-unit failure at any time during the flight, a forced landing will be required.

D1.107 **Operations Manual**

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

D1.108 **Operations Specifications**

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

D1.109 **Operator**

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

D1.110 **Operators 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.

D1.111 **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 functionality needed for the proposed operation in the context of a particular airspace concept.

D1.112 **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: Performance requirements are expressed in navigation specifications (RNAV specification, RNP specification) In terms of accuracy, integrity, continuity availability and functionality needed for the proposed operation in the context of a particular airspace concept.

D1.113 **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.

D1.114 **Pilot -In- Command**

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

D1.115 **Point of No Return**

The last possible geographic point at which an aircraft can proceed to the destination aerodrome as well as to an available en-route alternate aerodrome for a given flight.

D1.116 **Psychoactive Substances**

Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psycho stimulants, hallucinogens, and volatile solvents. whereas coffee and tobacco are excluded.

D1.117 **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.

D1.118 **Repair ††**

The restoration of an aircraft, engine or associated part to an airworthy condition in accordance with the appropriate airworthiness requirements after it has been damaged or subjected to wear.

D1.119 **Required Communication Performance (RCP) Specifications**

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

D1.120 **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.

D1.121 **Required Communication Performance Type (RCP Type)**

A label (e.g. RCP 240) that represents the values assigned to RCP parameters for communication transaction time, continuity, availability and Integrity.

D1.122 **Required Navigation Performance (RNP)**

A statement of the navigation performance necessary for operation within a defined airspace Navigation performance and requirements are defined for a particular RNP type and/or application.

D1.123 **Rest Period**

Any continuous and defined period of time, subsequent to, or prior to duty, on the ground during which a flight crewmember is relieved of all duties by the operator.

D1.124 **Runway Visual Range (RVR)**

The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or Identifying its centre line.

D1.125 **Safe Forced Landing**

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

D1.126 **Safety Area**

A defined area on a heliport surrounding the FATO which is free of obstacles, other than those required for air navigation purposes, and intended to reduce the risk of damage to helicopters accidentally diverging from the FATO.

D1.127 **Safety Management System (SMS)**

A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

D1.128 **Safety Program**

An integrated set of regulations and activities aimed at improving safety.

D1.129 **Series of Flights**

Series of flights are consecutive flights that:

a) Begin and end within a period of 24 hours; and

b) Are all conducted by the same pilot-in-command.

D1.130 **Specific Approval**

A specific approval is an approval which is documented in the operations specifications for commercial air transport operations or in the list of specific approvals for non-commercial operations.

Note: The terms authorization, specific approval, approval and acceptance are further described in.

D1.131 **Standard HLS**

Means a place that may be used as an aerodrome for helicopter operations by day or night.

D1.132 **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 (ICAO Doc 9587).

D1.133 **State of the Aerodrome**

The State in whose territory the aerodrome is located.

Note: State of the Aerodrome includes heliports and landing locations.

D1.134 **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.

D1.135 **State of the Principal Location of a General Aviation Operator**

The State in which the operator of a general aviation aircraft has its principal place of business or, if there is no such place of business, its permanent residence.

Note: Guidance concerning the options for the principal location of a general aviation operator is contained in the Manual on the Implementation of Article 83 bis of the Convention on International Civil Aviation (ICAO Doc 10059).

D1.136 **Synthetic Vision System (SVS)**

A system to display data-derived synthetic images of the external scene from the perspective of the flight deck.

D1.137 **Surface- Level Heliport**

A heliport located on the ground or on the water.

D1.138 **Take-Off**

In relation to a helicopter means accelerate to and commence climb at the relevant climb speed.

D1.139 **Take-Off and Initial Climb Phase**

That part of the flight from the start of take-off to 300 m (1000 ft) above the elevation of the FATO, if the flight is planned to exceed this height, or to the end of the climb in the other cases.

D1.140 **Take-Off Decision Point (TDP)**

The point used in determining take-off performance from which, a power-unit failure occurring at this point, either a rejected take-off may be made or a take-off safely continued.

Note: TDP applies only to helicopters operating in performance Class 1.

D1.141 **Touch Down and Lift-Off Area (TLOF)**

A load bearing area on which a helicopter may touch down or lift off.

D1.142 **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 Annex 2 of ICAO.

D1.143 **V_{TOSS}**

The minimum speed at which climb shall be achieved with the critical power-unit inoperative, the remaining power-units operating within approved operating limits.

Note: The speed referred to above may be measured by instrument indications or achieved by a procedure specified in the flight manual.

D2. APPLICABILITY

D2.1 The Standards and Recommended Practices contained in Annex 6, Part III, shall be applicable to all helicopters engaged in international commercial air transport operations or in international general aviation operations, except that these Standards and Recommended Practices are not applicable to helicopters engaged in aerial work.

Note 1: Standards and Recommended Practices applicable to the operation of aero planes by operators authorized to conduct international commercial air transport operations are to be found in Annex 6, Part I.

Note 2: Standards and Recommended Practices applicable to international general aviation operations with aero planes are to be found in Annex 6, Part II.

D3 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 fulfill 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 fulfillment of the conditions established in Article 83 bis.

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

D3.1 **Compliance With Laws, Regulations and Procedures**

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

D3.2 The operators 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 heliports 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 regulations and procedures as are pertinent to the performance of their respective duties in the operation of the helicopter.

Note: Information for pilots and flight operations personnel on flight procedure parameters and operational procedures is contained in PANS-OPS (ICAO Doc 8168), Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (ICAO 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.

D3.3 Operators shall ensure that flight crewmembers demonstrate the ability to speak and understand English language as specified by the Licensing Branch of PCAA in its regulations.

D3.4 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 helicopters registered in that State are not affected by this provision.

D3.5 Responsibility for operational control shall be delegated only to the pilot-in-command and to a flight operations officer/flight dispatcher if an 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 (ICAO Doc 8335). Detailed guidance on the authorization duties and responsibilities of the flight operation officer/ flight dispatcher is contained in the Manual Preparations of an Operational Manual (ICAO Doc 9376). The requirements for age skill knowledge for experienced for licensed flight operations officer/ flight dispatcher are contained in Annex – 1.

D3.6 If an emergency situation which endangers the safety of the helicopter or persons becomes known first to the flight operations officer/flight dispatcher, action by that person in accordance with 5.8 shall include, where necessary, notification to the appropriate authorities of the nature of the situation without delay, and requests for assistance if required.

D3.7 In an emergency situation, which endangers the safety of the helicopter or persons necessitate 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. 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 State of the Operator. Such reports shall be submitted as soon as possible and normally within ten days.

D3.8 Operators shall ensure that pilots-in-command have available on board the helicopter all the essential information concerning the search and rescue services in the area over which the helicopter will be flown.

D3.8.1 Operator shall ensure that flight crewmembers demonstrate the ability to speak and understand the language used for radiotelephony communications as specified in Annex 1.

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

D3.9 **Compliance by a Foreign Operator with Laws, Regulations and Procedures of State**

D3.9.1 Whenever PCAA identifies a case of non-compliance or suspected non-compliance by a foreign operator with laws, regulations and procedures applicable within Pakistan, or a similar serious safety issue with that operator, the PCAA shall immediately notify the operator and, if the issue warrants it, to 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 the State and warrants a notification.

D3.9.2 In the case of notification to State, if the issue and its resolution warrant it, the PCAA shall engage in consultations with 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 (ICAO Doc 8335) provides guidance on the surveillance of operations by foreign operators. The manual also contains guidance on the consultations and related activities, 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.

D3.10 **Safety Management**

Note: Annex 19 includes safety management provisions for air operators. Further guidance is contained in the Safety Management Manual (ICAO Doc 9859).

D3.10.1 **Recommendation**

a) The operator of a helicopter of a certified take-off mass in excess of 7 000 kg, or having a passenger seating configuration of more than 9, and fitted with a flight data recorder should establish and maintain a flight data analysis program as part of its safety management system.

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

b) A flight data analysis program shall contain adequate safeguards to protect the source(s) of the data in accordance with Appendix 3 to Annex 19.

Note: Guidance on the establishment of flight data analysis programs is included in the Manual on Flight Data Analysis Programs (FDAP) (ICAO Doc 10000).

c) States shall not allow the use of recordings or transcripts of CVR, CARS, Class A AIR and Class A AIRS for purposes other than the investigation of an accident or incident as per Annex 13, except where the recordings or transcripts are:

   i) Related to a safety-related event identified in the context of a safety management system; are restricted to the relevant portions of a de-identified transcript of the recording; and are subject to the protections accorded by Annex 19;

   ii) Sought for use in criminal proceedings not related to an event involving an accident or incident investigation and are subject to the protections accorded by Annex 19; or

   iii) Used for inspections of flight recorder systems as provided in Section 6 of Appendix 4 (Annex-6 Part-III of ICAO).

Note: Provisions on the protection of safety data, safety information and related sources are contained in Appendix 3 to Annex 19. When an investigation under Annex 13 is instituted, investigation records are subject to the protections accorded by Annex 13.

d) States shall not allow the use of recordings or transcripts of FDR, ADRS, Class B and C AIR, and Class B and C AIRS for purposes other than the investigation of an accident or incident as per Annex 13, except where the recordings or transcripts are subject to the protections accorded by Annex 19 and are:

i) Used by the operator for airworthiness or maintenance purposes;

ii) Used by the operator in the operation of a flight data analysis program as provided in Section II of this Annex;

iii) Sought for use in proceedings not related to an event involving an accident or incident investigation;

iv) De-identified; or

v) Disclosed under secure procedures.

Note: Provisions on the protection of safety data, safety information and related sources are contained in Appendix 3 to Annex 19.

e) 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 D.

D4 SAFETY MANAGENMENT SYSTEM

The PCAA will monitor and supervise safety program according to the PCAA safety program. All operators shall establish a safety program in order to achieve an acceptable level of safety in civil aviation duly approved by the PCAA covering a minimum of following aspects:-

D4.1 Safety Policy and Objectives

a) Management commitment and responsibility.

b) Safety accountabilities.

c) Appointment of key safety personnel.

d) Coordination of emergency response planning.

e) SMS documentation.

D4.2 Safety Risk Management

a) Hazard identification.

b) Safety risk assessment and mitigation.

D4.3 Safety Assurance

a) Safety performance monitoring and measurement.

b) The management of change.

c) Continuous improvement of the SMS.

D4.4 Safety Promotion

a) Training and education.

b) Safety communication.

D4.5 **Safety Policy and Objectives**

D4.5.1 **Management Commitment and Responsibility**

The operator/approved maintenance organization shall define the organization's safety policy which shall be in accordance with international and national requirements, and which shall be signed by the accountable executive of the organization. The safety policy shall reflect organizational commitments regarding safety; shall include a clear statement about the provision of the necessary resources for the implementation of the safety policy; and shall be communicated, with visible endorsement, throughout the organization. The safety policy shall include the safety reporting procedures; shall clearly indicate which types of operational behaviors are unacceptable; and shall include the conditions under which disciplinary action would not apply. The safety policy shall be periodically reviewed to ensure it remains relevant and appropriate to the organization.

D4.6 **Management Commitment and Responsibility**

D4.6.1 The operator / approved maintenance organization shall identify the accountable executive who, irrespective of other functions, shall have ultimate responsibility and accountability, on behalf of the operator/ approved maintenance organization, for the implementation and maintenance of the SMS. The operator/approved maintenance organization shall also identify the accountabilities of all members of management, irrespective of other functions, as well as of employees, with respect to the safety performance of the safety management system. Safety responsibilities, accountabilities and authorities shall be documented and communicated throughout the organization, and shall include a definition of the levels of management with authority to make decisions regarding safety risk tolerability.

D4.7 **Appointment of Key Safety Personnel**

D4.7.1 The operator / approved maintenance organization shall identify a safety manager to be the responsible individual and focal point for the implementation and maintenance of an effective SMS.

D4.8 **Coordination of Emergency Response Planning**

D4.8.1 The operator/approved maintenance organization shall ensure that an emergency response plan that provides for the orderly and efficient transition from normal to emergency operations and the return to normal operations is properly coordinated with the emergency response plans of those organizations it must interface with during the provision of its services.

D4.9 **SMS Documentation**

D4.9.1 The operator/ approved maintenance organization shall develop an SMS implementation plan. Endorsed by senior management of the organization, that defines the organization's approach to the management of safety in a manner that meets the organization's safety objectives. The organization shall develop and maintain SMS documentation describing the safety policy and objectives, the SMS requirements, the SMS processes and procedures, the accountabilities, responsibilities and authorities for processes and procedure the accountabilities, responsibilities and authorities for processes and procedures, and the SMS outputs. Also as part of the SMS documentation, the operator/approved maintenance organization shall develop and maintain a safety management system manual (SMSM), to communicate its approach to the management of safety throughout the organization.

D4.10 **Safety Risk Management**

D4.10.1 **Hazard Identification**

The operator/approved maintenance organization shall develop and maintain a formal process that ensures that hazards in operations are identified. Hazard identification shall be based on a combination of reactive, proactive and predictive methods of safety data collection.

D4.10.2 **Safety Risk Assessment and Mitigation**

The operator/approved maintenance organization shall develop and maintain a formal process that ensures analysis, assessment and control of the safety risks in helicopter/maintenance operations.

D4.10.3 **Safety Assurance**

D4.10.4 **Safety Performance Monitors**

The operator/approved maintenance organization shall develop and maintain the means to verify the safety performance of the organization, and to validate the effectiveness of safety risks controls. Safety performance of the organization shall be verified in reference to the safety performance.

D4.10.5 **The Management of Change**

The operator/approved maintenance organization shall develop and maintain a formal process to identify changes within the organization which may affect established process and services; to describe the arrangements to ensure safety performance before implementing changes; to describe the arrangements to ensure safety performance before implementing changes; and to eliminate or modify safety risk controls that are no longer needed effective due to changes in the operational environment.

D4.10.6 **Continuous Improvement of the SMS**

The operator/ approved maintenance organization shall develop and maintain a formal process to identify the causes of substandard performance of the SMS, determine the implications of substandard performance of the SMS in operations, and eliminate or mitigate such causes.

D4.10.7 **Safety Promotion**

D4.10.8 **Training and Education**

The operator/approved maintenance organization shall develop and maintain a safety training program that ensures that personnel are trained and competent to perform the SMS duties. The scope of the safety training shall be appropriate to each individual's involvement in the SMS.

D4.10.9 **Safety Communication**

D4.10.9.1 The operator/ approved maintenance organization shall develop and maintain formal means for safety communication that ensures that all personnel are fully aware of the SMS, conveys safety critical information, and explains why particular safety actions is taken and why safety procedures are introduced or changed.

D4.10.9.2 The operator shall clearly define the acceptable level of safety to be achieved in the SMS Manual duly accepted by the PCAA.

D4.10.9.3 The operator shall, as part of their safety program, implement a safety management system acceptable to PCAA that as a minimum:

a) Identifies safety hazards.

b) Ensures the implementation of remedial action necessary to maintain an agreed safety performance.

c) Provides for continuous monitoring and regular assessment of the safety performance; and

d) Aims at continuous improvement of the over all performance of the safety management system.

e) All Operators shall implement a safety management system acceptable to the PCAA that, as a minimum:

   i) identifies safety Hazards;

   ii) Ensures that remedial action necessary to maintain an acceptable level of safety is implemented;

   iii) Provides for continuous monitoring and regular assessment of the safety level achieved; and

   iv) Aims to make continuous improvement to the overall level of safety.

   v) A safety management system shall clearly define lines of safety accountability throughout the operator's organization, including a direct accountability for safety on the part of senior management.

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

D4.11 Dangerous Goods

Note 1: Provisions for carriage of dangerous goods are contained in Annex 18. ICAO, Rules 294 & 295 of CARs, 1994 and Article 35 of the Convention.

Note 2: Article 35 of the Convention refers to certain classes of cargo restrictions.

D4.12 Use of Psychoactive Substances

Provisions concerning the use of psychoactive substances are contained in Annex 1, 1.2.7 and Annex 2, 2.5.

D5 FLIGHT OPERATIONS

D5.1 Operating Facilities

D5.1.1 An 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 helicopter 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: "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.

D5.1.2 An 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.

D5.1.3 Subject to their published conditions of use, heliports and their facilities shall be kept continuously available for flight operations during their published hours of operations, irrespective of weather conditions.

D5.2 **Operational Certification and Supervision**

D5.2.1 **The Air Operator Certificate**

a) The operator shall not engage in commercial air transport operations, unless in possession of a valid Air Operator Certificate issued by PCAA. The air operator certificate shall authorize the operator to conduct commercial air transport operations in accordance with the operations specifications.

Note: provision the content of AOC and its associated operations specifications are contained in AOC Guide version-IV.

b) The issue of an air operator certificate by PCAA is dependent upon the operator demonstrating an adequate organization, method of control and supervision of flight operations, training program and maintenance arrangements consistent with the nature and extent of the operations specified.

Note: AOC Guide contains guidance on the issue of an AOC.

c) The continued validity of an air operator certificate shall depend upon the operator maintaining the requirements of D5.2.1b.

d) The air operator certificate shall contain at least the following information and shall follow the layout of Appendix 3 Paragraph 2:

i) The State of the Operator and the issuing authority;

ii) The air operator certificate number and its expiration date;

iii) The operator name, trading name(if different) and address of the principal place of business;

iv) The date of issue and the name, signature and title of the authority representative; and

v) The location, in a controlled document carried on board, where the contact details of operational management can be found.

e) The operations specifications associated with the air operator certificate shall contain at least the information listed in relevant ANO. Appendix 3, paragraph 3, and shall follow the layout of Appendix 3, paragraph 3.

Note: AOC guide contains additional information that maybe listed in the operations Specifications associated with the AOC.

f) Air operator certificates and their associated operations specifications as given in relevant ANO.

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

h) AOC inspections certification and continued surveillance inspections are mandatory requirements and will be carried out by PCAA as per given program.

j) The State of the Operator shall establish a system for both the certification and the continued surveillance of the operator, in accordance with Appendix 1 to Annex 19, to ensure that the required standards of operations established in 2.2 are maintained.

D5.2.2 **Surveillance of Operations of a Foreign Operator**

a) PCAA 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 CARs, 1994, ANO and ICAO Annex-6, Part-III.

b) PCAA will carryout surveillance of foreign operators carrying out operations in Pakistan and for taking appropriate action when necessary to preserve safety.

c) An operator shall meet and maintain the requirements established by the PCAA when operating in Pakistan. Guidance on the surveillance of operations by foreign operators may be found in the Manual of Procedures for Operations Inspection, Certification, Continued Surveillance, relevant CARs, and ANOs.

d) Contracting States 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 Annex and in Annex 19.

e) States shall establish a program with procedures for the surveillance of operations in their territory by a foreign operator and for taking appropriate action when necessary to preserve safety.

f) The operator shall meet and maintain the requirements established by the States in which the operations are conducted.

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 (ICAO Doc 8335).

D5.2.3 **Operations Manual**

a) An operator shall provide, for the use and guidance of operations personnel concerned an operations manual. 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.

b) An operator shall provide a copy of the operations manual together with all amendments and/or revisions to it for approval of PCAA and shall incorporate in it such mandatory material as the PCAA may require.

Note 1: Guidance for the organization and contents of an operations manual is provided in appendix 8.

Note 2: Specific items in an operations manual require the approval of the PCAA.

D5.2.4 **Operating Instructions — General**

a) An 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.

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

c) A helicopter rotor shall not be turned under power, for the purpose of flight, without a qualified pilot at the controls. The operator shall provide appropriately specific training and procedures to be followed for all personnel, other than qualified pilots, who are likely to carry out the turning of a rotor under power for purposes other than flight.

d) **Recommendation** The operator should issue operating instructions and provide information on helicopter climb performance with all engines operating to enable the pilot-in-command to determine the climb gradient that can be achieved during the take-off and initial climb phase for the existing take-off conditions and intended take-off technique. This information should be based on the helicopter manufacturer's data, or other data acceptable to the State of the Operator, and should be included in the operations manual.

D5.2.5 **In-Flight Simulation of Emergency Situations**

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

D5.2.6 **Checklists**

The checklists provided in accordance with the rules 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, the 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 on the human factors principals can be found in the human factors training manuals (ICAO Doc 9683).

D5.2.7 **Minimum Flight Altitudes (Operations Under IFR)**

a) An operator is permitted to establish minimum flight altitudes for those routes flown for which minimum flight altitudes have been established by the PCAA or the responsible state, provided that they shall not be less than those established by PCAA , unless specifically approved.

b) An 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 PCAA and shall include this method in the operations manual. The minimum flight altitudes determined in accordance with the above mentioned shall not be lower than specified in ICAO Annex 2.

c) **Recommendation** the method for establishing the minimum flight altitudes should be approved by the PCAA.

d) **Recommendation** The PCAA would approve such method only after careful consideration of the probable effects of the following factors on the safety of the operation in question:-

i) The accuracy and reliability with which the position of the helicopter can be determined;

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

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

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

v) Possible inaccuracies in aeronautical charts; and

vi) Airspace restrictions.

D5.2.8 **Heliport or Landing Location Operating Minima**

a) The PCAA shall require that the operator establish operating minima for each heliport or landing location 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 heliports or landing locations by the PCAA, except when specifically approved by PCAA.

Note: This Standard does not require the PCAA to establish operating minima.

b) The PCAA shall authorize operational credit(s) for operations with helicopters equipped with automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS. Where the operational credit relates to low visibility operations, PCAA shall issue a specific approval. Such authorizations shall not affect the classification of the instrument approach procedure.

Note 1: Operational credit includes

a) For the purposes of an approach ban, a minima below the heliport or landing location 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 F and in the Manual of All-Weather Operations (ICAO 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 (ICAO Doc 9365).

Note 4: Automatic landing system — helicopter is an automatic approach using airborne systems which provide automatic control of the flight path, to a point aligned with the landing surface, from which the pilot can transition to a safe landing by means of natural vision without the use of automatic control.

c) The PCAA shall require that in establishing the operating minima for each heliport or landing location which will apply to any particular operation, the operator shall take full account of:

i) The type, performance and handling characteristics of the helicopter and any conditions or limitations stated in the flight manual;

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

iii) The physical characteristics of the heliport and direction of approach;

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

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

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

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

viii) The obstacles in the climb-out areas and necessary clearance margins;

ix) The conditions prescribed in the operations specifications; and

x) Any minima that may be promulgated by the State of the Aerodrome.

d) 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:

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

ii) 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; and

3) Category III (CAT III): a decision height lower than 30 m (100 ft) or no decision height and a runway visual range less than 300 m or 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 III but with an RVR in the range of CAT II would be considered a CAT III 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 a section of the visual aids or of the approach area 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 (ICAO Doc 9365).

e) The State of the Operator shall issue a specific approval for instrument approach operations in low visibility which shall only be conducted when RVR information is provided.

Note: Guidance on low visibility operations is contained in the Manual of All-Weather Operations (ICAO Doc 9365).

f) For take-off in low visibility, the PCAA shall issue a specific approval for the minimum take-off RVR.

Note: In general, visibility for take-off is defined in terms of RVR. An equivalent horizontal visibility may also be used.

g) **Recommendation** For instrument approach operations, heliport or landing location operating minima below 800 m visibility should not be authorized unless RVR information or an accurate measurement or observation of visibility is provided.

Note: Guidance on the operationally desirable and currently attainable accuracy of measurement or observation is given in Annex 3, Attachment B.

h) 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 (ICAO Doc 8168) Volume I, Part II, Section 5.

i) 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.

D5.2.9 **Fuel and Oil Records**

a) An operator shall maintain fuel and oil records to enable the PCAA to ascertain that, for each flight, the fuel & oil requirements have been complied with-in accordance with D5.2.18.

b) Fuel and oil records shall be retained by the operator for a period of six months.

D5.2.10 **Crew - Pilot-in-Command**

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

D5.2.11 **Flight Time, Flight Duty Periods and Rest Periods:**

a) An operator shall formulate rules to limit flight time and flight duty periods and for the provision of adequate rest periods for all its crewmembers. These rules shall be in accordance with the regulations established by the PCAA and included in the operations manual.

b) An operator shall maintain current records of the flight time, flight duty periods and rest periods of all its crewmembers.

D5.2.12 **Passengers**

a) An operator shall ensure that passengers are made familiar with the location and use of:

i) Seat belts or Harnesses.

ii) Emergency exits;

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

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

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

b) The operator shall ensure that in an emergency during flight inform the passengers of the location and general manner of use of the principal emergency equipment carried for collective use.

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

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

D5.2.13 **Over-Water Flights**

All helicopters on flights over water in a hostile environment shall be certificated for ditching. Sea state shall be an integral part of ditching information.

D5.2.14 **Flight Preparation**

a) The pilot-in-command shall ensure that crewmembers and passengers are made familiar, by means of a briefing about:

i) Seat belts or harnesses; and, as appropriate,

ii) Emergency exits;

iii) Life jackets

iv) Oxygen dispensing equipment; and

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

b) A flight, or series of flights, shall not be commenced until flight preparation forms have been completed certifying that the pilot-in-command is satisfied that:

i) The helicopter is airworthy;

ii) The instruments and equipment prescribed in Para D4, for the particular type of operation to be undertaken, are installed and are sufficient for the flight;

iii) A maintenance release has been issued in respect of the helicopter;

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

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

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

vii) The Standards of D4.5 relating to operational flight planning have been complied with.

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

D5.2.15 **Operational Flight Planning**

a) An operational flight plan shall be completed for every intended flight or series of 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 heliport authority or on record in a suitable place at the point of departure

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

D5.2.16 **Alternate Heliports**

a) **Takeoff Alternate Heliport**

i) A take-off alternate heliport shall be selected and specified in the operational flight plan if the weather conditions at the heliport of departure are at or below the applicable heliport operating minima.

ii) For a heliport 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 heliport operating minima for that operation.

b) **Destination Alternate Heliport**

i) For a flight to be conducted in accordance with IFR, at least one destination alternate shall be specified in the operational flight plan and the flight plan, unless:

1) The duration of the flight and the meteorological conditions prevailing are such that there is reasonable certainty that, at the estimated time of arrival at the heliport of intended landing, and for a reasonable period before and after such time, the approach and landing may be made under visual meteorological conditions as prescribed by the DG PCAA or the Operator; or

2) The heliport of intended landing is isolated and no suitable alternate is available. A point of no return (PNR) shall be determined.

ii) For a heliport to be selected as a destination alternate, the available information shall indicate that, the estimated time of use, the conditions will be at or above the heliport operating minima for that operation.

iii) **Recommendation** For a flight departing to a destination which is forecast to be below the heliport operating minima, two destination alternates should be selected. The first destination alternate should be at or above the heliport operating minima for destination and the second at or above the heliport operating minima for alternate. Suitable offshore alternates may be specified subject to the following:

1) The offshore alternates shall be used only after a PNR. Prior to a PNR, onshore alternates shall be used;

2) Mechanical reliability of critical control systems and critical components shall be considered and take into account when determining the suitability of the alternates;

3) One engine inoperative performance capability shall be attainable prior to arrival at the alternate;

4) To the extent possible, deck availability shall be guaranteed; and

5) Weather information shall be reliable and accurate.

Note: The landing technique specified in the fight manual following control system failure may preclude the nomination of certain helipads as alternates.

iv) **Recommendation** Offshore alternates should not be used when it is possible to carry enough fuel to have an onshore alternate. Offshore alternates should not be used in a hostile environment.

D5.2.17 **Weather Conditions**

a) A flight to be conducted in accordance with the visual flight rules 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 or in the intended area of operations under the visual flight rules will, at the appropriate time, be such as to render compliance with these rules possible.

Note: When a flight is conducted in accordance with VFR, the use of night vision imaging systems (NVIS) or other vision enhancing system does not diminish the requirements to comply with the provision D4.10.4.

b) A flight to be conducted in accordance with instrument flight rules shall not be commenced unless the information is available which indicates that conditions at the heliport of intended landing or, when an alternate is required, at least one alternate heliport will, at the estimated time of arrival, be at or above the heliport operating minima.

c) 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 heliport or landing location, the operator shall specify appropriate incremental values for height of cloud base and visibility, acceptable to the State of the Operator, to be added to the operator's established heliport or landing location operating minima.

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

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

e) A flight to be planned or expected to operate in suspected or known ground icing conditions shall not be commenced unless the helicopter 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 helicopter is kept in an airworthy condition prior to take-off.

Note: Guidance material is given in the manual of aircraft ground Di-icing / Anti-icing operations (ICAO Doc 9640).

D5.2.18 **Fuel and Oil Requirements**

D5.2.18.1 **All Helicopters**

A flight shall not be commenced unless, taking into account both the meteorological conditions and any delays that are expected in flight, the helicopter carries sufficient fuel and oil to ensure that it can safely complete the flight. In addition, a reserve shall be carried to provide for contingencies.

a) **Visual Flight Rules (VFR) Operations**

The fuel and oil carried in order to comply as mentioned above shall in the case of VFR operations be at least the amount sufficient to allow the helicopter to:

i) Fly to the heliport to which the flight is planned;

ii) Have final reserve fuel to fly thereafter for a period of 20 minutes at best-range speed and,

iii) Have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the PCAA.

b) **Instrument Flight Rules (IFR) Operations**

i) The fuel and oil carried in order to comply shall, in the case of IFR operations, be at least the amount sufficient to allow the helicopter:

When an alternate is not required, to fly and execute and approach to the heliport or landing location to which the flight is planned, and thereafter to have:

1) Final reserve fuel to fly 30 minutes at holding speed at 450 m (1500 ft) above the destination heliport under standard temperature conditions and approach and land; and
2) To have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the PCAA.

ii) When an alternate is required, to fly to and execute an approach, and a missed approach, at the heliport or landing location to which the flight is planned, and thereafter:

1) Fly to and execute an approach at the alternate specified in the flight plan; and then
2) Have final fuel reserve to fly for 30 minutes at holding speed at 450 m (1500 ft) above the alternate under standard temperature conditions, and approach and land; and
3) Have an additional amount of fuel sufficient to provide for the increased consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the PCAA.

iii) When no suitable alternate is available, in terms of D16.9.1 (e.g. the destination is isolated), sufficient fuel shall be carried to enable the helicopter to fly to the destination to which the flight is planned and thereafter for a period that will, based on geographic and environmental considerations, enable a safe landing to be made and approved by PCAA. In computing the fuel and oil required at least the following shall be considered:

1) Meteorological conditions forecast;
2) Expected air traffic control routings and traffic delays;
3) For IFR flight, one instrument approach at the destination heliport, including a missed approach;
4) The procedures prescribed in the operations manual for loss of pressurization, where applicable, or failure of one power-unit while en route; and
5) Any other conditions that may delay the landing of the helicopter or increase fuel and/or oil consumption,

Note: Nothing precludes amendment of a flight plan in flight in order to re-plan the flight to another heliport, from the point where the flight has been re-planned.

iv) 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.

D5.2.19 **Re-Fueling with Passengers on Board or Rotors Turning**

D5.2.19.1 A helicopter should not be re-fuelled when passengers are embarking, on board, disembarking or when the rotors are turning unless the operator is granted specific authorization by the DG PCAA setting forth the conditions under which such fuelling may be carried out. Additional precautions are required when re-fuelling with fuels other than aviation kerosene or when re-fuelling results in a mixture of aviation kerosene with other aviation turbine fuels, or when an open line is used.

Note: Except where otherwise stated, all helicopter refueling provisions relate to operations using jet fuels. restrictions specific to AVGAS/wide cut fuels.

D5.2.19.2 A Helicopter shall not be refueled, rotors stopped or turning, when:

a) Passengers are embarking or disembarking; or

b) When oxygen is being replenished.

D5.2.19.3 When the helicopter is refueled with passengers on board, rotors stopped or turning, it shall be properly attended by sufficient qualified personnel, ready to initiate and direct an evacuation of the helicopter by the most practical, safe and expeditious means available. In order to achieve this:

a) The flight crew shall ensure that the passengers are briefed on what actions to take if an incident occurs during refueling;

b) A constant two-way communication shall be maintained by the helicopter's intercommunication system or other suitable means between the ground crew supervising the refueling and the qualified personnel on board the helicopter; and

Note: Caution needs to be exercised when using radios for this purpose due to the potential for stray currents and radio-induced voltages.

c) During an emergency shutdown procedure, the flight crew shall ensure that any personnel or passengers outside the helicopter are clear of the rotor area.

D5.2.19.4 The operator shall establish procedures and specify conditions under which such refueling may be carried out.

D5.2.19.5 **Recommendation** In addition to the requirements specified earlier, operational procedures should specify that at least the following precautions are taken:

a) Doors on the refueling side of the helicopter remain closed where possible, unless these are the only suitable exits;

b) Doors on the non-refueling side of the helicopter remain open, weather permitting, unless otherwise specified by the RFM;

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

d) If the presence of fuel vapor is detected inside the helicopter, or any other hazard arises during refueling, fuelling be stopped immediately;

e) The ground or deck area beneath the exits intended for emergency evacuation be kept clear;

f) Seat belts should be unfastened to facilitate rapid egress; and

g) With rotors turning, only ongoing passengers should remain on board.

D5.2.19.6 A helicopter shall not be refueled with AVGAS (aviation gasoline) or wide-cut type fuel or a mixture of these types of fuel, when passengers are on board.

D5.2.19.7 A helicopter shall not be defueled at any time when:

a) Passengers remain on board; or

b) Passengers are embarking or disembarking; or

c) Oxygen is being replenished.

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

Note 2: 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.

D5.2.20 **Oxygen Supply**

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

Ser	Absolute Pressure	Meter	Feet
1.	700 hPa	3000	10000
2.	620 hPa	4000	13000
3.	376 hPa	7600	25000

D5.2.20.1 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 crewmembers 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.

D5.2.20.2 A flight to be operated with a pressurized helicopter shall not be commenced unless a sufficient quantity of stored breathing oxygen is carried to supply all the crewmembers 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 the helicopter is operated at flight altitudes at which the atmospheric pressure is more than 376 hPa and cannot descend safely to a flight altitude at which the atmospheric pressure is equal to 620 hPa within four minutes, there shall be no less than a 10-minute supply for the occupants of the passenger compartment.

D5.2.21 **In-Flight Procedures**

D5.2.21.1 **Heliport Operating Minima**

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

b) An instrument approach shall not be continued below 300 m (1000 ft) above the heliport elevation or into the final approach segment unless the reported visibility or controlling RVR is at or above the heliport operating minima.

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

c) If, after entering the final approach segment or after descending below 300 m (1000 ft) above the heliport elevation in case of non-precision approach, 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, a helicopter shall not continue its approach-to-land at any heliport beyond a point at which the limits of the operating minima specified for that heliport would be infringed.

D5.2.22 **Meteorological Observations**

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

D5.2.23 **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.

D5.2.24 **Flight Crew Members at Duty Stations**

D5.2.24.1 **Take-off and Landing** All flight crewmembers required to be on flight deck duty shall be at their stations.

D5.2.24.2 **En-Route** All flight crewmembers 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 helicopter or for physiological needs.

D5.2.24.3 **Seat Belts** All flight crewmembers shall keep their seat belt fastened when at their stations.

D5.2.24.4 **Safety Harness** Any flight crewmember occupying a pilot's seat shall keep the safety harness fastened during the take-off and landing phases; all other flight crewmembers shall keep their safety harness 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.

D5.2.24.5 **Use of Oxygen** All flight crewmembers, when engaged in performing duties essential to the safe operation of a helicopter in flight, shall use breathing oxygen continuously whenever the circumstances prevail for which its supply is required as given in D5.2.20.1.

D5.3 Safeguarding of Cabin Crew & Passengers in Pressurized Aircraft in the Event of Loss of Pressurization

D5.3.1 **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.

D5.4 Instrument Flight Procedures

D5.4.1 One or more instrument approach procedures to serve each final approach and take-off area or heliport utilized for instrument flight operations shall be approved and promulgated by the PCAA.

D5.4.2 All helicopters when operated in accordance with the instrument flight rules shall comply with instrument approach procedures approved by the DG PCAA or by the CAA responsible for the heliport when located outside Pakistan.

Note 1: Operational procedures recommended for the guidance of operations personnel involved in instrument flight operations are described in PANS-OPS (ICAO Doc 8168), Volume I.

Note 2: Criteria for the construction of instrument flight procedures for the guidance of procedure specialists are provided in PANS-OPS (ICAO 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 Section II, Chapter 1, 1.1.1 of Annex 6, Part-III).

D5.5 Helicopter Operating Procedures for Noise Abatement

D5.5.1 **Recommendation**: The operator should ensure that take-off and landing procedures take into account the need to minimize the effect of helicopter noise. Noise abatement procedures specified by an operator for any one helicopter type should be the same for all heliports.

D5.6 **In-Flight Fuel Management**

D5.6.1 The operator shall establish policies and procedures, approved by the State of the Operator, to ensure that in-flight fuel checks and fuel management are performed.

D5.6.2 The pilot-in-command shall monitor the amount of usable fuel remaining on board to ensure it is not less than the fuel required to proceed to a landing site where a safe landing can be made with the planned final reserve fuel remaining.

D5.6.3 The pilot-in-command shall advise ATC of a minimum fuel state by declaring MINIMUM FUEL when, having committed to land at a specific landing site, the pilot calculates that any change to the existing clearance to that landing site, or other air traffic delays, may result in landing with less than the planned final reserve fuel.

Note 1: The declaration of MINIMUM FUEL informs ATC that all planned landing site options have been reduced to a specific landing site of intended landing that no precautionary landing site is available, and any change to the existing clearance, or air traffic delays, 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: A precautionary landing site refers to a landing site, other than the site of intended landing, where it is expected that a safe landing can be made prior to the consumption of the planned final reserve fuel.

D5.6.4 The pilot-in-command shall declare a situation of fuel emergency by broadcasting MAYDAY MAYDAY MAYDAY FUEL, when the usable fuel estimated to be available upon landing at the nearest landing site where a safe landing can be made is less than the required final reserve fuel in compliance with D2.3.6.

Note 1: The planned final reserve fuel refers to the value calculated in 2.3.6 and is the minimum amount of fuel required upon landing at any landing site. The declaration of MAYDAY MAYDAY MAYDAY FUEL informs ATC that all available landing options have been reduced to a specific site and a portion of the final reserve fuel may be consumed prior to landing.

Note 2: The pilot estimates with reasonable certainty that the fuel remaining upon landing at the nearest safe landing site will be less than the final reserve fuel, taking into consideration the latest information available, the area to be over flown (i.e. with respect to the availability of precautionary landing areas), meteorological conditions and other reasonable contingencies.

Note 3: 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 (ICAO).

D5.7 **Duties of Pilot-In-Command**

D5.7.1 The pilot-in-command shall be responsible for the operation and safety of the helicopter and for the safety of all crewmembers, passengers and cargo on board, form the moment the engine(s) started until the helicopter finally comes to rest at the end of the flight, with the engine(s) shut down and the rotor blades stopped.

D5.7.2 The pilot-in-command shall ensure that the checklists are complied with in detail.

D5.7.3 The pilot-in-command shall be responsible for notifying the nearest appropriate authority by the quickest available means of any accident or incident involving the helicopter, resulting in serious injury or death of any person or substantial damage to the helicopter or property.

Note: Definition of the term “serious injury” is contained in Annex 13 (ICAO).

D5.7.4 The pilot-in-command shall be responsible for reporting all known or suspected defects in the helicopter, to the operator, at the termination of the flight.

D5.7.5 The pilot-in-command shall be responsible for the journey log-book or the general declaration containing the information listed.

Note: By virtue of Resolution A10-36 of the Tenth Session of the Assembly (Caracas, June–July 1956) "the general declaration, [described in 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 Contracting States to be an acceptable form of journey logbook".

D5.8 <u>Duties of Flight Operations Officer / Flight Dispatcher</u>

D5.8.1 A flight operations officer/flight dispatcher in conjunction with a method of control and supervision of flight operations 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 the ATS flight plans, sign when applicable and file the ATS flight plan with the appropriate ATS unit; and

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;

D5.8.2 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 a flight, particularly in the context of emergency situations.

D5.9 <u>Carry-On Baggage</u>

D5.9.1 The operator shall ensure that all baggage carried onto a helicopter and taken into the passenger cabin is adequately and securely stowed.

D5.10 <u>Fatigue Management</u>

Note: Guidance on the development and implementation of fatigue management regulations is contained in the Manual for the Oversight of Fatigue Management Approaches (ICAO Doc 9966).

5.10.1 The State of the Operator 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 crewmembers are performing at an adequate level of alertness. Accordingly, the State shall establish:

a) Prescriptive regulations for flight time, flight duty period and duty period limitations and rest period requirements; and

b) Were authorizing an operator to use a fatigue risk management system (FRMS), FRMS regulations in accordance with Appendix 7 of Annex-6 (ICAO).

D5.10.2 The PCAA shall require that the operator, for the purposes of managing its fatigue-related safety risks, establish one of the following:

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

b) An FRMS in compliance with regulations established by PCAA for all operations; or

c) An FRMS in compliance with regulations established by the PCAA for a defined part of its operations with the remainder of its operations in compliance with the prescriptive fatigue management regulations established by the PCAA.

Note: Complying with the prescriptive fatigue management regulations does not relieve the operator of the responsibility to manage its risks, including fatigue-related risks, using its safety management system (SMS) in accordance with the provisions of Annex 19 (ICAO).

D5.10.3 The operator shall maintain records of flight time, flight duty periods, duty periods and rest periods for all its flight and cabin crew members for a period of time specified by the PCAA.

D5.10.4 Where the operator complies with prescriptive fatigue management regulations in the provision of part or all of its services, the PCAA:

a) Shall require that the operator familiarize those personnel involved in managing fatigue with their responsibilities and the principles of fatigue management;

b) 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.

D5.10.5 Where the operator implements an FRMS to manage fatigue-related safety risks in the provision of part or all of its services, the PCAA shall:

a) Require the operator to have processes to integrate FRMS functions with its other safety management functions;

b) Require that the operator establish maximum values for flight times, flight duty periods and duty periods, and minimum values for rest periods; and

c) 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.

D6. HELICOPTER PERFORMANCE OPERATING LIMITATIONS

D6.1 General

D6.1.1 Helicopters shall be operated in accordance with a code of performance established by the PCAA, in compliance with the applicable Standards of Para D6.

Note 1: The code of performance reflects, for the conduct of operations, both the various phases of flight and the operational environment. The Helicopter Code of Performance Development Manual (ICAO Doc 10110) provides guidance to assist States in establishing a code of performance.

Note 2: Concerning compliance with codes of performance, Chapter 1 of Annex 6, Part-III requires operators to comply with the laws, regulations and procedures of the States in which their helicopters are operated. Article 11 of the Convention forms the basis for this requirement.

D6.1.2 In conditions where the safe continuation of flight is not ensured in the event of a critical engine failure, helicopter operations shall be conducted in conditions of weather and light, and over such routes and diversions, that permit a safe forced landing to be executed.

D6.1.3 Notwithstanding the provisions of D5.1.2, the State of the Operator may, based on the result of a risk assessment, allow for variations without a safe forced landing to be included in the Code of Performance established in accordance with the provisions of D5.1.1. The risk assessment shall take into consideration at least the following:

a) The type and circumstances of the operation;

b) The area/terrain over which the operation is being conducted;

c) The probability of, and length of exposure to, a critical engine failure and the tolerability of such an event;

d) The procedures and systems for monitoring and maintaining the reliability of the engine(s);

e) The training and operational procedures to mitigate the consequences of the critical engine failure; and

f) Helicopter equipment.

Note: Guidance on conduct of the risk assessment to allow for variations to the need for a safe forced landing, including mitigation strategies to reduce the risk, is contained in (ICAO Doc 10110).

D6.1.4 Where the State of the Operator permits IMC operations in performance Class 3, such operations shall be conducted in accordance with the provisions of D5.2.21.

D6.1.5 **Recommendation** For helicopters for which Part IV of Annex 8 (ICAO) is not applicable because of the exemption provided for in Article 41 of the Convention, the PCAA should ensure that the level of performance specified in D5.2 is met as far as practicable.

D6.2 **Applicable to Helicopters Certificated in Accordance with Part IV of Annex 8**

D6.2.1 The Standards contained here are inclusive and are applicable to the helicopter Operations.

Note The following Standards do not include quantitative specifications comparable to those found in national airworthiness codes. In accordance with 3.1.1, they are to be supplemented by national requirements prepared by Contracting States.

D6.2.2 The level of performance defined by the appropriate parts of the code of performance for the helicopters designated shall be consistent with the overall level embodied in the Standards of this ANO.

Note: Guidance on the level of performance intended by the Standards and Recommended Practices of this Para is contained in (ICAO Doc 10110).

D6.2.3 A helicopter shall be operated in compliance with the terms of its certificate of airworthiness and within the approved operating limitations contained in its flight manual.

D6.2.4 The Operator shall take such precautions as are reasonably possible to ensure that the general level of safety contemplated by these provisions are maintained under all expected operating conditions, including those not covered specifically by this ANO.

D6.2.5 A flight shall not be commenced unless the performance information provided in the flight manual indicates that the Standards given below at paragraph D6.2.6 and D6.2.7 can be complied with for the flight to be undertaken.

D6.2.6 In applying the Standards of this ANO, account shall be taken of all factors that significantly affect the performance of the helicopter (such as: mass, operating techniques, elevation, or the pressure-altitude appropriate to the elevation of the operating site, temperature, wind and condition of the surface). 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 helicopter is being operated.

D6.3 Mass Limitations

a) The mass of the helicopter at the start of take-off shall not exceed the mass at which the code of performance (given by manufacturer) is complied with, allowing for expected reductions in mass as the flight proceeds and for such fuel jettisoning as is appropriate.

b) In no case shall the mass at the start of take-off exceed the maximum take-off mass specified in the helicopter flight manual taking into account the factors specified in D6.2.6.

c) In no case shall the estimated mass for the expected time of landing at the destination and at any alternate, exceed the maximum landing mass specified in the flight manual taking into account the factors specified in D6.2.6.

d) In no case shall the mass at the start of take-off, or at the expected time of landing at the destination and at any alternate, exceed the relevant maximum mass at which compliance has been demonstrated with the applicable noise certification Standards, unless otherwise authorized in exceptional circumstances for a certain operating site where there is no noise disturbance problem, by the PCAA.

D6.4 Take-Off and Initial Climb Phase

The Operator shall either apply a risk assessment methodology in accordance with the guidance in attachment A or, apply a risk assessment methodology, the Standards of D4.2.8.1, D4.2.8.2 and D4.2.8.3.

D6.5 Operations in Performance Class – 1

The helicopter shall be able, in the event of the failure of the critical engine being recognized at or before the take-off decision point, to discontinue the take-off and stop within the rejected take-off area available or, in the event of the failure of the critical engine being recognized at or after the take-off decision point, to continue the take-off, clearing all obstacles along the flight path by an adequate margin.

D6.6 Operations in Performance Class – 2

The helicopter shall be able, in the event of the failure of the critical engine at any time after reaching DPATO, to continue the take-off, clearing all obstacles along the flight path by an adequate margin (The type, performance and handling characteristics of the helicopter). Before the DPATO, failure of the critical engine may cause the helicopter to force-land.

D6.7 Operations in Performance Class – 3

At any point of the flight path, failure of an engine will cause the helicopter to force-land.

D6.8 En-route Phase

D6.8.1 Operations in Performance Classes 1 and 2

The helicopter shall be able, in the event of the failure of the critical engine at any point in the en-route phase, to continue the flight to a site at which the conditions for operations in performance Class 1, or the conditions for operations in performance Class 2, can be met without flying below the appropriate minimum flight altitude at any point.

Note: When the en-route phase is conducted over a hostile environment and the diversion time to an alternate would exceed two hours, it is recommended that the State of the Operator assess the risks associated with a second engine failure.

D6.8.2 **Operations in Performance Class – 3**

The helicopter shall be able, with all engines operating, to continue along its intended route or planned diversions without flying at any point below the appropriate minimum flight altitude. At any point of the flight path, failure of an engine will cause the helicopter to force-land; therefore, the conditions stated in 3.1.2 shall apply.

D6.9 **Approach and Landing Phase**

D6.9.1 **Operations in Performance Class – 1**

In the event of the failure of the critical power-unit being recognized at any point during the approach and landing phase, before the landing decision point, the helicopter shall, at the destination and at any alternate, after clearing all obstacles in the approach path, be able to land and stop within the landing distance available or to perform a balked landing and clear all obstacles in the flight path by an adequate margin equivalent to as described earlier. In case of the failure occurring after the landing decision point, the helicopter shall be able to land and stop within the landing distance available.

D6.9.2 **Operations in Performance Class – 2**

In the event of the failure of the critical power-unit before the DPBL, the helicopter shall, at the destination and at any alternate, after clearing all obstacles in the approach path, be able either to land and stop within the landing distance available or to perform a balked landing and clear all obstacles in the flight path by an adequate margin. After the DPBL, failure of a power-unit may cause the helicopter to force-land; therefore the conditions stated in D6.1.2 shall apply.

D6.9.3 **Operations in Performance Class – 3**

At any point of the flight path, failure of a power-unit will cause the helicopter to force-land; therefore the conditions stated in D6.1.2 shall apply.

D6.10 **Obstacle Data**

The operator shall use available obstacle data to develop procedures to comply with the take-of, initial climb, approach and landing phases detailed in the code of performance established by the PCAA.

D6.11 **Additional Requirements for Operations of Helicopter in Performance Class – 3 in IMC, Except Special VFR Flights**

D6.11.1 The Operations in performance class – 3 in IMC shall be conducted only over a surface environment acceptable to PCAA and duly mentioned in the Ops-Manual.

D6.11.2 The Operators operating Helicopters in performance class 3 in IMC, shall ensure that the helicopter is certificated for flight under IFR and that the overall level of safety intended by this ANO specially:

a) The reliability of the engines;

b) The operator’s maintenance procedures, operating practices and crew training programs; and

c) Equipment and other requirements provided in accordance with Appendix 2.

Note: Guidance on additional requirements for operations of helicopter in performance in class – 3 in IMC is contained in appendix 2.

D6.11.3 Operations of helicopters operating in performance class – 3 in IMC shall have a program for engine trend monitoring and shall utilize the engine and helicopter manufacturer's recommended instruments, systems and operational/ maintenance procedures to monitor the engines.

D6.11.4 **Recommendation** In order to minimize the occurrence of mechanical failures, helicopters operating in IMC in performance class – 3 should utilize vibration health monitoring for the tail-rotor drive system.

D7 HELICOPTER INSTRUMENTS, EQUIPMENT & FLIGHT DOCUMENTS

Note: Specifications for the provision of helicopter communication and navigation equipment are contained in Para D5**.**

D7.1 General

D7.1.1 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 helicopters according to the helicopter used and to the circumstances under which the flight is to be conducted. The prescribed instruments / equipment including installation shall be approved by the PCAA.

D7.1.2 A helicopter shall carry a certified true copy of the air operator certificate and a copy of the authorizations, conditions and limitations relevant to the helicopter type, issued in conjunction with the certificate. When the certificate and the associated authorizations, conditions and limitations are issued 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 2.2.1.5 and 2.2.1.6 (Annex-6 Part III/ ICAO).

D7.1.3 The operator shall include in the operations manual a minimum equipment list (MEL), approved by the PCAA 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. If the helicopter is leased from other country the operator must ensure the compliance with the airworthiness requirements of that state as PCAA as applicable.

Note: Attachment B contains guidance on the minimum equipment list.

D7.1.4 The operator shall make available to operations staff and members 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 (ICAO Doc 9683).

D7.2 Helicopter Operated Under an Article 83 bis Agreement

Note: Guidance concerning the transfer of responsibilities by the State of Registry to the State of the Operator in accordance with Article 83 bis is contained in the Manual on the Implementation of Article 83 bis of the Convention on International Civil Aviation (ICAO Doc 10059).

D7.2.1 A helicopter, when operating under an Article 83 bis agreement entered into between the State of Registry and the State of the Operator, shall carry a certified true copy of the agreement summary, in either an electronic or hard copy format. When the summary is issued in a language other than English, an English translation shall be included.

Note: Guidance regarding the agreement summary is contained in (ICAO Doc 10059).

D7.2.2 The agreement summary of an Article 83 bis agreement shall be accessible to a civil aviation safety inspector, in determining which functions and duties are transferred by the State of Registry to the State of the Operator under the agreement, when conducting surveillance activities such as ramp checks.

Note: Guidance for the civil aviation safety inspector conducting an inspection of an aeroplane operated under an Article 83 bis agreement is contained in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (ICAO Doc 8335).

D7.2.3 The agreement summary shall be transmitted to ICAO together with the Article 83 bis Agreement for registration with the ICAO Council by the State of Registry or the State of the Operator.

Note: The agreement summary transmitted with the Article 83 bis agreement registered with the ICAO Council contains the list of all aircraft affected by the agreement. However, the certified true copy to be carried on board as per 4.1.5.1. will need to list only the specific aircraft carrying the copy.

D7.2.4 **Recommendation** The agreement summary should contain the information in Appendix 7 for the specific aircraft and should follow the layout of Appendix 7, paragraph 2.

D7.3 **All Helicopters on All Flights**

D7.3.1 A helicopter shall be equipped with instruments, which will enable the flight crew to control the flight path of the helicopter, carry out any required procedural maneuvers and observe the operating limitations of the helicopter in the expected operating conditions.

D7.3.2 A helicopter shall be equipped with accessible and adequate medical supplies;

D7.3.3 **Recommendations**

a) Medical supplies should comprise:

1) A first Aid kit and

2) Helicopters required to carry cabin crew as part of the operating crew, a universal precaution kit, for the use of cabin crew 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.

Note: Guidance on the contents of first-aid and universal precaution kits is given in Attachment “B”.

c) Portable fire extinguishers of a type which, when discharged, will not cause dangerous contamination of the air within the helicopter. 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.

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

Note 2: Refer to D4.2.2.1 Annex-6 Part-III for fire extinguishing agents

1) A seat or berth for each person over an age of two years.

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

3) 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.

D7.3.4 **<u>Recommendations</u>**

D7.3.4.1 When dual controls are fitted the safety harness for each pilot seat should incorporate a restraining device to prevent the upper body of an incapacitated occupant from interfering with the flight controls.

Note 1: Depending on the design, the lock on an inertia reel device may suffice for this purpose.

Note 2: Safety harness includes shoulder straps and a seat belt, which may be used independently. Depending on the design, the lock on an inertia reel device may suffice for this purpose.

a) Means of ensuring that the following information and instructions are conveyed to passengers:

1) When seat belts or harness to be fastened;

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 floatation devices where their carriage is required; and

5) Location and method of opening emergency exits; and

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

b) If fuses are used, spare electrical fuses of appropriate ratings for replacements of those accessible in flight.

D7.3.4.2 Any agent used in a built-in fire extinguisher for each lavatory disposal receptacle for towels, paper or waste, in a helicopter 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 a helicopter, 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 State of Registry; 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, 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.

D7.3.4.3 **A Helicopter Shall Carry**

a) The operations manual

b) The helicopter flight manual for the helicopter, or other documents containing performance data required and any other information necessary for the operation of the helicopter within the terms of its certificate of airworthiness, unless these data are available in the operations manual;

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.

D7.3.4.4 **Marking of Break-in Points**

a) If areas of the fuselage suitable for break-in by rescue crews in an emergency are marked on a helicopter, such areas shall be marked as shown in appendix ”C”. The color of the markings shall be red or yellow, and if necessary they shall be outlined in white to contrast with the background.

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

Note: This standard does not require any helicopter to have break-in areas.

D7.4 **Flight Recorders**

Note1: Crash-protected flight recorders comprise one or more of the following:

- A flight data recorder (FDR),
- A cockpit voice recorder (CVR),
- An airborne image recorder (AIR),
- A data link recorder (DLR).

D7.4.1 As per Appendix 4 (Annex-6 Part-III of ICAO), image and data link information may be recorded on either the CVR or the FDR.

Note 2: Combination recorders (FDR/CVR) may be used to meet the flight recorder equipage requirements in this Annex.

Note 3: Detailed requirements on flight recorders are contained in Appendix 4 (Annex-6 Part-III of ICAO).

Note 4: Lightweight flight recorders comprise one or more of the following:

- An aircraft data recording system (ADRS),
- A cockpit audio recording system (CARS),
- An airborne image recording system (AIRS),
- A data link recording system (DLRS)

D7.4.2 As per Appendix 4 (Annex-6 Part-III of ICAO), image and data link information may be recorded on either the CARS or the ADRS.

Note 5: For helicopters for which the application for type certification is submitted to a Contracting State before 1 January 2016, specifications applicable to crash-protected flight recorders may be found in EUROCAE ED-112, ED-56A, ED-55, Minimum Operational Performance Specification (MOPS), or earlier equivalent documents.

Note 6: For helicopters for which the application for type certification is submitted to a Contracting State on or after 1 January 2016, specifications applicable to crash-protected flight recorders may be found in EUROCAE ED-112A, Minimum Operational Performance Specification (MOPS), or equivalent documents.

Note 7: Specifications applicable to lightweight flight recorders may be found in EUROCAE ED-155, Minimum Operational Performance Specification (MOPS), or equivalent documents.

Note 8: Chapter 1 (Annex-6, Part-III ICAO) contains requirements for States regarding the use of voice, image and/or data recordings and transcripts.

D7.5 **Flight Data Recorders and Aircraft Data Recording Systems**

Note: Parameters to be recorded are listed in Table A4-1 of Appendix4 (Annex-6, Part-III ICAO).

D7.5.1 **Applicability**

D7.5.1.1 All helicopters of a maximum certificated take-off mass of over 3175 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2016 shall be equipped with an FDR which shall record at least the first 48 parameters listed in Table A4-1 of Appendix 4 (Annex-6 Part-III of ICAO).

D7.5.1.2 All helicopters of a maximum certificated take-off mass of over 7000 kg, or having a passenger seating configuration of more than nineteen, for which the individual certificate of airworthiness is first issued on or after 1 January 1989 shall be equipped with an FDR which shall record at least the first 30 parameters listed in Table A4-1 of Appendix 4 (Annex-6 Part-III of ICAO).

D7.5.1.3 **Recommendation** All helicopters of a maximum certificated take-off mass of over 3175 kg, up to and including 7 000 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1989, should be equipped with an FDR which should record at least the first 15 parameters listed in Table A4-1 of Appendix 4 (Annex-6 Part-III of ICAO).

D7.5.1.4 All turbine-engined helicopters of a maximum certificated take-off mass of over 2250 kg, up to and including 3175 kg, for which the application for type certification was submitted to a Contracting State on or after 1 January 2018, shall be equipped with:

a) An FDR which shall record at least the first 48 parameters listed in Table A4-1 of Appendix 4 (Annex-6 Part-III of ICAO); or

b) A Class C AIR or AIRS which shall record at least the flight path and speed parameters displayed to the pilot(s), as defined in Appendix 4 (Annex-6 Part-III of ICAO), Table A4-3; or

c) An ADRS which shall record the first 7 parameters listed in Table A4-3 of Appendix 4 (Annex-6 Part-III of ICAO).

Note: The “application for type certification was submitted to a Contracting State” refers to the date of application of the original “Type Certificate” for the helicopter type, not the date of certification of particular helicopter variants or derivative models

D7.5.1.5 **Recommendation** All helicopters of a maximum certificated take-off mass of 3175 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 2018 should be equipped with:

a) An FDR which should record at least the first 48 parameters listed in Table A4-1 of Appendix 4 (Annex-6 Part-III of ICAO); or

b) A Class C AIR or AIRS which should record at least the flight path and speed parameters displayed to the pilot(s), as defined in Appendix 4 (Annex-6 Part-III of ICAO), Table A4-3; or

c) An ADRS which should record the first 7 parameters listed in Table A4-3 of Appendix 4 (Annex-6 Part-III of ICAO).

Note: AIR or AIRS classification is defined in 4.1 of Appendix 4 (Annex-6 Part-III of ICAO).

D7.5.1.6 All helicopters of a maximum certificated take-off mass of over 3175 kg for which the application for type certificate is submitted to a Contracting State on or after 1 January 2023 shall be equipped with an FDR capable of recording at least the first 53 parameters listed in Table A4-1 of Appendix 4 (Annex-6 Part-III of ICAO).

D7.5.1.7 **Recommendation** All helicopters of a maximum certificated take-off mass of over 3175 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2023 should be equipped with an FDR capable of recording at least the first 53 parameters listed in Table A4-1 of Appendix 4 (Annex-6 Part-III of ICAO).

D7.6 **Recording Technology**

FDRs, ADRS, AIRs or AIRS shall not use engraving metal foil, frequency modulation (FM), photographic film or magnetic tape.

D7.6.1 **Duration** All FDRs shall retain the information recorded during at least the last 10 hours of their operation.

D7.7 **Cockpit Voice Recorders and Cockpit Audio Recording Systems**

D7.7.1 **Applicability**

All helicopters of a maximum certificated take-off mass of over 7000 KGs shall be equipped with a CVR the objective of which is the recording of the aural environment on the flight deck during flight time. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on one track of the CVR.

D7.7.2 **Recommendation** All helicopters of a maximum certificated take-off mass of over 3175 kg for which the individual certificate of airworthiness is first issued on or after 01 January 1987 shall be equipped with a cockpit voice recorder CVR, the objective of which is the recording of the aural environment on the flight deck during flight time. For helicopters not equipped with a flight data recorder, at least main rotor speed shall be recorded on one track of the Cockpit Voice Recorder (CVR).

D7.8 **Recording Technology**

CVRs and CARS shall not use magnetic tape or wire.

D7.8.1 **Duration**

All helicopters required to be equipped with a CVR shall be equipped with a CVR which shall retain the information recorded during at least the last two hours of its operation.

D7.9 **Data Link Recorders**

D7.9.1 **Applicability**

D7.9.1.1 All helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which use any of the data link communications applications referred to in 5.1.2 of Appendix 4 (Annex-6 Part-III of ICAO) and are required to carry a CVR, shall record the data link communications messages on a crash-protected flight recorder.

D7.9.1.2 All helicopters for which the individual certificate of airworthiness was first issued before 1 January 2016 that are required to carry a CVR, and are modified on or after 1 January 2016 to use any of the data link communications applications referred to in 5.1.2 of Appendix 4 (Annex-6 Part-III of ICAO), shall record the data link communications messages on a crash-protected flight recorder unless the installed data link communications equipment is compliant with a type design or aircraft modification first approved prior to 1 January 2016.

Note 1: A Class B AIR could be a means for recording data link communications applications messages to and from the helicopters where it is not practical or is prohibitively expensive to record those data link communications applications messages on FDR or CVR.

Note 2: The "aircraft modifications" refer to modifications to install the data link communications equipment on the aircraft (e.g. structural, wiring).

D7.9.2 **Recommendation** All helicopters for which the individual certificate of airworthiness was first issued before 1 January 2016, that are required to carry a CVR and are modified on or after 1 January 2016 to use any of the data link communications applications referred to in 5.1.2 of Appendix 4 (Annex-6 Part-III of ICAO) should record the data link communications messages on a crash-protected flight recorder.

D7.9.3 **Duration**

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

D7.9.4 **Correlation**

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

D7.10 **Flight Recorders – General**

D7.10.1 **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.

D7.11 **Flight Recorders — Operation**

D7.11.1 Flight recorders shall not be switched off during flight time.

D7.11.2 To preserve flight recorder records, flight recorders should be de-activated upon completion of flight time following an accident or incident, and not re-activated prior to removal of these records. The need for removal of the flight recorder records from the Helicopter will be determined by the investigation authority of PCAA.

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 Section II, Chapter 9, 9.6 (Annex-6, Part-III ICAO).

D7.12 **Flight Recorders – Continued Serviceability**

D7.12.1 Operational checks and evaluations of recordings from the FDR and CVR 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 Appendix 4 (Annex-6 Part-III of ICAO) (Annex-6, Part-III ICAO).

D7.12.2 **Recommendation** The documentation requirement concerning FDR 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.

D7.13 **Instruments and Equipment for Flights Operated Under VFR and IFR — by Day and Night**

Note: The flight instruments requirements may be met by combinations of instruments or by electronic displays.

D7.13.1 All helicopters when operated in accordance with visual flight rules 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.

D7.13.2 All helicopters when operating in accordance with VFR at night shall be equipped with:

a) Equipment specified previously.

b) An attitude indicator (artificial horizon) for each required pilot and one additional attitude indicator;

c) A slip indicator;

d) A heading indicator (directional gyroscope);

e) A rate of climb and descent indicator;

f) Such additional instruments or equipment as may be prescribed by the PCAA;

g) All helicopters when operating in accordance with VFR at night shall be equipped with the following lights;

Note: The general characteristics of lights are specified in Annex-8

h) The lights required by annex 2 for aircraft in flight or operating on the movement area of a heliport;

i) Two landing lights;

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

k) Lights in all passenger compartments; and

l) A flashlight for each crewmember station.

D7.13.3 **Recommendation** One of the landing lights should be trainable, at least in the vertical plane.

D7.13.4 All helicopters when operating in accordance with IFR, or when the helicopter cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with:

a) Magnetic compass;

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

c) Two sensitive pressure altimeters;

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

e) A slip indicator;

f) An attitude indicator (artificial horizon), for each required pilot and one additional attitude indicator;

g) A heading indicator (directional gyroscope);

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;

k) A stabilization system; unless it has been demonstrated to the satisfaction of the certificating authority that the Helicopter possesses, by nature of its design, adequate stability without such a system;

l) Such additional instruments or equipment as may be prescribed by the PCAA.

m) If operated at night, the lights specified in previous paragraphs.

D7.13.5 All helicopters when operating in accordance with IFR 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.

D7.13.6 **Recommendation** A helicopter when operating in accordance with IFR and which has a maximum certificated take-off mass in excess of 3175 kg or a maximum passenger seating configuration of more than 9 should be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.

D7.14 All Helicopters on Flights Over Water

D7.14.1 Means of Floatation

All helicopters intended to be flown over water shall be fitted with a permanent or rapidly deployable means of floatation so as to ensure a safe ditching of the helicopter when:

a) Engaged in offshore operations, or other over water operations; or

b) Flying over water in a hostile environment at a distance from land corresponding to more than 10 minutes at normal cruise speed when operating in performance Class 1 or 2; or

Note: When operating in a hostile environment, a safe ditching requires a helicopter to be designed for landing on water or certificated in accordance with ditching provisions.

c) Flying over water in a non-hostile environment at a distance from land specified by PCAA when operating in performance Class 1; or

Note: When considering the distance beyond which flotation equipment is required, the State should take into consideration the certification standard of the helicopter.

d) Flying over water beyond auto rotational or safe forced landing distance from land when operating in performance Class 3.

D7.14.2 **Emergency Equipment**

D7.14.2.1 Performance Class I and 2 helicopters, operating over water shall be equipped with:

a) One life jacket, or equivalent individual floatation 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. For offshore operations the life jacket shall be worn constantly unless the occupant is wearing an integrated survival suit that includes the functionality of the life jacket;

b) 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. When two life-rafts are fitted, each should be able to carry all occupants in the overload state.

c) Equipment for making the pyrotechnical distress signals.

Note: The life raft overload state has a design safety margin of 1.5 times the maximum capacity.

D7.14.2.2 Performance Class – 3 helicopters when operating beyond auto rotational distance from land but within a distance from land specified by the PCAA shall be equipped with one life jacket, or equivalent individual floatation 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: When determining the distance from land referred to above consideration should be given to environmental conditions and the availability of SAR facilities.

D7.14.2.3 For offshore operations, when operating beyond auto rotational distance from the land, the life jacket shall be worn unless the occupant is wearing an integrated survival suit that includes the functionality of the life jacket.

D7.14.2.4 Performance Class – 3 helicopters when operating outside the provisions quoted above shall be equipped as mentioned in paragraph D18.5.

D7.14.2.5 In the case of performance Class 2 and 3 helicopters. When taking off or landing at a heliport where, in the opinion of the

PCAA , the take-off or approach path is so disposed over water that in the event of a mishap there would be likelihood of a ditching, at least the equipment required mentioned in paragraph D18.5 a) shall be carried.

D7.14.2.6 Each life jacket and equivalent individual floatation device, when carried in accordance with this, shall be equipped with a means of electric illumination for the purpose of facilitating the location of persons.

D7.14.2.7 **Recommendation** Any helicopter for which the individual certificate of airworthiness is first issued on or after (01 January 1991), at least 50 per cent of the life rafts carried in accordance with the provisions should be deployable by remote control.

D7.14.2.8 **Recommendation** Rafts which are not deployable by remote control and which have a mass of more than 40 kg should be equipped with some means of mechanically assisted deployment.

D7.14.2.9 **Recommendation** On any helicopter for which the individual certificate of airworthiness was first issued before 1 January 1991, the provision of D7.14.2.6 and D7.14.2.7 should be complied with no later than 31 December 1992.

D7.15 **All Helicopters on Flights Over Designated Sea Areas**

D7.15.1 Helicopters, when operating over sea areas in which search and rescue would be especially difficult, shall be equipped with life-saving equipment (including means of sustaining life) as may be appropriate to the area over flown.

D7.15.2 **Recommendation** For offshore operations, a survival suit should be worn by all occupants when the sea temperature is less than 10°C or when the estimated rescue time exceeds the calculated survival time. When the elevation and strength of the sun results in a high temperature hazard on the flight deck, consideration should be given to alleviating the flight crew from this recommendation.

Note: When establishing rescue time, the sea state and the ambient light conditions should be taken into consideration.

D7.15.3 **All Helicopters on Flights Over Designated Land Areas**

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

D7.16 **Emergency Locator Transmitter (ELT)**

D7.16.1 All Performance Class 1, 2 and 3 helicopters operating on flights over water shall be equipped with a least one ELT(S) per raft carried but not more than a total of two ELTs are required i.e. one automatic and the other ELT(s) in a raft.

D7.16.2 All helicopters of maximum certificated take-off mass over 2730 kg required to be equipped with an FDR and / or a CVR, may alternatively be equipped with one combination recorder (FDR/CVR).

D7.16.3 A Type – IVA FDR shall record the parameters required to determine accurately the helicopter flight path, speed, attitude, engine power, operation and configuration.

D7.16.4 Helicopters on flights over designated land areas as described in shall be equipped with at least one ELT.

D7.16.5 All helicopters should carry an automatically activated ELT.

D7.16.6 ELT equipment carried to satisfy the above requirement shall operate in accordance with the provision of Annex 10 Volume III.

D7.16.7 From 1 July 2008, all helicopters operating in performance Class 1 and 2 shall be equipped with at least one automatic ELT and, when operating on flights over water with at least one automatic ELT and one ELT(S) in a raft or life jacket.

D7.16.8 From 1 July 2008, all helicopters operating in performance Class – 3 shall be equipped with at least one automatic ELT and, when operating on flights over water with at least one automatic ELT and one ELT(S) in a raft or life jacket.

D7.16.9 ELT equipment carried to satisfy the requirements of D7.16.7 and D7.16.8 shall operate in accordance with the relevant provisions of 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.

D7.17 **<u>All Helicopters on High Altitude Flights</u>**

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

SER	Absolute pressure	Meter	Feet
1.	700 hPa	3000	10000
2.	620 hPa	4000	13000
3.	376 hPa	7600	25000

D7.17.1 A helicopter 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.

D7.17.2 A helicopter 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 as described earlier.

D7.17.3 A helicopter intended to be operated at flight altitudes at which the atmospheric pressure is more than 376 hPa, which cannot descend safely within four minutes to a flight altitude at which the atmospheric pressure is equal to 620 hPa, shall be provided with automatically deployable oxygen equipment to satisfy the requirements. The total number of oxygen dispensing units shall exceed the number of passenger and cabin crew seats by at least 10 per cent.

D7.17.4 **<u>Recommendation</u>** A helicopter intended to be operated at flight altitudes at which the atmospheric pressure is more than 376 hpa which 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 issued before 9 November 1998, should be provided with automatically deployable oxygen equipment. The total number of oxygen dispensing units should exceed the number of passenger and cabin crew seats by at least 10 per cent.

D7.17.5 **All Helicopters in Icing Conditions**

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

D7.18 **Helicopters when Carrying Passengers**

D7.18.1 **Significant Weather Detection**

Recommendation Helicopters when carrying passengers should be equipped with operative weather radar or other significant-weather detection equipment, whenever such helicopters are being operated in areas where thunderstorms or other potentially hazardous weather conditions, regarded as detectable, may be expected to exist along the route either at night or under instrument meteorological conditions.

D7.18.2 **All Helicopters Required to Comply with the Noise Certification Standards in Annex – 16 Volume – I**

D7.18.2.1 All helicopters required to comply with the noise certification Standards of annex 16, Volume I, 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 o Registry, is issued in a language other than English, it shall include an English translation.

Note 1: The attestation may be contained in any document, carried on board, approved by the state of registry in accordance with the relevant provisions of Annex – 16.

Note 2: The various noise certification Standards of Annex 16, which are applicable to helicopters are determined according to the date of application for a type certificate or the date of acceptance of an application under an equivalent prescribed procedure by the certificating authority. Some helicopters are not required to comply with any noise certification Standard.

D7.18.3 **Helicopters Carrying Passengers —Cabin Crew Seats**

D7.18.3.1 All helicopters shall be equipped with a forward or rearward facing (within 15° of the longitudinal axis of the helicopter) seat, fitted with a safety harness for the use of each cabin crew required in respect of emergency evacuation.

Note 1: In accordance with the provisions of a seat and seat belt shall be provided for the use of each additional cabin crew.

Note 2: Safety harness includes shoulder straps and a seat belt, which may be used independently.

D7.18.3.2 Cabin crew seats shall be located near floor level and other emergency exits as required by PCAA for emergency evacuation.

D7.19 **Helicopters Required to be Equipped with Pressure-Altitude Reporting Transponders**

D7.19.1 All helicopters shall be equipped with a pressure-altitude reporting transponder to fly in designated airspaces. This provision is intended to improve the effectiveness of air traffic services as well as airborne collision avoidance systems.

D7.19.2 Except as may be otherwise authorized by the appropriate authority, all helicopters shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the provisions of Annex – 10, Volume – IV.

Note: This provision is intended to support the effectiveness of ACAS as well as to improve the effectiveness of air traffic services. The intent is also for aircraft not equipped with pressure-altitude reporting transponders to be operated so as not to share airspace used by aircraft equipped with airborne collision avoidance systems.

D7.20 **Microphones**

D7.20.1 All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones.

D7.21 **Vibration Health Monitoring System**

D7.21.1 **Recommendation** A helicopter which has a maximum certificated take of Mass in excess of 3175 Kg's or a maximum passenger seating configuration of more than 9 should be equipped with a vibration health monitoring system.

D7.22 **Helicopters Equipped With Automatic Landing Systems, Head-Up Display (HUD) or Equivalent Displays, Enhanced Vision Systems (EVS), Synthetic Vision Systems (SVS) and/or Combined Vision Systems (CVS)**

D7.22.1 Where helicopters are equipped with automatic landing systems, 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 a helicopter shall be approved by the PCAA.

Note 1: Information regarding a HUD or equivalent displays, including references to RTCA and EUROCAE documents, is contained in the Manual of All-Weather Operations (ICAO Doc 9365).

Note 2: Automatic landing system — helicopter is an automatic approach using airborne systems which provide automatic control of the flight path, to a point aligned with the landing surface, from which the pilot can transition to a safe landing by means of natural vision without the use of automatic control.

D7.22.2 In approving the operational use of automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, the PCAA 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; and

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 (ICAO Doc 9859).

Note 2: Guidance on operational approvals is contained in Attachment F.

D7.23 **Electronic Flight Bags (EFBS)**

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

D7.23.1 **EFB Equipment**

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

D7.23.2 **EFB Functions**

D7.23.2.1 Where EFBs are used on board a helicopter 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 (ICAO Doc 9859).

D7.23.2.2 The PCAA shall issue a specific approval for the operational use of EFB functions to be used for the safe operation of helicopters.

D7.23.3 **EFB Specific Approval**

D7.23.3.1 When issuing a specific approval for the operational use of EFBs, the PCAA shall ensure that:

a) The EFB equipment and its associated installation hardware, including interaction with helicopter 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 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 databases it may use; and

e) The operator has established and documented the procedures for the use of, and training requirements for the EFB function(s).

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

D8 HELICOPTER COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT

D8.1 **Communication Equipment**

D8.1.1 A helicopter shall be provided with radio communication equipment capable of:

a) Conducting two-way communication for heliport control purposes;

b) Receiving meteorological information at any time during flight:

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 D7.1.1 are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.

D8.1.2 Radio communication equipment required in accordance with D8.1.1 shall provide for communications on the aeronautical emergency frequency 121.5 MHZ.

D8.1.3 For operations where communication equipment is required to meet an RCP specification for performance-based communication (PBC), a helicopter 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) Be authorized by the PCAA for operations in such airspace.

c) Have information relevant to the helicopter RCP specification capabilities listed in the flight manual or other helicopter documentation approved by the State of Design or State of Registry; and

d) Have information relevant to the helicopter RCP specification capabilities included in the MEL.

e) Be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP type(s); and

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 (ICAO Doc 9869).

D8.1.4 The PCAA 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 program for relevant personnel consistent with the intended operations; and

d) Appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RCP specifications.

D8.1.5 The State of the Operator shall ensure that, in respect of those helicopters mentioned in D7.1.3, adequate provisions exist for:

a) Receiving the reports of observed communication performance issued by monitoring programs established in accordance with Annex 11, Chapter 3, 3.3.5.2 of ICAO; and

b) Taking immediate corrective action for individual helicopters, helicopter types or operators, identified in such reports as not complying with the RCP specification(s).

D8.2 <u>Navigation Equipment</u>

D8.2.1 A helicopter 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 the visual flight rules is accomplished by visual reference to landmarks.

D8.2.2 For operations where a navigation specification for performance-based navigation (PBN) has been prescribed, a helicopter shall:

a) Be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specification(s); and

b) Have information relevant to the helicopter navigation specification capabilities listed in the flight manual or other helicopter documentation approved by the State of Design or State of Registry; and

c) Have information relevant to the helicopter navigation specification capabilities included in the MEL.

Note: Guidance on helicopter documentation is contained in the Performance-based Navigation (PBN) Manual (ICAO Doc 9613).

D8.2.3 The State of the Operator 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 program for relevant personnel consistent with the intended operations; and

d) Appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate navigation specifications.

Note 1: Guidance on specific approvals for PBN authorization required (AR) navigation specifications is contained in the Performance-based Navigation (PBN) Operational Approval Manual (ICAO Doc 9997).

Note 2: Electronic navigation data management is an integral part of normal and abnormal procedures.

D8.2.4 The State of Registry 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 (ICAO Doc 9997).

D8.2.5 The helicopter 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 helicopter to navigate in accordance with D7.3 and, where applicable, D7.3.2.

D8.2.6 On flights in which it is intended to land in instrument meteorological conditions, a helicopter shall be provided with appropriate navigation equipment providing guidance to a point from which a visual landing can be effected. This equipment shall be capable of providing such guidance at each heliport at which it is intended to land in instrument meteorological conditions and at any designated alternate heliports.

D8.3 <u>Surveillance Equipment</u>

D8.3.1 A helicopter shall be provided with surveillance equipment which will enable it to operate in accordance with the requirements of air traffic services.

D8.3.2 For operations where surveillance equipment is required to meet an RSP specification for performance-based surveillance (PBS), a helicopter shall, in addition to the requirements specified in D5.3.1:

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 helicopter RSP specification capabilities listed in the flight manual or other helicopter documentation approved by the State of Design or State of Registry; and

c) Have information relevant to the helicopter RSP specification capabilities included in the MEL.

Note 1: Information on surveillance equipment is contained in the Aeronautical Surveillance Manual (ICAO Doc 9924).

Note 2: Information on RSP specifications for performance-based surveillance is contained in the Performance-based Communication and Surveillance (PBCS) Manual (ICAO Doc 9869).

D8.3.3 The State of the Operator 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 program for relevant personnel consistent with the intended operations; and

d) Appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RSP specifications.

D8.3.4 The PCAA shall ensure that, adequate provisions exist for:

a) Receiving the reports of observed surveillance performance issued by monitoring programs established in accordance with Annex 11, Chapter 3, 3.3.5.2 of ICAO; and

b) Taking immediate corrective action for individual helicopter, helicopter types or operators, identified in such reports as not complying with the RSP specification(s).

D8.4 Installation

D8.4.1 The equipment installation shall be such that the failure of any single unit required for either communications or navigation purposes or both will not result in the failure of another unit required for communications or navigation purposes.

D8.5 Electronic Navigation Data Management

D8.5.1 The operator shall not employ electronic navigation data products that have been processed for application in the air and on the ground, unless the State of the Operator 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 State of the Operator 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 DO200A/EUROCAE ED-76 and RTCADO-201A/EUROCAE ED-77.

D8.5.2 The operator shall implement procedures that ensure the timely distribution and insertion of current and unaltered electronic navigation data to all necessary aircraft.

D9. HELICOPTER MAINTENANCE**

Note 1: For the purpose of this part "helicopter" includes: power-plants, power transmission, rotors, components, accessories, instruments equipment and apparatus including emergency equipment.

Note 2: Reference is made to the requirements of the PCAA. 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.

Note 3: Guidance on continuing airworthiness requirements is contained in the relevant Airworthiness ANO/ASC.

D9.1 Operator's Maintenance Responsibilities**

D9.1.1 Operators shall ensure that, in accordance with procedures acceptable to the PCAA:

a) Each helicopter they operate is maintained in an airworthy condition;

b) The operational and emergency equipment necessary for the intended flight is serviceable; and

c) The Certificate of Airworthiness of the helicopter they operate remains valid.

D9.2 Operator's Continuing Airworthiness

D9.2.1 Until 4 November 2020, an operator shall not operate a helicopter unless it is maintained and released to service by an organization approved in accordance with Annex 6, Part I, 8. 7 or under an equivalent system, either of which shall be acceptable to the PCAA.

D9.2.2 As of 5 November 2020, the operator shall not operate a helicopter unless maintenance on the helicopter, including any associated engine, rotor and part, is carried out:

a) By an organization complying with Annex 8, Part II, Chapter 6 (ICAO) that is either approved by the State of Registry of the helicopter or is approved by another Contracting State and is accepted by the State of Registry; or

b) By a person or organization in accordance with procedures that are authorized by the State of Registry; and there is a maintenance release in relation to the maintenance carried out.

D9.2.3 Until 04 November 2020, When the state of the operator accepts an equivalent system, the person signing the maintenance release shall be licensed in accordance with PCAA regulations and Annex 1 of ICAO.

D9.2.4 An operator shall employ a person or group of persons to ensure that all maintenance is carried out in accordance with the maintenance control manual.

D9.2.5 The operator shall ensure the maintenance of its helicopters is performed in accordance with the maintenance program approved by the PCAA or the state of registry as applicable.

D9.3 **Operator's Maintenance Control Manual**

D9.3.1 The operator shall provide, for the use and guidance of maintenance and operational personnel concerned, a maintenance control manual, acceptable to PCAA, the design of the Manual shall observe Human Factors principles.

Note: Guidance material on the application of Human Factors Principles can be found in the Human Factor Training Manual (ICAO Doc 9683).

D9.3.2 The operator shall ensure that the maintenance control manual is amended as necessary to keep the information contained therein up to date.

D9.3.3 Copies of all amendments to the operator's maintenance control manual shall be furnished promptly to all organizations or persons to whom the manual has been issued.

D9.3.4 The operator shall provide the PCAA with a copy of the Operator's maintenance control manual, together with all amendments and/or revisions to it and shall incorporate in it such mandatory material as the PCAA may require.

D9.4 **Maintenance Program**

D9.4.1 The operator shall provide, for the use and guidance of maintenance and operational personnel concerned, a maintenance program, approved by the PCAA, containing the information required by D12.3. The design and application of the operator's maintenance program shall observe Human Factors principles.

Note: Guidance material on the application of Human Factors Principles can be found in the Human Factor Training Manual (ICAO Doc 9683).

D9.4.2 Copies of all amendments to the maintenance program shall be furnished promptly to all organizations or persons to whom the maintenance program has been issued.

D9.5 **Maintenance Records**

D9.5.1 An operator shall ensure that the following records are kept for the periods mentioned:-

a) The total time in service (hours, calendar time and cycles, as appropriate) of the helicopter and all life-limited components;

b) The current status of compliance with all mandatory continuing airworthiness information;

c) Appropriate details of modifications and repairs to the helicopter and its major components;

d) The time in service (hours, calendar time and cycles, as appropriate) since last overhaul of the helicopter or its components subject to a mandatory overhaul life;

e) The current status of the helicopter's compliance with the maintenance program; and

f) The detailed maintenance records to show that all requirements for a maintenance release have been met.

D9.5.2 The records shall be kept for a minimum period of 180 days after the unit to which they refer has been permanently withdrawn from service, and the detailed maintenance records to show that all requirements for a maintenance release should be kept for a minimum period of one year after the signing of the maintenance release.

D9.5.3 In the event of a temporary change of operator, the records shall be made available to the new operator. In the event of any permanent change of operator, the records shall be transferred to the new operator.

D9.5.4 As of 5 November 2020, records kept and transferred shall be maintained in a form and format that ensures readability, security and integrity of the records at all times.

Note 1: The form and format of the records may include, for example, paper records, film records, electronic records or any combination thereof.

Note 2: Guidance regarding electronic aircraft continuing airworthiness records is included in the Airworthiness Manual (ICAO Doc 9760).

D9.6 **Continuing Airworthiness Information**

D9.6.1 The operator of a helicopter over 3175 kg maximum mass shall monitor and assess maintenance and operational experience with respect to continuing airworthiness and provide the information as prescribed by PCAA and report through the system specified.

D9.6.2 The operator of a helicopter over 3175 kg maximum mass shall obtain and assess continuing airworthiness information and recommendations available from the organization responsible for the type design and shall implement resulting actions considered necessary in accordance with a procedure already prescribed by PCAA.

Note: Guidance on the interpretation of "The organization responsible for the type design" in the air worthiness manual (ICAO Doc 9760).

D9.7 **Modifications and Repairs**

All modifications and repairs shall comply with airworthiness requirements acceptable to the PCAA. Procedures shall be established to ensure that the substantiating data supporting compliance with the airworthiness requirements are retained.

D9.8 **Maintenance Release**

D9.8.1 Until November 2020, a maintenance release shall be completed and signed to certify that the maintenance work has been completed satisfactorily and in accordance with approved data and the procedures described in the maintenance organization's procedures manual.

D9.8.2 As of 5 November 2020, when maintenance is carried out by an approved maintenance organization, the maintenance release shall be issued by the approved maintenance organization in accordance with the provisions of Annex 8, Part II, 6.8 of ICAO.

D9.8.3 Until 04 November 2020, a maintenance release shall contain a certification including:

a) Basic details of the maintenance carried out including detailed reference of the approved data used;

b) Data such maintenance was completed;

c) When applicable, the identity of the approved maintenance organization; and

d) The identity of the person or persons signing the release.

D9.8.4 As of 5 November 2020, when maintenance is not carried out by an approved maintenance organization, the maintenance release shall be completed and signed by a person appropriately licensed in accordance with Annex 1 to certify that the maintenance work performed has been completed satisfactorily and in accordance with approved data and the procedures acceptable to the PCAA.

D9.8.5 As of 5 November 2020, when maintenance is not carried out by an approved maintenance organization, the maintenance release shall include the following:

a) Basic details of the maintenance carried out including detailed reference of the approved data used;

b) The date such maintenance was completed; and

c) The identity of the person or persons signing the release.

D9.9 **Records**

D9.9.1 An operator shall ensure that the following records are kept:

a) In respect of the entire helicopter: the total time in service;

b) In respect of the major components of the helicopter:

1) The total time in service;

2) The date of the last overhaul;

3) The date of the last inspection;

c) In respect of those instruments and equipment, the serviceability and operating life of which are determined by their time in service;

1) Such records of the time in service as are necessary to determine their serviceability or to compute their operating life;

2) The date of the last inspection.

D9.9.2 These records shall be kept for a period of 180 days after the end of the operating life of the unit to which they refer.

D10. HELICOPTER FLIGHT CREW

D10.1 **Composition of the Flight Crew**

D10.1.1 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 crewmembers in addition to the minimum number specified in the flight manual or other documents associated with the certificate of the airworthiness, when necessitated by considerations related to type of helicopter used, the type of operation involved and the duration of flight between points where flight crews are changed. However, flying IFR operations, VFR operations at or above 7000 feet in any part of the country or over sea/water for prolong period will be two pilot operations.

D10.1.2 The flight crew shall include all members who held a valid license, issued or rendered valid by the PCAA, authorizing operation of the type of radio transmitting equipment to be used.

Note: Some states have dispensed with the system of issuing of radio license.

D10.2 **Flight Crew Member Emergencies Duties**

An operator shall for each type of helicopter, assign to all flight crewmembers 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 program and shall include instruction in the use of all emergency and life-saving equipment required to be carried, and drill in the emergency evacuation of the helicopter.

D10.3 **Flight Crew Members Training Programs**

D10.3.1 An operator shall establish and maintain a ground and flight training program, approved by PCAA to ensure that all flight crew members are adequately trained to perform their assigned duties. The training program shall:

a) Including ground and flight training facilities and properly qualified instructors as determined by the PCAA;

b) Consist of ground and flight training in the type(s) of helicopter on which the flight crew member serves;

c) Include proper flight crew co-ordination and training for all types of emergency and abnormal situations or procedure caused by power plant, transmission, rotor, airframe or systems malfunctions, fire or other abnormalities;

d) Include training in knowledge and skills related to visual and instrument flight procedures for the intended area of operation, human performance and threat and error management and in the transport of dangerous goods and where applicable procedures specific to the environment in which the Helicopter is to be operated;

e) Ensure that all flight crew members know functions for which they are responsible and the relation of these functions to the function of other crew members, particularly in regard to abnormal or emergency procedures; and

f) include training in knowledge and skills related to the operational use of head-up display and/or enhanced vision systems for those helicopters so equipped; and

g) Be given on recurrent basis, an assessment of competence as required by PCAA and shall include an assessment of competence.

Note 1: Paragraph 2.2.5 (Annex-6, Part-III ICAO) 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 State of the Operator, be given in flight simulation training devices approved by the State for that purpose.

Note 3: The scope of the recurrent training required by 7.2 and 7.3 (Annex-6, Part-III ICAO) may be varied and need not be as extensive as the initial training given in a particular type of helicopter.

Note 4: The use of correspondence courses and written examinations as well as other means may, to the extent deemed feasible by the State of the Operator, be utilized in meeting the requirements for periodic ground training.

Note 5: Provisions for training in the transport of dangerous goods are contained in ICAO Annex 18 .

Note 6: Guidance material to design training programs to develop knowledge and skills in human performance can be found in the Human Factors Training Manual (ICAO Doc 9683).

Note 7: Information for pilots and flight operations personnel on flight procedure parameters and operational procedures is contained in PANS-OPS (ICAO Doc 8168), Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (ICAO 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 programs can be found in the Manual of Evidence-based Training (ICAO 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, ICAO Doc 9868).

D10.3.2 The requirement for recurrent flight training in a particular type of helicopter shall be considered fulfilled by:

a) The use, to the extent deemed feasible by the PCAA of flight simulation training devices approved by the PCAA for that purpose; or

b) The completion within the appropriate period of the proficiency check required by PCAA in that type of helicopter.

D10.3.3 The flight crew operating Helicopter of 5700 Kg and above shall undergo annual simulator check, duly monitored by PCAA.

D10.4 **<u>Qualifications</u>**

Note: See the manual of procedures for establishment and management of PCAA personal licensing system in light of (ICAO Doc 9379) for guidance of a general nature on cross-over qualifications, mixed-fleet flying and cross-credit.

D10.5 **<u>Recent Experience: Pilot-in-Command and Co–Pilot</u>**

D10.5.1 An 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 a helicopter 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 helicopter or in a flight simulator approved for the purpose.

D10.5.2 When a pilot-in-command or a co-pilot is flying several variants of the same type of helicopter or different types of helicopter with similar characteristics in terms of operating procedures, systems and handling, the PCAA shall decide under which conditions the requirements for each variant or each type of helicopter can be combined.

D10.6 **<u>Pilot – In–Command Operational Qualification</u>**

D10.6.1 **<u>Route and Heliport Qualification</u>**

D10.6.1.1 An operator shall not utilize a pilot as pilot-in-command of a helicopter on a route or route segment for which that pilot is not currently qualified until such pilot has complied with D10.6.1.2.

D10.6.1.2 Each such pilot shall demonstrate to the operator an adequate knowledge of:

a) The route to be flown, and the heliports 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 associated with the route along 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 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.

D10.6.1.3 A pilot-in-command shall have made a flight, representative of the operation with which the pilot is to be engaged which must include a landing at a representative heliport, as a member of the flight crew and accompanied by a pilot who is qualified for the operation.

D10.6.1.4 A pilot-in-command shall have made an actual approach into each heliport of landing on the route, accompanied by a pilot who is qualified for the heliport, as a member of the flight crew or as an observer on the flight deck,

D10.6.1.5 The approach to the heliport 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 DG PCAA is added to the normal operating minima, or there is reasonable certainty that approach and landing can be made in visual meteorological conditions; or

D10.6.1.6 The decent from the initial approach altitude can be made by day in visual meteorological conditions; or

D10.6.1.7 The operator qualifies the pilot-in-command to land at the heliport concerned by means of an adequate pictorial presentation.

D10.6.1.8 The operator shall be maintain a record, sufficient to satisfy the PCAA of the qualification of the pilot and of the manner in which such qualification has been achieved.

D10.6.1.9 An operator shall not continue to utilize a pilot as a pilot-in-command on an operation unless, within the preceding 12 months, the pilot has made at least one representative flight as a pilot member of the flight crew, or as a check pilot, or as an observer on the flight deck. In the event that more than 12 months elapse in which a pilot has not made such a representative flight, prior to again serving as a pilot-in-on that operation, that pilot must re-qualify in accordance with D8.4.2.2 and D8.4.2.3.

D10.7 **Pilot Proficiency Checks (PPC)**

D10.7.1 An operator shall ensure that piloting technique and the ability to execute emergency procedures (Emergencies shall only be practiced in FSTD-H) is checked in such a way as to demonstrate the pilot's competence on each type or variant of type of helicopter. Where the operation may be conducted under IFR, an operator shall ensure that the pilot's competence to comply with such rules is demonstrated to the representative of the PCAA. 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 simulations training devices approved by the PCAA 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 of training devices (ICAO Doc 9625), Volume – II Helicopters and Part-II ANO-23 of PCAA.

