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GOVERNMENT OF LIBYA
MINISTRY OF TRANSPORT
CIVIL AVIATION AUTHORITY

دولة ليبيا
الحكومة الليبية
وزارة المواصلات
مصلحة الطيران المدني

Libya Civil Aviation Regulations (LYCARs)

Part Instrument Flight Procedure Design Services

(LYCAR Part-IFPDS)

Initial Issue – October 2017

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Libyan Civil Aviation Regulations (LYCARs)

- Part Instrument Flight Procedures Design Services (IFPDS)

Foreword

1. The regulations contained herein are adopted under the provision of Article No.(5) of Libyan Civil Aviation Law No.(6) of 2005, and issued and signed up by the Director General of Civil Aviation by virtue of powers vested from the Minister of Transport under the resolution No.(154) issued on 13/05/2015.
2. The Libyan Civil Aviation Regulations - Part Instrument Flight Procedures Design Services (IFPDS) describes the requirement and the process Designing Instrument Flight Procedure and Airspace Design and categorisation.
3. LYCAR – Part IFPDS is a part of series parts related to the requirements and process of authorising different functions applied for by an applicant for ANSP certificate.
4. LYCAA in development of these regulations has adopted ICAO standards and other international principles and practices.
5. The information contained herein is subject to constant review in the light of changing regulations and requirements. No subscriber or other reader should act on the basis of any such information without also referring to the applicable laws and regulations and/or without taking appropriate professional advice when/as indicated/required. Although, every effort has been made to ensure accuracy, the Libyan Civil Aviation Authority, shall not be held responsible for loss or damage caused by errors, omissions, misprints or misinterpretation of the contents hereof.
6. Copies of this publication can be downloaded from: www.caa.gov.ly

Issued on 13 November 2017, and signed by

Capt. Nasereddin Shaebelain

Director General

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Subpart - A – General (GEN)

IFPDS.GEN.005.Purpose.

(a) This part prescribes rules governing the development, validation, approval, registration, promulgation and maintenance of instrument flight procedures (IFP) that are intended for use by civil aircraft operating under instrument flight rules (IFR) within the limits of the FIR of the State of Libya.

(b) All approved IFP intended for public use are published in the Libyan Aeronautical Information Publication (AIP).

IFPDS.GEN.010. Definitions

When the following terms are used in this part, they have the following meanings:

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.

Aerodrome reference point: The designated geographical location of an aerodrome.

Aeronautical chart: A representation of a portion of the Earth, its culture and relief, specifically designated to meet the requirements of air navigation.

Air transit route: A defined route for the air transiting of helicopters.

Airway: A control area or portion thereof established in the form of a corridor

Bare Earth: Surface of the Earth including bodies of water and permanent ice and snow, and excluding vegetation and man-made objects.

Calendar: Discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108).

Canopy: Bare Earth supplemented by vegetation height.

Change-over point: The point at which an aircraft navigating on an ATS route segment defined by reference to very high frequency omnidirectional radio ranges is expected to transfer its primary navigational reference from the facility behind the aircraft to the next facility ahead of the aircraft.

Contour line: A line on a map or chart connecting points of equal elevation.

Culture: All man-made features constructed on the surface of the Earth, such as cities, railways and canals.

Cyclic redundancy check (CRC): A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.

Data product specification: Detailed description of a data set or data set series together with additional information that will enable it to be created, supplied to and used by another party (ISO 19131).

Note.— A data product specification provides a description of the universe of discourse and a specification for mapping the universe of discourse to a data set. It may be used for production, sales, end-use or other purpose.

Data quality: A degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution and integrity.

Data set: Identifiable collection of data (ISO 19101).

Data set series: Collection of data sets sharing the same product specification (ISO 19115).

Datum: Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104).

Digital Elevation Model (DEM): The representation of terrain surface by continuous elevation values at all intersections of a defined grid, referenced to common datum.

Note. — Digital Terrain Model (DTM) is sometimes referred to as DEM.

Displaced threshold: A threshold not located at the extremity of a runway.

Electronic aeronautical chart display: An electronic device by which flight crews are enabled to execute, in a convenient and timely manner, route planning, route monitoring and navigation by displaying required information.

Ellipsoid height (Geodetic height): The height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question.