D10.7.2 When an operator schedules flight crew on several variants of the same type of helicopter or different types of helicopter with similar characteristics in terms of operating procedures, systems and handling, the PCAA decides under which conditions requirements for each variant or each type of helicopter can be combined.

D10.8 **Flight Crew Equipment**

A flight crewmember assessed as fit to exercise the privileges of a license subject to the use of suitable correcting lenses, shall have a spare set of the correcting lenses readily available when exercising those privileges.

D10.9 **Flight Time, Flight Duty Periods and Rest Periods**

The PCAA has established regulations specifying the limitations applicable to the flight time and flight duty periods for flight crewmembers. These regulations also make provision for adequate rest periods and ensure that fatigue occurring either in a flight or successive flights or accumulated over a period of time due to these and other tasks, does not endanger the safety of a flight. They are to be adhered to by the operators.

D11 FLIGHT OPERATIONS OFFICER / FLIGHT DISPATCHER

D11.1 The PCAA 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 officers / flight dispatcher shall be licensed in accordance with the provisions of PCAA Rules & Regulations.

D11.2 In accepting proof of qualifications other than the option of holding of a flight operations officer / flight dispatcher license, the PCAA 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 Licensing rules and regulations for the flight operations officer/flight dispatcher license.

D11.3 A flight operations officer / flight dispatcher shall not be assigned to duty unless that person has:

a) Satisfactorily completed an operator-specific training course that address all the specific components of its approved method of control and supervision of flight operations specified in relevant PCAA regulations;

Note: Guidance on the composition of such training syllabi is provided in the training manual (ICAO Doc 7192). Part D-3 Flight Operations Officer / Flight dispatchers.

b) Made within the preceding 12 months, at lest a one-way qualification flight in a helicopter over any area for which that person is authorized to exercise flight supervision. The flight should include landings at as many heliports 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;

2) The radio equipment in the helicopters used; and

3) The navigation equipment in the helicopters 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 source of meteorological information;

2) The effects of meteorological conditions on radio reception in the helicopters used;

3) The peculiarities and limitations of each navigation system which is used by the operation; and

4) The helicopter loading instructions;

e) Satisfied the PCAA or operator as to knowledge and skills related to human performance as they apply to dispatch duties; and

f) Demonstrated to the PCAA or operator the ability to perform the duties specified in D5.8.

D11.4 **Recommendation** A flight operations officer / flight dispatcher assigned the duty should maintain complete familiarization with all features of the operations, which are pertinent to such duties, including knowledge and skills related to human performance.

Note: Guidance material to design training programs to develop knowledge and skills in human performance can be found in the Human Factors Training Manual (ICAO Doc 9683).

D11.5 **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 D11.1 are met.

D12 MANUALS, LOGS AND RECORDS

Note: The following additional manuals, logs and records are to be included and maintained**:**

- Fuel and oil records;
- Maintenance records;
- Flight time, flight duty periods and rest periods records;
- Flight Preparation Forms.
- Operational flight plan;
- Pilot-in-command operational qualification records.

D12.1 Flight Manual

Note: The flight manual contains the information specified in Annex 8 (ICAO).

D12.1.1 The flight manual shall be updated by implementing changes made mandatory by the PCAA.

D12.2 Operator's Maintenance Control Manual

D12.2.1 The operator's maintenance control manual provided in accordance with D9, which may be issued in separate parts, shall contain the following information:

a) Description of the procedures required by D9.1 including, when applicable:

1) 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 the 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 D9.1;

c) A reference to the maintenance program required by D9.3.1;

d) A description of the methods used for the completion and retention of the operator's maintenance records required by D9.4;

e) A description of the procedures for monitoring, assessing and reporting maintenance and operational experience required by D9.5.1;

f) A description of the procedures for complying with the service information reporting requirements;

g) A description of procedures for assessing continuing airworthiness information and implementing any resulting actions, as required by D9.5.2;

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 of program, in order to correct any deficiency in that program.

j) A description of helicopter types and models to which the manual applies;

k) A description of procedures for ensuring that un-serviceability affecting airworthiness are recorded and rectified;

l) A description of the procedures for advising the PCAA of significant in-service occurrences;

m) A description of procedures to control the leasing of aircraft and related aeronautical products; and

n) A description of the Maintenance Control Manual amendment procedures.

D12.3 **Maintenance Program**

D12.3.1 A maintenance program for each helicopter as required by D9.3 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 helicopter;

b) When applicable, continuing structural integrity program;

c) Procedures for changing or deviating from a) and b) above; and

d) When applicable, condition monitoring and reliability program descriptions for helicopter systems, components, power transmissions, rotors and power-plants.

D12.3.2 Maintenance tasks and intervals that have been specified as mandatory in approval of the type design shall be identified as such.

D12.3.3 **Recommendation** The maintenance program should be based on maintenance program information made available by the PCAA or by the organization responsible for the type design, and any additional applicable experience.

D12.4 **Journey Log Book**

D12.4.1 **Recommendation** The helicopter journey log-book should contain the following items and the corresponding roman numerals:

I -- Helicopter nationality and registration.

II -- Date.

III -- Names of crewmembers.

IV -- Duty assignments of crewmembers.

V -- Place of departure.

VI -- Place of arrival.

VII -- Time of departure.

VII -- Time of arrival.

IX -- Hours of flight.

X -- Nature of flight (private, scheduled or non-scheduled).

XI -- Incidents, observations, if any.

XII -- Signature of person in charge.

D12.4.2 **Recommendation** Entries in the journey log-book should be made currently and in ink or indelible pencil.

D12.4.3 **Recommendation** Completed journey log-book should be retained to provide a continuous record of the last 12 months' operations.

D12.5 Records of Emergency and Survival Equipment Carried

Operators shall at all times have available for immediate communication to rescue coordination centers, lists containing information on the emergency and survival equipment carried on board any of their helicopters 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.

D12.6 Flight Recorder Records

An operator shall ensure, to the extent possible, in the event the helicopter 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 Annex 13.

D13 CABIN CREW

D13.1 Assignment of Emergency Duties

An operator shall establish, to the satisfaction of the PCAA, the minimum number of cabin crew required for each type of helicopter, based on seating capacity or the number of passengers carried, in order to effect a safe and expeditious evacuation of the helicopter, 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 helicopter.

D13.2 Protection of Cabin Crew During Flight

Each cabin crewmember 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 and landing.

D13.3 Training

An operator shall establish and maintain a training program, approved by the PCAA, to be completed by all persons being assigned as a cabin crewmember. Cabin crewmembers shall complete a recurrent training program annually. These training programs shall ensure that each person is:

a) Competent to execute those safety duties and functions that the cabin attendant is assigned to perform in the event of an emergency or in a situation requiring emergency evacuation;

b) Drilled and capable in the use of emergency and life-saving equipment required to be carried, such as life jackets, life rafts, evacuation slides, emergency exits, portable fire extinguishers, oxygen equipment first-aid and universal precaution kits, automated external defibrillators;

c) When serving on helicopters operated above 3000 m (10000 ft), knowledgeable as regards the effect of lack of oxygen and, in the case of pressurized helicopters, as regards physiological phenomena accompanying a loss of pressurization;

d) Aware of other crewmembers assignments and functions in the event of an emergency so far as is necessary for the fulfillment of the cabin crew member's own duties;

e) Aware of the types of dangerous goods which may, and may not, be carried in a passenger cabin.

f) Knowledgeable about human performance as related to passenger cabin safety duties and including flight crew-cabin crew coordination.

Note 1: Requirements for the training of cabin crewmembers in the transport of dangerous goods are included in the Dangerous Goods Training Program.

Note 2: Guidance material to design training programs to develop knowledge and skills in human performance can be found in cabin crew safety training manual (ICAO Doc 10002).

D14 SECURITY

* In the context of this ANO the word **"Security"** Is used in the sense of prevention of illicit act against Civil Aviation.

D14.1 Helicopter Search Procedure Checklist

An 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. The checklist shall be supported by guidance on the course of action to be taken should a bomb or suspicious object be found.

D14.2 Training Programs

D14.2.1 An operator shall establish and maintain a training program which enables crew members to act in the most appropriate manner to minimize the consequences of acts of unlawful interference.

D14.2.2 An operator shall also establish and maintain a training program to acquaint appropriate employees with preventive measures and techniques in relation to passengers, baggage, cargo, mail, equipment, stores and supplies intended for carriage on a helicopter so that they contribute to the prevention of acts of sabotage or other forms of unlawful interference.

D14.3 Reporting Act 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.

D15 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 fulfill 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 (ICAO Doc 9318) upon fulfillment of the conditions established in Article 83 bis.

Note 2: In the case of international operations effected jointly with helicopters not all of which are registered in the same Contracting State, nothing in this Part of the Annex prevents the state concerned entering into an agreement for the joint exercise of the functions placed upon the state of registry by the provision of the relevant annexes.

D15.1. **Compliance with Laws, Regulations & Procedures**

International General Aviation

D15.1.1 The pilot-in-command shall comply with the relevant laws, regulations and procedures of the States in which the helicopter is operated.

Note 1: Compliance with more restrictive measures not in contravention of the provisions may be required by the PCAA.

Note 2: Rules covering flight over the high seas are contained in Annex 2 of ICAO.

Note 3: Information for pilots flight procedures parameters and operational procedures is contained in PAN-OPS (ICAO Doc 8168) volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (ICAO Doc 8168) Volume II. Obstacle clearance criteria and procedures used in certain states may differ from PAN-OPS and knowledge of these differences is important for safety reasons.

D15.1.2 The pilot-in-command shall be responsible for the operation and safety of the helicopter and for the safety of all crew member, passengers and cargo on board, from moment the engine(s) are started until the helicopter finally come to rest at the end of flight with the engine’s shut down and the rotor blade stopped.

D15.1.3 In an emergency situation, which endangers the safety of helicopter 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. The pilot-in- command shall also submit a report on any such violation to the PCAA. Such reports shall be submitted as soon as possible and normally within ten days.

D15.1.4 The pilot-in-command shall be responsible for notifying the nearest appropriate authority by the quickest available means of any accident or incident involving the helicopter, resulting in serious injury or death of any person or substantial damage to the helicopter or property.

Note: A definition of term “serious injury” is contained in Annex 13 of ICAO.

D15.1.5 **Recommendation** The pilot-in-command should have available on board the helicopter essential information concerning the search and rescue services in the areas over which it is intended the helicopter will be flown.

D15.2. **Dangerous Goods**

Note 1: Provision for carriage of dangerous goods are contained in Annex 18 of ICAO.

Note 2: Article 35 of the convention refers to certain classes of cargo restrictions.

D15.3. **Use of Psychoactive Substances**

Note: Provisions concerning the use of psychoactive substances are contained in Annex 1, 1.2.7 Annex 2, 2.5 of ICAO and relevant PCAA laws and regulations, which shall be complied with.

D15.4 **Specific Approvals**

The pilot-in-command shall not conduct operations for which a specific approval is required unless such approval has been issued by the State of Registry. Specific approvals shall follow the layout and contain at least the information listed in Appendix 5 (Anne-6 Part-III).

D16 FLIGHT OPERATIONS

D16.1 **Adequacy of Operating Facilities**

The pilot-in-command shall not commence a flight unless it has been ascertained by every reasonable means available that the ground and/or water areas and facilities available and directly required for such flight and for the safe operation of the helicopter are adequate including communication facilities and navigation aids.

Note: "Reasonable means" in this standard is intended to denote the use, at the point of departure, of information available to the pilot-in-command either through official information published by the Aeronautical Information Publication (AIP) or readily obtainable from other sources.

D16.2 **Heliport Operating Minima**

D16.2.1 **Heliport or Landing Location Operating Minima**

D16.2.1.1 The pilot-in-command shall establish operating minima in accordance with criteria specified by the State of Registry for each heliport or landing location to be used in operations. When establishing aerodrome operating minima, any conditions that may be prescribed in the list of specific approvals shall be observed. Such minima shall not be lower than any that may be established 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 operating minima.

D16.2.1.2 The State of Registry shall authorize operational credit(s) for operations with helicopters equipped with automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS. Where the operational credit relates to low visibility operations, the State of Registry shall issue a specific approval. Such authorizations shall not affect the classification of the instrument approach procedure.

Note 1: Operational credit includes:

a) For the purposes of an approach ban (2.6.3.2), a minima below the heliport or landing location 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 F and in the Manual of All-Weather Operations (ICAO 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 (ICAO Doc 9365).

Note 4: Automatic landing system — helicopter is an automatic approach using airborne systems which provide automatic control of the flight path, to a point aligned with the landing surface, from which the pilot can transition to a safe landing by means of natural vision without the use of automatic control.

D16.3 **<u>Briefing</u>**

D16.3.1 The pilot-in-command shall ensure that crewmembers and passengers are made familiar, by means of an oral briefing or by other means, with the location and the use of:

a) Seat belts; and, harness as appropriate,

b) Emergency exits;

c) Life jackets;

d) Oxygen dispensing equipment; and

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

D16.3.2 The pilot-in-command shall ensure that all persons on board are aware of the location and general manner of use of the principal emergency equipment carried for collective use.

D16.4 **<u>Helicopter Airworthiness and Safety Precautions</u>**

D16.4.1 A flight shall not be commenced until the pilot-in-command is satisfied that:

a) The helicopter is airworthy, duly registered and that appropriate certificates with respect thereto are aboard the helicopter;

b) The instruments and equipment installed in the helicopter are appropriate, taking into account the expected flight conditions;

c) Any necessary maintenance has been performed in accordance with PCAA Rules, Airworthiness Notices, ASC, ANOs and Directives.

d) The mass of the helicopter 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; and

f) The helicopter operating limitations, contained in the flight manual, or its equivalent, will not be exceeded.

D16.5 **<u>Weather Reports and Forecasts</u>**

D16.5.1 Before commencing a flight the pilot-in-command shall be familiar with all available meteorological information appropriate to the intended flight. Preparation for a flight away from the vicinity of the place of departure, and for every flight under the instrument flight rules, shall include

1) A study of available current weather reports and forecasts; and

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

Note: The requirements for flight plans are contained in Annex 2 and PAN-ATM (ICAO Doc 4444).

D16.6 **Limitations Imposed by Weather Conditions**

D16.6.1 **Flight in Accordance with the VFR**

A flight, except one of purely local character in visual meteorological conditions, to be conducted in accordance with the visual flight rules shall not be commenced unless available 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 the visual flight rules, will, at the appropriate time, be such as to render compliance with these rules possible.

D16.6.2 **Flight in Accordance with the IFR**

D16.6.2.1 When an alternate is required. A flight to be conducted in accordance with the instrument flight rules shall not be commenced unless the available information indicates that conditions, at the heliport of intended landing and at least one alternate heliport will, at the estimated time of arrival, be at or above the heliport operating minima.

Note: It is a practice to declare, for flight planning purposes, higher minima for a heliport when nominated as an alternate than for the same heliport when planned as that of intended landing.

D16.6.2.2 When no alternate is required. A flight to be conducted in accordance with the instrument flight rules to a heliport when no alternate heliport is required shall not be commenced unless available current meteorological information indicates that the following meteorological conditions will exist from two hours before to two hours after the estimated time of arrival: or from the actual time of departure to two hours after the estimated time of arrival. whichever is the shorter period:

a) A cloud base of at least 120 m (400 ft) above the minimum associated with the instrument approach procedure; and

b) Visibility of at least 1.5 km more than the minimum associated with the procedure.

Note: These should be considered as minimum values where a reliable and continuous meteorological watch is maintained. When only an “area” type forecast is available these values should be increased accordingly.

D16.7 **Heliport Operating Minima**

D16.7.1 A flight shall not be continued towards the heliport of intended landing unless the latest available meteorological information indicates that conditions at that heliport, or at least one alternate heliport, will, at the estimated time of arrival, be at or above the specified heliport operating minima.

D16.7.2 An instrument approach shall not be continued below 300 m (1000 ft) above the heliport elevation into the final approach segment unless the reported visibility or controlling RVR is above the specified minimum.

Note: Criteria for final approach segment is contain in PAN-OPS (ICAO Doc 8168) Volume II.

D16.7.3 If after the final approach segment of descending below 300 m (1000 ft) above the heliport elevation, the reported visibility or controlling RVR falls below the specified minimum, the approach maybe continued to DA/H or MDA/H . In any case a helicopter shall not continue its approach to land beyond a point at which the limits of the heliport operating minima would be infringed.

D16.8 **Flight in Icing Conditions**

A flight to be operated in known or expected icing conditions shall not be commenced unless the helicopter is certificated and equipped by the manufacturer and duly approved by DG PCAA to cope with such conditions.

D16.9 **Alternate Heliports**

D16.9.1 For a flight to be conducted in accordance with the instrument flight rules, at least one suitable alternate shall be specified in the operational flight plan and the flight plan, unless:

a) The weather conditions are such that no alternate is required as given in D14.6.2.2; or

b) 1) The heliport of intended landing is isolated and no suitable alternate is available;

2) An instrument approach procedure is prescribed for the isolated heliport of intended landing; and

3) A point of no return (PNR) is determined in case of an off-shore destination.

D16.9.2 Suitable off-shore alternates may be specified subject to the following:

a) The off-shore alternates shall be used only after passing a point of no return (PNR). Prior to PNR on-shore alternates shall be used;

b) Mechanical reliability of critical control systems and critical components shall be considered and taken into account when determining the suitability of the alternate;

c) One engine inoperative performance capability shall be attainable prior to arrival at the alternate;

d) Deck availability shall be guaranteed; and

e) Weather information must be reliable and accurate.

Note: The landing technique specified in the flight manual following control system failure may preclude the nomination of certain helidecks as alternate heliports.

D16.9.3 **Recommendation** Off-shore alternates should not be used when it is possible to carry enough fuel to have an on-shore alternate. Offshore alternates should not be used in a hostile environment

D16.10 **Fuel and Oil Requirements**

D16.10.1 **All Helicopters** A flight shall not be commenced unless, taking into account both the meteorological conditions and any delays that are expected in flight, the helicopter carries sufficient fuel and oil to ensure that it can safely complete the flight. In addition, a reserve shall be carried to provide for contingencies.

D16.11 **Visual Flight Rules (VFR) Operations** The fuel and oil carried shall, in the case of VFR operations be at least the amount sufficient to allow the helicopter:

a) To fly to the heliport to which the flight is planned;

b) To fly thereafter for a period of 20 minutes at best-range speed; plus 10 per cent of the planned flight time; and

c) To have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of potential contingencies, as determined by the PCAA and specified in the regulations governing general aviation.

D16.12 **Instrument Flight Rules (IFR) Operations**

D16.12.1 The fuel and oil carried in order to comply with D16.10 shall in the case of IFR operations, be at least the amount sufficient to allow the helicopter.

D16.12.2 When no suitable alternate is available (i.e. the heliport of intended landing is isolated and no suitable alternate is available), to fly to the heliport to which the flight is planned and thereafter for a period as specified by the PCAA.

D16.12.3 When no alternate is required, in accordance with D16.6.2.2 to fly to the heliport to which the flight is planned and thereafter:

a) To fly 30 minutes at holding speed at 450 m (1500 ft) above the destination heliport under standard temperature conditions and approach and land; and

b) To have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of potential contingencies.

D16.12.4 When an alternate is required, in terms of D14.6.2.1 to fly to and execute an approach, and a missed approach, at the heliport to which the flight is planned, and thereafter:

a) To fly to the alternate specified in the flight plan; and then

b) To fly for 30 minutes at holding speed at 450m (1500 ft) above the alternate under standard temperature conditions, and approach and land; and

c) To have an additional amount of fuel sufficient to provide for the increased consumption on the occurrence of potential contingencies.

D16.12.5 When no suitable alternate is available, to fly to the heliport to which the flight is planned and thereafter for a period of two hours at holding speed.

D16.12.6 In computing the fuel and oil required in D16.10.1 at least the following shall be considered:

a) Meteorological conditions forecast;

b) Expected air traffic control routings and traffic delays;

c) For IFR flight, one instrument approach at the destination heliport, including a missed approach;

d) The procedures for loss of pressurization, where applicable, or failure of one power-unit while en route; and

e) Any other conditions that may delay the landing of the helicopter or increase fuel and/or oil consumption.

Note: Nothing in D16.10 precludes amendment of a flight plan in flight in order to re-plan the flight to another heliport, provided that all the requirements of fuel & oil can be complied with from the point where the flight has been re-planned.

D16.12.7 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

D16.13 **In-Flight Fuel Management**

D16.13.1 The pilot-in-command shall monitor the amount of usable fuel remaining on board to ensure it is not less than the fuel required to proceed to a landing site where a safe landing can be made with the planned final reserve fuel remaining.

Note: The protection of final reserve fuel is intended to ensure safe landing at any heliport or landing location when unforeseen occurrences may not permit a safe completion of an operation as originally planned.

D16.13.2 The pilot-in-command shall advise ATC of a minimum fuel state by declaring MINIMUM FUEL when, having committed to land at a specific landing site, the pilot calculates that any change to the existing clearance to that landing site, or other air traffic delays, may result in landing with less than the planned final reserve fuel.

Note 1: The declaration of MINIMUM FUEL informs ATC that all planned landing site options have been reduced to a specific landing site of intended landing, that no precautionary landing site is available, and any change to the existing clearance, or air traffic delays, 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: A precautionary landing site refers to a landing site, other than the site of intended landing, where it is expected that a safe landing can be made prior to the consumption of the planned final reserve fuel.

D16.13.3 The pilot-in-command shall declare a situation of fuel emergency by broadcasting MAYDAY MAYDAY MAYDAY FUEL, when the usable fuel estimated to be available upon landing at the nearest landing site where a safe landing can be made is less than the required final reserve fuel.

Note 1: The planned final reserve fuel refers to and is the minimum amount of fuel required upon landing at any landing site. The declaration of MAYDAY MAYDAY MAYDAY FUEL informs ATC that all available landing options have been reduced to a specific site and a portion of the final reserve fuel may be consumed prior to landing.

Note 2: The pilot estimates with reasonable certainty that the fuel remaining upon landing at the nearest safe landing site will be less than the final reserve fuel taking into consideration the latest information available to the pilot, the area to be over flown (i.e. with respect to the availability of precautionary landing areas), meteorological conditions and other reasonable contingencies.

Note 3: 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) of ICAO.

D16.14 **Oxygen Supply**

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

Ser	Absolute Pressure	Meter	Feet
1.	700 hPa	3000	10000
2.	620 hPa	4000	13000
3.	376 hPa	7600	25000

D16.14.1 A flight to be operated at 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;

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

D16.14.2 A flight to be operated with a pressurized helicopter shall not be commenced unless a sufficient quantity of stored breathing oxygen is carried to supply all the crew members and a proportion of the 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.

D16.15 **Use of Oxygen**

All flight crew members, when engaged in performing duties essential to the safe operation of a helicopter in flight, shall use breathing oxygen continuously whenever such circumstances prevail for which its supply has been required in D16.14.1 and D16.14.2.

D16.16 **In-Flight Emergency Instruction**

In an emergency during flight, the pilot-in-command shall ensure that all persons on board are instructed in such emergency action as may be appropriate to the circumstances.

D16.17 **Weather Reporting by Pilots**

D16.17.1 When weather conditions likely to affect the safety of other aircraft are encountered, the should be reported as soon as possible.

D16.17.2 **Hazardous Flight Conditions**

Recommendation Hazardous flight conditions, other than those associated with meteorological conditions, encountered en route should be reported as soon as possible. The reports so rendered should give such details as may be pertinent to the safety of other aircraft.

D16.18 **Fitness of Flight Crew Members**

The pilot-in-command shall be responsible for ensuring that a flight:

a) Will not be commenced if any flight crew member is incapacitated from performing duties by any cause such as injury, sickness, fatigue, the effects of alcohol or drugs; and

b) Will not be continued beyond the nearest suitable heliport when flight crewmembers capacity to perform functions is significantly reduced by impairment of faculties from causes such as fatigue, sickness, lack of oxygen etc.

D16.19 **Flight Crew Members at Duty Stations**

D16.19.1 **Take-off and landing** All flight crewmembers required to be on flight deck duty shall be at their stations.

D16.19.2 **En-Route** All flight crewmembers 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 helicopter, or for physiological needs.

D16.19.3 **Seat Belts** All flight crewmembers shall keep their seat belt fastened when at their stations.

D16.19.4 **Safety Harness**

Recommendation When safety harnesses are provided, any flight crewmember occupying a pilot's seat should keep the safety harness fastened during the take-off and landing phases; all other flight crewmembers should keep their safety harness 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 strap(s) and a seat belt which may be used independently.

D16.20 **Instrument Flight Procedures**

D16.20.1 One or more instrument approach procedures shall be approved and promulgated by the PCAA, to serve each final approach and take-off area or heliport utilized for instrument flight operations.

D16.20.2 All helicopters operated in accordance with instrument flight rules shall comply with the instrument approach procedures approved by the PCAA, or by the State, which is responsible for the heliport when located outside the territory of Pakistan.

Note 1: See section – II, Chapter – II (Annex-6, Part-III ICAO), for instruments approach operations classifications.

Note 2: Information for pilots on flight procedures parameters and operational procedures is contained in PANS-OPS (ICAO Doc 8168), Volume – I. Criteria for the construction of instrument flight procedures for the guidance of procedures specialist are provided in PANS-OPS (ICAO 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 section – II, Annex-6, Part-III ICAO).

D16.21 **Instruction – General**

A helicopter rotor shall not be turned under power without a qualified pilot at the controls.

D16.22 **Refueling With Passengers on Board or Rotors Turning**

D16.22.1 **Recommendation** A helicopter shall not be re-fuelled when passengers are embarking, on board or disembarking or when the rotor is turning unless it is attended by the pilot-in-command or other qualified personnel ready to initiate and direct an evacuation of the helicopter by the most practical and expeditious means available.

D16.22.2 **Recommendation** When re-fuelling with passengers embarking, on board or disembarking, two-way communications shall be maintained by helicopter intercommunications system or other suitable means between the ground crew supervising the re-fuelling and the pilot-in-command or other qualified personnel.

Note 1: Provisions concerning aircraft refueling are contained in Annex 14 Volume I, and guidance on safe refueling practices is contained in airport services manual (ICAO Doc 9137). Parts 1 and 8.

Note 2: 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.

D16.23 **Over-Water Flights**

All helicopters on flights over water in accordance with D18.4.1 shall be certificated for ditching. Sea state shall be an integral part of ditching information.

D17 HELICOPTER PERFORMANCE OPERATING LIMITATIONS

D17.1 A helicopter shall be operated:

a) In compliance with the terms of its airworthiness certificate or equivalent approved document;

b) Within the operating limitations prescribed by the certificating authority of the state of registry duly approved by PCAA.

c) Within the mass limitations imposed by compliance with the applicable noise certification Standards, unless otherwise authorized, in exceptional circumstances for a certain heliport where there is no noise disturbance problem, by the competent authority.

D17.2 Placards, listings, instrument markings, or combinations thereof, containing those operating limitations prescribed by the Certificating Authority or PCAA for visual presentation, shall be displayed in the helicopter.

Note: The standards of annex 8, part IV apply to all helicopters intended for carriage of the passengers or cargo or mail in international Air navigation.

D17.3 Only performance Class I helicopters are permitted to operate from elevated heliports in congested areas. Where helicopters are operating to or from heliports in a congested hostile environment, the operator shall take such precautions as are necessary to control the risk associated with a power unit failure and include the procedures in the OPS-Manual.

Note: Guidance is provided in the Helicopter Code of Performance Development Manual (ICAO Doc 10110).

D17.4 Performance Class 3 helicopters are not permitted to operate from elevated heliports or helidecks.

D18 HELICOPTER INSTRUMENTS, EQUIPMENT & FLIGHT DOCUMENTS

Note: Specifications for the provision of helicopter communication and navigation equipment are contained in Para D5.

D18.1 All Helicopters on All Flights

D18.1.1 General

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 helicopters according to the helicopter used and to the circumstances under which the flight is to be conducted. The instruments & equipment and their installation shall be approved by the PCAA.

D18.1.2 Instruments

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

D18.1.3 Equipment

D18.1.2.1 All helicopters on all flights shall be equipped with or carry on board;

a) An accessible first-aid kit;

b) Portable fire extinguishers of a type which, when discharged, will not cause dangerous contamination of the air within the helicopter. 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 not readily accessible to the pilot or co-pilot;

Note: Refer to 4.1.3.2 Annex-6, Part-III ICAO for fire extinguishing agent.

c) 1) A seat or berth for each person over an age of two years; and

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

d) The following manuals, charts and information:

1) The flight manual or other documents or information concerning any operating limitations prescribed for the helicopter by the PCAA.

2) Any specific approval issued by PCAA if applicable, for the operation(s) to the conducted.

3) Current and suitable charts for the route of the proposed flight and all routes along which it is reasonable to expect that the flight may be diverted;

4) Procedures, as prescribed in ICAO Annex 2, (ICAO) for pilots-in-command of intercepted aircraft; and

5) A list of visual signals for use by intercepting and intercepted aircraft, as contained in ICAO Annex 2; and

6) The journey log book for the helicopter

e) If fuses are used, spare electrical fuses of appropriate ratings for replacement of those accessible in flight.

D18.1.2.2 All helicopters on all flights shall be equipped with the ground-air signal codes for search and rescue purposes.

D18.1.2.3 Any agent used in a built-in fire extinguisher for each lavatory disposal receptacle for towels, paper or waste in a helicopter, 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 a helicopter, 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 State of Registry; 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, 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.

D18.1.2.4 **Recommendation** All helicopters on all flights should be equipped with the ground-air signal codes for search and rescue purposes.

D18.1.2.5 **Recommendation** All helicopters on all flights should be equipped with a safety harness for each flight crew member seat.

Note: Safety harness includes shoulder strap(s) and a seat belt which may be used independently.

D18.2 **Marking of Break-In Points**

D18.2.1 If areas of the fuselage suitable for break-in by rescue crews in an emergency are marked on a helicopter, such areas shall be marked as shown in Appendix “C”. The color of the markings shall be red or yellow, and if necessary they shall be outlined in white to contrast with the background.

D18.2.2 If the corner markings are more than 2 m apart, intermediate lines 9 cm x 3 cm shall be inserted so that there is no more than 2 m between adjacent markings.

Note: This Standard does not require any helicopter to the have break-in areas.

D18.3 **Instruments and Equipment for Flights Operated Under VFR / IFR – Day and Nights**

Note: The flight equipment required in D18.3.1 may be met by combinations of instruments or by electronic displays.

D18.3.1 All helicopters when operated as VFR flights shall be equipped with:

1) A magnetic compass;
2) An accurate timepiece indicating the time in hours, minutes and seconds;
3) A sensitive pressure altimeter;
4) An airspeed indicator; and
5) Such additional instruments or equipment as may be prescribed by the appropriate authority.

D18.3.2 All helicopters, when operating in accordance with VFR by night, shall be equipped with:

a) The equipment specified in D18.3.1;
b) An attitude indicator (artificial horizon) for each required pilot;
c) A slip indicator;
d) A heading indicator (directional gyroscope);
e) A rate of climb and descent indicator;
f) Such additional instruments or equipment as may be prescribed by the PCAA;
g) The lights required by Annex 2 for aircraft in flight or operating on the movement area of a heliport;
h) A landing light;
i) Illumination for all flight instruments and equipment that are essential for the safe operation of the helicopter;
j) Lights in all passenger compartments; and
k) A flashlight for each crew member station.

D18.3.3 **Recommendation** The landing light should be trainable, at least in the vertical plane.

a) All helicopters, when operating in accordance with IFR, or when the helicopter cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with:
    1) Magnetic compass;
    2) An accurate timepiece indicating the time in hours, minutes and seconds;
    3) A sensitive pressure altimeter;

Note: Due to the long history of misreading, the use of drum-pointer altimeters is not recommended.

4) An airspeed indicating system with a means of preventing malfunctioning due to either condensation or icing;
5) A slip indicator;

6) An attitude indicator (artificial horizon), for each required pilot and one additional attitude indicator;

7) A heading indicator (directional gyroscope)

8) Means of indicating whether the supply of power to the gyroscopic instruments is adequate;

9) A means of indication in the flight crew compartment the outside air temperature;

10) A rate of climb and descent indicator;

11) Such additional instruments or equipment as may be prescribed by the PCAA; and

12) If operated by night, the lights specified in D17.3.2g.

b) Equipped with, or shall carry , a means of measuring and displaying the time in hours, minutes and seconds.

D18.4 **<u>All Helicopters on Flights Over Water</u>**

D18.4.1 **<u>Means of Floatation</u>**

All helicopters intended to be flown over water shall be fitted with a permanent or rapidly deployable means of floatation so as to ensure a safe ditching of the helicopter when:

a) Engaged in offshore operations or other over-water operations as prescribed by the PCAA or;

b) Flying at a distance from land specified by the PCAA.

Note: When determining the distance from land refer to in 4.3.1 Annex-6, Part-III ICAO consideration should be given to environmental conditions and the availability of search and rescue facilities.

D18.5 **<u>Emergency Equipment</u>**

D18.5.1 Helicopters operating in accordance with the provisions of D18.4.1 shall be equipped with:

a) One life jacket, or equivalent individual floatation 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) When not precluded by consideration related to the type of helicopter used, 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; and

c) Equipment for making the pyrotechnical distress signals described in ICAO Annex 2.

D18.5.2 When taking off or landing at a heliport where, the take-off or approach path is so disposed over water that in the event of a mishap there would be likelihood of a ditching, at least the equipment required in D18.4.1 shall be carried.

D18.5.3 Each life jacket and equivalent individual floatation device, when carried in accordance with this D18.4, shall be equipped with a means of electric illumination for the purpose of facilitating the location of persons.

D18.5.4 **<u>Recommendation</u>** On any helicopter for which the individual certificate of airworthiness is first issued on or after 1 January 1991, at least 50 per cent of the life rafts carried in accordance with the provisions of D16.3.2 should be deployable by remote control.

D18.5.5 **Recommendation** Rafts which are not deployable by remote control and which have a mass of more than 40 kg should be equipped with some means of mechanically assisted deployment.

D18.5.6 **Recommendation** On any helicopter for which the individual certificate of airworthiness was first issued before 1 January 1991, the provisions of D18.5.4 andD18.5.5 should be complied with no later than 31 December 1992.

D18.6 **All Helicopters on Flights Over Designated Land Areas**

Helicopters, when operated across land areas which have been designated by the PCAA 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 over flown.

D18.7 **All Helicopters on High Altitude Flights**

D18.7.1 **Un-Pressurized Helicopters**

Un-pressurized helicopters intended to be operated at high altitudes shall carry equipment for storing and dispensing the oxygen supplies as required in D16.14.1.

D18.7.2 **Pressurized Helicopters**

Recommendation Pressurized helicopters intended to be operated at high altitudes should carry emergency oxygen storage and dispensing equipment capable of storing and dispensing the required oxygen supplies as required in D16.14.2.

D18.8 **All Helicopters Required Compliance with the Noise Certification Standards of Annex – 16 Volume – I (ICAO)**

All helicopters required to comply with the noise certification Standards of Annex -16 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 1: The attestation may be contained in any document, carried on board, approved by the State of Registry in accordance with the relevant provisions of Annex – 16 Volume – 1 of ICAO.

Note 2: The various noise certification standards of Annex 16, which are applicable to helicopters are determined according to the date of application for a type certificate, or the date of acceptance of an application under an equivalent prescribed procedure by the certificating authority. Some helicopters are not required to comply with any noise certification Standards. For details see Annex 16 of ICAO.

D18.9 **Flight Recorders**

Note 1: Crash-protected flight recorders comprise one or more of the following:

- A flight data recorder (FDR), —
- A cockpit voice recorder (CVR),
- An airborne image recorder (AIR),
- A data link recorder (DLR).

D18.9.1 As per Appendix 4 (Annex-6 Part-III of ICAO), Annex-6, Part-III of ICAO image and data link information may be recorded on either the CVR or the FDR.

Note 2: Combination recorders (FDR / CVR) may be used to meet the flight recorder equipage requirements in this Annex.

Note 3: Detailed requirements on flight recorders are contained in Appendix 4

(Annex-6 Part-III of ICAO).

Note 4: Lightweight flight recorders comprise one or more of the following:

- An aircraft data recording system (ADRS),
- A cockpit audio recording system (CARS),
- An airborne image recording system (AIRS),
- A data link recording system (DLRS)

D18.9.1 As per Appendix 4, Annex-6, Part-III of ICAO image and data link information may be recorded on either the CARS or the ADRS.

Note 5: For helicopters for which the application for type certification is submitted to a Contracting State before 1 January 2016, specifications applicable to crash-protected flight recorders may be found in EUROCAE ED-112, ED-56A, ED-55, Minimum Operational Performance Specification (MOPS), or earlier equivalent documents.

Note 6: For helicopters for which the application for type certification is submitted to a Contracting State on or after 1 January 2016, specifications applicable to crash-protected flight recorders may be found in EUROCAE ED-112A, Minimum Operational Performance Specification (MOPS), or equivalent documents.

Note 7: Specifications applicable to lightweight flight recorders may be found in EUROCAE ED-155, Minimum Operational Performance Specification (MOPS), or equivalent documents.

Note 8: Chapter 1 Annex-6, Part-III of ICAO contains requirements for States regarding the use of voice, image and/or data recordings and transcripts.

D18.10 **Flight Data Recorders and Aircraft Data Recording Systems**

Note: Parameters to be recorded are listed in Table A4-1 of Appendix4, Annex-6, Part-III of ICAO.

D18.10.1 **Applicability**

D18.10.1.1 All helicopters of a maximum certificated take-off mass of over 3175 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 2016, shall be equipped with an FDR which shall record at least the first 48 parameters listed in Table A4-1 of Appendix -4.

D18.10.1.2 All helicopters of a maximum certificated take-off mass of over 7000 kg or having a passenger seating configuration of more than nineteen, for which the individual certificate of airworthiness is first issued on or after 1 January 1989 shall be equipped with an FDR which shall record at least the first 30 parameters listed in Table A4-1 of Appendix-4, Annex-6, Part-III of ICAO.

D18.10.1.3 **Recommendation** All helicopters of a maximum certificated take-off mass of over 3175 kg, up to and including 7 000 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1989, should be equipped with an FDR which should record at least the first 15 parameters listed in Table A4-1 of Appendix 4 (Annex-6 Part-III of ICAO).

D18.11 **Recording Technology** FDRs, ADRS, AIRs or AIRS shall not use engraving metal foil, frequency modulation (FM), photographic film or magnetic tape.

D18.11.1 **Duration** All FDRs shall retain the information recorded during at least the last 10 hours of their operation.

D18.12 **Cockpit Voice Recorders and Cockpit Audio Recording Systems**

D18.12.1 **Applicability**

All helicopters of a maximum certificated take-off mass of over 7000 kg shall be equipped with a CVR the objective of which is the recording of the aural environment on the flight deck during flight time. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on one track of the CVR.

D18.12.2 **Recommendation** All helicopters of a maximum certificated take-off mass of over 3175 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1987 should be equipped with FDR, at least main rotor speed should be recorded on CVR.

D18.13 **Recording Technology**

CVRs and CARS shall not use magnetic tape or wire.

D18.13.1 **Duration**

All helicopters required to be equipped with a CVR shall be equipped with a CVR which shall retain the information recorded during at least the last two hours of its operation.

D18.14 **Data Link Recorders**

D18.14.1 **Applicability**

a) All helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which use any of the data link communications applications referred to in 7.1.2 of Appendix 4 (Annex-6 Part-III of ICAO) and are required to carry a CVR, shall record the data link communications messages on a crash-protected flight recorder.

b) All helicopters for which the individual certificate of airworthiness was first issued before 1 January 2016 that are required to carry a CVR, and are modified on or after 1 January 2016 to use any of the data link communications applications referred to in 7.1.2 of Appendix 4 (Annex-6 Part-III of ICAO), shall record the data link communications messages on a crash-protected flight recorder unless the installed data link communications equipment is compliant with a type design or aircraft modification first approved prior to 1 January 2016.

Note 1: A Class B AIR could be a means for recording data link communications applications messages to and from the helicopters where it is not practical or is prohibitively expensive to record those data link communications applications messages on FDR or CVR.

Note 2: The “aircraft modifications” refer to modifications to install the data link communications equipment on the aircraft (e.g. structural, wiring).

D18.14.2 **Recommendation** All helicopters for which the individual certificate of airworthiness was first issued before 1 January 2016, that are required to carry a CVR and are modified on or after 1 January 2016 to use any of the data link communications applications referred to in 7.1.2 of Appendix 4 (Annex-6 Part-III of ICAO) should record the data link communications messages on a crash-protected flight recorder.

D18.14.3 **Duration**

Minimum recording duration shall be equal to the duration of the CVR.

D18.14.4 **Correlation**

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

D18.15 **Flight Recorders – General**

D18.15.1 **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 specification.

D18.16 **Flight Recorders — Operation**

D18.16.1 Flight recorders shall not be switched off during flight time.

D18.16.2 To preserve flight recorder records, flight recorders should be de-activated upon completion of flight time following an accident or incident, and not re-activated prior to removal of these records.

Note 1: The need for removal of the flight recorder records from the Helicopter will be determined by the investigation authority of PCAA with due regard to the seriousness of an occurrence and the occurrences including the impact on the operation.

Note 2: The operator's responsibilities regarding the retention of flight recorder records are contained in Section II, Chapter 9, 9.6 of Annex 6, Part-III.

D18.17 **Flight Recorders – Continued Serviceability**

D18.17.1 Operational checks and evaluations of recordings from the FDR and CVR systems shall be conducted to ensure the continued serviceability of the recorders.

Note: Procedures for the inspections of flight recorder systems are given in Appendix 4 (Annex-6 Part-III of ICAO) (Annex-6, Part-III ICAO).

D18.18 **Flight Recorders Electronic Documentation**

D18.18.1 **Recommendation** The documentation requirement concerning FDR parameters provided by operators/owner 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.

D18.19 **Emergency Locator Transmitter (ELT)**

D18.19.1 From 1 July 2008, all helicopters operating in performance Class 1 and 2 shall be equipped with at least one automatic ELT and, when operating on flights over water with at least one automatic ELT and one ELT(S) in a raft or life jacket.

D18.19.2 From 1 July 2008, all helicopters operating in performance Class-3 shall be equipped with at least one automatic ELT and, when operating on flights over water as described in D7.16, with at least one automatic ELT and one ELT(S) in a raft or life jacket.

D18.19.3 ELT equipment carried to satisfy the requirements of D7.16.8 and D7.16.9 shall operate in accordance with the relevant provisions of 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 crewmembers.

D19 HELICOPTERS REQUIRED TO BE EQUIPPED WITH A PRESSURE-ALTITUDE REPORTING TRANSPONDER

D19.1 From 1 January 2003, unless exempted by the appropriate authorities, all helicopters shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of Annex 10, Volume IV.

D19.2 **Recommendation** All helicopters should be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of Annex 10, Volume IV.

Note: The provisions in 4.9.1 and 4.9.2 (Annex-6 Part-III of ICAO) are intended to support the effectiveness of ACAS as well as to improve the effectiveness of air traffic services. Effective dates for carriage requirements of ACAS are contained in Annex 6, Part I, 6.19.1 and 6.19.2. The intent is also for aircraft not equipped with pressure-altitude reporting transponders to be operated so as not to share airspace used by aircraft equipped with airborne collision avoidance systems. To this end, exemptions from the carriage requirement for pressure-altitude reporting transponders could be given by designating airspace where such carriage is not required.

D19.3 **Microphones**

D19.4 **Recommendation** All flight crew members required to be on flight deck duty should communicate through boom or throat microphones.

D20 HELICOPTERS 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)

D20.1 Where helicopters 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, criteria for the use of such systems for the safe operation of a helicopter shall be established by the State of Registry.

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

D20.2 In establishing operational criteria for the use of automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, the State of Registry shall require that:

a) The equipment meets the appropriate airworthiness certification requirements;

b) The operator/owner has carried out a safety risk assessment associated with the operations supported by the automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS;

c) The operator/owner 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 (ICAO Doc 9859).

Note 2: Guidance on establishing operational criteria is contained in Attachment F, Annex-6, Part-III of ICAO.

D21 ELECTRONIC FLIGHT BAGS (EFBS)

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

D21.1 **EFB Equipment**

Where portable EFBs are used on board a helicopter, the pilot-in-command and the owner shall ensure that they do not affect the performance of the helicopter systems, equipment or the ability to operate the helicopter.

D21.2 **EFB Functions**

Where EFBs are used on board a helicopter, the pilot-in-command and/or the owner shall:

a) Assess the safety risk(s) associated with each EFB function;

b) Establish 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 (ICAO Doc 9859).

D21.3 The State of the Registry shall issue a specific approval for the operational use of EFB functions to be used for the safe operation of helicopters.

D21.4 **EFB Specific Approval**

When issuing a specific approval for the operational use of EFBs, the State of Registry shall ensure that:

a) The EFB equipment and its associated installation hardware, including interaction with helicopter systems if applicable, meet the appropriate airworthiness certification requirements;

b) The owner has assessed the risks associated with the operations supported by the EFB function(s);

c) The owner has established requirements for redundancy of the information (if appropriate) contained and displayed by the EFB function(s);

d) The owner has established and documented procedures for the management of the EFB function(s) including any databases it may use; and

e) The owner has established and documented the procedures for the use of, and training requirements for, the EFB function(s).

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

D22 HELICOPTER OPERATED UNDER AN ARTICLE 83 *BIS* AGREEMENT

Note: Guidance concerning the transfer of responsibilities by the State of Registry to the State of the principal location of a general aviation operator in accordance with Article 83 bis is contained in (ICAO Doc 10059).

D22.1 A helicopter, when operating under an Article 83 *bis* agreement, entered into between the State of Registry and the State of the principal location of a general aviation operator, shall carry a certified true copy of the agreement summary, in either an electronic or hard copy format. When the summary is issued in a language other than English, an English translation shall be included.

Note: Guidance regarding the agreement summary is contained in ICAO Doc 10059.

D22.2 The agreement summary of an Article 83 bis agreement shall be accessible to a civil aviation safety inspector to determine which functions and duties are transferred by the State of Registry to the State of the principal location of a general aviation operator under the agreement, when conducting surveillance activities such as ramp checks.

Note: Guidance for the civil aviation safety inspector conducting an inspection of an aero plane operated under an Article 83 bis agreement is contained in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (ICAO Doc 8335).

D22.3 The agreement summary shall be transmitted to ICAO together with the Article 83 *bis* Agreement for registration with the ICAO Council by the State of Registry or the State of the principal location of a general aviation operator.

Note: The agreement summary transmitted with the Article 83 bis agreement registered with the ICAO Council contains the list of all aircraft affected by the agreement. However, the certified true copy to be carried on board as per 4.13.1 Annex-6, Part-III ICAO will need to list only the specific aircraft carrying the copy.

D23 OPERATION OF AIRCRAFT

D23.1 **Recommendation:** The agreement summary should contain the information in Appendix 7 for the specific aircraft and should follow the layout of Appendix 7 paragraph 3.

D24 HELICOPTER COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT

D24.1 Communication Equipment

D24.1.1 A helicopter to be operated in accordance with IFR or at night shall be provided with radio communication equipment. Such equipment shall be capable of conducting two-way communication with those aeronautical stations and on those frequencies prescribed by the appropriate authority.

Note: The requirements of D7.1.1 are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.

D24.1.2 When compliance with D7.1.1 requires that more than one communication equipment unit be provided, each shall be independent of the other or others to the extent that a failure in any one will not result in failure of any other.

D24.1.3 A helicopter to be operated in accordance with VFR, but as a controlled flight, shall, unless exempted by the appropriate authority, be provided with radio communication equipment capable of conducting two-way communication at any time during flight with such aeronautical stations and on such frequencies as may be prescribed by the appropriate authority.

D24.1.4 A helicopter to be operated on a flight, unless exempted by the appropriate authority, be provided with radio communication equipment capable of conducting two-way communication at any time during flight with such aeronautical stations and on such frequencies as may be prescribed by the appropriate authority.

D24.1.5 **Recommendation** The radio communication equipment required in accordance with D7.1.1 to D7.1.4 should provide for communication on the aeronautical emergency frequency 121.5 MHz.

D24.2 For operations where communication equipment is required to meet an RCP specification for performance-based communication (PBC), a helicopter shall, in addition to the requirements specified in D7.1.1 to D7.1.5:

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 helicopter RCP specification capabilities listed in the flight manual or other helicopter documentation, approved by the State of Design or State of Registry; and

c) Where the helicopter is operated in accordance with a MEL, have information relevant to the helicopter 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 (ICAO Doc 9869).

D24.3 The State of Registry shall establish criteria for operations where an RCP specification for PBC has been prescribed.

D24.4 In establishing criteria for operations where an RCP specification for PBC has been prescribed, the State of Registry shall require that the operator/owner establish:

a) Normal and abnormal procedures, including contingency procedures;

b) Flight crew qualification and proficiency requirements, in accordance with appropriate RCP specifications;

c) A training program for relevant personnel consistent with the intended operations; and

d) Appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RCP specifications.

D24.5 The State of Registry shall ensure that, in respect of those helicopters mentioned in D7.1.6, adequate provisions exist for:

a) Receiving the reports of observed communication performance issued by monitoring program established in accordance with Annex 11, Chapter 3, 3.3.5.2 of ICAO; and

b) Taking immediate corrective action for individual helicopters, helicopter types or operators identified in such reports as not complying with the RCP specification(s).

D25 NAVIGATION EQUIPMENT

D25.1 A helicopter shall be provided with navigation equipment which will enable it to proceed:

a) In accordance with its 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. For international general aviation, landmarks shall be located at least every 110 km (60 NM).

D25.2 For operations where a navigation specification for performance-based navigation (PBN) has been prescribed, a helicopter shall, in addition to the requirements specified in D5.2.1:

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 helicopter navigation specification capabilities listed in the flight manual or other helicopter documentation approved by the State of Design or State of Registry; and

c) Where the helicopter is operated in accordance with a MEL, have information relevant to the helicopter navigation specification capabilities included in the MEL.

Note: Guidance on helicopter documentation is contained in the Performance-based Navigation (PBN) Manual (ICAO Doc 9613).

D25.3 The State of Registry shall establish criteria for operations where a navigation specification for PBN has been prescribed.

D25.4 In establishing criteria for operations where a navigation specification for PBN has been prescribed, the State of Registry shall require that the operator/owner establish:

a) Normal and abnormal procedures, including contingency procedures;

b) Flight crew qualification and proficiency requirements, in accordance with the appropriate navigation specifications;

c) Training 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 Annex 19, are contained in the Performance-based Navigation (PBN) Operational Approval Manual (ICAO Doc 9997).

Note 2: Electronic navigation data management is an integral part of normal and abnormal procedures.

D25.5 The State of Registry 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 (ICAO Doc 9997).

D25.6 The helicopter 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 helicopter to navigate in accordance with D7.3.1 and, where applicable, D7.3.2.

Note: For international general aviation, this requirement may be met by means other than the duplication of equipment.

D25.7 On flights in which it is intended to land in instrument meteorological conditions, a helicopter shall be provided with appropriate navigation equipment providing guidance to a point from which a visual landing can be effected. This equipment shall be capable of providing such guidance at each heliport at which it is intended to land in instrument meteorological conditions and at any designated alternate heliports.

D25.8 **Surveillance Equipment**

D25.8.1 A helicopter shall be provided with surveillance equipment which will enable it to operate in accordance with the requirements of air traffic services.

D25.8.2 For operations where surveillance equipment is required to meet an RSP specification for performance-based surveillance (PBS), a helicopter shall, in addition to the requirements specified in D5.3.1:

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 helicopter RSP specification capabilities listed in the flight manual or other helicopter documentation approved by the State of Design or State of Registry; and

c) Where the helicopter is operated in accordance with a MEL, have information relevant to the helicopter RSP specification capabilities included in the MEL.

Note 1: Information on surveillance equipment is contained in the Aeronautical Surveillance Manual (ICAO Doc 9924).

Note 2: Information on RSP specifications for performance-based surveillance is contained in the Performance-based Communication and Surveillance (PBCS) Manual (ICAO Doc 9869).

D25.8.3 The State of Registry shall establish criteria for operations where an RSP specification for PBS has been prescribed.

D25.8.4 In establishing criteria for operations where an RSP specification for PBS has been prescribed, the State of Registry shall require that the operator/owner establish:

a) Normal and abnormal procedures, including contingency procedures;

b) Flight crew qualification and proficiency requirements, in accordance with appropriate RSP specifications;

c) A training program for relevant personnel consistent with the intended operations; and

d) Appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RSP specifications.

D25.8.5 The State of Registry shall ensure that, in respect of those helicopters mentioned in D7.5, adequate provisions exist for:

a) Receiving the reports of observed surveillance performance issued by monitoring program established in accordance with Annex 11, Chapter 3, 3.3.5.2 of ICAO; and

b) Taking immediate corrective action for individual helicopter, helicopter types or operators identified in such reports as not complying with the RSP specification(s).

D25.9 Helicopter Maintenance††

Note 1: For the purpose of this paragraph "helicopter" includes: engines, power transmissions, rotors, components, accessories, instruments, equipment and apparatus including emergency equipment.

Note 2: Guidance on continuing airworthiness requirements is contained in the Airworthiness Manual (ICAO Doc 9760).

D26 MAINTENANCE RESPONSIBILITIES††

D26.1 The owner of a helicopter, or in the case where it is leased, the lessee, shall ensure that:

a) The helicopter is maintained in an airworthy condition;

b) The operational and emergency equipment necessary for the intended flight is serviceable;

c) The certificate of airworthiness of the helicopter remains valid; and

d) The maintenance of the helicopter is performed in accordance with a maintenance program acceptable to the State of Registry.

D26.2 Until 4 November 2020, the helicopter shall not be operated unless it is maintained and released to service under a system acceptable to the State of Registry.

D26.3 As of 5 November 2020, the owner or the lessee shall not operate the helicopter unless maintenance on the helicopter, including any associated engine, rotor and part, is carried out:

a) By an organization complying with Annex 8, Part II, Chapter 6 of ICAO that is either approved by the State of Registry of the helicopter or is approved by another Contracting State and is accepted by the State of Registry; or

b) By a person or organization in accordance with procedures that are authorized by the State of Registry; and there is a maintenance release in relation to the maintenance carried out.

D26.4 Until 4 November 2020, when the maintenance release is not issued by an organization approved in accordance with Annex 6, Part I, 8.7, the person signing the maintenance release shall be licensed in accordance with Annex 1.

D26.5 **Maintenance Records††**

D26.5.1 The owner shall ensure that the following records are kept for the periods mentioned in D12.4.3:

a) The total time in service hours, calendar time and cycles, as appropriate of the helicopter, and all life-limited components;

b) The current status of compliance with all mandatory continuing airworthiness information;

c) Appropriate details of modifications and repairs to the helicopter;

d) The time in service (hours, calendar time and cycles, as appropriate) since last overhaul of the helicopter or its components, subject to a mandatory overhaul life;

e) The current status of the helicopter's compliance with the maintenance program; and

f) The detailed maintenance records to show that all requirements for signing of a maintenance release have been met.

D26.5.2 The records shall be kept for a minimum period of 90 days after the unit to which they refer has been permanently withdrawn from service, and the records for a minimum period of one year after the signing of the maintenance release.

D26.5.3 The lessee of a helicopter shall comply with the requirements of D26.5.1 and D26.5.2, as applicable, while the helicopter is leased.

D26.5.4 As of 5 November 2020, records kept and transferred shall be maintained in a form and format that ensures readability, security and integrity of the records at all times.

Note 1: The form and format of the records may include, for example, paper records, film records, electronic records or any combination thereof.

Note 2: Guidance regarding electronic aircraft continuing airworthiness records is included in the Airworthiness Manual (ICAO Doc 9760).

D27 CONTINUING AIRWORTHINESS INFORMATION

D27.1 The owner of a helicopter over 3175 kg maximum certificated take-off mass, or in the case where it is leased, the lessee, shall, as required by the State of Registry, ensure that the information resulting from maintenance and operational experience with respect to continuing airworthiness is transmitted as required by Annex 8, Part II, 4.2.3.1 f) and 4.2.4 of ICAO.

D27.2 **Modifications and Repairs**

D27.2.1 All modifications and repairs shall comply with airworthiness requirements acceptable to the State of Registry. Procedures shall be established to ensure that the substantiating data supporting compliance with the airworthiness requirements are retained.

D27.3 **Maintenance Release**

D27.3.1 Until 4 November 2020, a maintenance release shall be completed and signed, as prescribed by the State of Registry, to certify that the maintenance work performed has been completed satisfactorily.

D27.3.2 As of 5 November 2020, when maintenance is carried out by an approved maintenance organization, the maintenance release shall be issued by the approved maintenance organization in accordance with the provisions of Annex 8, Part II, 6.8.

D27.3.3 Until 4 November 2020, a maintenance release shall contain a certification including:

a) Basic details of the maintenance carried out;

b) The date such maintenance was completed;

c) When applicable, the identity of the approved maintenance organization; and

d) The identity of the person or persons signing the release.

D27.4 As of 5 November 2020, when maintenance is not carried out by an approved maintenance organization, the maintenance release shall be completed and signed by a person appropriately licensed in accordance with Annex 1 to certify that the maintenance work performed has been completed satisfactorily and in accordance with data and procedures acceptable to the State of Registry.

D27.5 As of 5 November 2020, when maintenance is not carried out by an approved maintenance organization, the maintenance release shall include the following:

a) Basic details of the maintenance carried out;

b) The date such maintenance was completed; and

c) The identity of the person or persons signing the release.

D27.6 The pilot-in-command shall ensure that the licenses of each flight crew member have been issued or rendered valid by the State of Registry, and are properly rated and of current validity, and shall be satisfied that flight crew members have maintained competence.

Note: Information for pilots on flight procedure parameters and operational procedures is contained in PANS-OPS (ICAO Doc 8168), Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (ICAO 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.

D28 COMPOSITION OF THE FLIGHT CREW

The number and composition of the flight crew shall not be less than that specified in the flight manual or other documents associated with the certificate of airworthiness.

E1. RECORDS:

Nil

E2. REFERENCES:

E2.1 ICAO Annexes

E2.2 Civil Aviation Rules, 1994

E2.3 ANO 91.0025

E2.4 ASC-011-FSXX-2.0

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 31st July, 2021 and supersedes ANO-025-FSXX-2.0.

--S/d--

(**KHAQAN MURTAZA**)

Director General,

Pakistan Civil Aviation Authority

Dated: **16th July, 2021**

--S/d--

(CAPT. S. M. RAFATULLAH)

Director Flight Standards

Dated: **15th July, 2021**

File No. HQCAA/1066/009/HELI/PC

ANNEXURE – A

A1 STATE OF THE OPERATOR AND STATE OF REGISTRY RESPONSIBILITIES

A1.1 Annex 6, Part III, Section II, places the responsibility for initial certification, issuance of the AOC, and ongoing surveillance of an air operator on the State of the Operator, Annex-6, Part III, also requires the State of the Operator 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.

A1.2 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 to the Convention on International Civil Aviation should be arranged to the Convention on International Civil aviation should be arranged to preclude any misunderstandings regarding which State is responsible for specific oversight responsibilities.

A2 APPROVAL ACTIONS

A2.1 **Approvals:**

The term “approval” implies a more formal action on the part of the PCAA with respect to a certification matter than does the term “acceptance”. PCAA require that a Director or a designated lower level CAA official to issue a formal written instrument for every “approval” action take. PCAA may allow a variety of documents to be issued as evidence of an approval. The approval document issue and the matter addressed by the approval will depend on the delegated authority of the official. Authority to sign routine approvals, such as operator minimum equipment lists for specific aircraft, is delegated to FOI or Technical Inspectors. More complex or significant approvals are normally issued by higher level officials.

A3 AIR OPERATOR CERTIFICATE (AOC):

The AOC required by Annex 6, Part III, Section II, Chapter 2,2.1, is a formal instrument. Section II, Chapter 2, 2.2.1.5, lists the information to be included in the AOC.

In addition to the items in Appendix 1, Paragraph 4, operations specifications may include other specific authorizations, such as:

A3.1 Take off and landing operations with exposure time;

A3.2 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);

A3.3 Instrument meteorological conditions operations in Performance Class III; and

A3.4 Operations in areas with special procedures (e.g. operations in areas using different altimetry units or altimeter setting procedures).

A4 PROVISIONS THAT REQUIRE AN APPROVAL:

A4.1 The following provisions require or encourage approval by PCAA. The approval of the PCAA 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 “*” by the State of Design (double asterisk or “**”), or that operators for which it is responsible comply with any applicable approvals issued by the PCAA should take the necessary steps to ensure that operators for which it is responsible comply with any applicable approvals issued by the State of Registry and / or State of Design, in additions to its own requirements.

a) ** Configuration deviations list (CDL) (Definitions);

b) ** Master minimum equipment list (MMEL) (Definitions);

c) The method for establishing minimum flight altitudes;
d) The method of determining heliport operating minima ;
e) Flight time, flight duty periods and rest periods ;
f) Helicopter-specific minimum equipment list (MEL);
g) RNP Performance base navigation operations ;
h) *Approved maintenance organization;
i) *Helicopter specific maintenance program;
j) Flight crew training programs;
k) Training in the transport of dangerous goods(7.3.1, Note 5);
l) Use of flight simulation training devices (7.3.2 a), 7.4.2 and 7.4.4.1, Note);
m) Method of control and supervision of flight operations (2.2.1.3 and 8.1);
n) **Mandatory maintenance tasks and intervals (9.3.2); and
o) Cabin attendant training programs (10.3).

A5 PROVISIONS THAT REQUIRE A TECHNICAL EVALUATION

A5.1 Other provisions of Part III, Section II, require the State to have made a technical evaluation. These provisions contain the phrases “acceptable to the State”, satisfactory to the State”, “determined by the State”, “deemed acceptable by the State”, and “prescribed by the State”. While not necessarily requiring an approval by the State, these Standards do require the State to at least accept the matter at issue after it conducts a specific review or evaluations. These provisions are:

a) Details of the helicopter-specific checklists (definition: aircraft operating manual);
b) Details of the aircraft specific systems (definition: aircraft operating manual;
c) Mandatory material for the operations manual;
d) *Operator’s aircraft specific maintenance responsibilities;
e) *Method of maintenance and release;
f) *Maintenance control manual;
g) *Mandatory material for the maintenance control manual;
h) *Reporting of maintenance experience information;
i) *Implementing necessary maintenance corrective action;
j) *Modification and repair requirements;
k) Training facilities;
l) Qualifications of instructors;
m) Need for recurrent training;
n) Use of correspondence courses and written examinations;
o) Use of flight simulation training devices;
p) Flight crew qualification records;
q) Designated representative of PCAA;
r) *Flight manual changes; and
s) Minimum number of flight attendants assigned to a specific aircraft.

A6. ACCEPTANCE ACTIONS

A6.1 **Acceptance:**

The actual extent of the technical evaluation of an operator's readiness to conduct certain flight operations are much broader than just those standards, which require or imply approval. During certification, the PCAA would ensure that an operator will be in compliance with all requirements of Part III, Section II, prior to conducting international commercial air transport operations.

A6.2 The concept of "acceptance" is used by PCAA as a formal method of ensuring that all critical aspects of operator certification are reviewed by the PCAA prior to the formal issuance of the AOC. Using this concept, the PCAA exercises the 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.

A6.3 The act of "acceptance" is in addition to the issuance of a specific approval. For example, certain portions of the operations manual may be "accepted" by formal instrument, while other portions such as the aircraft specific minimum equipment list are "approved" by a separate formal instrument.

A7 CONFORMANCE REPORT:

A7.1 PCAA uses a conformance report to document the acceptance 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 ICAO Doc 8335 and ICAO 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 PCAA in the operator's policies and procedures. Then a final conformance report is included in the PCAA 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.

A8 OPERATIONS AND MAINTENANCE MANUALS:

A8.1 Operations and maintenance manuals, and any subsequent amendments should be submitted to the PCAA. The PCAA established minimum contents for these manuals Refer to relevant ANOs. The pertinent portions of an operator's manual for evaluation are identified in the PCAA technical guidance, e.g., operations policy manual, aircraft operating manual, cabin crew manual, route guide, and training manual. PCAA issues a formal instrument accepting each manual and any subsequent amendments.

A8.2 The PCAA Technical evaluation would, 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 fight plan should provide the step-by-step completion guidance necessary for compliance with 2.3 concerning the content and retention of these plans.

A8.3 Proven industry practices, such as an example of an actual completed operational flight plan for reference by the flight crew and dispatchers (although not standard), is also required by a PCAA technical evaluator during certification. This aspect of the technical evaluation would be conducted by inspectors experienced in operator certification.

A9 OTHER APPROVAL OR ACCEPTANCE CONSIDERATIONS:

A9.1 PCAA require the approval or acceptance of certain critical documents, records or procedures. The following are some examples:

a) Safety program;

b) Method for obtaining aeronautical data;

c) Adequacy of the fuel and oil records;

d) Adequacy of flight time, flight duty and rest period records;

e) Adequacy of the aircraft maintenance logbook;

f) Adequacy of the load manifest;

g) Adequacy of the operational plan;

h) Method for obtaining weather data;

i) Method of compliance with carry on baggage stowage;

j) Helicopter performance operating limitations;

k) Method of obtaining and applying heliport obstacle data;

l) Adequacy of passenger information card;

m) Procedures for long range navigation;

n) Contents of the journey log book; and

o) Content of the security training program.

ANNEXURE – B

MEDICAL SUPPLIES

B1 FIRST- AID KIT:

B1.1 The following provides guidance on typical contents of a first-aid kit for carriage aboard a helicopter:

- List of contents
- Antiseptic swabs (10/pack)
- Bandage: adhesive strips
- Bandage: gauze 7.5 cm x 4.5 m
- Bandage: triangular, safety pins
- Dressing: burn 10 cm x 10 cm
- Dressing: compress, sterile 7.5 cm x 10.4 cm
- Dressing: gauze, sterile 10.4 cm x 10.4 cm
- Tape: adhesive 2.5 cm (roll)
- Steri-strips(or equivalent adhesive strip)
- Hand cleanser or cleansing towels
- Pad with shield, or tape, fore eye
- Scissors 10 cm (if allowed by national regulations)
- Tape: Adhesive, surgical 1.2 cm x 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

B1.2 The following suggested medications can be included in the first-aid kits.

- Mild to moderate analgesic
- Antiemetic
- Nasal decongestant
- Antacid
- Antihistamine

B2 UNIVERSAL PRECAUTION KIT:

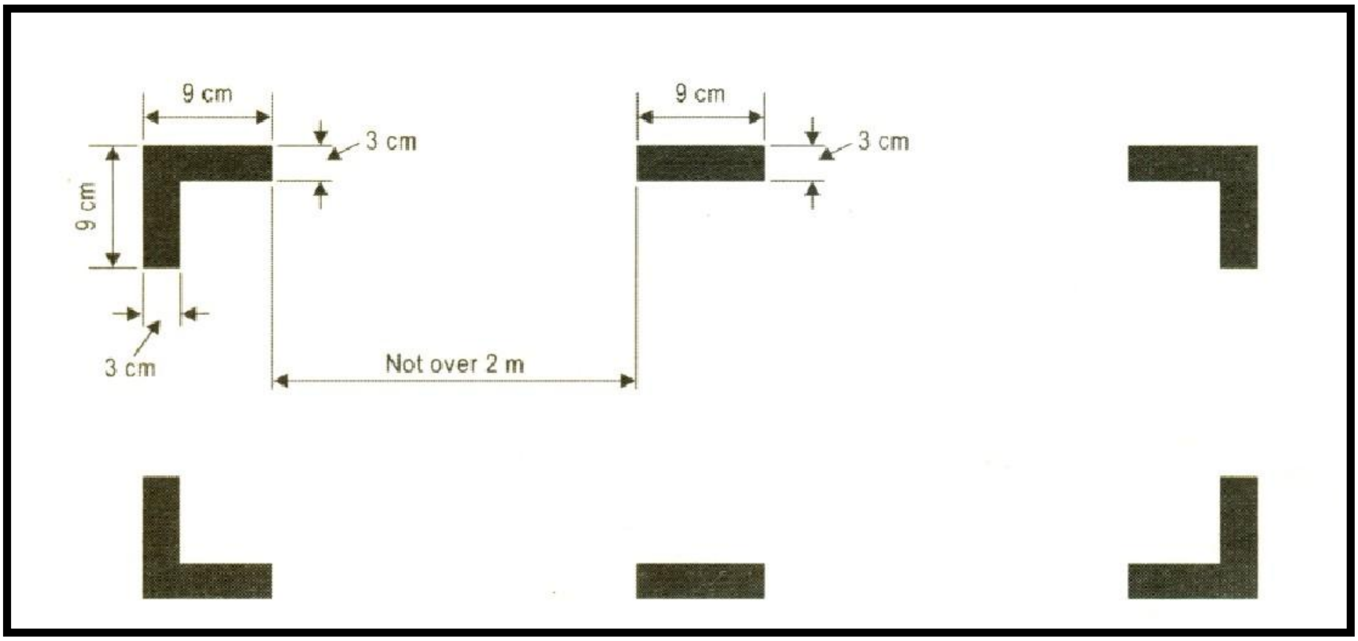
B2.1 A universal precaution kit should be carried on a helicopter that is required to operate with at least one cabin crewmember. Such a kit may be used to clean up any potentially infectious body contents such as blood, urine, vomit and faeces and to protect the cabin crew who are assisting potentially infectious cases of suspected communicable disease.

B3 TYPICAL CONTENTS:

- 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

ANNEXURE – C



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ANNEXURE – D

SPECIAL OPERATIONS (HELICOPTER)

HELICOPTER EMERGENCY MEDICAL SERVICE (HEMS)

D1 INTRODUCTION:

A helicopter is very versatile machine and its utilization is unlimited in today's modern world. One of the most important tasks of the helicopter is to provide emergency service during urgent situations that necessitate quick evacuation and medical aid. The helicopter in this role provides immediate medical assistance and rapid transportation from site of the medical emergency.

D2 OPERATIONAL REQUIREMENTS:

An operator must ensure that the Operations Manual includes a supplement specifying operational considerations specific to HEMS operations. Relevant extracts from the Operations Manual shall be made available to the organization for which the HEMS are being provided.

D2.1 Performance Class – 3 operations shall not be conducted over a hostile environment.

D2.2 Performance Class – 3 operations in non-congested hostile environment over hilly terrain with any turbine engine helicopter may be conducted subject to the following conditions:

a) Prior CAA approval for type and area of such operations has been obtained;

b) Such operations are performed with-in the limitations established by the helicopter manufacturer.

c) The max certificated seating capacity of the helicopter is less than or equal to six.

d) The operator shall ensure that performance criteria of flight manual are strictly followed and the reliability of the engine and helicopter systems are continuously monitored.

D3 TAKE-OFF AND LANDING-HELICOPTERS WITH A MAXIMUM TAKEOFF MASS (MTOM) OF 5700 KGs OR LESS:

D3.1 Operations to/from a heliport at a hospital, which is located in a hostile environment, shall be operated as performance Class – 1.

D3.2 Operations to/from a HEMS operating site located in a hostile environment shall be as performance Class – 1. The PIC shall make every reasonable effort to minimize the period during which there would be danger to helicopter occupants and persons on the surface in the event of failure of a power unit.

D3.3 The HEMS operating site must be big enough to provide adequate clearance from all obstructions.

D3.4 Guidance on take-off and landing procedures at previously un-surveyed HEMS operating sites shall be contained in the Operations Manual.

D4 TAKE-OFF AND LANDING-HELICOPTERS WITH A MTOM EXCEEDING 5700 KG:

D4.1 Helicopters conducting HEMS shall be operated in accordance with Performance Class – 1 operations.

D4.2 **The Crew:**

The Operations Manual shall contain specific criteria for the selection of flight crewmembers for the HEMS task, taking previous experience into account.

D4.3 The minimum experience for PIC conducting HEMS flights shall not be less than:

a) Either 1000 hours pilot-in-command of aircraft of which 500 hours is as pilot-in-command on helicopters;

or 1000 hours as co-pilot in HEMS operations of which 500 hours is as pilot-in-command under supervision; and, 100 hours pilot-in-command of helicopters.

b) 500 hours operating experience gained in similar operational environment.

c) Successful completion of training in accordance with 5.2.

D4.4 **Recency:**

All pilots conducting HEMS operations shall have completed a minimum of 30 minutes flight by sole reference to instruments in a helicopter or in a synthetic training device (STD) within the last 6 months.

D4.5 **Crew Composition:**

D4.5.1 **Day Flight:** The minimum crew by day shall be one pilot and one HEMS crewmember.

D.5.2 **Night Flight:** The minimum crew by night shall be two pilots.

D4.6 **Additional Requirements:**

The helicopter internal configuration should be suitable for HEMS operations and provide necessary space for approved stretchers and medical equipment.

D4.7 **Helicopter Medical Equipment:**

a) The installation of all helicopter dedicated medical equipment and, where appropriate, its operation including any subsequent modifications shall be approved by the CAA.

b) An operator shall ensure that procedures are established for the use of portable equipment on board.

D4.8 **Helicopter Communication and Navigation Equipment:**

Helicopters conducting HEMS flights shall be provided with communications equipment capable of conducting two-way communication with the organization for which the HEMS is being provided and, where possible, to communicate with ground emergency service personnel.

D5 HEMS OPERATING BASE FACILITIES:

a) If crewmembers are required to be on standby with a reaction time of less than 45 minutes, dedicated suitable accommodation shall be provided close to each operating base.

b) At each operating base the pilots shall be provided with facilities for obtaining current and forecast weather information and shall be provided with satisfactory communications with the appropriate ATS unit. Satisfactory facilities shall be available for the planning of all tasks.

D5.1 **Refueling With Passengers on Board:**

D5.1.1 When the commander considers refueling with passengers on board to be necessary, it can be undertaken with rotors stopped / turning provided the following requirements are met:

a) Door(s) on the refueling side of the helicopter shall remain closed;

b) Door(s) on the non-refueling side of the helicopter shall remain open, weather permitting;

c) Fire fighting facilities of the appropriate scale shall be positioned so as to be immediately available in the event of a fire; and

d) Sufficient personnel shall be immediately available to move patients clear of the helicopter in the event of a fire.

D5.2 **Training and Checking:**

D5.2.1 **Flight Crewmember:**

D5.2.2 The Flight crew shall have the following additional items of training:

a) Meteorological training concentrating on the understanding and interpretation of available weather information;

b) Preparing the helicopter and specialist medical equipment for subsequent HEMS departure;

c) Practice of HEMS departures;

d) The assessment from the air of the suitability of HEMS operating sites;

e) The medical effects air transport may have on the patient.

D5.2.2 **The Proficiency Check:**

D5.2.2.1 The proficiency check of the crew shall have the following additional items;

a) Proficiency check by day and/or night checks as appropriate including landing and takeoff profiles likely to be used at HEMS operating sites.

b) Line checks with special emphasis on the following:

(i) Local area meteorology;

(ii) HEMS flight planning;

(iii) HEMS departure;

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

(v) Low level flight in poor weather; and

(vi) Familiarity with established HEMS operating sites in operator area of operation.

D5.3 **HEMS CREWMEMBER:**

The HEMS crewmember shall be trained in following additional items:

a) Duties in the HEMS role;

b) Navigation (map reading, navigation aid principles and use);

c) Operation of radio equipment;

d) Use of onboard medical equipment;

e) Preparing the helicopter specialist medical equipment for subsequent HEMS departure;

f) Instrument reading, warnings, use of normal and emergency checklist in assistance of the pilot as required;

g) Basic understanding of helicopter type in terms of location design of normal and emergency systems and equipment;

h) Crew coordination;

i) Practice of response to HEMS call out;

j) Conducting refueling and rotors running refueling;

k) HEMS operating site selection and use;

l) Techniques for handling patients, the medical consequences of air transport and some knowledge of hospital casualty reception;

m) Marshalling signals;

n) Under slung load operations as appropriate;

o) Winch operations as appropriate;

p) The dangers to self and others of rotor running helicopters including loading of patients;

q) The use of the helicopter inter-communications system

D6 MEDICAL PASSENGERS:

Prior to any HEMS flight, or series of flights, medical passengers shall be briefed on the following:

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

b) Entry and exit under normal and emergency condition both for self and patients;

c) Use of the relevant onboard specialist medical equipment;

d) The need for the commander's approval prior to use of specialized equipment;

e) Method of supervision of other medical staff;

f) The use of helicopter intercommunication system; and

g) Location and use of onboard fire extinguishers.

D7 GROUND EMERGENCY SERVICE PERSONNEL

An operator shall take all reasonable measures to ensure that ground emergency service personnel are familiar with the following:

a) Two way radio communication procedures with helicopters;

b) The selection of suitable HEMS operating sites for HEMS flights;

c) The physical danger area of helicopters;

d) Crowd control in respect of helicopter operations; and

e) The evacuation of helicopter occupants following an on-site helicopter accident.

D8 MOUNTAIN / HILL FLYING OPERATIONS (HELICOPTER)

D8.1 Introduction

Helicopter flying in the Mountains / hilly terrain requires knowledge of the typical characteristics of Mountains / hilly terrain, the effects of wind and rapidly changing weather conditions etc. that can restrict the operations. Height of the helipads may adversely affect the performance of helicopter especially during takeoff and landing phases, which also varies from helicopter to helicopter. There are inherent hazards in the Mountain / Hill flying, which require considerable preparation and planning, a thorough knowledge of topography. Several accidents have taken place due to intentional or inadvertent flying in the clouds.

D8.2 General Requirements

D8.2.1 Mountain / Hill flying shall be restricted VFR operations only.

D8.2.2 The operator shall ensure that the pilot engaged in Mountain / Hill operations has through knowledge of topography, general weather pattern, presence of the mountain waves and planning of entry and exit procedures.

D8.2.3 A pilot having at least 250 hours. of hill flying experience on helicopters will be considered experienced in Mountain / Hill operations.

D8.3 Training / Experience Requirements

D8.3.1 Pilots engaged in regular / irregular operations in the Mountain / Hill area shall undergo training as given below:

a) Pilot having no previous experience of Mountain / Hilly flying shall be imparted special training specific to Mountain / Hill operations prior to operate from copilot seat for such operations.

b) Pilots having Mountain / Hill flying experience but no experience in the area of intended operations may fly from copilot seat for area familiarization.

c) Pilot shall be checked by an examiner before he is cleared to operate as PIC.

d) The special training specific to Mountain / Hill operations to be conducted at an approved training school.

e) Flying experience / training requirements for regular operations in Mountain / Hilly areas for all categories of pilots having flying experience below 1000 hours, between 1000 to 2500 hours and more than 2500 hours are given in subsequent paragraphs / tables.

f) Similarly flying experience / training requirement for irregular operations in Mountain / Hill areas for all categories of pilots are given in subsequent paragraphs / tables.

D8.3.2 Pilots required to carry out one time / occasional operations in Mountain / Hilly area shall meet the following requirements:

a) Pilots having no experience of flying in Mountain / Hilly terrain is permitted to fly from the copilot seat

b) Pilots having previous experience in Mountain / Hill flying and with more than 250 hours on type shall operate in the Mountain / Hilly area after a check flight with an examiner or alternatively carry out trial run/landing before operating a flight with passengers on board.

D8.3.3 A pilot engaged in regular and irregular Mountain / Hill operations shall undergo periodical recurrent training once in a year. Proficiency check of such a pilot shall be carried out for the capacity in which he is regularly flying every year by a PCAA Inspector or an approved person by PCAA.

D8.4 **Ground Training Syllabus Mountain / Hill Flying**

a) Density altitude and performance considerations;

b) Effects of decreased air density on engine and airframe;

c) Type performance Manufacturer's Flight Manual;

d) Physiological Effects-lack of oxygen and external horizon;

e) Mountain winds-convection and air mass stability, wind pattern across prominent features of rounded shape and sharp contours, standing waves, rotor streaming turbulence, ridges, conical hills and valleys.

f) Transit flying-pre-flight planning, blade stall, engine failure, en-route wind assessment, action when caught in a down draught, ridge crossing and valley flying;

g) Wind direction finding / assessment.

h) Reconnaissance, approach, landing and takeoff techniques;

i) Winter operations;

j) Meteorological peculiarities of the area of operations and its effect on helicopter operations;

k) Helicopter icing.

Flying Training Requirement for Operations in Mountain / Hilly Areas

REGULAR OPERATIONS*

Pilots with <1000 hours on helicopters		**Pilots with > 1000 hours but < 2500 hours on helicopters**		**Pilots with > 2500 hours on helicopters**	
Category	Inexperienced pilots	Without previous experience	With previous experience	Without previous experience	With previous experience
Dual	15 hours. AND	5 hours. AND	5 hours. OR	5 hours. AND	5 hours. OR
Co-pilot	1000 hours	250 hours	100 hours	100 hours	25 hours

Requirement for Operations in Mountain / Hilly Areas

IRREGULAR OPERATIONS**

Pilots with <1000 hours on helicopters		**Pilots with > 1000 hours but < 2500 hours on helicopters**		**Pilots with > 2500 hours on helicopters**	
Category	Inexperienced pilots	Without previous experience	With previous experience	Without previous experience	With previous experience
Dual	15 hours. AND	5 hours. AND	5 hours. OR	5 hours. AND	5 hours. OR
Co-pilot	At least 1000 hours	At least 500 hours	250 hours	At least 250 hours	50 hours

* Regular operations means that flights are carried out on regular basis.

** Irregular operations means that the flights are carried out for a limited period such as heli-skiing etc.

D9 EXTERNAL LOAD OPERATIONS OF HELICOPTER:

D9.1 **Introduction**

Helicopter is a very versatile machine and can be gainfully deployed in variety of roles. One of the tasks that it can perform is carriage of load externally. In this operation unwieldy load that cannot otherwise be accommodated in the cabin can be carried externally from one place to another. In this role the helicopter can be deployed in various operations such as Wire Stringing, Cable Laying. Pylon Fixing, High Tension Cable Washing, Cargo Sling, Hoist Mining Survey, Fire Fighting, Aerial Photography, Power Line Inspection, Crop Spraying, Pollution Control, Electronic News Gathering etc.

D9.2 **External Load Classification**

D9.2.1 **Class-A:** An external load that cannot be moved freely, cannot be jettisoned and does not extend below the under carriage. Ski-pods, TV camera, survey equipment, crop spraying equipment attached to helicopter will come under this category.

D9.2.2 **Class-B:** An external load that can be jettisoned and is not in contact with surface (land, water etc.) e.g. a normal sling load, mining, surveys, firefighting equipment, anti pollution pads, a container, part of wrecked car or aircraft, military stores and vehicles.

D9.2.3 **Class-C:** An external load that can be jettisoned and that remains in contact with the land or water or any other surface e.g. wire pulling, cable laying, power line maintenance.

D9.2.4 **Class-D:** Hoisting an external load or person will come under this category.

D9.3 A helicopter shall meet airworthiness and certification requirements for external load equipment. Operations shall be conducted out of ground effect.

D9.4 The pilot must be aware of reserve power requirements for operations with external load.

D9.5 External load operation shall be conducted under VFR condition only.

D9.6 **Training Requirements**

D9.6.1 **Ground Training:** A pilot shall undergo ground training covering the following topics:

a) Aerodynamic considerations.

b) Knowledge of sling / hoist equipment, its operation and limitations given in the operation manual.

c) Preparation of load-sheet, rigging or its attachments.

d) Emergencies for the particular type of operations.

e) Operation peculiarities of different terrains, e.g. mountain, off shore, jungle, desert, etc.

D9.6.2 **Flying Training**

D9.6.2.1 A pilot shall have at least 500 hours PIC experience on type of helicopter. However this may be relaxed in case of a pilot with previous experience on external load operations.

D9.6.2.2 Flying training shall be for specific type of operations.

D9.6.2.3 Flying training shall include the following exercises:

a) Briefing of Crew, Inspection of Load, sling equipment and jettisoning system;

b) Hover, take off and landing with external load;

c) Maneuvering of helicopter in hover, transition and forward flight and delivering of load at predetermined point.

d) Emergencies including engine failure, unstable flight condition due to undue oscillation of external load, loss of tail rotor effectiveness. These are to be covered on the ground.

e) The pilot shall be checked by a CAA Inspector or an approved Examiner before carrying out external load operations. A test Performa is attached as Appendix ‘A’.

D9.6.3 **Initial Training**

a) **Class A typed load**: A pilot without previous experience in external load operations shall undergo a minimum of 1 hour or 5 practices of flight instructions in external load operations. A pilot having previous experience may be cleared for operations, after 0.5 hour or 3 practices. An entry in this regard shall be made in pilot’s logbook by the examiner.

b) **Class B & C type load**: A pilot who has not conducted Class B and C type of operations earlier, shall undergo dual flying instructions under supervision by an approved examiner for minimum of 2 hours or 10 practices of flight instructions in external load operations. A pilot who has conducted external load operations earlier shall undergo 1 hour or 5 practices of dual instructions. An entry in this regard shall be made in pilot’s logbook by the examiner.

c) **Class D type load**: A pilot who has not conducted Class D operations (Hoisting) shall undergo flight training of at least 10 hoistings. A pilot who has conducted hoisting operations in the past may be cleared after 5 hoistings and if found fit, be released for independent operation. An entry in this regard shall be made in pilot’s logbook by the examiner.

D9.6.4 **One Time Operation**

D9.6.4.1 In case of emergency, there may be requirement to carry out external load. In such a case the pilot should satisfy the following:

a) **Class A type load**: A pilot having experience on external load operations and meeting the other training requirements is permitted to undertake the task.

b) **Class B, C and D type load**: A pilot having previous experience of external load operations and 500 hours PIC experience on type is permitted to undertake the task.

D9.6.4.2 **Recurrent Training:**

a) A pilot who has not conducted an external load operation in the last 12 months preceding the date of operations shall be checked by an examiner before permitting him for independent operations.

b) A pilot who has not carried out external load operation in the last 24 months shall undergo full training as prescribed for initial training.

c) A pilot who is often called upon to undertake such mission shall carry out at least one flight of one-hour duration in a period of 12 months to maintain currency.

Note: The recurrent training shall be required for all types of operations except for one time emergent conditions.

D10 OFF SHORE OPERATIONS (HELICOPTER):

D10.1 **Introduction:**

Flying to offshore platforms and floating decks present its peculiar difficulties. The limited size of the heli-decks surrounded by obstacles, hot gases and varying winds and rapidly changing meteorological conditions pose a great challenge to pilots. In addition pitching, rolling and heaving experienced while landing on floating decks require a very high degree of skill and accuracy in flying. Offshore flying requirement is continuous and is under taken in all weather conditions – by days as well as by night. Offshore flying is a specialized operation and therefore, pilots engaged in this role are required to be given specific role oriented training.

D10.2 **Co-Pilot:**

Before being a co-pilot in offshore operation a pilot shall meet the following pre-requisite requirements:

a) The pilot should have undergone a Multi Crew Co-operation Course, a type rating course and 20 hours instrument flying experience, simulated or actual; and

b) Should undertake Offshore Conversion Training with an instructor as defined in the operator's Operations Manual. Offshore Conversion Training shall be an in depth training covering all aspects of takeoff and landing on all available types of helidecks and moving vessels present in the operation area.

D10.3 Before being cleared for operation, a check flight shall be conducted by a CAA Flight Inspector or an approved examiner. The check shall be recorded in the pilot log-book and training records.

D10.4 Thereafter the pilot shall continue to fly as a co-pilot in offshore until he reached the level defined in the paragraph 3 in order to be eligible for a pilot-in-command training course at the operator's discretion, taking into account his previous pilot experience.

REQUIREMENTS FOR OFFSHORE COMMAND TRAINING COURSE

With less 1000 H, 100 H Multi	**Between 1000 and 2500 H 500 H Multi**	**More than 2500 H 500 H Multi**
750 H* CP multi offshore 200 H on type	500 H CP multi offshore, 100 H on type	500 H CP multi offshore, 100 H on type,
Instrument rating**, 100H IMC	Instrument rating**, 100 H IMC	Instrument rating**, 100H IMC
+ 1 Monsoon	+ 1 Monsoon	+ 1 Monsoon
If 100 H offshore	**If 100 H offshore**	**If 100 H offshore**
Instrument rating**, 100H IMC	Instrument rating**, 100H IMC	Instrument rating**, 100 IMC
600 H* CP multi offshore 100 H on Type	400 H CP multi offshore, 100 H on Type	400 H CP multi offshore, 100 H on Type

* In any case he shall not have less than 1000 H Helicopter total time before he undertakes the offshore command course.

* IFR rating must be obtained prior to the final PIC check with CAA Flight Inspector or an approved examiner.

D10.5 For pilots having a large previous experience in multi engine, multi pilot and IFR the following criteria shall be applicable:

Helicopter of less than 5,700 kg	**Helicopter of more than 5,700 kg**
CPL (H) and current IR	**ATPL (H) and current IR**
2000 h helicopter, 500 H multi of which 200 as PIC, 200 H IFR	2000 H helicopter, 500 H multi of which 200 as PIC, 200 H IFR
300 H Offshore of which 100 H on type	300 H Offshore of which 100 H on type
OR	OR
1500 H Helicopter of which 500 H as PIC, 300 H multi of which 200 H as PIC, 200 H IFR	1500 H Helicopter of which 500 H as PIC, 500H Multi of which 300 H as PIC, 200 H IFR
500 H Offshore of which 100 H on type	500 H Offshore of which 100 H on Type

D10.6 **Command Training**

Command training will consist of the following:

a) A Ground Training course covering at least the following:-

i) Flight Manual / Technical Manuals;

ii) Operations Manual including CRM, DGR Courses;

iii) Area competency check

iv) Aeronautical publications including ASC's, ANO's, CAR, AIP, etc.

v) Local procedures and instructions.

b) Flying Training:

i) 100 hours on fixed decks, jack up rigs, tied down floaters, floaters and productions platforms. Before being cleared as PIC in offshore operations, the pilot under training must have carried out a minimum of 15 landings on fixed platforms / jacks up rigs, 5 on floaters with a CAA Inspector or an approved instructor.

ii) A Pilot shall perform at least one specific offshore simulator training, essentially covering engine failure during take off and landings on heli-decks. The simulator shall be of level C/D if a FFS or level 2/3 if a FTD. This training shall be recorded in pilot training records.

iii) He does undertake 20 offshore flights within the oil field on all types of landing sites as "Pilot-in-Command under supervision" (PICUS) with a company senior captain.

iv) An independent flying test shall be conducted in accordance with the format specified in Appendix 'B' and shall be cleared to operated as PIC offshore operations after a satisfactory check by CAA Inspector or an approved examiner, who will make an entry in the pilot's log book to this effect.

v) Pilots engaged in regular night offshore operations shall carry out at least 5 take offs and landings on helidecks.

ANNEXURE – E

ESTABLISHMENT AND USE OF HELICOPTER LANDING SITE (HLS)

E1 PURPOSE:

E1.1 A Helicopter shall not land at, or take-off from, any place unless: the place...is suitable for use as an aerodrome for the purposes of the landing and taking-off of helicopter; and, having regard to all the circumstances of the proposed landing or take-off (including the prevailing weather conditions), the helicopter can land at, or take-off from, the place in safety.

E1.2 CAR Regulations does not specify the method of determining which "circumstances", other than the prevailing weather conditions, should be considered in any particular case. These matters are the responsibility of the pilot in command and, in some circumstances, are shared with the aircraft operator and specified in the operations manual.

E1.3 These guidelines set out factors that may be used to determine the suitability of a place for the landing and taking-off of helicopters. Experience has shown that, in most cases, application of these guidelines will enable a take-off or landing to be completed safely, provided that the pilot in command: Has sound piloting skills; and displays sound airmanship Therefore, the pilot flying techniques have not been covered in this Annexure. This annexure only sets out the criteria that ensure compliance with the regulations regarding the helicopter landing sites.

E2 COMPLIANCE

Instructions contained in this Annexure to be observed by all concerned and where dates / periods are given for compliance with such instructions, the specified date / period must not be exceeded except by written authority of Director Flight Standards.

E3 CERTIFICATE OF COMPLIANCE

A declaration by the Director Flight Operations / Chief of Flight Operations or General Manager Operations of the organization that all applicable regulations have been complied with on the subject aircraft will be mandatory condition for the renewal of an Air Operator Certificate.

E4 INQUIRIES

Any inquiries as to the supply or technical contents of these should be made to Director Flight Standards, Headquarters Civil Aviation Authority JIAP, Karachi.

E5 FACTORS THAT SHOULD BE CONSIDERED PRIOR TO USING AN HLS:

E5.1 The pilot of a helicopter operating to / from or at an HLS should ensure that:

a) The HLS is clear of all:

i) persons, other than persons essential to the helicopter operation; and

ii) objects and animals likely to be a hazard to maneuvering the helicopter, other than objects essential to the helicopter operation; and

iii) no person outside the helicopter, other than a person essential to the operation is within 30 meters of the helicopter; and

b) Appropriate permission from the owners and authorities has been given; and

c) Where a helicopter may be required to be operated with rejected takeoff or landing capability, and the performance requirements of the particular flight manual detail greater or additional requirements concerning the FATO, GEA, LLA or the approach and departure paths than those set out in these guidelines, then the greater and/ or additional requirements should be met.

E5.2 A helicopter must not land at, or take-off from a HLS that is located within controlled airspace unless:

a) Helicopter VMC exists;

b) Two way VHF radio communications with the appropriate ATS unit are established; and

c) The appropriate ATC clearances have been received.

E5.3 If a proposed HLS is to be located near a city, town or populous area or any other area where noise or other environmental considerations make helicopter operations undesirable, such an HLS may be affected by the provisions of the Noise Environment Protection Procedures and there may be other local legislation affecting the site of HLS's or aerodromes.

E6 RECOMMENDED CRITERIA FOR A BASIC AND STANDARD HLS:

E6.1 **Basic HLS**: A basic HLS should:

a) Be large enough to accommodate the helicopter safely;

b) Have a surface capable of withstanding the static and dynamic loads imposed by the helicopter, and

c) Be clear of any obstacles in Take-off path / Approach.

d) Only be used for day operations under helicopter VMC.

e) Should have an accurate means of assessing the wind direction and speed.

f) Should have Firefighting equipment (Carbon Dioxide Fire extinguisher of 4.5 Kg capacity).

g) The surface of the HLS shall be clear and slope within limits of the type of Helicopter attempting a landing or take-off.