Feature: Abstraction of real world phenomena (ISO 19101).

Feature attribute: Characteristic of a feature (ISO 19101).

Note.— A feature attribute has a name, a data type and a value domain associated with it.

Geodesic distance: The shortest distance between any two points on a mathematically defined ellipsoidal surface.

Geodetic datum: A minimum set of parameters required to define location and orientation of the local reference system with respect to the global reference system/frame.

Geoid: The equipotential surface in the gravity field of the Earth which coincides with the undisturbed mean sea level (MSL) extended continuously through the continents.

Note.— The geoid is irregular in shape because of local gravitational disturbances (wind tides, salinity, current, etc.) and the direction of gravity is perpendicular to the geoid at every point.

Geoid undulation: The distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid.

Note.— In respect to the World Geodetic System — 1984 (WGS-84) defined ellipsoid, the difference between the WGS-84 ellipsoidal height and or thometric height represents WGS-84 geoid undulation.

Hot spot: A location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary.

Hypsometric tints: A succession of shades or colour gradations used to depict ranges of elevation.

Instrument flight procedure: A published procedure used by aircraft flying in accordance with the instrument flight rules which is designed to achieve and maintain an acceptable level of safety in operations and includes an instrument approach procedure, a standard instrument departure, a planned departure route and a standard instrument arrival.

Instrument flight procedure designer: A person who has acquired and maintained the required competency level to design instrument flight procedures in accordance with the applicable criteria.

Instrument approach procedure: A series of pre-determined manoeuvres by reference to flight instruments with specific 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.

Isogonal: A line on a map or chart on which all points have the same magnetic variation for a specified epoch.

Isogriv: A line on a map or chart which joins points of equal angular difference between the North of the navigation grid and Magnetic North.

Planned departure route (PDR): A notified instrument flight rule departure (IFR) route linking the aerodrome or a specific runway of the aerodrome with a specified significant point, normally on the boundary of controlled airspace associated with the aerodrome.

Standard instrument arrival: A designated instrument flight rule arrival (IFR) route linking a significant point, normally on an ATS route, with a point from which a published instrument approach procedure can be commenced.

Standard instrument departure: A designated instrument flight rule (IFR) departure route linking the aerodrome or a specific runway of the aerodrome with a specified significant point, normally on a designated ATS route, at which the enroute phase of a flight commences.

IFPDS.GEN.015. Abbreviations

AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
ATC	Air Traffic Control
ATS	Air Traffic Services
CRM	Collision Risk Model
FIR	Flight Information Region
ICAO	International Civil Aviation Organisation
IFP	Instrument Flight Procedure
IFR	Instrument Flight Rules
MOS	Manual of Standards
OJT	On-the-Job Training
PANS-OPS	Procedure for Air Navigation Services – Aircraft Operation

IFPDS.GEN.020. Applicability.

(a) Except as provided in paragraph (b) this part prescribes rules governing:

(1) Instrument flight procedure design services (IFPDS) provided by an IFPDS provider that holds or is required to hold an Air Navigation Service Certificate (ANSC) under Libyan Civil Aviation Regulation (LYCAR) part Air Navigation Service Provider (ANSP);

(2) Each person employed or used by a IFPDS provider when developing and maintaining IFP under this part; and

(3) Each Aeronautical Information Service (AIS) provider supplying aeronautical data in support of IFP design, development and promulgation.

(b) This part does not apply to IFPDS providers who are developing and maintaining IFP exclusively for military flight operations.

(c) Additional requirements applicable to the establishment of airspace, routes, points and minimum altitudes are prescribed under LYCAR - Part Air Traffic Service (ATS).

(d) Additional requirements applicable to the publication and distribution of the aeronautical charts associated with IFP, procedures are prescribed under LYCAR - Part Aeronautical Information Service (AIS).

IFPDS.GEN.025. Requirement for a Custodian and Restrictions on IFPDS Providers.

(a) Each IFP intended for use by aircraft operating under instrument flight rules within the territorial limits of the State of Libya must have a custodian who:

(1) Meets the applicable requirements of this part; and

(2) Is certificated by the LYCAA to be an IFPDS provider.

(b) No person may provide an instrument flight procedure service in the State of Libya unless the person complies with the provisions of this part and they have been certificated by the LYCAA to provide such service.