E6.2 **Standard HLS:**

E6.2.1 Since a standard HLS is intended to be used for all types of operations both day and night under helicopter VMC, it should satisfy the following guidelines apart from the requirements mentioned above.

E6.2.2 The FATO, at minimum should have a circular area with a diameter equal to twice the length of the helicopter, when the rotor(s) are turning (2X'L'), which is free of obstacles likely to interfere with the maneuvering of the helicopter.

E6.2.3 The GEA. at minimum, should have either a circular area with a diameter equal to the diameter of the main rotor of the helicopter; alternatively if the helicopter is of the tandem rotor type the GEA should be a rectangular area equal to the length of the helicopter and the width equal to the rotor diameter. Further, the GEA should be within the FATO with the overall slope not to exceed 7.5 degrees (1:8 vertical to horizontal).

E6.2.4 The LLA, at minimum, should have an area equal in size to the undercarriage contact points plus one meter on all sides; if the LLA is not within the FATO, an air taxiing route with a width equal to twice the main rotor diameter of the helicopter should be provided between the LLA and the FATO. The LLA should be a cleared and stable area capable of bearing twice the gross weight of the helicopter. If on a building, the LLA should also be capable of accepting the static and dynamic loads involved. Overall slope of the LLA, in any direction, should not exceed the maximum slope landing capability of the helicopter.

E6.2.5 The approach and departure path should extend outwards from the edge of the FATO as indicated in Fig 1 and have an obstacle free gradient of 7.5 degree (1:8 vertical to horizontal) measured from the edge of the FATO to a height of 500 feet above the LLA level. This path may be curved left or right to avoid obstacles or take advantage of a more advantageous approach or departure path.

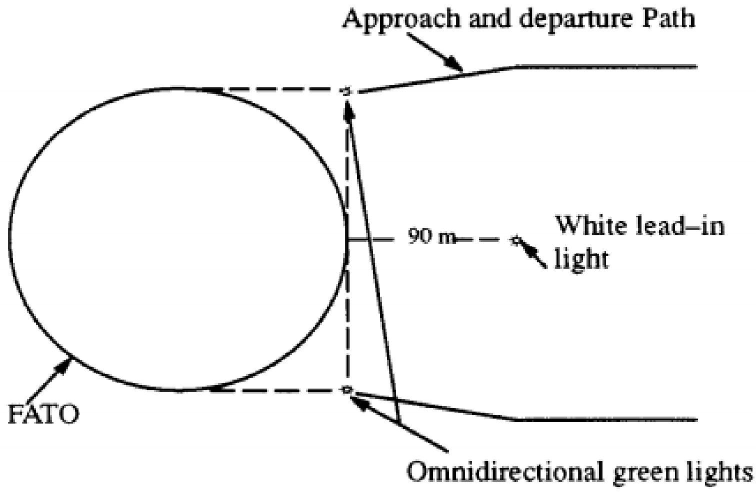


Figure-1

E7 <u>BUILDINGS</u>:

E7.1 For operations from a standard HLS that is located on a building the following additional guidelines are to be met:-

E7.1.1 Markings: The HLS should be painted with markings indicating the undercarriage ground contact limit points on which the helicopter may be positioned without compromising, clearance requirements.

E7.1.2 The LLA should be indicated by an aiming point painted on the HLS (this may take any form such as a circle, letter or logo).

E7.1.3 The edge of the FATO should be indicated by a 40-centimeter wide stripe painted on the HLS.

E7.1.4 A whole number (termed the indicator number) should be painted on the HLS with the helicopter's weight, expressed in Kg, calculated by multiplying the indicator number by 1000.

E7.1.5 Drainage facilities should be provided to prevent the collection, the spreading or falling of liquids onto other parts of the building.

E7.1.6 Safety net: As a means of avoiding risk of death or injury to passengers, crew and other personnel the outer edge of the HLS should be protected by a safety net or similar device, that is a least 1.5 meters wide and does not project more than 25 centimeters above the HLS at its outer edge.

E7.1.7 Access: The HLS should be sited with separate primary and emergency personnel access routes with both routes located as far apart as practicable.

E7.1.8 Fire extinguishers: The HLS should be equipped with at least two carbon dioxide fire extinguishers each with a minimum capacity of 4.5 Kg; one extinguisher should be positioned at each of the primary and emergency personnel access routes.

E7.1.9 A wind direction indicator should be positioned on the HLS in an unobstructed area so that it is readily visible to helicopter pilots when approaching / departing; the HLS.

E8 NIGHT OPERATIONS

For night operations the following additional guidelines are to be met:

E8.1 Lighting: The edge of the FATO should be defined by either omni directional white lights which project no more than 25 centimeters above the level of the HLS and are spaced no more than eight meters apart or by a combination of markings and floodlighting. However, where this is not practicable, the GEA should be so defined.

E8.2 Wind velocity information: An accurate means of assessing the HLS wind direction and speed should be provided. This may be accomplished either by an illuminated wind direction indicator located in an unobstructed area visible to approaching/departing helicopter pilots, or by any other suitable means such as radio communication with a responsible person located on or in proximity to the HLS.

E8.3 Approach guidance: When it is considered essential that an accurate approach path be achieved due to obstacles, the direction of approach should be indicated by at least two omni directional green lights, or by one white lead-in light positioned.

E8.4 Any air taxiing route, as recommended for day operations, should have a minimum width equal to three times the main rotor diameter of the helicopter, and depending on the operational demands be marked by either blue edge or green centre line lights spaced at 15 meters intervals, or be floodlit.

E8.5 All lights, except any air taxiing route lights, should be visible from at least 5 KM in clear conditions.

E9 RECOMMENDED CRITERIA FOR AN OFFSHORE HLS

E9.1 The landing area on either an offshore resource platform or offshore resource ship is generally referred to as an 'offshore HLS'. Since an offshore HLS may be used for all types of operations both day and night under helicopter VMC, it should satisfy the following guidelines:-

a) The FATO / GEA, at minimum, should be a circular area equal to the overall length of the helicopter when the rotor(s) are turning ('L').

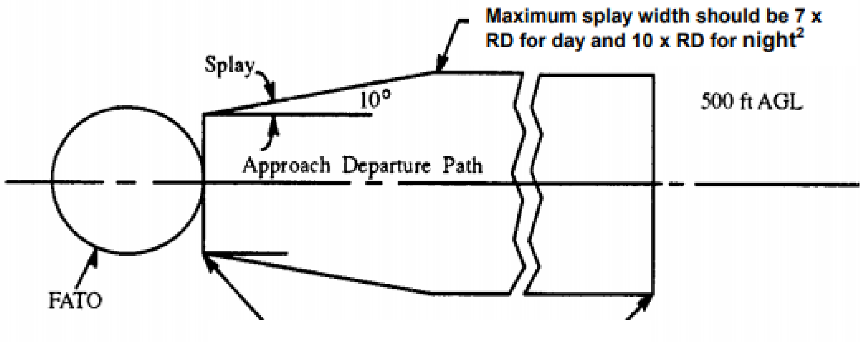
b) It should be capable of providing ground effect while the helicopter is hovering.

c) The FATO should be capable of safely accepting the static and dynamic loads involved during the operation.

d) The FATO should be free of obstacles likely to interfere with the maneuvering of the helicopter as well as having an obstacle limitation area.

e) This obstacle limitation area should have an obstacle free gradient of 26.5 degrees (1:2 vertical to horizontal).

CAAP 92-2 (1) -- Guidelines for the establishment and use of HLS



Obstacle-free gradient 1:8 (Not to scale)

Figure-2

E9.2 The LLA, at minimum, should be a circular area equal to 1.5 times the greatest dimension of the helicopter's undercarriage gear with the surface being non-slip.

E9.3 The approach and departure obstacle-free sector should subtend an arc of 210 degrees centered on the rear or opposite edge of the FATO and extend outwards to a distance compatible with the one-engine inoperative capability of the most critical helicopter that the helidecks is intended to serve. The surface should be a horizontal plane level with the elevation of the helideck. Over an arc of 180 degrees, passing through the centre of the FATO, the surface should descend outwards from the edge of the FATO with a gradient of five (5) units vertically to one (1) unit horizontally to the water level. At water level, the surface should then extend out a distance compatible with the take-off space required for the most critical helicopter that is intended to use the helideck.

E9.4 Markings: The HLS should be painted with 40cm wide markings as follows:

a) To indicate the limits to which the undercarriage surface contact points may be positioned without compromising, clearance requirements;

b) An aiming circle six meters in diameter; and

c) A stripe marking the edge of the FATO.

d) Drainage facilities should be provided to prevent the collection, the spreading or falling of liquids onto other parts of the platform or vessel concerned.

E9.5 Safety net: As a means of avoiding risk of death or injury to passengers, crew and other personnel the outer edge of the HLS should be protected by a safety net, or a similar device, that is at least 1.5 meters wide and does not project more than 25 centimeters above the HLS at its outer edge.

E9.6 Access: The HLS should be sited with separate primary and emergency personnel access routes with both routes located as far apart as practicable.

E9.7 Fire extinguishers: The HLS should be equipped with at least two carbon dioxide fire extinguishers each with a minimum capacity of 4.5 Kg; one extinguisher should be positioned at each of the primary and emergency personnel access routes.

E9.8 **A wind** direction indicator should be positioned on the HLS in an unobstructed area so that it is readily visible to helicopter pilot approaching / departing the HLS.

E10 RECOMMENDED CRITERIA FOR A MARINE HLS:

E10.1 Since a marine HLS may be used for all types of operations by day and night under helicopter VMC, it should generally conform to the following guidelines.

E10.2 Mid-ship HLS, for a mid-ship located HLS:

a) The FATO, at minimum, should be a circular area equal in diameter to the overall length of the helicopter when the rotor(s) are turning ('L').

b) Line.~ should be marked on the deck of the vessel.

c) There should be no obstacles in the area between these lines, which protrude more than 25 centimeters above the surface of the vessel.

d) Further, in front of and behind the FATO there should be obstacle limitation areas extending from these lines.

e) Each obstacle limitation areas should have an obstacle free gradient of 11.5 degrees (1:5 vertical to horizontal).

E10.3 The GEA, at minimum, should be a circular area with a diameter equal to the helicopter's main rotor diameter and is to be entirely within the FATO.

E10.4 The LLA should be entirely within the FATO and be capable of safely accepting the static and dynamic loads of the operation as well as have a non-slip surface.

E12 NIGHT OPERATIONS:

E12.1 For night operations from a marine HLS the following additional guidelines are recommended:

a) The HLS should be floodlit; and

b) Any lights on the ship that may interfere with the helicopter pilot's vision during approach to or departure from the HLS, or during winching or sling loading operations should be adequately shielded.

E12.2 Wind velocity information. An accurate means of assessing the HLS wind direction and speed should be provided. This may be accomplished either by an illuminated wind direction indicator located in an unobstructed area visible to approaching/departing helicopter pilots, or by any other suitable means such as radio communication with a responsible person located on or in proximity to the HLS.

ENFORCEMENT PROCEDURES VIOLATIONS OF DANGEROUS GOODS REGULATIONS

AIR NAVIGATION ORDER

VERSION	**:**	**2.0**
DATE OF IMPLEMENTATION	**:**	**01.02.2018**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. MARATIB ALI ZAFAR	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR MARSHAL (RETD.) ASIM SULEIMAN	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is being issued under Rule 296 and 297 of CARs 94 by the Director General of the Civil Aviation Authority (CAA) in pursuance of the powers vested in him under Rules 4, Civil Aviation Rules (CARs) 1994. Rule 296 and Rule 297 are being listed as under for information and as a ready reference:

Rule 296. **Compliance with Technical Instructions.-** An aircraft shall not carry dangerous goods unless the relevant instructions in the currently applicable edition of the Technical Instructions have been complied with.

Rule 297. **Carriage of forbidden articles.-** Unless specially authorized by the Director-General an aircraft shall not carry:
(a) articles and substances that are identified as being forbidden in the Dangerous Goods List in the Technical Instructions, including those that are described in that list as "not otherwise specified";
(b) radio active materials that are also explosive;
(c) infected live animals; or
(d) weapons or parts thereof, or ammunition or constituents thereof, which are designed for use in warfare, or against the person.

B. PURPOSE:

B1. Subject document has been designed and created to regulate and ensure procedural framework for conducting safe transportation of “Dangerous Goods” by air.

C. SCOPE:

C1. The ANO relates and refers to the procedures to be adopted in case a violation has been observed on part of an operator regarding regulations of carriage of dangerous goods.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 In addition to Part-XVI (Transportation of Dangerous Goods by Air) of CARs’ 94, for the purpose of this ANO and in line with ICAO Standards, Recommended Practices and procedures. In this regard, please refer to Chapter 3 (3.1 Definitions) in ICAO Doc 9284, AN 905 (Technical Instructions for the Safe Transport of Dangerous Goods by Air) current addition.

D2. ENFORCEMENT PROCEDURE:

D2.1 Whenever an operator is found to be carrying dangerous goods in violation of CARs 296 and 297, following procedures shall be enforced.

a) The articles and substances, being forbidden in the light of List of dangerous goods, provided in the technical instruction shall be pointed out to the operator as being forbidden items.
b) A written notice be served to the operator with the direction to follow the technical instructions provided in the technical manual.
c) In case the notice is not complied with the aircraft shall be declared unsafe and be disallowed to take off by the inspector.

d) Immediately the inspector shall report the matter to DFS who shall proceed as provided in Rule 333(5) read with Rule 372.

Rule 333. Penalty for contravention of the rules.-

(1) A person who contravenes or fails to comply with any provision of these rules is guilty of an offence.
(2) The owner, the operator and the hirer, and the pilot-in-command and any other pilot, of an aircraft that flies in contravention of or fails to comply with any provision of these rules is guilty of an offence.
(3) Any reference in sub-rules (1) and (2) to a contravention of, or failure to comply with, a provision of these rules shall be read as including a reference to a contravention or failure to comply with any Air Navigation Order, or any direction.
(4) Notwithstanding the provisions of sub-rules (1), (2) and
(3) a person shall not be convicted of an offence against this rule by reason only of a contravention of, or a failure to comply with, a direction given under these rules if:-
    (a) the direction is of a kind that, by virtue of these rules does not have effect in relation to a person until it has been served by post on the person or has otherwise been brought to his attention; and
    (b) at the time of the alleged contravention or failure to comply, the direction had not been served by post on the first-mentioned person and had otherwise not been brought to his attention.
(5) An offence, not being an offence for which a penalty is prescribed otherwise by this rule, shall be punishable with fine not exceeding one hundred thousand rupees or with imprisonment for a term not exceeding six months, or both.
(6) A person who attempts to commit an offence under these rules is guilty of an offence and is punishable as if the attempted offence had been committed.

Rule 334. Summary Powers of the Director-General.-

(1) Where an aircraft is flown within Pakistan in breach of, or not in compliance with, any rule for the safety of aircraft, passengers, goods, mails or other things carried therein, or a person commits an act in breach of rule 369 of these rules, the Director-General may, for the purpose of preventing aircraft or persons from endangering other persons or property, notwithstanding anything contained in the Code of Criminal Procedures, 1898 (Act V of 1898), or any other law for the time being in force, try for the offence in a summary way, in accordance with Sections 262 to 265 of the said Code-
    (a) the pilot-in-command or other person in charge of the aircraft; or
    (b) the person acting in breach of rule 369 of these rules; or compound any such offence for a sum not exceeding ten thousand rupees.
(2) Where a person contravenes a provision of, or does not comply with, any rule contained in Section 10 of Part VIII of these rules, the Director-General may compound such offence for a sum not exceeding fifty thousand rupees.
(3) Where the Director-General has reason to suspend an approval, licence, or certificate under rule 341 or rule 342, he may suspend the licence, or may impose a financial penalty not exceeding one hundred thousand rupees, or with the approval of the Authority, such amount exceeding one hundred thousand rupees as he may consider appropriate, the penalty to be paid to the Authority.

Rule 372. Imposition of Penalty.

(1) A penalty under these rules shall not be imposed by the Director-General on any person or operator unless the person or operator has been informed in writing of the grounds on which the penalty is to be imposed; and is given an opportunity of making such representation in person or through an agent, as the person or operator may wish against such imposition.

(2) Where a penalty has been imposed on any person or operator for any contravention of these rules, such person or operator shall not be liable to be tried for the same contravention.

D2.2 Where an aircraft, is flown within Pakistan airspace or airspace controlled by Pakistan in breach of or not in compliance with any of the rules for the safely of Aircraft, passengers, goods*****, mail or other things carried therein following procedure shall be followed:

a) On occurrence the inspector shall immediately serve a notice to the operator identifying the breach / violation or rules and inform DFS of the occurrence.
b) The Director Flight Standards shall serve a show cause notice in the light of Rule 372.
c) In case, explanation submitted by the operator is found unsatisfactory the matter will be referred to the DG for imposition of penalty in term of Rule 334.

***** The word "goods" in Rule 334(i) of CARs' 94 means and includes every kind of moveable property including dangerous goods.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
CARs	:	CIVIL AVIATION RULES
DFS	:	DIRECTOR FLIGHT STANDARDS
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 Civil Aviation Rules (CARs), 1994

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st February, 2018 and supersedes ANO 91.0026 (Issue-1).

--S/d--

(ASIM SULEIMAN)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **23rd January, 2018**

--S/d--

(CAPT. ARIF MAJEED)
Director Flight Standards

Dated- **17th January, 2018**
File No. HQCAA/1077/034/FSAC

FLIGHT INSPECTION OF AIR CARRIERS / OPERATORS

AIR NAVIGATION ORDER

VERSION : 4.0
DATE OF IMPLEMENTATION : 01.01.2018
OFFICE OF PRIME INTEREST : Flight Standards Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. NAVED SHABAHAT KHAN	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR MARSHAL (RETD.) ASIM SULEIMAN	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by the Director General Civil Aviation Authority in exercise of the powers vested in him under Rule 4 of the Civil Aviation Rules, 1994 (CARs 94).

A2. This ANO is supplemental to Part XV-ACCIDENTS AND INCIDENTS of CARs 1994.

B. PURPOSE:

B1. Continuing surveillance by the State of an AOC holder's operations is inherent in the system of' certification and is an essential part of the State's responsibility to ensure that the required standards of operations are maintained in order to provide a safe and reliable commercial air transportation service to the public.

B2. En-route inspections are one of the most important ways for an authority to fulfil the requirements of the International Convention on Civil Aviation in terms of continuing surveillance of operators. The objective(s) is to ensure that the standards required under an AOC are being maintained.

B3. Surveillance activities are carried out in the total environment of the air transportation system and all elements both internal and external to the operator are included in these activities. Cockpit and cabin en-route inspections are the most efficient methods for accomplishing the required functions. These functions are vital for the continued life of an AOC.

C. SCOPE:

C1. Flight Operations Inspectors / Cabin Safety Inspectors of CAA that are type rated and current (as determined by the Director General) on the type of aircraft are hereby authorized to undertake examination or checks of an aircraft's crew including but not limited to a proficiency check or a check for the issuance of a type rating. Flight Inspectors / CSIs with a valid licence and with a rating on the type are authorized to conduct inspections of the operating procedures. Where qualified inspectors are not available for a particular type, any Flight Operations Inspector / CSI may carry out any required check for the operation of an aircraft including but not limited to cockpit and cabin en-route inspections or the aircraft equipment or of the ground organization of the air carriers / operators.

C2. CAA Inspectors are also authorized to perform any other required examinations / Inspections / checks and any additional checks that may be required by the Director General to fulfill the requirements of the International Convention on Civil Aviation and the Civil Aviation Rules. 1994.

C3. The information in this ANO does not limit the emergency authority of the pilot in command to exclude any person from the flight deck in the interests of safety, However, when a pilot in command exercises that authority, he shall make an immediate report to the CAA in writing outlining the situation and the reason(s) for such action. This report must be transmitted to CAA as soon as possible from the time of occurrence and at the latest within 24 hours.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 For the purpose of this ANO and in line with ICAO Standards, Recommended Practices and procedures, the following terms are defined as hereunder:

D1.1.1 **Air Carrier / Operator:** An operator that for remuneration provides scheduled or non-scheduled air transport services to the public for carriage of passengers, freight or mail. This category also includes small-scale operators, such as air taxis and commercial business operators that provide commercial air transport services. On demand, non-scheduled flights on short notice for the carriage by air of passengers, freight or mail or any combination thereof for remuneration usually performed with smaller aircraft including helicopters (typically no more than 30 seats). Also includes any positioning flights required for the provision of the service. A person, company, organization or enterprise engaged in or offering to engage in an aircraft operation under an Air Operator Certificate issued by the CAA in accordance with CARs 94;

D1.1.2 **Competent Authority:** The Director General, Civil Aviation Authority (DGCAA) or an officer/any other person delegated the authority under Rule 5 of CARs, 94.

D1.1.3 **Inspector:** Inspector duly authorized by the Competent Authority under Rule 5 of CARs 94;

D2. APPLICABILITY:

D2.1 The ANO applies to Flight Inspection and surveillance activities of Air Carriers / Operators and flight crews engaged in Regular Public Transport Operations holding Air Licenses and Air Operator Certificates (AOC) issued under Part XI of Civil Aviation Rules, 1994. Air Navigation Order No. 91.0027 Issue Two stands cancelled with enforcement of this Air Navigation Order.

D3. PROCEDURES:

D3.1 Director Flight Standards will schedule surveillance activities in accordance with the required work program and as directed by the Director General. Amendments shall be made as required to satisfy any regulatory requirements.

D3.2 Each operator shall ensure that their operations manual contains a simplified procedure to ensure that when notification is made by CAA to an operator for a surveillance activity, that a ticket and boarding card is provided to the Inspector in sufficient time and at place convenient to the Inspector to permit him to meet with the crew at the time they report for work or as soon as practicable and proceed with the crew to the aircraft.

D3.3 The following shall be the guidance for notification:
CAA will continue to provide the operator with notification in as far in advance as possible. However, CAA shall be entitled to do a "No Notice" inspection at any time at any place as determined by the Director General. In such a case, the operator's procedures must be placed in their operations manual and shall be sufficiently flexible to accommodate this "No Notice" requirement.

D3.4 Each operator shall ensure that when such a notification is received, in addition to the ticket and boarding card, a flight deck 'jump seat" and a headset or cabin seat if a cabin en-route is planned is made available for the Inspector's use during the performance of the surveillance activities.

D3.5 Whenever, in performing the duties of conducting an inspection, an Inspector presents his identification to the operator and / or pilot in command of an aircraft operated by a certificate holder, the Inspector must be given free and uninterrupted access to all facilities but not limited to the pilot's compartment of that aircraft.

D3.6 In the event that the operator has scheduled training for that particular flight that would require the forward seat. The Inspector would then utilize the second seat if available and in addition in the normal surveillance activities, also make relevant observations on the conduct of the training.

D3.7 In order to minimize disruptions to the operator, Inspectors will evaluate situations where possible conflicts arise over the use of the jump seat(s). If, after evaluation, an Inspector determines that the use of the seat would cause the operator a disruption to a required activity such as a line check and the en-route check could reasonably be rescheduled, he will so indicate. However, where the Inspector has a specific requirement to be performed on a particular flight or a particular aircraft such as surveillance of a particular crew or aeroplane, the Inspector shall conduct the inspection.

D3.8 In case an aircraft is not equipped with a cockpit or flight deck jump seat, a cabin seat may be required for the conduct of a cockpit en-route inspection. An effort will be made to inform the operator as soon as possible that a suitable cabin seat will be required to preclude interruption to the operations.

D3.9 Schedule of charges for the inspections and/or approvals are applicable only for the base station of Inspectors. An operator shall also pay the additional expenses, such as accommodation, transportation, communications and daily allowance compatible with major National Air Carrier / Operator if any such service is required to be performed out of the base of Inspectors within Pakistan.

D3.10 Logistic arrangement of PCAA Inspector while on duty abroad with aviation operators / organization:

D3.10.1 All PCAA monitored checks are to be planned on weekdays. Schedules on weekends if planned due any exigencies should be forwarded with specific reason for perusal of Director Flight Standards, PCAA.

D3.10.2 The inspectors will travel in Economy Class if the journey duration time (flight time from departure to destination including transit) is upto eight (08) hours, if it exceeds eight (08) hours, the inspector will be authorized for Business Class.

D3.10.3 The rate of allowance will be USD 250 per day. The allowance will be applicable from the date of departure to date of arrival to / from the base.

D3.10.4 Total amount of the allowance will be paid to the deputed inspector through his Director before commencement of the visit.

D3.10.5 A four-star hotel accommodation will be provided to the deputed inspector by the organization.

D3.10.6 The operator / organization will be responsible for provision of all facilities like transportation and communication during the visit.

D3.10.7 The operator / organization responsible for sponsoring the visit will arrange medical insurance of the deputed inspector.

D4. DELEGATION:

D4.1 Under authority vested in him by rule 5 of the Civil Aviation Rules, 1994 the Director General has delegated the authority to Director Flight Standards to carry out surveillance and certification activities with respect to the operation of aircraft and licence holders employed by Airline Licence holders, applicants and holders of an AOC. This includes inspection of the operation of the aircraft and/or the performance of the crew.

D4.2 All CAA Officers possessing identification issued to them by the Director General identifying them as Flight Operations, Flight Engineer Inspectors or otherwise shall be deemed to be "Authorised Persons" within the meaning in Rule 5 of the CARs, 1994 for the performance of duties and functions assigned to them under the authority of Rules 4 and 236 of CARs, 1994.

D4.3 The Director General may also exercise himself the said powers available under the above-mentioned rules, as and when deemed necessary.

D5. IDENTIFICATION:

D5.1 The Flight Inspectors / Cabin Safety Inspectors, before conducting any inspections, checks and examinations, shall identify themselves with the Flight Inspectors / Cabin Safety Inspectors identity card.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
CARs	:	CIVIL AVIATION RULES
CSI	:	CABIN SAFETY INSPECTOR
DGCAA	:	DIRECTOR GENERAL CIVIL AVIATION AUTHORITY
FOI	:	FLIGHT OPERATIONS INSPECTOR
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 Civil Aviation Rules (CARs), 1994

E3.2 AOC Guide (PCAAD-617)

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st January, 2018 and supersedes ANO 91.0027 (Issue-3).

--S/d--

(ASIM SULEIMAN)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **26th December, 2017**

--S/d--

(CAPT. ARIF MAJEED)
Director Flight Standards

Dated- **19th December, 2017**
File No. HQCAA/1077/035/FSAC

FLIGHT DATA ANALYSIS (FDA) PROGRAMME AND FLIGHT DATA MONITORING

AIR NAVIGATION ORDER

VERSION	**:**	**3.0**
DATE OF IMPLEMENTATION	**:**	**01.03.2018**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. ASIF JABBAR KHAN	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Actg. Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by the Director General Pakistan Civil Aviation Authority (PCAA) in pursuance of the powers vested under Rule 4 of Civil Aviation Rules (CARs) 1994.

A2. Flight Data Analysis is the ICAO terminology for processes often referred to as Flight Data Monitoring (FDM) and Flight Operations Quality Assurance (FOQA); this includes a number of activities designed to collect and routinely analyze recorded flight in order to improve the safety of flight operations.

A3. This ANO is supplemental to Part XV – Accidents and Incidents of CARs 1994, and ANO 91.0020, ANO 91.0024 and ANO 91.0033.

B. PURPOSE:

B1. This document is designed to meet the following objectives:

a) Outline CAA's view on how FDM may be embodied within an Operator's Safety Management System;

b) Give guidance on the policy, preparation and implementation of FDM;

c) Describe the principles that should underpin a FDM system acceptable to the CAA.

C. SCOPE:

C1. All Operators operating with aircraft (including wet lease or damp lease) of a maximum certificated take off mass in excess of 27,000 kgs shall establish and maintain a flight data analysis (FDA) programme as a part of its accident prevention and flight safety programme.

C2. All Operators and/or the service providers (as applicable) shall establish, maintain and comply with Flight Data Monitoring and Flight Safety Document System that must correspond to the provisions of this ANO and that are subject to the approval by the DG CAA.

C3. Regularly review and revise the same in consultation with CAA as widespread FDA experience develops.

C4. A flight data analysis programme shall be non-punitive and contain safeguards to protect the source(s) of the data.

Note: An Operator may contract the operation of a flight data analysis programme to another party while retaining the overall responsibility for the maintenance of such a programme.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 The terms used in this ANO have the following meanings:

D1.1.1 **Flight Data Analysis:** A process of analyzing recorded flight data in order to improve the safety of flight operations;

D1.1.2 **Flight Data Monitoring (FDM):** It is the systematic, pro-active and non-punitive use of digital flight data from routine operations to improve aviation safety;

D1.1.3 **FDM Event / Exceedence:** It is circumstances detected by an algorithm looking at FDR data;

D1.1.4 **FDM Parameter Analysis:** Measurements taken from every flight e.g. maximum g at landing;

D1.1.5 **Hazard:** A physical situation, often following from some initiating event that can lead to an accident;

D1.1.6 **Incident:** An occurrence, other than an accident, associated with the operation of an aircraft that affects or could affect the safety of operation;

D1.1.7 **Risk:** It is the combination of the probability, or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence;

D1.1.8 **Risk Assessment:** Assessment of the system or component to establish that the achieved risk level is lower than or equal to the tolerable risk level;

D1.1.9 **Safety Assessment:** A systematic, comprehensive evaluation of an implemented system to show that the safety requirements are met;

D1.1.10 **Safety Objective:** A safety objective is a planned and considered goal that has been set by a design or project authority;

D1.1.11 **Safety Policy:** Defines the fundamental approach to managing safety and that is to be adopted within an organisation and its commitment to achieving safety;

D1.1.12 **Severity:** The potential consequences of a hazard;

D1.1.13 **System:** A combination of physical components, procedures and human resources organized to achieve a function;

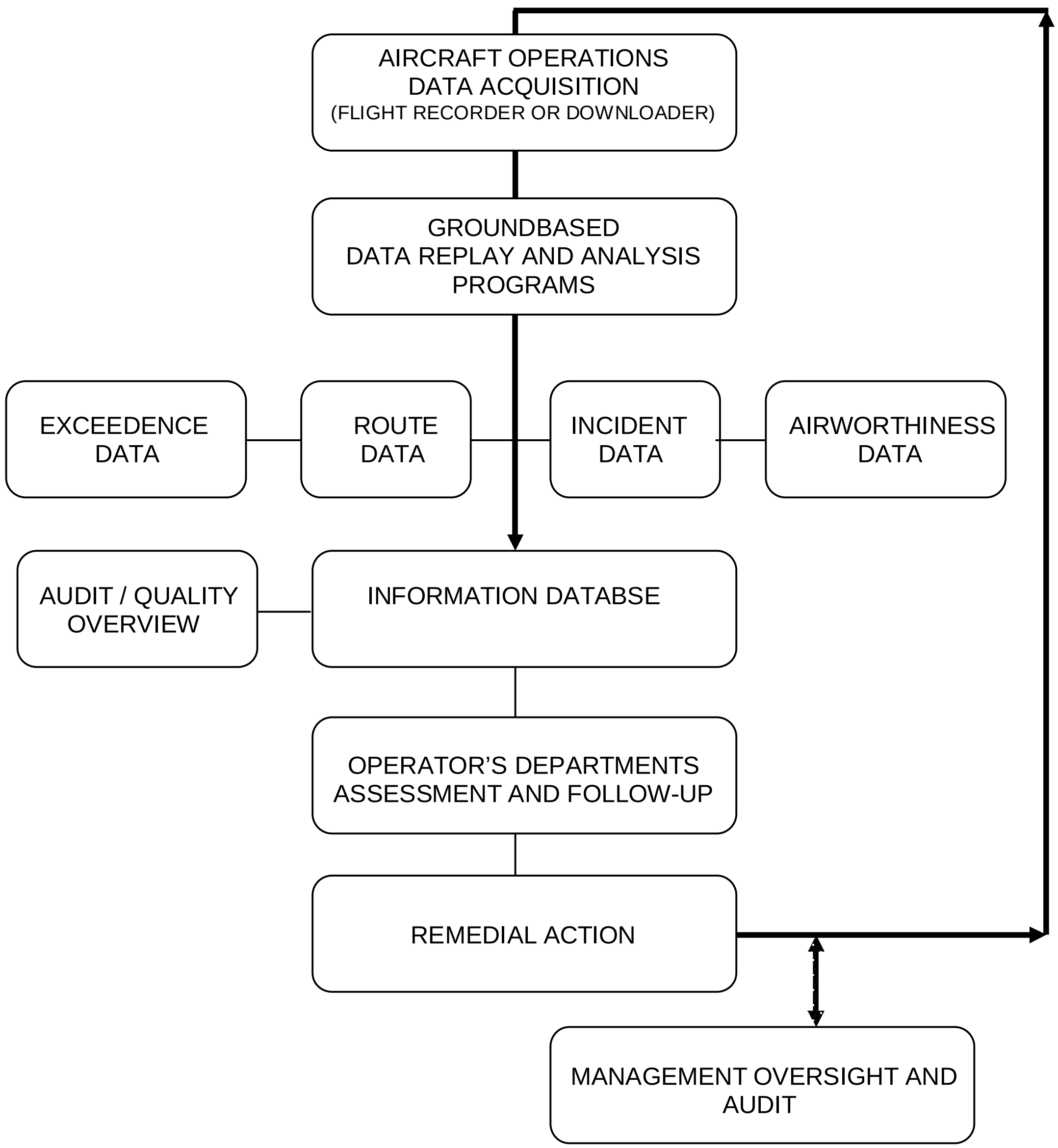
D1.1.14 **Validation:** The process of determining that the requirements are the correct requirements and that they are complete;

D1.1.15 **Verification:** The evaluation of the results of a process to ensure correctness and consistency with respect to the inputs and standards provided to that process.

D2. DESCRIPTION OF A TYPICAL FDM SYSTEM:

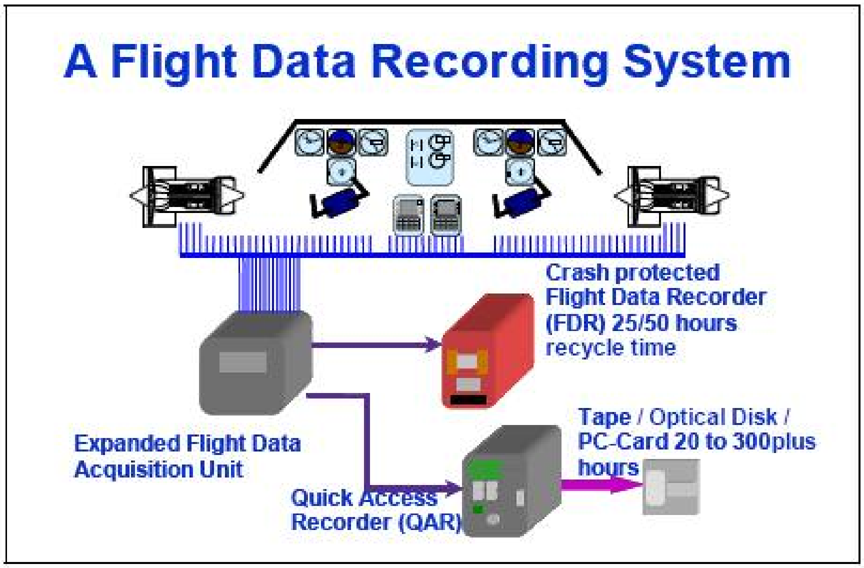
The principal components of a typical FDM system is not necessarily an optimum system but one that reflects current practice. Details of other options are shown in subsequent sections.

System Outline – Information Flow



D3. AIRCRAFT OPERATIONS – DATA ACQUISITION:

D3.1 Data is obtained from the aircraft's digital systems by a Flight Data Acquisition Unit (FDAU) and routed to the crash protected Digital Flight Data Recorder (DFDR). In addition to this mandatory data "stream", a second output is generated to a non mandatory recorder. This output is often more comprehensive than that of the crash recorder due to the increased capacity of this recorder. Unlike the DFDR, this recorder has a removable recording medium such as a tape or optical disk cartridge. Because these are easy to gain access to replace the medium, these are known as Quick Access Recorders (QARS).



D3.2 The QAR tapes/disks are replaced at the end of each day or sometimes after a period of several days have elapsed, dependent on media capacity and data recovery strategy, and sent to a central point for replay and analysis. This normally takes place at the operator's major hub airport for convenience.

D3.3 As an alternative to the QAR, some operators routinely download information contained on the crash recorder. While this is not practicable with the older, tape-based devices, the modern solid-state recorder is reliable and fast. The technology also exists to download straight from an onboard storage device to an operator's file server via wireless links. This reduces the logistical problems associated with the movement of media or physical downloading tasks.

D3.4 Exceedence Detection

D3.4.1 Exceedence or event detection is the traditional approach to FDM that looks for deviations from flight manual limits, standard operating procedures and good airmanship. There is normally a set of core events that cover the main areas of interest that are fairly standard across operators.

Example: High take-off rotation rate, stall warning, GPWS warning, flap limit speed exceedence, fast approach, high/low on glideslope and heavy landing.

D3.5 Routine Data Measurements

D3.5.1 Increasingly, data is retained from all flights and not just the significant ones producing events. The reason for this is to monitor the more subtle trends and tendencies before the trigger levels are reached. A selection of measures are retained that are sufficient to characterize each flight and allow comparative analysis of a wide range of aspects of operational variability.

Examples of parameters: take-off weight; flap setting; temperature; rotation and take-off speeds vs scheduled speeds; maximum pitch rate and attitude during rotation; gear and retraction speeds, heights and times.

Examples of analysis: Pitch rates from high vs low take-off weights; pilot technique during good vs bad weather approaches; touchdowns on short vs long runways.

D3.6 Incident Investigation Data

D3.6.1 FDR data should be used as part of the routine follow-up of mandatory occurrences and other technical reports. FDR data has been found to be very useful in adding to the picture painted by the flight crew report, quantifying the impressions gathered from the recollections after the heat of the moment. System status and performance can add further clues to cause and effect.

D3.6.2 FDR data obtained for use in this way falls under the requirements of CAD 360 and hence de-identification of the data, required to maintain FDM confidentiality, does not usually apply. As the crew have already filed reports then this is reasonable in an open, pro-active safety culture that provides constructive feedback.

Examples of Incidents where FDR data could be useful: vortex wake encounters; all flight control problems; system failures that affect operations; emergencies such as high speed abandoned take-offs; TCAS or GPWS triggered manoeuvres.

D3.7 Continued Airworthiness Investigation Data

D3.7.1 Both routine and event data can be utilized to assist the continued airworthiness function. Engine monitoring programs use measures of engine operation to monitor efficiency and predict future performance. These programs are normally supplied by the engine manufacturer and feed their own databases. Operators should consider the potential benefits of including the wider use of this data within their continued airworthiness programmes.

Examples of continued airworthiness uses: Engine thrust levels; airframe drag measurement; avionic and other system performance monitoring; flying control performance; brake and landing gear usage.

D3.8 The Information Database

D3.8.1 All the information gathered should be kept either in a central database or in linked databases that allow cross-referencing of the various types of data. These links should include air safety and technical fault reporting systems to provide a complete view of the operation. Where there is an obvious tie up between the systems then this should be highlighted by the system.

Example of links: A heavy landing should produce a crew report, a FDR event and also an airworthiness report. The crew report will provide the context, the FDR event the qualitative description and the airworthiness report the result.

D4. OPERATOR'S DEPARTMENTS – ASSESSMENT AND FOLLOW-UP:

D4.1 This is the critical part of the process. Given the systems are put in place to detect, validate and distribute the information, it finally reaches the areas where the safety and continued airworthiness benefits may be realized. The data must be assessed using firsthand knowledge of the operational or airworthiness context in which it is set. Final validation done at this informed level may still weed out some erroneous data.

Example of follow-up: During a routine analysis of go-arounds it was found that one had a delay of over 20 seconds between flap selection and raising the gear.

D4.2 Remedial Action

Once a hazard or potential hazard has been identified, then the first action has to be to decide if the level of risk is acceptable. If not, then appropriate action to mitigate the effect should be investigated along with an assessment of the fuller effects of any proposed changes. This should ensure the risk is not moved elsewhere. The responsibility for ensuring action is taken must be clearly defined and those identified must be fully empowered.

Example of Remedial Action: In the go-around case described above, the operator included go-arounds in the next simulator check sessions. These highlighted how easy it was to miss the gear action if the "positive climb" call was missed by the non-handling pilot. It stressed the importance of a team effort during go-arounds.

D4.3 Continued Monitoring

Once any action is taken, then an active monitor should be placed on the original problem and a careful assessment made of other hazards in the area of change. Part of the assessment of the fuller effects of changes should be an attempt to identify potential relocation of risks. This, plus a general monitor on all surrounding measures is required before "signing off" the change as successful. This confirmation, or otherwise, would be expected to feed into a high level management group to ensure remedial action takes place.

D5. FLIGHT DATA MONITORING (FDM):

D5.1 Flight Data Monitoring is the systematic, pro-active and non-punitive use of digital flight data from routine operations to improve aviation safety.

D5.2 Flight Data Monitoring is a process that includes:

a) The acquisition, measurement and analysis of flight data in order to identify, establish probable causes for, and rectify adverse trends and deviations from accepted norms of flight operations and safety;
b) The capability to more thoroughly understand flight operations by tracking trends, and investigating the circumstances relating to minor incidents;

c) The detection of risk factors before they lead to major incidents, and to develop preventative and/or corrective actions such as increased training or changes in in-flight operating procedures In short, the flight data monitoring process is a closed loop system that provides a means for the continual monitoring and improvement of the safety of flight operations and performance.

D5.3 Main Reasons for implementing Flight Data Monitoring

a) To comply with Regulatory FDM requirement (ICAO Annex 6 Part 1);
b) Main benefits that can be derived from FDM:
   i) Increased safety oversight;
   ii) Operational improvements;
   iii) Fuel savings;
   iv) Improved Engine Condition Monitoring;
   v) Reduced maintenance costs;
   vi) More focused training.

D6. OBJECTIVES OF AN OPERATOR'S FDM SYSTEM:

D6.1 Flight Data Monitoring (FDM) programmes assist an operator to identify, quantify, assess and address operational risks. A FDM system allows an operator to compare their Standard Operating Procedures (SOPs) with those actually achieved in everyday line flights.

D6.2 A feedback loop, preferably part of a Safety Management System (SMS), will allow timely corrective action to be taken where safety may be compromised by significant deviation from SOPs.

D6.3 The FDM system should be constructed so as to:

a) Identify areas of operational risk and quantify current safety margins. Initially a FDM system will be used as part of an operator's System Safety Assessment to identify deviations from SOPs or areas of risk and measure current safety margins. This will establish a baseline operational measure against which to detect and measure any change.

   Example: Current rates of rejected take-offs, hard landings, unstable approaches.

b) Identify and quantify changing operational risks by highlighting when non-standard, unusual or unsafe circumstances occur. In addition to highlighting changes from the baseline, the system should enable the user to determine when non-standard, unusual or basically unsafe circumstances occur in operations.

   Example: Increases in above rates, new events, new locations.

c) To use the FDM information on the frequency of occurrence, combined with an estimation of the level of severity, to assess the risks and to determine which may become unacceptable if the discovered trend continues. Information on the frequency of occurrence, along with estimations of the level of risk present, is then used to determine if the individual or fleet risk level is acceptable. Primarily the system should be used to deduce whether there is a trend towards unacceptable risk prior to it reaching risk levels that would indicate the SMS process has failed.

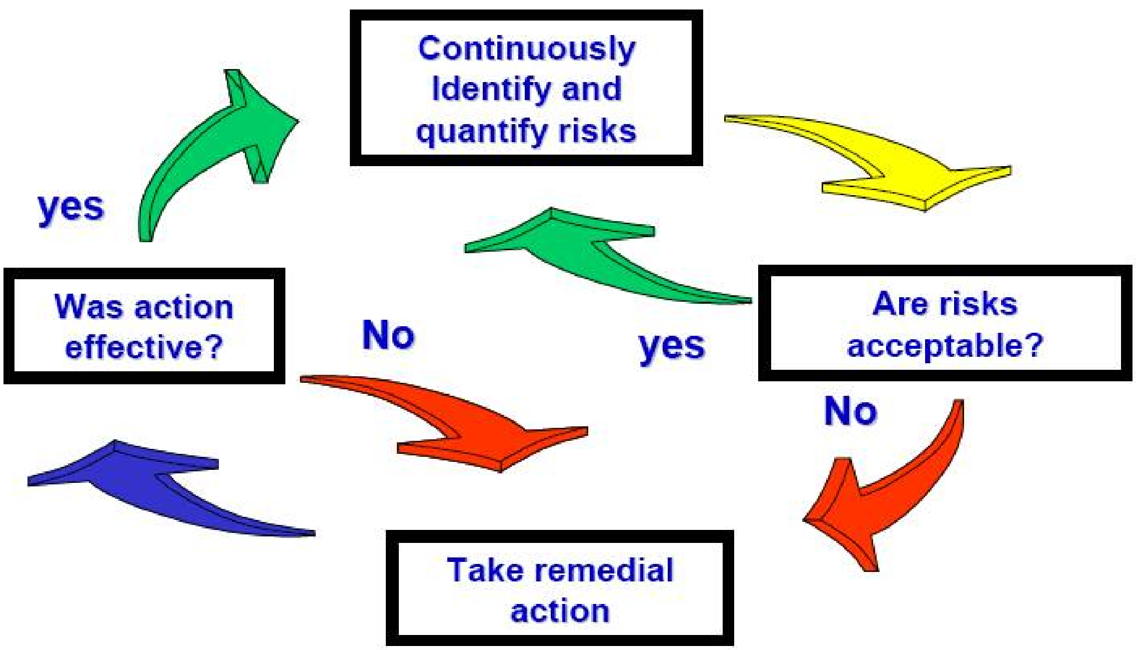
Example: A new procedure has introduced high rates of descent that are approaching the threshold for triggering GPWS warnings. The SMS process should have predicted this.

d) To put in place appropriate risk mitigation techniques to provide remedial action once an unacceptable risk, either actually present or predicted by trending, has been identified. Once an unacceptable risk, either actually present or predicted by trending, has been identified, then appropriate risk mitigation techniques must be used to put in place remedial actions. This should be accomplished while bearing in mind that the risk must not simply be transferred elsewhere in the system.

Example: Having found high rates of descent the Standard Operating Procedures (SOPs) are changed to improve control of the optimum/maximum rates of descent being used.

e) Confirm the effectiveness of any remedial action by continued monitoring. Once a remedial action has been put in place, it is critical that its effectiveness is monitored, confirming that it has both reduced the original identified risk and not transferred the hazard elsewhere.

Example: Confirm that the other measures at the airfield with high rates of descent do not change for the worse after changes in approach procedures.



D7. TYPICAL FDM SYSTEMS FOR FLIGHT ANALYSIS:

D7.1 Integrated software solutions are available commercially, offering comprehensive measurement, analysis, and reporting tools that can benefit all types of aircraft operators. These packages are designed to meet Regulatory requirements for FDM

(Flight Data Monitoring). Initially the program decodes the recorded data collected from an aircraft DFDR / QAR into engineering values. Thereafter, a flight analysis program enables easy reconstruction of the flight, comparing the recorded data with the recommended values retrieved from the flight profile, and highlights abnormal events and deviations. Several vendors offer solutions that perform all the major functions of the flight data monitoring process, including data processing, flight analysis and reporting, and flight data animation.

D7.2 Visualization tools reconstruct the aircraft profile, enabling easy replay and review of flight information, while a user-configurable reporting module provides a range of comprehensive and customizable reports. By accurately processing and analyzing flight data, the software allows operators to evaluate flight operations trends, identify risk precursors, and make information-based decisions to enhance operations and increase safety. The output information may be directly utilized for:

a) Exceedence Detection;
b) Routine Data Measurements;
c) Incident Investigation Data;
d) Continued Airworthiness Investigation Data.

D8. THE IMPLEMENTATION PLAN:

D8.1 The following is a broad guide to the major steps involved in putting an FDM programme in place. The key steps are getting buy in at the top level of management, a good team with crew participation, clear objectives and specification and finally, rigorous testing and verification procedures for the resulting data.

a) Confirm CEO approval and support for FDM implementation;
b) Identify Key team members;
c) Agree Aims and Objectives;
d) Develop crew agreements and involvement;
e) Conduct feasibility study and develop business plan(people, processes, software and hardware);
f) Obtain funding and organizational approval;
g) Survey key areas in Operation for targets of opportunity;
h) Produce detailed specification and place contracts;
i) Put in place operating procedures;
j) Installation of airborne equipment (if required);
k) Provision of ground analysis station;
l) Conduct staff training;
m) Test data acquisition and analysis, complete manuals;
n) Produce Completion Report.

D9. FDM FUNCTION AND MODALITIES:

D9.1 The Information Database

All the information gathered should be kept either in a central database or in linked databases that allow cross-referencing of the various types of data. These links should include air safety and technical fault reporting systems to provide a complete view of the operation.

D9.2 Operator's Departments - Assessment and Follow-up

This is the critical part of the process. Given the systems are put in place to detect, validate and distribute the information; it finally reaches the areas where the safety and continued airworthiness benefits may be realized. The data must be assessed using first hand knowledge of the operational or airworthiness context in which it is set. Final validation done at this informed level may still weed out some erroneous data.

D9.3 Remedial Action

Once a hazard or potential hazard has been identified, then the first action has to be to decide if the level of risk is acceptable. If not, then appropriate action to mitigate the effect should be investigated along with an assessment of the fuller effects of any proposed changes. This should ensure the risk is not moved elsewhere. The responsibility for ensuring action is taken must be clearly defined and those identified must be fully empowered.

D9.4 Continued Monitoring

Once any action is taken, then an active monitor should be placed on the original problem and a careful assessment made of other hazards in the area of change. Part of the assessment of the fuller effects of changes should be an attempt to identify potential relocation of risks. This, plus a general monitor on all surrounding measures is required before "signing off" the change as successful. This confirmation, or otherwise, would be expected to feed into a high level management group to ensure remedial action takes place.

D10. FDM WITHIN A SAFETY MANAGEMENT SYSTEM:

D10.1 The principles behind successful Safety Management Systems (SMS) are the same as those for FDM programmes that have been proven to function much more effectively within an integrated risk management system.

D10.2 FDM Integrated within the Safety Management System

An FDM programme held remote from all other safety systems of an Operation will produce lower benefits when compared with one that is linked with other safety monitoring systems. This other information gives context to the FDR data which will, in return, provide quantitative information to support investigations that otherwise would be based on less reliable subjective reports. Air safety reporting, avionic and systems maintenance, engine monitoring, ATC and scheduling are just a few of the areas that could benefit.

D10.3 Definition of Risk, Probability and Safety Criticality

Risk is defined as the combination of probability, or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence.

Safety criticality classifications are detailed in the Joint Aviation Requirements (JAR 23 and 27 and 25.1309) and are shown below.

Value	Category	Results in one or more of the following effects
4	Catastrophic	• Loss of the aircraft • Multiple fatalities
3	Hazardous	• A large reduction in safety margins • Physical distress or workload such that the flight crew cannot be relied upon to perform their tasks accurately or completely • Serious or fatal injury to a relatively small number of occupants
2	Major	• Significant reduction in safety margins • Reduction in the ability of the flight crew to cope with adverse operating condition impairing their efficiency • Injury to occupants
1	Minor	• Nuisance • Operating limitations or emergency procedures

The probability of occurrence, or likelihood, as defined in both qualitative terms and in quantitative terms, gives an indication of order of magnitude:

Value	Probability of Occurrence	Quantitative Definition	Qualitative Definition
1	Extremely improbable	• Less than 10-9 per flight hour (see note)	• Should virtually never occur in the whole fleet life.
2	Extremely remote	• Between 10-7 and 10-9 per flight hour	• Unlikely to occur when considering several systems of the same type, but nevertheless, has to be considered as possible.
3	Remote	• Between 10-5 and 10-7 per flight hour	• Unlikely to occur during total operational life of each system but may occur several times when considering several systems of the same type.
4	Probable	• Between 1 and 10-5 per flight hour	• May occur once or several times during operational life.
Note: The use of mathematical probability is not essential. They are included to give an indication of order of magnitude when qualitative estimates.			

D10.4 Finally, these two aspects are brought together in a risk tolerability matrix that defines the maximum rate of occurrence allowed for any particular effect of event. The table below shows the **minimum** safety performance standards that should be applied, although depending on the safety significance given to each risk the actual standards required may be higher.

Quantitative probability	10	10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	10-9
JAR 25 Qualitative Probability or Occurrence	Frequent			Reasonably Probable		Remote		Extremely Remote		Extremely Improbable
Category of Effect	Minor					Major		Hazardous		Catastrophic

D10.5 Determining what is Acceptable

In practical terms, experience can be displayed as a Risk Assessment Matrix as shown Figure I below. While this approach can offer guidance to the safety analyst, much rests on the appreciation of the seriousness of the incident and, most critically, upon the understanding of potential risk. Just because there was a safe outcome to a particular incident scenario, this does not necessarily make it a low severity incident. The mitigating component may not always be present. Present and potential risk is discussed further in this chapter.

Examples of incidents with a high risk potential that on the (good) day resulted in no damage: A very severe wind-shear, rather than resulting in a prompt go-around, is flown through to landing, A long landing after a hurried approach did not result in an overrun because that particular runway had a good braking coefficient; a crew's slow response to a GPWS Glideslope warning was not a problem as the aircraft was on the centre line and not on a terrain critical approach.

D10.6. The Initial Risk Assessment

Knowledge of the current operation is needed to formulate an assessment of the total risks falling upon the operator. This can be gained, in part, using a carefully implemented FDM programme that will provide identification and measures to support expert opinion and experience. All available sources of safety data should be utilized to better model the risk environment. The better the understanding of risk, especially at the less obvious lower risk levels, the more likely that potential risks will be highlighted and in those areas mitigation techniques can be developed.

Example: the probability of a CFIT accident may be arrived at by examining a combination of world accident trends, operator's reports, FDM exceedence data, FDM routine measurements, airport assessments etc.

Figure I – Risk Assessment Matrix

Severity					
Catastrophic	5 Review	10 Unacceptable	15 Unacceptable	20 Unacceptable	25 Unacceptable
Hazardous	4 Review	8 Review	12 Unacceptable	16 Unacceptable	20 Unacceptable
Major	3 Acceptable	6 Review	9 Review	12 Unacceptable	15 Unacceptable
Minor	2 Acceptable	4 Acceptable	6 Review	8 Review	10 Unacceptable
Negligible	1 Acceptable	2 Acceptable	3 Acceptable	4 Acceptable	5 Review
	Extremely improbable	Improbable	Remote	Occasional	Frequent
	1	2	3	4	5
Probability					

D10.7 How a SMS can benefit from FDM

D10.7.1 FDM Provides Definitive Risk Data to Validate Assumptions

The success of any SMS requires knowledge of actual operations and cannot be achieved using assumed safety performance. One cannot know with any certainty that, because one audit point, say a check flight, measures up to standards, that the other 1000 flights will also be satisfactory. In monitoring all flights, FDM can help to fill in this missing information and assist in the definition of what is normal practice. This gives assurance that SMS is managing actual rather than perceived safety issues.

D10.7.2 A Summary of SMS Benefits from the Implementation of FDM

a) Gives knowledge of actual operations rather than assumed.
b) Gives a depth of knowledge beyond accidents and incidents.
c) Setting up a FDM program gives insight into operations.
d) Helping define the buffer between normal and unacceptable operations.
e) Indicates potential as well as actual hazard.
f) Provides risk-modeling information.
g) Indicates trends as well as levels.
h) Can provide evidence of safety improvements.
i) Feeds data to cost-benefit studies.
j) Provides a continuous and independent audit of safety standards.
k) Can help identify area where flying crew training can be further be improved.

D10.8 How FDM can Benefit from Incorporation within a SMS

D10.8.1 SMS Provides a Structured Environment for a FDM Implementation

The implementation of FDM has increased gradually over the last 30 years as analysis techniques and data recording technologies have improved. As a result, the processes used have tended to be rather adhoc, locally implemented and controlled by informal procedures with less than ideal "check and balance" records after issues have been raised and actioned. It says a great deal for the individuals concerned and the undeniable evidence produced that, despite this lack of established process, many significant safety issues have been raised and resolved. However, the techniques are now sufficiently mature to enable a more formal process to be constructed along the lines of other SMS processes.

D10.8.2 A Summary of FDM Benefits from the Incorporation within a SMS

a) Formal recognition and buy-in by operator's management.
b) Formalization of assessment and action process.
c) Integration with other safety information.
d) Auditable benefits and evidence of "best endeavours".
e) Allows regulatory bodies to take into account the pro-active process.

D11. <u>PLANNING AND INTRODUCTION OF FDM:</u>

This chapter describes the development and implementation of FDM within an operator. It is recognized that there are a wide range of operators covered by the FDM requirements and that there is no "one size fits all" system. The size and age of aircraft may determine the parameters available for analysis. The programme effectiveness and efficiency of a small fleet or operation may be helped by pooling analysis within a group of similar operations. While retaining responsibility for risk assessment and action, some operators may wish to contract out the basic analysis due to lack of expertise or resources.

D11.1 FDM Guiding Principles Checklist

As an aid to operators, Appendix D provides a checklist of guiding principles that highlight some of the fundamental concepts that should be considered when putting one of these pro-active safety processes in place. Principles covered:

a) Definition
b) Accountability
c) Objectives
d) Flight Recorder Analysis Techniques
e) Flight Recorder Analysis Assessment and Process Control Tools
f) Education and Publication
g) Accident and Incident Data Requirements
h) Significant Risk Bearing Incidents Detected by FDM
i) Data Recovery Strategy
j) Data Retention Strategy
k) Data Access and Security
l) Conditions of Use and Protection of Participants
m) Airborne Systems and Equipment

D12. THE IMPLEMENTATION PLAN:

This is a broad guide to the major steps involved in putting an FDM programme in place. The key steps are getting buy in at the top level of management, a good team with crew participation, clear objectives and specification and finally, rigorous testing and verification procedures for the resulting data.

a) Confirm CEO approval and support for FDM implementation.
b) Identify Key team members.
c) Agree Aims and Objectives.
d) Develop crew agreements and involvement.
e) Conduct feasibility study and develop business plan people, processes, software and hardware.
f) Obtain funding and organizational approval.
g) Survey key areas in Operation for targets of opportunity.
h) Produce detailed specification and place contracts.
i) Put in place operating procedures.
j) Installation of airborne equipment (if required).
k) Provision of ground analysis station.
l) Conduct staff training.
m) Test data acquisition and analysis, complete manuals.
n) Produce Completion Report.

D12.1 Management and Crew's Responsibility to Act upon Knowledge

Once an area of risk has been identified then a documented / trackable decision must be made. Either remedial action should be taken, projecting the likely reduced risk, or justification for maintaining current status. Without this process in place, then the consequences of not acting upon risk information may be severe.

D12.2 Good Written Agreements - Not Over Detailed but Strong on Principles

It is important that the underlying principles to be applied are understood by all parties and signed up to, early in the process. Once this is done, when problems or conflicts of interest arise, they form the foundation of practical solutions. An operator-crew agreement is recommended so that everyone involved know the limits which the agreements place on them. In uncertain cases there should be an accepted procedure by which a course of action can be approved.

D13. THE FDM TEAM:

Experience has shown that the "team" required to run an FDM programme can vary in size from one person with say a five aircraft fleet, to a small department looking after scores of aircraft. The description below describes the various roles within a larger system in some detail. Most of the aspects covered will still be required in a smaller scale system but would be handled by one individual in a "multirole" function.

In this case other areas, for example engineering, would provide part time support. In addition to their existing subject area expertise, all staff should be given at least basic training in the specific area of FDR data analysis. It is essential that a regular, realistic amount of time is allocated to FDM tasks. Lack of manpower resources usually results in underperformance or even failure of the whole programme.

In the case of a very small operator the day to day running of the programme may be contracted out to a third party, thus removing the data handling and basic analysis tasks. However, sufficient expertise must remain within the operation to control, assess and act upon the processed information received back from the other company. Responsibility for action may not be delegated.

D13.1 Team Leader

This person will be trusted by and given the full support of both management and crews. They may have direct crew contact in situations that require diplomatic skills. They will be able to act independently of other line management to make recommendations that will be seen by all to have a high level of integrity and impartiality. The individual will have good analytical, presentation and management skills.

D13.2 Flight Operations Interpreter

This person will normally be a practicing or very recent pilot, possibly a senior Captain or trainer, who knows the company's route network and aircraft. Their in depth knowledge of SOPs, aircraft handling characteristics, airfields and routes will be used to place the FDM data in context.

D13.3 Airworthiness Interpreter

This person will interpret FDM data on technical aspects of the aircraft operation. They will be familiar with the powerplant, structures and systems departments requirements for information and also any existing monitoring techniques employed by the operator.

D13.4 Crew Liaison Officer

This person will be the link between the fleet or training managers and aircrew involved in circumstances highlighted by FDM. This person is often a representative of International Federation of airline Pilot's Association (IFALPA) or other staff representative with good people skills and a positive attitude towards safety education.

It is essential that the post holder has the trust of both crew and managers for their integrity and good judgment.

D13.5 Engineering Technical Support

This will be an individual who is knowledgeable about the FDM and associated systems needed to run the programme. An avionics specialist normally is also involved in the supervision of mandatory FDR system serviceability.

D13.6 Air Safety Coordinator

This person will be involved with the follow-up of Air Safety Reports and will be able to put the FDR data into the context of ASRs and vice versa. This function ensures read-across between the two systems and should reduce duplication of investigations.

D13.7 Replay Operative and Administrator

Responsible for the day to day running of the system, producing reports and analysis. Methodical, with some knowledge of the general operating environment, this person is the “engine room” of the system.

D14. ORGANISATION AND CONTROL OF FDM INFORMATION:

As with all information systems, it is critical that the data flows are tightly controlled by clear procedures. Careful thought has to be given to the practicalities and possible disruptions involved in getting data from the aircraft and translated to useful information for safety managers. Additionally, much of the data has to be treated confidentially with access carefully restricted to those authorized to view it. This para deals primarily with enabling the efficient handling of exceedences (or events) produced by an FDM programme. These exceptions to normal operating practice, good airmanship and flight manual limitations will be highlighted ready for evaluation and action.

D15. RATIONALISED DATA STREAM:

D15.1 Regular Replay Schedule

Downloaded data should be replayed to a regular schedule to avoid build ups. Batch processing of a number of files may be a practical method of initial replay and analysis if the system is suitably automated.

D15.2 Initial Verification of Data

The first step in the investigation process is to ensure the information is realistic and presents a consistent picture. VALIDATION IS CRITICAL. Before any action is instigated the basic FDR information must be thoroughly checked. Well written FDM software should automate as much of this process as practical.

D15.3 Identification of Urgent Actions

There are a number of circumstances where FDM data will indicate that immediate safety action is required and a fast procedure to ensure safety critical remedial action should be defined. In general, the urgent actions are associated with Continued Airworthiness checks, rather than operational situations. For example, a very heavy landing with potential damage that has not been reported by other means should trigger relevant structural checks as soon as possible, whereas crew remedial investigations are not so urgent. Therefore, replays ideally should be completed and a basic initial examination of the results should be carried out before the next flight. When this is not practicable then a reasonable period of time after the flight should be specified.

Note: in an effective open safety culture the crew reporting of likely problems should be expected to alert the operator to the majority of these situations.

D15.4 Allocation of Follow-up Coordinator

Once a basic assessment has been carried out and has revealed a significant risk, or aspect requiring further investigation, then one particular person or department should be allocated follow-up responsibility. This responsibility is normally fairly clearly defined by the type of incident. However, on occasions there may be a need to involve several departments or even organizations and in this case the follow-up coordinator will act as a focal point for the investigation.

D15.5 Database all Results

The results of all analysis should be placed on a database ready for interpretation and further analysis. Generally it is best to automatically database all events detected and then mark as invalid those that are in error due to program or data anomalies. Experience has shown that a manual data entry of the event details is both time consuming and prone to error. Recording all erroneous events will assist in the later refinement and improvement of the program.

D15.6 Record all Actions Taken

An important part of the assessment of a new FDM system and an integral part of a fully functioning system within a SMS is the careful recording of all actions arising from the data. This can be used to help demonstrate the benefits accrued and also ensure an audit path to confirm remedial actions have taken place.

Example: A heavy landing event -
Initial analysis action **-** validate and set event in context of previous hard landings
Action informee **-** structures, action taken - checks, result - no damage,
Action informee **-** operations, action taken - flying assessed - crew interviewed, result - revised crew briefing for airfield Ongoing analysis action **-** monitor airfield events for recurrence or changes.

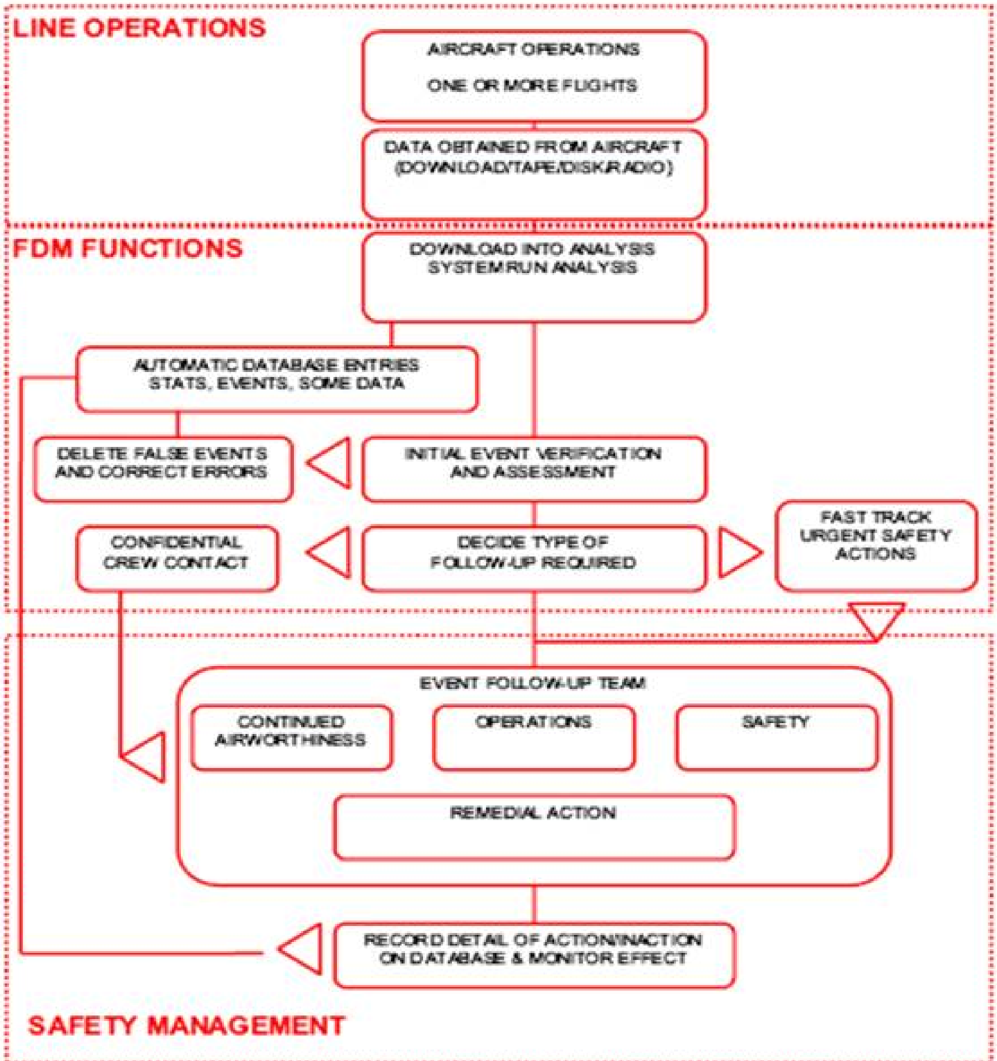
D15.7 Replay Statistics

Part of the replay process should be the recording of statistics on replay coverage, individual aircraft reliability, general data quality measurements. Differences in replay success/errors between aircraft can help indicate where remedial engineering action is required. These statistics are required to allow the derivation of overall and specific event rates; airfield and aircraft specific rates etc.

Examples: Number of sectors and hours flown, replayed and analyzed to give heavy landing events per 1000 landings or turbulence encounters per 1000 hours. Proportion of bad data by aircraft/recorder/tape/disk to identify problem areas.

D16. <u>DATA FLOW:</u>

The data flow should be optimized to minimize the delay between the flight and data analysis. This will ensure timely recognition of serious incidents that may need prompt action - for example a structural inspection - and increase the likelihood of the crew remembering the surrounding circumstances.



D17. DATA SECURITY AND CONTROL:

D17.1 Defined Policy on Retention of Data

Because of the large volumes of data involved, it is important that a strategy for data access, both on and off line, is carefully developed to meet the needs of the system users. The most recent full flight and event data is normally kept on line to allow fast access during the initial analysis and interpretation stages. When this process is completed it is less likely that additional data from the flights will be required so the full flight data can be archived. Event data is usually kept on line for a much longer period to allow trending and comparison with previous events. There are many hardware and software solutions to long-term data storage available off the shelf but the one selected must be compatible with the analysis software to allow practical access to historical data. In most systems, data compression and the removal of non-essential parameters can reduce the capacity required. Also at this time removal of identification data can be completed.

D17.2 Link with the Air Safety Reporting Process

This is required to allow relevant crew Air Safety Reports (ASR) to be automatically added to FDM information. Low significance incidents/events that are not subject to mandatory occurrence reporting would not normally be identified Care has to be taken where there has been no ASR submitted for an apparently reportable incident detected by the FDM programme. The crew should be encouraged to submit an ASR without prejudice via a confidential contact method.

D17.3 Engineering use of FDM Data

It must be recognized that the use of FDM and associated data sources for Continued Airworthiness purposes is an important component of the system. For investigation of say potential heavy landing damage, there will be a need to identify the aircraft concerned and in the case of a technical defect report, the data associated with that particular flight may prove invaluable in fixing the fault. However, secure procedures must be in place to control access to the identified data and how the data is used. Identification of and contact with crews for operational rather than technical follow-up of FDM data should not be permitted through this path.

D17.4 Defined De-identification Policy and Procedures

This is an absolutely critical area that should be carefully written down and agreed before needed in extreme circumstances. Management assurance on the nondisclosure of individuals must be very clear and binding. The one exception is when the operator/crew team believes that there is a continuing unacceptable safety risk if crew specific action is not taken. In this case an identification and follow-up action procedure, previously agreed before the heat of the moment, can be brought into play.

D17.5 Crew Identification in Mandatory Occurrences

An exception to the de-identification of FDM data should be made when there is an incident that is subject to a Mandatory Occurrence Report. In this case the identified data must be retained for any subsequent safety investigation. A safety rather than disciplinary approach should to be taken in these cases.

D17.6 Set Authorized Access Levels

The FDM system must have the ability to restrict access to sensitive data and also control the ability to edit data. The System Administrator should have full access, while operations management may only have sight of de-identified data and the ability to add comments and edit a few appropriate fields. Similarly the replay technician will be able to feed in new data, check identification etc. but will not be able to change program specifications and event limits. Continued Airworthiness and operations would have particular views of the data, perhaps with the former being airframe identified, while the latter would by say, pilot group.

D18. CREW PARTICIPATION:

D18.1 Agree Joint Aim - to Improve Safety and Non-punitive

It is fundamental that all involved in FDM agree the aims and objectives of the work and the self-imposed restrictions which operate. The improvement of safety standards is accepted as a worthy goal by all aviation professionals but the method of achieving it is more difficult to agree. By fully sharing the objectives and concerns of all parties, the possibility of misunderstanding are reduced.

D18.2 Flexible Agreement

It has been found that agreements of principles, with plain English definitions of the areas covered, exclusions and conditions of use, are far more workable than a rigid set of rules that impede progress. Based on trust and mutual consent, all parties should view the data access as privileged and handle it carefully.

D18.3 Defined Procedure for Restricted Contact with Flight Crew

A step by step description of the restricted method by which crews are contacted and the safeguards in place should be publicized to gain crew confidence. The aims of the contact along with the approach to debriefing and raising actions should be clear. Flight crews should be encouraged to talk through difficult situations and learn from experience, even to ask for data about their flying. As with air safety reporting, a willingness to communicate and learn is a good indicator of a successful safety culture. It is suggested that debrief tools including traces and visualizations/ animations would, in some cases, be useful during this process.

D18.4 Discrete Retraining of Individuals where Required

Where it is agreed with the individual that retraining is appropriate then this should be scheduled into the training programme in a discrete manner to avoid highlighting the person. It must be stressed that additional training is not to be considered disciplinary action but merely a safety improvement action.

Note: while an individual co-pilot may be placed into a programme of continuation training fairly easily, a captain may be more difficult to schedule in unobtrusively.

D18.5 Confidentiality

A statement of agreement outlining the protection of the identity of the individual should be clearly written, along with any provisos necessary. An example of such wording as used by the Director-General in respect of the Mandatory Occurrence Reporting Scheme follows:

"The Director-General will not disclose the name of the person submitting the report or of a person to whom it relates unless required to do so by law or unless, in either case, the person concerned authorizes disclosure. Should any flight safety follow up action arising from a report be necessary, the Director-General will take all reasonable steps to avoid disclosing the identity of the reporter or of those individuals involved in the reportable occurrence.

D18.6 Define Confidentiality Exceptions

It would be irresponsible to guarantee total confidentiality in a situation where there would be significant ongoing risk to safety. In the case of grossly negligent behaviour, where the crew have "failed to exercise such care, skill or foresight as a reasonable man in his situation would exercise", then action to prevent repetition should be agreed by a pre-defined group that would usually include crew representatives. Formal action may be required by law.

D18.7 Inform Crew

At all times keep the crew informed of areas of concern and remedial actions contemplated. Their involvement and ideas will usually ensure a workable solution to operational problems that they have experienced and ensure future buy in to the programme.

D18.8 Feedback on Good Airmanship

Where examples of good flying have been found then these should be highlighted and commented upon. They also make useful reference material when analyzing or debriefing less well executed flights.

Example: A well flown go-around or procedurally correct TCAS resolution advisory action, with an ASR should be commended. Similarly, exceptional handling of technical problems may be singled out with data from the programme and used in training material.

D19. INTERPRETATION OF RESULTS - THE OPERATIONAL ASSESSMENT:

D19.1 Degree of Direct or Indirect Hazard

It is best if the degree of hazard is estimated to enable resources to be targeted at the most beneficial reduction in hazard. This may be to prevent a large number of relatively low risk events or to eliminate a low number of high risk events. In assessing the level of risk, the analyst must take into account both the direct risks and those that may be a consequence of those circumstances.

Example of a direct risk: a hard GPWS warning while an indirect one would be a plethora of false warnings - of little risk in themselves but if reducing the effectiveness of standard recovery from a real warning these could be catastrophic if not addressed.

D19.2 Assess Potential Accident Factors

It is useful if a list of precursors of and causal factors in previous accidents is drawn up to further highlight potential hazards. These again may be relatively low risk events in their own right but good indications of the probability of further, more significant incidents.

Examples of accident precursors**:** positional errors, auto vs manual flight conflict, landing technique, directional control during take-off and landing runs.

D19.3 Assess Frequency - Single Event or Systematic Problem

The events should be assessed in the context of previous experience. One of a series showing a trend or a one-off incident in exceptional circumstances. Clusters of events may occur at a particular airfield, on one aircraft or during a period of bad weather. By placing all events on a database will enable the analyst to decide an informed course of action.

D19.4 Taking Action - The Decision Process

As with any safety report, the responsible analyst must decide if it is appropriate to take action to prevent repetition. Action could be required due to safety severity (through individual risk or high frequency), financial or operational implications. Actions and the underlying reasons and data used should be recorded to provide an audit path.

D19.5 Continuous Monitoring of Result of Actions

After taking action, anticipated knock-on effects should be carefully monitored to ensure no risks are transferred elsewhere. A general monitor should also be applied to pick up other changes.

D20. MANDATORY OCCURRENCE REPORTING AND FDM:

D20.1 Air Safety Reports (ASRs)

The incident reports initially submitted to the operator's flight safety officer. The processing, assessment and actions arising from each ASR will form part of the operator's Safety Management System. ASRs are raised by a wide range of methods and triggers. A flight crew or air traffic controller's assessment of a risk, the result of an engineer's inspection, cabin crew reports, security staff etc. all contribute to an overall awareness of the safety risk to the operation. Be aware that an incident may be reported in one or more reporting systems e.g. ground report, maintenance, human factors, cabin crew etc. and that an integrated system will bring together all the relevant information. Reports could indicate failure of the defensive measures you have put in place to prevent a hazard

D20.2 Mandatory Occurrence Reports (MORs)

The more significant ASRs (along with maintenance and other reports) will be noted, either by the person submitting the report or the safety officer, as requiring submission to the CAA's MOR Scheme. These reports are further considered, acted upon and publicized to increase awareness.

D20.3 Retention of FDR data for MORs

For this purpose, the ANO requires that operators retain the date from the FDR which is relevant to a reportable occurrence for a period of 14 days from the date of the occurrence being reported to the Director-General, or a longer period if the Director-General directs.

D20.4 Confidentiality Issues

While all ASRs are attributable to the reporter, an open safety reporting culture relies on the knowledge that the identification of individuals is restricted to a need-to-know basis and that it is definitely non-punitive. basis and that it is definitely non-punitive. It should be noted that there is a difference between anonymity and confidentiality with the former being less desirable in an integrated safety system. While the reports generated automatically from FDM programmes should be treated confidentially, the greatest benefit will be gained by correlating this information with other relevant safety and technical reports especially in the case of the most hazardous or significant events. Where an air safety report has already been submitted then (only) relevant FDM events can be used to add to the understanding of the circumstances of the incident. It is important to emphasize that it is not the purpose of the process to checkout the reporter's recollection and accuracy.

D20.5 Withdrawal of Protection of Identity

Experience has shown that very rarely there will be cases where an important issue has been raised by FDM and for some reason no report has been submitted. In this case the persons involved have been encouraged, through a confidential contact by a crew representative or other trusted person, to submit, "without prejudice", a report. This method of contact has proved to be very effective in soliciting reports and a good means of imparting constructive safety advice to those involved. Almost invariably any advice or remedial action, i.e. training, is well received by the crews – on the understanding that this is not "held against them".

In the **extremely** rare case where **there is a definite ongoing safety risk** and no report is forthcoming despite requests, making remedial action impossible, then agreed procedures are followed to allow essential safety action to be taken. It should be emphasized that at no stage in this process is disciplinary action considered. There may have to be a judgment made on the probability of recurrence against a potential reduction in the openness of the overall safety culture resulting from a loss of confidence. However, experience has shown that the vast majority of FDM information is concerned with lower levels of hazard where no identification is needed.

D20.6 Confidentiality and Mandatory Occurrence Reports

It should be noted that while MORs are not subject to FDM confidentiality agreements, it is possible to submit a confidential MOR. In this way, although the original report must be identified, this information will be restricted during subsequent publication and analysis.

D21. <u>REPORTING STANDARDS AND AUDIT EVENTS:</u>

D21.1 FDM systems have proven to be very effective in reminding crews to submit reports during the early stages and are then a useful audit tool, confirming reporting standards in an established programme. Issues covered may include the following:

a) Various warnings: Stall, Hard GPWS, high speed or major systems warning
b) Heavy landing
c) Tail scrape
d) Rejected take-off at high speed and go-arounds
e) Engine failure
f) Severe turbulence and vortex wake encounters
g) Altitude deviation
h) Flight control difficulties indicated by excessive/untypical control deflections. It should be remembered that in the case of significant incidents found as the result of FDM analysis, the crews should be encouraged to submit retrospective reports without prejudice or penalty to the crew concerned.

D21.2 Reporting of Issues raised by FDM Events

Multiple FDM events may come together to indicate a potential issue for wider consideration or action. Examples of the type of issue that would be appropriate for such a submission include:
a) Unacceptable number of unsterilized/rushed approaches at a particular airfield.
b) False/nuisance GPWS warnings at a particular location or with certain equipment.
c) Rough Runway – permanent problem area or out of Specification temporary ramps.

d) Repeated near tail scrapes due to pilot rotation technique indicating revised guidance required.
e) Repeated events considered unacceptable elsewhere produced by a particular SID.
f) Reduced fuel reserves on certain sectors.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

AFM	:	AIRCRAFT FLIGHT MANUAL
ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
ASC	:	AIR SAFETY CIRCULAR
CAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
CARs	:	CIVIL AVIATION RULES, 1994
DGCAA	:	DIRECTOR GENERAL CIVIL AVIATION AUTHORITY
FSD	:	FLIGHT STANDARDS DIRECTORATE
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
MSN	:	MANUFACTURER SERIAL NUMBER

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 NIL

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st March, 2018 and supersedes ANO 91.0028 (Issue-2).

--S/d--

(USAID-UR-REHMAN USMANI)
Air Vice Marshal
Actg. Director General,
Pakistan Civil Aviation Authority

Dated: - **28th February, 2018**

(CAPT. ARIF MAJEED)
Director Flight Standards

Dated **26th February, 2018**
File No. HQCAA/1077/159/FSAC

APPENDIX "A"

PROGRAMME EXCEEDENCE DETECTION AND ROUTINE PARAMETER ANALYSIS

1. TRADITIONAL EVENT SET:

These operational events are typical of those found in most software packages; however events should be tailored to the specific needs / peculiarities of the air operator and its operation.

Event Group	Event Code	Description
Flight Manual Speed Limits	01A	Vmo exceedance
	02A	Mmo exceedance
	03A	Flap placard speed exceedance
	03G	Gear down speed exceedance
	031	Gear up / down selected speed exceedance
Flight Manual Altitude Limits	04	Exceedance of flap / slat altitude
	05	Exceedance of maximum operating altitude
High Approach Speeds	06A	Approach speed high within 90 sec of touchdown
	06B	Approach speed high below 500 ft AAL
	06C	Approach speed high below 50 ft AGL
Low Approach Speed	07A	Approach speed low within 2 minutes of touchdown
High Climb-out Speeds	08A	Climb out speed high below 400 ft AAL
	08B	Climb out speed high 400 ft AAL to 1000 ft AAL
Low Climb-out Speeds	08C	Climb out speed low 35 ft AGL to 400ft AAL
	08D	Climb out speed low 400 ft AAL to 1500 ft AAL
Take-off Pitch	09A	Pitch rate high on take-off
Unstick Speeds	10A	Unstick speed high
	10B	Unstick speed low
Pitch	20A	Pitch attitude high during take-off
	20B	Abnormal pitch landing (high)
	20C	Abnormal pitch landing (low)
Bank Angles	21A	Excessive bank below 100 ft AGL
	21B	Excessive bank 100 ft AGL to 500 ft AAL
	21C	Excessive bank above 500 ft AGL
	21D	Excessive bank near ground (below 20 ft AGL)
Height Loss in Climb-out	22D	Initial climb height loss 20 ft AGL to 400 ft AAL
	22E	Initial climb height loss 400 ft to 1500 ft AAL

Event Group	Event Code	Description
Slow Climb-out	22F	Excessive time to 1000 ft AAL after take-off
High Rate of Descent	22G	High rate of descent below 2000 ft AGL
Normal Acceleration	23A	High normal acceleration on ground
	23B	High normal acceleration in flight flaps up / down
	23C	High normal acceleration at landing
	23D	Normal acceleration; hard bounced landing
Low go-around	024	Go-around below 200 ft
RTO	026	High Speed Rejected take-off
Configuration	40C	Abnormal configuration; speed brake with flap
Low Approach	042	Low on approach
Configuration	43A	Speed brake on approach below 800 ft AAL
	43B	Speed brake not armed below 800 ft AAL (any flap)
Ground Proximity Warning	44A	GPWS operation – hard warning
	44B	GPWS operation – soft warning
	44C	GPWS operation – false warning
	44D	GPWS operation – wind shear warning
Margin to Stall	45A	Reduced lift margin except near ground
	45B	Reduced lift margin at take-off
	46A	Stick shake
	46B	False stick shake
Configuration	047	Early configuration change after take-off (flap)
Landing Flap	48A	Late land flap (not in position below 500 ft AAL)
	48B	Reduced flap landing
	48D	Flap load relief system operation
Glideslope	56A	Deviation under glideslope
	56B	Deviation above glideslope (below 600 ft AGL)
Buffet Margin	061	Low buffet margin (above 20,000 ft)
Approach Power	75A	Low power on approach

2. EXTENDED OPERATIONAL EVENT SET:

In addition to the basic events detailed above, there are a number of new events that could be used to detect other situations that an operator may be interested in. Some of the new triggers are relatively simple to implement while others would need careful coding and research to avoid false events while still activating against good data.

Description	Notes
Engine Parameter excellence (eg TGT etc)	One of a range of engine monitors
Full and free control checks not carried out	Essential pilot actions and a measure of control transducers.
Taxi out to take-off time – more than (x) minutes	Can be measured against a standard time for that airfield and runway.
High Normal Acceleration – Rough taxi-way	Detection along with an estimate of position derived from groundspeed and heading.
High Longitudinal Acceleration – Heavy braking	As above
Excessive Taxi Speed	As above
Take-off configuration warning	
Landing gear in transit longer than (x) seconds	To be used as an indicator of system problems and wear
Flap / slats in transit longer than (x) seconds	As above
Master Warning	All master warnings, even if false, heard by the crew are a useful indicator of distractions and “mundane/known problems”.
Engine failure	To determine crew performance as well as help technical investigation.
Autopilot vertical speed mode selected below (x) ft	One of a range of auto flight system usage monitors
Fuel Remaining at landing below minimums	
Airborne holding – more than (x) minutes	
Excessive control movement – airborne (especially rudder)	This will indicate control problems that other events might not identify
TCAS warning	A must for monitoring future significant hazards and crew reactions
Reverse thrust not used on landing	
Auto ground spoiler not selected for landing	
Landing to shutdown time – more than (x) minutes	Indicates taxiway or stand allocation problems
Localiser Deviation	Excessive or oscillating
Altitude Deviation	Level busts, Premature Descents etc.

3. OPERATIONAL PARAMETER ANALYSIS VARIABLES:

The following list suggests additional parameters that could be extracted from each flight and logged into a database. The concept is to log a sufficiently wide range of data points from each flight so as to enable the analyst to deduce and compare performance and safety measures. Airfield, runway, weight, time of year and many other combinations of circumstances may be correlated. This approach to FDM has proved very useful in determining what is normal as opposed to the event method that gives what is abnormal.

Subject Area	Description
General	Arrival and Departure time, airfield and runway *note the identification of date is normally limited to month to restrict identification.
	Temperature, pressure altitude, weight, take-off / landing configuration.
	Estimated wind speed – headwind and crosswind components
	Aircraft Routing – reporting points and airways
	Cruise Levels
	Elapsed times – taxi-out, holding, climb, cruise, descent and approach, taxi in.
Powerplant	Start up EGT etc.
	Max power during take-off
	Cruise performance measure
	Reverse thrust usage, time, max-min speeds, thrust setting
Structures	Flap / slat configuration vs time usage
	Flap / slat configuration vs max normal acceleration
	Flap / slat configuration vs normal acceleration max / min counter
	Flap / slat – Asymmetric deployment
	Airbrake extension – time, max and min speeds
	Gear extension / retraction cycle times
	Aircraft weight at all loading event times
	Landing assessment – pitch and roll angles and rates (plus other parameters)
	Normal acceleration at touchdown
	Normal acceleration – Airborne – Count of g crossings
	Normal acceleration – Ground – Count of g crossings
Flight Operations	Take-off and landing weight
	Thrust setting at take-off
	Rotation speed
	Lift-off speed and attitude
	Climb out speeds
	Climb height profile
	Noise abatement power reduction – height, time etc.
	Flap speeds – selection, max, min
	Gear speeds – selection, max, min
	Top of Descent point – time to landing
	Holding time
	Autopilot mode usage vs altitude
	Approach flap selection – time, speed, height
	Glideslope capture point – time, speed, height
	Localiser capture point – time, speed, height
	Maximum control deflection – airborne
	Maximum control deflection – ground
	Maximum control deflection – take-off or landing roll
	Landing speeds, attitudes and rates
	Turbulence indication – climb, cruise, descent and approach

Subject Area	Description
FDR Data Quality	Periods of bad / poor data
	Percentage of airborne data not analyzed
	Take-off or landing not analyzed
	Bad / non-existent FDR Parameters
Fuel Usage	Take-off fuel and landing fuel
	Taxi-out fuel burn
	Taxi-in fuel burn
	Total fuel burn
	Reserve fuel
	Specific fuel burn
	Cruise fuel burn measurement

پاکستان سول ایوی ایشن اتھارٹی

AEROPLANES PERFORMANCE CODE AND LIMITATION

AIR NAVIGATION ORDER

VERSION : 2.0
DATE OF IMPLEMENTATION : 01.03.2018
OFFICE OF PRIME INTEREST : Flight Standards Directorate (FSD)

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. NAVED SHABAHAT KHAN	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Actg. Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued under Rule 241 of CARs 94 by Director General Civil Aviation Authority in pursuance of powers vested in him under Rule-4 of Civil Aviation Rules 1994.

B. PURPOSE:

B1. This ANO is intended to provide comprehensive and detailed code of performance established by PCAA in compliance with the applicable standards of this chapter.

C. SCOPE:

C1. All Operators shall ensure that aeroplanes are operated in accordance with code of performance established in this ANO that takes full account of SARPs contained in ICAO Annex-6 Part-1. The level of performance defined by the appropriate parts of this ANO for the aeroplanes is substantially equivalent to the overall level embodied in the SARPs.

C2. Any amendments, additions, alteration and deletion necessitated in ICAO Annex 6, Part-1 Chap-5, ANOs and CARs would be applicable to the operator subject to intimation by CAA.

C3. Performances Classs appended below are meant only for this ANO and not intended to contravene/differ with any definition provided by ICAO in this regard.

C1.1 This regulation addresses aviation safety related processes and activities rather than occupational safety, environmental protection, or customer service quality.

C1.2 The AOC holder is responsible for the safety of services or products contracted to or purchased from other organizations.

C1.3 This regulation establishes the minimum acceptable requirements; AOC holder can establish more stringent requirements.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 When the following terms are used in this ANO, they have the following meanings:

D1.1.1 Accelerate-stop distance available (ASDA). The length of the take-off run available plus the length of stopway, if such stopway is declared available by the appropriate Authority and is capable of bearing the mass of the aeroplane under the prevailing operating conditions.

D1.1.2 Contaminated runway. A runway is considered to be contaminated when more than 25% of the runway surface area (whether in isolated areas or not) within the required length and width being used is covered by the following:

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

b) Snow which has been compressed into a solid mass which resists further compression and will hold together or break into lumps if picked up (compacted snow); or

c) Ice, including wet ice.

D1.1.3 Damp runway. A runway is considered damp when the surface is not dry, but when the moisture on it does not give it a shiny appearance.

D1.1.4 Dry runway. A dry runway is one which is neither wet nor contaminated, and includes those paved runways which have been specially prepared with grooves or porous pavement and maintained to retain 'effectively dry' braking action even when moisture is present.

D1.1.5 Landing distance available (LDA). The length of the runway, which is declared available by the appropriate Authority and suitable for, the ground run of an aeroplane landing.

D1.1.6 Maximum approved passenger-seating configuration. The maximum passenger seating capacity of an individual aeroplane, excluding pilot seats or flight deck seats and cabin crew seats as applicable, used by the operator, approved by the Authority and specified in the Operations Manual.

D1.1.7 Take-off distance available (TODA). The length of the take-off run available plus the length of the clearway available.

D1.1.8 Take-off mass. The take-off mass of the aeroplane shall be taken to be its mass, including everything and everyone carried at the commencement of the take-off run.

D1.1.9 Take-off run available (TORA). The length of runway which is declared available by the appropriate Authority and suitable for the ground run of an aeroplane taking off.

D1.1.10 Wet runway. A runway is considered wet when the runway surface is covered with water, or equivalent, less than specified in Para D1.1.2 above or when there is sufficient moisture on the runway surface to cause it to appear reflective, but without significant areas of standing water.

D2. APPLICABILITY:

D2.1 This ANO shall apply to all commercial, charter and aerial work operations, in which:

D2.1.1 An operator shall ensure that multi-engine aeroplanes powered by turbopropeller engines with a maximum approved passenger seating configuration of more than 9 or a maximum take-off mass exceeding 5700 kg, and all multi-engine turbojet powered aeroplanes are operated in accordance with Performance Class A.

D2.1.2 An operator shall ensure that propeller driven aeroplanes with a maximum approved passenger seating configuration of 9 or less, and a maximum take-off mass of 5700 kg or less are operated in accordance with Performance Class B.

D2.1.3 An operator shall ensure that aeroplanes powered by reciprocating engines with a maximum approved passenger seating configuration of more than 9 or a maximum take-off mass exceeding 5700 kg are operated in accordance with Performance Class C.

D2.1.4 Where full compliance with the requirements of the appropriate Class cannot be shown due to specific design characteristics (e.g. supersonic aeroplanes or seaplanes), the operator shall apply approved performance standards that ensure a level of safety equivalent to that of the appropriate Class.

D3. GENERAL OBLIGATION OF OPERATORS:

D3.1 Aeroplanes shall be operated in accordance with a comprehensive and detailed code of performance established in this ANO in compliance with the applicable Standards of ICAO Annex 6. Except as provided in Para 5.4, ICAO Annex-6, Part-I, 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.

D3.2 Except as provided in Para 5.4, ICAO Annex-6, Part-I, 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.

D3.3 Unless the operation has been specifically approved by the CAA, an aeroplane with two turbine power-units shall not, be operated on a route where the flight time at single engine cruise speed to an adequate en-route alternate aerodrome exceeds a threshold time established for such operations.

D3.4 The level of performance defined by the appropriate parts of the comprehensive and detailed national code referred to in Para D3.1 shall be at least substantially equivalent to the overall level embodied in the Standards of this chapter.

D3.5 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.

D3.6 CAA 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 ANO.

D3.7 A flight shall not be commenced unless the performance information provided in the flight manual indicates that the requirements of Para D3.8 to D3.15 below can be complied with for the flight to be undertaken.

D3.8 In applying the Standards of this chapter, account shall be taken of all factors that significantly affect the performance of the aeroplane (such as: mass, operating procedures, the pressure-altitude appropriate to the elevation of the aerodrome, temperature, wind, runway gradient and condition of runway, i.e. presence of 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.