(c) Except as provided in part Air Navigation Service Provider (ANSP), each IFPDS provider must comply with the limitations and provisions of their certificate, operations specifications and their manual prepared under Subpart C to this part.

IFPDS.GEN.030. Resource Requirements.

Each IFPDS provider must:

(a) Have available equipment that is appropriate for the design, design verification, flight validation, declaration, and maintenance of the types of IFP that they wish to manage;

(b) Have access to relevant and current data including, but not limited to, aeronautical data, land contour data, and obstacle data for the design, design verification, flight validation, and maintenance of their IFP; and

(c) Hold or have ready access to copies of relevant documentation comprising technical standards, practices, and instructions, and any other documentation that may be necessary for the design, design verification, flight validation, declaration, and maintenance of the types of IFP they wish to manage.

IFPDS.GEN.035. Aeronautical Data Integrity.

(a) Determination and reporting of aeronautical data must be in accordance with the accuracy and integrity requirements prescribed in LYCARs Part (AIS). Accuracy requirements for aeronautical data are based upon a 95 per cent confidence level. Three types of positional data must be identified: surveyed points (e.g. navigation aids positions), calculated points (mathematical calculations from the known surveyed points of points in space/fixes) and declared points.

(b) Each AIS provider must ensure that integrity of aeronautical data is maintained throughout the data process from survey/origin to the next intended user. The integrity classification related to aeronautical data must be as provided in Tables A7-1 to A7-5 of Appendix 7 of ICAO Annex 15. Aeronautical data integrity requirements must be based upon the potential risk resulting from the corruption of data and upon the use to which the data item is put. Based on the applicable integrity classification, the validation and verification procedures must:

(1) For routine data: avoid corruption throughout the processing of the data;

(2) For essential data: assure corruption does not occur at any stage of the entire process and may include additional processes as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and

(3) For critical data: assure corruption does not occur at any stage of the entire process and include additional integrity assurance processes to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

(c) Protection of electronic aeronautical data while stored or in transit must be totally monitored by the cyclic redundancy check (CRC). To achieve protection of the integrity a 32-bit CRC algorithm must apply.

(d) Geographical coordinates indicating latitude and longitude must be determined and reported to the aeronautical information services provider in terms of the World Geodetic System — 1984 (WGS 84) geodetic reference datum, identifying those geographical coordinates which have been transformed into WGS 84 coordinates by mathematical means and whose accuracy of original field work does not meet the requirements in LYCAR - Part (AIS), shall be identified by an asterisk in the Manual of Operations.

(e) The order of accuracy of the field work and determinations and calculations derived therefrom must be such that the resulting operational navigation data for the phases of flight will be within the maximum deviations, with respect to an appropriate reference frame. For those fixes and points that are serving a dual purpose, e.g. holding point and missed approach point, the higher accuracy applies.

IFPDS.GEN.040. Inspections.

Each IFPDS provider must allow the LYCAA to make any inspections, at any time to determine compliance with this part.

Subpart- B - Personnel Requirements (PER)

IFPDS.PER.005. Personnel Requirements

(a) Each IFPDS provider must employ, contract, or otherwise engage:

(1) A person, identified for the purposes of this part as the director of instrument flight procedure services, who must:

(i) Have the authority within the custodian's organization to ensure that the organization's IFPDS provider services can be financed and provided in accordance with the requirements and standards prescribed by this part; and

(ii) Be responsible for ensuring that the organization complies with the requirements of this part.

(2) A chief designer, responsible for:

(i) Ensuring that the custodian's organization complies with the organization's procedures for developing and validating IFP; and

(ii) Making the declaration of compliance required for every IFP provided by the custodian's organization for publication in the Libyan AIP and otherwise made available for publication and operational use.

(3) Sufficient personnel to plan, design, verify, and maintain the IFP provided by the custodian's organization.

(b) Each IFPDS provider must establish a procedure for initially assessing, training, and maintaining, the competence of those personnel involved in the planning, design, verification, and maintenance of IFP. These procedures must comply with IFPDS.PER.015.

IFPDS.PER.010. Declarations Concerning Instrument Flight Procedures.

Each IFPDS provider must establish a procedure for the chief designer to declare that an IFP has been designed in accordance with and meets every applicable standard and requirement prescribed by this part.