D3.9 Mass limitations

D3.9.1 The mass of the aeroplane at the start of take-off shall not exceed the mass at which Para D3.10 is complied with, nor the mass at which Paras D3.13, D3.14 and D3.15 are complied with, allowing for expected reductions in mass as the flight proceeds, and for such fuel jettisoning as is envisaged in applying Paras D3.13 and D3.14 and, in respect of alternate aerodromes, Paras D3.10, D3.11 and D3.15.

D3.9.2 In no case shall the mass at the start of take-off exceed the maximum take-off mass specified in the flight manual or Ops. Manual Part B (if it is more restrictive) 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.

D3.9.3 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 or Ops. Manual Part B (if it is more restrictive) 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.

D3.9.4 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 Annex 16, Volume I, unless otherwise authorized in exceptional circumstances for a certain aerodrome or a runway where there is no noise disturbance problem..

D3.10 Take-off. The aeroplane shall be able, in the event of a critical power-unit failing 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 margin until the aeroplane is in a position to comply with Para D3.11. 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.

D3.11 En route — one power-unit inoperative. The aeroplane shall be able, in the event of the critical power-unit becoming inoperative at any point along the route or planned diversions therefrom, to continue the flight to an aerodrome at which the Standard of Para 3.15 can be met, without flying below the minimum flight altitude at any point.

D3.12 En route — two power-units inoperative. In the case of aeroplanes having three or more power-units, 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 power-unit 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 power-units becoming inoperative, to continue the flight to an en-route alternate aerodrome and land.

D3.13 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.

D3.14 Obstacle data: Obstacle data for T/off is provided in AIP. For Enroute, Approach & Missed Approach it is provided in both AIP & Route Manual. This is to enable the operator to develop procedures to comply with Para D3.10 while taking account of charting accuracy.

D3.15 An operator shall ensure that the approved performance Data contained in the Aeroplane Flight Manual is used to determine compliance with the requirements of the appropriate Class, supplemented as necessary with other data acceptable to the Authority as prescribed in the relevant Class. When applying the factors prescribed in the appropriate Class, account may be taken of any operational factors already incorporated in the Aeroplane Flight Manual performance data to avoid double application of factors.

D3.16 When showing compliance with the requirements of the appropriate Class, due account shall be given to aeroplane configuration, environmental conditions and the operation of systems which have an adverse effect on performance.

D3.17 For performance purposes, a damp runway, other than a grass runway, may be considered to be dry.

D4. <u>PERFORMANCE CLASS-A:</u>

A1 General

a) An operator shall ensure that, for determining compliance with the requirements of this Class, the approved performance data in the Aeroplane Flight Manual is supplemented as necessary with other data acceptable to the Authority if the approved performance Data in the Aeroplane Flight Manual is insufficient in respect of items such as:

1) Accounting for reasonably expected adverse operating conditions such as take-off and landing on contaminated runways; and

2) Consideration of engine failure in all flight phases.

b) An operator shall ensure that, for the wet and contaminated runway case, performance data determined in accordance with flight manual or equivalent acceptable to the Authority is used.

A2 Take-off

a) An operator shall ensure that the take-off mass does not exceed the maximum take-off mass specified in the Aeroplane Flight Manual for the pressure altitude and the ambient temperature at the aerodrome at which the take-off is to be made.

b) An operator must meet the following requirements when determining the maximum permitted take-off mass:

1) The accelerate-stop distance must not exceed the accelerate-stop distance available;

2) The take-off distance must not exceed the take-off distance available, with a clearway distance not exceeding half of the take-off run available;

3) The take-off run must not exceed the take-off run available;

4) Compliance with this section must be shown using a single value of V_1 for the rejected and continued take-off ; and

5) On a wet or contaminated runway, the take-off mass must not exceed that permitted for a take-off on a dry runway under the same conditions.

c) When showing compliance with sub-section A2 b) above, an operator must take account of the following:

1) The pressure altitude at the aerodrome;

2) The ambient temperature at the aerodrome; and

3) The runway surface condition and the type of runway surface (See A3);

4) The runway slope in the direction of take-off;

5) Not more than 50% of the reported head-wind component or not less than 150% of the reported tailwind component; and

6) The loss, if any, of runway length due to alignment of the aeroplane prior to take-off. (See A4).

A3 Take-off – Runway surface condition (see A2c) 3))

a) Operation on runways contaminated with water, slush, snow or ice implies uncertainties with regard to runway friction and contaminant drag and therefore to the achievable performance and control of the aeroplane during take-off, since the actual conditions may not completely match the assumptions on which the performance information is based. In the case of a contaminated runway, the first option for the pilot-in-command is to wait until the runway is cleared. If this is impracticable, he may consider a take-off, provided that he has applied the applicable performance adjustments, and any further safety measures he considers justified under the prevailing conditions.

b) An adequate overall level of safety will only be maintained if operations are limited to rare occasions. Where the frequency of such operations on contaminated runways is not limited to rare occasions, operators should provide additional measures ensuring an equivalent level of safety. Such measures could include special crew training, additional distance factoring and more restrictive wind limitations.

A4 Loss of runway length due to alignment (see A2 c) 6))

a) The length of the runway which is declared for the calculation of TODA, ASDA and TORA, does not account for line-up of the aeroplane in the direction of take-off on the runway in use. This alignment distance depends on the aeroplane geometry and access possibility to the runway in use. Accountability is usually required for a 90° taxiway entry to the runway and 180° turnaround on the runway. There are two distances to be considered:

1) The minimum distance of the main wheels from the start of the runway for determining TODA and TORA,”L”; and

2) The minimum distance of the most forward wheel(s) from the start of the runway for determining ASDA,”N”.

b) Alignment Distance

The distances mentioned in (a)(1) and (a)(2) are:

	90^o entry	180^o
L=	RM + X	RN + Y
N=	RM + X + WB	RN + Y + WB

where:

RN = A + WN = WB/cos(90°-α) + WN

RM = B + WM = WB tan (90°-α) + WM

X = afety distance of outer main wheel during turn to the edge of the runway

Y = safety distance of outer nose wheel during turn to the edge of the runway

Note: Minimum edge safety distances for X and Y are specified in FAA AC 150/5300-13 and ICAO Annex 14, 3.8.3

RN = radius of turn of outer nose wheel

RM = radius of turn of outer main wheel

WN = distance from aeroplane centre-line to outer nose wheel

WM = distance from aeroplane centre-line to outer main wheel

WB = wheel base

α = steering angle.

A5 Take-off obstacle clearance

a) An operator shall ensure that the net take-off flight path clears all obstacles by a vertical distance of at least 35 ft or by a horizontal distance of at least 90 m plus 0·125 x D, where D is the horizontal distance the aeroplane has travelled from the end of the take-off distance available or the end of the take-off distance if a turn is scheduled before the end of the take-off distance available. For aeroplanes with a wingspan of less than 60 m a horizontal obstacle clearance of half the aeroplane wingspan plus 60 m, plus 0·125 x D may be used. (See A5 g))

b) When showing compliance with sub-section A5 a) above, an operator must take account of the following:

1) The mass of the aeroplane at the commencement of the take-off run;

2) The pressure altitude at the aerodrome;

3) The ambient temperature at the aerodrome; and

4) Not more than 50% of the reported head-wind component or not less than 150% of the reported tailwind component.

c) When showing compliance with sub-section A5 a) above:

1) Track changes shall not be allowed up to the point at which the net take-off flight path has achieved a height equal to one half the wingspan but not less than 50 ft above the elevation of the end of the take-off run available. Thereafter, up to a height of 400 ft it is assumed that the aeroplane is banked by no more than 15°. Above 400 ft height bank angles greater than 15°, but not more than 25° may be scheduled;

2) Any part of the net take-off flight path in which the aeroplane is banked by more than than 15° must clear all obstacles within the horizontal distances specified in sub-sections A5 a), d) and e) of this section by a vertical distance of at least 50 ft; and

3) An operator must use special procedures, subject to the approval of the Authority, to apply increased bank angles of not more than 20º between 200 ft and 400 ft, or not more than 30º above 400 ft (see A13).

4) Adequate allowance must be made for the effect of bank angle on operating speeds and flight path including the distance increments resulting from increased operating speeds. (see A5 h))

d) When showing compliance with sub-section A5 a) above for those cases where the intended flight path does not require track changes of more than 15°, an operator need not consider those obstacles which have a lateral distance greater than:

1) 300 m, if the pilot is able to maintain the required navigational accuracy through the obstacle accountability area (see A6); or

2) 600 m, for flights under all other conditions.

e) When showing compliance with sub-section A5 a) above for those cases where the intended flight path does require track changes of more than 15°, an operator need not consider those obstacles which have a lateral distance greater than:

1) 600 m, if the pilot is able to maintain the required navigational accuracy through the obstacle accountability area (see A6); or

2) 900 m for flights under all other conditions.

f) An operator shall establish contingency procedures to satisfy the requirements of A5 and to provide a safe route, avoiding obstacles, to enable the aeroplane to either comply with the en-route requirements of A8, or land at either the aerodrome of departure or at a take-off alternate aerodrome (see A7).

g) In accordance with the definitions used in preparing the take-off distance and take-off flight path Data provided in the Aeroplane Flight Manual:

1) The net take-off flight path is considered to begin at a height of 35 ft above the runway or clearway at the end of the take-off distance determined for the aeroplane in accordance with sub-section A5 g) 2) below.

2) The take-off distance is the longest of the following distances:

i) 115% of the distance with all engines operating from the start of the take-off to the point at which the aeroplane is 35 ft above the runway or clearway; or

ii) The distance from the start of the take-off to the point at which the aeroplane is 35 ft above the runway or clearway assuming failure of the critical engine occurs at the point corresponding to the decision speed (V_1) for a dry runway; or

iii) If the runway is wet or contaminated, the distance from the start of the take-off to the point at which the aeroplane is atleast 15 ft above the runway or clearway assuming failure of the critical engine occurs at the point corresponding to the decision speed (V_1) for a wet or contaminated runway.

3) Section A5(a) specifies that the net take-off flight path, determined from the data provided in the Aeroplane Flight Manual in accordance with sub-sections A5 g) 1) and A5 g) 2) above, must clear all relevant obstacles by a vertical distance of 35 ft. When taking off on a wet or contaminated runway and an engine failure occurs at the point corresponding to the decision speed (V_1) for a wet or contaminated runway, this implies that the aeroplane can initially be as much as 20 ft below the net take-off flight path in accordance with sub-section 1 above and, therefore, may clear close-in obstacles by only 15 ft. When taking off on wet or contaminated runways, the operator should exercise special care with respect to obstacle assessment, especially if a take-off is obstacle limited and the obstacle density is high.

h) 1) The Aeroplane Flight Manual generally provides a climb gradient decrement for a 15° bank turn. For bank angles of less than 15°, a proportionate amount should be applied, unless the manufacturer or Aeroplane Flight Manual has provided other data.

2) Unless otherwise specified in the Aeroplane Flight Manual or other performance or operating manuals from the manufacturer, acceptable adjustments to assure adequate stall margins and gradient corrections are provided by the following:

BANK	SPEED	GRADIENT CORRECTION
15°	V_2	1 x Aeroplane Flight Manual 15° Gradient Loss
20°	V_2 + 5 kt	2 x Aeroplane Flight Manual 15° Gradient Loss
25°	V_2 + 10 kt	3 x Aeroplane Flight Manual 15° Gradient Loss

Some older airplanes do not have gradient decrement in AFMs. In such cases a mass penalty (assuming a higher mass than actual) of 1/cos bank angle must be considered(-0.5% as a rule of thumb).

A6 Required Navigational Accuracy

a) Flight-deck systems. The obstacle accountability semi-widths of 300 m (see A5 d) 1)) and 600 m (see A5 e) 1)) may be used if the navigation system under one-engine-inoperative conditions provides a two standard deviation (2 s) accuracy of 150 m and 300 m respectively.

b) Visual Course Guidance

1) The obstacle accountability semi-widths of 300 m (see A5 d) 1)) and 600 m (see A5 e) 1)) may be used where navigational accuracy is ensured at all relevant points on the flight path by use of external references. These references may be considered visible from the flight deck if they are situated more than 45° either side of the intended track and with a depression of not greater than 20° from the horizontal.

2) For visual course guidance navigation, an operator should ensure that the weather conditions prevailing at the time of operation, including ceiling and visibility, are such that the obstacle and/or ground reference points can be seen and identified. The Operations Manual should specify, for the aerodrome(s) concerned, the minimum weather conditions which enable the flight crew to continuously determine and maintain the correct flight path with respect to ground reference points, so as to provide a safe clearance with respect to obstructions and terrain as follows:

i) The procedure should be well defined with respect to ground reference points so that the track to be flown can be analysed for obstacle clearance requirements;

ii) The procedure should be within the capabilities of the aeroplane with respect to forward speed, bank angle and wind effects;

iii) A written and/or pictorial description of the procedure should be provided for crew use;

iv) The limiting environmental conditions (such as wind, the lowest cloud base, ceiling, visibility, day/night, ambient lighting, obstruction lighting) should be specified.

A7 Engine failure procedures after T/off

If compliance with A5 f) is based on an engine failure route that differs from the all engine departure route or SID normal departure, a “deviation point” can be identified where the engine failure route deviates from the normal departure route. Adequate obstacle clearance along the normal departure with failure of the critical engine at the deviation point will normally be available. However, in certain situations the obstacle clearance along the normal departure route may be marginal and should be checked to ensure that, in case of an engine failure after the deviation point, a flight can safely proceed along the normal departure. To calculate the deviation point, all engine climb gradients must be available in Operations Manual Part B.

A8 En-route – One Engine Inoperative (see A8 e))

a) An operator shall ensure that the one engine inoperative en-route net flight path data shown in the Aeroplane Flight Manual, appropriate to the meteorological conditions expected for the flight, complies with either sub-section A8 b) or A8 c) at all points along the route. The net flight path must have a positive gradient at 1 500 ft above the aerodrome where the landing is assumed to be made after engine failure. In meteorological conditions requiring the operation of ice protection systems, the effect of their use on the net flight path must be taken into account.

b) The gradient of the net flight path must be positive at at least 1 000 ft above all terrain and obstructions along the route within 9·3 km (5 nm) on either side of the intended track.

c) The net flight path must permit the aeroplane to continue flight from the cruising altitude to an aerodrome where a landing can be made in accordance with A11 or A12 as appropriate, the net flight path clearing vertically, by at least 2 000 ft, all terrain and obstructions along the route within 9·3 km (5 nm) on either side of the intended track in accordance with sub-sections (1) to (4) below:

1) The engine is assumed to fail at the most critical point along the route;

2) Account is taken of the effects of winds on the flight path;

3) Fuel jettisoning is permitted to an extent consistent with reaching the aerodrome with the required fuel reserves, if a safe procedure is used; and

4) The aerodrome where the aeroplane is assumed to land after engine failure must meet the following criteria:

i) The performance requirements at the expected landing mass are met; and

ii) Weather reports or forecasts, or any combination thereof, and field condition reports indicate that a safe landing can be accomplished at the estimated time of landing.

d) When showing compliance with A8, an operator must increase the width margins of subsections A8 b) and A8 c) above to 18·5 km (10 nm) if the navigational accuracy does not meet the 95% containment level.

e) 1) The high terrain or obstacle analysis required for showing compliance with A8 may be carried out in one of two ways, as explained in the following three sections.

2) A detailed analysis of the route should be made using contour maps of the high terrain and plotting the highest points within the prescribed corridor's

width along the route. The next step is to determine whether it is possible to maintain level flight with one engine inoperative 1000 ft above the highest point of the crossing. If this is not possible, or if the associated weight penalties are unacceptable, a driftdown procedure should be worked out, based on engine failure at the most critical point and clearing critical obstacles during the driftdown by at least 2000 ft. The minimum cruise altitude is determined by the intersection of the two driftdown paths, taking into account allowances for decision making (see Figure 1). This method is time consuming and requires the availability of detailed terrain maps.

3) Alternatively, the published minimum flight altitudes (Minimum En route Altitude, MEA, or Minimum Off-Route Altitude, MORA or Grid MORA) may be used for determining whether one engine inoperative level flight is feasible at the minimum flight altitude or if it is necessary to use the published minimum flight altitudes as the basis for the driftdown construction. This procedure avoids a detailed high terrain contour analysis but may be more penalising than taking the actual terrain profile into account as in A8 e) 2).

4) In order to comply with A8 c), one means of compliance is the use of MORA and, with A8 d), MEA provided that the aeroplane meets the navigational equipment standard assumed in the definition of MEA.

A9 En-route – Aeroplanes with three or more Engines, two Engines Inoperative

a) An operator shall ensure that at no point along the intended track will an aeroplane having three or more engines be more than 90 minutes, at the all-engines long range cruising speed at standard temperature in still air, away from an aerodrome at which the performance requirements applicable at the expected landing mass are met unless it complies with sub-sections A9 b) to A9 f) below.

b) The two engines inoperative en-route net flight path data must permit the aeroplane to continue the flight, in the expected meteorological conditions, from the point where two engines are assumed to fail simultaneously, to an aerodrome at which it is possible to land and come to a complete stop when using the prescribed procedure for a landing with two engines inoperative. The net flight path must clear vertically, by at least 2 000 ft all terrain and obstructions along the route within 9·3 km (5 nm) on either side of the intended track. At altitudes and in meteorological conditions requiring ice protection systems to be operable, the effect of their use on the net flight path data must be taken into account. If the navigational accuracy does not meet the 95% containment level, an operator must increase the width margin given above to 18·5 km (10 nm).

c) The two engines are assumed to fail at the most critical point of that portion of the route where the aeroplane is more than 90 minutes, at the all engines long range cruising speed at standard temperature in still air, away from an aerodrome at which the performance requirements applicable at the expected landing mass are met.

d) The net flight path must have a positive gradient at 1500 ft above the aerodrome where the landing is assumed to be made after the failure of two engines.

e) Fuel jettisoning is permitted to an extent consistent with reaching the aerodrome with the required fuel reserves, if a safe procedure is used.

f) The expected mass of the aeroplane at the point where the two engines are assumed to fail must not be less than that which would include sufficient fuel to proceed to an aerodrome where the landing is assumed to be made, and to arrive there at least 1 500 ft directly over the landing area and thereafter to fly level for 15 minutes.

A10 Landing – Destination and Alternate Aerodromes (see A11 f))

a) An operator shall ensure that the landing mass of the aeroplane does not exceed the maximum landing mass specified for the altitude and the ambient temperature expected for the estimated time of landing at the destination and alternate aerodrome allowing a missed approach (approach configuration: flaps for approach, gears up) gradient of atleast 2.5%.

b) For all instrument approaches (approach configuration: flaps for approach, gears up), a one engine out missed approach gradient of 2·5% for twin engine airplanes, 2.7% for 3 engine airplanes and 3 % for four engine airplane is required.

c) In case the missed approach gradient (approach configuration: flaps for approach, gears up) for a particular runway requires a higher gradient (more than 2.5%) then the approach mass must allow such a higher gradient.

d) The required missed approach gradient may not be achieved by all aeroplanes when operating at or near maximum certificated landing mass and in engine-out conditions. Operators of such aeroplanes should consider mass, altitude and temperature limitations and wind for the missed approach. As an alternative method, an increase in the decision altitude/height or minimum descent altitude/height and/or a contingency procedure (see A5 f)) providing a safe route and avoiding obstacles, can be approved.

A11 Landing – Dry Runways (see A11 f))

a) An operator shall ensure that the landing mass of the aeroplane for the estimated time of landing at the destination aerodrome and at any alternate aerodrome allows a full stop landing from 50 ft above the threshold:

1) For turbo-jet powered aeroplanes, within 60% of the landing distance available; or

2) For turbo-propeller powered aeroplanes, within 70% of the landing distance available;

3) For Steep Approach procedures the Authority may approve the use of landing distance Data factored in accordance with sub-sections A11 a) 1) and A11 a) 2) above as appropriate, based on a screen height of less than 50 ft, but not less than 35 ft. (see A14)

4) When showing compliance with sub-sections A11 a) 1) and A11 a) 2) above, the Authority may exceptionally approve, when satisfied that there is a need (see A15), the use of Short Landing Operations in accordance with A15 and A16 together with any other supplementary conditions that the Authority considers necessary in order to ensure an acceptable level of safety in the particular case.

b) When showing compliance with sub-section A11 a) above, an operator must take account of the following:

1) The altitude at the aerodrome;

2) Not more than 50% of the head-wind component or not less than 150% of the tailwind component; and

3) The runway slope in the direction of landing if greater than +/-2%.

c) When showing compliance with sub-section A11 a) above, it must be assumed that:

1) The aeroplane will land on the most favourable runway, in still air; and

2) The aeroplane will land on the runway most likely to be assigned considering the probable wind speed and direction and the ground handling characteristics of the aeroplane, and considering other conditions such as landing aids and terrain. (See A11 g))

d) If an operator is unable to comply with sub-section A11 c) 1) above for a destination aerodrome having a single runway where a landing depends upon a specified wind component, an aeroplane may be despatched if 2 alternate aerodromes are designated which permit full compliance with sub-sections A11 a), b) and c). Before commencing an approach to land at the destination aerodrome the pilot-in-command must satisfy himself that a landing can be made in full compliance with A10 and sub-sections A11 a) and A11 b) above.

e) If an operator is unable to comply with sub-section A11 c) 2) above for the destination aerodrome, the aeroplane may be despatched if an alternate aerodrome is designated which permits full compliance with sub-sections A11 a), b) and c).

f) In showing compliance with A10 and A11, the operator should use either pressure altitude or geometric altitude for his operation and this should be reflected in the Operations Manual.

g) There are two considerations in determining the maximum permissible landing mass at the destination and alternate aerodromes.

1) Firstly, the aeroplane mass will be such that on arrival the aeroplane can be landed within 60%or 70% (as applicable) of the landing distance available on the most favourable (normally the longest)runway in still air. Regardless of the wind conditions, the maximum landing mass for an aerodrome/aeroplane configuration at a particular aerodrome, cannot be exceeded.

2) Secondly, consideration should be given to anticipated conditions and circumstances. The expected wind at the time of arrival, or ATC and noise abatement procedures, may indicate the use of a different runway. These factors may result in a lower landing mass than that permitted under para 1) above, in which case, to show compliance with sub-section A11 a), despatch should be based on this lesser mass.

A12 Landing – Wet and contaminated runways

a) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be wet, the landing distance available is:

i) Required landing distance for planning
= 60%(jet eng)/70%(prop) +15% Factor of the required landing distance,

ii) Required landing distance for en-route/actual landing
= Un-factored Landing Distance + correction for contamination +correction for the system failure (if any) + 15% Factor

Note: The landing distance as calculated for actual landing shall never be less than that of i) above.

b) If the performance data has been determined on the basis of measured runway friction coefficient (see A1 b)), the operator should use a procedure correlating the measured runway friction coefficient and the effective braking coefficient of friction of the aeroplane type over the required speed range for the existing runway conditions.

D5. PERFORMANCE CLASS-B:

B1 General

a) Except as provided in B1 b) & c), 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.

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

i) The reliability of the turbine engine;

ii) The operator's maintenance procedures, operating practices, flight dispatch procedures and crew training programmes; and

iii) Equipment and other requirements provided in accordance with Appendix "A".

c) 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.

d) An operator shall treat two-engine aeroplanes which do not meet the climb requirements of section B2 b) as single-engine aeroplanes.

B2 Take-off and Landing Climb

a) Take-off Climb

1) All Engines Operating

i) The steady gradient of climb after take-off must be at least 4% with:

A) Take-off power on each engine;

B) The landing gear extended except that if the landing gear can be retracted in not more than 7 seconds, it may be assumed to be retracted;

C) The wing flaps in the take-off position(s); and

D) A climb speed not less than the greater of 1.1 VMC and 1.2 VS1.

2) One Engine Inoperative

i) The steady gradient of climb at an altitude of 400 ft above the take-off surface must be measurably positive with:

A) The critical engine inoperative and its propeller in the minimum drag position;

B) The remaining engine at take-off power;

C) The landing gear retracted;

D) The wing flaps in the take-off position(s); and

E) A climb speed equal to that achieved at 50 ft.

ii) The steady gradient of climb must be not less than 0.75% at an altitude of 1500 ft above the take-off surface with:

A) The critical engine inoperative and its propeller in the minimum drag position;

B) The remaining engine at not more than maximum continuous power;

C) The landing gear retracted;

D) The wing flaps retracted; and

E) A climb speed not less than 1.2 VS1.

b) Landing Climb

1) All Engines Operating

i) The steady gradient of climb must be at least 2.5% with:

A) Not more than the power or thrust that is available 8 seconds after initiation of movement of the power controls from the minimum flight idle position;

B) The landing gear extended;

C) The wing flaps in the landing position; and

D) A climb speed equal to VREF.

2) One engine Inoperative

i) The steady gradient of climb must be not less than 0.75% at an altitude of 1500 ft above the landing surface with:

A) The critical engine inoperative and its propeller in the minimum drag position;

B) The remaining engine at not more than maximum continuous power;

C) The landing gear retracted;

D) The wing flaps retracted; and

E) A climb speed not less than 1.2 VS1.

B3 Take-off

a) An operator shall ensure that the take-off mass does not exceed the maximum take-off mass specified in the Aeroplane Flight Manual for the pressure altitude and the ambient temperature at the aerodrome at which the take-off is to be made.

b) An operator shall ensure that the unfactored take-off distance, as specified in the Aeroplane Flight Manual does not exceed:

1) When multiplied by a factor of 1.25, the take-off run available; or

2) When stop way and/or clearway is available, the following:

i) The take-off run available;

ii) When multiplied by a factor of 1.15, the take-off distance available; and

iii) When multiplied by a factor of 1.3, the accelerate-stop distance available.

c) When showing compliance with sub-section b) above, an operator shall take account of the following:

1) The mass of the aeroplane at the commencement of the take-off run;

2) The pressure altitude at the aerodrome;

3) The ambient temperature at the aerodrome;

4) The runway surface condition and the type of runway surface (see B4 a));

5) The runway slope in the direction of take-off (see B4 b)); and

6) Not more than 50% of the reported head-wind component or not less than 150% of the reported tail-wind component.

B4 Take-Off - Performance Correction Factors

a) Surface condition and the type of runway surface:

1) Due to the inherent risks, operations from contaminated runways are inadvisable, and should be avoided whenever possible. Therefore, it is advisable to delay the take-off until the runway is cleared. Where this is impracticable, the

pilot-in-command should also consider the excess runway length available including the criticality of the overrun area.

2) Unless otherwise specified in the Aeroplane Flight Manual or other performance or operating manuals from the manufacturers, the variables affecting the take-off performance and the associated factors that should be applied to the Aeroplane Flight Manual data are shown in the table below. They should be applied in addition to the operational factors as prescribed in sub-section B3(b).

SURFACE TYPE	CONDITION	FACTOR
Grass (on firm soil) up to 20 cm long	Dry	1·20
	Wet	1·30
Paved	Wet	1·00

Notes:

1. The soil is firm when there are wheel impressions but no rutting.

2. When taking off on grass with a single engined aeroplane, care should be taken to assess the rate of acceleration and consequent distance increase.

3. When making a rejected take-off on very short grass which is wet, and with a firm subsoil, the surface may be slippery, in which case the distances may increase significantly.

b) Runway Slope: Unless otherwise specified in the Aeroplane Flight Manual, or other performance or operating manuals from the manufacturers, the take-off distance should be increased by 5% for each 1% of upslope except that correction factors for runways with slopes in excess of 2% require the acceptance of the Authority.

B5 Take-off Obstacle Clearance - Multi-Engined Aeroplanes

a) An operator shall ensure that the take-off flight path of aeroplanes with two or more engines, determined in accordance with this sub-section, clears all obstacles by a vertical margin of at least 50 ft, or by a horizontal distance of at least 90 m plus 0.125 x D, where D is the horizontal distance travelled by the aeroplane from the end of the take-off distance available or the end of the take-off distance if a turn is scheduled before the end of the take-off distance available except as provided in sub-section s b) and c) below. When showing compliance with this sub-section (see Section B6) it must be assumed that:

1) The take-off flight path begins at a height of 50 ft above the surface at the end of the take-off distance required by section B3(b) and ends at a height of 1500 ft above the surface;

2) The aeroplane is not banked before the aeroplane has reached a height of 50 ft above the surface, and that thereafter the angle of bank does not exceed 15°;

3) Failure of the critical engine occurs at the point on the all engine take-off flight path where visual reference for the purpose of avoiding obstacles is expected to be lost;

4) The gradient of the take-off flight path from 50 ft to the assumed engine failure height is equal to the average all-engine gradient during climb and transition to the en-route configuration, multiplied by a factor of 0.77; and

5) The gradient of the take-off flight path from the height reached in accordance with sub-section (4) above to the end of the take-off flight path is equal to the one engine inoperative en-route climb gradient shown in the Aeroplane Flight Manual.

b) When showing compliance with sub-section a) above for those cases where the intended flight path does not require track changes of more than 15°, an operator need not consider those obstacles which have a lateral distance greater than:

1) 300 m, if the flight is conducted under conditions allowing visual course guidance navigation, or if navigational aids are available enabling the pilot to maintain the intended flight path with the same accuracy (see B6); or

2) 600 m, for flights under all other conditions.

c) When showing compliance with sub-section a) above for those cases where the intended flight path requires track changes of more than 15°, an operator need not consider those obstacles which have a lateral distance greater than:

1) 600 m for flights under conditions allowing visual course guidance navigation (see B6);

2) 900 m for flights under all other conditions.

d) When showing compliance with sub-sections a), b) and c) above, an operator must take account of the following:

1) The mass of the aeroplane at the commencement of the take-off run;

2) The pressure altitude at the aerodrome;

3) The ambient temperature at the aerodrome; and

4) Not more than 50% of the reported head-wind component or not less than 150% of the reported tail-wind component.

B6 Take-off Flight Path - Visual Course Guidance Navigation

In order to allow visual course guidance navigation with reference to B5 b) 1) & c) 1), an operator must ensure that the weather conditions prevailing at the time of operation including ceiling and visibility, are such that the obstacle and/or ground reference points can be seen and identified. The Operations Manual must specify, for the aerodrome(s) concerned, the minimum weather conditions, which enable the flight crew to continuously determine and maintain the correct flight path with respect to ground reference points, so as to provide a safe clearance with respect to obstructions and terrain as follows:

a) The procedure must be well defined with respect to ground reference points so that the track to be flown can be analysed for obstacle clearance requirements;

b) The procedure must be within the capabilities of the aeroplane with respect to forward speed, bank angle and wind effects;

c) A written and/or pictorial description of the procedure must be provided for crew use; and

d) The limiting environmental conditions must be specified (e.g. wind, cloud, visibility, day/night, ambient lighting, obstruction lighting).

B7 Obstacle Clearance in Limited Visibility

a) The intent of the complementary requirements of section B5 is to enhance safe operation with Performance Class B aeroplanes in conditions of limited visibility. Unlike the Performance Class A Airworthiness requirements, those for Performance Class B do not necessarily provide for engine failure in all phases of flight. It is accepted that performance accountability for engine failure need not be considered until a height of 300 ft is reached.

b) The weather minima up to and including 300 ft imply that if a take-off is undertaken with minima below 300 ft a one engine inoperative flight path must be plotted starting on the all-engine take-off flight path at the assumed engine failure height. This path must meet the vertical and lateral obstacle clearance specified in section B5.

c) Should engine failure occur below this height, the associated visibility is taken as being the minimum which would enable the pilot to make, if necessary, a forced landing broadly in the direction of the take-off. At or below 300 ft, a circle and land procedure is extremely inadvisable. If the assumed engine failure height is more than 300 ft, the visibility must be at least 1500 m and, to allow for manoeuvring, the same minimum visibility should apply whenever the obstacle clearance criteria for a continued take-off cannot be met.

B8 En-Route - Multi- engined aeroplanes

a) An operator shall ensure that the aeroplane, in the meteorological conditions expected for the flight, and in the event of the failure of one engine, with the remaining engines operating within the maximum continuous power conditions specified, is capable of continuing flight at or above the relevant minimum altitudes for safe flight stated in the Operations Manual to a point 1000 ft above an aerodrome at which the performance requirements can be met.

b) When showing compliance with sub-section a) above:

1) The aeroplane must not be assumed to be flying at an altitude exceeding that at which the rate of climb equals 300 ft per minute with all engines operating within the maximum continuous power conditions specified; and

2) The assumed en-route gradient with one engine inoperative shall be the gross gradient of descent or climb, as appropriate, respectively increased by a gradient of 0.5%, or decreased by a gradient of 0.5%.

c) The altitude at which the rate of climb equals 300 ft per minute is not a restriction on the maximum cruising altitude at which the aeroplane can fly in practice, it is merely the maximum altitude from which the driftdown procedure can be planned to start.

d) Aeroplanes may be planned to clear en-route obstacles assuming a driftdown procedure, having first increased the scheduled en-route one engine inoperative descent data by 0·5% gradient.

B9 En-Route - Single-engine aeroplanes

a) An operator shall ensure that the aeroplane, in the meteorological conditions expected for the flight, and in the event of engine failure, is capable of reaching a place at which a safe forced landing can be made. Unless otherwise specified by the Authority, this point should be 1000ft above the intended landing area. For landplanes, a place on land is required, unless otherwise approved by the Authority.

b) When showing compliance with sub-section a) above:

1) The aeroplane must not be assumed to be flying, with the engine operating within the maximum continuous power conditions specified, at an altitude exceeding that at which the rate of climb equals 300 ft per minute; and

2) The assumed en-route gradient shall be the gross gradient of descent increased by a gradient of 0.5%.

c) 1) In the event of an engine failure, single-engine aeroplanes have to rely on gliding to a point suitable for a safe forced landing. Such a procedure is clearly incompatible with flight above a cloudlayer which extends below the relevant minimum safe altitude.

2) Operators should first increase the scheduled engine-inoperative gliding performance data by 0·5% gradient when verifying the en-route clearance of obstacles and the ability to reach a suitableplace for a forced landing.

3) The altitude at which the rate of climb equals 300 ft per minute is not a restriction on the maximum cruising altitude at which the aeroplane can fly in practice, it is merely the maximum altitude from which the engine-inoperative procedure can be planned to start.

B10 Landing - Destination and Alternate Aerodromes

a) An operator shall ensure that the landing mass of the aeroplane does not exceed the maximum landing mass specified for the altitude and the ambient temperature expected for the estimated time of landing at the destination and alternate aerodrome.

b) In showing compliance with B10 a) & B11, the operator should use either pressure altitude or geometric altitude for his operation and this should be reflected in the Operations Manual.

c) Unless otherwise specified in the Aeroplane Flight Manual, or other performance or operating manuals from the manufacturers, the variable affecting the landing performance and the associated factor that should be applied to the Aeroplane Flight Manual data is shown in the table below. It should be applied in addition to the operational factors as prescribed in B12 a).

SURFACE TYPE	FACTOR
Grass (on firm soil up to 20 cm long)	1·15

Note: The soil is firm when there are wheel impressions but no rutting

d) Unless otherwise specified in the Aeroplane Flight Manual, or other performance or operating manuals from the manufacturer, the landing distances required should be increased by 5% for each 1% of downslope except that correction factors for runways with slopes in excess of 2% need the acceptance of the Authority.

B11 Landing – Dry runway

a) An operator shall ensure that the landing mass of the aeroplane for the estimated time of landing allows a full stop landing from 50 ft above the threshold within 70% of the landing distance available at the destination aerodrome and at any alternate aerodrome.

1) The Authority may approve the use of landing distance data factored in accordance with this section based on a screen height of less than 50 ft, but not less than 35 ft.

b) When showing compliance with sub-section a) above, an operator shall take account of the following:

1) The altitude at the aerodrome;

2) Not more than 50% of the head-wind component or not less than 150% of the tail-wind component.

3) The runway surface condition and the type of runway surface (See B9(c)); and

4) The runway slope in the direction of landing (See B9 d))

c) For despatching an aeroplane in accordance with sub-section a) above, it must be assumed that:

1) The aeroplane will land on the most favourable runway, in still air; and

2) The aeroplane will land on the runway most likely to be assigned considering the probable wind speed and direction and the ground handling characteristics of the aeroplane, and considering other conditions such as landing aids and terrain. There two considerations in determining the maximum permissible landing mass at the destination and alternate aerodromes:

i) The aeroplane mass will be such that on arrival the aeroplane can be landed within 70% of the landing distance available on the most favourable (normally the longest) runway in still air. Regardless of the wind conditions, the maximum landing mass for an aerodrome/aeroplane configuration at a particular aerodrome, cannot be exceeded.

ii) The expected wind at the time of arrival, or ATC and noise abatement procedures, may indicate the use of a different runway. These factors may result in a lower landing mass than that permitted under section 2 above, in which case, to show compliance with B10 a), despatch should be based on this lesser mass.

d) If an operator is unable to comply with sub-section c) 2) above for the destination aerodrome, the aeroplane may be despatched if an alternate aerodrome is designated which permits full compliance with sub-sections a), b) and c) above.

B12 Landing - Wet and Contaminated Runways

a) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be wet, the landing distance available is equal to or exceeds the required landing distance, determined in accordance with B11, multiplied by a factor of 1.15.

b) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be contaminated, the landing distance, determined by using data acceptable to the Authority for these conditions, does not exceed the landing distance available.

c) A landing distance on a wet runway shorter than that required by sub-section a) above, may be used if the Aeroplane Flight Manual includes specific additional information about landing distances on wet runways.

d) Landing on Wet Grass Runways

1) When landing on very short grass which is wet, and with a firm subsoil, the surface may be slippery, in which case the distances may increase by as much as 60% (1.60 factor).

2) As it may not be possible for a pilot to determine accurately the degree of wetness of the grass, particularly when airborne, in cases of doubt, the use of the wet factor (1.15) is recommended.

D6. PERFORMANCE CLASS-C:

C1 General

An operator shall ensure that, for determining compliance with the requirements of this Class, the approved performance Data in the Aeroplane Flight Manual is followed. Incase this data is considered insufficient; it must be supplemented with additional data acceptable to the Authority. Presently, no aircraft with performance class C is being operated in Pakistan. However, in case an aircraft with this class is brought on Pakistan Register, the decision to accept the presented data shall be made on case to case basis.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
AOC	:	AIR OPERATOR CERTIFICATE
ASDA	:	Accelerate-stop Distance Available
CARs	:	Civil Aviation Rules, 1994
ICAO	:	International Civil Aviation Organization
LDA	:	Landing Distance Available
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
TODA	:	Take-off Distance Available

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 Civil Aviation Rules, 1994
E3.2 ICAO Annex 6, Part-I

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st March, 2018 and supersedes ANO 91.0029 (Issue-1).

--S/d--

(USAID-UR-REHMAN USMANI)
Air Vice Marshal
Actg. Director General,
Pakistan Civil Aviation Authority

Dated: - **13th February, 2018**

--S/d--

(CAPT. ARIF MAJEED)
O/Director Flight Standards

Dated- **12th February, 2018**
File No. HQCAA/1077/036/FSAC

APPENDIX "A"

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

Airworthiness and operational requirements provided 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.

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:

i) 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;

ii) Lower the flaps and landing gear, if applicable;

iii) Provide power to one pitot heater, which must serve an air speed indicator clearly visible to the pilot;

iv) Provide for operation of the landing light specified in 2 j);

v) Provide for one engine restart, if applicable; and

vi) 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 CAA shall require the minimum equipment list of an operator approved in accordance with this ANO 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 An 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 CAA who in turn will notify the State of Design.

5.2 The CAA 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 CAA 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 CAA.

6.2 An 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.

7. Flight crew experience, training and checking

7.1 The CAA shall prescribe the minimum flight crew experience required for night/IMC operations by single-engine turbine-powered aeroplanes.

7.2 An 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 CAA 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 CAA.

SAFE TRANSPORT OF DANGEROUS GOODS BY AIR

AIR NAVIGATION ORDER

VERSION	**:**	**4.0**
DATE OF IMPLEMENTATION	**:**	**01-08-2023**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	ENGR. M. UMER KHURSHID	Sr. Dy. Director (Operations Engineer)	Signed
REVIEWED BY	CAPT. FAROOQ IQBAL	Flight Inspector (Pilot)	Signed
VERIFIED BY	MR. RIZWAN UDDIN	Oi/C Legal (Regulatory)	Signed
	MR. NADIR SHAFI DAR	Dy. Director General (Regulatory) Civil Aviation Authority	Signed
APPROVED BY	MR. KHAQAN MURTAZA	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order is issued by Director General Pakistan Civil Aviation Authority in pursuance of powers vested in him under Rule 4(3) of Civil Aviation Rules 1994.

B. PURPOSE:

B1. The purpose of this ANO is to prescribe the requirements for Issue/Renewals of Registration of Authorized Air Operators / Freight Forwarders / Shippers who intend to involve in transport of Dangerous Goods by Air.

B2. It is to interpret the requirements of ICAO Annex-18 and currently applicable ICAO Technical Instructions (Doc.9284) / Procedures for the **"Safe Transport of Dangerous Goods by Air"**, and implement these requirements through Part – XVI, CARs 1994.

B3. To provide guidance, document control and revisions / review as received / required in line with ICAO guidance (OPI: Flight Standards Directorate).

C. SCOPE:

C1. This ANO is applicable to all legal entities i.e Companies / Enterprises / Organizations who intend to hold or have held Certificate of Registration with PCAA as Authorized Air Operator/ Freight Forwarders / Shippers for transport of Dangerous Goods by air who shall comply with the instructions contained herein.

C2. This ANO is applicable to all the concerned Directorates of PCAA who are directly or indirectly involved with the matters relating for transportation of Dangerous Goods by Air.

C3. Air Operator shall comply with the provisions contained in Part-XVI of CARs, 1994 and currently applicable TIs for the Safe Transport of Dangerous Goods by Air (ICAO Doc.9284) on all occasions when Dangerous Goods are carried, irrespective of whether the flight is operated wholly or partly within or wholly outside the territory of Pakistan. Where Dangerous Goods are to be transported outside the territory of Pakistan, the Operator shall review and comply with the appropriate variations noted by contracting states contained in Attachment "3" to ICAO TIs (Doc.9284). No Operator may transport Dangerous Goods unless approved to do so by PCAA.

C4. Articles and substances which would otherwise be classed as Dangerous Goods are excluded from the Scope of provisions of the ICAO TIs (Doc.9284), provided they are:

C4.1 Required to aboard the aircraft for operating reasons, as catering or cabin service supplies;

C4.2 Carried for use in flight as veterinary aid or as a humane killer for an animal, or for use in flight for medical aid for a patient, provided that, gas cylinders have been manufactured specifically for the purpose of containing and transporting that particular gas;

C4.3 Drugs, medicines and other medical matter are under the control of trained personnel during the time when they are in use in the aircraft;

C4.4 Equipment containing wet cell batteries is kept and, when necessary secured, in an upright position to prevent spillage of the electrolyte; and

C4.5 Proper provision is made to stow and secure all the equipment during take-off and landing and at all other times when deemed necessary by the Pilot-in-Command in the interests of safety, or they are carried by passengers or crewmembers.

C5. Articles and substances intended as replacements for those in paragraph C4 may be transported on an aircraft as specified in the ICAO TIs (Doc.9284)

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 The following terms when used in this ANO, shall have the meanings as assigned to them respectively. Any term used in this ANO but not defined herein shall have meaning as given in the Civil Aviation Rules 1994 (CARs, 1994), other relevant ICAO Annexes / documents:-

D1.1.1 **Air Navigation Order** means orders issued by the Director General PCAA under CARs, 1994.

D1.1.2 **Air Operator** means an Operator holding a valid PCAA License and Air Operator Certificate.

D1.1.3 **Applicant** means the person (registered as organization / registered company) applying for registration as AFF/Shipper).

D1.1.4 **Approval.** An authorization granted by an appropriate national authority (means approval by the Director General PCAA).

D1.1.4.1 the transport of dangerous goods forbidden on passenger and/or cargo aircraft where the ICAO TIs (Doc.9284) state that such goods may be carried with an approval; or other purposes as provided for in the ICAO TIs (Doc.9284).

Note: In the absence of a specific reference in the ICAO TIs (Doc.9284) allowing the granting of an approval, an exemption may be sought.

D1.1.5 **Authority** means the Civil Aviation Authority established under Section 3 of the Pakistan Civil Aviation Authority Ordinance, 1982.

D1.1.6 **Authorized Person** means a person authorized by a Company / Organization / Operator to perform a specific function.

D1.1.7 **Accident.** An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which a person is fatally or seriously injured as a result of:

D1.1.7.1 being in the aircraft, or

D1.1.7.2 direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or

D1.1.7.3 direct exposure to jet blast, except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or

D1.1.7.4 the aircraft sustains damage or structural failure which:

a) adversely affects the structural strength, performance or flight characteristics of the aircraft, and

b) would normally require major repair or replacement of the affected component, except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, tires, brakes, fairings, small dents or puncture holes in the aircraft skin; or

D1.1.7.5 the aircraft is missing or is completely inaccessible.

Note 1. For statistical uniformity only, an injury resulting in death within thirty days of the date of the accident is classified as a fatal injury by ICAO.

Note 2. An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located.

D1.1.8 **Cargo Aircraft.** Any aircraft, other than a passenger aircraft, which is carrying goods or property.

D1.1.9 **COMAT.** Operator material carried on an operator's aircraft for the operator's own purposes.

D1.1.10 **Competency**. A dimension of human performance that is used to reliably predict successful performance on the job. A competency is manifested and observed through behaviors that mobilize the relevant knowledge, skills and attitudes to carry out activities or tasks under specific conditions.

D1.1.11 **Competency-based training and assessment**. Training and assessment that are characterized by a performance orientation, emphasis on standards of performance and their measurement, and the development of training to the specified performance standards.

D1.1.12 **Competency standard**. A level of competence that is defined as acceptable when assessing whether or not competency has been achieved.

D1.1.13 **Conditions**. Anything that may qualify a specific environment in which performance will be demonstrated.

D1.1.14 **Consignee.** Any person, organization or government which is entitled to take delivery of a consignment.

D1.1.15 **Consignment.** One or more packages of dangerous goods accepted by an operator from one shipper at one time and at one address, receipted for in one lot and moving to one consignee at one destination address.

D1.1.16 **Crew Member.** A person assigned by an operator to duty on an aircraft during a flight duty period.

D1.1.17 **Dangerous Goods.** Articles or substances which are capable of posing a hazard to health, safety, property or the environment and which are shown in the list of dangerous goods in the ICAO TIs (Doc.9284) or which are classified according to those Instructions.

D1.1.18 **Dangerous Goods Accident.** An occurrence associated with and related to the transport of dangerous goods by air which results in fatal or serious injury to a person or major property or environmental damage.

D1.1.19 **Dangerous Goods Incident.** An occurrence, other than a dangerous goods accident, associated with and related to the transport of dangerous goods by air, not necessarily occurring on board an aircraft, which results in injury to a person, property or environmental damage, fire, breakage, spillage, leakage of fluid or radiation or other evidence that the integrity of the packaging has not been maintained. Any occurrence relating to the transport of dangerous goods which seriously jeopardizes the aircraft or its occupants is also deemed to be a dangerous goods incident.

D1.1.20 **Designated Postal Operator (DPO).** Any governmental or non-governmental entity officially designated by a Universal Postal Union (UPU) member country to operate postal services and to fulfill the related obligations arising from the acts of the UPU Convention of its territory.

D1.1.21 **Exception.** A provision in this ANO which excludes a specific item of dangerous goods from the requirements normally applicable to that item.

D1.1.22 **Exemption.** An authorization, other than an approval, issued by an appropriate national authority providing relief from the provisions of this ANO.

D1.1.23 **Flight Crew Member.** A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

D1.1.24 **Freight Forwarder.** A person or organization who offers the service of arranging the transport of cargo by air.

D1.1.25 **Ground Handling Agent.** A person, organization or enterprise engaged in or offering to engage in ground handling of aircraft operation in accordance with the Civil Aviation Rules and Regulations of the Authority.

D1.1.26 **Incident.** An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.

Note: The types of incidents which are of main interest to ICAO for accident prevention studies are listed in the Accident/Incident Reporting Manual (ICAO Doc. 9156).

D1.1.27 **Incompatible.** Describing dangerous goods which, if mixed, would be liable to cause a dangerous evolution of heat or gas or produce a corrosive substance.

D1.1.28 **Inspection.** means the examination of specific documents, articles or processes either routinely or for specific reason to ensure compliance with the regulations.

D1.1.29 **Observable behavior.** A single role-related behavior that can be observed and may or may not be measurable.

D1.1.30 **Operator.** A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

D1.1.31 **Overpack.** An enclosure used by a single shipper to contain one or more packages and to form one handling unit for convenience of handling and stowage.

Note. A unit load device is not included in this definition.

D1.1.32 **Oversight.** means audit or inspection activities.

D1.1.33 **Package.** The complete product of the packing operation, consisting of the packaging and its contents prepared for transport.

D1.1.34 **Packaging.** One or more receptacles and any other components or materials necessary for the receptacle to perform their containment and other safety functions.

Note. For radioactive material, see Part 2; 7.1.3 of ICAO TIs (Doc.9284).

D1.1.35 **Passenger Aircraft.** An aircraft that carries any person other than a crew member, an operator's employee in an official capacity, an authorized representative of an appropriate national authority or a person accompanying a consignment or other cargo.

D1.1.36 **Performance criteria**. Statements used to assess whether the required levels of performance has been achieved for a competency. A performance criterion consists of an observable behavior, condition(s) and a competency standard.

D1.1.37 **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.

D1.1.38 **Safety Management System (SMS).** A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

D1.1.39 **Serious Incident.** An incident involving circumstances indicating that an accident nearly occurred.

Note 1. The difference between an accident and a serious incident lies only in the result.

Note 2. Examples of serious incidents can be found in Attachment 'C' of ICAO Annex-13 and in the Accident/Incident Reporting Manual (ICAO Doc. 9156).

D1.1.40 **Serious Injury.** An injury which is sustained by a person in an accident and which:

D1.1.40.1 requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received; or

D1.1.40.2 results in a fracture of any bone (except simple fractures of fingers, toes or nose); or

D1.1.40.3 involves lacerations which cause severe hemorrhage, nerve, muscle or tendon damage; or

D1.1.40.4 involves injury to any internal organ; or

D1.1.40.5 involves second or third degree burns, or any burns affecting more than 5 percent of the body surface; or

D1.1.40.6 involves verified exposure to infectious substances or injurious radiation.

D1.1.41 **State of Origin.** The State in the territory of which the consignment is first loaded on an aircraft.

D1.1.42 **State of Destination.** The State in the territory of which the consignment is finally to be unloaded from an aircraft.

D1.1.43 **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.

D1.1.44 **Technical Instructions.** The Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Doc.9284), approved and issued periodically in accordance with the procedure established by the ICAO Council.

D1.1.45 **UN Number.** The four-digit number assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals to identify an article or substance or a particular group of articles or substances.

D1.1.46 **Unit Load Device.** Any type of freight container, aircraft container, aircraft pallet with a net, or aircraft pallet with a net over an igloo.

Note 1. An over pack is not included in this definition.

Note 2. A freight container for radioactive material is not included in this definition (see ICAO TI 2; 7.1.3).

D2. VALIDITY OF THE REGISTRATION CERTIFICATE OF AFF/SHIPPER

D2.1 The validity of the Registration Certificate issued under this ANO shall be one year from the date of registration as AFF / Shipper, unless extended by or under the authority of the DAT&ER, for such period, as deemed appropriate.

D3. VALIDITY AND APPROVAL OF AIR OPERATOR

D3.1 The approval to Air Operator for Transportation of Dangerous Goods by Air is issued by Flight Standards Directorate on yearly basis for the period of one year or up to one year or as deemed appropriate and reflected in 'Ops Specs' of the Air Operator.

D4. REGISTERED OFFICE:

D4.1 The Authorization-holder shall have a permanent registered office in Pakistan. Any change in such registered office shall be duly notified to PCAA immediately after approval of SECP or Joint Registrar of Firm, as the case may be.

D5. ELIGIBILITY – REGISTRATION OF AFF / SHIPPER:

D5.1 A company shall be eligible for registration with PCAA as AFF / Shipper provided that:-

D5.1.1 Company must be registered with SECP as Private Limited or Public Limited by Shares.

D5.1.2 Having a Registered office in Pakistan.

D5.1.3 Applicant must be financially sound.

D5.1.4 Applicant and / or its staff must have required knowledge and certified with valid DGR category 3 or 6 (or as per function assigned in the Attachment-1 to this ANO) to handle Dangerous Goods as per ICAO / IATA Documents (at least 02 personnel at head-office and 01 at branch office).

D5.1.5 Majority shareholding must be in local hands (Multi-national companies if requested, may shall be granted an approval by the DGCAA)

D5.1.6 Applicant must be certified by IATA.

D5.1.7 In case Applicant intends to apply for more than one station / location then it should have IATA certificate separately for each station / location.

D6. ELIGIBILITY – AIR OPERATOR:

D6.1 An Air Operator with RPT/CHARTER License, valid AOC and Ops Specs is eligible to apply for Transportation of Dangerous Goods by Air to FSD, PCAA

Note: The Air Operator is approved / authorized as Dangerous Goods Transporter through Issued "Operations Specifications" after due process.

D7. PROCESSING & ISSUE FEE AND SECURITY DEPOSIT:

D7.1 Certificate Processing Fee, Issue Fee and amount of Security, in accordance with Para D15 is to be deposited in PCAA Collection **Account No. 4099093160 (IBAN No.PK80NBPA0003004099093160) National Bank of Pakistan**.

D8. REQUIREMENTS FOR CERTIFICATE ISSUANCE OF AFF / SHIPPER:

D8.1 An Applicant shall submit the following documents along with duly filled PCAA Application Form CAAF-014-ATNR-2.2 **(Appendix "A")** to DAT&ER, PCAA. After verification of documents, the applicant shall submit prescribed application and requisite documents through PCAA's Software, available on PCAA's website, after taking ID and Password from AT&ER Directorate, before submitting hard copies there of:-

D8.1.1 Covering Letter on Company's letter-head duly signed and stamped by CE of the Company, in which a brief introduction of their business activities shall be given and also indicating the place and city of each office / branch from where the applicant intends to handle Dangerous Goods by air.

D8.1.2 Copy of bank deposit slip related to processing fee, issuance fee and security deposit as per Para D15.

D8.1.3 Notarized copy of Certificate of Incorporation with SECP.

D8.1.4 Notarized copies of Memorandum & Article of Association incorporated in SECP and signed by the Directors of the Company.

D8.1.5 Notarized copies of Form-3, Form-A, Form-29 or any other prescribed Form duly verified by SECP, as applicable.

D8.1.6 Indemnity Bond as per the specimen provided by AT & ER Directorate

D8.1.7 Bank statement along with bank certificate showing financial soundness of the Company.

D8.1.8 Corporate Structure on the Company's letter-head duly signed and stamped by the CE.

D8.1.9 Undertaking from CE of the Company regarding compliance of all regulatory requirements / instructions and that the Company shall abide by the rules / regulations issued by PCAA from time to time.

D8.1.10 Notarized copies of other Licenses/Certificates issued by PCAA, if any.

D8.1.11 Notarized copies of valid NTN Certificate/proof for filing Income Tax return issued by FBR.

D8.1.12 Experience and Bio Data of CE and Directors of the Company along with their CNICs and Photographs duly attested by Notary Public.

D8.1.13 Authorization letter in favor of two persons to deal with PCAA on behalf of the company, signed by CE.

D8.1.14 Evidence required for Agent's handling staff (minimum 02 at head-office and 01 at branch office) trained in the field of DGR. They must be certified with valid DGR category 3 or 6 (or as per function assigned in the Attachment-1 to this ANO) to handle Dangerous Goods as per IATA Dangerous Goods Regulations / ICAO Doc.9284 (TIs), from PCAA / IATA approved training organization (notarized copies to be attached).

D8.1.15 Notarized copy of valid Certification of head-office address / for each station by IATA of the Applicant.

D8.1.16 Undertaking that Applicant shall submit NOC from PNRA while applying for Dangerous Goods NOC for shipment of Radioactive Material by Air.

D8.1.17 Undertaking that the Owner and Directors / Managers of the Company are not involved and have no history of safety violations or consumer fraud activities that would pose a risk to the travelling public.

D8.1.18 Any other document(s) as desired by PCAA, if required.

D8.2 Applicant would be fully responsible for the authenticity of the required documents submitted for registration. In case of deviation, an enforcement action under Enforcement Manual shall be initiated followed by imposition of appropriate penalty or cancellation of license/certificate, as the case maybe, under CARs-1994 or ANO. Soft copies of CARs, 1994; relevant ANOs and the Enforcement Manual are available on PCAA's website www.caapakistan.com.pk for further information & ready reference.

D9. <u>REQUIREMENTS FOR 'OPS SPECS' APPROVAL OF AIR OPERATOR:</u>

D9.1 In case of Air Operator, the Air Operator shall request for approval of DGR in its "Ops Specs" and submit the following to Flight Standards Directorate for DFS approval:

D9.1.1 Operations Manual with "Dangerous Goods procedures"

D9.1.2 Dangerous Goods Manual (with Training Programme)

D9.1.3 Emergency Response Guide

D9.1.4 List of DGR trained personnel as per **Appendix "L-I"**

D9.1.5 02 copies of Operations Manual - Dangerous Goods Segment, CAAF-052-FSXX-1.0 **(Appendix "K")**

D9.1.6 02 copies of (Amendments to Operations Specifications Application Form) CAAF-028-FSXX-2.0 as per Para D4.2 of ANO-002-FSXX.

D10. INSPECTIONS FOR ISSUANCE. For issuance PCAA would establish an inspection team.

D10.1 **AFF/SHIPPER:** For initial approval issuance inspection of every site / office of freight forwarder / shipper, from where the applicant intends to carry out Dangerous Goods handling shall be undertaken by Dangerous Goods Inspectors of DAT&ER with representative of Flight Standards and Directorate of Security. The inspections shall be in accordance with ICAO TIs (Doc.9284) titled **"Safe Transport of Dangerous Goods by Air"**, IATA DGR Manual and PCAA Dangerous Goods Inspector Manual.

D10.1.1 After successful inspection of AFF/Shipper, the case shall be processed for approval from DAT&ER. After DAT&ER approval, registration on PCAA Form CAAF-011-ATNR-1.2 **(Appendix "B")** along with conditions will be issued to AFF/Shipper for each inspected station / location and shall be reflected accordingly on approval certificate.

D10.1.2 In case, any registered AFF / Shipper desires to add additional stations / locations for Dangerous Goods purposes, shall apply on company letter-head with applicable fee. A separate certificate of registration of additional station / location shall be issued once required formalities including inspection of the respective location is conducted. The expiry of the Certificate of that particular station shall be same as of the certificate of other locations.

Note. Inspection shall be undertaken **"AT NO COST TO PCAA"**.

D10.2 **Air Operator:** For initial issue, inspection by Flight Standards Directorate, PCAA shall be carried out to verify the approved procedures of the Air Operator in accordance with ICAO TIs (Doc.9284) titled "Safe Transport of Dangerous Goods by Air", IATA DGR Manual and PCAA Dangerous Goods Inspector Manual.

D10.2.1 After successful inspection, AOC holder i.e., Air Operator shall be granted an authorization to transport Dangerous Goods by air and Air Operator's Ops Specs shall be annotated with Dangerous Goods approval by DFS.

D11. RENEWAL OF CERTIFICATE OF AFF / SHIPPER

D11.1 AFF / Shipper shall submit an application **online** and also separately on Company's letter-head along with PCAA Application Form CAAF-014-ATNR-2.2 **(Appendix "A")** signed by the Chief Executive of the Company or an authorized person to DAT&ER, HQ CAA at least **60 days** before its expiry. Failing this, the Certificate-holder, in addition to normal renewal fee, shall pay a late fee amounting to **Rs. 2,000/-** per month or part thereof.

D11.2 Original Certificate and copy of bank deposit slip regarding applicable renewal fee.

D11.3 In case AFF/Shipper hold certificate of registration for more than one station / location, shall be required to get renewal for each station.

D11.4 Current copy(s) of IATA Certificate are to be attached duly notarized separately for each station / location.

D11.5 Valid DGR Certificate(s) of company officials are to be attached, duly notarized.

D11.6 Notarized copies of Form-3, Form-A, Form-29 or any other prescribed Form duly verified by SECP, if applicable.

D11.7 Indemnity Bond as per specimen provided by AT & ER Directorate

D11.8 After scrutiny of application, Dangerous Goods Inspector(s) would undertake on site renewal inspection of AFF/Shippers for continued in vogue DGR Procedure.

D11.9 Fulfillment of any other deficiency (if any), highlighted during the inspection.

D11.10 No application for renewal of Certificate shall be entertained after expiry of the Certificate unless approval/extension is otherwise granted by DAT&ER. The Certificate-holder shall have no right to continue the privileges of the Certificate unless he justifies such delay to the satisfaction of DAT&ER. In such delayed cases, the Certificate may be processed for renewal subject to imposition of late fee as prescribed. Meanwhile, on request AFF / Shipper may be granted an extension by DAT&ER in the validity of Certificate for exercising the privileges not more than a period of **60 days** or as deemed appropriate to accommodate its Dangerous Goods operations.

D11.11 a) If the certificate holder/ AFF/ Shipper does not apply for certificate renewal after its expiry for 11 months, then the DAT&ER shall serve a notice to AFF/Shipper that its expired certificate shall be stood cancelled automatically, if it does not apply for its renewal within one month, and the existing security deposit shall be refunded after deducting outstanding CAA dues with the approval of Competent Authority, subject to returning of original Certificate to DAT&ER.

b) In case, the AFF/Shipper does not respond to the served notice or fails to apply for renewal of expired certificate within the stipulated time, the expired Certificate shall stand cancelled automatically. The existing Security Deposit of the AFF/Shipper held with PCAA, with prior approval of Competent Authority, shall be refunded, as and when requested by the company".

c) The AFF/Shipper can apply for issuance of a fresh certificate after cancellation under this Para, and their existing Security Deposit held with PCAA may be adjusted, on request of AFF/Shipper (if the majority shareholdings are same) subject to the clearance of any outstanding CAA dues.

D12. RENEWAL OF DGR 'OPS SPECS' FOR AIR OPERATOR

D12.1 Flight Standards Directorate would annually renew Ops Specs for the Transportation of Dangerous Goods by Air for Air Operators. The renewal of continued Dangerous Goods Ops Specs shall be incumbent on successful renewal inspection as part of AOC Renewal Inspection. Inspection would encompass approved continued in vogue procedures in accordance with ICAO TIs (Doc.9284) titled "Safe Transport of Dangerous Goods by Air", IATA DGR and PCAA Dangerous Goods Inspector Manual.

D13. PCAA INSPECTION SYSTEM:

D13.1 The concerned directorates are required to institute Dangerous Goods Programme under guidance of ICAO TIs (Doc.9284) titled "Safe Transport of Dangerous Goods by Air", IATA DGR, and PCAA Dangerous Goods Inspectors Manual.

D13.2 **Compliance/Inspection systems.** PCAA shall establish inspection, surveillance and enforcement procedures with a view to achieve compliance with its dangerous goods regulations.

D13.3 **PCAA Inspector Qualification.** In order to establish an effective inspection programme the PCAA inspectors would have to be qualified as per criteria given in Dangerous Goods Inspectors Manual.

D13.4 **Certification Approval/Renewal of AFF/Shipper:** A team comprising of Dangerous Goods Inspectors from AT&ER, Flight Standards and Aviation Security Directorates would be constituted for initial and renewal of certification of AFF/ Shippers. DAT&ER would initiate and lead the process. **(As per Appendix "C", "C-I" and "C-II")**

D13.5 **Approval/Renewal of Air Operator:** Flight Standards Directorate (FSD), PCAA would evaluate for initial issuance and renewal of an Air Operator's Dangerous Goods Programme.

D13.6 **Continuous Oversight of AFF / Shippers:** DAT&ER, PCAA would carry out CMA over DGR activities for AFF / Shippers.

D13.7 **Continuous Oversight of Air Operator:** FSD, PCAA would carry out CMA of DGR for Air Operator.

D14. NOC REQUIREMENTS FOR TRANSPORT OF DANGEROUS GOODS BY AIR:

D14.1 Registered AFF / Shipper or Air Operator as the case may be, shall be required to apply to FSD on PCAA Form CAAF-083-FSXX-1.0 (Appendix "D") giving all the essential information along with the following:

D14.1.1 Covering letter on Company's letter-head.

D14.1.2 Copy of Dangerous Goods Declaration (DGD)

D14.1.3 Copy of Airway bill.

D14.1.4 Undertaking on the Company's letter-head that their Dangerous Goods trained and qualified staff has checked and complied the subject Dangerous Goods consignment regarding its classification, Packing instructions, Labeling, Marking and all necessary transportation documentation in accordance with ICAO TIs (Doc.9284) titled "Safe Transport of Dangerous Goods by Air" and IATA DGR, the Dangerous Goods are not forbidden for Transportation by Air as per provision of ICAO Annex-18 to the Chicago Convention 1944 and TIs for the Safe Transport of Dangerous Goods by Air (ICAO Doc.9284-AN/905) / DGR (IATA), as amended from time to time.

D14.1.5 A declaration on the letter-head of the company duly signed and stamped by the CE / Authorized person of the company that NOC has been issued if applicable, from PNRA for Transport of Radioactive materials by air.

D14.1.6 A Non-refundable / Non-transferable Processing Fee of **Rs.1000**/- shall be charged for each NOC issued against a single Dangerous Goods Declaration (DGD) form irrespective of the number of Dangerous Goods items reflected in the request. Fee shall be paid in authorized bank of PCAA collection account and a copy of paid bank challan be attached with NOC request Form.

Note: The Form is available on PCAA website www.caapakistan.com.pk

D14.2 The NOC on PCAA Form CAAF-084-FSXX-1.0 **(Appendix "E")** shall be issued to AFF / Shipper / Air Operator. They would be fully responsible for the authenticity of the details submitted for the issuance of NOC and would be liable for penalties under CARs, 1994 and relevant ANOs. Soft copies of CARs 1994, relevant ANOs and the Enforcement Manual are available on PCAA's website www.caapakistan.com.pk for further information & ready reference.

D15. CERTIFICATE FEE / CHARGES FOR AFF/SHIPPER:

D15.1 The following fee shall be charged for issue / renewal of AFF / Shipper Certificate:

*	Processing Fee	Rs. 10,000/-
**	Issue Fee	Rs. 25,000/-
*	Renewal	Rs. 10,000/-
***	Security Deposit	Rs. 100,000/-
*	Duplicate Certificate Issue Fee	Rs. 25,000/-
*	Late Fee	Rs. 2000/- per month

* Non-refundable.
** Refundable in case the issuance is not approved.
*** Refundable in case the issuance is not approved or at the time of closure of business / surrender of certificate, subject to clearance of PCAA's dues.

Note 1. In case of registration for more than one station / location, issue fee to be deposited separately for each station / location.

Note 2. For renewal of registration for more than one station / location, renewal fee to be deposited separately for each station / location.

D16. REFUSAL FOR RENEWAL OF CERTIFICATE AFF/SHIPPER

D16.1 DAT&ER may refuse renewal of the Certificate in case the Certificate holder fails to meet the Conditions of the Certificate / relevant ANO or fails to meet applicable rules and regulations.

D16.2 The refusal shall be dealt in accordance with the minimum requirements laid down in this ANO.

D17. REFUSAL FOR RENEWAL OF DGR 'OPS SPECS' TO AIR OPERATOR

D17.1 DFS may refuse renewal of Dangerous Goods Approval in Ops Specs of an Air Operator, in case the Operator fails to meet the required conditions as per the ANO and ICAO Annex-18 and in compliance of Operators approved Dangerous Goods Manual (Ops Manual).

D17.2 The refusal shall be dealt in accordance with the minimum requirements laid down in this ANO.

D18. CHANGE IN AFF/SHIPPER NAME AND REGISTERED ADDRESS:

D18.1 On receipt of request for change in name of the Certificate holder and / or registered Address, AT&ER Directorate shall send request and relevant documents provided by an applicant, to PCAA Legal Branch for vetting of comments.

D18.2 PCAA Legal Branch shall vet the documents and provide its comments within 05 working days to DAT&ER.

D18.3 The case shall be processed for the approval by Competent Authority through Finance Directorate.

D18.4 On receipt of the applicable approval / intimation, a new Certificate shall be issued to the applicant after collection of fresh Certificate issuance fee.

D19. CHANGE OF OWNERSHIP OF AFF/SHIPPER ON PURCHASE BASIS:

D19.1 Where the Certificate holder intends to transfer ownership of its company, shall inform AT&ER Directorate before concluding an agreement with purchaser. Subsequently, the buyer shall also submit an application to AT&ER Directorate for acquiring necessary permission and current status regarding any PCAA's financial, legal and operational liability against the owner.

D19.2 DAT&ER shall forward the case to Commercial and Finance Directorate / Branch or any other concerned Directorates of PCAA to seek comments / no-objection. After receiving comments from concerned directorates, a complete case shall be forwarded to Legal Branch for comments.

D19.3 In case of any liability highlighted by concerned Directorate / Branch of PCAA, the buyer shall be informed with a copy endorsed to Certificate holder.

D19.4 In case of no-objection, the requisite permission/NOC shall be issued to the buyer with a copy to Certificate holder and also advise the buyer to take further necessary action in line with ANO.

D19.5 Upon receiving of all the requisite documents / requirements, AT&ER Directorate shall process the case on the same pattern as mentioned in **Para-D8**, where applicable.

D19.6 After approval from DAT&ER, the applicant shall be informed for the intended changes accordingly with a copy to all concerned.

D20. CHANGE IN TOP MANAGEMENT HIERARCHY OF AFF/SHIPPER:

D20.1 AFF/Shipper shall notify the changes to DAT&ER immediately, if any changes in company's hierarchy/major shareholders/top management, duly certified by SECP.

D20.2 AT&ER Directorate shall forward the application along with its attachments to Legal Branch for comments.

D20.3 Upon obtaining comments, the AFF/Shipper shall be informed for the intended changes accordingly with a copy to all concerned quarters.

D21. DUPLICATE CERTIFICATE REQUIREMENTS FOR AFF/SHIPPER:

D21.1 Where holder of a certificate reports that the certificate is misplaced / loss or mutilated, the Certificate holder i.e., AFF / Shipper shall be required to apply to the DAT&ER, HQCAA on prescribed Application Form for issuance of a duplicate certificate along with the following documents:-

D21.1.1 Copy of police report or FIR regarding the misplacement / loss of Certificate, duly notarized.

D21.1.2 Original press clippings (advertisement) published in two leading newspapers (English & Urdu).

D21.1.3 Prescribed Fee Voucher (non-refundable)

Note 1. The applicant shall inform DAT&ER, in case the police does not recover certificate or no response is received within **30 days** of lodging the police report / FIR or issuance of the Press Notices.

Note 2. In case, the certificate is tempered or mutilated and rendered unusable, the applicant shall be required to apply to DAT&ER, HQCAA on prescribed Application Form along with prescribed fee and previous original certificate (mutilated) for issue of duplicate certificate, except copies of FIR and Press Notices.

D22. SUSPENSION/CANCELLATION OF CERTIFICATE AFF/SHIPPER:

D22.1 The DAT&ER with the approval of the competent authority i.e., DGCAA, may suspend, cancel or revoke the Certificate of Registration for carriage of dangerous goods by air of the Agent (AFF/Shipper), if the certificate holder (AFF/Shipper) fails to comply with the conditions of Registration Certificate, issued to it at the time of issuance of Certificate or Rules / Regulations / Instructions of PCAA.

D23. GUIDANCE FOR SAFE CONDUCT

D23.1 **General Applicability.** This ANO shall be applicable to all domestic / international operations of civil aircraft. Where specifically provided for in the ICAO TIs (Doc.9284), the States concerned may grant an approval provided that in such instances an overall level of safety in transport which is equivalent to the level of safety provided for in the ICAO TIs (Doc.9284) is achieved. In cases

D23.1.1 of extreme urgency; or

D23.1.2 when other forms of transport are inappropriate; or

D23.1.3 when full compliance with the prescribed requirements is contrary to the public interest, the States concerned may grant an exemption from the provisions of the ICAO TIs (Doc.9284) provided that in such instances every effort shall be made to achieve an overall level of safety in transport which is equivalent to the level of safety provided for in the ICAO TIs (Doc.9284).

D23.2 For the State of Overflight, if none of the criteria for granting an exemption are relevant, an exemption may be granted based solely on whether it is believed that an equivalent level of safety in air transport has been achieved.

Note 1. For the purposes of approvals, “States concerned” are the States of Origin and the Operator, unless otherwise specified in the ICAO TIs (Doc.9284).

Note 2. For the purpose of exemptions, “States concerned” is the States of Origin, Operator, Transit, Overflight and Destination.

Note 3. Guidance for the processing of exemptions, including examples of extreme urgency, may be found in the Supplement to the ICAO TIs (Part S-1, Chapter 1, 1.2 and 1.3).

Note 4. Refer to D23.10 for Dangerous Goods forbidden for transport by air under any circumstances.

Note 5. It is not intended that this ANO be interpreted as requiring an operator to transport a particular article or substance or as preventing an operator from adopting special requirements on the transport of a particular article or substance.

D23.3 **Dangerous Goods Technical Instructions**

D23.3.1 PCAA shall take the necessary measures to achieve compliance with the detailed provisions contained in ICAO Annex-18 and the TIs for the Safe Transport of Dangerous Goods by Air (ICAO Doc.9284), approved and issued periodically in accordance with the procedure established by the ICAO Council. PCAA shall also take the necessary measures to achieve compliance with any amendments to ICAO Annex-18 and the ICAO TIs (Doc.9284) which may be published during the specified period of applicability of an edition of the ICAO TIs (Doc.9284).

D23.3.2 PCAA should inform ICAO of difficulties encountered in the application of the ICAO TIs (Doc.9284) and of any amendments which it would be desirable to make to them.

D23.3.3 Although an amendment to the ICAO TIs (Doc.9284) with an immediate applicability for reasons of safety may not yet have been implemented in PCAA, as such should, nevertheless, facilitate the movement of Dangerous Goods in its territory which are consigned from another Contracting State in accordance with that amendment, providing the dangerous goods comply in total with the revised requirements.

D23.4 **Domestic Civil Aircraft Operations.** In the interests of safety and of minimizing interruptions to the international transport of dangerous goods, PCAA should also take the necessary measures to achieve compliance with this ANO and the ICAO TIs (Doc.9284) for domestic civil aircraft operations.

D23.5 **General Exceptions.**

D23.5.1 Except for 7;4.2 of ICAO TIs, these Instructions do not apply to dangerous goods carried by an aircraft where the dangerous goods are:

a) to provide, during flight, medical aid to a patient or to preserve tissues or organs intended for use in transplantation when those dangerous goods:
   1) have been placed on board with the approval of the operator; or
   2) form part of the permanent equipment of the aircraft when it has been adapted for specialized use; providing that:
   1) gas cylinders have been manufactured specifically for the purpose of containing and transporting that particular gas;
   2) equipment containing wet cell batteries is kept and, when necessary, secured in an upright position to prevent spillage of the electrolyte;
   3) lithium metal or lithium ion cells or batteries meet the provisions of 2;9.3 and spare lithium batteries are individually protected so as to prevent short circuits when not in use;

   Note. For dangerous goods that passengers are permitted to carry as medical aid, (Ref. ICAO TIs 8;1.1.2)

b) to provide, during flight, veterinary aid or a humane killer for an animal;
c) for dropping in connection with agricultural, horticultural, forestry, ice jam control, landslide clearance, pollution control activities or pest management activities;
d) for dropping or triggering in connection with avalanche control activities;
e) to provide, during flight, or related to the flight, aid in connection with search and rescue operations;
f) vehicles carried in aircraft designed or modified for vehicle ferry operations and all of the following requirements are met:
   1) authorization has been given by the appropriate authorities of the States concerned, and such authorities have prescribed specific terms and conditions for the particular operator's operation;
   2) vehicles are secured in an upright position;
   3) fuel tanks are so filled as to prevent spillage of fuel during loading, unloading and transit; and
   4) adequate ventilation rates are maintained in the aircraft compartment in which the vehicle is carried;

g) required for the propulsion of the means of transport or the operation of its specialized equipment during transport (e.g. refrigeration units) or that are required in accordance with the operating regulations (e.g. fire extinguishers) (Ref. ICAO TIs 2.2).

Note. This exception is only applicable to the means of transport performing the transport operation.

h) contained within items of excess baggage being sent as cargo provided that:
   1) the excess baggage has been consigned as cargo by or on behalf of a passenger;
   2) the dangerous goods may only be those that are permitted by and in accordance with 8;1.1.2 to be carried in checked baggage;
   3) the excess baggage is marked with the words “Excess baggage consigned as cargo”.

D23.5.2 Provision must be made to stow and secure dangerous goods transported under Para D23.5.1 a), b), c), d) and e) during take-off and landing and at all other times when deemed necessary by the pilot-in-command.

D23.5.3 The dangerous goods must be under the control of trained personnel during the time when they are in use on the aircraft.

D23.5.4 Dangerous goods transported under Para D23.5.1 a), b), c), d) and e) may be carried on a flight made by the same aircraft before or after a flight for the purposes identified above, when it is impracticable to load or unload the dangerous goods immediately before or after the flight, subject to the following conditions:

a) the dangerous goods must be capable of withstanding the normal conditions of air transport;
b) the dangerous goods must be appropriately identified (e.g. by marking or labelling);
c) the dangerous goods may only be carried with the approval of the operator;
d) the dangerous goods must be inspected for damage or leakage prior to loading;
e) loading must be supervised by the operator;
f) the dangerous goods must be stowed and secured in the aircraft in a manner that will prevent any movement in flight which would change their orientation;
g) the pilot-in-command must be notified of the dangerous goods loaded on board the aircraft and their loading location. In the event of a crew change, this information must be passed to the next crew;
h) all personnel must be trained commensurate with the functions for which they are responsible;
i) the provisions of 7;4.2 and 7;4.4 apply (Ref ICAO TI).

D23.5.5 Dangerous goods transported under Para D23.5.1 a), b), c), d) and e) may be carried on flights made by the same aircraft for other purposes (e.g. training flights and positioning flights prior to or after maintenance), subject to the conditions in Para D23.5.4 a) to i).

D23.6 **Surface Transport.** PCAA should make provisions to enable Dangerous Goods intended for air transport and prepared in accordance with the ICAO TIs (Doc.9284) to be accepted for surface transport to or from aerodromes.

D23.7 **National Authority.** Director General Civil Aviation is the Authority for all Civil Aviation matters. The subject of Approval of Transportation of Dangerous Goods by Air as per CARs, 1994 is further delegated to:

D23.7.1 Air Transport & Economic Regulations (AT&ER) Directorate of PCAA for certification/approval of AFF/Shippers.

D23.7.2 Flight Standards Directorate (FSD) of PCAA for approval / exemption of Dangerous Goods Transportation by Air Operators.

D23.7.3 Pakistan Nuclear Regulatory Authority (PNRA), Transport Waste and Safety Directorate are the competent authority responsible for authorizing transport of radioactive material.

D23.8 **Classification.** The classification of an article or substance shall be in accordance with the provisions of the ICAO TIs (Doc.9284).

Note. The detailed definitions of the classes of Dangerous Goods are contained in the ICAO TIs (Doc.9284). These classes identify the potential risks associated with the transport of dangerous goods by air and are those recommended by the United Nations Committee of Experts on the Transport of Dangerous Goods.

D23.9 **Limitations on the Transport of Dangerous Goods by Air**

D23.9.1 **Dangerous Goods permitted for transport by Air.** The transport of Dangerous Goods by air shall be forbidden except as established in this ANO and the detailed specifications and procedures provided in the ICAO TIs (Doc.9284).

D23.9.2 **Dangerous Goods forbidden for transport by Air unless exempted.**

D23.9.2.1 The Dangerous Goods described hereunder shall be forbidden on aircraft unless exempted by the States concerned under the provisions of D22.1 of this ANO or unless the provisions of the ICAO TIs (Doc.9284) indicate they may be transported under an approval issued by the State of Origin:

D23.9.2.2 articles and substances that are identified in the ICAO TIs (Doc.9284) as being forbidden for transport in normal circumstances; and

D23.9.2.3 infected live animals.

D23.9.3 **Dangerous Goods forbidden for transport by air under any circumstances**. Articles and substances that are specifically identified by name or by generic description in the ICAO TIs (Doc.9284) as being forbidden for transport by air under any circumstances shall not be carried on any aircraft.

D23.9.3.1 Any article or substance which, as presented for transport, is liable to explode, dangerously react, produce a flame or dangerous evolution of heat or dangerous emission of toxic, corrosive or flammable gases or vapors under conditions normally encountered in transport must not be carried on aircraft under any circumstance.

Note 1. Certain dangerous goods known to meet the description above have been included in the Dangerous Goods List (Table 3-1) of the ICAO TIs (Doc. 9284) with the word “Forbidden” shown in columns 2 and 3. It must be noted, however, it would be impossible to list all dangerous goods which are forbidden for transport by air under any circumstance. Therefore, it is essential that appropriate care be exercised to ensure that no goods meeting the above description are offered for transport.

Note 2. Para D23.9.3 is intended to include articles being returned to the manufacturer for safety reasons.

D23.10 **Exceptions for Dangerous Goods of the Operator.**

D23.10.1 The provisions of these Instructions do not apply to the following:

a) articles and substances which would otherwise be classified as dangerous goods but which are required to be aboard the aircraft in accordance with the pertinent airworthiness requirements and operating regulations or that are authorized by the State of the Operator to meet special requirements;
b) aerosols, alcoholic beverages, perfumes, colognes, liquefied gas lighters and portable electronic devices containing lithium metal or lithium ion cells or batteries provided that the batteries meet the provisions of Table 8-1, Item 1) carried aboard an aircraft by the operator for use or sale on the aircraft during the flight or series of flights, but excluding non-refillable gas lighters and those lighters liable to leak when exposed to reduced pressure;
c) dry ice intended for use in food and beverage service aboard the aircraft;
d) alcohol-based hand sanitizers and cleaning products carried aboard an aircraft by the operator for use on the aircraft during the flight or series of flights for the purposes of passenger and crew hygiene;
e) electronic devices, such as electronic flight bags, personal entertainment devices, and credit card readers, containing lithium metal or lithium ion cells or batteries and spare lithium batteries for such devices carried aboard an aircraft by the operator for use on the aircraft during the flight or series of flights, provided that the batteries meet the provisions of Table 8-1, Item 1). Spare lithium batteries must be individually protected so as to prevent short circuits when not in use. Conditions for the carriage and use of these electronic devices and for the carriage of spare batteries must be provided in the operations manual and/or other appropriate manuals as will enable flight crew, cabin crew and other employees to carry out the functions for which they are responsible.

D23.10.2 Unless otherwise authorized by the State of the Operator, articles and substances intended as replacements for those referred to in Para D23.10.1 a), or articles and substances referred to in Para D23.10.1 a) which have been removed for replacement, must be transported in accordance with the provisions of these Instructions, except that when consigned by operators, they may be carried in containers specially designed for their transport, provided such containers are capable of meeting at least the requirements for the packagings specified in these Instructions for the items packed in the containers.

D23.10.3 Unless otherwise authorized by the State of the Operator, articles and substances intended as replacements for those referred to Para D23.10.1 b), c) and d) must be transported in accordance with the provisions of these Instructions.

D23.10.4 Unless otherwise authorized by the State of the Operator, battery-powered devices with installed batteries and spare batteries intended as replacements for those referred to in Para D23.10.1 e) must be transported in accordance with the provisions of these Instructions.

D23.11 **Packing General requirements.** Dangerous Goods shall be packed in accordance with the provisions of this Para and as provided for in the ICAO TIs (Doc.9284).

D23.11.1 **Packaging**

D23.11.1.1 Packaging used for the transport of Dangerous Goods by air shall be of good quality and shall be constructed and securely closed so as to prevent leakage which might be caused in normal conditions of transport, by changes in temperature, humidity or pressure, or by vibration.

D23.11.1.2 Packaging shall be suitable for the contents. Packaging in direct contact with Dangerous Goods shall be resistant to any chemical or other action of such goods.

D23.11.1.3 Packaging shall meet the material and construction specifications in the ICAO TIs (Doc.9284).

D23.11.1.4 Packaging shall be tested in accordance with the provisions of the ICAO TIs (Doc.9284).

D23.11.1.5 Packaging for which retention of a liquid is a basic function, shall be capable of withstanding, without leaking, the pressure stated in the ICAO TIs (Doc.9284).

D23.11.1.6 Inner packaging shall be packed, secured or cushioned so as to prevent their breakage or leakage and to control their movement within the outer packaging(s) during normal conditions of air transport. Cushioning and absorbent materials shall not react dangerously with the contents of the packaging.

D23.11.1.7 No packaging shall be re-used until it has been inspected and found free from corrosion or other damage. Where a packaging is re-used, all necessary measures shall be taken to prevent contamination of subsequent contents.

D23.11.1.8 If, because of the nature of their former contents, un-cleaned empty packaging may present a hazard, they shall be tightly closed and treated according to the hazard they constitute.

D23.11.1.9 No harmful quantity of a dangerous substance shall adhere to the outside of packages.

D23.12 **Labels.** Unless otherwise provided for in the ICAO TIs (Doc.9284), each package of Dangerous Goods shall be labelled with the appropriate labels and in accordance with the provisions set forth in those Instructions.

D23.13 **Markings.**

D23.13.1 Unless otherwise provided for in the ICAO TIs (Doc.9284), each package of Dangerous Goods shall be marked with the proper shipping name of its contents and, when assigned, the UN number and such other markings as may be specified in those Instructions.

D23.13.2 **Specification markings on packaging**. Unless other-wise provided for in the ICAO TIs (Doc.9284), each packaging manufactured to a specification contained in those Instructions shall be so marked in accordance with the appropriate provisions of those Instructions and no packaging shall be marked with a packaging specification marking unless it meets the appropriate packaging specification contained in those Instructions.

D23.14 **Languages to be used for markings.** In addition to the languages required by the State of Origin and pending the development and adoption of a more suitable form of expression for universal use, English should be used for the markings related to dangerous goods.

D23.15 **Shipper's Responsibilities**

D23.15.1 **General Requirements.** Before a person offers any package or over-pack of Dangerous Goods for transport by air, that person shall ensure that the Dangerous Goods are not forbidden for transport by air and are properly classified, packed, marked, labeled and accompanied by a properly executed Dangerous Goods transport document, as specified in this ANO and the ICAO TIs (Doc.9284).

D23.15.2 **Dangerous Goods Transport Document**

D23.15.2.1 Unless otherwise provided for in the ICAO TIs (Doc.9284), the person who offers Dangerous Goods for transport by air shall complete, sign and provide to the operator a Dangerous Goods transport document, which shall contain the information required by those Instructions.

D23.15.2.2 The transport document shall bear a declaration signed by the person who offers Dangerous Goods for transport indicating that the Dangerous Goods are fully and accurately described by their proper shipping names and that they are classified, packed, marked, labelled, and in proper condition for transport by air in accordance with the relevant regulations.

D23.16 **Languages to be used.** In addition to the languages which may be required by the State of Origin and pending the development and adoption of a more suitable form of expression for universal use, English should be used for the Dangerous Goods transport document.

D23.17 **Operator's Responsibilities**

D23.17.1 ICAO Annex-19 includes Safety Managements provisions for Air Operators. Further guidance is contained in Safety Management Manual (SMM) ICAO Doc. 9859.

D23.17.2 The carriage of Dangerous Goods is included in the scope of Operator's Safety Management System (SMS).

D23.17.3 **Acceptance for transport.** An operator shall not accept Dangerous Goods for transport by air:

D23.17.3.1 unless the Dangerous Goods are accompanied by a completed Dangerous Goods transport document, except where the ICAO TIs indicate that such a document is not required; and

D23.17.3.2 until the package, over-pack or freight container containing the Dangerous Goods has been inspected in accordance with the acceptance procedures contained in the ICAO TIs (Doc.9284).

Note 1. See Para D24.4.4 concerning the reporting of Dangerous Goods accidents and incidents.

Note 2. Special provisions relating to the acceptance of over-packs are contained in the ICAO TIs (Doc.9284).

D23.17.4 **Acceptance checklist.** An operator or entity shall develop and use an acceptance checklist as an aid to compliance with the provisions of D23.17.3 and of ICAO TIs (Doc.9284).

Note 1. Acceptance checklists for Radioactive, Non-radioactive and Dry Ice must always be used as per current applicable edition available on IATA's official website. The web link is as follows: https://www.iata.org/en/programs/cargo/dgr/download/

Note 2. Sample acceptance checklists are attached as **Appendix "G", "H" and "I"** respectively.

D23.17.5 **Loading and Stowage.** Packages and over-packs containing Dangerous Goods and freight containers containing radioactive materials shall be loaded and stowed on an aircraft in accordance with the provisions of the ICAO TIs (Doc.9284).

D23.17.6 **Inspection for Damage or Leakage**

D23.17.6.1 Packages and over-packs containing Dangerous Goods and freight containers containing radioactive materials shall be inspected for evidence of leakage or damage before loading on an aircraft or into a unit load device. Leaking or damaged packages, over-packs or freight containers shall not be loaded on an aircraft.

D23.17.6.2 A unit load device shall not be loaded aboard an aircraft unless the device has been inspected and found free from any evidence of leakage from, or damage to, any Dangerous Goods contained therein.

D23.17.6.3 Where any package of Dangerous Goods loaded on an aircraft appears to be damaged or leaking, the operator shall remove such package from the aircraft, or arrange for its removal by an appropriate authority or organization, and thereafter shall ensure that the remainder of the consignment is in a proper condition for transport by air and that no other package has been contaminated.

D23.17.6.4 Packages or over packs containing Dangerous Goods and freight containers containing radioactive materials shall be inspected for signs of damage or leakage upon unloading from the aircraft or unit load device. If evidence of damage or leakage is found, the area where the Dangerous Goods or unit load devices were stowed on the aircraft shall be inspected for damage or contamination.

D23.18 **Loading restrictions in Passenger Cabin or on Flight Deck.** Dangerous Goods shall not be carried in an aircraft cabin occupied by passengers or on the flight deck of an aircraft, except in circumstances permitted by the provisions of the ICAO TIs (Doc.9284).

D23.19 **Removal of Contamination**

D23.19.1 Any hazardous contamination found on an aircraft as a result of leakage or damage to Dangerous Goods shall be removed without delay.

D23.19.2 An aircraft which has been contaminated by radioactive materials shall immediately be taken out of service and not returned to service until the radiation level at any accessible surface and the non-fixed contamination are not more than the values specified in the ICAO TIs (Doc.9284).

D23.20 **Separation and Segregation**

D23.20.1 Packages containing Dangerous Goods which might react dangerously one with another shall not be stowed on an aircraft next to each other or in a position that would allow interaction between them in the event of leakage.

D23.20.2 Packages of toxic and infectious substances shall be stowed on an aircraft in accordance with the provisions of the ICAO TIs (Doc.9284).

D23.20.3 Packages of radioactive materials shall stowed on an aircraft so that they are separated from persons, live animals and undeveloped film, in accordance with the provisions in the ICAO TIs (Doc.9284).

D23.21 **Securing of Dangerous Goods cargo loads.** When Dangerous Goods subject to the provisions contained herein are loaded in an aircraft, the operator shall protect the Dangerous Goods from being damaged, and shall secure such goods in the aircraft in such a manner that will prevent any movement in flight which would change the orientation of the packages. For packages containing radioactive materials, the securing shall be adequate to ensure that the separation requirements of D23.20.3 are met at all times.

D23.22 **Loading on cargo aircraft.** Packages of Dangerous Goods bearing the "Cargo Aircraft Only" label shall be loaded in accordance with the provisions in the ICAO TIs (Doc.9284). It should be done in such a manner that a crew member or other authorized person can see, handle and, where size and weight permit, separate such packages from other cargo in flight.

D23.23 **Provision of Information**

D23.23.1 **Information to Pilot-in-Command.** The operator of an aircraft in which Dangerous Goods are to be carried shall provide the pilot-in-command as early as practicable before departure of the aircraft with written information as specified in the ICAO TIs (Doc.9284). This information should be presented on a dedicated form and not by means of "Air Waybills", "Shipper's Declaration for Dangerous Goods", etc. Generally this information is presented on a "Special Load – Notification to Captain (NOTOC)" form. The NOTOC is provided for use in an emergency situation and must include, as a minimum, the following:

Note 1. Sample NOTOC (CAAF-089-FSXX-1.0) attached as **Appendix "J"**

Note 2. This includes information about Dangerous Goods loaded at a previous departure point and which are to be carried on the subsequent flight.

D23.23.1.1 the date of the flight;

D23.23.1.2 the Air Waybill number (when issued);

D23.23.1.3 the proper shipping name supplemented with the technical name(s) if appropriate, and the corresponding UN number or ID number as listed in the ICAO TIs (Doc.9284);

D23.23.1.4 the Class or Division, and subsidiary hazard(s) corresponding to the labels applied by numerals, and in the case of Class 1, the compatibility group;

D23.23.1.5 the Packing Group as shown on the Shipper's Declaration;

D23.23.1.6 for non-radioactive material, the number of packages, the net quantity, or gross mass if applicable, of each package, except that this does not apply to Dangerous Goods where the net quantity or gross mass is not required on the Shipper's Declaration, and their exact loading location. For a consignment consisting of multiple packages containing Dangerous Goods bearing the same proper shipping name and UN number or ID number, only the total quantity and an indication of the largest and smallest package at each loading location need to be provided;

D23.23.1.7 for radioactive material, the number of packages, overpacks or freight containers, their category, their transport index (if applicable) and their exact loading location;

D23.23.1.8 whether the package must be carried on cargo aircraft only;

D23.23.1.9 the airport at which the package(s) is to be unloaded;

D23.23.1.10 where applicable, an indication that the Dangerous Goods are being carried under a state exemption.

Note 1. Where the operator intends to make it possible for the pilot-in-command to provide a telephone number instead of the details about the Dangerous Goods on board the aircraft as specified in ICAO TIs (Doc.9284), the telephone number from where a copy of the information shown on the NOTOC can be obtained during the flight must be included on the NOTOC.

Note 2. This information must be provided prior to departure in writing, to enable the pilot-in-command to check should he wish to do so. The pilot-in-command must indicate on a copy of the NOTOC, or in some other way, that he has received the information.