IFPDS.PER.015. Procedure Designer Qualification and Training.

(a) Each IFPDS provider must ensure that IFP designers have acquired and maintain the necessary competency level through training and supervised on-the-job training (OJT).

(b) Training for IFP designers must include an initial training and recurrent training at periodic intervals not to exceed 3 years.

(c) Initial training must ensure that the IFP designer is able to demonstrate a basic level of competency that includes at least the following elements:

(1) Knowledge of information contained in the IFP design criteria prescribed in Subpart D to this part; and

(2) Skills in the design of procedures.

(d) Recurrent training must ensure that the IFP designer is able to demonstrate a basic level of competency that includes at least the following elements:

(1) Knowledge about updates in ICAO provisions and other provisions pertaining to IFP design; and

(2) Maintenance and enhancement of knowledge and skills in the design of IFP.

(e) Each IFPDS provider must ensure that flight procedure designers have undergone an adequate, supervised OJT.

Subpart- C - Manual Requirements (MAN)

IFPDS.MAN.005. General.

(a) This subpart prescribes requirements for each IFPDS provider to prepare and maintain a manual.

(b) Each manual, and all of its revisions, must be acceptable to the LYCAA.

(c) Each IFPDS provider must:

(1) Ensure that its manual is amended, as required, to remain a current description of the IFPDS provider's organization, personnel and procedures;

(2) Ensure that any amendments made to its manual meet the applicable requirements of this part;

(3) Comply with the manual amendment procedure contained in its manual;

(4) Provide the LYCAA with a copy of each amendment to its manual, immediately after the amendment is incorporated into the manual; and

(5) Make such amendments to its manual as the LYCAA may consider necessary in the interests of aviation safety.

IFPDS.MAN.010. Manual Contents.

(a) Each IFPDS provider must provide the LYCAA with a manual containing:

(1) A statement signed by the director of instrument flight procedure design services , on behalf of the organization, confirming that:

(i) The manual defines the organization and demonstrates its means and methods for ensuring ongoing compliance with this part; and

(ii) The manual, and all associated manuals, operating, and maintenance instructions, must be complied with by the organization's personnel at all times.

(2) The titles and names of the chief designer required under IFPDS.PER.005. (a)(2) and all qualified designers.

(3) The duties and responsibilities of the chief designer and all qualified designers.

(4) An organization chart showing lines of responsibility of the senior persons in paragraph (a)(2).

(5) A summary of the organization's staffing structure.

(6) The detailed procedures required under Subpart D regarding IFP development.

(7) The detailed procedures required under Subpart E regarding IFP validation.

(8) The detailed procedures required under Subpart F regarding IFP design submissions and declarations.

(9) The detailed procedures required under Subpart G regarding IFP promulgation.

(10) The detailed procedures required under Subpart H regarding IFP maintenance.

(11) The IFP register required under IFPDS.PIP.015.

(12) The detailed procedures required under Subpart I regarding quality assurance.

(13) The detailed procedures, or an outline of the procedures including information that identifies the documentation that contains the detailed procedures, that are required under:

(i) LYCAR IFPDS.GEN.035.regarding data integrity;

(ii) IFPDS.VAL.020 (a) regarding the control, calibration, and maintenance of inspection. measuring, and test equipment; and

(iii) IFPDS.REC.005 regarding the identification, collection, indexing, storage, maintenance, and disposal of records.

(14) Detailed procedures to control, amend, and distribute the manual.

(b) The policies and procedures contained in the manual must not be contrary to any applicable LYCAR.

Subpart - D - Development of Instrument Flight Procedures (DIP)

IFPDS.DIP.005. General.

(a) In the interest of efficiency, regularity and economy, every effort must be made to ensure that instrument approach procedures (IAP) are evolved so as to keep to the minimum consistent with safety, both the time taken in executing an instrument approach and the airspace necessary for the associated manoeuvres.

(b) Except as provided in (c), only one IAP may be promulgated for each type of radio aid in relation to a particular runway.

(c) More than one IAP may be promulgated for each type of radio aid in relation to a particular runway if authorized by the LYCAA and only after joint consideration by the operators concerned.

(d) IFPDS providers must take steps during the development of IFP to minimize the disturbance to the local population caused by aircraft noise. When directed by the LYCAA, IFPDS providers must consult local noise abatement committees or similar bodies representing the populace of local communities/towns, local authorities, aerodrome and aerodrome and airspace users. The LYCAA may prescribe other requirements addressing how local noise abatement committees are included in the planning and introduction of new departure routes.

(e) The specifications contained in this subpart are based on conventional navigation equipment and operating practices and have been formulated with a view to achieving a reasonable degree of standardization. Exceptions are permitted only after joint consideration by the LYCAA and the operators concerned.

IFPDS.DIP.010. Design of Instrument Flight Procedures.

(a) Each IFPDS provider must establish detailed procedures for ensuring that every IFP developed Is:

(1) Designed or amended by a qualified designer, or an unqualified designer under supervision of a qualified designer, using methods ensuring that the procedure meets the applicable design criteria prescribed in LYCAR IFPDS.DIP.015.;

(2) Independently verified by a qualified designer who is independent of the person directly responsible for the design; and

(3) Validated as prescribed in Subpart E of this part.

(b) Each IFPDS provider must establish detailed procedures for ensuring that during the processes of design, maintenance, or transfer of data of an IFP:

(1) The applicable aeronautical data and aeronautical information complies with the standards specified in Standards for Aeronautical Information;

(2) Manipulation or processing of aeronautical data complies with the standards specified in Standards for Processing Aeronautical Data; and

(3) Any transfer of aeronautical information within the custodian’s organization, or to or from external entities, complies with the standards specified in the Aeronautical Information Transfer Model (AIXM-5).

IFPDS.DIP.015. Design Criteria.

(a) Every IFP must be designed in accordance with the appropriate design processes, standards, guidelines, and aeronautical data quality requirements contained in the following:

(1) ICAO Documents:

(i) Doc. 8168, Procedures for Air Navigation Services – Aircraft Operations — Volume I Flight Procedures, and Volume II, Construction of Visual and Instrument Flight Procedures;

(ii) Doc. 8697, Aeronautical Chart Manual;

(iii) Doc. 9365, Manual of All-Weather Operations;

(iv) Doc. 9613 Performance Based Navigation Manual — Volume I Concept and Implementation Guidance, and Volume II Implementing RNAV and RNP;

(v) Doc. 9905 Required Navigation Performance Authorization Required (RNP AR) Procedure Design Manual;

(vi) Doc. 9881, Guidelines for Electronic Terrain, Obstacle and Aerodrome Mapping Information; and

(vii) Doc. 9906, Quality Assurance Manual for Flight Procedure Design.

(2) Any other guideline or standard that is applicable to a particular type of instrument flight procedure and that is acceptable to the LYCAA.

(b) For the purposes of paragraph (a), if there is a conflicting difference between any of the applicable design processes, standards, guidelines, or aeronautical data quality requirements, the particular design process, standard or guideline to be used must be acceptable to, or specified by, the LYCAA.

(c) The design of an IFP must:

(1) Be coordinated with all appropriate air traffic service (ATS) providers; and

(2) Be compatible with any air traffic service and associated procedure that is provided within the area or areas of airspace where the IFP is intended to be established; and

(3) Take into account:

(i) Any special air traffic rules prescribed by LYCAR - Part (ATS);

(ii) Any other regulation restricting aircraft operations;

(iii) The classification and any associated designation of the airspace in which the IFP is to be established and any adjacent airspace that may be affected by the procedure; and

(iv) The effect that the proposed IFP may have on any other IFP established in the airspace.

(d) An IFP must not be designed for an aerodrome (including heliports) unless the operator of the aerodrome agrees in writing that the aerodrome may be used for IFR operations using the intended IFP procedure.

(e) An IFP must not be designed on or use a ground based aeronautical facility unless:

(1) The aeronautical facility is operated under the authority of Communication Navigation and Surveillance service operated in accordance with LYCAR Part (CNS); and

(2) The holder of the CNS service agrees in writing that the aeronautical facility can be used for the intended IFP.

IFPDS.DIP.020. Terrain Data to be Used in Instrument Flight Procedures Design.