Note 3. The information to the pilot-in-command must also include signed confirmation, or some other indication, from the person responsible for loading the aircraft, that there is no evidence that any damaged or leaking packages have been loaded on the aircraft.

Note 4. The NOTOC must be readily available to the pilot-in-command during flight.

Note 5. A legible copy of the information to the pilot-in-command must be retained on the ground. This copy must have an indication on it or with it that the pilot-in-command has received the information. The copy, or the information contained on it must be readily accessible to the airport of last departure and next scheduled arrival, until after the flight to which the information refers.

Note 6. When a pilot-in-command takes over a transit aircraft, a notification for all the dangerous goods loaded at previous airports, and which remain on board the aircraft, must be readily available.

D23.24 **Notification to Captain (NOTOC)**

D23.24.1 A NOTOC must be issued whenever dangerous goods requiring a Shipper's Declaration or Carbon dioxide, solid (dry ice) is being carried as cargo. A NOTOC is not required for Dangerous Goods in Excepted Quantities or Excepted Packages of Radioactive Material.

D23.24.2 Generally the cargo department is responsible for completion of all of the required information with the exception of loading position. The loading position should be completed by the Load Planner or inserted by the loading supervisor/ ramp agent based on advice provided by the Load Planner.

D23.24.3 The loading supervisor / ramp agent confirms by his signature that the stated loading position is identical with the actual loading position and that there is no evidence of any damage to, or leakage from, the packages loaded on the aircraft. The original and one copy of the NOTOC shall be handed over to the pilot-in-command for signature as early as possible before departure, to provide adequate time for the pilot-in-command to review the document. The original remains on board the aircraft and the copy signed by the pilot-in-command is kept on file at the departure station.

D23.25 **Information and Instructions to Flight/Cabin Crew Members.** The operator shall provide such information in the Operations Manual as will enable the flight/cabin crew to carry out its responsibilities with regard to the transport of Dangerous Goods and shall provide instructions as to the action to be taken in the event of emergencies arising involving Dangerous Goods.

D23.26 **Information to Passengers.** PCAA shall ensure that information is promulgated in such a manner that passengers are warned as to the types of Dangerous Goods which they are forbidden from transporting aboard an aircraft as provided for in the ICAO TIs (Doc.9284).

D23.27 **Information to other Persons.** Operators, or other organizations involved in the transport of Dangerous Goods by air shall provide such information to their personnel as will enable them to carry out their responsibilities with regard to the transport of Dangerous Goods and shall provide instructions as to the action to be taken in the event of emergencies arising involving Dangerous Goods.

D23.28 **Information from Pilot-in-Command to Aerodrome authorities.** If an in-flight emergency occurs, the pilot-in-command shall, as soon as the situation permits, inform the appropriate air traffic services unit, for the information of aerodrome authorities, of any Dangerous Goods on board the aircraft, as provided for in the ICAO TIs (Doc.9284).

D23.29 **Information in the event of an Aircraft Accident or Incident.** In the event of:

a) an aircraft accident; or

b) a serious incident where Dangerous Goods carried as cargo may be involved, the operator of the aircraft carrying Dangerous Goods as cargo shall provide information, without delay, to emergency services responding to the accident or serious incident about the Dangerous Goods on board, as shown on the written information to the pilot-in-command. As soon as possible, the operator shall also provide this information to PCAA and the State in which the accident or serious incident occurred.

D23.29.1 In the event of an aircraft incident, the operator of an aircraft carrying Dangerous Goods as cargo shall, if requested to do so, provide information without delay to emergency services responding to the incident and to the appropriate authority of the State in which the incident occurred, about the Dangerous Goods on board, as shown on the written information to the pilot-in-command.

Note. The terms 'accident', 'serious incident' and 'incident' are as defined in ICAO Annex-13.

D23.30 **Foreign Air Operator**

D23.30.1 Foreign air operators may carry Dangerous Goods to, from and via Pakistan provided the air operator is approved to carry Dangerous Goods by the Civil Aviation Authority of their State of Registry or the State of the operator or the State of Origin as applicable. It must be taken into account that Pakistan originating Dangerous Goods shipments shall only be offered and accepted for air transport by a PCAA certified AFF/ Shipper as defined in this ANO.

D23.30.2 shall ensure compliance with this ANO as applicable.

D23.30.3 shall report Dangerous Goods occurrences as per this ANO.

D23.31 **Ground Handling Agent (Including Self-Handling Air Operator)**

D23.31.1 shall ensure that Dangerous Goods shipments origination from Pakistan are offered and accepted for air transport only by a PCAA certified AFF / Shipper.

D23.31.2 shall ensure that staff involved in the handling, storage and loading of cargo or mail or baggage or the passenger handling staff undergo the appropriate Dangerous Goods training as required in this ANO.

D23.31.3 shall maintain Dangerous Goods training records of all employees and ensure it is available and accessible anytime to PCAA officials.

D23.31.4 shall dedicate dangerous goods storage area inside its warehouse facility with appropriate signage and must be properly marked and protected.

D23.31.5 shall report Dangerous Goods occurrences as per this ANO.

D23.32 **Dangerous Goods Training Provider/ATO (Approved Training Organization)**

D23.32.1 The Training Provider/ATO shall ensure compliance with the PCAA dangerous goods certification requirements as outlined in this ANO.

D23.32.2 The Training Provider/ATO offering dangerous goods training courses shall:

a) be physically located in the Pakistan;

b) use proper training aids providing an effective learning environment.

d) develop initial and recurrent Dangerous Goods Regulations Competency Based Training and Assessment program with well-defined aims and objectives, include the Knowledge, Skills & Attitude elements and in compliance with the changes in regulatory requirements.

e) maintain evidence/records of successful completion, training title, place and validity of training by means of a certificate in addition to detail list of participants.

f) if accredited by external organization such as but not limited to ICAO or IATA, the Training Provider must;

I. Communicate such information by submission of supporting evidence to the PCAA when they apply for the initial or renewal of their Dangerous Goods Certificate.

II. Communicate any changes to the status of such accreditation to PCAA.

g) ensure that dangerous goods training program, are developed in accordance with the training aspects referred to in the task list as defined in Attachment-1 to this ANO.

D23.32.3 If the Training Provider/ATO wants to conduct the training at or more than one station / location, than it shall seek approval separately for each station / location respectively.

Note. If the Training Provider/ATO wishes to apply for more than one station/location, then one station will be certified as Main Training Centre and others as Satellite Training Centers respectively.

D23.32.4 Training centre/classroom/facility, Instructor and training program of Dangerous Goods must be in compliance with this ANO, ICAO TI (Doc.9284) / IATA DGR and must be submitted to FSD, PCAA for review and approval.

Note 1. It applies to all entities involved in the transport of Dangerous Goods by Air that wish to develop their own Dangerous Goods training program.

Note 2. Certification and Inspection of Training Provider's training centre/classroom/facility, Instructor and training program for Dangerous Goods of all entities shall be done by FSD, PCAA.

D24 <u>COMPLIANCE</u>

D24.1 **Notification of variations from the TIs**

D24.1.1 Where a PCAA adopts different provisions from those specified in the ICAO TIs (Doc.9284); it shall notify ICAO promptly of such State variations for publication in the ICAO TIs (Doc.9284).

Note. PCAA is expected to notify a difference to the provisions of 7.2.1 of ICAO TIs (Doc.9284) under Article 38 of the Convention only if they are unable to accept the binding nature of the ICAO TIs (Doc.9284). Where PCAA has adopted different provisions from those specified in the ICAO TIs (Doc.9284), it is expected to be reported only under the provisions of 7.5 of ICAO TIs (Doc.9284).

D24.1.2 PCAA should take the necessary measures to ensure that when an operator adopts more restrictive requirements than those specified in the ICAO TIs (Doc.9284), the notification of such operator variations is made to ICAO for publication in the ICAO TIs (Doc.9284).

D24.1.3 DFS on receiving new measures from ICAO or from the operator as per Para D24.1 above shall take the necessary actions and in case variations established forward the same to ICAO or IATA for inclusion in ICAO TIs (Doc.9284) or IATA DGR.

D24.2 **Establishment of Dangerous Goods Training Programmes.** Air Operators are to ensure that initial and recurrent training is approved, established and conducted **(Appendix “L-I” and “L-II”)**:

D24.2.1 by Shippers of Dangerous Goods, including packers and persons or organizations undertaking the responsibilities of the shipper;

D24.2.2 by Operators; ground handling agencies which perform, on behalf the Operator, the act of accepting, handling, loading, unloading, transferring or other processing of cargo, mail or stores;

D24.2.3 ground handling agencies located at an airport which perform, on behalf of the operator, the act of processing passengers; Or the agencies; not located at an airport, which perform, on behalf of the operator, the act of checking in passengers;

D24.2.4 freight forwarders; and agencies engaged in the security screening of passengers and their baggage and/or cargo, mail or stores.

D24.2.5 designated postal operators.

D24.2.6 All Operators shall ensure that Dangerous Goods Training Programme required by D24.3 must be subjected to review and approval by DFS. Dangerous Goods Training programme required by other than D24.3 should be subjected to review and approvals as determined by the PCAA.

D24.2.7 Training courses may be developed and delivered by of for the employer.

Note 1. A training programme includes elements such as design methodology, assessment, initial and recurrent training, instructor qualifications and competencies, training records and evaluation of the effectiveness of training.

Note 2. An approach to ensuring personnel are competent to perform any function for which they are responsible is provided in Guidance on a Competency-based Approach to Dangerous Goods Training and Assessment (Doc.10147)

Note 3. Training Programs Approval Letter shall be issued in accordance with attached **Appendix “M”**

D24.3 **Training Curricula.** DGR modules as applicable should be the basic course qualification. However approved DGR category 3, 6 (or as per function assigned in the Attachment-1 to this ANO) is essential for AFF/Shippers and DGR category 9, 10 (or as per function assigned in the Attachment-1 to this ANO) for Air Operators. Additionally;

D24.3.1 Operator shall ensure that personnel must receive training and assessment in the requirements commensurate with the functions for which they are responsible. Such training must include;

D24.3.2 general awareness / familiarization training – personnel must be trained to be familiar with the general provisions;

D24.3.3 function-specific training – personnel must be trained to perform competently any function for which they are responsible; and

D24.3.4 safety training – personnel must be trained on how to recognize the hazards presented by dangerous goods, on the safe handling of dangerous goods, and on emergency response procedures.

Note. General information on the provisions for dangerous goods carried by passengers and crew (see Part 8 to ICAO TIs) should be included in training courses, as appropriate.

D24.3.5 Operator shall ensure that training must be provided or verified upon the employment of personnel identified in the functions specified in IATA DGR.

D24.3.5.1 Personnel who have received training but who are assigned to new functions must be assessed to determine their competence in respect of their new function. If competency is not demonstrated, appropriate additional training must be provided.

D24.3.5.2 Personnel must be trained to recognize the hazards presented by dangerous goods, to safely handle them and to apply emergency response procedures.

D24.3.6 **Recurrent Training & Assessment.** Operator shall ensure that personnel must receive recurrent training and assessment within 24 month of previous training and assessment to ensure that competency has been maintained. However, if recurrent training and assessment is completed within the final three months of validity of the previous training and assessment, the period of validity extends from the month on which the recurrent training and assessment was completed until 24 months from the expiry month of that previous training and assessment.

Note. An example would be the following: If recurrent training is required by the end of May 2022, then any training occurring between March 2022 and the end of May 2022 will result in a new recurrent training date of May 2024.

D24.3.7 **Assessment.** Operator shall ensure that an assessment to verify understanding must be undertaken following training. Confirmation that the assessment has been completed satisfactorily is required.

D24.3.8 **Training and Assessment Records**.

D24.3.8.1 Operator shall ensure that a record of training and assessments must be maintained for personnel which must include:

a) the individual's name;

b) the month of completion of the most recent training and assessment;

c) a description, copy or reference to training and assessment materials used to meet the training and assessment requirements;

d) the name and address of the organization providing the training and assessment; and

e) evidence which shows that an assessment has been assessed as competent.

D24.3.8.2 The records of training and assessments must be retained by the employer for a minimum period of 36 months from the most recent training and assessment completion month and must be made available upon request to PCAA. Confirmation of Training Record Inspection Checklist attached as **Appendix "N"** and **Appendix "O"**.

D24.3.9 **Operators not approved as Dangerous Goods transporters.** All operators must establish a dangerous goods training programme regardless of whether or not they are approved to transport dangerous goods as cargo. Staff of operators not carrying Dangerous Goods as cargo, mail or stores must be trained commensurate with their responsibilities. The subject matter to which their various functions of staff should be trained is specified in ICAO TIs (Doc.9284), IATA DGR and in this ANO.

Note 1. Training courses may be developed and delivered by or for the employer.

Note 2. The DGR Training Programme for No-carry operators must be submitted to FSD, PCAA for review and approval along with Checklist CAAF-061-FSXX-1.0 **(Appendix "L-I")**

D24.3.10 **Training Program Approval for Designated Postal Operators.** Staff of designated postal operators must be trained commensurate with their responsibilities. The subject matter with which their various categories of staff should be familiar is specified in ICAO TIs (Doc.9284), IATA DGR and in this ANO.

Note. The DGR Training Programme of Designated Postal Operators (DPOs) must be submitted to FSD, PCAA for review and approval along with Checklist CAAF-100-FSXX-1.0 **(Appendix "L-II")**

D24.3.11 **Dangerous Goods Instructor Qualifications & Competencies.**

D24.3.11.1 Instructors of initial and recurrent Dangerous Goods training programme must;

a) demonstrate or be assessed as competent in instruction and the function(s) that they will instruct prior to delivering such training.

b) have adequate and valid instructional skills certificate such as Train the Trainer, etc. and have successfully completed a Dangerous Goods training programme in the applicable category or Category-6, (or as per function assigned in the Attachment-1 to this ANO) prior to delivering such a Dangerous Goods training programme, approval by FSD, PCAA is required.

D24.3.11.2 Instructors delivering initial and recurrent Dangerous Goods training programme must deliver such courses at least every 24 months, or in the absence of this, attend recurrent training (as applicable) referred to in Attachment-1 to this ANO.

Note. Instructor to be valid must undergo refresher/recurrent training after every 24 months.

Note. Dangerous Goods Instructor evaluation shall be carried out by FSD, PCAA as per CAAF-049-FSXX-2.0 **(Appendix "P")**

D24.3.11.3 New instructors of dangerous goods should construct and co-facilitate dangerous goods courses together with an established instructor with PCAA approved syllabi.

D24.4 **Inspections**

D24.4.1 **Inspection Systems. FSD/ DAT & ER.** PCAA shall establish inspection, surveillance and enforcement procedures with a view to achieve compliance with Dangerous Goods Regulations. Refer to Para D10, D11, D12 & D13.

Note 1. It is envisaged that these procedures would include provisions for

- the inspection of Dangerous Goods consignments prepared, offered, accepted or transported by the entities referred..
- Inspecting the practices of entities referred to.
- Investigating alleged violations ------

Note 2. Guidance on Dangerous Goods inspections and enforcement maybe found in the Supplement to the ICAO TIs (Doc.9284), (Chap 1 Part S 5 & 7, Chap 5, 6)

D24.4.2 **Cooperation between States.** PCAA should participate in cooperative efforts with other States concerning violations of Dangerous Goods regulations, with the aim of eliminating such violations. Cooperative efforts could include coordination of investigations and enforcement actions; exchanging information on a regulated party compliance history; joint inspections and other technical liaisons, exchange of technical staff, and joint meetings and conferences. Appropriate information that could be exchanged include safety alerts, bulletins or Dangerous Goods advisories; proposed and completed regulatory actions; incident reports; documentary and other evidence developed in the investigation of incidents; proposed and final enforcement actions; and educational/ outreach materials suitable for public dissemination

D24.4.3 **Dangerous Goods by Post.**

D24.4.3.1 The procedures of designated postal operators for controlling the introduction of dangerous goods in mail into air transport are subject to review and approval by the FSD, PCAA where the mail is accepted.

Note. The assessment for approval of DPO procedures is attached as CAAF-101-FSXX-1.0 (**Appendix "Q").**

D24.4.3.2 In accordance with the Universal Postal Union (UPU) Convention, dangerous goods are not permitted in mail, except as provided in the ICAO TIs and this ANO.

D24.4.3.3 The following dangerous goods may be acceptable in mail for air carriage subject to the provisions of the appropriate national authorities concerned and these Instructions:

a) patient specimens as defined in 2;6.3.1.4 provided that they are classified, packed and marked as required by 2;6.3.2.3.8 a), b), c) and d); (Refer to ICAO TI)

b) infectious substances assigned to category B (UN 3373) only, when packed in accordance with the requirements of Packing Instruction 650, and solid carbon dioxide (dry ice) when used as a refrigerant for UN 3373. Where dry ice is used as a refrigerant for UN 3373, all applicable requirements of Packing Instruction 954 must be met. Mail containing dry ice as a refrigerant for UN 3373 must be offered separately to the operator by the designated postal operator so that the operator can comply with all applicable requirements of ICAO TI Part 7;

c) radioactive material in an excepted package, UN Nos. 2910 and 2911 only, the activity of which does not exceed one tenth of that listed in Part 2, Chapter 7, Table 2-14, and that does not meet the definitions and criteria of classes, other than Class 7, or divisions, as defined in Part 2. The package must be marked with the name of the shipper and the consignee, the package must be marked "radioactive material — quantities permitted for movement by post" and must bear the radioactive material, excepted package label (ICAO TI Figure 5-33);

d) lithium-ion batteries contained in equipment (UN 3481) meeting the provisions of Section II of Packing Instruction 967. No more than four cells or two batteries may be mailed in any single package; and

e) lithium-metal batteries contained in equipment (UN 3091) meeting the provisions of Section II of Packing Instruction 970. No more than four cells or two batteries may be mailed in any single package.

D24.4.3.4 The DPO must have received specific approval from the PCAA before the DPO can introduce the acceptance of lithium batteries as identified in Para D24.4.3.3 d) and e) (Ref: ICAO TIs Part 1, Chapter 2, Para 3.2 d) and e))

D24.4.3.5 The DPO may accept the dangerous goods identified in Para D24.4.3.3 a), b) and c) (Ref: ICAO TIs Part 1, Chapter 2, Para 3.2 a), b) and c) without receiving specific approval from PCAA.

Note 1. Designated postal operators may accept the dangerous goods identified in Para D24.4.3.3 a), b) and c) without receiving specific approval from the civil aviation authority.

Note 2. Guidelines for appropriate national authorities and civil aviation authorities are contained in the Supplement to these Instructions (S-1;3).

D24.4.4 **Dangerous Goods Accident and Incident Reporting**

D24.4.4.1 With the aim of preventing the recurrence of Dangerous Goods accidents and incidents, PCAA shall establish procedures for investigating and compiling information concerning such accidents and incidents which occur in its territory and which involve the transport of Dangerous Goods originating in or destined for another State. Reports on such accidents and incidents shall be made in accordance with the detailed provisions of the ICAO TIs (Doc.9284). **(Appendix "R" & "R-I")**

D24.4.4.2 With the aim of preventing the recurrence of Dangerous Goods accidents and incidents, PCAA should establish procedures for investigating and compiling information concerning such accidents and incidents which occur in its territory other than those described in D24.4.4.1. Reports on such accidents and incidents shall be made in accordance with the detailed provisions of the ICAO TIs (Doc.9284).

D24.4.4.3 With the aim of preventing the recurrence of instances of undeclared or mis-declared Dangerous Goods in cargo, PCAA shall establish procedures for investigating and compiling information concerning such occurrences which occur in its territory and which involve the transport of Dangerous Goods originating in or destined for another State. Reports on such instances shall be made in accordance with the detailed provisions of the ICAO TIs (Doc.9284)

D24.4.4.4 With the aim of preventing the recurrence of instances of undeclared or mis-declared Dangerous Goods in cargo, PCAA should establish procedures for investigating and compiling information concerning such occurrences which occur in its territory other than those described in D24.4.4.3. Reports on such instances shall be made in accordance with the detailed provisions of the ICAO TIs (Doc.9284). **(Appendix "S")**

D24.5 **Dangerous Goods Security Provisions.** PCAA shall establish Dangerous Goods security measures, applicable to shippers, operators and other individuals engaged in the transport of Dangerous Goods by air, to be taken to minimize theft or misuse of Dangerous Goods that may endanger persons, property or the environment. These measures should be commensurate with security provisions specified in ICAO Annexes and the ICAO TIs (Doc.9284).

D24.6 **Emergency Response Information.** Operator shall ensure that consignments for which a Dangerous Goods transport document is required by ICAO TIs (Doc.9284), appropriate information is immediately available at all times for use in emergency response to accident and incidents involving Dangerous Goods in air transport. The information must be available to the pilot-in-command and can be provided by ICAO document for **"Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods"** (ICAO Doc. 9481).

D24.7 **Enforcement Actions / Penalties.** PCAA shall take such measures as it may deem appropriate to achieve compliance with its Dangerous Goods regulations including the prescription of appropriate penalties for violations **(ANO-026-FSXX)**.

D24.8 PCAA should take appropriate action to achieve compliance with its Dangerous Goods regulations, including the prescription of appropriate penalties for violations, when information about a violation is received from another Contracting State, such as when a consignment of dangerous goods is found not to comply with the requirements of the ICAO TIs (Doc.9284) on arrival in a Contracting State and that State reports the matter to the State of Origin.

Note: Refer to Enforcement Act on orders and Enforcement Manual, PCAA.

D25 EXEMPTIONS AND APPROVALS

D25.1 **Introduction**

D25.1.1 The difference between an "exemption" and an "approval" can be understood by refereeing to the definitions in ICAO Annex-18 to the Convention on International Civil Aviation, The Safe Transport of Dangerous Goods by Air defines them as follow:

D25.1.1.1 **Exemption.** An authorization, other than an approval, granted by an appropriate national authority providing relief from the provisions of the ICAO TIs (Doc.9284).

D25.1.1.2 **Approval.** An authorization granted by an appropriate national authority for:

a) the transport of Dangerous Goods forbidden on passenger and/or cargo aircraft where the ICAO TIs (Doc.9284) state that such goods may be carried with an approval; or

b) other purposes as provided for in the ICAO TIs (Doc.9284).

Note. In the absence of a specific reference in the ICAO TIs (Doc.9284) allowing the granting of an approval, an exemption may be sought."

D25.1.2 In the ICAO TIs (Doc.9284), approvals are required for the following circumstances:

a) when Dangerous Goods are shipped under special provisions A1 or A2 (ICAO TI: Part 3 – Table 3-2);

b) when shipping infected live animals, dead or alive (ICAO TIs Part 2:6.3.6), etc

D25.1.3 The ICAO TIs (Doc.9284) (Part 1:1.1.3) provides for States to grant exemptions to enable the transport by air of Dangerous Goods which may not be permitted in normal circumstances or in conditions which are different to those prescribed in the Instructions. Such exemptions may only be granted in instances of extreme urgency, when other forms of transport are inappropriate or when full compliance with the ICAO TIs (Doc.9284) is contrary to the public interest.

D25.1.4 The following is offered as guidance to States to determine whether these criteria have been met:

D25.1.4.1 Extreme urgency.

a) In deciding whether the transport is urgent, States should consider why it is important for a consignment to reach its destination quickly or why it has been necessary to make an application at short notice. Dangerous Goods may need to be transported because of:

i) humanitarian relief;
ii) environmental relief;
iii) pestilence;
iv) national or international security;
v) saving of life (e.g. rescue); and
vi) limited availability at destination (ICAO TI Supp 51:1.2.1a).

b) Applications based on commercial reasons only should not be viewed as urgent and carriage by other forms of transport should also be considered.

D25.1.4.2 When other forms of transport are inappropriate.

a) Whilst carriage by other forms of transport may be possible, States should evaluate a risk analysis which should include consideration of:
   i) **Length of journey**. Transport by other forms may result in an unrealistic journey time and could affect the viability of the dangerous goods;
   ii) **Infrastructure**. The availability of other forms of transport may be limited;
   iii) **Security**. The comprehensive security provisions of the air mode may reduce the possibility of unlawful interference (theft, etc.);
   iv) **Routing**. Transport by air may result in a reduced risk of exposure of the public to the Dangerous Goods in the event of an incident or accident. The risk of piracy may also be significantly reduced;
   v) **Cost**. The cost of carriage by other forms of transport may be economically unreasonable. However, the decision to grant an exemption should not be based on cost alone (ICAO TI Supp 51:1.2.1b).

D25.1.4.3 When full compliance with the ICAO TIs (Doc.9284) is contrary to the public interest

a) For example:

   i) medical applications;
   ii) new technologies; and
   iii) Enhancements in safety (ICAO TI Supp 51:1.2.1c).

D25.2 **Request for an Exemption**

D25.2.1 When a State is approached for an exemption it is suggested that, if it is appropriate, at least the following information should be supplied before consideration is given to granting an exemption:

D25.2.1.1 the reason why it is essential the article or substance must be carried by air;

D25.2.1.2 a statement why the applicant believes the proposal (including any safety control measures specified by the applicant) will achieve a level of safety equivalent to that provided by these Instructions;

D25.2.1.3 proposed proper shipping name, classification and UN number with full supporting technical data;

D25.2.1.4 the proposed packaging;

D25.2.1.5 quantity to be carried;

D25.2.1.6 any special handling required and any special emergency response information;

D25.2.1.7 name and address of shipper and consignee;

D25.2.1.8 the airports of departure, transit and destination and the proposed dates of transport; and

D25.2.1.9 details of the operator including aircraft type, flight numbers, etc (ICAO TI Supp 51:1.2.3).

Note. Refer to **Appendix "T"** (Application for Approval or Exemption to Carry Dangerous Goods in Special Circumstances).

D25.3 **Evaluation of an Exemption request**

D25.3.1 When granting an exemption, an overall level of safety in transport that is at least equivalent to the level of safety provided by the ICAO TIs (Doc.9284) must be achieved. In determining an equivalent level of safety, the following should be considered:

D25.3.1.1 **A review of the applicable regulatory provisions**. This includes the identification of specific provisions that will not be met, thus requiring a determination that an equivalent level of safety has been achieved;

D25.3.1.2 **A review of any potential increased risk to safety or property that may result from deviating from the provisions in question and identification of the measures considered necessary or appropriate to address that risk**. This should include substantiation with applicable analysis or an evaluation demonstrating that the proposed additional measures will achieve a level of safety that is at least equal to that required by the ICAO TIs (Doc.9284);

D25.3.1.3 **A thorough review and risk assessment to identify and evaluate potential risks in transport**. This may include a risk analysis addressing failure modes and effects, a systems safety evaluation, and an explanation of the measures imposed to ensure each risk factor has been evaluated, in order to provide an appropriate level of safety;

D25.3.2 When appropriate, **risk mitigation factors and a safety analysis** may be based on analogy to requirements in place for technologies posing similar risks in order to ensure safety and regulatory consistency.

D25.4 **Issuing an Exemption**

D25.4.1 When an exemption is to be issued by a State it is suggested that, if appropriate, the following items should be considered to be the minimum requirements to be applied in connection with that exemption:

a) Notification should be provided to the authorities at the relevant airports within that State;
b) The packing method to be used should, where possible, be as shown in the supplementary Dangerous Goods list. The packaging to be used should provide a level of safety at least equivalent to that which is needed in order to meet the applicable requirements of Parts 4 and 6 of the ICAO TIs (Doc.9284); and
c) copies of the relevant exemption documents should be attached to the Dangerous Goods transport document which accompanies the goods (ICAO TI Supp 51:1.3.1).

D25.4.2 When a State grants an exemption it should contain, as a minimum, the following:

a) the UN number, proper shipping name and the classification of the goods;
b) the packaging and quantity applicable;
c) any special handling required and any special emergency response information;
d) name and address of shipper and consignee;
e) the airports of departure, transit and destination and the proposed dates of transport; and
f) The duration of the validity of the exemption, this normally should not exceed a period of two years from the date of issue.

D25.4.3 A copy of the exemption must be provided to the operator concerned.

D25.4.4 The responsibility for obtaining the above exemption may rest with a State or with the operator or with the shipper, depending on States' national procedures. Generally, the applicant for an exemption should be the party for whom the responsibilities are most relevant, e.g. when an exemption is granted for dangerous goods which are forbidden under normal circumstances, it may be most appropriate for the shipper to apply. However, the exemption must address all affected parties. Irrespective of who is responsible, the operator must be in possession of confirmation that all the required exemptions have been obtained prior to accepting the goods for shipment.

D25.4.5 Usually an exemption should cover a single occasion, but it may be necessary to issue exemptions to cover multiple occasions and/or multiple shippers.

D25.4.6 An exemption must not be granted for any Dangerous Goods indicated as forbidden under any circumstance, as described in the ICAO TIs (Doc.9284) (see Part 1:2.1).

D25.4.7 Where Dangerous Goods are forbidden on both passenger and cargo aircraft, consideration should ordinarily only be given to carriage on cargo aircraft.

D25.4.8 Transport on a passenger aircraft should only be considered in exceptional circumstances.

D25.4.9 Where an exemption or approval is required from more than one State, it is usually most appropriate for the State of Origin to grant the initial exemption because they may have greater awareness of the shipper and the terms and conditions under which the Dangerous Goods will be shipped. However, there may be circumstances where another State concerned might be better placed to grant the initial exemption.

D25.4.10 If a States grant an exemption from the prohibition to transport lithium metal batteries on passenger aircraft as per special provision A201, the Authorities issuing the exemption must provide a copy to the Chief of the Cargo Safety Section within three months via email at CSS@icao.int, via facsimile at +1 514-954-6077 or via post to the following address:

Chief, Cargo Safety Section
International Civil Aviation Organization
999 University Street
Montréal, Quebec
CANADA H3C 5H7

D26. PROCEDURES FOR DIPLOMATIC FLIGHT PERMIT / CLEARANCE FOR AIRCRAFT CARRYING DANGEROUS GOODS

D26.1 In order to receive a diplomatic flight permit for carrying the dangerous goods, all State members shall, by diplomatic procedure, send a flight permit request to the Ministry of Foreign Affairs (MoFA), Islamabad, Pakistan not later than 7 working days before the planned flight of the aircraft.

D26.2 An undertaking shall be submitted with the affirmation that the dangerous goods are packaged and secured in the aircraft in accordance with the TIs for the Safe Transport of Dangerous Goods by Air (ICAO Doc.9284) requirements.

D26.3 If the aircraft is planning to land in a civil aviation aerodrome of the Islamic Republic of Pakistan, information must be included on the unloading and loading conditions of the dangerous goods, specific requirements for processing the cargo, as well as instructions for action of emergency services in cases of incidents.

D26.4 NOC must be obtained from PCAA for all the outbound diplomatic flights carrying dangerous goods from Pakistan.

D27. COMPETENCY-BASED TRAINING & ASSESSMENT (CBTA) – REQUIREMENTS

All entities performing activities directly or indirectly related to transport of dangerous goods by air must;

D27.1 Ensure compliance with the dangerous goods training requirements as defined in Attachment-1 to this ANO, as a minimum.

D27.2 Ensure that their employees are competent to perform any function for which they are responsible prior to performing any of these functions. This must be achieved through training and assessment commensurate with the functions for which they are responsible.

Note. As a minimum, dangerous goods program for Competency-based Training and Assessments are defined in Attachment-1 to this ANO.

D27.3 Ensure to address the mandatory dangerous goods minimum training requirements into their relevant Operations Manual(s), Standard Operating Procedures or Work Instructions, as appropriate and maintain records of the Dangerous Goods Training for their employees.

D27.4 Ensure that all dangerous goods training records of all employees are made available and accessible anytime to PCAA officials for regulatory purposes.

Note. A comprehensive summary of CBTA Tables corresponding to previously known Categories & IATA CBTA Guidance is given in Attachment-2 to this ANO.

D28. PCAA DANGEROUS GOODS FORMS

D28.1 All the Dangerous Goods Forms / Checklists / applications are available and can be accessed through the PCAA official website www.caapakistan.com.pk

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1 ACRONYMS:

AOC	:	AIR OPERATOR CERTIFICATE
AFF	:	AUTHORIZED FREIGHT FORWARDER
ANO	:	AIR NAVIGATION ORDER
AWB	:	AIR WAYBILL
CAA	:	CIVIL AVIATION AUTHORITY
CAO	:	CARGO AIRCRAFT ONLY
CARs, 1994	:	CIVIL AVIATION RULES 1994
CBTA	:	COMPETENCY-BASED TRAINING & ASSESSMENT
CE/CEO	:	CHIEF EXECUTIVE/CHIEF EXECUTIVE OFFICER
CMA	:	CONTINUOUS MONITORING APPROACH
COMAT	:	COMPANY MATERIAL
DAT&ER	:	DIRECTOR AIR TRANSPORT & ECONOMIC REGULATIONS
DFS	:	DIRECTOR FLIGHT STANDARDS
DG CAA	:	DIRECTOR GENERAL PAKISTAN CIVIL AVIATION AUTHORITY
DGD	:	DANGEROUS GOODS DECLARATION
DGR	:	DANGEROUS GOODS REGULATIONS
ERG	:	EMERGENCY RESPONSE GUIDE
FBR	:	FEDERAL BOARD OF REVENUE
FIR	:	FIRST INFORMATION REPORT
FIT	:	FUNCTION IN TABLE
FSD	:	FLIGHT STANDARDS DIRECTORATE
GHA	:	GROUND HANDLING AGENT
HQCAA	:	HEADQUARTERS PAKISTAN CIVIL AVIATION AUTHORITY
IATA	:	INTERNATIONAL AIR TRANSPORT ASSOCIATION
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
ICAO TI	:	ICAO TECHNICAL INSTRUCTIONS (Doc.9284)
NOC	:	NO OBJECTION CERTIFICATE
NOTOC	:	NOTIFICATION TO CAPTAIN
NTN	:	NATIONAL TAX NUMBER
PCAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
PNRA	:	PAKISTAN NUCLEAR REGULATORY AUTHORITY
SECP	:	SECURITIES & EXCHANGE COMMISSION OF PAKISTAN
Supp	:	SUPPLEMENT
ULD	:	UNIT LOAD DEVICE

E2 RECORDS:

E2.1 Application for Registration of Authorized Freight Forwarder / Shipper (CAAF-014-ATNR-2.2)

E2.2 Certificate of Registration – Authorized Freight Forwarder / Shipper (CAAF-011-ATNR-1.2).

E2.3 Dangerous Goods Audit / Inspection Checklist (CAAF-041-FSXX-2.0).

E2.3.1 Checklist for Yearly Inspection of Location / Station of Freight Forwarder / Shipper (CAAF-042-ATNR-1.0).

E2.3.2 Observation Form for FF / Shipper's Inspection (CAAF-040-ATNR-1.0).

E2.3.3 Air Cargo Security Standards Checklist

E2.4 Information Form - NOC for Carriage of Dangerous Goods (CAAF-083-FSXX-1.0).

E2.5 NOC for carriage of Dangerous Goods by Air (CAAF-084-FSXX-1.0)

E2.6 Application for an authorization to carry Dangerous Goods as Cargo (CAAF-085-FSXX-1.0).

E2.7 Acceptance Checklist for a Non-Radioactive Shipment (CAAF-086-FSXX-1.0)

E2.8 Acceptance Checklist for a Radioactive Shipment (CAAF-087-FSXX-1.0)

E2.9 Acceptance Checklist for Dry Ice (Carbon Dioxide, Solid) – (CAAF-088-FSXX-1.0)

E2.10 NOTOC (CAAF-089-FSXX-1.0)

E2.11 Operations Manual's Dangerous Goods Segment (CAAF-052-FSXX-1.0)

E2.12 Application for approval of Dangerous Goods Training Program (CAAF-061-FSXX-1.0)

E2.12.1 Training Programs Approval Letter

E2.12.2 Register of Dangerous Goods Training Program Approvals

E2.13 Certificates of Dangerous Goods Training Inspection Checklist (CAAF-042-FSXX-1.0)

E2.14 Record of Dangerous Goods Training Inspection Checklist (CAAF-055-FSXX-1.0)

E2.15 Dangerous Goods Training Course Delivery – Evaluation Report (CAAF-049-FSXX-2.0)

E2.16 Contingency Plan for Dealing with Dangerous Goods Incident

E2.17 Application for Approval or Exemptions to Transport Dangerous Goods in special circumstances

E2.18 Dangerous Goods Ramp Inspection Checklist

E2.19 Dangerous Goods Occurrence Report (CAAF-090-FSXX-1.0)

E2.20 Passenger / Crew Dangerous Goods Occurrence Report (CAAF-091-FSXX-1.0)

E2.21 Dangerous Goods Investigation Report (CAAF-024-FSXX-1.0)

E3 REFERENCES:

E3.1 Civil Aviation Rules 1994 (CARs, 1994)

E3.2 PCAA Enforcement Policy and Procedure Manual (MNL-010-DGR)

E3.3 ICAO Annex-18 to the Chicago Convention 1944

E3.4 ICAO TIs on the Safe Transport of Dangerous Goods by Air (Doc.9284)

E3.5 ICAO Emergency Response Guidance for Aircrafts Incidents Involving Dangerous Goods (Doc. 9481)

E3.6 Guidance on a Competency-based Approach to Dangerous Goods Training and Assessment (ICAO Doc.10147)

E3.7 IATA Dangerous Goods Regulations (DGR)

E3.8 IATA Dangerous Goods Training Guidance on Competency-based Training & Assessment Approach

E3.9 ANO-026-FSXX (Enforcement Procedures Violations of Dangerous Goods Regulations)

E3.10 Document & Record Control **(CAAO-001-MSXX)**

IMPLEMENTATION:

This Air Navigation Order supersedes previous ANO-030-FSXX-3.0, orders / directives on the subject of Safe Transportation of Dangerous Goods by Air, and shall be implemented with effect from **01st August, 2023**.

-- S/d --

(KHAQAN MURTAZA)
Director General,
Pakistan Civil Aviation Authority

Dated: - **23rd June, 2023**

-- S/d --

(CAPT. FAROOQ IQBAL)
FLIGHT INSPECTOR (PILOT)

Dated: - **15th June, 2023**
File No. HQCAA/1076/205/FSAC

APPENDIX "A"

PAKISTAN CIVIL AVIATION AUTHORITY APPLICATION FOR REGISTRATION OF AUTHORIZED FREIGHT FORWARDER / SHIPPER	CAAF-014-ATNR-2.2
Air Transport & Economic Regulations Directorate	

Please read overleaf instructions.

Application for : ☐ Issue ☐ Renewal ☐ Duplicate Issue

1. **Name of Applicant Company**: ____________________
2. **Registered Address**: ____________________
3. **Address for Communication (if other than in Column-2)**: ____________________

____

Note: *As per Civil Aviation Rules, 1994, the Company must be registered in Pakistan. Any change therein, shall be incorporated in SECP and be submitted on the prescribed Form.*

Telephone No: ____________________ **Cell No:** ____________________

Fax No: ____________________

E-mail: ____________________**Website:** ____________________

4. **Station / Location:**____________________
5. **Identification of Applicant**:

☐ **Private Limited Company** ☐ **Public Limited Company**

5.1 Name and address of Owner / Chief Executive: ____________________

____

5.2 Name, address and Nationality of each Director (separate paper may be used):

(a) ____________________

(b) ____________________

(c) ____________________

5.3 Details of earlier Licences / Certificates issued by CAA (if any). Copies are to be attached.

(a) ____________________

(b) ____________________

6. **CERTIFICATE OF ACCEPTANCE**

6.1 I being the Owner / CEO of ____________________do hereby state that I have thoroughly read and understood Rules, Air Navigation Orders and Conditions of this Certificate and acknowledge its acceptance accordingly.

Dated:____________________

Name and Signature of Owner / CEO
with Stamp with Stamp

	PAKISTAN CIVIL AVIATION AUTHORITY APPLICATION FOR REGISTRATION OF AUTHORIZED FREIGHT FORWARDER / SHIPPER	CAAF-014-ATNR-2.2
	Air Transport & Economic Regulations Directorate	

INSTRUCTIONS FOR
REGISTRATION OF AUTHORIZED FREIGHT FORWARDER / SHIPPER

1. General

The applicant, prior to apply, must go through AT & ER Directorate's ANO-014-ATNR for the pre-requisites conditions.

1.1 To expedite processing of the application, the Form must be completed in all respects.
1.2 Fill all columns neatly. Do not leave any column blank. Put a (X) at appropriate boxes.
1.3 Extra sheets, if required, are to be used on company's letterhead.

2 Eligibility

2.1 Company / proprietor intending to register itself as AFF / Shipper shall be eligible for the registration provided it fulfills the following requirements:-
2.1.1 Company registered in Pakistan with SECP
2.1.2 Company must be financially sound.
2.1.3 Company's place of business must in Pakistan.
2.1.4 The promoter / administration of such Company has the required knowledge / desired skills for such registration.
2.1.5 Company's majority shareholding must be in local hands.
2.1.6 Company must be certified by IATA. (For more than one station / location, applicant should have IATA Certificate separately).

3. Certificate Fee

3.1 Schedule specified in the Air Navigation Order which is available on CAA website.

4. Attachments for Issuance of Certificate

4.1 The Applicant shall submit the following documents along with duly filled CAA Form CAAF-014-ATNR to DAT & ER, HQCAA. After verification of documents, the applicant shall submit prescribed application and requisite documents through CAA's Software, available on CAA's website, after taking ID and Password from AT & ER Directorate, before submitting hard copies there of:- ***[Please put a cross in the appropriate box to ensure the attachments]***

- ❏ Apply on Company's Letterhead indicating the station / location from where the applicant intend to handle DG by air, duly signed and stamped by owner / CEO.
- ❏ Brief introduction about the Firm and past experience.
- ❏ Application Form duly filled, signed and stamped by Owner / CEO.
- ❏ Evidence of Certificate Processing Fee, Issuance Fee and Security Deposit, as per ANO.
- ❏ Bank statement along with Bank Certificate.
- ❏ Corporate Structure (Organogram) on company's letterhead signed & stamped by Owner / CEO.
- ❏ Details of experience of CEO and Directors along with their attested photographs.
- ❏ Certificate from Owner / CEO of the Company regarding compliance of all regulatory requirements / instructions and shall abide by the rules / regulations issued by CAA from time to time.
- ❏ Undertaking on company's letterhead that NOC would be obtained from Pakistan Nuclear Regulatory Authority (PNRA), prior to requesting NOC from CAA for Radioactive material.
- ❏ Applicant shall submit an Undertaking that the Owner and Directors / Managers of the Company are not involved and have no history of safety violations or consumer fraud activities that would pose a risk to the travelling public.
- ❏ Authorization letter in favour of two persons to deal with CAA on behalf of the company, signed by CEO.

4.2 **Notarized Copies of:-**

- ❏ Certificate of Incorporation incorporated in SECP.
- ❏ Memorandum & Articles of Association, incorporated in SECP duly signed by the Company's Directors along with any other prescribed SECP Forms.
- ❏ IATA Certificate (For more than one station / location, applicant should have IATA Certificate separately).
- ❏ Valid CNICs of Owner / CEO and Directors on A4 size paper with their attested passport size photographs.
- ❏ Valid DGR Certificate holder Cat-6 staff, employed by the company
- ❏ Income Tax Certificate showing NTN Number.
- ❏ Other Certificate / Licences issued by CAA, if any

{ Note: Any other documents as desired by CAA, are to be submitted }

5. Attachments for Renewal of Certificate

- ❏ Applicant is to apply online through Software and also forward hard copies supporting by company's covering letter at least **60 days** before expiry of the Certificate.
- ❏ CAA Form, duly filled, signed and stamped by Owner / CEO.
- ❏ Original Certificate and its applicable Renewal Fee as per ANO.
- ❏ Notarized current copy of IATA Certificate (For more than one station / location, applicant is to submit IATA Certificate separately).
- ❏ Notarized copies of Form-3, Form-A, Form-29 or any other prescribed Form duly verified by SECP, if applicable.
- ❏ Late submission charges of Rs.2000/- per month or part thereof (if applicable)

6. Attachments for Re-issuance / Duplicate Certificate

6.1 As per Air Navigation Order.

APPENDIX "B"

CAAF-011-ATNR-1.2

پاکستان سول ایوی ایشن اتھارٹی

PAKISTAN CIVIL AVIATION AUTHORITY

AUTHORIZED FREIGHT FORWARDER / SHIPPER

CERTIFICATE OF REGISTRATION # ____________

1. M/s. ____________ having registered office at ____________ are hereby registered with Pakistan Civil Aviation Authority as Authorized Freight Forwarder / Shipper.

2. This Certificate of Registration is issued by the Director Flight Standards on behalf of Director General, Pakistan Civil Aviation Authority subject to the Conditions of the Certificate attached herewith.

3. The Certificate shall remain valid until the ______ day of ______ It shall be renewed annually upon satisfactory compliance of the Conditions hereof.

4. The Certificate holder can perform the handling of 'Dangerous Goods by air' from their ____________ office.

Karachi,
Dated

DIRECTOR AIR TRANSPORT & ER
Headquarters, CAA Pakistan

Renewals

From	To	Signature	From	To	Signature

APPENDIX "C"

	PAKISTAN CIVIL AVIATION AUTHORITY DANGEROUS GOODS AUDIT / INSPECTION CHECKLIST Flight Standards Directorate	CAAF-041-FSXX-2.1

Dangerous Goods Audit / Inspection Checklist ☐ Initial ☐ Renewal

Name of Operator		Date
Name and Title of Dangerous Goods Coordinator		
Telephone	Fax	E-mail

Location		
Airport Name	Closest City	IATA Code
Province / State	Country	ICAO Code
Name of Facility		Telephone
Address of Facility		Fax
Name and Title of Contact Person		
Telephone	Fax	E-mail

Type of Operation

☐ Year Long	☐ Maintenance Only	☐ Ad Hoc
☐ Seasonal	☐ Cargo Acceptance Only	☐ Sub-Contract

Dangerous Goods Handled (Based on historical data)	YES	NO	If yes - > Average quantity of package per year
Commercial Dangerous Goods Cargo accepted at Station	☐	☐	☐ 0-999 ☐1,000-9,999 ☐+10,000
Cargo Aircraft Only quantities of Dangerous Goods accepted at Station	☐	☐	☐ 0-999 ☐1,000-9,999 ☐+10,000
Non-Dangerous Goods Commercial Cargo accepted at Station	☐	☐	☐ 0-999 ☐1,000-9,999 ☐+10,000
Dangerous Goods COMAT shipped	☐	☐	☐ 0-999 ☐1,000-9,999 ☐+10,000
Mail / Post loaded	☐	☐	☐ 0-999 ☐1,000-9,999 ☐+10,000

Note

	PAKISTAN CIVIL AVIATION AUTHORITY **DANGEROUS GOODS** **AUDIT / INSPECTION CHECKLIST**	**CAAF-041-FSXX-2.1**
	Flight Standards Directorate	

Pre-Audit							
	Item	**Reference**	**OK**	**FDG**	**N/A**	**N/C**	**Notes**
1	Identify any outstanding Audit Finding respecting the last audit.	N/A					
2	Determine the current type of operator service and identify any changes since the last audit.	N/A					
3	Review prior company records to establish compliance history	N/A					
4	Review dangerous occurrence reports, where applicable.	N/A					
5	Determine if the company currently has any approval or exemption	N/A					
6	Review manual and determine if there has been any amendments to the dangerous goods operations manual/other manuals.	ICAO TI 7;4.2					
7	Determine if the company has an approval for the transport of dangerous goods on main deck cargo compartments of passenger aircraft.	ICAO TI 7;2.1					
8	Determine if the company has an approved dangerous goods training program.	ICAO TI 1;4.1.2					
9	Determine if the training program reflects all regulatory or operational amendments.	ICAO TI 1;4.2					
Note							

	PAKISTAN CIVIL AVIATION AUTHORITY DANGEROUS GOODS AUDIT / INSPECTION CHECKLIST	CAAF-041-FSXX-2.1
	Flight Standards Directorate	

Various lower level managers are generally delegated, by senior management, the responsibility of managing the systems for ensuring that the operators dangerous goods manual is appropriately distributed, is current and kept up to date, that training records are maintained and various dangerous goods transport documents are retained. The following checklist is applicable to all levels of management who hold those responsibilities.

Site Inspection							
	Item	Reference	OK	FDG	N/A	N/C	Notes
1	ADMINISTRATION						
	Determine if internal audits on the Dangerous Goods Manual, Dangerous Goods Training, Dangerous Goods Acceptance/ Handling/Loading Processes and Dangerous Goods Document Control are conducted.						
	Determine who has the authority to amend and issue the Dangerous Goods Manual, the system for distribution and control of the manual and the system for keeping the manual up to date: • Responsibility/Authority (Who) • Date of amendment (When) • Distribution List • Distribution process (How)						
1-1	Does the company's dangerous goods training program match the State approved program?	ICAO TI 1;4.1.2					
	Determine who conducts that dangerous goods training and the system for ensuring that those courses and instructors are appropriately authorised / qualified: • System for assessing and approving internal dangerous goods training providers • System for assessing and approving external dangerous goods training providers						
1-2	Determine that the recurrent training takes place within 24 months of previous training.	ICAO TI 1;4.2.3					
1-3	Determine that the company maintain a record of training for trained employees.	ICAO TI 1;4.2.5					
	Determine who is responsible for maintaining the dangerous goods training records and the system used for maintaining those records: • System for the training of staff relating to dangerous goods • System for maintaining currency of staff relating to dangerous goods System for maintaining dangerous goods training records						
1-4	Determine that the maintenance staffs are aware of requirements in respect of replacements or unserviceable items.	ICAO TI 1;2.2.2					
Note							

PAKISTAN CIVIL AVIATION AUTHORITY DANGEROUS GOODS AUDIT / INSPECTION CHECKLIST	CAAF-041-FSXX-2.1
Flight Standards Directorate	

ACCEPTANCE, HANDLING, STORAGE AND LOADING OF DANGEROUS GOODS

The operator must have procedures in place to ensure that dangerous goods are accepted, handled, temporary stored (segregation and consideration to goods who need to be stored away from certain environmental condition (heat, light or water) and loaded on aircraft as per the requirements.

The "CARGO FACILITIES INSPECTION FORM", "PACKAGE INSPECTION FORM" and the "GROUND HANDLING INSPECTION FORM" should be used in addition to this checklist.

Site Inspection							
	Item	Reference	OK	FDG	N/A	N/C	Notes
2	**ACCEPTANCE OF DANGEROUS GOODS**						
2-1	Determine who accepted the dangerous goods cargo and general cargo for the operator.						
2-2	Determine if the Operations Manual is available to acceptance staff as required.	ICAO TI 7;4.2					
2-3	Determine if the company's acceptance procedures are in compliance with the regulations. Adequacy and use of acceptance checklist, accessibility of Dangerous Goods documents.	ICAO TI 7;1					
2-4	Determine if the Pilot Notification System procedures are in compliance with the appropriate regulations. Verify correct completion (including signature/ some other indication) and accessibility.	ICAO TI 7;4.1					
2-5	Determine if the documents are retained for a minimum of three months.	ICAO TI 7;4.11					
2-6	Determine if the operator's acceptance staff are adequately trained to assist them to identify and detect dangerous goods presented as general cargo	ICAO TI 1;4.2.1					
2-7	Determine the capability of the operator to replace lost or stolen safety marks.	ICAO TI 7;2.7					
2-8	Determine provision of information is provided at cargo acceptance areas.	ICAO TI 7;4.8					
3-	**STORAGE, HANDLING AND LOADING OF DANGEROUS GOODS**						
3-1	Verify the company's storage procedures are in compliance with the regulations. Verify packages are handled correctly and segregation between packages respected.	ICAO TI 7;2					
3-2	Determine that operator has procedure to ensure inspection for leaking or damage before and after loading.	ICAO TI 7;3.1					
3-3	Determine that operator has procedures for removal of damaged or leaking packages from aircraft.	ICAO TI 7;3.2 7;3.3					
3-4	Determine that pilots have been supplied with appropriate written or printed information regarding dangerous goods to be carried as cargo,	ICAO TI 7;4.1					

	PAKISTAN CIVIL AVIATION AUTHORITY **DANGEROUS GOODS** **AUDIT / INSPECTION CHECKLIST**	**CAAF-041-FSXX-2.1**
	Flight Standards Directorate	

Site Inspection

	Item	Reference	OK	FDG	N/A	N/C	Notes
3-5	Determine that the notification to the pilot (NOTOC) includes signed confirmation of no evidence of any damage to or leakage from the package.	ICAO TI 7;4.1.4					
3-6	Determine that the pilot indicates on one copy or in some other way that the information was received.	ICAO TI 7;4.1.7					
3-7	Determine if the operator provided the pilot in command with the "Emergency Response Guidance" or a similar document concerning dangerous goods on board.	ICAO TI 7;4.9					
3-8	Determine that the company has procedures for loading and stowing a wheelchair for a passenger. (including notification to the pilot in command)	ICAO TI 8;1.1.2 Table 8-1 (5 to 7)					
3-9	Determine if the operator's employees including those agencies employed to act on the operator's behalf are adequately trained.	ICAO TI 7;4.10					

Note

PAKISTAN CIVIL AVIATION AUTHORITY DANGEROUS GOODS AUDIT / INSPECTION CHECKLIST Flight Standards Directorate	CAAF-041-FSXX-2.1

PASSENGER INFORMATION

Except as otherwise provided in TIs Part 8; 1.1.2, dangerous goods must not be transported by passengers or crew members. Passengers and crew are permitted to transport certain dangerous goods either in checked baggage or carry-on baggage. Some of these permitted items require the express approval of the operator. In order to do this, safely check-in staff must be provided with the appropriate training and material at the check-in counter to be able to identify those items "PASSENGER HANDLING FACILITIY INSPECTION FORM" should be used in addition to this section.

Site Inspection							
	Item	Reference	OK	FDG	N/A	N/C	Notes
4	**PASSENGER CHECK-IN**						
4-1	Determine if there is a documented policy or process concerning dangerous goods carried by passengers or crew.	ICAO TI 8;1					
4-2	Determine that the company is in compliance with the requirements for provision of information to passengers and crew. Verify notices in place and information provided with passenger ticket or in another manner.	ICAO TI 7;5.1.2					
4-3	Determine that passenger check-in procedures are in compliance with the regulation.	ICAO TI 7;5.2					
4-4	Determine if the operator's employees including those agencies employed to act on the operator's behalf are adequately trained.	ICAO TI 7;5.2.1					
Note							

	PAKISTAN CIVIL AVIATION AUTHORITY DANGEROUS GOODS AUDIT / INSPECTION CHECKLIST Flight Standards Directorate	CAAF-041-FSXX-2.1

REPORTING OF INCIDENT, ACCIDENT OR UNDECLARED DANGEROUS GOODS

It is important to remember that dangerous goods incident is not incidents until the product in question has been formally accepted for uplift by the airline operator. However, once formally accepted there are a number of aspects that must be addressed by the operator.

Site Inspection							
	Item	Reference	OK	FDG	N/A	N/C	Notes
5	**REPORTING OF DANGEROUS GOODS**						
5-1	Verify the company has the proper dangerous occurrence procedures in place, in case of an aircraft accident, incident and occurences.	ICAO TI 7;4.6 & 7;4.7					
5-2	Determine if a reporting system exists to report Dangerous Goods accidents and incidents to the State of operator and state where accident or incident occurred.	ICAO TI 7;4.4					
5-3	Determine if a reporting system exists to identify undeclared or misdeclared dangerous goods. Arrangements between operator/handling agents and operator/security staff to ensure reporting to the State.	ICAO TI 7;4.5					
5-4	Determine that pilots have been supplied with appropriate information concerning his responsibility to inform appropriate air traffic services in case of in-flight emergency	ICAO TI 7;4.3					
5-5	Determine that pilots have been supplied with appropriate information regarding emergency response.	ICAO TI 7;4.9					
Note							

PAKISTAN CIVIL AVIATION AUTHORITY DANGEROUS GOODS AUDIT / INSPECTION CHECKLIST	CAAF-041-FSXX-2.1
Flight Standards Directorate	

Observation	
Ref	**Details Of Non-Conformity (continued from above tables)**

Name and Title of Inspector	Signature	Date
Telephone	Fax	E-mail

APPENDIX "C-I"

	PAKISTAN CIVIL AVIATION AUTHORITY **AIR TRANSPORT & ER DIRECTORATE** **CHECKLIST FORM FOR YEARLY INSPECTION OF LOCATION / STATION OF FREIGHT FORWARDER / SHIPPER**	**CAAF-042-ATNR-1.0**
	Air Transport & Economic Regulations Directorate	

M/s ________________.

Initial / Renewal **Station / Location ____________.** **Dated: ______ 20 __.**

	YES	NO	Reason if NO….
Valid Certificate of Registration FF/Shipper			
Valid DGR Certificate of employees			
Availability of current IATA Dangerous Goods Regulations			
Valid IATA certificate (for each station)			
SOP for Emergency Handling Procedure in case of fire			
Process for handling Radioactive materials			
NOC obtained from PNRA and Flight Standards Directorate			
Availability of Valid Fire Extinguisher			
Availability of Civil Aviation Rules 1994			
Availability of Air Navigation Order ANO-030-FSXX			
Undertaking for obtaining NOC from Flight Standards Directorate for Shipment in accordance with ICAO Doc.9284-AN/905/IATA TIs.			
NOCs for shipment obtained from Flight Standards Directorate			
SECP Form-29, Form-A, Form-3 &Form-21			
Registration with SECP by shares (Pvt) Ltd. Company or Public Limited Company			
Security Deposit in line with ANO-030-FSXX			

Signature ______________________

Company Official Contacted

Name	Designation	Cell No.

APPENDIX "C-IA"

	PAKISTAN CIVIL AVIATION AUTHORITY **OBSERVATION FORM FOR FF/SHIPPER'S INSPECTION FOR DANGEROUS GOODS** **AIR TRANSPORT DIRECTORATE NATIONAL REGULATION** **Air Transport & Economic Regulations Directorate**	**CAAF-040-ATNR-1.0**

ISSUANCE ☐ **RENEWAL** ☐	**Dated:**
Auditor's Name	File No.
Company Name	Area / Location of Audit:
Company Representatives:	Docs: ICAO 9284, CARs 1994 & ANO-030-FSXX
OBSERVATION No._____	
Auditor's Signature	
Company response is to be received by: Dated:	
COMPANY RESPONSE	
Company Representative's Signature & Stamp	Date
FOR AUDITOR'S USE ONLY:	

Company Response Accepted ☐ Company Response Rejected ☐

Auditor's Finding **Settled** ☐ **Not Settled** ☐

Recommended for:

Issuance ☐ **Renewal** ☐

Not to Issue ☐ **Not to Renew** . ☐

Auditor's Signature & Stamp Date

APPENDIX "C-II"

AIR CARGO SECURITY STANDARDS CHECKLIST

AIR CARGO SECURITY STANDARDS CHECKLIST		SECURITY LEVEL	
MANDATORY REQUIREMENTS		1	2
1.	PREPARATION:		
1.1.	Risk assessment completed and accurate		
2.	MANAGEMENT COMMITMENT & SUPPORT:		
2.1.	Security organisation in place with roles and responsibilities defined.		
2.2.	Security policy and procedures implemented and managed by the total organisation.		
2.3.	Security strategy implemented with clear objectives and targets.		
2.4.	Process in place to implement and manage legal and other requirements related to threat and risks.		
3.	PHYSICAL SECURITY ARRANGEMENTS : PERIMETER SECURITY		
3.1.	Cargo handling and shipping and receiving yard enclosed by perimeter fencing.		
3.2.	CCTV external coverage of shipping and receiving yard, including entry/exit points, to cover movement of vehicles and individuals.		
3.3.	CCTV coverage of all external dock areas.		
3.4.	CCTV system able to view exterior sides of the facility.		
3.5.	Flood lighting of loading/unloading areas.		
3.6.	Dock doors illuminated externally at night.		
3.7.	Exterior and interior lighting levels that support high quality CCTV images and recording are adequate.		
3.8.	All facility external doors alarmed and linked to main alarm system.		
3.9.	All windows or other openings in warehouse walls and roof secured.		
3.10.	Ground floor warehouse windows protected by anti-ram posts or other physical barrier.		
3.11.	Dock doors of sufficient strength to delay forced entry by use of portable hand tools or ramming by vehicle.		
3.12.	Reinforced exit doors from warehouse (steel doors and frames or suitable alternative).		
3.13.	Exterior walls and roof designed and maintained to resist penetration by removing building fabric, cutting or ramming by vehicle.		
3.14.	External access to roof (ladder or stairs) controlled.		
4.	PHYSICAL SECURITY ARRANGEMENTS: ACCESS CONTROLS		
4.1.	Visitor entry point(s) controlled.		
4.2.	Employee entry point(s) controlled.		
4.3.	Access control processes both during and outside normal operating hours to ensure access is granted only for authorized Supplier employees and visitors.		
4.4.	Security controlled access points (e.g., guard, card access or CCTV with intercom).		
4.5.	Only authorised employees and escorted visitors permitted access to dock/warehouse.		
4.6.	Restricted-access to caged/vault area for vulnerable cargo staged on-site for more than 4 hours: High-grade security mesh, chain-link, or hard-wall, including top/roof; CCTV, controlled access.		
4.7.	All external dock and warehouse doors closed and secured when not in active use.		
4.8.	Internal dock doors and dock areas covered by CCTV.		
4.9.	Motion detection alarms inside warehouse and activated when entire warehouse is vacated.		

AIR CARGO SECURITY STANDARDS CHECKLIST		SECURITY LEVEL	
MANDATORY REQUIREMENTS		1	2
5.	PHYSICAL SECURITY ARRANGEMENTS: SECURITY SYSTEMS:		
5.1.	Manned security monitoring posts; monitoring post secured from attack.		
5.2.	All security system alarms responded to in real-time.		
5.3.	Documented maintenance programs in place for all technical (physical) security installations / systems (CCTV, Access controls, Intruder detection, Lighting).		
5.4.	Minimum of 60 day records on system alarms.		
5.5.	Restricted access to alarm system.		
5.6.	Alarms Monitored (On or offsite)		
5.7.	All CCTV images are recorded digital in “real time”.		
5.8.	Restricted access to CCTV system functions.		
5.9.	Minimum 30-day retention of all CCTV recordings; recordings are held in secure storage area.		
5.10.	Minimum 60-day records on access control system transactions.		
5.11.	Restricted access to systems functions.		
5.12.	Quarterly review of access reports.		
6.	PROCEDURES:		
6.1.	Suitable documented procedures for secure handling of cargo on ramp and in warehouse areas.		
6.2.	Process in place to escort freight (done by security escorts) directly from or to the tarmac / plane parking location.		
6.3.	Process in place for timely reporting of lost, missing, damaged or stolen cargo to police by the Aerodrome Operator.		
6.4.	Emergency customer and local management contacts for security incidents listed and available		
6.5.	Security Awareness Training provided to employees (to include robbery response and challenging un-identified persons).		
6.6.	Employees and contractors issued with and required to display company photo-ID card on landside of warehouse and Airport Entry Pass for airside.		
6.7.	Procedures in place to restrict access for Shipper's employees, visitors and contractors to cargo.		
6.8.	Visitor policy in place.		
6.9.	Control of shipping documents/information so that details of cargo are restricted to those with a “need to know.”		
6.10.	All keys controlled in areas where cargo is transiting or stored.		
6.11.	All drivers identified using Apron Driving Permit (ADP) on airside and government- issued photo-ID (e.g. Drivers license) or national ID card, etc as appropriate on landside.		
6.12.	Random trash inspection procedures in place for trash from dock/warehouse.		
6.13.	No pre-loading or post-delivery storage of cargo in external trailers/containers on airside.		
6.14.	Security incident reporting system and method of tracking local security incidents.		
6.15.	Personal containers (defined as lunch box, backpacks, coolers, purses etc.) controlled in the warehouse.		
6.16.	Searches or inspections performed on exit from restricted/secure areas used for cargo.		
6.17.	Personal vehicles access to shipping and receiving yard/area controlled.		
6.18.	Box and pallet integrity verified upon receipt.		
6.19.	Valuable/vulnerable handling procedures to be documented.		
6.20.	Controlled and authorised use of cargo-handling equipment by personnel and secured when not operating.		

AIR CARGO SECURITY STANDARDS CHECKLIST		SECURITY LEVEL	
MANDATORY REQUIREMENTS		1	2
6.21.	Uninterrupted Power Supply (UPS) in place to ensure all electronic systems are able to function, even during power-failure scenario.		
6.22.	Records maintained to consider background of previously terminated personnel before re-hiring.		
6.23.	Vendor management program in place that requires vendors compliance to Service Provider's security policy		
7.	PERSONNEL SECURITY:		
7.1.	Employee security education and induction training in place including awareness of terrorist threats.		
7.2.	Threat awareness program in place to identify and maintain terrorist threats within the total supply chain.		
7.3.	Procedures in place to ensure communication of security management information.		
8.	EMPLOYEE INTEGRITY:		
8.1.	Process in place to screen all new employees.		
8.2.	Process in place to periodically re-screen current employees in general and with key positions in the organization in particular.		
8.3.	Termination procedures in place for employees and contractors, ensuring return of IDs, AEP's, ADP's, keys and other sensitive information.		
8.4.	Proper vendor ID and/or photo identification must be presented for documentation purposes upon arrival by all vendors.		
9.	DATA AND INFORMATION SECURITY:		
9.1.	Information Technology (IT) Security policies documented and implemented		
9.2.	Procedure in place to prevent systems access to data by terminated employees.		
9.3.	Processes in place to maintain system integrity, utilize data encryption and to protect against hacking, computer contaminants or malicious software.		
9.4.	Establish, implement and maintain process for controlling all documents, data and information.		
9.5.	Security Personnel ensure sufficient password protection of automated logistics systems and have procedures in place to protect business data.		
9.6.	A system must be in place to identify the abuse of IT including improper access, tampering or the altering of business data.		
9.7.	Locally established, implemented and maintained process for hardware security, providing security for workstations, servers and server rooms, password protected screen savers.		
9.8.	Processes in place to ensure legible, complete and accurate shipping documents.		
9.9.	To help ensure the integrity of Cargo received, procedures in place to ensure that information received from business partners is reported accurately and timely.		
10.	GOODS AND CONVEYANCE SECURITY FOR EXPORT FREE ZONES CARGO (WHERE APPLICABLE):		
10.1.	Process in place to restrict, detect and report unauthorised access to all shipping, loading dock areas and closed transport units storage.		
10.2.	Solid-top, hard-sided or reinforced soft-sided trailers with lockable cargo doors.		
10.3.	Tamper-evident security seals for trucks carrying cargo.		
10.4.	Vehicle immobilisation devices utilised.		
10.5.	Two-way communication present during entire journey and monitored by Security Personnel.		
10.6.	Written contingency plans in place for reporting unscheduled events (i.e., stops, delays, route deviation).		

AIR CARGO SECURITY STANDARDS CHECKLIST		SECURITY LEVEL	
MANDATORY REQUIREMENTS		1	2
10.7.	Truck cab and ignition keys secured from unauthorised use at all times.		
10.8.	Proof of shipping and receiving records (Proof of Delivery, Bill of loading, Airway bill, etc.).		
10.9.	Policy in place requiring driver to be present for loading and unloading when allowed.		
10.10	Pre-alert capability in place.		
10.11	Security Personnel to be provided robbery response training. Details of training are to be available.		
10.12	Processes in place to notify law enforcement authorities in case of illegal activities.		
10.13	Process in place to report all shortages, overages and other significant discrepancies or anomalies, being resolved and/or investigated appropriately.		
10.14	Security incident reporting system and method of tracking and recording local security incidents in place.		
10.15	An established, implemented and maintained process to assess the risk level to planned routes, stopping points and schedules.		
11.	CLOSED / SECURE CARGO TRANSPORT UNITS:		
11.1.	Processes in place for routine security inspections and maintenance of empty and non-sealed cargo containers and/or trailers, whilst under facility control.		
11.2.	Processes in place for the recognising and reporting of compromised seals and/or containers and trailers to Management/Security and where considered necessary to the Local Authorities.		
11.3.	Processes in place for the safe storage of containers preventing unauthorised access and/or manipulation.		
12.	TRANSPORT OF DANGEROUS GOODS AND ITS HANDLING:		
12.1.	Dangerous goods being handled by authorized handling agents.		
12.2.	Authorized Dangerous Goods Handling Agents (DGHA's) are deploying the trained personnel for handling of dangerous goods.		
12.3.	Processes in place for security of dangerous goods upon receipt.		
12.4.	Dangerous goods being placed as per classification and are segregated from other cargo.		
12.5.	Dangerous goods are being escorted throughout while being transported to and from aircraft for loading/unloading.		
12.6.	Dangerous goods are not left un-attended while awaiting Customs clearance.		
12.7.	Packages of Dangerous goods are marked and labelled as per hazard classification		
12.8.	Dangerous goods are secure while in cargo warehouse/complex and are un-accessible to un-authorized personnel.		
12.9.	Packages of Dangerous goods are not tempered with. If so are being reported, checked and secured. Records to this affect are maintained.		
12.10	Handlers are aware of the security and safety procedures applicable to the class of dangerous goods being handled.		
13.	ADDITIONAL AIR CARGO SECURITY REQUIREMENTS:		
13.1.	Identify regulatory requirements to establish which security controls have been applied to cargo, and are they adequate /sufficient?		
13.2.	Processes established to ensure that mandatory application of security screening criteria is applied to cargo consignments tendered as air freight that has or believed to have been subjected to tampering.		
13.3.	Mandatory requirements for ensuring that Aviation Security instructions and Declarations of commitments are in place.		

APPENDIX "D"

	PAKISTAN CIVIL AVIATION AUTHORITY **INFORMATION FORM – NOC FOR DANGEROUS GOODS**	**CAAF-083-FSXX-1.0**
	Flight Standards Directorate	

INFORMATION REQUIRED FOR ISSUANCE OF N.O.C.
FOR THE TRANSPORTATION OF DANGEROUS GOODS BY AIR

1. SHIPPER'S CONSIGNER NAME ______________________
2. AFF/SHIPPER CERTIFICATE NO.______________ EXPIRY DATE ______________
3. NAME OF GOOD/GOODS TO BE TRANSPORTED______________________
4. U.N. NO.______________________
5. CLASS/DIV______________________
6. PACKING INSTRUCTION ______________________
7. WEIGHT/VOLUME OF THE GOOD/GOODS______________________
8. CONTAINING PACKAGE______________________
9. NO. OF PACKAGE ______________________
10. WEIGHT OF EACH PACKAGE ______________________
11 FROM (ORIGIN)______________________
12. TO (DESTINATION)______________________
13. BY (NAME OF AIRLINES)______________________
14. FLIGHT NO. ______________________
15. ON (DATE, MONTH, YEAR)______________________
16. AIRWAYS BILL NO.______________________

Note: Attach the following documents with the above information.

a) Photocopies of Airway Bill.

b) Shipper's/Consignor declaration that, the dangerous goods are not forbidden for Transport by Air and as per the provision of ICAO Annex-18, TIs for the Safe Transport of Dangerous Goods by Air (ICAO Doc.9284-AN/905 as amended from time to time) and relevant Air Navigation Orders have been fully complied with.

c) NOC from Pakistan Nuclear Regulatory Authority (PNRA) for radioactive material (if applicable)

Dated______________

(Signature of Authorized Person)
STAMP OF CLEARING AGENT

APPENDIX "E"

PAKISTAN CIVIL AVIATION AUTHORITY	
NOC FOR CARRIAGE OF DANGEROUS GOODS BY AIR	CAAF-084-FSXX-1.0
Flight Standards Directorate	

Ref : HQCAA/ / /FSAC Dated : ________________

In exercise of the powers conferred under Part XVI, Rule 297 of Civil Aviation Rules 1994, CAA has no objection to the carriage of following dangerous goods by M/s ________________.

1. NAME OF GOOD/GOODS TO BE TRANSPORTED ________________
2. U.N. NO.________________
3. CLASS/DIV________________
4. PACKING INSTRUCTION ________________
5. WEIGHT/VOLUME OF THE GOOD/GOODS________________
6. CONTAINING PACKAGE________________
7. NO. OF PACKAGE ________________
8. WEIGHT OF EACH PACKAGE ________________
9. FROM (ORIGIN)________________
10. TO (DESTINATION)________________
11. BY (NAME OF AIRLINES)________________
12. FLIGHT NO. ________________
13. ON (DATE, MONTH, YEAR)________________
14. AIRWAYS BILL NO.________________

This NOC is subject to compliance of the provisions of ICAO Annex-18 to the Chicago Convention, 1944, the TIs for the "Safe Transport of Dangerous Goods by Air" **(ICAO Doc.9284-AN/905),** Civil Aviation Rules 1994 and ANO-030-FSXX as amended from time to time. **In this regard, read Rule 298 of CARs, 1994.**

Note: If any change in current NOC regarding date & flight details you should inform immediately to Flight Standards Directorate on this email address: FlightStandard.Directorate@caapakistan.com.pk.

( )
Director Flight Standards

M/s.

Copy for information & necessary action :-

- The Chief Security Officer, ASF, AIIAP Lahore.
- The Airport Manager, CAA, AIIAP Lahore.
- Additional Director Cargo, HQCAA, JIAP, Karachi

APPENDIX "F"

	PAKISTAN CIVIL AVIATION AUTHORITY **APPLICATION FOR AN AUTHORIZATION TO CARRY DANGEROUS GOODS AS CARGO**	**CAAF-085-FSXX-1.0**
	Flight Standards Directorate	

Instruction:

1. The form once completed should be returned to the [Authority].
2. Failure to complete this form in full may result in a delay in processing the application.
3. The issuing of this form does not in itself constitute an authorization to carry dangerous goods.
4. Throughout this form the term "operator" refers specifically to that so identified in question 1.2.

1. General Information

Is this application for: ☐ INITIAL AUTHORIZATION ☐ RENEWAL

Full legal name of the operator: ______________________________

____

Operating/Trading Name (if different from above): ______________________________

____

Name of the person within the operator with overall responsibility for the transport of dangerous goods by air: ______________________________

Address for the person in 1.4: ______________________________

____

Contact numbers for the person in 1.4:

Telephone number: ______________________________

Facsimile number:______________________________

E-mail address: ______________________________

2. Dangerous Goods Operations

Classes of dangerous goods

☐ Class 1	☐ Class 4	☐ Division 6.2	☐ Class 9
☐ Class 2	☐ Class 5	☐ Class 7	
☐ Class 3	☐ Division 6.1	☐ Class 8	

Types of Operations

☐ Domestic destinations	☐ International destinations
☐ Year-round operation	☐ Seasonal operation From:____________To: ____________
☐ Aeroplane	☐ Helicopter
☐ Land-base	☐ Water-base
☐ Passenger and cargo	☐ Cargo aircraft only
☐ Combi-operation	☐ Medical evacuation operations
☐ Scheduled passenger and cargo operations	☐ Charter operations
☐ Transport of company materials (COMAT)	☐ Transport of post

Applicant's Name:______________________________ Date: ______________

Signature: ______________________________

APPENDIX "G"

	PAKISTAN CIVIL AVIATION AUTHORITY **ACCEPTANCE CHECKLIST FOR A NON-RADIOACTIVE SHIPMENT**	**CAAF-086-FSXX-1.0**
	Flight Standards Directorate	

The recommended checklist appearing on the following pages is intended to verify shipments at origin.
Never accept or refuse a shipment before all items have been checked.
Is the following information correct for each entry?

SHIPPERS DECLARATON FOR DANGEROUS GOODS (DGD)

	YES	NO*	N/A
1. Two copies in English and in the IATA format including the air certification statement. This question may be indicated as not applicable "N/A" only when the Shipper's Declaration data is submitted electronically [8.0.2.1, 8.1.1, 8.1.2, 8.1.6.12]	❑	❑	❑
2. Full name and address of Shipper and Consignee [8.1.6.1, 8.1.6.2]	❑	❑	
3. If the Air Waybill number is not shown, enter it. [8.1.6.3]	❑		
4. The number of pages shown. This question may be indicated as not applicable "N/A" only when the Shipper's Declaration data is submitted electronically [8.1.6.4]	❑	❑	
5. The non-applicable Aircraft Type deleted or not shown [8.1.2.5.2, 8.1.6.5]	❑	❑	
6. If full name of Airport or City of Departure or Destination is not shown, enter it. [8.1.6.6 and 8.1.6.7]	❑		
7. The word "Radioactive" deleted or not shown [8.1.2.5.2, 8.1.6.8]	❑	❑	
Identification			
8. UN or ID Number, preceded by prefix [8.1.6.9.1, Step 1]	❑	❑	
9. Proper Shipping Name and the technical name in brackets for entries with * [8.1.6.9.1, Step 2]	❑	❑	
10. Class or Division, and for Class 1, the Compatibility Group, [8.1.6.9.1, Step 3]	❑	❑	
11. Subsidiary hazard, in brackets, immediately following Class or Division [8.1.6.9.1, Step 4]	❑	❑	❑
12. Packing Group [8.1.6.9.1, Step 5]	❑	❑	❑
Quantity and Type of Packing			
13. Number and Type of Packages [8.1.6.9.2, Step 6]	❑	❑	
14. Quantity and unit of measure (net or gross followed by "G", as applicable) within per package limit [8.1.6.9.2, Step 6]	❑	❑	
15. For Class 1 (Explosives), the net quantity supplemented with the net explosive mass followed by unit of measurement [8.1.6.9.2, Step 6]	❑	❑	❑
16. When different dangerous goods are packed in one outer packaging, the following rules are complied with:			
16.1 - Compatible according to Table 9.3.A.	❑	❑	❑
16.2 – Conditions met for UN packages containing Division 6.2 [5.0.2.11(c)]	❑	❑	❑
16.3 –Wording "All packed in one (type of packaging)" [8.1.6.9.2, Step 6(f)]	❑	❑	❑
16.4 - Calculation of "Q" value which must not exceed 1 [5.0.2.11(g) & (h); 2.7.5.6; 8.1.6.9.2, Step 6(g)]	❑	❑	❑
17. Overpack			
17.1 - Compatible according to Table 9.3.A.	❑	❑	❑
17.2 – Wording "Overpack Used" [8.1.6.9.2, Step 7]	❑	❑	❑
17.3 – If more than one overpack is used, identification marks shown and total quantity of dangerous goods [8.1.6.9.2, Step 7]	❑	❑	❑
Packing Instructions			
18. Packing Instruction Number [8.1.6.9.3, Step 8]	❑	❑	
19. For lithium batteries in compliance with section IB, "IB" follows the packing instruction [8.1.6.9.3, Step 8]	❑	❑	❑
Authorizations			
20. Check all verifiable special provisions. The Special Provision Number A1, A2, A4, A5, A51, A81, A88, A99, A130, A190, A191, A201, A202, A211, A212, A331 if used [8.1.6.9.4, Step 9]	❑	❑	❑
21. Indication that governmental authorization is attached including a copy in English and additional approvals for other items under [8.1.6.9.4, Step 9]	❑	❑	❑
Additional Handling Information			
22. Additional handling information shown for self-reactive and related substances of Division 4.1 and organic peroxides of Division 5.2, or samples thereof, PBE, infectious and controlled substances, fireworks (UN 0336 & UN 0337) and viscous flammable liquids [8.1.6.11.1]	❑	❑	❑

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23. **Name of Signatory and Date** indicated and **Signature** of Shipper [8.1.6.13, 8.1.6.14 and 8.1.6.15] ❑ ❑
24. **Amendment** or alteration signed by Shipper [8.1.2.6] ❑ ❑ ❑

AIR WAYBILL-HANDLING INFORMATION

25. The statement: "Dangerous goods as per associated Shipper's Declaration" or "Dangerous Goods as per associated DGD" [8.2.1(a)] ❑ ❑
26. "Cargo Aircraft Only" or "CAO", if applicable [8.2.1(b)] ❑ ❑ ❑
27. Where non-dangerous goods are included, the number of pieces of dangerous goods shown [8.2.2] ❑ ❑ ❑

PACKAGE(S) AND OVERPACKS

28. Packaging free from damage or leakage [9.1.3 (i)] ❑ ❑
29. Packing conforms with packing instruction ❑ ❑ ❑
30. Same number and type of packagings and overpacks delivered as shown on DGD [9.1.3] ❑ ❑

Marks

31. UN Specification Packaging, marked according to 6.0.4 and 6.0.5:

31.1 - Symbol and Specification Code [6.0.4.2.1 (a), (b)] ❑ ❑ ❑

31.2 - X, Y or Z, meets or exceeds Packing Group / Packing Instruction requirements [6.0.4.2.1 (c)] ❑ ❑ ❑

31.3 - Gross Weight within limits (Solids, Inner Packagings or IBCs [SP A179, 6.0.4.2.1 (d)] ❑ ❑ ❑

31.4 – Plastic drums, jerricans and IBCs within permitted period of use [5.0.2.15] ❑ ❑ ❑

31.5 - Infectious substance package mark [6.5.3.1] ❑ ❑ ❑

32. UN or ID Number(s), preceded by prefix [7.1.4.1(a)] ❑ ❑
33. The Proper Shipping Name (s) including Technical name where required [7.1.4.1 (a)] ❑ ❑ ❑
34. The full name and Address of Shipper and Consignee [7.1.4.1(b)] ❑ ❑
35. For consignments of more than one package of all classes (except ID 8000 and Class 7) the net quantity or gross weight followed by "G", as applicable, unless contents are identical, marked on the packages [7.1.4.1(c)] ❑ ❑ ❑
36. Carbon Dioxide, Solid (Dry Ice), the net weight marked on the packages [7.1.4.1(d)] ❑ ❑ ❑
37. The Name and Telephone Number of a responsible person for Division 6.2 Infectious Substances shipment [7.1.4.1(e)] ❑ ❑ ❑
38. The Special Marking requirements shown for Packing Instruction 202 [7.1.4.1(f)] ❑ ❑ ❑
39. Limited Quantities mark [7.1.4.2] ❑ ❑ ❑
40. Environmentally Hazardous Substance mark [7.1.5.3] ❑ ❑ ❑
41. Lithium Battery mark [7.1.5.5] ❑ ❑ ❑

Labelling

42. The label(s) identifying the Primary hazard as per 4.2, Column D properly affixed [7.2.3.1; 7.2.6] ❑ ❑
43. The label(s) identifying the Subsidiary hazard as per 4.2, Column D properly affixed [7.2.3.1; 7.2.6.2.3] ❑ ❑ ❑
44. "Cargo Aircraft Only" label [7.2.4.2; 7.2.6.3] ❑ ❑ ❑
45. "Orientation" labels on two opposite sides, if applicable [7.2.4.4] ❑ ❑ ❑
46. "Cryogenic Liquid" label, if applicable as per 4.2 Column D [7.2.4.3] ❑ ❑ ❑
47. "Keep Away From Heat" label, if applicable as per 4.2 Column D [7.2.4.5] ❑ ❑ ❑
48. Any irrelevant marks and labels removed or obliterated [7.1.1; 7.2.1] ❑ ❑ ❑

For Overpacks

49. Packaging use marks and hazard and handling labels, as required must be clearly visible or reproduced on the outside of the overpack [7.1.71, 7.1.7.2, 7.2.7] ❑ ❑ ❑
50. The word "Overpack" marked if marks and labels are not visible on packages within the overpack [7.1.7.1] ❑ ❑ ❑
51. If more than one overpack is used, identification marks shown and total quantity of dangerous goods [7.1.7.3] ❑ ❑ ❑

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GENERAL

52. State and Operator variations complied with [2.8] ____________________	❑	❑	❑
53. Cargo Aircraft Only shipments, a cargo aircraft operates on all sectors ________	❑	❑	❑

Comments: ____

____

Checked by: ____

Place: ______________________ Signature: ______________________

Date: ______________________ Time: ______________________

* **IF ANY BOX IS CHECKED "NO", DO NOT ACCEPT THE SHIPMENT AND GIVE A DUPLICATE COPY OF THIS COMPLETED FORM TO THE SHIPPER.**

APPENDIX "H"

PAKISTAN CIVIL AVIATION AUTHORITY ACCEPTANCE CHECKLIST FOR A RADIOACTIVE SHIPMENT	CAAF-087-FSXX-1.0
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The recommended checklist appearing on the following pages is intended to verify shipments at origin.
Never accept or refuse a shipment before all items have been checked.
Is the following information correct for each entry?

SHIPPERS DECLARATON FOR DANGEROUS GOODS (DGD)

	YES	NO*	N/A
1. Two copies in English and in the IATA format including the air certification statement. This question may be indicated as not applicable "N/A" only when the Shipper's Declaration data is submitted electronically [10.8.1.2, 10.8.1.4; 8.1.1; 10.8.3.12.2] ____	❑	❑	❑
2. Full name and address of Shipper and Consignee [10.8.3.1, 10.8.3.2] ____	❑	❑	
3. If the Air Waybill number is not shown, enter it. [10.8.3.3] ____	❑		
4. The number of pages shown. This question may be indicated as not applicable "N/A" only when the Shipper's Declaration data is submitted electronically [10.8.3.4] ____	❑	❑	❑
5. The non-applicable Aircraft Type deleted or not shown [10.8.1.6.2, 10.8.3.5] ____	❑	❑	
6. If full name of Airport or City of Departure or Destination is not shown, enter it. [10.8.3.6 and 10.8.3..7] ____	❑		
7. The word "Non-Radioactive" deleted or not shown [10.8.1.6.2, 10.8.3.8] ____	❑	❑	
Identification			
8. UN number, preceded by prefix "UN" [10.8.3.9.1, Step 1] ____	❑	❑	
9. Proper Shipping Name and where the Special Provision A78 applies, the supplementary information in brackets [10.8.9.3.1, Step 2] ____	❑	❑	
10. Class 7 [10.8.9.3.1, Step 3] ____	❑	❑	
11. Subsidiary hazard, in brackets, immediately following Class [10.8.3.9.1, Step 4] and Packing Group if required for Subsidiary hazard [10.8.3.9.1, Step 5] ____	❑	❑	❑
Quantity and Type of Packing			
12. Number or Symbol of Radionuclide (s) [10.8.3.9.2, Step 6 (a)] ____	❑	❑	
13. A description of the physical and chemical form if in other form [10.8.3.9.2, Step 6 (b)]_	❑	❑	❑
14. "Special Form" (not required for UN 3332 or UN 3333 or low dispersible material [10.8.9.3.2, Step 6 (b)] ____	❑	❑	❑
15. The number and type of packages and the activity in Becquerel or multiples thereof in each package. For Fissile material the total weight in grams or kilograms of fissile material may be shown in place of activity [10.8.9.3.2, Step 7] ____	❑	❑	
16. For different individual nuclides, the activity of each equal radionuclide and the words "All packed in one (type of package)" [10.8.3.9.2, Step 7] ____	❑	❑	❑
17. Activity within limits for Type A packages [Table 10.3.A], Type B or Type C (see attached competent authority certificate) ____	❑	❑	❑
18. Words "Overpack Used" shown on the DGD [10.8.9.3.2, Step 8] ____	❑	❑	❑
Packing Instructions			
19. Category of package (s) and overpack if applicable [10.5.15.1 (a), 10.8.3.9.3, Step 9 (a) and Table 10.5.C] ____	❑	❑	
20. Transport Index and dimensions (preferably in sequence Length x Width x Height) for Category II and Category III only [10.8.3.9.3, Step 9 (b) and (c)] ____	❑	❑	❑
21. For Fissile Material the Critically Safety Index (with, in addition and if applicable*, reference to paragraphs 10.6.2.8.1.3 (a) to (c) or 10.6.2.8.1.4), or the words "Fissile Excepted" [10.8.3.9.3, Step 9 (d)] ____	❑	❑	❑
Authorizations			
22. Identifications marks shown and a copy of the document in English attached to DGD for the following [10.5.7.3; 10.8.3.9.4, Step 10; 10.8.7]:			
22.1- Special Form approval certificate ____	❑	❑	❑
22.2- Type B package design approval certificate ____	❑	❑	❑
22.3 – Other approval certificates as required ____	❑	❑	❑
23. For radionuclides not listed in 10.3.A, the type of radiation and use of Table 10.3.B is referenced [10.3.2.2; 10.3.2.5.2; 10.8.3.9.4, Step 13]____	❑	❑	❑
24. Additional Handling Information [10.8.3.11]			
25. **Name of Signatory and Date** indicated [10.8.3.13 and 10.8.3.14] and **Signature** of Shipper [10.8.3.15] ____	❑	❑	
26. **Amendment** or alteration signed by Shipper [10.8.1.7] ____	❑	❑	❑

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AIR WAYBILL-HANDLING INFORMATION

27. The statement: "Dangerous goods as per associated Shipper's Declaration" or "Dangerous Goods as per associated DGD" [10.8.8.1(a)] ____ ❑ ❑
28. "Cargo Aircraft Only" or CAO, if applicable [10.8.8.1(b)] ____ ❑ ❑ ❑
29. Where non-dangerous goods are included, the number of pieces of dangerous goods shown [10.8.2.2] ____ ❑ ❑ ❑

PACKAGE(S) AND OVERPACKS

30. Same number and type of packagings and overpacks delivered as shown on DGD ____ ❑ ❑
31. Unbroken transportation seal [10.6.2.4.1.2] and package in proper condition for carriage [9.1.3; 9.1.4] ____ ❑ ❑ ❑

Marks

32. UN number, preceded by prefix [10.7.1.3.1] ____ ❑ ❑
33. The Proper Shipping Name and where Special Provision A78 applies, the supplementary information in brackets [10.7.1.3.1] ____ ❑ ❑
34. The full name and address of the0 Shipper and Consignee [10.7.1.3.1] ____ ❑ ❑
35. The permissible gross weight if the gross weight of the package exceeds 50 kg [10.7.1.3.1] ____ ❑ ❑ ❑
36. Type A packages, marked as per 10.7.1.3.4 ____ ❑ ❑ ❑
37. Type B packages, marked as per 10.7.1.3.5 ____ ❑ ❑ ❑
38. Type C packages, Industrial Packages and packages containing Fissile material marked as per 10.7.1.3.6, 10.7.1.3.3 or 10.7.1.3.7 ____ ❑ ❑ ❑

Labelling

39. Same category labels as per DGD properly affixed to two opposite sides of package. [10.7.4] ____ ❑ ❑

39.1 – Symbol of radionuclide and/or LSA/SCO indicated as required. [10.7.3.3.1]____ ❑ ❑

39.2 – Activity in Bq (or multiples thereof). For Fissile material, the total mass in grams may be used instead [10.7.3.3.2] ____ ❑ ❑

39.3 – For Category II & III, same TI as per DGD, rounded-up to one decimal place. [10.7.3.3.3] ____ ❑ ❑ ❑

40. Applicable label(s) identifying the subsidiary hazard [10.7.3.2; 10.7.4.3] ____ ❑ ❑ ❑
41. Two "Cargo Aircraft Only" labels, if required, on the same surface near the hazard labels [10.7.4.2.4; 10.7.4.3.1; 10.7.4.4.1] ____ ❑ ❑ ❑
42. For fissile materials, two correctly completed Criticality Safety Index (CSI) labels on the same surface as the hazard labels [10.7.3.3.4; 10.7.4.3.1] ____ ❑ ❑ ❑
43. Any irrelevant marks and labels removed or obliterated [10.7.1.1; 10.7.2.1] ____ ❑ ❑ ❑

For Overpacks

44. Package use marks and labels clearly visible or reproduced on the outside of the overpack [10.7.1.4.1; 10.7.4.4] ____ ❑ ❑ ❑
45. The word "Overpack" marked if marks and labels are not visible on packages within the overpack [10.7.1.4.1] ____ ❑ ❑ ❑
46. If more than one overpack is used, identification marks shown [10.7.1.4.3] ____ ❑ ❑ ❑
47. Hazard labels reflect the content(s) and activity of each individual radionuclide and the TI of the overpack [10.7.3.4] ____ ❑ ❑ ❑

GENERAL

48. State and Operator variations complied with [2.8] ____ ❑ ❑ ❑
49. Cargo Aircraft Only shipments, a cargo aircraft operates on all sectors ____ ❑ ❑ ❑
50 . Packages containing Carbon Dioxide solid (dry ice), the marking, labeling and documentary requirements complied with [Packing Instruction 954; 7.1.4.1 (d); 7.2.3.9.1]❑ ❑ ❑

Comments: ____________________

____

Checked by: ____________________

Place: ____________________ Signature: ____________________

Date: ____________________ Time: ____________________

* **IF ANY BOX IS CHECKED "NO", DO NOT ACCEPT THE SHIPMENT AND GIVE A DUPLICATE COPY OF THIS COMPLETED FORM TO THE SHIPPER.**

APPENDIX "I"

	PAKISTAN CIVIL AVIATION AUTHORITY **ACCEPTANCE CHECKLIST FOR DRY ICE (Carbon Dioxide, solid)**	**CAAF-088-FSXX-1.0**
	Flight Standards Directorate	

(For use when a Shipper's Declaration for Dangerous Goods is not required)
A checklist is required for all shipments of dangerous goods (9.1.4) to enable proper acceptance checks to be made. The following example checklist is provided to assist shippers and carriers with the acceptance of dry ice when packages on its own or with non-dangerous goods.

Is the following information correct for each entry?

DOCUMENTATION

	YES	NO*	N/A
The "Nature and Quantity of Goods" box of the Air Waybill or an alternate transport documentation contains the following information [8.2.3]			
1. "UN 1845" ______	❑	❑	
2. The words "Carbon dioxide, solid" or "Dry ice" ______	❑	❑	
3. Number of packages (unless these are the only packages within the consignment) ______	❑	❑	
4. The net weight if dry ice in kilograms ______	❑	❑	
State and Operator Variations			
5. State and Operator Variations complied with [2.8] ______	❑	❑	❑
Note: The following questions do not apply where the dry ice, or packages containing dry ice, is offered in a ULD.			
Quantity			
6. The quantity of dry ice per package is 200 kg or less [4.2] ______	❑	❑	
PACKAGES AND OVERPACKS			
7. Same number or packages as shown on the Air Waybill ______	❑	❑	
8. Packages free from damage and leakage ______	❑	❑	
9. The packages conforms with Packing Instruction 954 and the package is vented to permit the release of gas ______	❑	❑	
Marks & Labels			
10. "UN 1845" marked [7.1.4.1(a)] ______	❑	❑	
11. The words "Carbon dioxide, solid" or "Dry ice" [7.1.4.1(a)] ______	❑	❑	
12. Full name and address of the shipper and consignee [7.1.4.1(b)] ______	❑	❑	
Note: The name and address of the shipper and consignee marked on the package may differ from that on the AWB.			
13. The net weight of dry ice within each package [7.1.4.1(d)] ______	❑	❑	
14. Class 9 label property affixed [7.2.3.9, 7.2.6] ______	❑	❑	
15. Irrelevant marks and labels removed or obliterated [7.1.1(b); 7.2.1(a)] ______	❑	❑	❑
For Overpacks			
16. Packaging Use marks and hazard and handling labels, as required must be clearly visible or reproduced on the outside of the overpack [7.1.7.1, 7.2.7] ______	❑	❑	❑
17. The word Överpack"marked if marks and labels are not visible on packages within the overpack [7.1.7.1] ______	❑	❑	❑
18. The total net weight of carbon dioxide, solid (dry ice) in the overpack [7.1.7.1] ______	❑	❑	❑

Comments: ______

______

Checked by: ______

Place: ______ Signature: ______

Date: ______ Time: ______

*** IF ANY BOX IS CHECKED "NO", DO NOT ACCEPT THE SHIPMENT AND GIVE A DUPLICATE COPY OF THIS COMPLETED FORM TO THE SHIPPER.**

APPENDIX "J"

CAAF-089-FSXX-1.0

پاکستان سول ایوی ایشن اتھارٹی

NOTOC DISTRIBUTION :
1. Top Copy (white) : Captain
2. Middle Copy (green) : Station File
3. Bottom Copy (yellow) : Freight Agent

NOTIFICATION TO CAPTAIN (NOTOC)

INSTRUCTIONS FOR COMPLETION OF NOTOC

1. A NOTOC is to be issued whenever dangerous goods (DGs) or other special load items are to be carried on DG & Safety aircraft.
2. The NOTOC form is to be prepared by the freight handling agent contracted to dispatch consignments on DG & Safety when DGs and/or Special Load are consigned as freight, **OR** by the Pit Crew Leader when items of Special Load checked-in by guests are to be carried.
3. The freight agent must print and sign his/her name in the *DGs Preparation Certification* field in the top right-hand section of the form, whenever freight loads containing dangerous goods are dispatched.
4. The person responsible for entering the Special Load details must annotate their name in the applicable name fields of the Special Load section of the form. Two fields are provided for this: one for use by the Freight Agent and one for the Pit Crew Leader (as required).
5. Before loading, the Pit Crew Leader (or CASR Subpart 92.C qualified delegate) is to check the dangerous goods items for evidence of any non-normal features such as leakage or damage. After loading on the aircraft, the person responsible for supervising loading operations is to print and sign their name in the certification field in the bottom right-hand section of the form, certifying that the items have been loaded in the locations specified on the form.
6. The NOTOC is to be given to the captain who is to certify acceptance of the NOTOC in the bottom left-hand corner of the form.

PORT OF LOADING:

FLIGHT NUMBER:

DATE:

AIRCRAFT REG:

DGs PREPARATION CERTIFICATION

(To be completed by a CASR Subpart 92.C certified person when dangerous goods are to be consigned as freight.)

I certify that this NOTOC has been prepared in compliance with the procedures for the acceptance and dispatch of dangerous goods as detailed in the DG & Safety *Dangerous Goods Manual*

Signature:

Prepared By:
(Print Name)

DANGEROUS GOODS

1	2	3	4	5	6	7	8	9	10	11	12	13	14		15
Destination	Air Waybill Number Consignment Note	Proper Shipping Name	Class or Division	UN or ID Number	Sub-risk	No. of Packages	Net Quantity Non-Radioactive Material	Transport Index Radioactive Material	Radioactive Package Category	UN Packing Group	Code	CAO	Loaded		Emergency Response Code
													ULD	Position	

SPECIAL LOAD - the person entering the Special Load details is to print their name here → (1) Freight Agent: (2) Pit Crew Leader:

Destination	Air Waybill Number Consignment Note	Contents and Description	No. of Packages	Quantity	Supplementary Information	Code	Loaded	
							ULD	Position

ACCEPTANCE BY CAPTAIN:

I accept the loading locations of the items specified on this NOTOC.

Captain's Name:
(Print Name)

Captain's Signature:

CERTIFICATION BY PERSON SUPERVISING LOADING OPERATIONS:

I certify that this aircraft has been loaded in accordance with the procedures detailed in the DG&Safety Volume A5: *Airport Handling Manual* and Volume A6: *Dangerous Goods Manual*, and that the items have been checked, and that this NOTOC accurately reflects the locations of the DGs and/or special load items on this aircraft.

Certified By:
(Print Name)

Signature:

APPENDIX "K"

	PAKISTAN CIVIL AVIATION AUTHORITY OPERATIONS MANUAL'S DANGEROUS GOODS SEGMENT Flight Standards Directorate	CAAF-052-FSXX-1.0

Instruction:

1. The form once completed should be returned to the [Authority].
2. Failure to complete this form in full may result in a delay in processing the application.
3. The issuing of this form does not in itself constitute an approval of the operations manual.

Name of Air Operator		Date
Name and Title of Dangerous Goods Coordinator		
Telephone	Fax	E-mail

For each of the item listed on the left, indicate in which manual the information is located as well as a precise reference.

	Information provided to the employees (ICAO TI 7;4.2)	**Reference in the Applicable Operations Manual**
1	**General Restrictions**	
1.1	States the types of dangerous goods operations you are engaged in. • Aeroplane or/and helicopter operations • Passenger carrying or/and all cargo aircraft(s) • Domestic or/and international operations • Carrying dangerous goods as cargo • Carrying dangerous goods in stores • Carrying dangerous goods in mail	
1.2	States which dangerous goods you do not accept for transport for all destinations (Operator's variation(s)). (ICAO TI A3;2)	
1.3	There is a list of all locations where the various operations manuals are kept.	
1.4	List all State's exemptions or approvals affecting the operator (ICAO TI 1;1.1)	
1.5	If using the exemption for electronic devices, such as electronic flight bags, personal entertainment devices, and credit card readers, containing lithium metal or lithium ion cells or batteries and spare lithium batteries, provide the conditions for the carriage and use of these electronic devices and for the carriage of spare batteries.(ICAO TI 1;2.2.1 d))	
2	**Dangerous Goods Coordinator**	
2.1	Contact information for the operator Dangerous Goods Coordinator(s), or designated person(s) and their role(s) with respect to the administration of the company's dangerous goods program	
2.2	The list of all third parties acting on their behalf of the operator for training, handling, offering for transport or transporting dangerous goods.	
3	**Applicable Regulations**	
3.1	The operator identifies the applicable regulations and documents the company uses including where they're located and how they're accessed	

	PAKISTAN CIVIL AVIATION AUTHORITY **OPERATIONS MANUAL'S DANGEROUS GOODS SEGMENT** **Flight Standards Directorate**	**CAAF-052-FSXX-1.0**

	Information provided to the employees (ICAO TI 7;4.2)	**Reference in the Applicable Operations Manual**
4	**Aircraft Specific**	
4.1	Details of the location and the numbering system of cargo compartments for each aircraft type. (ICAO TI 7;4.2)	
4.2	Instructions on the loading restrictions for each aircraft type. (ICAO TI 7;4.2)	
4.3	Maximum quantity of dry ice permitted in each compartment. (ICAO TI 7;4.2 a))	
4.4	Maximum sum of transport indexes for radioactive material permitted in each compartment. (ICAO TI 7;4.2 b))	
5	**Training** (ICAO TI 1;4 and 7;4.10)	
5.1	States who is responsible for the operator's Training Program (ICAO TI 1;4.2.5)	
5.2	States who is responsible for the operator's Training Records (ICAO TI 1;4.2.5)	
5.3	States which employees require training. (TDGR 6.2, ICAO TI 7;4.10)	
5.4	States the frequency of recurrent training. (TDGR 6.5, ICAO TI 7;4.2.3)	
5.5	States that the air operator training programs must be approved by the State of authority (ICAO TI 1;4.1.2)	
6	**Passenger Handling** (ICAO TI 7;5 and 8;1)	
6.1	Describes which dangerous goods are permitted and not permitted in passenger or crew baggage or on the person (ICAO TI 7;5.2 and 8;1)	
6.2	Describes the procedures to prevent Spare batteries for portable electronic devices containing lithium metal or lithium ion cells or batteries from being transported in checked baggage (ICAO TI 7;5.2 and 8;1.1.4 Table 8-1)	
6.3	Describes the procedures for and the form of promulgating information to passengers. (ICAO TI 7;5.1)	
6.4	State what the acceptance procedures are for passengers and baggage. (ICAO TI 7;5.2)	
6.5	Describe how information on the types of dangerous goods which a passenger is forbidden to transport aboard an aircraft is provided at the point of ticket purchase (ICAO TI 7;5.1.1)	
6.6	Describe how information provided via the Internet may be in text or pictorial form but must be such that ticket purchase cannot be completed until the passenger, or a person acting on their behalf, has indicated that they have understood the restrictions on dangerous goods in baggage (ICAO TI 7;5.1.1)	
6.7	Describe how the operator will ensure that notices warning passengers of the types of dangerous goods which they are forbidden to transport aboard an aircraft are prominently displayed, in sufficient number, at each of the places at an airport where tickets are issued, passengers are checked in and aircraft boarding areas are maintained, and at any other location where passengers are checked in. These notices must include visual examples of dangerous goods forbidden from transport aboard an aircraft (ICAO TI 7;5.1.2)	
6.8	Describe how an operator, of passenger aircraft, should have information on those dangerous goods which may be carried by passengers is made available prior to the check-in process on their websites or other sources of information (ICAO TI 7;5.1.3)	

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	Information provided to the employees (ICAO TI 7;4.2)	**Reference in the Applicable Operations Manual**
6	**Passenger Handling** (ICAO TI 7;5 and 8;1)	
6.9	Describe if provision is made for the check-in process to be completed remotely (e.g. via the Internet), the operator must ensure that information on the types of dangerous goods which a passenger is forbidden to transport aboard an aircraft is presented to passengers. Information may be in text or pictorial form but must be such that the check-in process cannot be completed until the passenger, or a person acting on their behalf, has been presented with this information and indicated that they have understood the restrictions on dangerous goods in baggage. (ICAO TI 7; 5.1.4).	
6.10	Describe when provision is made for the check-in process to be completed at an airport by a passenger without the involvement of any other person (e.g. automated check-in facility), the operator or the airport operator must ensure that information on the types of dangerous goods which a passenger is forbidden to transport aboard an aircraft is presented to passengers. Information should be in pictorial form and must be such that the check-in process cannot be completed until the passenger has been presented with this information and indicated that they have understood the restrictions on dangerous goods in baggage. (ICAO TI 7; 5.1.5).	
7	**Stores (Company Material (COMAT)) Shipment (ICAO TI 1;2.2 and 7;4.2)**	
7.1	If the air operator does not perform the responsibilities of a shipper of COMAT, then the air operator will include a statement to this effect (ICAO TI 7;4.2)	
7.2	State who is responsible / qualified to prepare dangerous goods COMAT for transport. (ICAO TI 7;4.2)	
7.3	Describes how dangerous goods COMAT are prepared for transport (ICAO TI 1;2.2)	
7.4	Explains how dangerous goods COMAT are to be processed once prepared. (ICAO TI 1;2.2)	
8	**Acceptance Procedures** (ICAO 7;1, 7;6 and 7.4.8)	
8.1	Describes how dangerous goods are prevented from entering the system without appropriate preparation (ICAO TI 7;1.2)	
8.2	States the procedures for accepting general cargo ensuring that dangerous goods do not enter the system when they are not permitted. (ICAO TI 7;6)	
8.3	States the procedures for accepting / rejecting dangerous goods cargo (ICAO TI 7;1)	
8.4	States the procedures for handling rejected dangerous goods in cargo. (ICAO TI 7;4.5)	
8.5	Describe the procedures for accepting general cargo, which ensure that dangerous goods do not enter the transportation system when they are not permitted. (ICAO TI 7;6.1)	
8.6	Describes the procedures for and the form of promulgating information to those offering dangerous goods or cargo for transport. (ICAO TI 7;4.8)	
9	**Retention of Documents** (ICAO TI 7;4.11)	
9.1	Describes what documents must be retained. (ICAO TI 7;4.11)	
9.2	States the length of time each type of document must be retained (ICAO TI 7;4.11)	
9.3	Describes who is responsible for retaining the document;	
9.4	States the location where each is to be kept, including with third party;	

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9.5	**Information provided to the employees** (ICAO TI 7;4.2)	**Reference in the Applicable Operations Manual**
10	**Ground Handling** (ICAO 7;2 and 7;3.1)	
10.1	Describes procedures for storing cargo in the course of air transportation, other than on the aircraft (ICAO TI 7;2)	
10.2	Describes procedures for movement within the cargo facility, and to and from the cargo facility to the aircraft	
10.3	Describes procedures for replacing lost, detached or illegible safety marks on packages, overpacks, and freight or unit load devices. (ICAO TI 7;2.7)	
10.4	Describes the procedures for loading / unloading dangerous goods onto or from and aircraft (ICAO TI 7;2 and 7;3.1)	
11	**Load Planning** (ICAO TI 7;4.1)	
11.1	Describes the procedures for load planning (including preparation of NOTOC where applicable). (ICAO TI Part 7;4,1)	
12	**Emergency Procedures** (ICAO TI 7;4)	
12.1	States emergency response information is available and where the pilot-in-command/other crew members can find it (ICAO TI 7;4.9)	
12.2	States how the pilot-in-command is to report emergencies involving dangerous goods. (ICAO TI 7;4.3)	
12.3	Describes how the NOTOC is accessed during an emergency (ICAO TI 7;4.1.5)	
12.4	Describes the procedures for managing a dangerous goods incident/accident on the ground. (ICAO TI 7;3)	
12.5	Describes the procedures for managing misdeclared or undeclared dangerous goods. (ICAO TI 7;4.5)	
12.6	Describes the procedures to follow when reporting undeclared or misdeclared dangerous goods as cargo or mail. (ICAO TI 7;4.5)	
12.7	Describes the procedures to follow when reporting dangerous goods in passenger / crew baggage (ICAO TI 7;4.5)	
12.8	Describes procedures to follow when reporting dangerous goods incidents / accidents. (ICAO TI 7;4.4)	
12.9	Describes the procedures to follow when reporting dangerous goods discovered to have been carried when not loaded, segregated, separated or secured in accordance (ICAO TI 7;4.6 a))	
12.10	Describes the procedures to follow when reporting dangerous goods dangerous goods are discovered to have been carried without information having been provided to the pilot-in command (ICAO TI 7;4.6 b))	
12.11	In the event of an aircraft accident or serious incident, the operator must have a procedure to provide information without delay to emergency service responders about dangerous goods on board. (ICAO TI 7;4.7)	

Note: The dangerous goods activities of the operator and individual employee(s) will dictate the amount of information needed in the operations manuals.

Declaration and Signature

The information given in this application form is correct to the best of my knowledge and belief.

Applicant's Name:_______________________________________ Date: _________________

Signature: ____

APPENDIX "L-I"

	PAKISTAN CIVIL AVIATION AUTHORITY **APPLICATION FOR APPROVAL OF DANGEROUS GOODS TRAINING PROGRAM** **Flight Standards Directorate**	**CAAF-061-FSXX-2.0**

Instructions

1. The form once completed should be returned to the office of Flight Standards Directorate CAA
2. Failure to complete this form in full may result in a delay in processing the application.
3. The issuing of this form does not in itself constitute an approval of the training program.

Name of Operator / Service Provider:	☐ Carry Operator ☐ No-carry Operator	Date submitted:
Title of training program		
Type of submission ☐ Initial Submission ☐ Amendment	Prior Approval Number (if applicable) ☐ Not Applicable	
Type of Program ☐ Initial ☐ Re-Current ☐ Initial & Re-Current ☐ Other (Specify)	How the training is to be delivered ☐ Initial ☐ Re-Current ☐ Initial & Re-Current ☐ Other (Specify)	

FUNCTIONS OF PERSONNEL WHO WILL USE THE TRAINING PROGRAM

☐a) Personnel responsible for preparing dangerous goods consignments

☐b) Personnel responsible for processing or accepting goods presented as general cargo

☐c) Personnel responsible for processing or accepting dangerous goods consignments

☐d) Personnel responsible for handling cargo in a warehouse, loading and unloading unit load devices and loading and unloading aircraft cargo compartments

☐e) Personnel responsible for accepting passenger and crew baggage, managing aircraft boarding areas and other functions involving direct passenger contact at an airport

☐f) Personnel responsible for the planning of aircraft loading

☐g) Flight crew

☐h) Flight operations officers and flight dispatchers

☐i) Cabin crew

☐j) Personnel responsible for security screening of passengers, crew, baggage, cargo and mail

☐k) Personnel who will perform as dangerous goods training instructor

Please ensure that

- Every page is identified with a page number a date and a revision number.
- There is a list of effective pages.
- All the application training references are inscribed on the "Training Program Reference" column of the form. If the topic is not applicable "N/A" should be inscribed.
- All student handouts exams, answer sheet, correctors and marking details are included.
- The passing grade is mentioned.
- A copy of all audio-visual (transparencies, PowerPoint & movies) is included (if applicable)
- If the program is a Computer Base Training (CBT), submit either the scenario or a copy of the computer program.
- If the program is a Home Study, submit the form used by the trainee to attest that he/she has completed the training.

	PAKISTAN CIVIL AVIATION AUTHORITY **APPLICATION FOR APPROVAL OF DANGEROUS GOODS TRAINING PROGRAM** **Flight Standards Directorate**	**CAAF-061-FSXX-2.0**

CONTENTS OF TRAINING PROGRAM APPLICABLE TO PERSONNEL INVOLVED IN DANGEROUS GOODS

DG Knowledge Table

NO.	Aspect of transport of dangerous goods by air with which they should be familiar, as a minimum	a	b	c	d	e	f	g	h	i	j	k	Reference in the Applicable Training Program	Comment (PCAA only)
1	**Scope and applicability (including overview of DG regulatory requirements)**													
	1.1 General applicability (ICAO TI 1;1 IATA 1.1, 1.2)	X	X	X	X	X	X	X	X	X	X	X		
	1.2 overview of DG regulatory requirements (ICAO TI 7;4.2 IATA 1.4.2)	X	X	X	X	X	X	X	X	X	X	X		
	1.3 Reference to specific dangerous goods accidents, incidents movies (ICAO TI 7;4.2 IATA 1.4.2)	X	X	X	X	X	X	X	X	X	X	X		
	1.4 Unit of Measurements (ICAO TI 1;3.2 IATA APP B.1)	X	X	X	X	X	X	X	X	X	X	X		
2	**Limitation of dangerous goods on aircraft**													
	2.1 Dangerous goods Forbidden for Transport by Air under any circumstances (ICAO TI 1;2.1 IATA 2.1.1)	X	X	X	X	X	X	X	X	X	X	X		
	2.2 General Exceptions	X	X	X	X	X	X	X	X	X	X	X		
	2.2.1 Medical aid for patients (ICAO TI 1;1.1.5.1 a), 1;1.1.5.2, 1;1.1.5.3, 1;1.1.5.4, 1;1.1.5.5 IATA 1.2.7.1 (a), 1.2.7.2, 1.2.7.3, 1.2.7.4, 1.2.7.5)	X	X	X	X	X	X	X	X	X	X	X		
	2.2.2 Veterinary aid for animals (ICAO TI 1;1.1.5.1 b), 1;1.1.5.2, 1;1.1.5.3, 1;1.1.5.4, 1;1.1.5.5 IATA 1.2.7.1(b), 1.2.7.2, 1.2.7.3, 1.2.7.4, 1.2.7.5)	X	X	X	X	X	X	X	X	X	X	X		
	2.2.3 Excess baggage being sent as cargo (ICAO TI 1;1.1.5.1 h) IATA 1.2.7.1(h))	X	X	X	X	X	X	X	X	X	X	X		
	2.3 Transport of Dangerous Goods by Post (ICAO TI 1;2.3 IATA 2.4)	X	X	X	X	X	X	X	X	X	X	X		
	2.4 Exceptions for Dangerous Goods of the Operator (ICAO TI 1;2.2 IATA 2.5)	X	X	X	X	X	X	X	X	X	X	X		
	2.5 Dangerous Goods in Excepted Quantities (ICAO TI 1;2.4, 3;5 IATA 2.6)	X	X	X	X	X	X	X	X	X	X	X		
	2.6 Dangerous Goods in Limited Quantities (ICAO TI 1;2.5, 3;4 IATA 2.7)	X	X	X	X	X	X	X	X	X	X	X		
	2.7 State and Operator Variations (ICAO TI Attachments 3;1, 3;2 IATA 2.8)	X	X	X	X	X	X	X	X	X	X	X		
3	**Definitions, Roles and Responsibilities**													
	3.1 Definition of Dangerous Goods (ICAO TI 1;3.1 IATA 1.0)	X	X	X	X	X	X	X	X	X	X	X		
	3.2 Shipper's Responsibilities (ICAO TI 5;1.1 IATA 1.3)	X	X	X	X	X	X	X	X	X	X	X		
	3.3 Operator's Responsibilities (ICAO TI 7; IATA 1.4)	X	X	X	X	X	X	X	X	X	X	X		
4	**Training requirements**													
	4.1 Establishment of Dangerous Goods Training Programmes (ICAO TI 1;4.1 IATA 1.5.1.1)	X	X	X	X	X	X	X	X	X	X	X		
	4.2 Objective of Dangerous Goods Training (ICAO TI 1;4.2 IATA 1.5.1.2)	X	X	X	X	X	X	X	X	X	X	X		
	4.3 Recurrent Training and Assessment	X	X	X	X	X	X	X	X	X	X	X		

DG Knowledge Table

NO.	Aspect of transport of dangerous goods by air with which they should be familiar, as a minimum	a	b	c	d	e	f	g	h	i	j	k	Reference in the Applicable Training Program	Comment (PCAA only)
	(ICAO TI 1;4.3 IATA 1.5.1.3)													
	4.4 Training and Assessment Records (ICAO TI 1;4.4 IATA 1.5.1.4)	X	X	X	X	X	X	X	X	X	X	X		
	4.5 Approval of Training Programmes (ICAO TI 1;4.5 IATA 1.5.2)	X	X	X	X	X	X	X	X	X	X	X		
5	**Dangerous goods security**													
	5.1 General Security Provisions (ICAO TI 1;5.1 IATA 1.7.1)										X	X		
	5.2 Dangerous Goods Security Training (ICAO TI 1;5.2 IATA 1.7.2)										X	X		
	5.3 Provisions For High Consequence Dangerous Goods (ICAO TI 1;5.3 IATA 1.7.3)										X	X		
6	**General provisions concerning radioactive material (ICAO TI 1;6 IATA 10.0.1-10.0.6)**	X		X			X	X				X		
7	**Reporting of dangerous goods accidents, incidents**													
	7.1 Definition of dangerous goods accident and incident (ICAO TI 1;3.1 IATA APPENDIX A)		X	X	X	X	X	X	X	X	X	X		
	7.2 Reporting of dangerous goods accidents and incidents (ICAO TI 7;4.4 IATA 9.6.1)		X	X	X	X	X	X	X	X	X	X		
	7.3 Reporting of undeclared or mis-declared dangerous goods (ICAO TI 7;4.5 IATA 9.6.2)		X	X	X	X	X	X	X	X	X	X		
	7.4 Information by the operator in case of an aircraft accident or incident (ICAO TI 7;4.7 IATA 9.6.3)		X	X	X	X	X	X	X	X	X	X		
	7.5 Reporting of dangerous goods occurrences (ICAO TI 7;4.6 IATA 9.6.4, 9.6.5)		X	X	X	X	X	X	X	X	X	X		
	7.6 Information by Pilot-in-command in case of In-Flight Emergency (ICAO TI 7;4.3 IATA 9.5.1.3)		X	X	X	X	X	X	X	X	X	X		
8	**Emergency response procedures (ICAO TI 7;4.9 IATA 9.5.1.2)**		X	X	X	X	X	X	X	X	X	X		
9	**Classification General**													
	9.1 Responsibilities (ICAO TI 2; Introductory Chapter, point 1 IATA 3.0.1.4, 3.0.1.5,3.0.1.6, 3.0.5)	X	X	X	X	X	X	X	X	X	X	X		
	9.2 Classes, Divisions, Packing Groups —Definitions (ICAO TI 2; Introductory Chapter, point 2 IATA 3.0.1.1, 3.0.1.2, 3.0.1.3, 3.0.2, 3.0.3)	X	X	X	X	X	X	X	X	X	X	X		
	9.3 UN Numbers And Proper Shipping Names (ICAO TI 2; Introductory Chapter, point 3 IATA 4.1.0.1, 4.1.0.2, 4.1.0.3, 4.1.0.4, 4.1.2.1, 4.1.2.2, 4.1.3, 4.1.3.1,4.1.3.2, 4.1.4)	X	X	X	X	X	X	X	X	X	X	X		
	9.4 Precedence Of Hazard characteristics (ICAO TI 2; Introductory Chapter, point 4 IATA 3.0.4, 3.10, Table 3.10.A)	X	X	X	X	X	X	X	X	X	X	X		
	9.5 Transport of samples (ICAO TI 2; Introductory Chapter, point 5 IATA 3.11)	X	X	X	X	X	X	X	X	X	X	X		
	9.6 Classification of Articles As Articles Containing Dangerous Goods N.O.S. (ICAO TI 2; Introductory Chapter, point 6 IATA 3.12)	X	X	X	X	X	X	X	X	X	X	X		
	Classification Class 1 (ICAO TI 2;1 IATA 3.1)	X										X		
	Classification Class 2 (ICAO TI 2;2 IATA 3.2)	X										X		
	Classification Class 3	X										X		

DG Knowledge Table

NO.	Aspect of transport of dangerous goods by air with which they should be familiar, as a minimum	a	b	c	d	e	f	g	h	i	j	k	Reference in the Applicable Training Program	Comment (PCAA only)
	(ICAO TI 2;3 IATA 3.3)													
	Classification Class 4 (ICAO TI 2;4 IATA 3.4)	X										X		
	Classification Class 5 (ICAO TI 2;5 IATA 3.5)	X										X		
	Classification Class 6 (ICAO TI 2;6 IATA 3.6)	X										X		
	Classification Class 7 (ICAO TI 2;7 IATA 3.7)	X										X		
	Classification Class 8 (ICAO TI 2;8 IATA 3.8)	X										X		
	Classification Class 9 (ICAO TI 2;9 IATA 3.9)	X										X		
	Dangerous goods list General (ICAO TI 3;1 IATA 4.0, 4.1, 4.1.2, 4.1.3.1)	X		X			X	X				X		
10	**Dangerous goods list Arrangement**													
	10.1 Arrangement of the Dangerous Goods List (ICAO TI 3;2.1, Table 3-1 IATA 4.1.6, Table 4.2)	X		X			X	X				X		
	10.2 Method of using the Dangerous Goods List for articles or substances specifically listed by name (ICAO TI 3;1.1.2 IATA 4.0.2.1)	X		X			X	X				X		
	10.3 Mixtures and solution containing one or more dangerous substances (ICAO TI 3;1.3 IATA 4.1.3, 4.1.3.1, 4.1.3.2)	X		X			X	X				X		
	10.4 Forbidden dangerous goods entries in the Dangerous Goods List (ICAO TI 3;2.1.1 and Note 1 IATA 4.1.6, 2.1.1 Notes 1)	X		X			X	X				X		
	10.5 Quantity Limitations for types of aircraft (ICAO TI 3;2.1.1 column 11, 13 IATA 4.1.6.10, 4.1.6.12)	X		X			X	X				X		
11	**Special provision entries in the Dangerous Goods List (ICAO TI 3;3 and Table 3-2 IATA 4.4)**	X		X								X		
12	**Dangerous goods in limited quantities (ICAO TI 3;4 IATA 2.7, 4.1.5)**	X		X								X		
13	**Dangerous goods packed in excepted quantity (ICAO 3;5 IATA 2.6)**	X		X								X		
14	**Packing Instructions General (ICAO TI 4;1, 4;2 IATA 5.0.1, 5.0.2)**	X		X								X		
	Packing Instructions Class 1 (ICAO TI 4;3 IATA 5.1)	X		X								X		
	Packing Instructions Class 2 (ICAO TI 4;4 IATA 5.2)	X		X								X		
	Packing Instructions Class 3 (ICAO TI 4;5 IATA 5.3)	X		X								X		
	Packing Instructions Class 4 (ICAO TI 4;6 IATA 5.4)	X		X								X		
	Packing Instructions Class 5 (ICAO TI 4;7 IATA 5.5)	X		X								X		
	Packing Instructions Class 6 (ICAO TI 4;8 IATA 5.6)	X		X								X		
	Packing Instructions Class 7 (ICAO TI 4;9 IATA 5.7)	X		X								X		
	Packing Instructions Class 8 (ICAO TI 4;10 IATA 5.8)	X		X								X		
	Packing Instructions Class 9 (ICAO TI 4;11 IATA 5.9)	X		X								X		
	Packing Instructions Lithium batteries PI965-970 (General) (ICAO TI 4;11, 5;2.4.16, 2;9.3 IATA 5.9, 1.6)	X		X								X		

DG Knowledge Table

NO.	Aspect of transport of dangerous goods by air with which they should be familiar, as a minimum	a	b	c	d	e	f	g	h	i	j	k	Reference in the Applicable Training Program	Comment (PCAA only)
15	**Preparing dangerous goods shipment general (ICAO TI 5;1.1 IATA 5.0.1.2)**											X		
16	**Package markings (ICAO TI 5;2 IATA 7.1)**	X	X	X	X	X	X	X	X	X	X	X		
17	**Labelling (ICAO TI 5;3 IATA 7.2)**	X	X	X	X	X	X	X	X	X	X	X		
18	**Documentation**													
	18.1 Dangerous goods transport document (ICAO TI 5;4.1 IATA 8.1)	X	X	X			X				X	X		
	18.2 Air Waybill information (ICAO TI 5;4.2 IATA 8.2)	X	X	X			X				X	X		
	18.3 Additional documentation for other than radioactive material (ICAO TI 5;4.3 IATA 8.3)	X	X	X			X				X	X		
	18.4 Retention of Transportation Document (ICAO TI 5;4.4 (shipper), 7;4.11 (operator) IATA 1.3.4 (shipper), 9.8 (operator)	X	X	X			X				X	X		
19	**Packaging applicability, nomenclature and codes (ICAO TI 6;1 IATA 6.0.1, 6.0.2, 6.0.3)**	X		X								X		
20	**Marking of packagings other than inner packagings (ICAO TI 6;2 IATA 6.0.4, 6.0.5, 6.0.6, 6.0.7)**	X		X								X		
21	**Requirements for packagings (ICAO TI 6;3 IATA 6.1, 6.2)**	X		X								X		
	21.1 Different substances packed together (ICAO TI 4;1.1.8 IATA 5.0.2.11)	X		X								X		
	21.2 Overpacks (ICAO TI 1;3.1, 5;1.1 e), 5;1.1 f), 5;1.1 h), 5;1.1 i), 5;1.1 j), 5;1.1 Note 1., 5;2.4.10, 5;3.3 IATA Appendix A, 5.0.1.5, 7.1.7)	X		X								X		
22	**Packaging performance tests (ICAO TI 6;4 IATA 6.3)**	X										X		
23	**Requirements for the construction and testing of cylinders and closed cryogenic receptacles, aerosol dispensers and small receptacles containing gas (gas cartridges) and fuel cell cartridges containing liquefied flammable gas (ICAO TI 6;5 IATA 6.4)**	X										X		
24	**Packagings for infectious substances of Category A (ICAO TI 6;6 IATA 6.5)**	X		X								X		
25	**Requirements for the construction, testing and approval of packages for radioactive material and for the approval of such material (ICAO TI 6;7 IATA 10.6)**	X		X								X		
26	**Acceptance procedures**													
	26.1 Cargo Acceptance Procedures (ICAO TI 7;1.1 IATA 9.1.1)			X								X		
	26.2 Inspection for documentation, retention of document, marking, labelling, no leakage and integrity is not			X								X		

DG Knowledge Table

NO.	Aspect of transport of dangerous goods by air with which they should be familiar, as a minimum	a	b	c	d	e	f	g	h	i	j	k	Reference in the Applicable Training Program	Comment (PCAA only)
	compromised (ICAO TI 7;1.2 IATA 9.1.2)													
	26.3 Acceptance Checklist (ICAO TI 7;1.3 IATA 9.1.3)			X								X		
	26.4 Acceptance of Freight Containers And Unit Load Devices (ICAO TI 7;1.4 IATA 9.1.4)			X								X		
	26.5 Special Responsibilities in Accepting Infectious substances (ICAO TI 7;1.5 IATA 9.1.5)			X								X		
	26.6 Undeliverable consignments of radioactive material (ICAO TI 7;1.6 IATA 10.9.2.3)			X								X		
	26.7 Cargo Acceptance Areas - Provision of information (ICAO TI 7;4.8 IATA 9.5.3)			X								X		
	26.8 Conducting Safety Risk Assessments (ICAO TI 7;1.7 IATA 9.1.9)			X								X		
27	**Storage and loading**													
	27.1 Loading restrictions on the flight deck and on passenger aircraft (ICAO TI 7;2.1 IATA 9.3.1)				X		X	X				X		
	27.2 Loading of incompatible dangerous goods and segregation (ICAO TI 7;2.2 and Table 7-1 IATA 9.3.2, TABLE 9.3.A)				X		X	X				X		
	27.3 Loading of packages containing liquid dangerous goods (ICAO TI 7;2.3 IATA 9.3.3)				X		X	X				X		
	27.4 Loading and securing of dangerous goods (ICAO TI 7;2.4.2 IATA 9.3.5)				X		X	X				X		
	27.5 Accessibility of cargo aircraft only package (ICAO TI 7;2.4.1 IATA 9.3.4)				X		X	X				X		
	27.6 Damaged Packages of dangerous goods (ICAO TI 7;2.5 IATA 9.3.6)				X		X	X				X		
	27.7 Visibility of marking and labels (ICAO TI 7;2.6 IATA 9.2.2)				X		X	X				X		
	27.8 Replacement of labels (ICAO TI 7;2.7 IATA 9.3.7)				X		X	X				X		
	27.9 Identification of unit load devices containing dangerous goods (ICAO TI 7;2.8 IATA 9.3.8)				X		X	X				X		
	27.10 Handling and Loading of Radioactive Material (ICAO TI 7;2.9 IATA 10.9.3)				X		X	X				X		
	27.11 Loading of magnetized materials (ICAO TI 7;2.10 IATA 9.3.9)				X		X	X				X		
	27.12 Loading of dry ice (ICAO TI 7;2.11 IATA 9.3.10)				X		X	X				X		
	27.13 Loading of UN2211, polymeric beads, expandable or UN3314, plastics moulding compound (ICAO TI 7;2.12 IATA 9.3.12)				X		X	X				X		
	27.14 Loading of Battery-Powered Mobility Aids Carried Under The Provisions of Part 8				X		X	X				X		
	27.14.1 Loading of mobility aids powered by non-spillable wet batteries or batteries which comply with Special Provision A123 or A199 (ICAO TI 7;2.13.1 IATA 9.3.14.1, 2.3.2.2)				X		X	X				X		
	27.14.2 Loading of mobility aids powered by spillable batteries (ICAO TI 7;2.13.2 IATA 9.3.14.2, 2.3.2.3)				X		X	X				X		
	27.14.3 Loading of mobility aids powered by lithium ion batteries (ICAO TI 7;2.13.3 IATA 9.3.14.3, 2.3.2.4)				X		X	X				X		

DG Knowledge Table

NO.	Aspect of transport of dangerous goods by air with which they should be familiar, as a minimum	a	b	c	d	e	f	g	h	i	j	k	Reference in the Applicable Training Program	Comment (PCAA only)
	27.15 Handling of self-reactive substances and organic peroxides (ICAO TI 7;2.14 IATA 9.3.15)				X		X	X				X		
	27.16 Handling and loading of intermediate bulk containers (IBCs) (ICAO TI 7;2.15 IATA 9.3.16)				X		X	X				X		
28	**Inspection and decontamination**													
	28.1 Inspection for damage or leakage (ICAO TI 7;3.1 IATA 9.3.6, 9.4.1)				X			X				X		
	28.2 Damaged or leaking packages of radioactive material contaminated packaging (ICAO TI 7;3.2 IATA 10.9.4)				X			X				X		
	28.3 DEALING WITH SUSPECTED CONTAMINATED BAGGAGE OR CARGO (ICAO TI 7;3.3 IATA 9.4.3)				X			X				X		
29	**Provision of information**													
	29.1 Information to Pilot-in-Command (ICAO TI 7;4.1 IATA 9.5.1.1)						X	X	X			X		
	29.2 Accessibility of NOTOC (ICAO TI 7;4.1.5, 7;4.1.8 IATA 9.5.1.1.8, 9.5.1.1.9)						X	X	X			X		
30	**Provisions concerning passengers and crew**													
	30.1 Information to passengers (ICAO TI 7;5.1 IATA 1.4.3)	X	X	X	X	X	X	X	X	X	X	X		
	30.2 Passenger check-in procedures (ICAO TI 7;5.2 IATA 1.4.4, 9.5.2)	X	X	X	X	X	X	X	X	X	X	X		
	30.3 Provisions Concerning Passengers and Crew (ICAO TI 8 IATA 2.3)	X	X	X	X	X	X	X	X	X	X	X		
31	**Provisions to aid recognition of undeclared dangerous goods (ICAO TI 7;6 IATA 2.2)**	X	X	X	X	X	X	X	X	X	X	X		
	31.1 Awareness of consumer warning label, GHS (ICAO 7;4.2, 7.1.1 Note 1. IATA Appendix B.4, Table B.4.A, Table B.4.B)	X	X	X	X	X	X	X	X	X	X	X		

Note: The dangerous goods activities of the operator and individual employee (S) will dictate the amount of information needed in the training curriculum and the duration of the training program.

DECLARATION

I declare that the information given in the application form is true in every respect.

Name & Designation ____________________ Signature & Date ____________________

OBSERVATIONS

	Description
1.	
2.	
3.	
4.	

Name of Inspector ____________________ Signature & Date ____________________

APPENDIX "L-II"

	PAKISTAN CIVIL AVIATION AUTHORITY **APPLICATION FOR APPROVAL OF DANGEROUS GOODS TRAINING PROGRAM (DESIGNATED POSTAL OPERATORS)** **Flight Standards Directorate**	**CAAF-100-FSXX-1.0**

Instructions

1. The form once completed should be returned to the office of Flight Standards Directorate CAA
2. Failure to complete this form in full may result in a delay in processing the application.
3. The issuing of this form does not in itself constitute an approval of the training program.

Name of Operator / Service Provider:	Date submitted:
Title of training program	
Type of submission ☐ Initial Submission ☐ Amendment	Prior Approval Number (if applicable): ☐ Not Applicable
Type of Program ☐ Initial ☐ Re-Current ☐ Initial & Re-Current ☐ Other (Specify)	How the training is to be delivered ☐ Initial ☐ Re-Current ☐ Initial & Re-Current ☐ Other (Specify)

CATEGORY OF PERSONNEL WHO WILL USE THE TRAINING PROGRAM

☐ A; Staff of designated postal operators involved in accepting mail containing dangerous goods

☐ B; Staff of designated postal operators involved in processing mail (other than dangerous goods)

☐ C; Staff of designated postal operators involved in the handling, storage and loading of mail

Please ensure that

- Every page is identified with a page number a date and a revision number.
- There is a list of effective pages.
- All the application training references are inscribed on the "Training Program Reference" column of the form. If the topic is not applicable "N/A" should be inscribed.
- All student handouts exams, answer sheet, correctors and marking details are included.
- The passing grade is mentioned.
- A copy of all audio-visual (transparencies, PowerPoint & movies) is included (if applicable)
- If the program is a Computer Base Training (CBT), submit either the scenario or a copy of the computer program.
- If the program is a Home Study, submit the form used by the trainee to attest that he/she has completed the training.

	PAKISTAN CIVIL AVIATION AUTHORITY **APPLICATION FOR APPROVAL OF DANGEROUS GOODS TRAINING PROGRAM (DESIGNATED POSTAL OPERATORS)**	**CAAF-100-FSXX-1.0**
	Flight Standards Directorate	

CONTENTS OF TRAINING PROGRAM APPLICABLE TO PERSONNEL INVOLVED IN / AS:

Aspects of transport of dangerous goods by air with which they should be familiar, as a minimum	A	B	C	Training program ref (page or section)	FDG
General Philosophy					
General applicability (1;1)	X	X	X		
Definition of Dangerous Goods (1;3.1)	X	X	X		
State and Operator Variations (Attachments 3;1 and 2)	X	X	X		
Unit of Measurements (1;3.2)	X	X	X		
Limitations					
Dangerous goods Forbidden for Transport by Air under any circumstances (1;2.1)	X	X	X		
Exceptions for Dangerous Goods of the Operator (1;2.2)	X	X	X		
Dangerous Goods in Excepted Quantities (1;2.4)	X	X	X		
Dangerous Goods in Limited Quantities (1;2.5)	X	X	X		
General Requirements for shippers					
General (5;1.1)	X				
General provision for Class 7 (5;1.2)	X				
Information to employees (5;1.3)	X				
Training (5;1.4)	X				
Salvage packaging (5;1.5)	X				
Empty packaging (5;1.6)	X				
Mixed packaging (5;1.7)	X				
Classification					
Classes and divisions (Introductory Chapter 2;2.1)	X				
Complete List of Classes, divisions and definitions (2;1 to 2;9)	X				
Packing Groups (Introductory Chapter 2;2.4)	X				
UN Numbers and Proper shipping name (Introductory Chapter 3 and 3;1.2)	X				
Classification of Substances and Articles with Multiple Hazards (Introductory Chapter 2;2.5, 2;2.7, 4;4.1 and Table 2-1)	X				
Transport of samples (Introductory Chapter 5)	X				
Mixtures and solutions containing one or more dangerous substances (3;1.3)	X				
Forbidden dangerous goods entries in the Dangerous Goods List (3;2.1.1 and Note1)	X				
Special Provision entries in the Dangerous Goods List (3;3 and Table 3-2)	X				
List of Dangerous Goods					
Arrangement of the Dangerous Goods List (3;2.1 and Table 3-1)	X				
Method of using the Dangerous Goods List for articles or substances specifically listed by name (3;1.1.2)	X				

	PAKISTAN CIVIL AVIATION AUTHORITY APPLICATION FOR APPROVAL OF DANGEROUS GOODS TRAINING PROGRAM (DESIGNATED POSTAL OPERATORS) Flight Standards Directorate	CAAF-100-FSXX-1.0

Aspects of transport of dangerous goods by air with which they should be familiar, as a minimum	A	B	C	Training program ref (page or section)	FDG
Packing requirements					
General packing requirements (4;1 and 4;2)	X				
Types of packaging (1;3.1, 2;7.2, 7.7 and 7.9)	X				
Marking of packaging other than inner packaging (4;2.4, 5;2.4 and 6;2)	X				
Different substances packed together (4;1.1.7 and 4;1.1.8)	X				
Over packs (1;3.1 and 5;1.1)	X				
Packing Instructions (4;3 to 4;11)	X				
Use of the packing instructions in conjunction with the Dangerous Goods List (4;2.1 and 4;3)	X				
Labelling and marking					
Package markings (5;2)	X	X	X		
Labelling (5;3)	X	X	X		
Over packs (5;1.1 and 5;3.4.9)	X	X	X		
Handling Labels (5;3.4.2)	X	X	X		
Dangerous Goods transport document and other relevant documentation					
Dangerous goods transport document (5;4.1)	X	X			
Signature of the Shipper (5;4.1.6)	X	X			
Infectious substances (5;4.2)	X	X			
Air Waybill information (5;4.3)	X	X			
Additional documentation for other than radioactive material (5;4.4)	X	X			
Acceptance of the dangerous goods listed in 1;2.3.2					
General inspection requirements before acceptance (7;1.1.1)	X				
Inspection for documentation, retention of document, marking, labelling, no leakage and integrity is not compromised (7;1.1.2)	X				
Special Responsibilities – Infectious Substances (7;1.2)	X				
Acceptance Checklist (7;1.3)	X				
Cargo Acceptance procedures (7;1.4)	X				
Undeliverable consignments of radioactive material (7;1.5)	X				
Recognition of undeclared dangerous goods					
Provision to aid recognition of undeclared dangerous goods (7;6)	X	X	X		
Storage and loading procedures					
Loading restrictions on the flight deck and on passenger aircraft (7;2.1)			X		
Loading of incompatible dangerous goods and segregation (7;2.2 and Table 7-1)			X		
Loading of packages containing liquid dangerous goods (7;2.3)			X		
Loading and securing of dangerous goods (7;2.4)			X		
Damage Packages of dangerous goods (7;2.5)			X		
Replacement of labels (7;2.6)			X		
Identification of unit load devices containing dangerous goods (7;2.7)			X		
Stowage of (toxic) and infectious substances (7;2.8)			X		

	PAKISTAN CIVIL AVIATION AUTHORITY APPLICATION FOR APPROVAL OF DANGEROUS GOODS TRAINING PROGRAM (DESIGNATED POSTAL OPERATORS) Flight Standards Directorate	CAAF-100-FSXX-1.0

Aspects of transport of dangerous goods by air with which they should be familiar, as a minimum	A	B	C	Training program ref (page or section)	FDG
Handling and Loading of Radioactive Material (7;2.9)			X		
Loading of magnetized materials (7;2.10)			X		
Loading of dry ice (7;2.11)			X		
Loading of expandable polystyrene beads (7;2.12)			X		
Handling of self-reactive substances and organic peroxides (7;2.13)			X		
Inspection for damage or leakage (7;3.1)			X		
Damaged or leaking packages of radioactive material contaminated packaging (7;3.2)			X		
Provisions for passengers and crew					
Information to passengers (7;5.1)	X	X	X		
Passenger check-in procedures (7;5.2)	X	X	X		
List of general descriptions to aid recognition of undeclared dangerous goods (7;6)	X	X	X		
Dangerous goods carried by passengers or crew (8;1.1)	X	X	X		
Emergency procedures					
Definition of dangerous goods accident and incident (1;3.1)	X	X	X		
Reporting of dangerous goods accidents and incidents (7;4.4)	X	X	X		
Reporting of undeclared or misdeclared dangerous goods (7;4.5)	X	X	X		
Emergency response information (7;4.8)	X	X	X		

Note: The dangerous goods activities of the operator and individual employee (S) will dictate the amount of information needed in the training curriculum and the duration of the training program.

DECLARATION

I declare that the information given in the application form is true in every respect.

Name & Designation   Signature & Date

OBSERVATIONS

	Description
1.	
2.	
3.	
4.	

Name of Inspector   Signature & Date

APPENDIX "M"

TRAINING PROGRAMS APPROVAL LETTER (in accordance with ICAO TIs PART 1; 4.1.2)

Air Operator Name:
Address:

Attention:

Subject: - **APPROVAL OF OPERATOR'S DANGEROUS GOODS TRAINING PROGRAM (SPECIFY APPROVAL NUMBER)**

The Transport of Dangerous Goods Training Program prepared by (specify air operator) and submitted for initial and recurrent training of (specify category of personnel), has been evaluated pursuant to the requirements of Chapter 4, of Part I of the ICAO TIs for the Safe Transport of Dangerous Goods by Air, being part of National Regulation (reference ...). It has been determined that the submitted program meets all the requirements of the ICAO TIs.

In accordance with (National legislation in reference to ICAO TIs Part 1;4.1.2) the [State authority] hereby approves operator ("the operator's name") dangerous goods training programs.

"TIs " means the latest effective edition of the TIs for the Safe Transport of Dangerous Goods by Air (ICAO Doc.9284-AN/905), including the Supplement and any Addendum, approved and published by decision of the Council of the International Civil Aviation Organization.

This Approval shall have effect from the date hereof until varied, suspended or revoked.

Issued at: ....

Date: ....

Signature: ....

Name: ....

Title: ....

APPENDIX “N”

	PAKISTAN CIVIL AVIATION AUTHORITY **CERTIFICATES OF DANGEROUS GOODS TRAINING INSPECTION CHECKLIST** **Flight Standards Directorate**	**CAAF-042-FSXX-2.0**

Name of organization:	
Location:	
Date(s) of Inspection:	

Name of employee	**Functions of personnel**	**Date of training**	**Confirmation that a test has been completed satisfactorily**

Functions of personnel:

1	Personnel responsible for preparing dangerous goods consignment	6	Personnel responsible for the planning of aircraft loading
2	Personnel responsible for processing or accepting goods presented as general cargo	7	Flight Crew
3	Personnel responsible for processing or accepting dangerous goods consignment	8	Flight Operations Officers and Flight Dispatchers
4	Personnel responsible for handling cargo in a warehouse, loading and unloading ULDs and aircraft cargo compartments	9	Cabin Crew
5	Personnel responsible for accepting passenger and crew baggage, managing aircraft boarding areas and other functions involving direct passenger contact at an airport	10	Personnel responsible for screening of passengers and crew and their baggage, cargo and mail

REPORT COMPILED BY:

Signed .... Date:
DANGEROUS GOODS INSPECTOR

APPENDIX "O"

	PAKISTAN CIVIL AVIATION AUTHORITY **RECORD OF DANGEROUS GOODS TRAINING INSPECTION CHECKLIST**	**CAAF-055-FSXX-1.0**
	Flight Standards Directorate	

Name of organization:	
Location:	
Date(s) of Inspection:	

Is the record of training made available upon request? Y / N

Does the record of training included:	Y / N – COMMENTS
Name of the employee	
The most recent training completion date	
Recurrent training within 24 months of previous training	
A description, copy or reference to training materials used to meet the requirements	
Name and address of the organization providing the training	
A copy of the certification showing that a test has been completed satisfactorily	
Copy of record of training attached	

REPORT COMPILED BY:

Signed .... Date:
DANGEROUS GOODS INSPECTOR

APPENDIX "P"

	PAKISTAN CIVIL AVIATION AUTHORITY **DANGEROUS GOODS TRAINING COURSE DELIVERY – EVALUATING REPORT**	**CAAF-049-FSXX-2.1**
	Flight Standards Directorate	

☐ **INITIAL** ☐ **RENEWAL** ☐ **SPECIAL**

Name of organization: ____________________

Function of personnel: ____________________

Date of inspection: ____________________

Instructor(s): ____________________

ALLOCATION OF MARKS ON A SCALE 0-5

POINTS	EXPLANATION
5 = EXCELLENT	Outstanding, meet all requirements and delivered in an exceptional manner
4 = GOOD	Above average, message clearly delivered, drawing interest and participation of trainees.
3 = AVERAGE	Message delivered and understandable. Objectives met.
2 = BELOW AVERAGE	Message delivered but somewhat difficult to understand. Objectives barely met.
1 = NOT UP STANDARD	Message incomplete or difficult to understand. Objectives not met.
0 = OMITTED	Not addressed

EVALUATION CRITERIA	REMARKS	POINTS
1. Introduction		
a) Stimulating		
b) Effective linking to title		
c) Importance of lesson stressed		
d) Objective / Scope of lesson given		
TOTAL (20)		
2. Lesson content		
a) Content relevant sufficient to cover objective/scope		
b) Demonstration / explanations given		
c) Class participation evoked, practice & exercise		
d) Subject clarification provided where necessary		
TOTAL (20)		
3. Instructional Techniques		
a) Effective use of voice		
b) Effective use of questions to students		
c) Effective eye - contact		
d) Effective use of body language		
e) Effective movement around the class		
f) Logical explanation given		
g) Enthusiasm during presentation		
h) Effective handling of questions from students		
TOTAL (40)		

PAKISTAN CIVIL AVIATION AUTHORITY DANGEROUS GOODS TRAINING COURSE DELIVERY – EVALUATING REPORT Flight Standards Directorate	CAAF-049-FSXX-2.1

EVALUATION CRITERIA	REMARKS	POINTS
4. Use of teaching aid		
a) Effective use of aids		
b) Quality of aids		
TOTAL (10)		
5. Conclusion		
a) Summary of important facts		
b) Summary in line with objective		
TOTAL (10)		
GRAND TOTAL (100)		

Positive remarks:
Critical remarks:
Recommendations:

Does the course meet the objectives and the syllabus or curriculum? **YES / NO**

REPORT COMPILED BY:

Signed: .... Date:

DANGEROUS GOODS INSPECTOR

DFS Remarks:

APPENDIX "Q"

	PAKISTAN CIVIL AVIATION AUTHORITY COMPLIANCE CHECKLIST FOR APPROVAL OF PROCEDURES (DESIGNATED POSTAL OPERATORS)	CAAF-101-FSXX-1.0
	Flight Standards Directorate	

Compliance Checklist for approval of procedures (Designated Postal Operators) is developed in accordance with the ICAO Annex 18 and ICAO TIs (Doc.9284) and its supplement.

Name of the Postal Operator		Date	
Location			
Personnel Involved			

No.	Items	Ref.	Sat Un-Sat N/A	Remarks
1	a) Training of staff in accordance with Part 1; 4 of the ICAO TI (i.e. system to ensure the timely scheduling and delivery of initial and recurrent dangerous goods training, production and retention of records, etc.)	ICAO TI 1;4.1 and 4.2.8; and ICAO TI Supp 1;3		
	b) Adequacy of dangerous goods training programme (procedure, presentations, instructor's notes, handouts, visuals aids, etc.)			
	c) tests to verify understanding			
	d) procedures to ensure the appropriate qualification of instructors			
2	Reporting of Dangerous Goods accidents and incidents to Civil Aviation Authorities	ICAO TI Supp 1;3		
3	Reporting of hidden and undeclared Dangerous Goods to Civil Aviation Authorities	ICAO TI Supp 1;3		
4	Provision of information to customers at acceptance points (street post boxes, post offices, agencies and websites)	ICAO TI Supp 1;3		
5	Provision of information to account customers regarding dangerous goods	ICAO TI Supp 1;3		
6	Inclusion of clauses in contracts with account customers regarding dangerous goods not permitted in the mail	ICAO TI Supp 1;3		
7	Emergency procedures (e.g. for leaks and spills from dangerous goods on aircraft or within ULDs);	ICAO TI Supp 1;3		
8	Retention of documents (e.g. Dry ice acceptance checklist)	ICAO TI Supp 1;3		
9	Documented acceptance procedures for staff regarding the dangerous goods allowed by Part 1;2.3 of the TI	ICAO TI Part 1;2.3 and ICAO TI Supp 1;3		
10	Procedures for requiring the sender's name, address and signature on packages containing dangerous goods	ICAO TI Supp 1;3		
11	Procedures for ensuring that any State or Operator variations in attachment 3 of ICAO TI are complied with	ICAO TI Supp 1;3		
12	Procedures for ensuring that any changes to ICAO TI are incorporated into existing procedures	ICAO TI Supp 1;3		
13	Procedures for the handling of packages rejected from transport	ICAO TI Supp 1;3		
Acceptance of lithium batteries (in equipment)				
14	inclusion of procedures for the acceptance of lithium batteries within dangerous goods training and testing materials;	ICAO TI Supp 1;3		
15	provision of information to customers regarding the requirements for lithium batteries at acceptance points (e.g. street post boxes, post offices, agencies, websites);	ICAO TI Supp 1;3		
16	provision of information to account customers regarding the requirements for lithium batteries;	ICAO TI Supp 1;3		
17	inclusion of clauses in contracts with account customers regarding the requirements for lithium batteries;	ICAO TI Supp 1;3		
18	documented lithium battery acceptance procedures (including requiring the senders name, address and signature on packages in international air mail);	ICAO TI Supp 1;3		
19	Emergency procedures for lithium batteries in air transport (e.g. heat, smoke or flames noted from a mailbag).	ICAO TI Supp 1;3		

PCAA USE ONLY

Findings / Observations	
Name and Title of the Inspector	Date
Comments	
DFS	Date

APPENDIX "R"

	PAKISTAN CIVIL AVIATION AUTHORITY DANGEROUS GOODS OCCURRENCE REPORT Flight Standards Directorate	CAAF-090-FSXX-1.0

See the Notes on the reverse of this form. Those boxes where the heading is in italics needs only be completed if applicable.

Occurrence Type: Accident *Incident* *Other Occurrence*

1. Operator:		2. Date of Occurrence:	3. Local time of Occurrence:
4. Flight Date:		5. Flight No:	
6. Departure Airport:		7. Destination Airport:	
8. Aircraft Type:		9. Aircraft Registration:	
10. Location of Occurrence:		11. Origin of the goods:	
12. Description of the occurrence, including details of injury, damage, etc			
13. Proper Shipping Name (including the technical name):		14. UN/ID no (when known):	
15. Class/Division (when known):	16. Subsidiary risk(s):	17. Packing group:	18. Category, (class 7 only)
19. Type of packaging	20. Packaging specification marking:	21. No. of Packages:	22. Quantity (or transport index, if applicable)
23. Reference No. of Air Waybill:		24. Ref no. of courier pouch, baggage tag or passenger ticket:	
25. Name and Address of Shipper, Agent, Passenger, etc.			
26. Other relevant information (including suspected cause, any action taken):			
27. Name and title of person making report:		28. Mobile No:	
		29. Email address:	
30. Name of Company & Address:		31. Signature & Date	
32. Description of the occurrence (continuation):			

	PAKISTAN CIVIL AVIATION AUTHORITY DANGEROUS GOODS OCCURRENCE REPORT	CAAF-090-FSXX-1.0
	Flight Standards Directorate	

NOTES

1) Any type of Dangerous Goods Occurrence must be reported, irrespective of whether the Dangerous Goods are contained in cargo, mail or baggage.

2) A Dangerous Goods Accident is an occurrence associated with and related to the transport of Dangerous Goods which results in fatal or serious injury is an injury which is sustained by a person in an accident and which: (a) required hospitalization for more than 48hours, commencing within 07 days from the date the injury was received; or (b) results in a fracture of any bones (except simple fractures of fingers, toes or nose); or (c) involves lacerations which cause severe haemorrhage, nerve, muscle or tendon damage; or (d) involves injury to internal organ; or (e) involves second or third degree burns, or any burns affecting more than 5% of the body surface; or (f) involves verified exposure to infectious substances or injurious radiation. A Dangerous Goods accident may also be an aircraft accident; in which case the normal procedure for reporting of air accidents must be followed.

3) A Dangerous Goods incident is an occurrence, other than a Dangerous Goods Accident, associated with and related to the transport of Dangerous Goods, not necessarily occurring onboard an aircraft, which results in injury to a person, property damage, fire, breakage, spillage, leakage of fluid or radiation or other evidence that the integrity of the packaging has not been maintained. Any occurrence relating to the transport of Dangerous Goods which seriously jeopardizes the aircraft or its occupants is also deemed to constitute a Dangerous Goods Incident.

4) This form should also be used to report any occasion when undeclared or mis-declared Dangerous Goods are discovered in Cargo, Mail or unaccompanied baggage or when accompanied baggage contains Dangerous Goods which Passengers or Crew are not permitted to take on aircraft.

5) And Initial report, which may be made by any means, must be dispatched within 72 hours of the occurrence, to the Authority of the State (a) of the operator; (b) in which the incident occurred, unless exceptional circumstances prevent this. This occurrence report form, duly completed, must be sent as soon as possible, even if all the information is not available.

6) Copies of all relevant documents and any photographs should be attached to this report.

7) Providing it is safe to do so, all Dangerous Goods, Packaging, Documents, etc. relating to the occurrence must be retained until after the initial report has been sent to the Dangerous Goods State Authority and they have indicated whether or not these should continue to be retained.

8) All completed reports must be sent to:

HQs Civil Aviation Authority
Flight Standards Directorate
Jinnah International Airport
Karachi – PAKISTAN
Tel: 92-21-9907 2630-31
Fax: 92-21-99242767
Email: FlightStandard.Directorate@caapakistan.com.pk

APPENDIX "R-I"

	PAKISTAN CIVIL AVIATION AUTHORITY **PASSENGER / CREW DANGEROUS GOODS OCCURRENCE REPORT** **Flight Standards Directorate**	**CAAF-091-FSXX-1.0**

(PAKISTAN Regulations require occurrences to be reported to the CAA within 72hours of the occurrence becoming known to the reporter) (see Note 5)

1. Aircraft Operator:	2. Date of Occurrence:	3. Local Time of Occurrence:

4. Flight Date:	5. Flight number:	6. Aircraft type:	7. Aircraft Registration:
8. Location of occurrence:	9. Departure airport:	10. Destination airport	11. Origin of passenger

12. Product Name:	13. Proper shipping name (including the technical name):

14. UN / ID no.	15. Class / division	16. Subsidiary risk (s):	17. Packing group:
18. Type of packaging:	19. Packaging specification marking:	20. Number of pieces:	21. Quantity per piece:

22. Passenger (s) ticket number (s)
23. Name and address of passenger (s) involved:
24. Description of occurrence: (if necessary, continue on additional page)
25. Details of action taken against passenger (by operator / handling agent / security / police etc)

26. Goods are being held: Yes / No *(see note 8)*	27. Location of where goods are held:	28. Photographs are available: Yes / No
29. Name / title of person reporting:	30. Tel:	31. Reporter's reference / ASR number:
32. Company and address:	33. Fax:	34. Date of report:
	35. Email:	36. Signature:

	PAKISTAN CIVIL AVIATION AUTHORITY PASSENGER / CREW DANGEROUS GOODS OCCURRENCE REPORT Flight Standards Directorate	CAAF-091-FSXX-1.0

PASSENGER / CREW DANGEROUS GOODS OCCURRENCE REPORT – NOTES

1. It is important that this form is completed in as much detail as possible; this will help to avoid delays in processing the report and unnecessary additional work by both the reporter and the CAA.
2. Any type of dangerous goods occurrence must be reported, irrespective of whether the dangerous goods are carried by a passenger or crew on their person or in their carry on or checked-in baggage. Goods found prior to or during check-in are not required to be reported. A separate form is available for incidents related to cargo / mail or unaccompanied baggage.
3. A dangerous goods accident is an occurrence associated with and related to the transport of dangerous goods which results in fatal or serious injury to a person or major property damage. For this purpose, serious injury is an injury which is sustained by a person in an accident and which: (a) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; or (b) results in a fracture of any bones (except simple fractures of fingers, toes or nose); or (c) involves lacerations which cause severe haemorrhage, nerve, muscle or tendon damage; or (d) involves injury to any internal organ; or (e) involves second or third degree burns, or any burns affecting more than 5% of the body surface; or (f) involves verified exposure to infectious substances or injurious radiation. A dangerous goods accident may also be an aircraft accident; in which case the normal procedure for reporting of accidents must be followed.
4. A dangerous goods incident is an occurrence, other than a dangerous goods accident, associated with and related to the transport of dangerous goods, not necessarily occurring on board an aircraft, which results in injury to a person, property damage, fire, breakage, spillage, leakage of fluid or radiation or other evidence that the integrity of the packaging has not been maintained. Any occurrence relating to the transport of dangerous goods which seriously jeopardize the aircraft or its occupants is also deemed to constitute a dangerous goods incident.
5. An initial report, which may be made by any means, must be dispatched within 72 hours of the occurrence, to the Authority of the State (a) of the operator; and (b) in which the incident occurred unless exceptional circumstances prevent this. This occurrence report form, duly completed, must be sent as soon as possible, even if all the information is not available at that time.
6. Copies of all relevant documents and any photographs should be attached to or sent with this report.
7. Providing it is safe to do so, all dangerous goods, packagings, documents, etc. relating to the occurrence must be retained in a suitable location until after the initial report has been sent to the Flight Standards Directorate Office, PCAA and they have indicated whether or not these should continue to be retained.
8. Below are further explanations for some of the boxes on this form:

Box	Explanation / Details
1	Operator of the aircraft that the dangerous goods travelled on or on which they would have travelled if not intercepted.
8	Location in airport (e.g. baggage screening / security / ramp) and name of airport where incident occurred.
12	Commercial name of product being carried.
18 – 19	Details of any type of packaging used (e.g. cardboard / fiberboard box) and UN specification details if applicable.
20 – 21	Give as much details as possible in order to identify exactly the number and type of pieces and the quantities of dangerous goods in each piece found, e.g. 2 X 1L tins of paint.
24	How the incident occurred, how it was found (e.g. during security screening / baggage screening etc.), the reason for the occurrence. It is important to record any dangerous goods markings and labeling visible on the goods since this may determine the action taken by the CAA.
25	Record any action taken as a result of occurrence, e.g. warning from operator / police; goods removed; passenger / crew removed from flight.
28	Digital photographs of the consignment are extremely useful. If photographs cannot be taken (and only if safe to do so) photocopies of markings / labels on packagings can also be of use.

9. Completed reports must be sent to: -

HQs Civil Aviation Authority
Flight Standards Directorate
Jinnah International Airport
Karachi – PAKISTAN
Tel: 92-21-9907 2630-31
Fax: 92-21-99242767
Email: FlightStandard.Directorate@caapakistan.com.pk

APPENDIX "S"

PAKISTAN CIVIL AVIATION AUTHORITY DANGEROUS GOODS INVESTIGATION REPORT Flight Standards Directorate	CAAF-024-FSXX-1.0

Time and Date incident:	Report number:	
Place of occurrence:	**Type of Report**	
	Violation observed	
	Accident	
	Incident	
	Other	
Name and address of shipper:	**Documents attached:**	
	Air waybill	
	Shipper's declaration	
	Acceptance check list	
	Notification to captain	
Name and address of consignee:	Photographs	
	Analysis report	
	Witness statement	
	Police report	
	Other	
Name and address of operator:	**Additional Information:**	
	Airport of departure:	
	Airport of destination:	
	Aircraft registration:	
	Flight No:	

Dangerous Goods involved:

UN/ ID no.	Proper shipping name	Class/ Division	Sub risk	Number and type of packages	Packing instruction and packing group

Chronological report of occurrence:
Violation to the regulation:
Action taken by Inspector:

REPORT COMPILED BY:

Signed .... Date:

DANGEROUS GOODS INSPECTOR

APPENDIX "T"

	PAKISTAN CIVIL AVIATION AUTHORITY APPLICATION FOR APPROVAL OR EXEMPTION TO CARRY DANGEROUS GOODS IN SPECIAL CIRCUMSTANCES	CAAF-102-FSXX-1.0
	Flight Standards Directorate	

Note – *This form applies to requests to carry dangerous goods where they do not comply with the normal requirements of the TIs. If there is insufficient space to list all items, they can be listed on a separate sheet. Application should be made at least 10 days before the date of the flight on which the dangerous goods are to be carried and should be submitted to CAA Pakistan.*

Instructions:

1. *The form once completed should be returned to PCAA*
2. *Failure to complete this form in full may result in a delay in processing the application.*
3. *The issuing of this form does not in itself constitute an authorization to carry dangerous goods.*

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1. APPLICANT DETAILS

Name:		*Telephone:*	
Organization:		*Fax:*	
		Email:	

2. SHIPPER (if different from the applicant)

Name:		*Telephone:*	
Organization:		*Fax:*	
		Email:	

3. CONSIGNEE (if different from the applicant)

Name:		*Telephone:*	
Organization:		*Fax:*	
		Email:	

4. The reason why it is essential the article or substance must be carried by air

5. DETAILS OF THE DANGEROUS GOODS

UN Number	Proper Shipping Name	Class / Division and Compatibility Group	Packing Instruction	Number of package	Type of Package	Net quantity (total)	Gross Weight (total)

	PAKISTAN CIVIL AVIATION AUTHORITY **APPLICATION FOR APPROVAL OR EXEMPTION TO CARRY DANGEROUS GOODS IN SPECIAL CIRCUMSTANCES** **Flight Standards Directorate**	**CAAF-102-FSXX-1.0**

6. Operational Details

Operator:		Flight Number (s):	
Airport of Departure:		Airport of Destination:	
Date of Flight:		AWB Number:	

7. Additional Information:

Applicants Name: ______________________________ Date: ______________

Signature: ______________________________

ATTACHMENT - 1

Table 1-1					
Function: Personnel preparing dangerous goods consignments for transport (Personnel classifying dangerous goods for transport is provided simultaneously) - "Shippers & Packers" including operator's staff acting as shippers, operator's staff preparing dangerous goods as Company Materials (COMAT) and staff of freight forwarders acting on behalf of the Shipper.					
Terms & Conditions				**Classifying dangerous goods**	**Preparing dangerous goods shipment**
Duration of Training - INITIAL				24 hours	24 hours
Training Method: Classroom				Instructor Led	Instructor Led
Task List				**Proficiency Level**	
0	**Understanding the basics of dangerous goods**			★	★
	0.1	Recognizing dangerous goods applicability		★	★
		0.1.1	Understand the definition	★	★
		0.1.2	Recognize the legal framework (global, national)	★	★
		0.1.2.1	Familiarize with PCAA CARs, 1994 Part-XVI and ANO-030	★	★
		0.1.3	Identify the application and scope	★	★
		0.1.4	Differentiate hazard and risk	★	★
	0.2	Understanding the general limitations		★	★
		0.2.1	Develop a sense of forbidden dangerous goods	★	★
		0.2.2	Recognize potential hidden dangerous goods	★	★
		0.2.3	Familiarize with passenger provisions	★	★
	0.3	Identifying roles and responsibilities		★	★
		0.3.1	Clarify the individual and collective role of the supplychain stakeholders	★	★
		0.3.2	Understand the passengers responsibilities	★	★
		0.3.3	Recognize the impact of State & operator variations	★	★
	0.4	Understanding the importance of classification & packaging		★	★
		0.4.1	Identify the general information about classes, divisions	★	★
		0.4.2	Understand general principles of Packing Groups	★	★
		0.4.3	Consider multiple hazards	★	★
	0.5	Understanding hazard communication		★	★
		0.5.1	Recognize the basic marking requirements	★	★
		0.5.2	Recognize the basic labelling requirements	★	★
		0.5.3	Identify the required documentation	★	★
	0.6	Familiarizing with basic Emergency Response		★	★
		0.6.1	Create awareness about general emergency procedures	★	★
		0.6.2	Understand the employer's emergency response requirements	★	★
1	**Classifying dangerous goods**			★★★	★★
	1.1	Evaluate a substance or an article against the classification criteria		★★★	★★
		1.1.1	Determine if it is dangerous goods	★★★	★★
		1.1.2	Determine if it is forbidden under anycircumstances	★★★	★★
	1.2	Determine dangerous goods description		★★★	★★
		1.2.1	Determine class or division	★★★	★★
		1.2.2	Determine packing group	★★★	★★
		1.2.3	Determine proper shipping name and UN number	★★★	★★
		1.2.4	Determine if it is forbidden unless approval orexemption is granted	★★★	★★
	1.3	Review special provisions		★★★	★★
		1.3.1	Assess if special provision(s) is applicable	★★★	★★
		1.3.2	Apply special provision(s)	★★★	★★

(Cont'd) Table 1-1

2	**Preparing dangerous goods shipment**				★★★
	2.1	Assess packing options including quantity limitations			★★★
		2.1.1	Consider limitations (de minimis quantities, excepted quantities, limited quantities, passengeraircraft, cargo aircraft only, special provisions, dangerous goods in the mail)		★★★
		2.1.2	Consider State and operator variations		★★★
		2.1.3	Determine if all-packed-in-one can be used		★★★
		2.1.4	Select how dangerous goods will be shippedbased on limitations and variations		★★★
	2.2	Apply packing requirements			★★★
		2.2.1	Consider constraints of packing instructions		★★★
		2.2.2	Identify and follow the instructions provided by thepackaging manufacturer when UN specification packaging is used		★★★
		2.2.3	Select appropriate packaging materials(absorbent, cushioning, etc.)		★★★
		2.2.4	Assemble package		★★★
	2.3	Apply marks and labels			★★★
		2.3.1	Determine applicable marks		★★★
		2.3.2	Apply marks		★★★
		2.3.3	Determine applicable labels		★★★
		2.3.4	Apply labels		★★★
	2.4	Assess use of overpack			★★★
		2.4.1	Determine if overpack can be used		★★★
		2.4.2	Apply marks if necessary		★★★
		2.4.3	Apply labels if necessary		★★★
	2.5	Prepare documentation			★★★
		2.5.1	Complete the Shipper's Declaration		★★★
		2.5.2	Complete other transport documents (e.g. airwaybill)		★★★
		2.5.3	Include other required documentation(approvals/exemptions, etc.)		★★★
		2.5.4	Retain copies of documents		★★★

Note 1. Function in Table 1-1 for personnel (Classifying Dangerous Goods)

Note 2. Function in Table 1-1 for personnel (Preparing dangerous goods shipments)

Table 1-2				
Function: Personnel responsible for processing or accepting goods presented as general cargo				
Terms & Conditions				
Duration of Training - INITIAL				16 hours
Training Method: Classroom				Instructor Led
Task List				**Proficiency Level**
0	**Understanding the basics of dangerous goods**			★
	0.1	Recognizing dangerous goods applicability		★
		0.1.1	Understand the definition	★
		0.1.2	Recognize the legal framework (global, national)	★
		0.1.2.1	Familiarize with PCAA CARs, 1994 Part-XVI and ANO-030-FSXX	★
		0.1.3	Identify the application and scope	★
		0.1.4	Differentiate hazard and risk	★
	0.2	Understanding the general limitations		★
		0.2.1	Develop a sense of forbidden dangerous goods	★
		0.2.2	Recognize potential hidden dangerous goods	★
		0.2.3	Familiarize with passenger provisions	★
	0.3	Identifying roles and responsibilities		★
		0.3.1	Clarify the individual and collective role of the supply chain stakeholders	★
		0.3.3	Recognize the impact of State & operator variations	★
	0.4	Understanding the importance of classification & packaging		★
		0.4.1	Identify the general information about classes, divisions	★
		0.4.2	Understand general principles of Packing Groups	★
		0.4.3	Consider multiple hazards	★
	0.5	Understanding hazard communication		★
		0.5.1	Recognize the basic marking requirements	★
		0.5.2	Recognize the basic labelling requirements	★
		0.5.3	Identify the required documentation	★
	0.6	Familiarizing with basic Emergency Response		★
		0.6.1	Create awareness about general emergency procedures	★
		0.6.2	Understand the employer's emergency response requirements	★
3	**Processing/accepting cargo**			
	3.4	Process/accept cargo other than dangerous goods		★★★
		3.4.1	Check documentation for indications of hidden/undeclared dangerous goods	★★★
		3.4.2	Check packages for indications of hidden/undeclared dangerous goods	★★★
7	**Collecting safety data**			
	7.1	Report dangerous goods accidents		★★
	7.2	Report dangerous goods incidents		★★
	7.3	Report undeclared/mis-declared dangerous goods		★★
	7.4	Report dangerous goods occurrences		★★

Table 1-3				
Function: Personnel responsible for processing or accepting dangerous goods consignments				
Terms & Conditions				
Duration of Training - INITIAL				32 hours
Training Method: Classroom				Instructor Led
Task List				**Proficiency Level**
0	**Understanding the basics of dangerous goods**			★
	0.1	Recognizing dangerous goods applicability		★
		0.1.1	Understand the definition	★
		0.1.2	Recognize the legal framework (global, national)	★
		0.1.2.1	Familiarize with PCAA CARs, 1994 Part-XVI and ANO-030-FSXX	★
		0.1.3	Identify the application and scope	★
		0.1.4	Differentiate hazard and risk	★
	0.2	Understanding the general limitations		★
		0.2.1	Develop a sense of forbidden dangerous goods	★
		0.2.2	Recognize potential hidden dangerous goods	★
		0.2.3	Familiarize with passenger provisions	★
	0.3	Identifying roles and responsibilities		★
		0.3.1	Clarify the individual and collective role of the supply chain stakeholders	★
		0.3.2	Understand the passengers responsibilities	★
		0.3.3	Recognize the impact of State & operator variations	★
	0.4	Understanding the importance of classification & packaging		★
		0.4.1	Identify the general information about classes, divisions	★
		0.4.2	Understand general principles of Packing Groups	★
		0.4.3	Consider multiple hazards	★
	0.5	Understanding hazard communication		★
		0.5.1	Recognize the basic marking requirements	★
		0.5.2	Recognize the basic labelling requirements	★
		0.5.3	Identify the required documentation	★
	0.6	Familiarizing with basic Emergency Response		★
		0.6.1	Create awareness about general emergency procedures	★
		0.6.2	Understand the employer's emergency response requirements	★
3	**Processing/accepting cargo**			
	3.1	Review documentation		★★★
		3.1.1	Verify Shipper's Declaration	★★★
		3.1.2	Verify other transport documents (e.g. air waybill)	★★★
		3.1.3	Verify other documents (exemptions, approvals, etc.)	★★★
		3.1.4	Verify State/operator variations	★★★
	3.2	Review package(s)		★★★
		3.2.1	Verify marks	★★★
		3.2.2	Verify labels	★★★
		3.2.3	Verify packaging type	★★★
		3.2.4	Verify package conditions	★★★
		3.2.5	Verify State/operator variations	★★★
	3.3	Complete acceptance procedures		★★★
		3.3.1	Complete acceptance checklist	★★★
		3.3.2	Provide shipment information for load planning	★★★
		3.3.3	Retain documents	★★★
7	**Collecting safety data**			
	7.1	Report dangerous goods accidents		★★
	7.2	Report dangerous goods incidents		★★
	7.3	Report undeclared/mis-declared dangerous goods		★★
	7.4	Report dangerous goods occurrences		★★

Table 1-4				
Function: Personnel responsible for handling and storage of cargo in a warehouse, loading and unloading ULD and loading and unloading aircraft cargo compartments				
Terms & Conditions				
Duration of Training - INITIAL				8 hours
Training Method: Classroom				Instructor Led
Task List				**Proficiency Level**
0	**Understanding the basics of dangerous goods**			★
	0.1	Recognizing dangerous goods applicability		★
		0.1.1	Understand the definition	★
		0.1.2	Recognize the legal framework (global, national)	★
		0.1.2.1	Familiarize with PCAA CARs, 1994 Part-XVI and ANO-030-FSXX	★
		0.1.3	Identify the application and scope	★
		0.1.4	Differentiate hazard and risk	★
	0.2	Understanding the general limitations		★
		0.2.1	Develop a sense of forbidden dangerous goods	★
		0.2.2	Recognize potential hidden dangerous goods	★
		0.2.3	Familiarize with passenger provisions	★
	0.3	Identifying roles and responsibilities		★
		0.3.1	Clarify the individual and collective role of the supply chain stakeholders	★
		0.3.3	Recognize the impact of State & operator variations	★
	0.4	Understanding the importance of classification & packaging		★
		0.4.1	Identify the general information about classes, divisions	★
		0.4.2	Understand general principles of Packing Groups	★
		0.4.3	Consider multiple hazards	★
	0.5	Understanding hazard communication		★
		0.5.1	Recognize the basic marking requirements	★
		0.5.2	Recognize the basic labelling requirements	★
		0.5.3	Identify the required documentation	★
	0.6	Familiarizing with basic Emergency Response		★
		0.6.1	Create awareness about general emergency procedures	★
		0.6.2	Understand the employer's emergency response requirements	★
4	**Managing cargo pre-loading**			★★★
	4.1	Plan loading		★★★
		4.1.1	Determine stowage requirements	★★★
		4.1.2	Determine segregation, separation, compartment limitations	★★★
	4.2	Prepare load for aircraft		★★★
		4.2.1	Check packages for indications of hidden/undeclared dangerous goods	★★★
		4.2.2	Check for damage and/or leakage	★★★
		4.2.3	Apply stowage requirements (e.g. segregation, separation, orientation,securing and protecting from damage)	★★★
		4.2.4	Apply ULD tags when applicable	★★★
		4.2.5	Transport cargo to aircraft	★★★
6	**Transporting cargo/baggage**			
	6.1	Load aircraft		★★★
		6.1.1	Transport cargo/baggage to aircraft	★★★
		6.1.2	Check packages for indications of hidden/undeclared dangerous goods	★★★
		6.1.3	Check for damage and/or leakage	★★★
		6.1.4	Apply stowage requirements (e.g. segregation, separation, orientation,securing and protecting from damage)	★★★
		6.1.5	Verify aircraft load against NOTOC	★★★
		6.1.6	Provide NOTOC information to pilot-in-command and flight operationsofficer/flight dispatcher	★★★
	6.3	Unload aircraft		★★★
		6.3.1	Apply specific unloading considerations	★★★
		6.3.2	Check packages for indications of hidden/undeclared dangerous goods	★★★
		6.3.3	Check for damage and/or leakage	★★★
		6.3.4	Transport cargo/baggage to facility/terminal	★★★
7	**Collecting safety data**			
	7.1	Report dangerous goods accidents		★★
	7.2	Report dangerous goods incidents		★★
	7.3	Report undeclared/mis-declared dangerous goods		★★
	7.4	Report dangerous goods occurrences		★★

Table 1-5				
Function: Personnel responsible for accepting passenger and crew baggage, managing aircraft boarding areas and other functions involving direct passenger contact at an airport				
Terms & Conditions				
Duration of Training - INITIAL				8 hours
Training Method: Classroom				Instructor Led
Task List				**Proficiency Level**
0	**Understanding the basics of dangerous goods**			★
	0.1	Recognizing dangerous goods applicability		★
		0.1.1	Understand the definition	★
		0.1.2	Recognize the legal framework (global, national)	★
		0.1.2.1	Familiarize with PCAA CARs, 1994 Part-XVI and ANO-030-FSXX	★
		0.1.3	Identify the application and scope	★
		0.1.4	Differentiate hazard and risk	★
	0.2	Understanding the general limitations		★
		0.2.1	Develop a sense of forbidden dangerous goods	★
		0.2.2	Recognize potential hidden dangerous goods	★
		0.2.3	Familiarize with passenger provisions	★
	0.3	Identifying roles and responsibilities		★
		0.3.1	Clarify the individual and collective role of the supply chain stakeholders	★
		0.3.2	Understand the passengers responsibilities	★
		0.3.3	Recognize the impact of State & operator variations	★
	0.4	Understanding the importance of classification & packaging		★
		0.4.1	Identify the general information about classes, divisions	★
	0.5	Understanding hazard communication		★
		0.5.1	Recognize the basic marking requirements	★
		0.5.2	Recognize the basic labelling requirements	★
		0.5.3	Identify the required documentation	★
	0.6	Familiarizing with basic Emergency Response		★
		0.6.1	Create awareness about general emergency procedures	★
		0.6.2	Understand the employer's emergency response requirements	★
5	**Accepting passenger and crew baggage**			★★★
	5.1	Process baggage		★★★
		5.1.1	Identify forbidden dangerous goods	★★★
		5.1.2	Apply approval requirements	★★★
	5.2	Accept baggage		★★★
		5.2.1	Apply operator requirements	★★★
		5.2.2	Verify passenger baggage requirements	★★★
		5.2.3	Advise pilot-in-command, when applicable	★★★
7	**Collecting safety data**			
	7.1	Report dangerous goods accidents		★
	7.2	Report dangerous goods incidents		★
	7.3	Report undeclared/mis-declared dangerous goods		★
	7.4	Report dangerous goods occurrences		★

Table 1-6			
Function: Personnel responsible for the planning of aircraft loading			
Terms & Conditions			
Duration of Training - INITIAL			8 hours
Training Method: Classroom			Instructor Led
Task List			**Proficiency Level**
0	**Understanding the basics of dangerous goods**		★
	0.1	Recognizing dangerous goods applicability	★
		0.1.1 Understand the definition	★
		0.1.2 Recognize the legal framework (global, national)	★
		0.1.2.1 Familiarize with PCAA CARs, 1994 Part-XVI and ANO-030-FSXX	★
		0.1.3 Identify the application and scope	★
		0.1.4 Differentiate hazard and risk	★
	0.2	Understanding the general limitations	★
		0.2.1 Develop a sense of forbidden dangerous goods	★
		0.2.2 Recognize potential hidden dangerous goods	★
		0.2.3 Familiarize with passenger provisions	★
	0.3	Identifying roles and responsibilities	★
		0.3.1 Clarify the individual and collective role of the supply chain stakeholders	★
		0.3.2 Understand the passengers responsibilities	★
		0.3.3 Recognize the impact of State & operator variations	★
	0.4	Understanding the importance of classification & packaging	★
		0.4.1 Identify the general information about classes, divisions	★
		0.4.2 Understand general principles of Packing Groups	★
		0.4.3 Consider multiple hazards	★
	0.5	Understanding hazard communication	★
		0.5.1 Recognize the basic marking requirements	★
		0.5.2 Recognize the basic labelling requirements	★
		0.5.3 Identify the required documentation	★
	0.6	Familiarizing with basic Emergency Response	★
		0.6.1 Create awareness about general emergency procedures	★
		0.6.2 Understand the employer's emergency response requirements	★
4	**Managing cargo pre-loading**		
	4.1	Plan loading	
		4.1.1 Determine stowage requirements	★★★
		4.1.2 Determine segregation, separation, compartment limitations	★★★
	4.3	Issue NOTOC	★★★
		4.3.1 Enter required information	★★★
		4.3.2 Verify conformance with load plan	★★★
		4.3.3 Transmit to loading personnel	★★★
6	**Transporting cargo/baggage**		
	6.1	Load aircraft	
		6.1.6 Provide NOTOC information to pilot-in-command and flight operations officer/flight dispatcher	★★★
7	**Collecting safety data**		
	7.1	Report dangerous goods accidents	★★
	7.2	Report dangerous goods incidents	★★
	7.3	Report undeclared/mis-declared dangerous goods	★★
	7.4	Report dangerous goods occurrences	★★

Table 1-7				
Function: Flight Crew				
Terms & Conditions				
Duration of Training - INITIAL				8 hours
Training Method: Classroom				Instructor Led
Task List				**Proficiency Level**
0	**Understanding the basics of dangerous goods**			★
	0.1	Recognizing dangerous goods applicability		★
		0.1.1	Understand the definition	★
		0.1.2	Recognize the legal framework (global, national)	★
		0.1.2.1	Familiarize with PCAA CARs, 1994 Part-XVI and ANO-030-FSXX	★
		0.1.3	Identify the application and scope	★
		0.1.4	Differentiate hazard and risk	★
	0.2	Understanding the general limitations		★
		0.2.1	Develop a sense of forbidden dangerous goods	★
		0.2.2	Recognize potential hidden dangerous goods	★
		0.2.3	Familiarize with passenger provisions	★
	0.3	Identifying roles and responsibilities		★
		0.3.1	Clarify the individual and collective role of the supply chain stakeholders	★
		0.3.2	Understand the passengers responsibilities	★
		0.3.3	Recognize the impact of State & operator variations	★
	0.4	Understanding the importance of classification & packaging		★
		0.4.1	Identify the general information about classes, divisions	★
		0.4.2	Understand general principles of Packing Groups	★
		0.4.3	Consider multiple hazards	★
	0.5	Understanding hazard communication		★
		0.5.1	Recognize the basic marking requirements	★
		0.5.2	Recognize the basic labelling requirements	★
		0.5.3	Identify the required documentation	★
	0.6	Familiarizing with basic Emergency Response		★
		0.6.1	Create awareness about general emergency procedures	★
		0.6.2	Understand the employer's emergency response requirements	★
6	**Transporting cargo/baggage**			
	6.2	Manage dangerous goods pre and during flight		★★★
		6.2.1	Address dangerous goods not permitted in baggage	★★★
		6.2.2	Interpret NOTOC	★★★
		6.2.3	Apply procedures in the event of an emergency	★★★
		6.2.4	Inform flight operations officer/flight dispatcher/air traffic control in the eventof an emergency	★★★
		6.2.5	Inform emergency services of the dangerous goods on the NOTOC in theevent of an emergency	★★★
7	**Collecting safety data**			
	7.1	Report dangerous goods accidents		★★
	7.2	Report dangerous goods incidents		★★
	7.3	Report undeclared/mis-declared dangerous goods		★★
	7.4	Report dangerous goods occurrences		★★

Table 1-8				
Function: Personnel responsible for flight operations and flight dispatchers				
Terms & Conditions				
Duration of Training - INITIAL				8 hours
Training Method: Classroom				Instructor Led
Task List				**Proficiency Level**
0	**Understanding the basics of dangerous goods**			★
	0.1	Recognizing dangerous goods applicability		★
		0.1.1	Understand the definition	★
		0.1.2	Recognize the legal framework (global, national)	★
		0.1.2.1	Familiarize with PCAA CARs, 1994 Part-XVI and ANO-030-FSXX	★
		0.1.3	Identify the application and scope	★
		0.1.4	Differentiate hazard and risk	★
	0.2	Understanding the general limitations		★
		0.2.1	Develop a sense of forbidden dangerous goods	★
		0.2.2	Recognize potential hidden dangerous goods	★
		0.2.3	Familiarize with passenger provisions	★
	0.3	Identifying roles and responsibilities		★
		0.3.1	Clarify the individual and collective role of the supply chain stakeholders	★
		0.3.2	Understand the passengers responsibilities	★
		0.3.3	Recognize the impact of State & operator variations	★
	0.4	Understanding the importance of classification & packaging		★
		0.4.1	Identify the general information about classes, divisions	★
		0.4.2	Understand general principles of Packing Groups	★
		0.4.3	Consider multiple hazards	★
	0.5	Understanding hazard communication		★
		0.5.1	Recognize the basic marking requirements	★
		0.5.2	Recognize the basic labelling requirements	★
		0.5.3	Identify the required documentation	★
	0.6	Familiarizing with basic Emergency Response		★
		0.6.1	Create awareness about general emergency procedures	★
		0.6.2	Understand the employer's emergency response requirements	★
6	**Transporting cargo/baggage**			
	6.2	Manage dangerous goods pre and during flight		★★★
		6.2.1	Address dangerous goods not permitted in baggage	★★★
		6.2.2	Interpret NOTOC	★★★
		6.2.3	Apply procedures in the event of an emergency	★★★
		6.2.4	Inform flight operations officer/flight dispatcher/air traffic control in the event of an emergency	★★★
		6.2.5	Inform emergency services of the dangerous goods on the NOTOC in the event of an emergency	★★★
7	**Collecting safety data**			
	7.1	Report dangerous goods accidents		★★
	7.2	Report dangerous goods incidents		★★
	7.3	Report undeclared/mis-declared dangerous goods		★★
	7.4	Report dangerous goods occurrences		★★

Table 1-9				
Function: Cabin Crew				
Terms & Conditions				
Duration of Training - INITIAL				8 hours
Training Method: Classroom				Instructor Led
Task List				**Proficiency Level**
0	**Understanding the basics of dangerous goods**			★
	0.1	Recognizing dangerous goods applicability		★
		0.1.1	Understand the definition	★
		0.1.2	Recognize the legal framework (global, national)	★
		0.1.2.1	Familiarize with PCAA CARs, 1994 Part-XVI and ANO-030-FSXX	★
		0.1.3	Identify the application and scope	★
		0.1.4	Differentiate hazard and risk	★
	0.2	Understanding the general limitations		★
		0.2.1	Develop a sense of forbidden dangerous goods	★
		0.2.2	Recognize potential hidden dangerous goods	★
		0.2.3	Familiarize with passenger provisions	★
	0.3	Identifying roles and responsibilities		★
		0.3.1	Clarify the individual and collective role of the supply chain stakeholders	★
		0.3.2	Understand the passengers responsibilities	★
		0.3.3	Recognize the impact of State & operator variations	★
	0.4	Understanding the importance of classification & packaging		★
		0.4.1	Identify the general information about classes, divisions	★
	0.5	Understanding hazard communication		★
		0.5.1	Recognize the basic marking requirements	★
		0.5.2	Recognize the basic labelling requirements	★
		0.5.3	Identify the required documentation	★
	0.6	Familiarizing with basic Emergency Response		★
		0.6.1	Create awareness about general emergency procedures	★
		0.6.2	Understand the employer's emergency response requirements	★
5	**Accepting passenger and crew baggage**			
	5.2	Accept baggage		★★★
		5.2.1	Apply operator requirements	★★★
		5.2.2	Verify passenger baggage requirements	★★★
		5.2.3	Advise pilot-in-command, when applicable	★★★
6	**Transporting cargo/baggage**			
	6.2	Manage dangerous goods pre and during flight		★★★
		6.2.1	Address dangerous goods not permitted in baggage	★★★
		6.2.3	Apply procedures in the event of an emergency	★★★
7	**Collecting safety data**			
	7.1	Report dangerous goods accidents		★
	7.2	Report dangerous goods incidents		★
	7.3	Report undeclared/mis-declared dangerous goods		★
	7.4	Report dangerous goods occurrences		★

Table 1-10				
Function: Personnel responsible for security screening of passengers and crew, baggage, cargo and mail.				
Terms & Conditions				
Duration of Training - INITIAL				8 hours
Training Method: Classroom				Instructor Led
Task List				**Proficiency Level**
0	**Understanding the basics of dangerous goods**			★
	0.1	Recognizing dangerous goods applicability		★
		0.1.1	Understand the definition	★
		0.1.2	Recognize the legal framework (global, national)	★
		0.1.2.1	Familiarize with PCAA CARs, 1994 Part-XVI and ANO-030-FSXX	★
		0.1.3	Identify the application and scope	★
		0.1.4	Differentiate hazard and risk	★
	0.2	Understanding the general limitations		★
		0.2.1	Develop a sense of forbidden dangerous goods	★
		0.2.2	Recognize potential hidden dangerous goods	★
		0.2.3	Familiarize with passenger provisions	★
	0.3	Identifying roles and responsibilities		★
		0.3.1	Clarify the individual and collective role of the supply chain stakeholders	★
		0.3.2	Understand the passengers responsibilities	★
		0.3.3	Recognize the impact of State & operator variations	★
	0.4	Understanding the importance of classification & packaging		★
		0.4.1	Identify the general information about classes, divisions	★
	0.5	Understanding hazard communication		★
		0.5.1	Recognize the basic marking requirements	★
		0.5.2	Recognize the basic labelling requirements	★
		0.5.3	Identify the required documentation	★
	0.6	Familiarizing with basic Emergency Response		★
		0.6.1	Create awareness about general emergency procedures	★
		0.6.2	Understand the employer's emergency response requirements	★
3	**Processing/accepting cargo**			
	3.4	Process/accept cargo other than dangerous goods		★★★
		3.4.1	Check documentation for indications of hidden/undeclared dangerous goods	★★★
		3.4.2	Check packages for indications of hidden/undeclared dangerous goods	★★★
5	**Accepting passenger and crew baggage**			
	5.1	Process baggage		★★★
		5.1.1	Identify forbidden dangerous goods	★★★
		5.1.2	Apply approval requirements	★★★
7	**Collecting safety data**			
	7.1	Report dangerous goods accidents		★
	7.2	Report dangerous goods incidents		★
	7.3	Report undeclared/mis-declared dangerous goods		★

ATTACHMENT - 2

(CBTA Tables corresponding to Previously Known Categories & IATA CBTA Guidance)

Functions of Personnel involved in Dangerous Goods	Function In Table (FIT)	Previously Known (IATA DGR, Table 1.5.A)	IATA CBTA Guidance
Personnel preparing dangerous goods consignments for transport (Personnel classifying dangerous goods for transport is provided simultaneously) - "Shippers & Packers" including operator's staff acting as shippers, operator's staff preparing dangerous goods as Company Materials (COMAT) and staff of freight forwarders acting onbehalf of the Shipper	**1-1**	**1, 2 & 3**	**7.1.A**
Personnel responsible for processing or accepting goods presented as general cargo or processing mail other than dangerous goods	**1-2**	**4 & 7**	**7.2.A**
Personnel responsible for processing or accepting dangerous goods consignments or accepting mail containing dangerous goods	**1-3**	**6**	**7.3.A**
Personnel responsible for handling and storage of cargo or mail in a warehouse, loading and unloading ULD and loading and unloading aircraft cargo compartments	**1-4**	**5 & 8**	**7.4.A**
Personnel responsible for accepting passenger and crew baggage, managing aircraft boarding areas and other functions involving directpassenger contact at an airport	**1-5**	**9**	**7.5.A**
Personnel responsible for the planning of aircraft loading	**1-6**	**10**	**7.6.A**
Flight crew	**1-7**	**10**	**7.7.A**
Personnel responsible for flight operations and flight dispatchers	**1-8**	**10**	**7.8.A**
Cabin crew	**1-9**	**11**	**7.9.A**
Personnel responsible for security screening of passengers and crew, baggage, cargo and mail	**1-10**	**12**	**7.10.A**

AIRCRAFT MASS & BALANCE CONTROL PROGRAM OPERATIONAL REQUIREMENTS

AIR NAVIGATION ORDER

VERSION	**:**	**2.0**
DATE OF IMPLEMENTATION	**:**	**01-02-2018**
OFFICE OF PRIME INTEREST	**:**	**FLIGHT STANDARDS DIRECTORATE (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. ASIF JABBAR KHAN	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR MARSHAL (RETD.) ASIM SULEIMAN	Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by the Director General Civil Aviation Authority (CAA) in pursuance of the powers vested in him under Rule 4 read with Rules 219, 241, 242 and other relevant provisions of Civil Aviation Rules 1994 (CARs, 94).

B. PURPOSE:

B1. To create procedures and regulations in order to eliminate any risk / hazard involved in the operation of the aircraft, with respect to its mass and balance and related performance.

C. SCOPE:

C1. Rule 241 of CARs, 94 states that an aircraft registered in Pakistan shall not fly for the purpose of regular air transport, or charter, or aerial work unless such requirements as may be prescribed by the Director General in Air Navigation Orders in respect of its mass and related performance are complied with.

C2. Rule 242 of CARs, 94 states that an aircraft registered in Pakistan shall not fly for the purpose of regular air transport, charter, or aerial work unless the loading of the aircraft has been carried out in accordance with any instructions and conditions relating to loading and balance which are contained in the Operations Manual and Flight Manual, or equivalent certification document relating to the aircraft and any relevant instructions and conditions specified by the Director-General in Air Navigation Orders, and the load is properly secured.

C3. Rule 219 of CARs, 94 states that the pilot-in-command of an aircraft shall not commence a flight unless he is satisfied, and has certified that he is satisfied inter alia that the mass of the aeroplane does not exceed the maximum mass which has been calculated in accordance with the criteria relating to the performance of the aircraft at which the aircraft can safely take off in the space available and the load carried by the aircraft is properly secured and is so distributed as to achieve a balance within the limits prescribed in the aircraft Flight Manual, or equivalent document.

C4. In order to comply with the above Rules, the operator must have a program in place through which various aspects of loading and balance are monitored and controlled. This ANO prescribes the requirements on how to develop and receive operational approval for a mass and balance control program.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 Unless the context suggests otherwise, when the following terms are used in this ANO, they will have the meanings assigned to them hereunder:

D1.1.1 **Basic empty weight.** The aircraft empty weight, adjusted for variations in standard items.

D1.1.2 **Cargo.** Everything carried in the cargo compartments of the aircraft. This includes bags, mail, freight, express and company material. It also includes live animals, dangerous goods and hazardous materials as subcategories of the above.

D1.1.3 **Carry-on bag.** A bag that the operator allows the passenger to carry onboard in the passenger cabin. It should be of a size and shape that will allow it to be stowed under the passenger seat or in a storage compartment. The operator establishes the exact dimensional limits based on the particular aircraft stowage limits.

D1.1.4 **Certificated weight and CG limits.** Weight and centre of gravity (CG) limits are established at the time of aircraft certification. They are specified in the applicable aircraft flight manual (AFM).

D1.1.5 **Curtailment.** Creating an operational loading envelope that is more restrictive than the manufacturers' CG envelope, to assure the aircraft will be operated within limits during all phases of flight. Curtailment typically accounts for, but is not limited to, in-flight movement, gear and flap movement, cargo variation, fuel density, fuel burn-off, and seating variation.

D1.1.6 **Freight.** Cargo carried for hire in the cargo compartment that is not mail or passenger bags.

D1.1.7 **Loading envelope.** Weight and CG envelope used in a loading schedule. Loading the aircraft within the loading envelope will maintain the aircraft weight and CG within the manufacturer's type-certificated limits throughout the flight.

D1.1.8 **Loading schedule.** Method for calculating and documenting aircraft weight and balance prior to taxiing, to ensure the aircraft will remain within all required weight and balance limitations throughout the flight.

D1.1.9 **Maximum landing weight.** The maximum weight at which the aircraft is certified to land during normal operations.

D1.1.10 **Maximum takeoff weight.** The maximum allowable aircraft weight at the start of the takeoff run.

D1.1.11 **Maximum taxi weight.** The maximum allowable aircraft weight for taxiing.

D1.1.12 **Maximum zero-fuel weight.** The maximum permissible weight of an aircraft with no disposable fuel and oil.

D1.1.13 **Mean Aerodynamic Chord (MAC).** The MAC is established by the manufacturer, which defines its leading edge and its trailing edge in terms of distance (usually inches) from the datum. The CG location and various limits are then expressed in percentages of the chord. The location and dimensions of the MAC can be found in the aircraft specifications, the type certificate data sheet, the AFM, or the aircraft weight and balance manual.

D1.1.14 **Moment.** The moment is the product of a weight multiplied by its arm. The moment of an item about the datum is obtained by multiplying the weight of the item by its horizontal distance from the datum.

D1.1.15 **Operational empty weight (OEW) / Dry Operating Weight (DOW).** Basic empty weight or fleet empty weight plus operational items.

D1.1.16 **Passenger weight.** Passenger weight is the actual weight or the approved average weight of the passenger.

a) An adult is defined as an individual 12 years or older.
b) A child is defined as an individual aged 2 to less than 12 years of age.
c) Infants are children who have not yet reached their second birthday.

D1.1.17 **Operations Engineer**. A person holding a degree of BS / BE in Aeronautical / Aerospace / Avionics / electrical / Mechanical / Mechatronics / Electronics and Communications or equivalent. However irrespective of educational background, he / she must attend Performance and Weight and Balance courses from aircraft manufacturer Boeing / Airbus etc. that provides necessary knowledge, skills and attitudes for assuming responsibility over the Flight Operations Engineering domain and preferably has experience in airline Flight Operations.

D1.1.18 **Reference Balance Arm (BA).** The horizontal distance from the reference datum to the CG of an item.

D1.1.19 **Standard items.** Equipment and fluids not considered an integral part of a particular aircraft and not a variation for the same type of aircraft. These items may include, but are not limited to, the following:
a) Unusable fuel and other unusable fluids;
b) Engine oil;
c) Toilet fluid and chemical;
d) Fire extinguishers, pyrotechnics, and emergency oxygen equipment;
e) Structure in galley, buffet, and bar; and
f) Supplementary electronic equipment.

D2. DEVELOPMENT OF MASS AND BALANCE CONTROL PROGRAM:

D2.1 Accurately calculating an aircraft's weight and CG before flight is essential to comply with the certification limits established for the aircraft. These limits include both weight and CG limits. By complying with these limits and operating under the procedures established by the manufacturer, an operator is able to meet the weight and balance requirements specified in the aircraft flight manual (AFM). Typically, an operator calculates takeoff weight by adding the operational empty weight (OEW) of the aircraft, the weight of the passengers, cargo payload, and the weight of fuel. The objective is to calculate the takeoff weight and CG of an aircraft as accurately as possible.

D2.2 All operators are required to develop a Mass and Balance Program that should be able to establish following elements:

D2.2.1 Aircraft Loading Schedules:

D2.2.1.1 A loading schedule is a means of computing and controlling weight and centre of gravity during aircraft operations. It ensures compliance with aircraft limitations, operator procedures and regulatory requirements during aircraft operations. It is used to document compliance with the certificated weight and balance limitations contained in the manufacturer's Airplane Flight Manual or Weight and Balance manual.

D2.2.1.2 The loading schedule is to be designed by the operator based on its specific loading calculation procedures and it should provide the operational limits for use with the operator's weight and balance program approved under this ANO. These approved operational limits are typically more restrictive but should not exceed the manufacturer's certificated limits. This is because the loading schedule is generally designed to check only specific conditions (e.g., takeoff and zero fuel) known prior to takeoff, and must account for variations in weight and balance in flight. It must also account for factors selected to be excluded for ease of use from the calculation process. Loading the aircraft so that the calculated weight and balance is within the approved limits will maintain the actual weight and balance within the certificated limits throughout the flight.

D2.2.1.3 Development of a loading schedule represents a trade-off between ease of use and loading flexibility. A schedule can provide more loading flexibility by requiring more detailed inputs, or it can be made easier to use by further limiting the operational limits to account for the uncertainty caused by the less detailed inputs.

D2.2.1.4 The operator should take into account all probable loading conditions which may be experienced and show that the loading schedules may be applied to individual aircraft or to a complete fleet. When an operator uses several types or models of aircraft, the loading schedule (which may be index type, tabular type, or computer based) should indicate the type or model of aircraft for which it is designed.

D2.2.2 Aircraft Limitations-Loading Envelope

D2.2.2.1 Each operator complying with this ANO must design a loading envelope applicable to each type of aircraft being operated. The envelope will include all relevant weight and balance limitations. It will be used to ensure that the aircraft is always operated within appropriate weight and balance limitations, and will include provisions to account for the loading of passengers, fuel, and cargo; the in-flight movement of passengers, aircraft components, and other loaded items; and the usage or transfer of fuel and other consumables. The operator must be able to demonstrate that the aircraft is being operated within its certificated weight and balance limitations using reasonable assumptions that are clearly stated.

D2.2.2.2 The construction of the loading envelope will begin with the weight and balance limitations provided by the aircraft manufacturer in the weight and balance manual, type certificate data sheet, or similar approved document. These limitations will include, at minimum, the following items, as applicable:

a) Maximum zero-fuel weight.
b) Maximum takeoff weight.
c) Maximum taxi weight.
d) Takeoff and landing CG limitations.
e) In-flight CG limitations.
f) Maximum floor loadings including both running and per square foot limitations.
g) Maximum compartment weights.
h) Fuselage shear limitations.
j) Any other limitations provided by the manufacturer.

D2.2.3 Loading Envelope Curtailments.

D2.2.3.1 The operator must curtail the manufacturer's loading limitations to account for loading variations and in-flight movement that are encountered in normal operations. For example, if passengers are expected to move about the cabin in flight, the operator must curtail the manufacturer's CG envelope by an amount necessary to ensure that movement of passengers does not take the aircraft outside its certified envelope. If the aircraft is loaded within the new, curtailed envelope, it will always be operated within the manufacturer's envelope, even though some of the loading parameters, such as passenger seating location, are not precisely known.

D2.2.3.2 In some cases an aircraft may have more than one loading envelope for pre-flight planning and loading. Each envelope must have the appropriate curtailments applied for those variables that are expected to be relevant for that envelope. For example, an aircraft might have separate takeoff, in-flight, and landing envelopes. Passengers are expected to remain seated in the cabin during take-off or landing. Therefore, the takeoff and landing envelope does not need to be curtailed for passenger movement.

D2.2.3.3 Upon determination of the curtailed version of each envelope, the most restrictive points (for each condition the operator's program will check) generated by an "overlay" of the envelopes will form the aircraft operational envelopes. These envelopes must be observed. By restricting operation to these "operational envelopes," compliance with the manufacturer's certified envelope will be ensured in all phases of flight, based upon the assumptions within the curtailment process. Optionally, an operator may choose to not combine the envelopes but observe each envelope independently. However, due to calculation complexity, this is typically only possible through automation of the weight and balance calculation.

D2.2.3.4 Operator using an approved weight and balance control program must include curtailments appropriate to the operations being conducted. Each of the items mentioned below is a single curtailment factor. The total curtailment of the manufacturer's envelope is computed by combining the curtailments resulting from each of these factors.

a) **Passengers.** The operator must account for the seating of passengers in the cabin. The loading envelope does not need to be curtailed if the actual seating location of each passenger is known. If assigned seating is used to determine passenger location, the operator must implement procedures to ensure that the assignment of passenger seating is incorporated into the loading procedure. It is recommended that the operator take into account the possibility that some passengers may not sit in their assigned seats.

i) If the actual seating location of each passenger is not known, the operator may assume that all passengers are seated uniformly throughout the cabin or a specified subsection of the cabin. If this assumption is made, the operator must curtail the loading envelope to account for the fact that the passenger loading may not be uniform. The curtailment may make reasonable assumptions about the manner in which people distribute themselves throughout the cabin. For example, the operator may assume that window seats are occupied first, followed by aisle seats, followed by the remaining seats (window-aisle-remaining seating). Both forward and rear loading conditions should be considered. That is, the passengers may fill up the window, aisle, and remaining seats from the front of the aircraft to the back, or the back to the front.

ii) If necessary, the operator may divide the passenger cabin into subsections or "zones" and manage the loading of each zone individually. It can be assumed that passengers will be sitting uniformly throughout each zone, as long as the curtailments described in the previous paragraph are put in place.

iii) All such assumptions should be adequately documented.

b) **Fuel.** The operator's curtailed loading envelope must account for the effects of fuel. The following are examples of several types of fuel-related curtailments:

i) **Fuel density.** A certain fuel density may be assumed and a curtailment included to account for the possibility of different fuel density values. Fuel density curtailments only pertain to differences in fuel moment caused by varying fuel volumes, not to differences in total fuel weight. The fuel gauges in most transport category aircraft measure weight, not volume. Therefore, the indicated weight of the fuel load can be assumed to be accurate.

ii) **Fuel movement.** The movement or transfer of fuel in flight.

iii) **Fuel usage in flight.** The burning of fuel may cause the CG of the fuel load to change. The effect of fuel burning down to the required reserve fuel or to an acceptable fuel amount established by the operator should be accounted for. A curtailment may be included to ensure that this change does not cause the CG of the aircraft to move outside of the acceptable envelope.

c) **Fluids.** The operator's curtailed CG envelope must account for the effects of galley and lavatory fluids. These factors include such things as:

i) Use of potable water in flight.

ii) Movement of water or lavatory fluids.

d) **In-Flight Movement of Passenger and Crew.** The operational envelope must account for the in-flight movement of passengers, crew, and equipment. This may be done by including a curtailment equal to the moment change caused by the motion being considered. It may be assumed that all passengers, crew, and equipment are secured when the aircraft is in the takeoff or landing configuration. Standard operational procedures may be taken into account. Examples of items that can move during flight are:

   i) **Flight deck crewmembers moving to the lavatory.** Flight deck crewmembers may move to the most forward lavatory in accordance with the security procedures prescribed for crews leaving the cockpit. An offsetting credit may be taken if another crewmember moves to the flight deck during such lavatory trip.
   ii) **Flight attendants moving throughout the cabin.** Operator should take their standard operating procedures into account. If procedures do not dictate otherwise, it should be assumed that the flight attendants can travel anywhere within the compartment to which they are assigned.
   iii) **Service carts moving throughout the cabin.** Operator should take their standard operating procedures into account. If procedures do not dictate otherwise, it should be assumed that the service carts can travel anywhere within the compartment to which they are assigned. If multiple carts are in a given compartment, and no restrictions are placed on their movement, then the maximum number of carts, moving the maximum distance, must be considered. The weight of the number of flight attendants assigned to each cart must also be considered. The assumed weight of each cart may be the maximum anticipated cart-load or the maximum design load, as appropriate to the operator's procedures.
   iv) **Passengers moving throughout the cabin.** Allowances should be made for the possibility that passengers may move about the cabin in flight. The most common would be movement to the lavatory, described below. If a lounge or other passenger gathering area is provided, the operator should assume that passengers move there from the centroid of the passenger cabin(s). The maximum capacity of the lounge should be taken into account.
   v) **Passengers moving to the lavatory.** Operator should account for the CG change caused by passengers moving to the lavatory. Operator should develop reasonable scenarios for the movement of passengers in their cabins and consider the CG shifts that can be expected to occur. Generally, it may be assumed that passengers move to the lavatories closest to their seats. In aircraft with a single lavatory, movement from the "most adverse" seat must be taken into account. Assumptions may be made which reflect operator's

lavatory and seating policies. For example, it may be assumed that coach passengers may only use the lavatories in the coach cabin, if that is the operator's normal policy.

e) **Movement of Flaps and Landing Gear.** If the manufacturer has not already done so, the operator must account for the movement of landing gear, flaps, wing leading edge devices, or any other moveable components of the aircraft. Devices deployed only while in contact with the ground, such as ground spoilers or thrust reversers, may be excluded from such curtailments.

f) **Baggage and Freight.** It can be assumed that baggage and freight may be loaded at the centroid of each baggage compartment. Operators do not need to include a curtailment if procedures are used which ensure that the cargo is loaded uniformly and physically restrained (secured) to prevent the contents from becoming a hazard by shifting between zones or compartments.

D2.2.4 Components of Takeoff Weight.

D2.2.4.1 Components that make up the weight of an aircraft at takeoff fall into following overall categories

Takeoff Weight = Dry Operating Weight + Passengers + Carry-On Baggage + Checked Baggage + Freight + Total Loaded Fuel – Taxi Fuel

Dry Operating Weight can be further defined as

Dry Operating Weight (DOW) = Basic Empty Weight (BEW) + Operational Items

D2.2.4.2 **Basic Empty Weight (BEW):** Requirements and procedure for establishing aircraft basic empty weight are normally given in the manufacturer's Weight and Balance Manual for each aircraft type. Each new aircraft delivered from a manufacturer receives a report on the empty weight of the aircraft prior to delivery. Operators should establish and follow instructions for weighing the aircraft that are consistent with the recommendations of the aircraft and weighing scale manufacturers. A weighing report is to be prepared for each weighing in the same format as the delivery weight report.

a) Differences may exist in operator's definitions of what is included in BEW. Operators should thoroughly define and document what is, and is not, included according to their definition of BEW. Time interval for establishment of the basic empty weight is given in Airworthiness Notice Number 11.

D2.2.4.3 **Operational Items:** Operational items include items that could vary with route length, route type, or number of passengers carried. They include but are not limited to the following:

a) Crewmembers, supernumeraries, and their baggage
b) Manuals and navigation equipment
c) Passenger service equipment including pillows, blankets, newspapers and magazines
d) Removable service equipment for cabin and galley
e) Food and beverages
f) Usable fluids other than those which are part of aircraft systems
g) Required emergency equipment for all flights
h) Life rafts, life vests, and emergency transmitters
j) Aircraft unit load devices (ULDs)
k) Potable water
l) Drainable unusable fuel
m) Spare parts normally carried aboard and not accounted for as cargo.
n) All other equipment considered standard by the operator

D2.2.4.3.1 The operator is to develop for each aircraft or type of aircraft, a list of operational items providing weight and location for each item and include it in the Mass and Balance Program Document prepared in accordance with Para D5.

D2.2.4.4 **Passengers:** Following standard average per passenger weights with carry on baggage are to be used by all operators. These weights have been determined through a survey conducted in 2004 by CAA Pakistan and may change upon subsequent survey results.

Adult	75kg
Child (2 years to less than 12 years of age)	38kg
Infant	15kg

a) Aircraft with fewer than five passenger seats must use actual passenger and baggage weights.

D2.2.4.5 **Checked Bags:** it is preferred that actual weight of checked bags be used where it is readily available. An operator that chooses to use standard average weights for checked bags should use a weight of at least 20kgs per passenger. An operator that requests approval to use a standard average weight of less than 20kgs per passenger for checked bags should have current, valid survey data to support a lesser weight. An operator also may conduct a study to establish different standard average bag weights for portions of its operation to account for regional, seasonal, demographic, aircraft, or route variation. For example, an operator could establish different standard average bag weights for domestic and international routes and for Hajj / Umrah flights.

D2.2.4.6 **Freight:** Actual weight of freight must be used in all cases

D2.2.4.7 Total Loaded Fuel: Operator must determine the weight of the fuel loaded by using either the actual density or standard density.

D2.2.4.8 Operator is to determine the source of weight for fuel load and include it in the Mass and Balance Program Document required vide Para D5.

D2.2.4.9 **Taxi Fuel:** Taxi fuel can be calculated in the form of statistical taxi time and associated burn off, fixed taxi out time and associated burn off or single value for all cases.

D3. AIRCRAFT MASS CONTROL ORGANIZATION:

D3.1 Operators of aircraft having five or more passenger seats or carrying cargo only or combination of cargo and passengers on main deck must have an approved mass control organization for determination of aircraft mass and for the running of mass and balance control program.

D3.2 An aircraft mass control organization should consist of a minimum of two Operations Engineers, or one Operations Engineer and one mass control officer who is having at least two years of Load Control experience. The staff of an approved mass control organization should have adequate facilities to enable the maintenance of records of mass changes of each aircraft of the operator's fleet.

D3.3 In addition to above, the organization should have a dedicated sub organization called "Load Control" which should perform the following functions:

a) Load planning, weight and balance pre calculation and completion of loading instructions
b) Supervising the loading of the aircraft in accordance with the loading instructions and procedures contained in Airplane Flight Manual or associated Weight and Balance Manual.
c) Completion and checking of the load / trim sheet against the loading instructions and other related documents.

D3.4 Application for approval of the aircraft mass control organization should be made to the Flight Standards Directorate and should include the following:

a) The qualifications, and experience required by the operator for members of the aircraft mass control organization
b) Details of the method of liaison with other sections of the organization to ensure that all records of mass changes are transmitted to the aircraft mass control organization (may be submitted as an organogram) and
c) Details of the procedure within the organization for ensuring adequate control of the loading of all aircraft

D3.4.1 This information should be the same as provided in the operator's Operations Manual and can also be submitted as a part of Mass and Balance Policy Document described at Para D5.1.

D4. TRAINING AND QUALIFICATION:

In order to ensure flight safety through an acceptable level of standardization and proficiency, the following minimum requirements shall be recognised in the training and qualification of personnel engaged in load control functions.

D4.1 Training

D4.1.1 At least one Operations Engineer involved in development of loading schedule, limitations and curtailments must be given training on the subject through programs established by the manufacturer. This training requirement must be made part of induction process of the aircraft.

D4.1.2 All trainees must attend at least one week basic weight and balance course which should cover the syllabus given at Appendix "B" followed by minimum of 2 day type course covering knowledge of all specific weight and balance aspects, loading restrictions and particularities pertaining to the aircraft type for which they are being certified.

D4.1.3 Training should be conducted by personnel who have demonstrated competence in the subjects to be instructed and who have the skills to deliver the training effectively. These instructors will be approved by CAA for each operator.

D4.1.4 The objective of the training is also to promote safety awareness and to provide airside workers and their management with the procedure necessary for the handling and loading of aircraft and to work safely in the airport environment. Therefore, personnel should, as appropriate to their jobs function, receive training on the applicable subjects in the following list.

a) Airside safety
b) Security regulations
c) Principles of aircraft loading
d) Irregularity/ incident/accident reporting procedures
e) Manual handling of load
f) Safety during aircraft fuelling
g) Handling of loads requiring special attention
h) Loading incompatibilities
j) Handling of aircraft Unit Load Devices (ULDs)
k) Operation of aircraft loading systems/securing of ULDs
l) Identification/consequences of malfunctions of in-plane loading systems
m) Consequences of load damage and spillage
n) Positioning and operation of loading and servicing equipment
o) Notification to Captain of load being carried
p) Passenger embarkation/disembarkation procedures
q) Standards of aircraft cleaning, lavatory and fresh water servicing
r) Aircraft movement operations

D4.2 Qualification

D4.2.1 Knowledge verification will be required in the form of oral questioning and written tests throughout the training programmes.

D4.2.2 Practical competency will be determined through instructor evaluation.

D4.2.3 After successful completion of classroom training, personnel will be subjected to a period of practical training in the field under supervision of a qualified person.

D4.2.4 Upon completion of the above, and subject to final assessment, personnel may be considered as qualified to fulfil their assigned duties and issued with competency certificates for each type of aircraft.

D4.2.5 Personnel shall be continuously updated and reassessed at regular intervals. Such refresher/recurrent training shall take place at least once in any three-year period.

D4.2.6 The operator will describe the training and qualification requirements in its Mass and Balance Policy Document.

D5. MASS AND BALANCE PORGRAM DOCUMENT:

D5.1 The operator shall submit a Mass and Balance Program Document to Flight Standards Directorate for the approval. This document is to be appropriately numbered and must contain list of effective pages and signature of the persons preparing and checking it. The document should at least include following parts:

D5.1.1 Mass and Balance Policy

This part should cover following broad outline

a) Mass control organization structure
b) Minimum qualification, duties and responsibilities of position holders
c) Training and qualification requirements including procedure for issuance of competency certificates
d) Instructions and procedures with regards to completion of Load and Trim Sheet
e) Format of documents required for exchange of data between various departments
f) Operator's data for determination of aircraft take off weight in the format provided at Appendix 'A'

D5.1.2 Loading Schedule Substantiation

This part should describe the method of developing a loading schedule and should contain at least the following data:

a) Equations used to develop a loading schedule
b) Passenger cabin zones and cargo compartment definitions
c) Cargo load limits
d) Incremental load item index development methodology
e) Horizontal stabilizer trim settings
f) Development and application of curtailments to the structural center of gravity limits
g) Load and Trim Sheet construction using the data developed in the document.
h) Load and Trim Sheet derived from Para D5.1.2 g) which will be used in actual operations

D5.1.3 Aircraft Data

This part should contain at least the following data

a) Numbered weight reports for each type of aircraft. The report should contain all data used for preparing the Load and Trim Sheet. A new report is to be published whenever there is any change in its data.
b) Latest weighting report for each aircraft of the fleet in accordance with Para D2.2.4.2 along with operational items list developed vide Para D2.2.4.3.
c) Definition of Basic Empty Weight in accordance with Para D2.2.4.2.a).

D5.2 Operators may issue abridged mass and balance document for the use of Load Control staff but this document must not contain any information other than that provided in the approved Aircraft Flight Manual, Manufacturer's Weight and Balance Manual and the approved Mass and Balance Control Program Document.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS

ANO	:	AIR NAVIGATION ORDER
CARS' 94	:	CIVIL AVIATION RULES, 1994
RPT	:	REGULAR PUBLIC TRANSPORT
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
FAA	:	FEDERAL AVIATION ADMINISTRATION
IATA	:	INTERNATIONAL AIR TRANSPORT ASSOCIATION
CG	:	CENTRE OF GRAVITY
AFM	:	AIRCRAFT FLIGHT MANUAL
MAC	:	MEAN AERODYNAMIC
OEW	:	OPERATIONAL EMPTY WEIGHT
DOW	:	DRY OPERATING WEIGHT
BA	:	BALANCE ARM
CAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
BEW	:	BASIC EMPTY WEIGHT
ULDS	:	AIRCRAFT UNIT LOAD DEVICES
kg	:	KILOGRAM

E2. RECORDS:

E2.1 Nil

E3. REFERENCES:

E3.1 Civil Aviation Rules, 1994

E3.2 Annex 6, Part I to the Convention on International Civil Aviation.

E3.3 ICAO Document 9760.

E3.4 FAA Advisory Circular AC 120-27E.

E3.5 IATA Airport Handling Manual.

E3.6 Boeing Performance Engineer - Weight and Balance Fundamentals course material.

E3.7 Airbus guidance material on weight and balance.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st February, 2018 and supersedes ANO 91.0033 (Issue-1)

--S/d--

(ASIM SULEIMAN)
Air Marshal (Retd)
Director General,
Pakistan Civil Aviation Authority

Dated: - **24th January, 2018**

--S/d--

(ARIF MAJEED)
O/Director Flight Standards

Dated- **17th January, 2018**
File No. HQCAA/1077/011/FSAC

APPENDIX "A"

OPERATOR'S DATA FOR DETERMINATION OF AIRCRAFT TAKEOFF WEIGHT

(Tick applicable box and/or fill in the blanks).

1. Source of weight for fuel load prior to engine start

- ☐ Fueling truck paperwork with cockpit gauge readings used as a second check
- ☐ Cockpit gauge readings only
- ☐ Fueling truck paperwork only

2. Source of weight for taxi fuel burned prior to takeoff

- ☐ Statistical taxi time ______ Mins. Associated burn off_______kg
- ☐ Fixed taxi out time _______ Mins. Associated burn off_______kg
- ☐ Single value for all cases _____kg

3. Source of checked baggage weight

- ☐ Actual weighing of checked baggage
- ☐ Standard allowance of 20kg/Passenger
- ☐ Determined by operator's survey __________ kg
- ☐ Any other combination determined from survey (specify)

4. Average passenger weight including carry on baggage (if other than Para D2.2.4.4.)________Kg.
(Weights for Hajj / Umrah flights may be determined separately)

APPENDIX "B"

BASIC WEIGHT AND BALANCE COURSE SYLLABUS

1. General Weight and Balance Proficiency and Awareness

Terms used in the Load Control environment (vocabulary, acronyms, operational codes and abbreviations).
Definition and composition of the design and operational weights
Aircraft balance principles
Consequence of improper loading on flight and personnel safety

2. Aircraft Structural Load Limitations

Linear (running load) limitation
Area limitation (spreader floors)
Limitation per compartment/section/ULD position
Monocoque (combined) limitation
Cumulative limitation
Missing restraints limitations

3. Unit Load Devices

Gross weight limitations and hold restraint requirements
Container / pallets build-up and tie-down limitations and rules
Tagging

4. Bulk Hold Loading

Load spreading rules
Load restraint rules: aircraft nets, tie-down, and volume restraint

5. Loadsheet

Computation, issuance and check in both manual and computerized modes
Last minute change procedure

6. Balance Table/ Charts

Computation, issuance and check in all conventional methods (indexed weights, graphic charts etc.)

7. Loading Instruction Report

Knowledge of the aircraft holds designation and numbering
Issuance and check in both manual and computerized modes

8. Loading Message

Reading and sending of standard loading messages: LDM and CPM

9. Dangerous Goods

Cargo IMP codes
ULD and parcels labelling and marking
Loading restrictions and compatibility rules
NOTOC completion (loading positions)
Emergency procedures in case of incidents

10. Other Special Loads (Perishable, EAT AVI, WET, OBX, LHO etc)

Cargo IMP codes
Marking and labelling
Loading restrictions and compatibility rules
NOTOC completion (loading positions)

11. Load Planning

Loading/off-loading priorities
Baggage categories and hold locations
Optimum hold loading (multi-sector flights, volume utilization, fuel conservation etc.)

SECURITY PROCEDRUES FOR FLIGHT CREW AND CABIN CREW

AIR NAVIGATION ORDER

VERSION	**:**	**3.0**
DATE OF IMPLEMENTATION	**:**	**01.04.2018**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. MASOOD ILAHI	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. ARIF MAJEED	Director Flight Standards	Signed
VERIFIED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Addl. Director General Civil Aviation Authority	Signed
APPROVED BY	AIR VICE MARSHAL USAID-UR-REHMAN USMANI	Actg. Director General, Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) has been issued in pursuance of Rules 4(3), 118, 326 to 332, 360 and all other enabling provisions contained in Civil Aviation Rules, 1994 (CARs, 94).

B. PURPOSE:

B1. This ANO provides standards and procedures for Flight Crew and Cabin Crew members deployed by the Commercial Air Transport Operators holding Air Operator Certificate (AOC) issued by Pakistan Civil Aviation Authority to ensure security.

C. SCOPE:

C1. This ANO contains instructions and guidelines governing the security procedures for flight crew and cabin crew members to be utilized by the Commercial Air Transport Operators holding AOC issued by Pakistan Civil Aviation Authority under CARs, 1994.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 For the purpose of this ANO and in line with ICAO Standards and Recommended Practices the following terms are defined as hereunder:

D1.1.1 **Able-bodied Passenger(s) (ABPs):** Passengers who are clearly physically able and are willing to help cabin crew maintain good order and discipline on board the aircraft.

D1.1.2 **Acts of unlawful interference:**

D1.1.2.1 violence against a person on board of an aeroplane, on ground or in flight, if that act is likely to endanger the safety of that aeroplane;

D1.1.2.2 destroying an aeroplane in service by causing damage to such an extent which renders it incapable of flight or which is likely to endanger its safety in flight;

D1.1.2.3 placing or causing to be placed on an aeroplane in service, by any means whatsoever, a device or substance which is likely to destroy that aeroplane, or causing damage to it which renders it incapable of flight, or causing damage to it which is likely to endanger its safety in flight;

D1.1.2.4 destroying or damaging aerodrome installations, air navigation facilities or interfering with their operation, if any such act is likely to endanger the safety of the aeroplane;

D1.1.2.5 communicating information which is known to be false, thereby endangering the safety of an aeroplane in flight.

D1.1.2.6 Forcible intrusion on board an aircraft at an airport or on premises of an aeronautical facility.

D1.1.2.7 An aircraft in service used to cause death or injury to personnel or damages to infrastructure / vital installations.

D1.1.2.8 Unlawful seizure of aircraft on ground or in flight.

D1.1.3 **Airside:** The movement area of an airport, adjacent terrain and buildings or portions thereof, access to which is controlled.

D1.1.4 **Aircraft Security Check:** An inspection of the interior of an aircraft to which passengers may have had access and an inspection of the hold for the purposes of discovering suspicious objects, weapons, explosives or other dangerous devices.

D1.1.5 **Aircraft Security Search.** A thorough inspection of the interior and exterior of the aircraft for the purpose of discovering suspicious objects, weapons, explosives or other dangerous devices, articles or substances.

D1.1.6 **Background Check:** A check of a person's identity and previous experience, including criminal history, where appropriate, as part of the assessment of an individual's suitability for unescorted access to a security restricted area.

D1.1.7 **Bomb threat** is a communicated threat, anonymous or otherwise, which suggests, or infers, whether true or false, that the safety of an aeroplane in-flight or on the ground, or any aerodrome or civil aviation facility or any person may be in danger from an explosive or other item or device.

D1.1.8 **Cargo:** Any property carried on an aircraft other than mail, stores and accompanied or mishandled baggage.

D1.1.9 **Clear Zone:** The area of the passenger cabin immediately in front of the flight crew compartment door, including galleys and lavatories.

D1.1.10 **Crime on board** (on ground and in-flight) is considered to be infringement of law committed on board an aeroplane.

D1.1.11 **Hijacking** is an act of aggression in which the aggressor(s) force(s) the Commander to relinquish part of his authority in assuming command over the aeroplane.

D1.1.12 **Human Factors Principles:** Principles which apply to design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

D1.1.13 **Human Performance:** Human capabilities and limitations which have an impact on the safety, security and efficiency of aeronautical operations.

D1.1.14 **Improvised Explosive Device.** A device, placed or delivered, and fabricated in an improvised manner incorporating explosives or destructive, lethal, noxious, pyrotechnic or incendiary chemicals designed to destroy, disfigure, distract or harass.

D1.1.15 **In Flight:** The period from the moment all external aircraft doors are closed following boarding through the moment when one external door is opened to allow passengers to leave the aircraft or until, if a forced landing, competent authorities take over responsibility for the aircraft and individuals and property on the aircraft. For the purpose of the Tokyo Convention an aircraft is considered to be in flight from the moment when power is applied for the purpose of take-off until the moment when the landing run ends.

D1.1.16 **Lockdown:** The condition of the flight crew compartment door being closed and locked securely, with no traffic permitted either in or out of the flight crew compartment.

D1.1.17 **Regulated Agent:** An agent, freight forwarder or any other entity who conducts business with an operator and provides security controls that are accepted or required by the appropriate authority in respect of cargo, courier and express parcels or mail.

D1.1.18 **Rules:** Civil Aviation Rules, 1994 (CARs, 94).

D1.1.19 **Sabotage** is an act or deliberate omission, intended to cause malicious or wanton destruction of property, endangering or resulting in unlawful interference with civil aviation and its facilities.

D1.1.20 **Screening:** The application of technical or other means which are intended to identify and / or detect weapons, explosives or other dangerous devices which may be used to commit an act of unlawful interference.

D1.1.21 **Security:** A combination of measures and human and material resources intended to safeguard civil aviation against acts of unlawful interference.

D1.1.22 **Security Control:** A means by which the introduction of weapons, explosives or other dangerous devices which may be utilized to commit an act of unlawful interference can be prevented.

D1.1.23 **Security Restricted Area:** Airside areas of an airport into which access is controlled to ensure security of civil aviation. Such areas will normally include, inter alia, all passenger departure areas between the screening checkpoint & the aircraft, the ramp baggage make up areas, cargo sheds, mail centres, airside catering and aircraft cleaning premises.

D1.1.24 **Sterile Flight Deck:** During critical phases of flight and all flight operations (except cruise) conducted below 10 000 feet, no crew member may engage in any activity or conversation that is not required for safe operation of the aircraft. Non-essential cockpit-cabin communication is prohibited during this period.

D1.1.25 **Threat Levels:** A series of four defined threat levels of passenger disturbances, established so as to give common definition and thereby understanding to all concerned parties as to what is occurring on the aircraft:

Level 1 - Disruptive behaviour (suspicious or verbally threatening);

Level 2 - Physically abusive behaviour;

Level 3 - Life-threatening behaviour;

Level 4 - Attempted breach or actual breach of the flight crew Compartment.

D1.1.26 **Unidentified Baggage:** Baggage at an airport, with or without a baggage tag, which is not picked up by or identified with a passenger.

D2. SECURITY OF THE FLIGHT CREW COMPARTMENT DOOR:

D2.1 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.

D3. CABIN CREW NOTIFICATION TO THE FLIGHT CREW:

D3.1 Several means are available by which the cabin crew can discreetly notify the flight crew in the event of suspicious activity or security breaches in the cabin:

D3.1.1 a pre-arranged signal of chimes should be established to indicate a security emergency. It is important to keep this simple, however, to preclude confusion under stressful situations; and

D3.1.2 code words to indicate inability to speak freely should be pre-arranged. They should be simple and in the primary language of the crew. If changed too frequently, they can be easily forgotten under stress.

D3.2 A combination of the above means would assure redundancy of absolutely critical communication capability.

D3.3 All passenger carrying aeroplanes should be equipped with an approved flight crew compartment door, where practicable, that is designated 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.

D3.4 In all aeroplanes which are equipped with a flight crew compartment door in accordance with para D3.3:

D3.4.1 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

D3.4.2 means should be provided for monitoring the entire door area outside the flight crew compartment to identify persons requesting entry and to detect suspicious behaviour or potential threat.

D4. LOCKING MECHANISM:

D4.1 The locking mechanism on the flight crew compartment door of the affected aircraft may have a key lock in the door operable from the cabin side but capable of being overridden from the flight crew compartment, and a capability of electronically locking and unlocking from either pilot's station.

D5. FLIGHT CREW COMPARTMENT ACCESS PROCEDURES:

D5.1 Coordination and visual positive identification.

D5.1.1 Operational procedures must be in place to ensure that flight crew compartment access is coordinated with the flight crew in advance via the cabin interphone system. Once a request has been made by cabin crew to enter the flight crew compartment via the interphone (and via keypad on aircraft so equipped), the flight crew would visually positively verify who is at the flight crew compartment door and the exact circumstances existing prior to unlocking the door.

D5.2 Monitoring Requirement.

D5.2.1 Monitoring by the flight crew of the door area should only be necessary when cabin crew or other authorized personnel are requesting admittance to or are about to exit, or are exiting, the flight crew compartment. Procedurally this will normally be limited to periods of relatively low workload, such as above 10 000 feet MSL. The flight crew must be able to clearly see the door area and the cabin area directly in front of the door to ensure that the individual requesting entry is not operating in a situation of duress.

D5.3 Exit from the Flight Crew Compartment.

D5.3.1 When a person wishes to exit the flight crew compartment, that person, prior to unlocking the door, should:

D5.3.1.1 verify with the cabin crew that the adjacent lavatory is not passenger occupied;

D5.3.1.2 visually determine the exact circumstances existing outside the door, particularly on high risk flights or when unknown passengers are within easy access of the flight crew compartment door; and

D5.3.1.3 confirm that cabin crew are positioned to block passenger access to the door area when it is unlocked.

D5.3.2 It is essential that the flight crew compartment door be open for only the minimum time required to quickly leave or enter the flight crew compartment.

D6. AEROPLANE SEARCH PROCEDURE CHECKLIST:

D6.1 An 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.

D7. BOMB THREATS ON THE GROUND:

D7.1 When a bomb threat or warning is associated with an aircraft that is still on the ground, and once the warning has been assessed, aircraft operators in consultation with airport authorities should:

D7.1.1 have all passengers and crew disembark with all cabin baggage using steps or jetties. Escape slides should only be used in extreme emergencies;

D7.1.2 move the aircraft to a remote location such as the isolated parking position;

D7.1.3 isolate and re-screen all passengers and their cabin baggage and hold them in a separate area until the crew members, hold baggage, cargo and catering supplies have been inspected / screened, searched and declared safe;

D7.1.4 unload all hold baggage and require passengers to identify their baggage, which should then be screened or searched before it is re-loaded;

D7.1.5 unload all cargo which should then be screened or searched before it is re-loaded;

D7.1.6 unload and check the integrity of catering supplies; and

D7.1.7 search the aircraft.

Note: The details are given in the Appendix-A **"Aircraft Security Search Checklist on Ground Only"**.

D8. BOMB THREAT IN FLIGHT:

D8.1 Finding a "bomb on board", whatever the nature or contents of the device, has the unique capability of striking a crew – a crew untrained in in-flight bomb threat management procedures – with almost paralysing fear. As a result, a particular emphasis on building crew background knowledge in this domain must be included in the training curriculum. An active Improvised Explosive Device (IED) or Chemical / Biological Weapon (CBW) on board the aircraft is a serious safety and security matter, however, the situation is similar to various other in-flight emergencies. When the crew has a checklist and a procedure to follow the likelihood of a successful conclusion to the emergency is considerably enhanced.

D8.2 The calming effect of knowledge, and therefore the positive influence on a crew's performance in this situation, cannot be overemphasized. This knowledge will aid in the process of deliberate, mental control of the fear engendered by this threat and thereby facilitate the capability of the cabin crew to successfully hear, lead, direct and act.

D8.3 The aircraft should undergo an in-flight search 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. This is generally based upon a threat to the specific aircraft that is received while the aircraft is in flight.

Note 1: The details are given in the Appendix-B **"Bomb Search Checklist – Aircraft in Flight"**.

Note 2: Bomb Threat in flight should be simulated and rehearsed along with Partial Evacuation Demonstration Drill on annual basis.

D9. TRAINING PROGRAMMES:

D9.1 An operator shall establish and maintain an approved security training programme once in two years 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:

D9.1.1 determination of the seriousness of any occurrence;

D9.1.2 crew communication and coordination;

D9.1.3 appropriate self-defense responses;

D9.1.4 use of non-lethal protective devices assigned to crew members in case when authorized by CAA Pakistan;

D9.1.5 understanding of behaviour of terrorists so as to facilitate the ability of crew members to cope with hijacker behaviour and passenger responses;

D9.1.6 live situational training exercises regarding various threat conditions;

D9.1.7 flight deck procedures to protect the aeroplane; and

D9.1.8 aeroplane search procedures and guidance on least-risk bomb locations where practicable.

Note: The details are given in the Appendix-C **"Training Programme"**, Appendix-D **"Least Risk Bomb Location (LRBL) Checklist"** and Appendix-E **"Preflight Security Checklist"**.

D9.2 An 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.

D10. REPORTING ACTS OF UNLAWFUL INTERFERENCE:

D10.1 Following an act of unlawful interference, the pilot-in-command shall notify this fact, without delay, to the appropriate Air Traffic Service Unit and shall also submit a full report on the incident to the Director General, CAA or a designated local authority / person.

D11. UNRULY PASSENGERS:

D11.1 AOC Holders should develop a preventive strategy to deal with unruly passengers. The success of such preventive strategy relies on three conditions:

D11.1.1 raised awareness among passengers of how the airline will respond to disruptive acts;

D11.1.2 the implementation of a zero-tolerance policy; and

D11.1.3 the likelihood and type of consequence in response to their disruptive behaviours.

Note: AOC Holders may utilize the following proposed sample forms:

Appendix-F – Witness Report Form

Appendix-G – Final Warning for Unacceptable Behaviour Abroad Aircraft

Appendi-H – Final Warning for Smoking Prohibition Abroad Aircraft

D11.2 In addition to above, the pilot-in-command of an aeroplane, with such assistance as he requires, may:

D11.2.1 take such action, including the removal of a unruly passenger from the aeroplane or placing him under restraint or in custody, by force, as he considers reasonably necessary to ensure compliance with security procedures of this ANO and relevant provisions of CARs, 94 or in relation to the aircraft / aeroplane.

D11.2.2 Detain the unruly passenger, crew and cargo for such period as he considers reasonably necessary to ensure compliance with security procedures of this ANO and relevant provisions of CARs, 94 or in relation to the aircraft / aroplane.

D12. MISCELLANEOUS:

D12.1 Pakistan does not currently prescribe that specialized means of attenuating and directing the blast should be provided for use in Least Risk Bomb Location. Pakistan does not have aircraft design change capabilities. No implementation plan in near future.

Note: The details are given in the Appendix-D **“Least Risk Bomb Location (LRBL) Checklist”**.

D12.2 Passengers are not permitted to carry weapons on board.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

ANO	:	AIR NAVIGATION ORDER
CARs	:	CIVIL AVIATION RULES
CAA	:	PAKISTAN CIVIL AVIATION AUTHORITY
LRBL	:	LEAST RISK BOMB LOCATION
AOC	:	AIR OPERTOR CERTIFICATE
ABPs	:	ABLE-BODIED PASSENGER(S)
MSL	:	MEAN SEA LEVEL
IED	:	IMPROVISED EXPLOSIVE DEVICE
CBW	:	CHEMICAL / BIOLOGICAL WEAPON

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 Civil Aviation Rules, 1994.

E3.2 ICAO Annex 6 Part 1.

E3.3 ICAO Annex 17.

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st April, 2018 and supersedes ANO 91.0034 (Issue-2).

--S/d--

(USAID-UR-REHMAN USMANI)
Air Vice Marshal
Actg. Director General,
Pakistan Civil Aviation Authority

Dated: - **7th March, 2018**

--S/d--

(CAPT. ARIF MAJEED)
Director Flight Standards

Dated- **7th March, 2018**
File No. HQCAA/1076/158/FSAC

APPENDIX "A"

Flight No. : ___________________
Date : ___________________
Sector : ___________________
A/C Reg. : ___________________

AIRCRAFT SECURITY SEARCH CHECKLIST ON GROUND ONLY

The items in this checklist will be used by authorized personnel of the search team, with the possible assistance of aircraft Engineers.

Item		Checked	Remarks
1- FLIGHT DECK			
1-1	Seats including pouches, cushions and underside of seats.		
1-2	Log book and flight manual stowage		
1-3	Crew oxygen mask stowage		
1-4	Entire floor, including area forward of rudder pedals and beneath all flight deck seats		
1-5	Ceiling, floor and walls		
1-6	Life jacket stowage		
1-7	Crew coatroom and luggage stowage area		
1-8	Inside first-aid kit (if not sealed)		
1-9	Table and drawer of observers positions		
2- FORWARD ENTRANCE			
2-1	Escape chute stowage		
2-2	Cabin Crew seat and associated stowages		
2-3	Forward storage unit, including compartments		
2-4	Oxygen mask compartments		
2-5	Ceiling, floor and walls		
2-6	Fire extinguisher stowage		
3- COMPANINON WAY			
3-1	Ceiling, floor and walls		
3-2	Coatroom		
3-3	Baggage racks – entire area with baggage removed		
3-4	Drinking fountain, cup dispenser, cup disposal compartment and drain valve access		
3-5	Area above and along sidewall of stowage compartment		
4- FORWARD COMPARTMENT			
4-1	Coatrooms and stowages		
4-2	Flight Crew' and passengers' seats (including under seats)		
4-3	Ceiling, floor and walls		
4-4	Crew and passenger life vest stowages		
4-5	Portable oxygen stowage cupboard		
4-6	Seat / pouches		
4-7	Escape chute stowage		
4-8	Literature containers		

Item		Checked	Remarks
5- FORWARD GALLEY			
5-1	Remove all containers, food and service carts (if not done)		
5-2	Inspect containers removed from galley		
5-3	Escape chute stowage		
5-4	Compartments above service doors		
6- FORWARD TOILETS			
6-1	Remove soiled and waste material		
6-2	Remove / inspect containers under sink and inspect sink area		
6-3	Towel and tissue container / dispenser		
6-4	Toilet seat and lid		
6-5	Mirror and compartments		
6-6	Doors		
6-7	Ceiling, floor and walls		
6-8	Oxygen mask stowage		
7- MAIN CABIN			
7-1	Seats (pouches, cushions and underside of seats)		
7-2	Ceiling, floor and walls – do not remove carpet unless a foreign object is suspected		
7-3	Bulkheads and foot recesses		
7-4	Light recesses		
7-5	All compartments / Stowages		
7-6	All passenger entry doors and door frame recesses		
7-7	Escape chute stowages		
7-8	Main door and recess with door closed		
7-9	Magazine racks and literature containers		
7-10	Life vest pouches		
7-11	First-aid kit (only if unsealed)		
7-12	Passenger oxygen service units – drop them down and inspect		
7-13	Overwing emergency exit release covers		
7-14	Aft entry door cabin Crew' seats and stowages		
7-15	Sky cots and flight cradles		
7-16	Drinking fountain, cup dispenser and disposal compartment and drain valve access at floor		
8- CENTRE GALLEY			
8-1	Remove all containers, food and service carts (if not done)		
8-2	Open and inspect all galley compartments, bar and refrigerator		
8-3	Inspect all containers removed from the aircraft		
8-4	Ceiling, floor and walls		
8-5	First-aid kit (only if unsealed)		
8-6	All compartments / stowages		
8-7	Escape chute stowages		
8-8	Cabin Crew' seats and stowages		
8-9	Oxygen mask compartment in ceiling		

Item		Checked	Remarks
9- CENTRE TOILETS			
9-1	Remove soiled and waste material		
9-2	Remove / inspect containers under sink and inspect sink		
9-3	Towel and tissue container / dispenser		
9-4	Toilet seat and lid		
9-5	Mirror and compartments		
9-6	Doors		
9-7	Ceiling, floor and walls		
9-8	Oxygen mask stowage		
10- REAR GALLEY AREA			
10-1	Cabin Crew' seats and stowages		
10-2	Galley – remove all containers		
10-3	Open and inspect all compartments		
10-4	Ceiling, floor and walls		
10-5	Inspect containers removed from aircraft		
10-6	All compartments / stowages		
10-7	Escape slide stowage (each door)		
11- TOILETS			
11-1	Remove soiled and waste material		
11-2	Remove / inspect containers under sink and inspect sink		
11-3	Towel and tissue container / dispenser		
11-4	Toilet seat and lid		
11-5	Mirror and compartments		
11-6	Doors		
11-7	Ceiling, floor and walls		
11-8	Oxygen mask stowage		
12- AFT WARDROBES AND COATROOMS			
12-1	Remove coats and hand baggage		
12-2	Inspect entire area		
12-3	Oxygen mask stowage		
12-4	First-aid kit (only if unsealed)		
12-5	Life vest stowage		
13- BULK CREW REST COMPARTMENT			
13-1	All compartments and stowages		
14- AIRCRAFT EXTERIOR			
14-1	Fuselage (the areas behind ALL doors and openings, even those not included in the checklist, should be checked)		
14-2	Radome		
14-3	Ground pneumatic connector panel		
14-4	Cabin compressor air-inlets		
14-5	Cabin compressor access panel		
14-6	Cabin compressor air-outlets		
14-7	Heat exchange control access panels		
14-8	Heat exchange outlet guide vanes		
14-9	E and E compartment cooling air outlet		
14-10	Beacon-holder (beacon removed)		
14-11	Cabin pressure safety valves		
14-12	Cabin pressure regulator valves		
14-13	Aft waste system service panels		
14-14	Tail cone access door		

Item		Checked	Remarks
14-15	Aft portable water service panel		
14-16	Forward portable water service panel		
14-17	Ground air conditioning connector door		
14-18	External power fuser door		
14-19	External power receptacle		
15- CABIN AIR CONDITIONING COMPARTMENT			
15-1	Entire compartment, especially area of hollow spaces and cavities		
16- E and E COMPARTMENT			
16-1	Entire compartment as well as all installations and door leading to cargo compartment		
17- CARGO COMPARTMENTS			
17-1	Forward cargo compartments, especially the area around the door hinge joints		
17-2	Waste water tank compartment		
17-3	Aft cargo compartment, especially the area around the door hinge joints		
17-4	Bulk cargo compartment, especially the aft area nearest the tailcone		
18- LANDING GEAR WHEEL WELLS AND GEARS			
18-1	Nose wheel well area		
18-2	Entire main wheel wells and zone of wing roots LH + RH		
18-3	Gears, wheel-tires, rims, brakes and parts such as struts, drag-braces, beams, arms, actuators, frames and tracks		
19- WINGS			
19-1	Leading and Trailing edge flap sections		
19-2	Pressure refuelling panels		
19-3	Inspection snap-covers		
19-4	Fuel vent openings		
20- ENGINES AND PYLONS			
20-1	Engine air-intake, exhaust and fan-duct		
20-2	Engine oil and pneumatic heat exchanger air-inlet scoop		
20-3	Open engine cowl doors and fan cascade vanes		
20-4	Check entire engine installation and behind all doors / openings on the cowl and pylons		

APPENDIX “B”

Flight No. : ___________________
Date : ________________________
Sector : ________________________
A/C Reg. : ___________________

BOMB SEARCH CHECKLIST – AIRCRAFT IN FLIGHT

Items in this Checklist are for crew guidance and adherence and pertain to bomb threats to aircraft in flight.

Item		Checked	Remarks
1- CABIN			
1-1	Overhead hatracks, cost closets, cupboards and stowages		
1-2	Seat pockets and under seats		
1-3	Spaces between the fuselage linings and window seats		
1-4	Doghouses / stowages that do not need a key to open them		
1-5	Life vests, pouches / compartments (if sealed, check properly the integrity / tampering of seals)		
1-6	Video / Entertainment compartment		
1-7	Emergency equipment stowage		
1-8	Jumpseats and associated stowages		
1-9	Bulk Crew Rest Compartment and associated compartments		
1-10	If nothing suspicious is found, extend the search to all remaining cabin areas		
2- GALLEY			
2-1	Ovens		
2-2	All service carts (sealed / locked carts are exempt)		
2-3	Waste bins		
2-4	Ice drawers and fridge		
2-5	Standard service unit containers		
2-6	Bread warmer		
2-7	Hollowware and hot cups		
2-8	Galley stowages and bustles		
3- TOILETS			
3-1	Waste bin and area under the sink		
3-2	Amenities compartment		
3-3	All access areas that do not need a tool to open them		
4- FLIGHT DECK			
4-1	Seats including seat pouches		
4-2	Life jackets and oxygen mask stowage’s		
4-3	All material stowage compartments		
4-4	Coat / Baggage closet		
4-5	Walls and ceiling including the centre aisle stand		
4-6	Floor including forward of rudder pedals and under each seat		

APPENDIX “C”

TRAINING PROGRAMME

SUBJECTS PLAN

Sr. No.	Subjects
1.	**SECTION 1.** **Introduction and general information update**
1.1	Greeting and training start
1.2	Confidence and information protection
1.3	Government activities
1.4	Operator activities
1.5	Safety risk
1.6	Military intelligence
2.	**SECTION 2.** **Flight deck security**
2.1	General provisions
2.2	Notification procedure / codes
2.3	Methods of door locking / unlocking
2.4	Operating procedure
2.5	Able-bodied passengers – explanation
2.6	Needs of flight crew and other additional crew members
2.7	Operating procedure when a pilot leaves a flight deck during the flight with two pilots assigned
2.8	SARPs field of application
3.	**SECTION 3.** **Aircraft search checklist**
3.1	Concepts and principle contained in the checklist
3.2	Restriction s applied to checklist application procedure
3.3	General provisions
3.4	LRBL
3.5	Explosives compared to chemical and biological weapon – difference in application
3.6	Explosives
3.7	Chemical and biological weapon (CBW)
3.8	Safety risk in cargo compartment
3.9	Alternate airport landing and passengers disembarkation
3.10	Possession of information of the Crew if there are dangerous goods on board
3.11	Search of Aircraft
4.	**SECTION 4.** **Unlawful interference extent evaluation**
4.1	What is unlawful interference?
4.2	Possession of information on dangerous goods on board
4.3	Safety Department of Operator
4.4	Classification of risks
4.5	Troublesome passengers
4.6	Hi-jacking
4.7	Explosion risk
5.	**SECTION 5.** **Communication and coordination activity of the crew**
5.1	Provision of communication and coordination between the crew
5.2	New duties of cockpit crew – INFLUENCE on training and communication system

Sr. No.	Subjects
5.3	Captain's pre-flight briefing
5.4	Crew response – general provisions
5.5	Tactical cockpit crew response
5.6	Resource management apart from the crew
5.7	Communication between passengers compartment and cockpit in case of unlawful interference
6.	**SECTION 6.** **Appropriate self – defense actions**
6.1	Situation awareness
6.2	Evaluation of security facilities available
6.3	Methods of self – defense
7.	**SECTION 7.** **Utilization of protective limited-lethality devices, approved by CAA Pakistan**
7.1	Approval by CAA Pakistan
7.2	Capability and limitations of limited lethality weapon
7.3	Requirements on personnel training
7.4	Other immediately available to the crew devices
8.	**SECTION 8.** **Study of terrorists behaviour and skills application in emergency situation of terrorists behaviour and passenger response evaluation**
8.1	Terrorism and terrorists
8.2	Unsteady nature of hi-jacking (unlawful interference)
8.3	Crew counteraction to terrorists
9.	**SECTION 9.** **Cockpit actions procedure connected with aircraft security**
9.1	Basic conception of cockpit crew protection measures
9.2	Other actions
10.	**SECTION 10.** **Problems of the crew upon the incident**

APPENDIX “D”

Flight No. : ____________________
Date : ____________________
Sector : ____________________
A/C Reg. : ____________________

LEAST RISK BOMB LOCATION (LRBL) CHECKLIST

If the suspect device can be moved (determined after consulting with Ground / Bomb Disposal Expert), it should be moved to the LRBL, in the attitude it was found. LRBL for the type of aircraft is defined in the Operations Manual of the AOC Holders.

	Item	Checked
1	Where possible move all personnel as far away from LRBL as possible.	
2	Ensure that passengers are seated, with belts fastened, tray tables upright and as far from the devices as possible.	
3	Remove any hazardous items (e.g. oxygen bottles and inflammables) from the immediate area around the LRBL.	
4	Disconnect all non-essential power to the area of the LRBL	
5	The path to the LRBL must be clear of obstructions.	
6	Disarm the AFT Right Side Door / the required door.	
7	Tape the device to the slide raft container as central as possible.	
8	Cover with plastic bag to prevent liquid entering the device.	
9	Prepare seat cushions, blankets and pillows to make a bomb blanket.	
10	Saturate area with non-alcoholic liquid to reduce risk of fire.	
11	Standby with Halon Fire extinguishers.	
12	Aft Cabin Crew to relocate their seats for landing.	
	STANDBY FOR FURTHER INSTRUCTIONS	

APPENDIX "E"

Flight No. : ____________________
Date : ____________________
Sector : ____________________
A/C Reg. : ____________________

PREFLIGHT SECURITY CHECKLIST

- ***Items in this Checklist are for guidance and may be completed if required.***
- ***Visually inspect all the following areas and for each irregularity, immediately inform the Captain.***

Item		Checked	Remarks
1- CABIN			
1-1	Overhead hatracks		
1-2	Seat pockets		
1-3	Life vests, pouches / compartments (sealed items are exempt)		
1-4	Spaces between the fuselage linings and window seats		
1-5	Doghouses / stowages that do not need a key to open them		
1-6	Coat closets and cupboards		
1-7	Video / entertainment compartment		
1-8	Emergency equipment stowage (sealed items are exempt)		
1-9	Jumpseats and associated stowages		
1-10	Seat Backs		
1-11	Seat Cushions		
1-12	Areas under the seat		
1-13	Bulk Crew Rest Compartment (BCRC)		
1-14	Other compartments, closets and storage bins in the passenger cabin and / or in BCRC		
2- GALLEY			
2-1	Ovens		
2-2	All service carts		
2-3	Waste bins		
2-4	Ice drawers and fridges		
2-5	Standard service unit containers		
2-6	Bread warmer		
2-7	Hollowware and hot cups		
2-8	Galley stowages and bustles		
3- TOILETS			
3-1	Waste bin and area under the sink		
3-2	Amenities compartment		
3-3	All access areas that do not need a tool to open them		

Name of Leading Cabin Crew: ____________________ Signature: ________________

Item		Checked	Remarks
4- FLIGHT DECK			
4-1	Seats including seat pouches		
4-2	Life jackets and oxygen mask stowage compartments		
4-3	All material stowage compartments		
4-4	Coat / Baggage closet		
4-5	Walls and ceiling including the centre aisle stand		
4-6	Floor including forward of rudder pedals and under each seat		
Name of Pilot: ____________________		Signature: _________________	
5- EXTERIOR OF AIRCRAFT			
5-1	Cargo holds		
5-2	Undercarriage wells		
5-3	Inspection panels		
5-4	Areas under control surfaces on the wings		
5-5	Control surface areas on the tail		
Name of Engineer: ________________		Signature: _________________	

Signature of Captain: _____________________

APPENDIX "F"

XYZ AIRLINES

WITNESS REPORT FORM

Dear Passenger / Crew Member

We understand that you were witness to an incident that took place on your flight. In order to assist in the future handling of the matter, we would be most grateful if you could take a few moments to complete this form and return it to a cabin crew.

Many thanks for your assistance.

Your Full Name (Block Capitals) ____

Your Home Address ____

____

Official Telephone Number ____________________ Residence ___________________

Your Flight Number ___________________ Time of incident _______________am / pm

Description of the incident

____

____

____

____

____

____ (Continue overleaf if required)

I believe that the facts stated in this witness statement are true.

SIGNED _______________ DATE ___________ TIME _________________ am / pm

NB please describe only those things which you actually witnessed.

APPENDIX "G"

Passenger Copy

XYZ AIRLINES

FINAL WARNING

YOUR UNACCEPTABLE BEHAVIOUR ABOARD THIS AIRCRAFT

Name: ____________________________ Accompanied by ____________________

Flight No. _________________________ Date ________________ Time ________

Sector ____________________________ Seat No. __________________________

You have failed to observe the instructions and warnings given by XYZ Airlines and its officers. In addition your behaviour is a cause of grave concern to XYZ Airlines, its officers and passengers and may be in violation of the law. XYZ Airlines requires you to immediately do the following until you disembark / are removed from this aircraft.

1. ☐ Refrain from consuming any alcohol.

2. ☐ Hand over any / all alcohol in your possession to the officer of XYZ Airlines that requests same (such alcohol will be returned to your or the relevant authority when you disembark / are removed from this aircraft).

3. ☐ Desist from behaving in a manner interfering with the operation of this flight and / or creating a disturbance affecting flight safety.

4. ☐ Adhere to and comply with any and all instructions / requests given made by XYZ Airlines and its officers.

5. ☐ Refrain from smoking in any part of this Aircraft.

Your immediate corporation is required if you wish to avoid restraint, prosecution and / or removal from this aircraft at the next point of arrival. XYZ Airlines may also invalidate your ticket for further travel, report your actions to the relevant authorities and subject you to pay costs for any unscheduled stops.

The Pilot in Command of this Aircraft gives this Notice.

Pilot in Command's signature ______________________________

Pilot in Command's Name ____

APPENDIX "H"

XYZ AIRLINES **FINAL WARNING**
SMOKING PROHIBITION ABOARD THIS AIRCRAFT
Name: ____________________ Accompanied by ____________________ Flight No. ____________________ Date ____________ Time ________ Sector ____________________ Seat No. ____________________
You have already been spoken to by the Cabin Crew and you are now given this Notice because you have continued to smoke after being informed that smoking is totally prohibited aboard this aircraft. If you smoke again at any time before leaving this aircraft your ticket will be marked as invalid for further carriage and you will be reported to the police for possible prosecution. This Notice is given by the Pilot in Command of the Aircraft. Pilot in Command's signature ____________________ Pilot in Command's Name ____________________

ELECTRONIC FLIGHT BAG (EFB)

AIR NAVIGATION ORDER

VERSION	**:**	**1.0**
DATE OF IMPLEMENTATION	**:**	**01-07-2020**
OFFICE OF PRIME INTEREST	**:**	**Flight Standards Directorate (FSD)**

	NAME	DESIGNATION	SIGNATURE
PREPARED BY	CAPT. MASOOD ILAHI	Flight Inspector (Pilot)	Signed
REVIEWED BY	CAPT. S. M. RAFATULLAH	Director Flight Standards	Signed
	ENGR. MUHAMMAD ZAHID BHATTI	Director Airworthiness	Signed
VERIFIED BY	NISAR AHMED BROHI	Sr. Addl. Dir Legal (Regulatory)	Signed
	AIR CDRE. NASIR RAZA HAMDANI	Dy. DG (Regulatory) / Director SQMS	Signed
APPROVED BY	HASSAN NASIR JAMY	Director General Pakistan Civil Aviation Authority	Signed
TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO).		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Air Navigation Order (ANO) is issued by Director General, Civil Aviation Authority in pursuance of powers vested in him under Rule 4 of Civil Aviation Rules' 1994.

B. PURPOSE:

B1. This ANO provides the Standards and Recommended Practices as applicable to the Approval and use of Electronic Flight Bag (EFB) by Operators authorized to conduct Air Operations as outlined in Para C1 below.

C. SCOPE:

C1. This ANO applies to all persons, organization or enterprises who conduct Air Operations as outlined below:

C1.1 Commercial Air Transport Operations.

C1.2 Charter / Cargo Operations.

C1.3 Aerial Work Operations.

C1.4 General Aviation.

C1.5 Private Operations.

C1.6 Helicopter Operations.

D. DESCRIPTION:

D1. DEFINITIONS:

D1.1 When the following terms are used in this ANO, they have the following meanings:-

D1.1.1 **Aircraft Interface Device (AID).** A device or function that provides an interface between the EFBs and other aircraft systems which protects the aircraft systems and related functions from the undesired effects from non-certified equipment and related functions.

D1.1.2 **Critical Phases of Flight.** The period of high workload on the flight deck, normally being the periods between the beginning of taxiing until the aircraft is on the route climb phase and between the final part of descent to aircraft parking.

D1.1.3 **Electronic Flight Bag (EFB).** An electronic information system, composed 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.

D1.1.4 **EFB Software Application.** Software hosted on an EFB platform, providing one or more EFB functions.

D1.1.5 **EFB Management.** Contains all procedures related to the Operator's EFB management system as listed in the section "EFB Management".

D1.1.6 **Installed Resources.** Hardware/software installed in accordance with airworthiness requirements.

D1.1.7 **Independent EFB Platforms.** Multiple EFB platforms that are designed such that no single failure makes all of them unavailable.

D1.1.8 **Operator.** The person, organization or enterprise engaged in or offering to engage in an aircraft operation.

D1.1.9 **Portable Electronic Device (PED).** Any lightweight, electrically-powered equipment. These devices are typically consumer electronic devices capable of communication, data processing and/or utility. Examples range from handheld, lightweight electronic devices such as tablets, e-readers, and smart phones to small devices such as MP3 players and electronic toys.

Note: The definition of PED encompasses both transmitting and non-transmitting PEDs.

D1.1.10 **Standard Operating Procedure (SOP).** Flight crew operating procedures as described in the Flight Crew Operating Manual (FCOM).

D1.1.11 **Transmitting PED.** A PED that contains an intentional transmitter, which has some or all of the device's radio frequency transmitting functions turned ON. Intentional transmitters may include devices enabled with cellular technology, wireless radio frequency network devices, and other wireless-enabled devices such as remote control equipment (which may include toys), two-way radios, cellular/mobile/smart phones and satellite phones.

D2. APPLICABILITY:

D2.1 The contents contained in this ANO shall be applicable to the operation of aeroplanes by Operators authorized to conduct Air Transport Operations as outlined below:

D2.1.1 ICAO Annex-6, Part-I | Commercial Air Transport Operations

D2.1.2 ICAO Annex-6, Part-II | General Aviation

D2.1.3 ICAO Annex-6, Part-III | Helicopter Operations

D3. EQUIPMENT AND HARDWARE CONSIDERATIONS – EFB:

D3.1 **Types of EFB.** EFBs can be either "Portable" or "Installed" (i.e., part of the aircraft definition).

D3.1.1 **Portable EFBs** are not part of the aircraft configuration and are considered to be PEDs. They generally have self-contained power and may rely on data connectivity to achieve full functionality. Modifications to the aircraft to use portable EFBs require the appropriate Airworthiness Approval of CAA, Pakistan.

D3.1.2 **Installed EFBs** are integrated into the aircraft, subject to normal airworthiness requirements and under design control. The approval of these EFBs is included in the aircraft's Type Certificate (TC) or in a Supplemental Type Certificate (STC).

D4. HARDWARE CONSIDERATIONS FOR INSTALLED RESOURCES AND MOUNTING DEVICES:

D4.1 Installed resources should be certified during the certification of the aircraft, through Service Bulletins by the Original Equipment Manufacturer (OEM) or through a third-party STC (Supplemental Type Certificate).

D4.1.1 **Mounting Devices:** If the mounting is permanently attached to the aircraft structure, the installation will be approved in accordance with the appropriate Airworthiness Regulations of CAA, Pakistan. The following guidance may be considered for that purpose:

D4.1.1.1 The mounting method for the EFB should allow the pilot (when strapped in a seated position) to have easy access to the EFB controls and a clear unobstructed view of the EFB display. The EFB should be located such that the effects of glare and/or reflections are minimized. Flight crew should be able to make adjustments to compensate for glare and reflections.

D4.1.1.2 It should be confirmed that the intended EFB hardware in its mounting device does not obstruct visual or physical access to aircraft displays, controls or external vision, and that its location does not impede crew ingress, egress and emergency egress paths.

D4.1.1.3 There should be no mechanical interference between the EFB in its mounting device and any of the flight controls in terms of full and free movement, under all operating conditions, and no interference with buckles, oxygen hoses, etc.

D4.1.2 **Data Connectivity**

D4.1.2.1 The capability of connecting the EFB to certified aircraft systems has to be covered by an Airworthiness Approval of CAA, Pakistan.

D4.1.2.2 Certified aircraft systems should be protected from adverse effects of EFB system failures by using a certified AID (Aircraft Interface Device). An AID may be implemented as a dedicated device, e.g. as defined in ARINC 759, or it may be implemented in non-dedicated devices, such as an EFB docking station, a network file server or other avionics equipment.

D4.1.3 **Power to the EFB**

D4.1.3.1 Installed power provisions should comply with the applicable Airworthiness Regulations of CAA Pakistan. Connection of the EFB to a nonessential, or to the least critical, power bus is recommended, so failure or malfunction of the EFB or power supply will not affect safe operation of aircraft critical or essential systems.

D5. HARDWARE CONSIDERATIONS FOR PORTABLE EFBs:

D5.1 Portable EFBs can be used as either handheld equipment or mounted in a fixed or movable mount attached to the aircraft structure or temporarily secured (e.g. kneeboard, suction cup).

D5.2 **Physical Characteristics:** The size and practicality of the EFB should be evaluated as some devices may prove to be cumbersome for normal use on a flight deck. The EFB used by an Operator across the fleet, must have a common make, model and size (dimensions). The capacity (GBs) and RAM must be identical across the fleet for a unified performance. The EFB should be under the ownership of the Operator (with each EFB device serial number recorded for tracking) and issued to individual pilots for performing official operational duties only. Private PEDs are not allowed to be used on an aircraft.

D5.3 **Readability:** The EFB data should be legible under the full range of lighting conditions expected on the flight deck, including direct sunlight.

D5.4 **Environmental:** The EFB has to be operable within the foreseeable cockpit operating conditions including probable high/low temperatures, and after rapid depressurization if the EFB is intended for use in such an event.

D5.5 **Basic Non-Interference Testing**

D5.5.1 As previously noted, Portable EFBs are considered to be PEDs. As such, any reference to PEDs in this section is also applicable to Portable EFBs.

D5.5.2 The User/Operator is responsible for ensuring that a Portable EFB will not interfere in any way with the operation of aircraft equipment. The following methods can be used to test portable EFBs that are to remain powered (including being in standby mode) throughout the flight, in order to ensure that they will not electromagnetically interfere with the operation of aircraft equipment.

D5.5.3 **Method 1**

D5.5.3.1 **Step 1** is an Electromagnetic Interference (EMI) test using RTCA/DO-160, Section 21, Category M. An EFB vendor or other source can conduct this test for an EFB User/Operator. An evaluation of the results of the RTCA/DO-160 EMI test can be used to determine if an adequate margin exists between the EMI emitted by the EFB and the interference susceptibility threshold of aircraft equipment. If this step determines that adequate margins exist for all interference, then the test is complete. However, if this step identifies inadequate margins for interference, then step 2 testing must be conducted.

D5.5.3.2 **Step 2** testing is a complete test in each aircraft using standard industry practices. This should be done to the extent normally considered acceptable for non-interference testing of a Portable EFB in an aircraft for all phases of flight. Credit may be given to other aircraft of the same make and model equipped with the same avionics as the one tested.

D5.5.4 **Method 2**

D5.5.4.1 As an alternative, Step 2 of Method 1 can be used directly to determine non-interference of the EFB.

D5.6 **Additional Testing for Transmitting Portable EFBs**

D5.6.1 To activate the transmitting functions of a Portable EFB during flight in conditions other than those that may be already certified at aircraft level (e.g., tolerance to specific transmitting PED models) and hence documented in the Aircraft Flight Manual (AFM) or equivalent, the

User/Operator must ensure that the device will not interfere with the operation of the aircraft equipment in any way. The following is a method to test transmitting Portable EFBs that are to remain powered (including being in standby mode) during flight.

D5.6.2 This test consists of two separate test requirements:

D5.6.2.1 **Test Requirement 1.** Each model of the device should have an assessment of potential Electromagnetic Interferences (EMI) based on a representative sample of its frequency and power output. This EMI assessment should follow a protocol such as set forth in RTCA/DO-294, Guidance on Allowing Transmitting Portable Electronic Devices (T-PEDs) on Aircraft. This frequency assessment must confirm that no interference of aircraft equipment will occur as a result of intentional transmissions from these devices.

D5.6.2.2 **Test Requirement 2.** Once an EMI assessment has determined that there will be no interference from the EFB's intentional transmissions (Test Requirement 1), and basic non-interference testing has been conducted with the device not deliberately transmitting, non-interference testing should be conducted with an operating transmit function. The position of the transmitting device is critical to non-interference testing; hence, locations of the EFB and of the transmitter (if applicable) should be clearly defined and adhered to.

D5.7 **Power Supply, Connection and Source**

D5.7.1 The Operator should ensure that power to the EFB, either by battery or externally supplied power, is available to the extent required for the intended operation.

D5.7.2 The power source needs to be suitable for the device. It may be a dedicated power source or a general purpose source already fitted.

D5.7.3 Means to turn OFF the power source, other than a circuit breaker, should be reachable by the pilot when strapped in the normal seated position (e g. access to unplug the EFB or a separate hardware or software switch clearly labelled for the power source).

D5.8 **Batteries**

D5.8.1 The Operator should ensure that the batteries are compliant with the applicable Standards for use in an aircraft.

D5.8.2 The Operator should document procedures to handle thermal runaways or similar battery malfunctions potentially caused by EFB batteries (e.g. lithium-based batteries). At least the following issues should be addressed:

D5.8.2.1 Risk of leakage;

D5.8.2.2 Safe storage of spares including the potential for short circuit; and

D5.8.2.3 Hazards due to on-board continuous charging of the device, including battery overheat.

D5.9 **Cabling**

D5.9.1 The Operator should ensure that any cabling attached to the EFB, whether in the dedicated mounting or when handheld, does not present an operational or safety hazard.

D5.10 **Temperature Rise**

D5.10.1 Operating the proposed EFB device may generate heat. The placement of the EFB should allow sufficient airflow around the unit.

D5.11 **Data Connectivity between EFBs**

D5.11.1 If two or more EFBs on the flight deck are connected to each other, then the Operator should demonstrate that this connection does not negatively affect otherwise independent EFB platforms.

D5.12 **Data Connectivity to Aircraft Systems**

D5.12.1 See para D4.1.2

D5.13 **External Connectivity**

D5.13.1 Some EFBs may have a provision for external ports other than power or data connectivity with aircraft systems (e.g. an antenna or a data connection to the Operator ground network). External connectivity leading to a change to the aircraft type design would require an Airworthiness Approval from CAA, Pakistan. The extent of this information is dependent on the complexity of the interface to the aircraft systems.

D5.14 **Stowage**

D5.14.1 All handheld EFBs not secured on the flight crew (e.g. kneeboard) or into an existing aircraft part (e.g. suction cups) need to be **stowed during critical phases of flight** (See Definition at Para D1.1.2) to ensure the safety of the occupants of the flight deck. Stowage needs to be configured such that the EFB can be easily stowed securely but remain readily accessible in-flight. The method of stowage should not cause any hazard during aircraft operations.

D5.14.2 **Viewable Stowage**

D5.14.2.1 A portable EFB (not mounted in a mounting device) may be used during all phases of flight provided that it is secured on the flight crew or into an existing aircraft part with the intended function to hold acceptable light mass portable devices viewable to the pilot's required duty station. This viewable stowage device is not necessarily part of the certified aircraft configuration. Its location should be documented in the EFB Policy and Procedures Manual.

D5.14.2.2 Some types of viewable stowage securing means may have characteristics that degrade appreciably with age or because of various environmental factors. In all such cases, it must be ensured that the stowage characteristics remain within acceptable limits for the proposed operations. Securing means based on vacuum (e.g. suction cups) which have a holding capacity that decreases with pressure. It should be demonstrated that they will still perform their intended function at operating cabin altitudes.

D5.14.2.3 In addition, it should be demonstrated that if the EFB moves or is separated from its stowage, or if the viewable stowage is unsecured from the aircraft (as a result of turbulence, manoeuvring, or other action), it will not interfere with flight controls, damage flight-deck equipment or injure flight crew members.

D6. HUMAN FACTORS:

D6.1 The Operator should carry out an assessment of the Human-Machine Interface and aspects governing crew coordination when using the EFB. Whenever possible, the EFB user-interface philosophy should be consistent (but not necessarily identical) with the flight-deck design philosophy. The review of the complete system should include, but is not limited to, the following:

D6.1.1 General considerations including workload, usability, integration of the EFB into the flight deck, display and lighting issues, system shutdown and system failures;

D6.1.2 Physical placement issues, including stowage area, use of unsecured EFBs, design and placement of mounting devices;

D6.1.3 Considerations for interference with anthropometric constraints, cockpit ventilation and speaker sound;

D6.1.4 Training and procedure considerations, including training on using EFB applications, the EFB Policy and Procedures Manual, fidelity of the EFB training devices and mechanisms for gathering user feedback on EFB use;

D6.1.5 Hardware considerations — refer to Para D4 and Para D5

D6.1.6 Software considerations — refer to Para D11 and Para D12

D7. CREW OPERATING PROCEDURES:

D7.1 **General**

D7.1.1 The Operator should have procedures for using the EFB in conjunction with the other flight-deck equipment.

D7.1.2 If an EFB generates information similar to that generated by existing flight-deck systems, procedures should clearly identify the following:

D7.1.2.1 Which information source will be primary;

D7.1.2.2 Which source will be used as secondary information;

D7.1.2.3 Under what conditions to use the secondary source; and

D7.1.2.4 What actions to take when information provided by an EFB does not agree with that from other flight-deck sources, or, if more than one EFB is used, when one EFB disagrees with another.

D7.1.3 If normal operational procedures require an EFB for each flight-deck crew member, the set-up should comply with the definition of independent EFB platforms.

D7.1.4 Operators should include the requirements for EFB availability in the Operations Manual Part-A (OM-A), and Initial and Refresher Training of EFB in the Operations Manual Part-D (OM-D).

D7.1.5 Operators should include in each aircraft Minimum Equipment List (MEL), appropriate provisions for Dispatch with respect to EFB non availability or limited functionalities.

D7.2 **Revisions and Updates**

D7.2.1 The Operator should have a procedure in place to allow flight crews to confirm the revision number and/or date of EFB application software including, where applicable, database versions (e.g. update to the latest aeronautical charts).

D7.2.2 Flight crews should not, however, have to confirm the revision dates for databases that would not, in case of outdated data, adversely affect flight operations. Procedures should specify what actions to take if the software applications or databases loaded on the EFB are out of date.

D7.3 **Workload and Crew Coordination**

D7.3.1 In general, using an EFB should not increase the crew's workload during critical phases of flight. For other flight phases, crew operating procedures should be designed to mitigate and/or control additional workload created by using an EFB.

D7.3.2 Workload should be distributed among flight crew members to ensure ease of use and continued monitoring of other flight crew functions and aircraft equipment. The procedures should include specification of the phases of flight at which the flight crew may not use the EFB, if applicable.

D7.4 **Reporting**

D7.4.1 A reporting system for EFB failures should be established. Procedures should be put in place to inform maintenance and flight crews about a fault or failure of the EFB, including actions to isolate it until corrective action is taken.

D8. <u>FLIGHT CREW TRAINING:</u>

D8.1 The use of the EFB would be conditional on appropriate training. Training should be in accordance with the Operator's SOP (including abnormal procedures) and should include the following:

D8.1.1 Overview of the system architecture;

D8.1.2 Preflight checks of the system;

D8.1.3 Limitations of the system;

D8.1.4 Use of each operational software application;

D8.1.5 Restrictions on the use of the system, including when some or all of the EFB functions are not available;

D8.1.6 Conditions (including phases of flight) under which the EFB may not be used;

D8.1.7 Procedures for cross-checking data entry and computed information;

D8.1.8 Human performance considerations on the use of the EFB;

D8.1.9 Additional training for new applications, new features of current applications or changes to the hardware configuration;

D8.1.10 Recurrent training and proficiency checks; and

D8.1.11 Any area of special emphasis raised by PCAA during the EFB evaluation.

D8.2 All Operators would be required to include the “EFB Training Program” in the PCAA Approved Operations Manual Part-D (OM-D).

D9. EFB RISK ASSESSMENT:

D9.1 **General**

D9.1.1 The EFB Risk Assessment is a process that should be performed to assess the risks associated with the use of each EFB function and should allow the Operator to keep the risks to an acceptable level by defining the appropriate mitigation means.

D9.1.2 This Risk Assessment should be performed before the beginning of the approval process (if applicable), and its results should be reviewed on a periodic basis.

D9.1.3 Operators should refer to their Company Safety Management System (SMS) Manual, for guidance on Safety Risk Assessment.

D9.2 **EFB Failures and Mitigation Means**

D9.2.1 Based on the outcome of the EFB Risk Assessment, the Operator should determine the need for software architectural features, personnel, procedures and/or equipment that will eliminate, reduce or control risks associated with an identified failure in a system.

D9.2.2 Mitigation against EFB failure or impairment may be accomplished by one or a combination of the following:

D9.2.2.1 System design;

D9.2.2.2 Separate and backup power sources for the EFB;

D9.2.2.3 Electronic fallback solutions to the last known, stable configuration (e.g. before an update);

D9.2.2.4 Redundant EFB applications hosted on independent EFB platforms;

D9.2.2.5 Paper products carried by selected crew members;

D9.2.2.6 Complete set of sealed paper backups on the flight deck; and/or

D9.2.2.7 Procedural means.

D10. EFB FUNCTIONS:

D10.1 **General**

D10.1.1 ANO-024-FSXX Commercial Air Transport, Para D6.25, gives general guidance on Electronic Flight Bag (EFB). Detailed Policy on EFB is given in this ANO.

D10.1.2 EFB functions to be used for the safe operation of aircraft are considered to be those whose failure, malfunction or misuse would have an adverse effect on the safety of flight operations (e.g. increased in-flight crew workload during critical phases of flight, reduction in functional capabilities or safety margins).

D10.1.3 Those functions should be recorded in the Operations Manual Part-A (OM-A) and linked to the Operations Specifications (Ops Specs) as shown in Appendix-C of this ANO.

D10.1.4 The list below may be considered examples of applications providing such functions, depending on their use, associated procedures, and failure mitigation means:

D10.1.4.1 Document browsers displaying information required to be carried by regulations (subject to approval, where required);

D10.1.4.2 Electronic aeronautical chart applications;

D10.1.4.3 Airport Moving Map Display (AMMD) applications, not used as a primary means of navigation on the ground and used in conjunction with other materials and procedures;

D10.1.4.4 Cabin-mounted video and aircraft exterior surveillance camera displays;

D10.1.4.5 Aircraft performance calculation applications that provide take-off, en-route, approach, landing and missed approach performance calculations; and

D10.1.4.6 Mass and balance calculation applications.

Note: These applications require special attention during their evaluation, as described in Appendix-A of this ANO.

D10.1.5 On the contrary, the following features are not EFB functions and, unless certified as avionics functions, should **NOT** be hosted on an EFB:

D10.1.5.1 Displaying information that may be tactically used by the flight crew members to check, control or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse meteorological conditions, obstacles or other traffic, in-flight or on ground.

D10.1.5.2 Displaying information that may be directly used by the flight crew to assess the real-time status of aircraft critical and essential systems, as a replacement for existing installed avionics, and/or to manage aircraft critical and essential systems following failure;

D10.1.5.3 Communicating with Air Traffic Control (ATC);

D10.1.5.4 Sending data to aircraft systems not certified for this intended purpose; and

D10.1.5.5 Any other function determined by CAA, Pakistan that requires Airworthiness Certification.

D10.1.6 The display of own-ship position, in-flight, for strategic use is not universally accepted, thus, is not specifically covered in this ANO. If an Operator elects to implement the display of own-ship position, in-flight, on an EFB application, the following risks should be addressed and properly mitigated:

D10.1.6.1 Use of hazardously misleading information (in particular in case of erroneous position or frozen display);

D10.1.6.2 Misuse of the information for short-term piloting, e.g. for track monitoring purposes (see Para D10.1.5.1);

D10.1.6.3 Excessive fixation on EFB information and excessive head-in time; and

D10.1.6.4 Conflicting information with certified aircraft systems.

Note: Possible effects of improperly mitigated risks include an increase in workload and a decrease in situation awareness. In some cases, crews might unknowingly build an over-reliance on this uncertified, yet compelling information.

D11. <u>CONSIDERATIONS FOR ALL EFB APPLICATIONS:</u>

D11.1 **General**

D11.1.1 The Approved EFB system should only host approved EFB Applications and the Operating System required to operate such Applications. Private applications or data should not be hosted on the Approved EFB. Such additional data load can slow down the EFB, affecting its performance. If unauthorized material is hosted on the PCAA Approved EFB, the Approval so granted by CAA, Pakistan could be revoked and the Operator held accountable for the same.

D11.2 **Software HMI (Human Machine Interface)**

D11.2.1 The EFB system should provide an intuitive, and in general, consistent user interface within and across the various hosted EFB applications. This should include, but not be limited to, data-entry methods, colour-coding philosophies and symbology.

D11.2.2 Software considerations should be addressed, including ease of access to common functions, consistency of symbols, terms and abbreviations, legibility of text, system responsiveness, methods of interaction, use of colour, display of system status, error messages, management of multiple applications, off-screen text and content and use of active regions.

D11.2.3 **Use of Colours and Messages**. The colour “RED” should be used only to indicate a warning level condition. “AMBER” should be used to indicate a caution level condition. Any other colour may be used for items other than warnings or cautions, provided that the colours used differ sufficiently from the colours prescribed to avoid possible confusion. EFB messages and reminders should be integrated with (or compatible with) presentation of other flight-deck system alerts. EFB aural messages should be inhibited during critical phases of flight. CAA Pakistan, Regulatory requirements in conflict with the recommendation above would have precedence.

D11.2.4 **System Error Messages.** It may be desirable to have an indication of whether a software application is fully or partially disabled or is not visible or accessible to the user available to the user upon request. It may be desirable to prioritize these EFB status and fault messages.

D11.2.5 **Data-Entry and Error Messages.** If user-entered data are not of the correct format or type needed by the application, the EFB should not accept the data. An error message should be provided that communicates which entry is suspect and specifies what type of data are expected.

D11.2.6 **Responsiveness of Application.** The system should provide feedback to the user when user input is accepted. If the system is busy with internal tasks that preclude immediate processing of user input (e.g. calculations, self-test, or data refresh), the EFB should display a “system busy” indicator (e.g. clock icon) to inform the user that the system is occupied and cannot process inputs immediately. The timeliness of system response to user input should be consistent with the software application’s intended function.

D11.2.7 **Off-Screen Text and Content.** If the document segment is not visible in its entirety in the available display area, such as during “zoom” or “pan” operations, the existence of off-screen content should be clearly indicated in a consistent way. For some intended functions, it may be unacceptable if off-screen content is not indicated. This should be evaluated based on the application and intended operational function.

D11.2.8 Software developers and Operators are encouraged to evaluate the usability of an existing HMI before developing a new HMI themselves. It is also recommended that the HMI be reviewed after some time of operation in the everyday environment for unforeseeable common human errors, with special regard to the specific-use case of the Operator, which require changes or enhancement of the given design.

D11.3 **Electronic Signatures**

D11.3.1 In order to be accepted as an equivalent-to-handwritten signature, electronic signatures used in EFB applications need, as a minimum, to fulfill the same objectives and assure the same degree of security as the handwritten or any other form of signature it intends to replace.

D11.3.2 Operator’s Policy on Electronic Signature must be documented in the Operations Manual (OM-A) which will be approved by CAA, Pakistan. The same policy should be highlighted in the EFB Policy and Procedure Manual.

D12. CONSIDERATIONS FOR EFB APPLICATIONS TO BE USED FOR THE SAFE OPERATION OF AIRCRAFT:

D12.1 **EFB Management**

D12.1.1 The Operator should have an EFB management system in place. Complex EFB systems may require more than one individual to support the EFB management system. However, at least one person (e.g. dedicated EFB Manager, EFB Administrator) should possess an overview of the complete EFB system, including the distribution of responsibilities within the Operator’s management structure. Practical knowledge of Cockpit Operations and CRM is a preferred qualification of EFB Manager/EFB Administrator.

D12.1.2 EFB management is the key link between the Operator and the EFB system and software suppliers.

D12.1.3 EFB management is responsible for hardware and software configuration management, and for ensuring, in particular, that no unauthorized software is installed. EFB management is also responsible for ensuring that only a valid version of the application software and current data packages are installed on the EFB system. For some software applications there should be a means for Operators to carry out their own check of data content prior to load and/or release for operational use.

D12.1.4 The EFB management system should ensure that software applications supporting function(s) not directly related to operations conducted by the flight crew on the aircraft (e.g. web browser, email client, picture management) do not adversely impact the operation of the EFB.

D12.1.5 Each person involved in EFB management should receive appropriate training in their role and should have a good working knowledge of the proposed system hardware, operating system, relevant software applications and knowledge about flight operations.

D12.1.6 EFB management should establish procedures to ensure that no unauthorized changes take place to EFB applications. An EFB Policy and Procedures Manual should be a standalone document (see Appendix-D for Template Guidelines) with a general reference in the Operator's Operations Manual (OM-A).

D12.1.7 Procedures should be established for the maintenance of the EFB.

D12.1.8 EFB management should be responsible for the procedures and systems, documented in the EFB Policy and Procedures Manual that maintain EFB security and integrity. The required level of EFB security depends on the criticality of the used applications.

D12.1.9 Any new or modified EFB application requires a reassessment for proper functioning and on whether any additional training or procedures are necessary.

D12.1 **Quality Assurance**

D12.1.1 The Operator should ensure that the software developer has a quality assurance process in place. The software development and verification processes should be included and documented in the quality assurance process.

D13. <u>OPERATIONAL EVALUATION PROCESS</u>: (For Commercial Air Transport Operators and Aeroplane – Take Off Mass above 5700 Kgs)

D13.1 **Definition of the Scope**

D13.1.1 The scope of the operational evaluation plan will depend upon the applicant's experience with EFBs. Considerations should include whether the Operator:

D13.1.1.1 Has no EFB experience, thus requiring a "new application and approval process"; or

D13.1.1.2 Has an existing approved EFB program and seeks an additional Approval.

D13.1.2 An Operator seeking EFB Approval will be processed as follows:

D13.1.2.1 The Operator will apply for Approval of EFB by filling out the Application Form as given at Appendix-E in this ANO.

D13.1.2.2 The Operator will fill out and submit the “EFB Approval Checklist” as given at Appendix-B in this ANO, along with the Application Form.

D13.1.2.3 After successful completion of all formalities, a Provisional Approval will be granted for use of two EFBs along with paper back up in the cockpit for a maximum period of six (06) months.

D13.1.2.4 During the Provisional Approval period, the Operator will send a monthly return to Flight Standards Directorate, PCAA, of the number of flights conducted with EFB and problems or technical difficulties faced – if any.

D13.1.2.5 After the successful operation of EFB during the Provisional Approval period, the Operator will request Flight Standards Directorate, CAA Pakistan for a Final Approval. For a Final Approval, sufficient back-up (paper back up or an additional EFB) must be available onboard to cater for any EFB malfunctions/failures.

D13.1.2.6 After re-evaluating the Operator’s request, full approval may be granted or the Provisional Approval with Paper Backup may be extended.

D13.2 **Application and Audit Checklist Submission by the Operator – Phase-1**

D13.2.1 During Phase-1, the Commercial Air Operators and Operator with Aircraft Take Off Mass above 5700 Kgs, will submit the following documents to Flight Standards Directorate, CAA Pakistan for the approval of EFB:

D13.2.1.1 Application Form (CAAF/EFB/>5700 Kgs/000) given at Appendix-E.

D13.2.1.2 EFB Approval Checklist given at Appendix-B.

D13.3 **Scrutiny of Documents and In-flight Evaluation by CAA, Pakistan – Phase-2**

D13.3.1 Phase-2 begins with the scrutiny of Documents submitted by the Applicant (Operator) as outlined in Para D1.13.2 above. The Application and Audit Checklist is reviewed for completeness and compliance to the Regulations. Flight Standards Directorate (FSD) may coordinate with other Regulatory Offices of PCAA; as necessary. The scrutiny will encompass, but is not limited to the following areas:

D13.3.1.1 EFB Hardware and Application Specifications;

D13.3.1.2 EFB Policy and Procedures Manual (See Appendix-D);

D13.3.1.3 General Policy of EFB included in OM-A;

D13.3.1.4 EFB Training Program; included in OM-D;

D13.3.1.5 MEL Revisions (Incorporation of MEL provisions on EFB);

D13.3.1.6 EFB Evaluation Report (conducted by the Operator); and

D13.3.1.7 EFB Risk Assessment.

D13.3.2 Phase-2 ends with the Flight Evaluation of the Portable or Installed EFB as outlined below:

D13.3.2.1 **Flight Evaluation.** For a Portable and Installed EFB, a flight evaluation of a minimum of two (02) sectors of flight will be required for complete Flight analysis of the EFB.

Note: Evaluation of the EFB or its Mount, on Ground only, does not satisfy the requirements of EFB Approval Checklist as given in Appendix-B.

D13.4 **Issuance of EFB Approval through Operations Specification – Phase-3**

D13.4.1 After completion of the Flight Evaluation, FSD, CAA Pakistan will make the final evaluation as given below:

D13.4.1.1 **Unacceptable Results.** If CAA, Pakistan finds the proposed EFB reliability and/or function to be unacceptable, Flight Standards Directorate, PCAA will contact the Operator for corrective action. EFB deficiencies should be corrected and the EFB function revalidated prior to approval being issued.

D13.4.1.2 **Acceptable Results.** If CAA, Pakistan finds the proposed EFB reliability and/or function to be acceptable based on evaluation, a "Provisional Approval" for a specific time period will be issued.

D13.4.2 Flight Standards Directorate (FSD), CAA Pakistan will grant a "Provisional Approval" of EFB to the Operator through an appropriate entry with time period, in the Operations Specifications (Ops Specs) of the Operator. The Ops Specs will reference the location in the Operations Manual Part-A (OM-A) where more details of the approved EFB applications can be found (see Appendix-C for details).

Note-1: Additional Flight evaluations **are not** required for adding a new EFB to an existing approval unless there is a substantial change in EFB-intended functions.

Note-2: When a new aircraft is added to an existing EFB approval, the suitability of the EFB for that aircraft must be addressed. CAA, Pakistan would examine the technical content and quality of the proposed EFB program and other supporting documents and procedures.

D13.4.3 Fifteen (15) days prior to the expiration of the "Provisional Approval", the Operator will approach FSD, PCAA for a "Final Approval" of EFB. Flight Standards Directorate, PCAA will take the following actions:

D13.4.3.1 Scrutinize the Operator's request in light of the Monthly Return submitted by the Operator and Operations conducted with EFB so far. Based on the assessment, FSD may or may not conduct another In-flight assessment, before issuing the "Final Approval". Final Approval with the type of back-up, will be endorsed on the Operator Ops Specs accordingly.

D13.4.3.2 In case FSD is not satisfied with the EFB operations conducted during the Provisional Approval period, the Provisional Approval of the Operator, will be extended again for a specified period. The Ops Specs will be endorsed accordingly.

D14. EFB USE IN GENERAL AVIATION, BY PRIVATE OPERATORS (TAKE OFF MASS BELOW 5700 KGS) AND HELICOPTER OPERATIONS:

D14.1 **Equipment / Hardware Considerations**

D14.1.1 Operators involved in General Aviation, Private Operations (Take Off Mass below 5700 Kgs) and/or Helicopters Operators, should consider the following provisions before using an EFB.

D14.1.2 The Operator should follow the provisions of Para D1.5 of this ANO when using a portable EFB.

D14.2 **Pilot Operating Procedures**

D14.2.1 To ensure that adequate guidance is available for use of the EFB applications, the User Guide established by the software developer should be available to the pilot.

D14.3 **Pilot Training**

D14.3.1 The pilot should be familiar with EFB use before using it in-flight. Changes to EFB hardware or software will require additional familiarization.

D14.4 **EFB Risk Assessment**

D14.4.1 For General Aviation operations, hazard assessment in the traditional sense is not practical; therefore, the following mitigations are presented to address risks associated with EFB use. Before each flight, the pilot should conduct the following checks to ensure the continued safe operation of the EFB during the flight:

D14.4.1.1 General check of the EFB operation by switching it ON and checking that the applications intended to be used in-flight are operative;

D14.4.1.2 Check battery or other power sources to ensure the availability of the EFB during taxi and flight operations, including diversions and reasonable delays;

D14.4.1.3 Check for currency of EFB databases (effective dates), (e.g. aeronautical charts, performance calculation, and weight and balance applications); and

D14.4.1.4 Check that an appropriate backup is available when using an application displaying information or data required to be on board.

D14.5 **EFB Functions**

D14.5.1 EFB Applications provide functions that display information related to the aircraft position in-flight, navigation, terrain or traffic surroundings or altitude, the pilot should be aware of the potential misleading or erroneous information displayed and should only use these functions as an advisory means.

D14.5.2 When using an aeronautical chart, performance calculation, Mass and Balance (M&B) or In-Flight Weather Application (IFW), or an Airport Moving Map Display (AMMD), the following considerations should be taken into account by the pilot:

D14.5.1.1 **Aeronautical Chart Application.** The aeronautical charts that are depicted should contain the information necessary, in appropriate form, to conduct the flight safely. Consideration should be given to the size and resolution of the display to ensure legibility.

D14.5.1.2 **Performance Calculation and Mass and Balance (M&B) Application.** Prior to the first use of a performance or M&B application and following any update of the database supporting the application, the Operator should obtain assurance that the output of the application corresponds with the data derived from the AFM (or other appropriate sources).

D14.5.1.3 **Airport Moving Map Display Application.** An AMMD application should not be used as a primary means of navigation for taxi; outside references remain primary.

D14.5.1.4 **In-Flight Weather Application (IFW).** The displayed meteorological information may be forecast, observed, or both and may be updated on the ground or in-flight. It should be based on data from providers approved by the meteorological authority concerned or other sources approved by the operator. Consideration should be given to the latency of meteorological information and the hazards associated with utilization of latent information. Pilots should only use in-flight weather applications for broad strategic avoidance of adverse meteorological conditions

D14.6 **Application and Audit Checklist Submission by the Operator – General Aviation and Private Operators with Aircraft Take Off Mass below 5700 Kgs and Helicopter Operators**

D14.6.1 Application Form (CAAF/EFB/GA_Heli/000) given at Appendix-G.

D14.6.2 EFB Approval Checklist given at Appendix-F.

D14.7 **Evaluation Process (General Aviation, Private Operators & Helicopter Operations)**

D14.7.1 Following guidelines will be followed during the Evaluation Process of EFB for General Aviation (Take Off Mass less than 5700 Kgs), Private Operators and Helicopter Operations:

Note: The Evaluation Process for General Aviation and Private Operators (Take Off Mass less than 5700 Kgs), and Helicopter Operations is not as exhaustive as for the Commercial Air Transport Aircraft and Aeroplanes whose Take Off Mass is in excess of 5700 Kgs.

a) These Operators will apply for EFB Approval on Application Form as shown in Appendix-G to this ANO.

b) The Evaluation Checklist as given in Appendix-F will filled by the Applicant (Operator) and submitted along with the Application Form.

c) After successful evaluation, “Provisional Approval” will be given to the Operator for a maximum period of 06 Months, to ensure that mitigations to risk, including EFB failures, EFB misuse and other EFB malfunctions, are fully addressed. During this period, the Pilot or Owner/Operator should validate that the EFB is as available and reliable as the paper-based system being replaced.

d) During the Provisional Approval period, the Operator will send a monthly return to Flight Standards Directorate, PCAA, of the number of flights conducted with EFB and problems or technical difficulties faced – if any.

e) After the successful operation of EFB during the Provisional Approval period, the Operator will request Flight Standards

Directorate, CAA Pakistan for a Final Approval. For a Final Approval, sufficient back-up (paper or an additional EFB) must be available onboard to cater for any EFB malfunctions/failures.

f) After re-evaluating the Operator's request, full approval may be granted or the Provisional Approval may be extended.

D14.8 **Endorsement on Operations Specification (Ops Specs)**

D14.8.1 Flight Standards Directorate (FSD), CAA Pakistan will grant a specific EFB Approval to the Operator through an entry in the Operations Specifications (Ops Specs) with an EFB entry – if applicable.

D14.8.2 In case the Operator does not fall in the purview of AOC or Ops Specs, an official letter regarding approval of EFB, by Flight Standards Directorate, PCAA would constitute an approval to use EFB on-board.

E. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

AFM	AIRCRAFT FLIGHT MANUAL
AID	AIRCRAFT INTERFACE DEVICE
AMMD	AIRPORT MOVING MAP DISPLAY
AOC	AIRLINE OPERATIONS CENTRE
AODB	AIRPORT, RUNWAY, OBSTACLE DATABASE
CAA	CIVIL AVIATION AUTHORITY (PAKISTAN)
CDL	CONFIGURATION DEVIATION LIST
ECL	ELECTRONIC CHECKLIST
EFB	ELECTRONIC FLIGHT BAG
EMI	ELECTROMAGNETIC INTERFERENCE
FCOM	FLIGHT CREW OPERATING MANUAL
FOCC	FLIGHT OPERATIONS CONTROL CENTRE (SIMILAR TO AIRLINE OPERATIONS CENTRE)
GNSS	GLOBAL NAVIGATION SATELLITE SYSTEM
HMI	HUMAN-MACHINE INTERFACE
IFW	IN-FLIGHT WEATHER
M&B	MASS AND BALANCE
MEL	MINIMUM EQUIPMENT LIST
OEM	ORIGINAL EQUIPMENT MANUFACTURER
PED	PORTABLE ELECTRONIC DEVICE
SCAP	STANDARDIZED COMPUTERIZED AIRCRAFT PERFORMANCE
SOP	STANDARD OPERATING PROCEDURE
STC	SUPPLEMENTAL TYPE CERTIFICATE
TACS	TAXI AID CAMERA SYSTEM
TALP	TAKE-OFF AND LANDING PERFORMANCE
TC	TYPE CERTIFICATE
TOM	TAKE-OFF MASS (TOW HAS A SIMILAR CONNOTATION)
T-PED	TRANSMITTING PED
WAFS	WORLD AREA FORECAST SYSTEM
ZFM	ZERO FUEL MASS (ZFW HAS A SIMILAR CONNOTATION)

E2. RECORDS:

E2.1 NIL

E3. REFERENCES:

E3.1 Flight Standards Directorate, CAA Pakistan ANO-024-FSXX "Commercial Air Transport Operations – Aeroplane".

E3.2 ICAO Annex-6, Part-I, "Commercial Air Transport Operations".

E3.3 ICAO Annex-6, Part-II, "General Aviation".

E3.4 ICAO Annex-6, Part-III, "Helicopter Operations".

E3.5 ICAO DOC-10020, Ed-02 Year-2018 "Manual on Electronic Flight Bags (EFBs)".

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 01st July, 2020.

--S/d--

(HASSAN NASIR JAMY)
Director General,
Pakistan Civil Aviation Authority

Dated: - **21st July, 2020**

--S/d--

(CAPT. S. M. RAFATULLAH)
DIRECTOR FLIGHT STANDARDS

Dated: - **23rd June, 2020**
File No. HQCAA/1077/049/FSAC

APPENDIX "A"

GUIDANCE FOR EFB SOFTWARE APPLICATIONS

1. Preamble

1.1 The purpose of this Appendix is to provide information on best practices and general guidance for the development of commonly used EFB software applications. The specific examples used are not intended to preclude alternate methods which may accomplish similar objectives. In addition, Operators who have been granted a specific approval for particular EFB software applications may wish to consider adopting the methods discussed within this Appendix.

1.2 Manufacturers, Operators or vendors should carefully consider their particular operational needs when developing EFB software applications in order to maintain the highest safety and reliability standards for their specific use case.

2. Take Off & Landing Performance (TALP) and Mass & Balance (M&B) Applications

2.1 Introduction

2.1.1 The validity and integrity of Take-off and Landing Performance (TALP) and Mass and Balance (M&B) data are essential for safe flight operations. These types of EFB applications and the Operator's procedures for their use, require thorough evaluation prior to being approved for service.

2.1.2 CAA Pakistan consider the application architecture, the HMI, the documented testing results and the Operator's EFB procedures and training before approving the operational use of EFB, TALP and M&B applications.

2.2 Take-off and Landing Performance (TALP) Applications Architecture

2.2.1 TALP applications are usually separated into different layers:
a) Human-Machine Interface (HMI);
b) Calculation module;
c) Aircraft-specific information; and
d) Airport, Runway, Obstacle Database (AODB).

Figure A-1 (given on the next page) shows a typical architecture of a TALP application. Individual solutions that are in use by Operators might not need to be as modular as shown, but rather, have the different parts integrated into one software. Alternatively, there might be solutions where modularity is taken to a point where some or all parts are supplied by different providers.

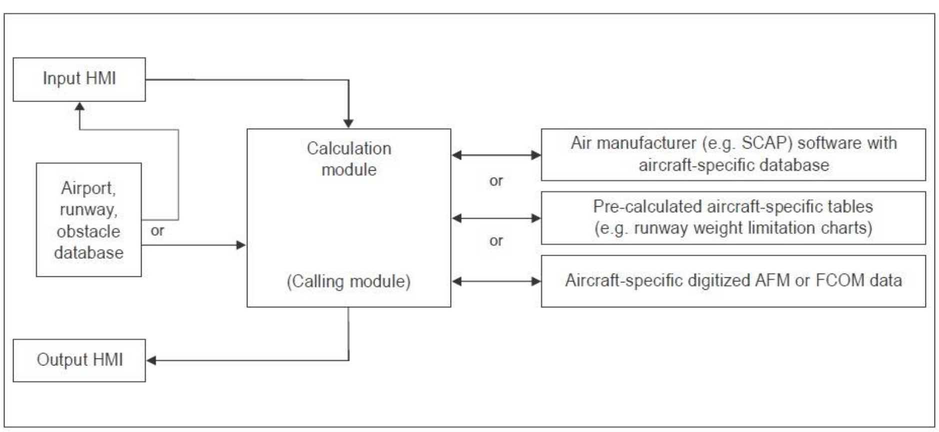

Figure A-1. Typical architecture of a TALP application

2.2.2 **Input and Output HMI.** The input HMI takes the pilot's inputs (or data read from the avionics if applicable) and requests the calculation from the calculation module. The results are transferred to the output HMI.

2.2.3 **Calculation Module.** The calculation module will process the requested data from the input HMI and determine the results which are then returned to the output HMI.

a) TALP source data is generally derived from either pre-calculated tables (e.g. runway weight limitation charts), digitized AFM or FCOM charts, or equations of motion-based software algorithms and data.
b) For TALP source data that is either digitized AFM data or based on equations of motion, the data is generally provided in a form that complies with the International Air Transport Association (IATA) Standardized Computerized Aircraft Performance (SCAP) specification. The IATA SCAP specification provides a standardized means for manufacturers, Operators and third parties to exchange aircraft performance data.
c) A typical software system that uses the SCAP approach will consist of the calling module or "SCAP module" (also known as a "manufacturer's module"). To obtain the results, the calculation module assembles the inputs from the HMI and other sources; it may call the SCAP software several times. Thus, the expression "calling module" has become widespread in the industry.
d) Another way for the calculation module to obtain results is to interpolate between pre-calculated tables (e.g. runway weight limitation charts).
e) In some cases, where manufacturer software and data are not available, paper AFM or FCOM charts may be digitized by third parties that develop the data for their own products.

2.2.4 **Aircraft Performance Data Sources.** Different sources of performance data can be used by TALP applications. Performance data can be delivered in various digitized formats:

a) SCAP modules or equivalent, delivered by the manufacturer;
b) Digitized aircraft performance data, built by the Operator based on the data published in the Flight Manual or Airplane Flight Manual (AFM); and
c) Data based on pre-calculated take-off or landing performance tables.

2.2.5 **Airport, Runway, Obstacle Database (AODB).** Take-off and landing performance applications require information about airports, runways and obstacles. The AODB should provide this information in a suitable way. Usually, it is the part of the EFB performance applications that will be updated most often. The management of this data is critical. The Operator is responsible for the data quality, accuracy and integrity of the runway and obstacle data, and should ensure this together with the data provider.

2.3 Take-off and Landing Performance (TALP), Mass and Balance (M&B) Applications and Human-Machine Interface (HMI)

2.3.1 Operators should be aware that pilot data-entry errors have been a contributing factor to numerous aviation incidents and accidents. A well-designed HMI can significantly reduce the risk of errors. The following are examples of design guidelines that are supplemental to the software HMI considerations shown in Para D1.11:

a) Input data and output data (results) should be clearly distinctive. All the information necessary for a given task should be presented together or easily accessible.
b) All data required for TALP and M&B applications should be prompted for or displayed, including correct and unambiguous terms (names), units of measurement (e.g. kg or lbs). The units should match those from other cockpit sources for the same type of data.
c) Field names and abbreviations used in the HMI should correspond to those used in this ANO and should match the labels in the cockpit.
d) If the application computes both dispatch (regulatory, factored) and other results (e.g. in-flight or not factored), the flight crew should be made aware of the nature of the results.
e) The application should clearly distinguish user entries from default values or entries imported from other aircraft systems.
f) The aircraft MSN or Aircraft Registration used for calculation must be clearly displayed to the flight crews, if relevant differences between MSN or Aircraft Registration exist. If MSN or

Aircraft Registration are associated with different sub-fleets, the selected sub-fleet should be clearly displayed to the flight crew.

g) The HMI should be designed so that input data are difficult to enter into the wrong fields of the HMI, by defining data-entry rules.

h) The HMI should only accept input parameters within the aircraft's operational envelope approved for the Operator (commonly more limiting than the certified envelope). Consideration should be given to the plausibility of outputs within the AFM envelope but outside normal operating conditions.

i) All critical TALP calculation assumptions (e.g. use of thrust reversers, full or reduced thrust/power rating) should clearly be displayed. The assumptions made about any calculation should be at least as clear to pilots as similar information would be on a tabular chart.

j) The HMI should indicate to the pilot if a set of entries results in an unachievable operation (for instance, a negative stopping margin), in accordance with general HMI considerations given in Para D1.11.

k) The user should be able to modify its input data easily, especially to account for Last-Minute Changes (LMC).

l) When calculation results are displayed, they should be displayed with the input parameters used for calculation.

m) Any active MEL/CDL/special restriction should be clearly visible and identifiable.

n) In the case of multiple runway selection, the output data should be clearly associated with the selected runway.

o) Changes of runway data by the pilot should be clearly displayed and the changes should be easy to identify.

2.4 Take-off & Landing Performance (TALP) & Mass and Balance (M&B) Applications Testing

2.4.1 Accurate TALP and M&B calculations are essential to safe aircraft operation. EFB applications can be effective tools used to make these calculations. Operators should be aware of the importance of thoroughly testing EFB applications that use mathematical algorithms or calculation modules before they are approved by PCAA for operational use.

2.4.2 Applications designed to perform TALP and M&B calculations must use data derived from the AFM or other sources acceptable to CAA, Pakistan.

2.4.3 Application testing should be conducted with the application running on a representative operating system and hardware device.

2.4.4 A proper evaluation of a TALP or M&B EFB application includes documented testing that verifies the calculation accuracy, user interface and complete environmental integration. The extent of testing and supporting documentation should reflect the complexity and functionality of the application being tested.

2.4.5 **Calculation Accuracy Tests.** Tests designed to verify an application calculates TALP and M&B results that are consistent with the AFM data or advisory data provided by the aircraft manufacturer.

a) The results of TALP applications are influenced by a large number of input parameters, and therefore, it is not feasible to verify all possible outputs for accuracy. Test cases should be defined to sufficiently cover the entire operating envelope of the aircraft under a representative cross section of conditions for TALP applications (e.g. runway surface condition, runway slope, wind conditions, temperature, pressure altitude, obstacle clearance and aircraft configuration, including failures with a performance impact).

b) The results of M&B applications are also influenced by a large number of input parameters, and therefore, it is not feasible to verify all possible outputs for accuracy. Test cases should be defined to sufficiently cover the entire operating envelope of the aircraft under a representative cross section of conditions for M&B applications (e.g. fuel load schedules including varying fuel densities or actual fuel density if known, passenger load schedules, cargo load schedules and unique or special cargo loads).

c) Test cases should also be defined to sufficiently cover a representative cross section of an Operator's aircraft (e.g. different aircraft types, models, configurations and modifications).
d) Test cases should contain a detailed check showing that the application produces results that match or are consistently conservative to results derived from previously approved methods accepted by the CAA, Pakistan.
e) An applicant (Operator) should provide an explanation of the methods used to evaluate a sufficient number of testing points with respect to the design of their software application and databases.
f) Test cases should demonstrate the application is stable and produces consistent results each time the process is entered with identical parameters.
g) Tests should be acceptable to CAA, Pakistan.

2.4.6 **User-Interface Tests.** Tests designed to verify that a software application's user interface is acceptable. Test cases should be defined to demonstrate that:
a) The HMI requirements are complied with (see Para 2.3 of Appendix-A);
b) The software application has a reasonable system response when incorrect values are inadvertently entered;
c) The software application provides easily comprehended results or error messages and instructions if incorrect input values (e.g. outside envelope, wrong combination of inputs) are entered; and
d) The software application does not fail or get into a state that would require special skills or procedures to bring it back to an operational state if incorrect input values are entered.

2.4.7 **Operational Integration Tests.** Tests that demonstrate that the software application runs properly in the complete operational environment for which the EFB application is to be used. Test cases should be defined that demonstrate that:
a) The software application functions correctly on the EFB platform;
b) The software application does not adversely impact other EFB applications or aircraft systems or vice versa; and
c) The software application correctly interfaces with other applications when applicable (e.g. take-off performance using results from M&B application).

2.5 Procedures, Management and Training

2.5.1 The evaluation of EFB applications that calculate TALP and M&B data should take into consideration all other processes, procedures and training that support the use of the application.

2.5.2 Normal Operating Procedures

a) Procedures should ensure the proper use of EFB applications that calculate TALP or M&B data. The procedures should apply to the flight crew and ground personnel (e.g. Flight Dispatchers, Flight Operating Officers (FOO), operating personnel) who may have roles defined in the use of the applications.
b) TALP and M&B data should be independently calculated and cross-checked by both pilots. When a dispatch system described in the Approved OM-A of the Operator is used for the control and supervision of flights, the Flight Dispatcher (or other ground staff assigned) should verify that the results are within operating limits. Any differences should be discussed before the results are used operationally. All M&B documents should be available to the dispatcher or the person on the ground responsible for the control and supervision of flight before take-off.

2.5.3 Abnormal Operating Procedures

a) Procedures should ensure that a high level of safety can be maintained consistent with the EFB risk assessment assumptions during a loss of EFB functionality (e.g. the loss of a single application or the failure of the device hosting the application).

2.5.4 **Security Procedures**

a) The application and the data it references should be checked for integrity and protected against unauthorized manipulation (e.g. by checking file checksum values at EFB start-up or prior to each calculation).

2.5.5 **Training**

a) Training should emphasize the importance of executing all TALP and M&B performance calculations in accordance with SOP to assure fully independent and cross-checked calculations. As an example, one pilot should not announce the values to be entered into the HMI of the performance applications because an incorrect announcement could lead to both calculations showing the same misleading results.
b) Training should include cross-checks (e.g. with avionics or flight-plan data) and gross error check methods (e.g. "rule-of-thumb") that may be used by pilots to identify order-of-magnitude errors (e.g. entering the zero fuel mass or weight (ZFM or ZFW) as take-off mass or weight (TOM or TOW) or transposing digits.
c) Training should emphasize that the use of EFBs makes TALP and M&B calculations simple but it does not eliminate the necessity of good pilot performance knowledge.
d) Through the use of EFBs, new procedures may be introduced (e.g. the use of multiple flap settings for take-off) and pilots should be trained accordingly.

2.6 Management of Performance TALP and M&B Applications

2.6.1 Within the Operator's organization, the responsibilities between the TALP and M&B management and the EFB management should be clear and well documented. An Operator should designate a person or group who are sufficiently trained to provide support for the performance tools. This person or group must have comprehensive knowledge of current regulations, TALP and M&B, and TALP and M&B software (e.g. SCAP modules) used on the EFB.

3. Electronic Charting Applications

3.1 Description

3.1.1 An EFB software application that supports route planning, route monitoring and navigation by displaying required information and includes visual, instrument and aerodrome charts.

3.1.2 The following should be considered:

a) Electronic aeronautical charts should provide, at least to a minimum, a level of information and usability comparable to paper charts.
b) For approach charts, the EFB software application should be able to show the entire instrument approach procedure all at once on the intended EFB hardware, with a degree of legibility and clarity equivalent to that of a paper chart.
c) An EFB display may not be capable of presenting an entire chart (e.g. airport diagram, departure and arrival procedures) if the chart is the expanded detail (fold-over) type.
d) Panning, scrolling, zooming, rotating or other active manipulation is permissible.
e) For data driven charts, it should be assured that shown symbols and labels remain clearly readable, (e.g. not overlapping each other). Layers of data may be used for decluttering.

4. Taxi Aid Camera System (TACS)

4.1 Description

4.1.1 Taxi Aid Camera System (TACS) is an EFB software application to increase situational awareness during taxi by displaying electronic real-time images of the actual external scene. The following should be considered:

a) Ensure real-time, live display of received imagery without noticeable time-lapse.
b) Image quality should be adequate during foreseeable environmental lighting condition.
c) Display of turning or aircraft dimension aids may be provided, (e.g. turning radius, undercarriage track width). In such cases, the information provided to the pilot should be verified for accuracy.

d) Connection should be made to one or more installed vision systems that include, but are not limited to, visible light cameras, forward-looking infrared sensors and intensifying low-light level images.
e) Operators should establish SOPs for use of TACS. Training should emphasize use of TACS as an additional resource and not as a primary means for ground navigation or avoiding obstacles.
f) Pilot use of TACS should not induce disorientation.

5. Airport Moving Map Display (AMMD)

5.1 Description

5.1.1 This section provides some consideration on how to demonstrate the safe operational use for Airport Moving Map Display (AMMD) applications to be hosted on EFBs.

5.1.2 An EFB AMMD with own-ship position symbol is designed to assist flight crews in orienting themselves on the airport surface to improve pilot positional awareness during taxi operations. The AMMD function is not to be used as the primary means of taxiing navigation. This application is limited to ground operations only.

5.1.3 The AMMD application is designed to indicate aeroplane position and heading (in case the own-ship position symbol is directional) on dynamic maps. The maps graphically portray runways, taxiways and other airport features to support taxi and taxi-related operations. Additionally, warning functions can be provided that notify crews about potentially dangerous conditions, for example, inadvertently entering a runway.

5.1.4 The following should be considered:
a) An AMMD application should not be used as the primary means of taxiing navigation; primary means of taxiing navigation remains the use of normal procedures and direct visual observation out of the cockpit window.
b) The total system error of the end-to-end system should be specified and characterized by either the AMMD software developer, EFB vendor or OEM. The accuracy should be sufficient to ensure that the own-ship position symbol is depicted on the correct runway or taxiway.
c) The AMMD should provide compensation means for the installation-dependent antenna position bias error, for example, along-track error associated to the GNSS antenna position to the flight deck.
d) The system should automatically remove the own-ship position symbol when the aircraft is in-flight (e.g. weight on wheels, speed monitoring) and when the positional uncertainty exceeds the maximum defined value.
e) It is recommended that the AMMD detects, annunciates to the flight crew and fully removes depiction of own-ship data, in case of any loss or degradation of AMMD functions due to failures such as memory corruption, frozen system, latency, etc.
f) The AMMD database should comply with applicable Standards for use in aviation (refer to ANO-024-FSXX-7.0 Para D7.5, “Electronic Navigation Data Management”).
g) The Operator should review the documents and the data provided by the AMMD developer and ensure that installation requirements of the AMMD software in the specific EFB platform and aircraft are addressed.

5.2 Flight Crew Training

5.2.1 The Operator should define specific training in support of an AMMD’s implementation. It should be included in the Operator’s EFB training (OM-D).

5.2.2 The Operations Manual (OM-A) and/or “EFB Policy and Procedures Manual” shall provide sufficient information to flight crews, including limitations and accuracy of the system and all related procedures.

6. Electronic Checklist Application

6.1 Scope

6.1.1 An Electronic Checklist (ECL) is an EFB application that displays checklists to the flight crew by means of an EFB.

6.1.2 This guidance applies to the following:

a) An ECL displaying pre-composed information or featuring a specific HMI to display the information in an optimized way to the flight crew;
b) An ECL with or without capability to interact with the pilot to record the completion of the actions and checklists;
c) An ECL without capability to process information from the aircraft (e.g. a stand-alone ECL); and

Note: The capability to process information from the aircraft is more critical and not addressed by this ANO.

d) An ECL displaying only normal checklists (Non-normal/abnormal/emergency checklists and procedures are more critical and are not addressed in this ANO).

6.1.3 Other ECL functionalities, such as those identified in the list below, may be present, in which case CAA, Pakistan will establish the applicable basis for compliance:

a) The ECL receives information from the aircraft (e.g. senses items such as aircraft system state, switch positions). The status of the sensed items may be reflected on the checklist. For example, if an action line of a checklist indicates that a button should be pressed and the aircraft sensors sense that the button has been pressed, then the checklist display will indicate that the item has been accomplished.
b) The ECL content includes non-normal (abnormal or emergency) checklists/procedures.

6.2 HMI Design and Human Factors Considerations

6.2.1 The ECL system (hardware, software) should provide at least the same level of accessibility, usability and reliability as a paper checklist.

6.2.2 HMI and Human Factor considerations:

a) Accessibility time for any checklist should not be longer than an equivalent paper checklist.
b) All checklists should be easily accessible for reference or review.
c) The resulting pilot actions called from an ECL should be identical to a paper checklist.
d) The pilot should be able to clearly recognize which items or checklists are safety relevant for the operation of the aircraft and which are of an additional nature.
e) Checklists should be presented in accordance with the normal sequence of flight.
f) The title of the checklist should be displayed and distinguished at all times when in use.
g) An indication of the existence of off-screen checklist content should be provided.
h) The end of each checklist should be clearly indicated.
i) The effect of switching between ECL and other EFB applications on the same hardware should be evaluated.

6.2.3 Additional HMI and Human Factor considerations for ECL with capability to interact with the pilot to record the completion of the actions and checklists:

a) ECL should provide a checklist overview displaying which checklists are completed and which are not.
b) ECL should display the completion status of action items within a checklist.
c) It should be possible to restart a checklist, if needed. The crew should be able to reset the checklist with a verification step to confirm the restart.
d) It should be possible to uncheck an action item in a checklist, if needed.

6.3 Flight Crew Procedures

6.3.1 The Operator should consider the impact on the pilot's workload in determining the method of use of ECL.

6.3.2 Flight crew procedures should be established to:
- a) Ensure that the flight crew verifies the validity of the ECL database before use; and
- b) Define backup procedure in case of loss of ECL during the flight to enable access to checklists at any time (e.g. to include scenarios regarding power loss, software malfunctions).

6.4 Administration

6.4.1 The Operator should also establish a consistent and methodical process for modifying the ECL data and updated data transmission and implementation on the EFBs. Such processes should include a method for database applicability verification to individual aircraft in the Operator's fleet.

6.4.2 ECL populated data content should:
- a) Be concise, simple, clear and unambiguous; and
- b) Ensure consistency between aircraft manufacturer provided data and Operator customized data (e.g. language, terminology, acronyms).

6.5 Flight Crew Training and Documentation

6.5.1 The Operator should define specific Flight Crew Training in support of an ECL implementation. It should be included in the Operator's overall EFB training. The OM-D should provide sufficient information to flight crews including limitations of the system and all related procedures.

7. In-Flight Weather (IFW) Application

7.1 Definition

7.1.1 In the context of this ANO, In-Flight Weather (IFW) is an Electronic Flight Bag (EFB) function enabling the crew to access meteorological information.

7.2 Intended Use and Limitations

7.2.1 The introduction of IFW (In-Flight Weather) is supplemental to the information provided by Pakistan Meteorological Department (Enroute Weather Charts, Upper Winds etc). IFW would contribute to increased situational awareness and support the flight crew when making strategic decisions.

7.2.2 The IFW application could be used to access both information required to be on board (e.g. World Area Forecast System (WAFS) data) and supplemental weather information.

7.2.3 Use of IFW should be non-safety-critical and not necessary for the performance of the flight.

7.2.4 In order to be non-safety-critical, IFW should not be used to support tactical decisions and/or substitute certified aircraft systems (e.g. weather radar).

7.2.5 Information from the official flight documentation or aircraft primary systems should always prevail in case there is a contradiction with IFW information.

7.2.6 Meteorological information in IFW applications may be displayed, for example, as an overlay on aeronautical charts and geographical maps or may be a stand-alone weather depiction (e.g. radar images, satellite images).

7.3 Meteorological Information Considerations

7.3.1 Meteorological information can be forecast and/or observed, and can be updated on the ground and/or inflight. It should be based on data from providers approved by the meteorological authority concerned or other sources approved by the Operator.

7.3.2 The meteorological information provided to the flight crew should, as far as possible, be consistent with the information available to ground-based users (e.g. Flight Operations Control Centre / Flight Dispatch) in order to establish common situation awareness and to facilitate collaborative decision-making.

7.4 Display Considerations

7.4.1 Meteorological information should be presented to the flight crew in a format that is appropriate to the content of the information; graphical depiction is encouraged whenever practicable.

7.4.2 Presentation should include:
a) Type of information contained in the meteorological information (e.g. forecast or observed);
b) Currency or age and validity time of the meteorological information;
c) Information necessary for interpreting the meteorological information (e.g. legend); and
d) A clear indication of any missing information or data in order for the flight crew to determine areas of uncertainty when making hazardous weather avoidance decisions.

7.4.3 If meteorological information is overlaid on aeronautical charts, special considerations should be given to Human-Machine Interface (HMI) issues in order to avoid adverse effects on the basic chart functions.

7.4.4 Meteorological information may require reformatting for cockpit use, for example, to accommodate display size or depiction technology. However, any reformatting of meteorological information should preserve both the geo-location and intensity of meteorological conditions regardless of projection, scaling or any other types of processing.

7.4.5 IFW display should, as far as possible, be consistent with the flight-deck design philosophy in terms of location of titles, location and visual representation of legends, element size, labelling and text styles, etc.

7.4.6 It is recommended that the IFW is able to display the meteorological information in relation to the route or operational flight plan, in order to ease interpretation of forecast information.

7.5 Training and Procedures

7.5.1 The Operator is required to specify in the EFB Policy and Procedures Manual, specifying the use of IFW information.

7.5.2 Adequate training should be provided for the use of IFW. Training should address the following:
a) Limitations of the IFW, in particular those presented Para 7.2 of Appendix-A;
b) Latency of observed meteorological information and the hazards associated with utilization of old information;
c) That IFW information beyond requirements spelled out in OM-A, is supplementary to the required information;
d) Use of the application;
e) Different types of displayed information (e.g. forecast or observed);
f) Symbology (e.g. symbols, colours);
g) Interpretation of meteorological information;
h) Identifying failures (e.g. incomplete uplinks, data link failures, missing information);
i) Avoiding fixation; and
j) Managing workload.

7.6 Notes

7.6.1 Consideration should be given to the speed of technological development. All efforts should be made by Operators in providing or arranging for the provision of meteorological service for International Air Navigation on behalf of a Contracting State (meteorological authority) should collaboratively work with the stakeholders to assess and, if requirements are met (e.g. actuality, latency, accuracy), enable new service implementation.

7.6.2 Whenever possible, future comparable information display functions, e.g. volcanic ash, solar radiation, should consider this guidance unless specific guidance is available.

APPENDIX "B"

	PAKISTAN CIVIL AVIATION AUTHORITY EFB APPROVAL CHECKLIST (FOR COMMERCIAL AIR OPERATORS & AIRCRAFT TAKE OFF MASS ABOVE 5700 KGS)	CAAF-093-FSXX-1.0
	Flight Standards Directorate	

1. Introduction

1.1 The checklist given below will be filled by the Applicant (Operator) and submitted along with the EFB Approval Application Form given at Appendix-E.

1.2 The EFB Approval Checklist will be evaluated during Phase-2 – Scrutiny of Documents Process for Commercial Air Operators and General Aviation aeroplanes above 5700 Kgs.

1.3 Checklist items are designed so that some questions may be Not Applicable (check **"N/A"**). Questions answered as **"NO"** are meant to allow identifying deficiencies that should be corrected and revalidated prior to Approval being issued.

Operator Name:	**AOC No/Validity:**
Aircraft Type:	**Date:**

PART – 1

HARDWARE	YES | NO | N/A
Have the installed EFB resources been certified by a CAA to accepted aviation standards either during the certification of the aircraft, Service Bulletin (SB) by the Original Equipment Manufacturer (OEM), or by a third-party STC?	☐ | ☐ | ☐
Has the Operator assessed the physical use of the device on the flight deck to include safe stowage, crashworthiness (mounting devices and EFBs, if installed), safety and use under normal environmental conditions including turbulence?	☐ | ☐ | ☐
Will the display be readable in all the ambient lighting conditions, both day and night, encountered on the flight deck?	☐ | ☐ | ☐
Has the Operator demonstrated that the EFB will not electromagnetically interfere with the operation of aircraft equipment?	☐ | ☐ | ☐
Has the EFB been tested to confirm operation in the anticipated environmental conditions (e.g. temperature range, low humidity, altitude)?	☐ | ☐ | ☐
Have procedures been developed to establish the level of battery capacity degradation during the life of the EFB.	☐ | ☐ | ☐
Is the capability of connecting the EFB to certified aircraft systems covered by an airworthiness approval?	☐ | ☐ | ☐
When using the transmitting functions of a portable EFB during flight, has the Operator ensured that the device does not electromagnetically interfere with the operation of the aircraft equipment in any way?	☐ | ☐ | ☐
If two or more EFBs on the Flight Deck are connected to each other, has the Operator demonstrated that this connection does not negatively affect otherwise independent EFB platforms?	☐ | ☐ | ☐
Can the brightness or contrast of the EFB display be easily adjusted by the flight crew for various lighting conditions?	☐ | ☐ | ☐

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PART – 2

INSTALLATION	
Mounting	YES | NO | N/A
Has the installation of the mounting device been approved in accordance with the appropriate airworthiness regulations?	☐ | ☐ | ☐
Is it evident that there are no mechanical interference issues between the EFB in its mounting device and any of the flight controls in terms of full and free movement, under all operating conditions and no interference with other equipment such as buckles, oxygen hoses, etc.?	☐ | ☐ | ☐
Has it been confirmed that the mounted EFB location does not impede crew ingress, egress and emergency egress path?	☐ | ☐ | ☐
Is it evident that the mounted EFB does not obstruct visual or physical access to aircraft displays or controls?	☐ | ☐ | ☐
Does the mounted EFB location minimize the effects of glare and/or reflections?	☐ | ☐ | ☐
Does the mounting method for the EFB allow easy access to the EFB controls and a clear unobstructed view of the EFB display?	☐ | ☐ | ☐
Is the EFB mounting easily adjustable by flight crew to compensate for glare and reflections?	☐ | ☐ | ☐
Does the placement of the EFB allow sufficient airflow around the unit, if required?	☐ | ☐ | ☐

PART – 3

Note: *This part (Part-3) should be completed multiple times to account for the different software applications being considered.*

Software	
Software Application: ______________________ (fill in the name of the software application)	YES | NO | N/A
Is the application considered an EFB function (see Para D1.10 in the ANO)?	☐ | ☐ | ☐
Has the software application been evaluated to confirm that the information being provided to the pilot is a true and accurate representation of the documents or charts being replaced?	☐ | ☐ | ☐
Has the software application been evaluated to confirm that the computational solution(s) being provided to the pilot is a true and accurate solution (e.g. performance, and mass and balance (M&B))?	☐ | ☐ | ☐
Does the software application have adequate security measures to ensure data integrity (e.g. preventing unauthorized manipulation)?	☐ | ☐ | ☐
Does the EFB system provide, in general, a consistent and intuitive user interface, within and across the various hosted applications?	☐ | ☐ | ☐
Has the EFB software been evaluated to consider HMI and workload aspects?	☐ | ☐ | ☐
Does the software application follow Human Factors guidance?	☐ | ☐ | ☐
Can the flight crew easily determine the validity and currency of the software application and databases installed on the EFB, if required?	☐ | ☐ | ☐

Power Connection & Batteries	YES | NO | N/A
Is there a means, other than a circuit-breaker, to turn OFF the power source (e.g. can the pilot easily remove the plug from the installed outlet)?	☐ | ☐ | ☐
Is the power source suitable for the device?	☐ | ☐ | ☐
Have guidance/procedures been provided for battery failure or malfunction?	☐ | ☐ | ☐
Is power to the EFB, either by battery and/or supplied power, available to the extent required for the intended operation?	☐ | ☐ | ☐
Has the Operator ensured that batteries are compliant to acceptable standards?	☐ | ☐ | ☐

	PAKISTAN CIVIL AVIATION AUTHORITY EFB APPROVAL CHECKLIST (FOR COMMERCIAL AIR OPERATORS & AIRCRAFT TAKE OFF MASS ABOVE 5700 KGS)	CAAF-093-FSXX-1.0
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Cabling	YES | NO | N/A
Has the Operator ensured that any cabling attached to the EFB, whether in the dedicated mounting or when handheld, does not present an operational or safety hazard (e.g. it does not interfere with flight controls movement, egress, oxygen mask deployment)?	☐ | ☐ | ☐

Stowage	YES | NO | N/A
If there is no mounting device available, can the EFB be easily and securely stowed and readily accessible in-flight?	☐ | ☐ | ☐
Is it evident that stowage does not cause any hazard during aircraft operations?	☐ | ☐ | ☐

Viewable Stowage	YES | NO | N/A
Has the Operator documented the location of its viewable stowage?	☐ | ☐ | ☐
Has the Operator ensured that the stowage characteristics remain within acceptable limits for the proposed operations?	☐ | ☐ | ☐
Has the Operator demonstrated that if the EFB moves or is separated from its stowage, or if the viewable stowage is unsecured from the aircraft (as a result of turbulence, manoeuvring, or other action), it will not interfere with flight controls, damage flight-deck equipment or injure flight crew?	☐ | ☐ | ☐

PART – 4

MANAGEMENT	
EFB Management	YES | NO | N/A
Is there an EFB management system in place?	☐ | ☐ | ☐
Does one person possess an overview of the complete EFB system and responsibilities within the Operator's management structure?	☐ | ☐ | ☐
Are the authorities and responsibilities clearly defined within the EFB Management System?	☐ | ☐ | ☐
Are there adequate resources assigned for managing the EFB?	☐ | ☐ | ☐
Are Third Party (e.g. software vendor) responsibilities clearly defined?	☐ | ☐ | ☐

Crew Procedures	YES | NO | N/A
Is there a clear description of the system, its operational philosophy and operational limitations?	☐ | ☐ | ☐
Are the requirements for EFB availability in the Company Operations Manual and/or as part of the Minimum Equipment List (MEL)?	☐ | ☐ | ☐
Have crew procedures for EFB operation been integrated within the existing Operations Manual (OM-A)?	☐ | ☐ | ☐
Are there suitable crew cross-checks for verifying safety-critical data (e.g. performance, mass and balance (M&B) calculations)?	☐ | ☐ | ☐
If an EFB generates information similar to that generated by existing flight-deck systems, do procedures identify which information will be primary?	☐ | ☐ | ☐
Are there procedures when information provided by an EFB does not agree with that from other flight-deck sources or, if more than one EFB is used, when one EFB disagrees with another?	☐ | ☐ | ☐
Are there procedures that specify what actions to take if the software applications or databases loaded on the EFB are out of date?	☐ | ☐ | ☐
Are there procedures in place to prevent the use of erroneous information by flight crews?	☐ | ☐ | ☐
Is there a reporting system for system failures?	☐ | ☐ | ☐
Have crew operating procedures been designed to mitigate and/or control additional workload created by using an EFB?	☐ | ☐ | ☐
Are there procedures in place to inform maintenance and flight crews about a fault or failure of the EFB, including actions to isolate it until corrective action is taken?	☐ | ☐ | ☐
Have procedures for use of electronic signature in EFB developed and document in OM-A?	☐ | ☐ | ☐

	PAKISTAN CIVIL AVIATION AUTHORITY EFB APPROVAL CHECKLIST (FOR COMMERCIAL AIR OPERATORS & AIRCRAFT TAKE OFF MASS ABOVE 5700 KGS)	CAAF-093-FSXX-1.0
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EFB Risk Assessment	YES | NO | N/A
Has an EFB Risk Assessment been performed?	☐ | ☐ | ☐
Are there procedures/guidance for loss of data and identification of corrupt/erroneous outputs?	☐ | ☐ | ☐
Are there contingency procedures for total or partial EFB failure?	☐ | ☐ | ☐
Is there a procedure in the event of a dual EFB failure (e.g. use of a paper checklist or a third EFB)?	☐ | ☐ | ☐
Have the EFB dispatch requirements (e.g. minimum number of EFBs on board) been incorporated into the Operations Manual (OM-A)?	☐ | ☐ | ☐
Have MEL or procedures in case of EFB failure been considered and published?	☐ | ☐ | ☐

Training	YES | NO | N/A
Is the training material appropriate with respect to the EFB equipment and published procedures?	☐ | ☐ | ☐
Does the training cover the list of items in Para D1.8 in the ANO?	☐ | ☐ | ☐

Hardware Management Procedures	YES | NO | N/A
Are there documented procedures for the control of EFB hardware configuration?	☐ | ☐ | ☐
Do the procedures include maintenance of EFB equipment?	☐ | ☐ | ☐

Software Management Procedures	YES | NO | N/A
Are there documented procedures for the configuration control of loaded software and software access rights to the EFB?	☐ | ☐ | ☐
Are there adequate controls to prevent corruption of operating systems, software and databases?	☐ | ☐ | ☐
Are there adequate security measures to prevent system degradation, malware and unauthorized access?	☐ | ☐ | ☐
Are procedures defined to track database expiration/updates?	☐ | ☐ | ☐
Are there documented procedures for the management of data integrity?	☐ | ☐ | ☐
If the hardware is assigned to the flight crew, does a policy on private use exist?	☐ | ☐ | ☐

Certification by EFB Administrator

The undersigned certifies that the information provided in the above "EFB Approval Checklist" is complete and true to the best of my knowledge.

Stamp with Name of the EFB Administrator of the Operator	Signature	Date

Verification by DFO/Head of Operations

The undersigned verifies the information given above and agrees that these will be considered for the issuance of EFBs approval in accordance with the current ANO on EFB.

Stamp with Name of the Head of Operations (DFO/Chief Pilot)	Signature	Date

APPENDIX "C"

SAMPLE OPERATIONS SPECIFICATIONS AND OPERATIONS MANUAL CONTENT

1. **General**

1.1 When an EFB function is to be used for the safe operation of an aeroplane (see Para D1.10 of this ANO), an entry must be included in the Operator's Operations Specifications (Ops Specs) approved by the CAA, Pakistan.

1.2 The Operations Specifications will reference the location in the Operations Manual (OM-A) where the approved EFB applications are detailed. Figure C-1 shows an example of a specific approval EFB entry.

Figure C-1. Example of a Specific Approval EFB entry (Given Below)

OPERATIONS SPECIFICATIONS (Subject to the approved conditions in the Operations Manual)				
SPECIFIC APPROVAL	YES	NO	DESCRIPTION	REMARKS
Continuing Airworthiness				
EFB for A/C type *Type 1*			18 - Specifically approved EFB hardware and software applications for A/C type *Type 1* are contained in [Operations Manual reference]	
Others				
18. *List the EFB functions with any applicable limitations*				

Note: *Boxes YES/NO (in the Figure above) are not used since some EFB functions might not require an Operational Approval. Other EFB functions not requiring an EFB approval should not be listed in the Operations Specifications (Ops Specs).*

1.3 The EFB-specific approvals referenced in the Operations Specifications should have a companion detailed list of EFB-approved hardware and software applications. This list should be located in the Operations Manual (OM-A) in a table and be updated through the normal OM-A Approval process established by CAA, Pakistan. Figure C-2 contains an example of a companion EFB-specific approval table.

1.4 The "Approved hardware for A/C type" column of the companion EFB (hardware and software) with specific approval table should match the "DESCRIPTION" column of the Operations Specifications. The "EFB applications" column of the table should list all the applications requiring a specific approval and include the application version, with any applicable limitations. The "Specific references and/or remarks" column of the table should include the application version in addition to any specific OM-A reference and other remarks, if applicable.

Figure C-2. Example of a Companion EFB-Specific Approval Table (Given below)

EFB (Hardware and Software) with specific approval		
Approved Hardware for A/C Type	EFB Applications *(List of EFB functions, versions and any applicable limitations.)*	Specific References and/or Remarks
EFB for A/C type *Type 1*	• Aircraft performance calculation (take-off and landing) – *AppName1 Ver-x.x* • Airport moving map – *AppName2 Ver-x.x* • Charts Application: En route – *AppName3 Ver-x.x* • Airport charts (SID, STAR, approach) – *AppName4 Ver-x.x*	*See procedures in Operations Manual Page-X; Backup: QRH* *Refer to OM-A, Page-X* *See OM-A, Page-Y* *Paper backup operation* *Paperless operation* *Refer to OM-A, Page-Z*
EFB for A/C type *Type 2*	• Charts Application: En route – *AppName3 Ver-x.x*	*See OM-A, Page-X* *Paper backup operation*

<u>Sample</u> Ops Specs Entries for Guidance of Operators:

OPERATIONS SPECIFICATIONS (Subject to the approved conditions in the Operations Manual)				
SPECIFIC APPROVAL	YES	NO	DESCRIPTION	REMARKS
Electronic Flight Bag (EFB)	YES	---	Specifically approved EFB hardware and software applications are contained in OM-A Chap-8, Para 8.5.4.	Applicable to A320 Family. Installed EFB Mount Fixed to Aircraft Power Source from Aircraft Electrical System
Others				

<u>Sample</u> OM-A Entries for Guidance of Operators:

EFB (Hardware and Software) with specific approval		
Approved Hardware for A/C Type	EFB Applications	Specific References and/or Remarks
• A320 Family • Ipad Air 2 • Fixed docking Station	• Jeppesen FD Pro Ver 8.1 • Airbus Fly Smart Ver 6.1 • Airbus eQRH Ver 2.2	• Paper Back up • See details in EFB Policy and Procedures Manual.

APPENDIX "D"

EFB POLICY AND PROCEDURES MANUAL

1.1 Given below are the typical contents of an EFB Policy and Procedures Manual which should be a standalone Manual, with a General reference regarding EFB in the Operations Manual OM-A.

1.2 The structure and content of the EFB Policy and Procedures Manual should correspond to the size of the Operator, the complexity of its activities and the complexity of the EFB used.

- **Introduction**
  - EFB General Philosophy
  - EFB Limitations
  - EFB – Approved Hardware and Software Applications
- **EFB Management**
  - Responsibilities
  - Data Management
  - Updates and Changes Management
- **Hardware Description**
  - EFB system architecture
  - Hardware configuration control
- **Software Description**
  - Operating system description
  - List and description of applications hosted
- **Flight Crew Training**
  - EFB – Initial Training (Hardware and Software Applications)
  - EFB – Recurrent/Refresher Training
- **Operating Procedures**
  - EFB – Normal Procedures (SOPs)
  - EFB – Abnormal/Emergency Procedures
- **Maintenance Considerations**
- **Security Considerations**

APPENDIX "E"

	PAKISTAN CIVIL AVIATION AUTHORITY **EFB APPROVAL APPLICATION FORM** **(FOR COMM. AIR OPERATORS & AIRCRAFT TAKE OFF MASS ABOVE 5700 KGs)**	**CAAF-094-FSXX-1.0**
	Flight Standards Directorate	

Please complete in Block Capitals in Blue Ink/Blue Ballpoint

PART – 1

1. COMPANY DETAILS:

a) Name of the Company (Applicant)	
b) AOC No. / Valid Upto	
c) Operations Specification Validity	
d) EFB Approval requested for	Aircraft Type:
e) Head of Operations	Name: Mob No: Email:
f) Head of Training	Name: Mob No: Email:

PART – 2

2. EFB DETAILS

a) Type of EFB Applied For	Portable ☐ Installed ☐
b) Initial or Additional Approval	Initial Approval ☐ Additional Approval ☐
c) Type of Tablet to be used as EFB	Ipad Apple ☐ Samsung ☐ Other (Specify) ☐
d) Type of EFB Mount in Cockpit	No Mount ☐ Knee Pad Type ☐ Suction Type ☐ Fixed Type ☐ Other (Specify) ☐
e) Stowage area of EFB (if Portable)	(Specify exact location of stowage)

PART – 3

*(**Note:** Tick mark the box with "√" for YES and "X" for NO. For more detail add text.)*

3. EFB SOFTWARE

a) Types of Software to be used on EFB	Take Off and Landing Software ☐ Jeppesen Charting ☐ Electronic Checklist (ECL) ☐ Aircraft Operating Manuals (FCOMs) ☐ Company Manuals ☐ Load / Trim Sheet Software ☐ Any Other (Specify) ☐

	PAKISTAN CIVIL AVIATION AUTHORITY **EFB APPROVAL APPLICATION FORM** **(FOR COMM. AIR OPERATORS & AIRCRAFT TAKE OFF MASS ABOVE 5700 KGs)**	**CAAF-094-FSXX-1.0**
	Flight Standards Directorate	

PART – 4

(***Note:*** *Tick mark the box with "√" for YES and "X" for NO. For more detail add text.)*

4. DOCUMENTATION DETAILS – EFB

a)	EFB Policy & Procedure of Manual	☐	Ref:
b)	OM-A (EFB Policy inclusion)	☐	Ref:
c)	OM-D (EFB Training inclusion)	☐	Ref:
d)	MEL (EFB Provisions inclusion)	☐	Ref:
e)	Any Other:	☐	Ref:

5. DECLARATION BY THE AIR OPERATOR – EFB

The undersigned certifies that the information provided in this application form are complete and true to the best of my knowledge and agree that these will be considered for the issuance of EFBs approval in accordance with the current ANO on EFB.

Stamp with Name of the Head of Operations (DFO/Chief Pilot etc)	Signature	Date

PART – 5

AIRWORTHINESS SCRUTINY

6. AIRWORTHINESS CHECKING – EFB

a)	Aircraft Modification	EFB has no impact on Airworthiness EFB modification is as per STC Any other observation (Specify)	☐ ☐ ☐
b)	Power Source for EFB	EFB External Power Source EFB Inbuilt Battery Power Bank Other (Specify)	☐ ☐ ☐ ☐
c)	Additional EFB Maintenance requirement	Incorporated in Maintenance Program No impact on Maintenance Program☐ Other (Specify)	☐ ☐ ☐

Stamp with Name of the Airworthiness Inspector, Airworthiness Directorate CAA Pakistan	Signature	Date

	PAKISTAN CIVIL AVIATION AUTHORITY **EFB APPROVAL APPLICATION FORM** **(FOR COMM. AIR OPERATORS & AIRCRAFT TAKE OFF MASS ABOVE 5700 KGs)**	**CAAF-094-FSXX-1.0**
	Flight Standards Directorate	

PART – 6

FLIGHT STANDARDS DIRECTORATE SCRUTINY

7. DOCUMENTATION CHECKING – EFB

a)	EFB Policy & Procedure of Manual	☐	Checked on | Date:
b)	OM-A (EFB Policy inclusion)	☐	Checked on | Date:
c)	OM-D (EFB Training inclusion)	☐	Checked on | Date:
d)	MEL (EFB Provisions inclusion)	☐	Checked on | Date:
e)	Any Other:	☐	Ref:

8. IN-FLIGHT CHECK OF EFB

a) EFB In-Flight Operational Check (**For Portable & Installed EFBs**)	☐	Checked in ______ (Aircraft Type) On Sector ____________ (e.g. KHI-ISB) On | Date: _____________

9. EFB APPROVAL CHECKLIST

a) EFB Checklist as given in Appendix-B of ANO-035 filled	☐	

10. Recommendation on EFB Approval by POI/Flight Inspector (Pilot):

Recommended	☐ | Remarks (if any)
Not Recommended	☐ | Remarks (if any)

Stamp with Name of the POI / Flight Inspector (Pilot)	Signature	Date

11. Final Approval by Director Flight Standards (DFS), CAA Pakistan

Approved	☐ | Limitations (if any)
Not Approved	☐ | Remarks (if any)

Stamp with Name of Director Flight Standards (DFS), PCAA	Signature	Date

پاکستان سول ایوی ایشن اتھارٹی

APPENDIX "F"

پاکستان سول ایوی ایشن اتھارٹی	**PAKISTAN CIVIL AVIATION AUTHORITY** **EFB APPROVAL CHECKLIST** **(FOR GENERAL AVIATION & PRIVATE OPERATORS TAKE OFF MASS BELOW 5700 KGS / HELICOPTERS)**	**CAAF-095-FSXX-1.0**
	Flight Standards Directorate	

1. Introduction

1.1 The checklist given below will be filled by the Applicant (Operator) and submitted along with the EFB Approval Application Form given at Appendix-G.

1.2 This Checklist is to be evaluated by PCAA for the EFB Approval of General Aviation and Private Operator Aircraft (Below 5700 Kgs) and Helicopters. General Aviation Aircraft or other Aeroplanes above 5700 Kgs will use the Checklist as given at Appendix-B.

1.3 This Checklist is to be used for Operational Evaluation of **Portable EFBs Only.** For installed EFB, Checklist given at Appendix-B is to be used.

1.4 Checklist items are designed so that some questions may be Not Applicable (check **"N/A"**). Questions answered as **"NO"** are meant to allow identifying deficiencies that should be corrected and revalidated prior to Approval being issued.

Operator Name:	**AOC No/Validity:**
Aircraft Type:	**Date:**

EFB Hardware and Software	YES | NO | N/A
Is the EFB Hardware to be used is standardized for the whole Company – Type / Make / Model?	☐ | ☐ | ☐
Will the display be readable in all the ambient lighting conditions, both day and night, encountered in the cockpit?	☐ | ☐ | ☐
Has the Operator demonstrated that the EFB will not electromagnetically interfere with the operation of aircraft equipment?	☐ | ☐ | ☐
Have procedures been developed to establish the level of battery capacity degradation during the life of the EFB. Are additional Power Source identified and available in the Cockpit.	☐ | ☐ | ☐
Have guidance/procedures been provided for battery failure or malfunction?	☐ | ☐ | ☐
Are the Software Applications installed match the one applied for?	☐ | ☐ | ☐

Stowage of EFB	YES | NO | N/A
Has the Operator documented the stowage location for the Portable EFB when not in use?	☐ | ☐ | ☐
Has the Operator demonstrated that if the EFB moves or is dislocated from its stowage, (as a result of turbulence, manoeuvring, or other action), it will not interfere with flight controls, damage cockpit equipment or injure flight crew?	☐ | ☐ | ☐

EFB Management	YES | NO | N/A
Is there an EFB management system in place?	☐ | ☐ | ☐
Does one person possess an overview of the complete EFB system and responsibilities within the Operator's management structure?	☐ | ☐ | ☐

Crew Procedures	YES | NO | N/A
Have Crew Procedures for EFB Operation been integrated within the existing Company Operations Manual?	☐ | ☐ | ☐
Is there a reporting system for system failures of EFB?	☐ | ☐ | ☐
Are there procedures in place to inform maintenance and flight crews about a fault or failure of the EFB, including actions to isolate it until corrective action is taken?	☐ | ☐ | ☐
Have MEL or procedures in case of EFB failure been considered and published?	☐ | ☐ | ☐
Have EFB Training (Hardware and Software) incorporated in the Company Operations Manual?	☐ | ☐ | ☐
Have procedures for use of electronic signature in EFB developed and document in OM-A?	☐ | ☐ | ☐

	PAKISTAN CIVIL AVIATION AUTHORITY **EFB APPROVAL CHECKLIST** **(FOR GENERAL AVIATION & PRIVATE OPERATORS TAKE OFF MASS BELOW 5700 KGS / HELICOPTERS)**	**CAAF-095-FSXX-1.0**
	Flight Standards Directorate	

Software Management Procedures	YES | NO | N/A
Are there documented procedures for the configuration control of loaded software and software access rights to the EFB?	☐ | ☐ | ☐
Are there adequate controls to prevent corruption of operating systems, software and databases?	☐ | ☐ | ☐
Are there adequate security measures to prevent system degradation, malware and unauthorized access?	☐ | ☐ | ☐
Are procedures defined to track database expiration/updates?	☐ | ☐ | ☐
If the hardware is assigned to the flight crew, does a policy on private use exist?	☐ | ☐ | ☐

Verification by Chief Pilot/Head of Operations

The undersigned verifies the information given above and agrees that these will be considered for the issuance of EFBs approval in accordance with the current ANO on EFB.

Stamp with Name of the Head of Operations / Chief Pilot etc	Signature	Date

APPENDIX "G"

	PAKISTAN CIVIL AVIATION AUTHORITY **EFB APPROVAL APPLICATION FORM** **(FOR GENERAL AVIATION/PRIVATE OPERATORS** **(Take Off Mass below 5700 Kgs) & HELICOPTERS)**	**CAAF-096-FSXX-1.0**
	Flight Standards Directorate	

Please complete in Block Capitals in Blue Ink/Blue Ballpoint

*(**Note:** Tick mark the box with "√" for YES and "X" for NO. For more detail add text.)*

1. COMPANY DETAILS:

a)	Name of the Company (Applicant)	
b)	AOC No. / Valid Upto	
c)	Operations Specification Validity	
d)	EFB Approval requested for	Aircraft Type:
e)	Head of Operations (Chief Pilot)	Name: Mob No: Email:

2. EFB HARDWARE / SOFTWARE & DOCUMENTATION DETAILS

a)	Type of EFB Applied For	Portable No of EFB in Cockpit applied for – 01 / 02	☐ ☐
b)	Initial or Additional Approval	Initial Approval Additional Approval	☐ ☐
c)	Type of Tablet to be used as EFB	Ipad Apple Samsung Other (Specify)	☐ ☐ ☐
d)	Stowage Area for Portable EFB	(Specify exact location of stowage)	
e)	Types of Software to be used on EFB	Jeppesen Charting Aircraft Operating Manuals (FCOMs) Company Manuals Any Other (Specify)	☐ ☐ ☐ ☐
f)	OM-A (EFB Policy inclusion)	☐	Ref:
g)	MEL (EFB Provisions inclusion)	☐	Ref:

3. DECLARATION BY THE AIR OPERATOR – EFB

The undersigned certifies that the information provided in this application form are complete and true to the best of my knowledge and agree that these will be considered for the issuance of EFBs approval in accordance with the current ANO on EFB.

Stamp with Name of the Head of Operations (Chief Pilot)	Signature	Date

	PAKISTAN CIVIL AVIATION AUTHORITY **EFB APPROVAL APPLICATION FORM** **(FOR GENERAL AVIATION/PRIVATE OPERATORS (Take Off Mass below 5700 Kgs) & HELICOPTERS)**	**CAAF-096-FSXX-1.0**
	Flight Standards Directorate	

FLIGHT STANDARDS DIRECTORATE SCRUTINY

4. DOCUMENTATION; APPROVAL CHECKLIST & IN-FLIGHT CHECK OF EFB

a)	OM-A (EFB Policy inclusion)	☐	Checked on | Date:
b)	MEL (EFB Provisions inclusion)	☐	Checked on | Date:
d)	EFB Checklist as given in Appendix-F of this ANO filled	☐	Checked on | Date:
e)	EFB Operational Check (In-Flight) (**For Portable EFBs**)	☐	Checked on | Date: Flight No. | A/C Type

5. Recommendation on EFB Approval by POI/Flight Inspector (Pilot):

Recommended ☐	**Not Recommended** ☐

Stamp with Name of the POI / Flight Inspector (Pilot)	Signature	Date

6. Final Approval by Director Flight Standards (DFS), CAA Pakistan

Approved	☐ | Limitations (if any)
Not Approved	☐ | Remarks (if any)

Stamp with Name of Director Flight Standards (DFS), PCAA	Signature	Date

CIVIL AVIATION AUTHORITY, PAKISTAN

Air Navigation Order
No. : 91.0031
Date : August, 2007
Issue : One

SPECIAL OPERATIONS (HELICOPTER)

CONTENTS

CIVIL AVIATION AUTHORITY, PAKISTAN

Air Navigation Order
No. : 91.0031
Date : August, 2007
Issue : One

SPECIAL OPERATIONS (HELICOPTER)

1. Authority

1.1 This Air Navigation Order (ANO) is issued by the Director General Civil Aviation Authority in pursuance of powers vested in him under Rules 191, 192 and Rule-4 of Civil Aviation Rules 1994.

2. Scope

2.1 This ANO deals with the special Helicopter Operations. All Operators / Companies / Firms / Persons shall comply with the instructions contained in this ANO and all other relevant Rules / ANOs concerning Aircraft Operations. This ANO lays down the minimum requirements for Helicopter Emergency Medical Service (HEMS), Mountain / Hill Operations by Helicopters, External Load Operations by Helicopters, Offshore Helicopter Operations.

3. Applicability

3.1 This ANO shall apply to all Helicopter Public Transport, charter and aerial works operations and sets the minimum requirements, conditions and obligations for an AOC holder be met in Operations Manual.
3.2 Any amendments, additions, alteration and deletion necessitated in ICAO Annex 6, Part-III and CARs would be deemed to be applicable to the operator subject intimation by CAA.

3.3 Any Helicopter Operator or person performing special operations in this ANO shall be deemed to be operating under this ANO.

4. Effective Date

4.1 This ANO shall come into force with immediate effect.

5. Operator’s Obligation

5.1 An Operator, prior to commencement of operation shall:

a) Prepare a Flight Safety Document System (Set of inter-related documentation) that is easily accessible, validated and consistent in use, with organized information necessary for flight and ground operations, and comprising, as a minimum, the operations manual and the operator's maintenance control manual.

b) Prepare and submit an operations manual as a part of its flight safety document system for the use and guidance of operations personnel concerned, in English language.

5.2 The Operator shall ensure that:

a) The contents of the Operations Manual, including all amendments or revisions, do not contravene the conditions contained in the Air Operator Certificate (AOC) or any applicable regulations of CAA and the countries into or over which its aircraft are operated and must have an approval of CAA.

b) The Structure and contents of the Operations Manual are in accordance with this ANO.

HELICOPTER EMERGENCY MEDICAL SERVICE (HEMS)

6. INTRODUCTION

A helicopter is very versatile machine and its utilization is unlimited in today's modern world. One of the most important tasks of the helicopter is to provide emergency service during urgent situations that necessitate quick evacuation and medical aid. The helicopter in this role provides immediate medical assistance and rapid transportation from site of the medical emergency.

6.1 DEFINITIONS

Congested hostile environment. A hostile environment within a congested area.

Helicopter Emergency Medical Service (HEMS) flight. A flight by a helicopter operating under a HEMS, the purpose of which is to facilitate emergency medical assistance, where immediate and rapid transportation is essential, by carrying:

(i) Medical personnel; or
(ii) Medical supplies (equipment, blood, organs, drugs); or
(iii) Sick or injured persons and other persons directly involved.

Ground emergency service personnel. Any ground emergency service personnel (such as policemen, firemen etc.) involved with HEMS and whose tasks are to any extent pertinent to helicopter operations.

HEMS crew member. A person who is assigned to a HEMS flight for the purpose of attending to any person in need of medical assistance carried in the helicopter and assisting the pilot during the mission. The person is subject to specific training as detailed in 5.2 below.

HEMS operating base. A heliport at which the HEMS crew members and the HEMS helicopter may be on standby for HEMS operations.

HEMS operating site. A site selected by the PIC during a HEMS flight for landing and take off.

Hostile environment. An environment in which:
a) a safe forced landing cannot be accomplished because the surface is inadequate; or
b) the helicopter occupants cannot be adequately protected from the elements; or
c) search and rescue response/capability is not provided consistent with anticipated exposure;
or
d) there is an unacceptable risk of endangering persons or property on the ground.

Medical passenger. A medical person carried in a helicopter during a HEMS flight, including but not limited to doctors, nurses and paramedics. This passenger shall receive a briefing as detailed in 5.3 below.

Non-congested hostile environment. A hostile environment outside a congested area.

Non-hostile environment. An environment in which:
a) the surface is suitable for a safe forced landing; and
b) the helicopter occupants can be adequately protected from the elements;
c) search and rescue response/capability is provided consistent with anticipated exposure; and
d) the assessed risk of endangering persons or property on the ground is acceptable.

Note:- Those parts of a congested area satisfying the above requirements are considered non-hostile.

6.2 Operational Requirements

6.2.1 An operator must ensure that the Operations Manual includes a supplement specifying operational considerations specific to HEMS operations. Relevant extracts from the Operations Manual shall be made available to the organization for which the HEMS is being provided.

6.2.2 Performance Class 3 operations shall not be conducted over a hostile environment.

6.2.3 Performance Class 3 operations in non congested hostile environment over hilly terrain with any turbine engine helicopter may be conducted subject to the following conditions:

(i) Prior CAA approval for type and area of such operations has been obtained;
(ii) Such operations are performed with in the limitations established by the helicopter manufacturer.
(iii) The max certificated seating capacity of the helicopter is less than or equal to six.
(iv) The operator shall ensure that performance criteria of flight manual are strictly followed and the reliability of the engine and helicopter systems are continuously monitored.

6.3 **Take-off and landing-helicopters with an Maximum Takeoff Mass (MTOM) of 5700 kg or less**

6.3.1 Operations to/from a heliport at a hospital, which is located in a hostile environment, shall be operated as Performance Class 1.

6.3.2 Operations to / from a HEMS operating site located in a hostile environment shall be as Performance Class 1. The PIC shall make every reasonable effort to minimize the period during which there would be danger to helicopter occupants and persons on the surface in the event of failure of a power unit.

6.3.3 The HEMS operating site must be big enough to provide adequate clearance from all obstructions.

6.3.4 Guidance on take-off and landing procedures at previously unsurveyed HEMS operating sites shall be contained in the Operations Manual.

6.4 Take-off and landing-helicopters with an MTOM exceeding 5700 kg.

6.4.1 Helicopters conducting HEMS shall be operated in accordance with Performance Class 1 operations.

6.5. THE CREW

6.5.1 The Operations Manual shall contain specific criteria for the selection of flight crewmembers for the HEMS task, taking previous experience into account.

6.5.2 The minimum experience for PIC conducting HEMS flights shall not be less than

a) either 1000 hours pilot-in-command of aircraft of which 500 hours is as pilot-in-command on helicopters;

or

1000 hours as copilot in HEMS operations of which 500 hours is as pilot-in-command under supervision; and, 100 hours pilot-in-command of helicopters.

b) 500 hours operating experience gained in similar operational environment.

d) Successful completion of training in accordance with 5.2.

6.6 Recency

All pilots conducting HEMS operations shall have completed a minimum of 30 minutes flight by sole reference to instruments in a helicopter or in a synthetic training device (STD) within the last 6 months.

6.7 Crew composition

6.8 **Day flight.** The minimum crew by day shall be one pilot and one HEMS crewmember.

6.9 **Night Flight.** The minimum crew by night shall be two pilots.

6.10. Additional Requirements

The helicopter internal configuration should be suitable for HEMS operations and provide necessary space for approved stretchers and medical equipment.

6.10.1 **Helicopter medical equipment**

(i) The installation of all helicopter dedicated medical equipment and, where appropriate, its operation including any subsequent modifications shall be approved by the CAA.

(ii) An operator shall ensure that procedures are established for the use of portable equipment on board.

6.10.2 **Helicopter communication and navigation equipment**

Helicopters conducting HEMS flights shall be provided with communications equipment capable of conducting two-way communication with the organization for which the HEMS is being provided and, where possible, to communicate with ground emergency service personnel.

6.10.3 **HEMS operating base facilities**

(i) If crew members are required to be on standby with a reaction time of less than 45 minutes, dedicated suitable accommodation shall be provided close to each operating base.

(ii) At each operating base the pilots shall be provided with facilities for obtaining current and forecast weather information and shall be provided with satisfactory communications with the appropriate ATS unit. Satisfactory facilities shall be available for the planning of all tasks.

6.11 **Refueling with passengers on board**

When the commander considers refueling with passengers on board to be necessary, it can be undertaken with rotors stopped / turning provided the following requirements are met:

(i) Door(s) on the refueling side of the helicopter shall remain closed;

(ii) Door(s) on the non-refueling side of the helicopter shall remain open, weather permitting;

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

(iv) Sufficient personnel shall be immediately available to move patients clear of the helicopter in the event of a fire.

6.12. Training and checking

6.12.1 **Flight crew members**

6.12.2 **The flight crew shall have the following additional items of training:**

(i) Meteorological training concentrating on the understanding and interpretation of available weather information;

(ii) Preparing the helicopter and specialist medical equipment for subsequent HEMS departure;

(iii) Practice of HEMS departures;

(iv) The assessment from the air of the suitability of HEMS operating sites;

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

6.13 The proficiency check of the crew shall have the following additional items:

(a) Proficiency check by day and/or night checks as appropriate including landing and takeoff profiles likely to be used at HEMS operating sites.

(b) Line checks with special emphasis on the following:
   (i) Local area meteorology;
   (ii) HEMS flight planning;
   (iii) HEMS departure;
   (iv) The selection from the air of HEMS operating sites;
   (v) Low level flight in poor weather; and
   (vi) Familiarity with established HEMS operating sites in operator's area of operation.

6.14 **HEMS crew member**

The HEMS crew member shall be trained in following additional items:

(i) Duties in the HEMS role;
(ii) Navigation (map reading, navigation aid principles and use);
(iii) Operation of radio equipment;
(iv) Use of onboard medical equipment;
(v) Preparing the helicopter specialist medical equipment for subsequent HEMS departure;

(vi) Instrument reading, warnings, use of normal and emergency check list in assistance of the pilot as required;
(vii) Basic understanding of helicopter type in terms of location design of normal and emergency systems and equipment;
(viii) Crew coordination;
(ix) Practice of response to HEMS call out;
(x) Conducting refueling and rotors running refueling;
(xi) HEMS operating site selection and use;
(xii) Techniques for handling patients, the medical consequences of air transport and some knowledge of hospital casualty reception;
(xiii) Marshalling signals;
(xiv) Under slung load operations as appropriate;
(xv) Winch operations as appropriate;
(xvi) The dangers to self and others of rotor running helicopters including loading of patients;
(xvii) The use of the helicopter inter-communications system.

6.15 **Medical passengers.**

Prior to any HEMS flight, or series of flights, medical passengers shall be briefed on the following:

(i) Familiarization with the helicopter type(s) operated;
(ii) Entry and exit under normal and emergency condition both for self and patients;
(iii) Use of the relevant onboard specialist medical equipment;
(iv) The need for the commander's approval prior to use of specialized equipment;
(v) Method of supervision of other medical staff;
(vi) The use of helicopter intercommunication system; and
(vii) Location and use of onboard fire extinguishers.

6.16 Ground emergency service personnel

An operator shall take all reasonable measures to ensure that ground emergency service personnel are familiar with the following:

(i) Two way radio communication procedures with helicopters;
(ii) The selection of suitable HEMS operating sites for HEMS flights;
(iii) The physical danger area of helicopters;
(iv) Crowd control in respect of helicopter operations; and
(v) The evacuation of helicopter occupants following an on-site helicopter accident.

MOUNTAIN / HILL FLYING OPERATIONS (HELICOPTER)

7. INTRODUCTION

Helicopter flying in the Mountains / hilly terrain requires knowledge of the typical characteristics of Mountains / hilly terrain, the effects of wind and rapidly changing weather conditions etc. that can restrict the operations. Height of the helipads may adversely affect the performance of helicopter especially during take off and landing phases, which also varies from helicopter to helicopter. There are inherent hazards in the Mountain / Hill flying, which require considerable preparation and planning, a through knowledge of topography. Several accidents have taken place due to intentional or inadvertent flying in the clouds.

7.1 GENERAL REQUIREMENTS

7.1.1 Mountain / Hill flying shall be restricted VFR operations only.

7.1.2 The operator shall ensure that the pilot engaged in Mountain / Hill operations has through knowledge of topography, general weather pattern, presence of the mountain waves and planning of entry and exit procedures.

7.1.3 A pilot having at least 250 hrs. of hill flying experience on helicopters will be considered experienced in Mountain / Hill operations.

7.2 TRAINING / EXPERIENCE REQUIREMENTS

7.2.1 Pilots engaged in regular / irregular operations in the Mountain / Hill area shall undergo training as given below:

a) Pilot having no previous experience of Mountain / Hilly flying shall be imparted special training specific to Mountain / Hill operations prior to operate from copilot seat for such operations.

b) Pilots having Mountain / Hill flying experience but no experience in the area of intended operations may fly from copilot seat for area familiarization.

c) Pilot shall be checked by an examiner before he is cleared to operate as PIC.

d) The special training specific to Mountain / Hill operations to be conducted at an approved training school is given at Para 7.5.

e) Flying training requirements for regular operations in Mountain / Hilly areas for all categories of pilots having flying experience below 1000 hrs., between 1000 to 2500 hrs and more than 2500 hrs are given at Para 7.6.

f) Similarly flying training requirement for irregular operations in Mountain / Hill areas for all categories of pilots as defined in para 7.7.

7.3 Pilots required to carry out one time/occasional operations in Mountain / Hilly area shall meet the following requirements:

a) Pilots having no experience of flying in Mountain / Hilly terrain is permitted to fly from the copilot seat.

b) Pilots having previous experience in Mountain / Hill flying and with more than 250 hrs on type shall operate in the Mountain / Hilly area after a check flight with an examiner or alternatively carry out trial run/landing before operating a flight with passengers on board.

7.4 A pilot engaged in regular and irregular Mountain / Hill operations shall undergo periodical recurrent training once in a year. Proficiency check of such a pilot shall be carried out for the capacity in which he is regularly flying every year by a CAA Inspector or an approved person by CAA.

7.5 Ground Training Syllabus Mountain / Hill Flying

a) Density altitude and performance considerations.
b) Effects of decreased air density on engine and airframe.
c) Type performance Manufacturer's Flight Manual.
d) Physiological Effects-lack of oxygen and external horizon.
e) Mountain winds-convection and air mass stability, wind pattern across prominent features of rounded shape and sharp contours, standing waves, rotor streaming turbulence, ridges, conical hills and valleys.
f) Transit flying-pre-flight planning, blade stall, engine failure, wind assessment enroute, action when caught in a down draught, ridge crossing and valley flying.
g) Wind direction finding / assessment.
h) Reconnaissance, approach, landing and take off techniques.
i) Winter operations.
j) Meteorological peculiarities of the area of operations and its effect on helicopter operations.
k) Helicopter icing.

7.6 Flying Training Requirement For Operations in Mountain / Hilly Areas

REGULAR OPERATIONS*

	Pilots with <1000 hrs on helicopters	**Pilots with > 1000 hrs but < 2500 hrs on helicopters**		**Pilots with > 2500 hrs on helicopters**	
Category	Inexperienced pilots	Without previous experience	With previous experience	Without previous experience	With previous experience
Dual	15 hrs. AND	5 hrs. AND	5 hrs. OR	5 hrs. AND	5 hrs. OR
Co-pilot	1000 hrs	250 hrs	100 hrs	100 hrs	25 hrs

7.7 **Flying Training Requirement For Operations in Mountain / Hilly Areas**

IRREGULAR OPERATIONS**

	Pilots with <1000 hrs on helicopters	**Pilots with > 1000 hrs but < 2500 hrs on helicopters**		**Pilots with > 2500 hrs on helicopters**	
Category	Inexperienced pilots	Without previous experience	With previous experience	Without previous experience	With previous experience
Dual	15 hrs. AND	5 hrs. AND	5 hrs. OR	5 hrs. AND	5 hrs. OR
Co-pilot	At least 1000 hrs	At least 500 hrs	250 hrs	At least 250 hrs	50 hrs

* Regular operations means that flights are carried out on regular basis.

** Irregular operations means that the flights are carried out for a limited period such as heli skiing etc.

EXTERNAL LOAD OPERATIONS OF HELICOPTER

8. INTRODUCTION

Helicopter is a very versatile machine and can be gainfully deployed in variety of roles. One of the tasks that it can perform is carriage of load externally. In this operation unwieldy load that cannot otherwise be accommodated in the cabin can be carried externally from one place to another. In this role the helicopter can be deployed in various operations such as Wire Stringing, Cable Laying. Pylon Fixing, High Tension Cable Washing, Cargo Sling, Hoist Mining Survey, Fire Fighting, Aerial Photography, Power Line Inspection, Crop Spraying, Pollution Control, Electronic News Gathering etc.

8.1 External Load are Classified as Follows:

8.1.1 **CLASS A.** An external load that cannot be moved freely, cannot be jettisoned and does not extend below the under carriage. Ski-pods, TV camera, survey equipment, crop spraying equipment attached to helicopter will come under this category.

8.1.2 **CLASS B.** An external load that can be jettisoned and is not in contact with surface (land, water etc.) e.g. a normal sling load, mining, surveys, fire fighting equipment, anti pollution pads, a container, part of wrecked car or aircraft, military stores and vehicles.

8.1.3 **CLASS C.** An external load that can be jettisoned and that remains in contact with the land or water or any other surface e.g. wire pulling, cable laying, power line maintenance.

8.1.4 **CLASS D.** Hoisting an external load or person will come under this category.

8.2.

8.2.1 A helicopter shall meet airworthiness and certification requirements for external load equipment.

8.2.2 Operations shall be conducted out of ground effect.

8.2.3 The pilot must be aware of reserve power requirements for operations with external load.

8.2.4 External load operation shall be conducted under VFR conditions only.

8.3 Training Requirements

8.3.1 **Ground training**

A pilot shall undergo ground training covering the following topics:

a) Aerodynamic considerations.
b) Knowledge of sling / hoist equipment, its operation and limitations given in the operation manual.
c) Preparation of load-sheet, rigging or its attachments.
d) Emergencies for the particular type of operations.
e) Operation peculiarities of different terrains, e.g. mountain, off shore, jungle, desert, etc.

8.4 **Flying Training**

8.4.1 A pilot shall have at least 500 hours PIC experience on type of helicopter. However this may be relaxed in case of a pilot with previous experience on external load operations.

8.4.2 Flying training shall be for specific type of operations.

8.4.3 Flying training shall include the following exercises:

a) Briefing of Crew, Inspection of Load, sling equipment and jettisoning system.
b) Hover, take off and landing with external load.
c) Maneuvering of helicopter in hover, transition and forward flight and delivering of load at predetermined point.
d) Emergencies including engine failure, unstable flight condition due to undue oscillation of external load, loss of tail rotor effectiveness. These are to be covered on the ground.
e) The pilot shall be checked by a CAA Inspector or an approved Examiner before carrying out external load operations. A test Performa is attached as Appendix ‘A’.

8.5 **Initial training**

a) Class A typed load. A pilot without previous experience in external load operations shall undergo a minimum of 1 hour or 5 practices of flight instructions in external load operations. A pilot having previous experience may be cleared for operations, after 0.5 hour or 3 practices. An entry in this regard shall be made in pilot's logbook by the examiner.

b) Class B & C type load. A pilot who has not conducted Class B and C type of operations earlier shall undergo dual flying instructions under supervision by an approved Examiner for minimum of 2 hours or 10 practices of flight instructions in external load operations. A pilot who has conducted external load operations earlier shall undergo 1 hour or 5 practices of dual instructions. An entry in this regard shall be made in pilot's logbook by the examiner.

c) Class D type load. A pilot who has not conducted Class D operations (Hoisting) shall undergo flight training of at least 10 hoistings. A pilot who has conducted hoisting operations in the past may be cleared after 5 hoistings and if found fit, be released for independent operation. An entry in this regard shall be made in pilot's logbook by the examiner.

8.6 One time operation. In case of emergency there may be requirement to carry out external load. In such a case the pilot should satisfy the following:

a) Class A type load. A pilot having experience on external load operations and meeting the other training requirements is permitted to undertake the task.

b) Class B, C and D type load. A pilot having previous experience of external load operations and 500 hours PIC experience on type is permitted to undertake the task.

8.7 Recurrent Training

a) A pilot who has not conducted an external load operation in the last 12 months preceding the date of operations shall be checked by an examiner before permitting him for independent operations.

b) A pilot who has not carried out external load operation in the last 24 months shall undergo full training as prescribed for initial training.

c) A pilot who is often called upon to undertake such mission shall carry out at least one flight of one-hour duration in a period of 12 months to maintain currency.

Note: The recurrent training shall be required for all types of operations except for one time emergent conditions

OFF SHORE OPERATIONS (HELICOPTER)

9. INTRODUCTION

Flying to offshore platforms and floating decks present its peculiar difficulties. The limited size of the heli-decks surrounded by obstacles, hot gases and varying winds and rapidly changing meteorological conditions pose a great challenge to pilots. In addition pitching, rolling and heaving experienced while landing on floating decks require a very high degree of skill and accuracy in flying. Offshore flying requirement is continuous and is undertaken in all weather conditions – by days as well as by night. Offshore flying is a specialized operation and therefore, pilots engaged in this role are required to be given specific role oriented training.

9.1. **Co-Pilot**

Before being a co-pilot in offshore operations a pilot shall meet the following pre-requisite requirements:

i) The pilot should have undergone a Multi Crew Co-operation Course, a type rating course and 20 hours instrument flying experience, simulated or actual; and

ii) Should undertake Offshore Conversion Training with an instructor as defined in the operator's Operations Manual. Offshore Conversion Training shall be an in depth training covering all aspects of take off and landing on all available types of heli-decks and moving vessels present in the operation area.

9.2 Before being released for operation, a check flight shall be conducted by a CAA Flight Inspector or an approved examiner. The check shall be recorded in the pilot log book and training records.

9.3 Thereafter the pilot shall continue to fly as a co-pilot in offshore until he reached the level defined in the Para 3 in order to be eligible for a pilot-in-command training course at the operator's discretion, taking into account his previous pilot experience.

9.4 **REQUIREMENTS FOR OFFSHORE COMMAND TRAINING COURSE**

With less 1000 H, 100 H Multi	**Between 1000 and 2500 H 500 H Multi**	**More than 2500 H 500 H Multi**
750 H* CP multi offshore 200 H on type	500 H CP multi offshore, 100 H on type	500 H CP multi offshore, 100 H on type,
Instrument rating**, 100H IMC	Instrument rating**, 100 H IMC	Instrument rating**, 100H IMC
+ 1 Monsoon	+ 1 Monsoon	+ 1 Monsoon
If 100 H offshore	**If 100 H offshore**	**If 100 H offshore**
Instrument rating**, 100H IMC	Instrument rating**, 100H IMC	Instrument rating**, 100 IMC
600 H* CP multi offshore 100 H on Type	400 H CP multi offshore, 100 H on Type	400 H CP multi offshore, 100 H on Type

* In any case he shall not have less than 1000 H Helicopter total time before he undertakes the offshore command course.

* IFR rating must be obtained prior to the final PIC check with CAA Flight Inspector or an approved examiner.

9.5 For pilots having a large previous experience in multi engine, multi pilot and IFR the following criteria shall be applicable:

Helicopter of less than 5,700 kg	**Helicopter of more than 5,700 kg**
CPL (H) and current IR.	**ATPL (H) and current IR.**
2000 h helicopter, 500 H multi of which 200 as PIC, 200 H IFR	2000 H helicopter, 500 H multi of which 200 as PIC, 200 H IFR
300 H Offshore of which 100 H on type	300 H Offshore of which 100 H on type
OR	OR
1500 H Helicopter of which 500 H as PIC, 300 H multi of which 200 H as PIC, 200 H IFR	1500 H Helicopter of which 500 H as PIC, 500H Multi of which 300 H as PIC, 200 H IFR
500 H Offshore of which 100 H on type	500 H Offshore of which 100 H on Type

9.6 **Command Training will consist of the following**:

a) A Ground Training course covering at least the following:-

i) Flight Manual / Technical Manuals

ii) Operations Manual including CRM, Dangerous Goods Course.

iii) Area competency check.

iv) Aeronautical publications – ASC's, ANO's, CAR, AIP, etc.

v) Local procedures and instructions.

b) Flying Training:

i) 100 hours on fixed decks, jack up rigs, tied down floaters, floaters and productions platforms. Before being cleared as PIC in offshore operations, the pilot under training must have carried out a minimum of 15 landings on fixed platforms / jacks up rigs, 5 on floaters with a CAA Inspector or an approved instructor.

ii) A Pilot shall perform at least one specific offshore simulator training, essentially covering engine failure during take off and landings on heli-decks. The simulator shall be of level C/D if a FFS or level 2/3 if a FTD. This training shall be recorded in pilot training records.

iii) He does undertake 20 offshore flights within the oil field on all types of landing sites as "Pilot-in-Command under supervision" (PICUS) with a company senior captain.

iv) An independent flying test shall be conducted in accordance with the format specified in Appendix 'B' and shall be cleared to operated as PIC offshore operations after a satisfactory check by CAA Inspector or an approved examiner, who will make an entry in the pilot's log book to this effect.

v) Pilots engaged in regular night offshore operations shall carry out at least 5 take offs and landings on helidecks and one route-flying sortie by night, in the preceding 6 months.

vi) Proficiency check of a pilot shall be carried out for the capacity in which he is regularly flying.

vii) A pilot engaged in offshore operations on regular operations shall undergo periodical recurrent training as given in relevant CAR's, ANO's and Company Operations Manual.

9.7 Introduction of new Helicopter Type

When introducing a new helicopter type in his fleet an operator shall qualify his experienced offshore pilots on that type. The Commander shall have not less than 500 H offshore PIC and the co-pilots 200 H offshore in that Group of helicopters in which the new type falls. The initial training shall be carried out to the manufacturer standards. In addition after the type rating qualification, the offshore qualification of the Commander shall be performed as PICUS for 50 H.

-Sd-

(FAROOQ RAHMATULLAH)
Director General
Civil Aviation Authority
Pakistan

Dated August, 2007.

APPENDIX 'A'

TEST PROFORMA – EXTERNAL LOAD OPERATIONS

Company ________________________	Date of check ______________________
Name of Pilot ________________________	Block time (D/N) ____________________
License No. ________________________	Location ____________________
Date of last check____________________	Type of Helicopter____________________
Examiner ____________________	Registration ____________________

	Pilot Proficiency
A. Ground Checks	
1. Status on ground training	
2. Performance and limitations sling operation	
3. Preparation of load, rigging or its attachments	
4. Emergency procedures e.g. engine failure, control of flight during oscillation of external load, loss of tail rotor effectiveness	
B. Flight Preparation	
1. Weather situation	
a. Weather charts	
b. Forecasts	
c. Winds and temperatures	
2. Flight planning	
a. Fuel calculation	
b. Performance calculation	
c. Payload calculation with external load	
3. Pre-flight inspection including load, sling equipment and jettisoning system	
4. Use of checklist	
5. Engine starting procedures	
6. Cockpit check after starting	
7. Departure briefing	
8. Navigation systems set-up	
9. Hover, take off and landing with external load	

	Pilot Proficiency
C. En-route	
1. Maneuvering of helicopter during forward flight	
2. Route selection	
D. Approach, Landing	
1. Assessment	
a. Wind direction and velocity	
b. Approach briefing	
2. Delivering of load at predetermined point	
3. Landing	
4. Repeat exercise	
E. General flight ability	
1. Radio Communication procedures	
2. Co-ordination of control during external load Ops.	
3. CRM & Situation awareness	

S = Satisfactory	**U =** Unsatisfactory	**N =** Not observed	**N/A =** Not applicable

Result of check **Passed**	**Failed**

Remarks/Comments

Pilots sign.________________________ Examiners sign_______________________

APPENDIX ‘B’

PERFORMA – OFFSHORE FLYING ROUTE CHECK

Company ______________________	Date of check ____________________
Name of Pilot ______________________	Block time (D/N) __________________
License No. ______________________	Location __________________
Date of last check___________________	Type of Helicopter__________________
Examiner ___________________	Registration __________________

	Pilot Proficiency
A. Ground Checks	
1. Status on recurrent training	
2. Performance and limitations	
3. Mass & Balance	
4. Emergency procedures	
B. Preflight	
1. Flight planning	
2. Pre-flight inspection	
3. Passenger briefing	
4. Use of checklist	
5. Engine starting procedures	
6. Cockpit check after starting	
7. Departure briefing	
8. Navigation systems set-up	
9. Taxi	
C. En-route	
1. Navigation – use of navigation systems	
2. Altitude selection	
3. Fuel management	
4. Position reporting	
D. Approach & Landing	
1. Pre-landing checks	
2. Approach selection – FP and NFP	
3. Deck clearance	
4. Final Approach	
5. Missed approach and aborted landing in case of engine failure	

6. Landing	
	Pilot Proficiency
E. Turnaround	
1. Passenger handling	
2. Baggage and freight handling	
3. Refueling procedure	
4. Payload calculation	
5. Coordination with HLO	
F. Take off	
1. Pre take-off checks	
2. Take off procedure	
3. Procedure in case of engine failure prior and post TDP/DPATO	
G. General flight ability	
1. Radio Communication procedures	
2. Co-ordination	
3. CRM & Situation awareness	

S = Satisfactory	**U =** Unsatisfactory	**N =** Not observed	**N/A =** Not applicable

Result of check Passed	**Failed**

Remarks/Comments

Pilots sign.________________________ Examiners sign_______________________