(a) Terrain data and associated criteria relating to electronic terrain, obstacle and aerodrome mapping information must comply with the guidelines provide in ICAO Doc 9881 – *Guidelines for Electronic Terrain, Obstacle and Aerodrome Mapping Information*, and documents referenced by ICAO Doc 9881.

(b) When designing IFP, an IFPDS provider may:

(1) Utilize Shuttle Radar Terrain Model (SRTM) digital elevation data provided the data meet applicable accuracy and resolution requirements; and/or

(2) Apply such vertical and horizontal tolerances as are required based on the accuracy of available obstacle data, provide the tolerances applied are not less than any published ICAO tolerances for that obstacle type. All such added tolerances, and their sources, must be clearly identified in the design submission.

IFPDS.DIP.025. Determination of Visibility Minima Required to be Published in Instrument Flight Procedure Design.

Each IFPDS provider must establish and publish visibility minima for each instrument approach procedure and circling procedure in accordance with the criteria in documents identified in LYCAR IFPDS.DIP.015. (a) (1), or other criteria approved by the LYCAA.

IFPDS.DIP.030. Use of Design Automation Tools.

(a) Each IFPDS provider must utilize design automation tools to the maximum extent practicable in the design of each IFP in order to minimize the potential for design errors.

(b) Each IFPDS provider must ensure all design automation tools are validated prior to use using a tool validation methodology acceptable to the LYCAA.

Subpart - E - Validation of Instrument Flight Procedures (VAL)

IFPDS.VAL.005. General.

(a) This subpart prescribes the requirements for the validation of IFP.

(b) Validation comprises a ground validation element and may also comprise a flight validation element. In the case of RNAV procedures, a navigation database validation is also required.

IFPDS.VAL.010. Validation Package.

(a) Each IFPDS provider must compile an IFP validation package for use in the ground/flight validation process. Each validation package must include the following:

(1) A plan view of the final approach obstacle evaluation template, drawn on an appropriate topographical map of scale 1:50,000 to safely accommodate use for navigation, elevated terrain analysis, obstacles and obstructions evaluation;

(2) Completed documents that identify associated terrain, obstacles and obstructions as applicable to the procedure. The controlling terrain/obstacle must be identified and highlighted on the appropriate chart;

(3) Minimum altitudes determined to be applicable from map studies and database information for each segment of the procedure;

(4) A narrative description of the IFP;

(5) Plan and profile pictorial views of the IFP;

(6) Documented data as applicable for each fix, intersection, and/or holding pattern; and

(7) The output from the NAVAID coverage analysis together with any supporting data and design assumptions.

(b) Each IFPDS provider is responsible for all elements of the validation and must document their proposed validation activities in a plan and submit as early as possible to LYCAA for acceptance.

IFPDS.VAL.015. Ground Validation.

(a) Each IFPDS provider must establish detailed procedures for conducting the ground validation of an IFP. The aim of ground validation is to reveal any errors in criteria application and documentation, and assess the flyability of the IFP.

(b) Ground validation must comprises the following elements:

(1) Aerodrome assessment: Verification that the infrastructure required for the provision of an instrument runway as required by LYCAR;

(2) Navigational aid coverage: Verification that the navigational aid coverage infrastructure required for the IFP as required by LYCAR Part (CNS) and ICAO Doc. 8071 is in place;

(3) Obstacle clearance review: A review conducted by an authorized designer not involved in the design of the considered IFP for each route segment;

(4) Coding review: A review of the coding of RNAV IFP conducted by an authorized designer not involved in the design; and

(5) Flyability assessment: Verification that the IFP can actually be flown. The use of software tools is preferred, (e.g. PC-based to full flight simulator), in order to evaluate a range of aircraft types in various weight, speed and center of gravity configurations, and in various weather conditions (temperature, wind effects and visibility).

(c) Where a flyability assessment is conducted using a full flight simulator the following elements must be evaluated:

(1) All segments of the IFP must be assessed;

(2) In the case of SIDs and PDRs, all segments of the procedure from the Departure End of the Runway (DER) to joining the en-route structure or termination point must be assessed; and

(3) In the case of IAPs all segments of the procedure from the Arrival/ Initial Fix through to the Missed Approach must be assessed.

(d) Where procedures share the same segment of flight (e.g. initial), the shared segment needs only to be validated once.

(e) In the case of RNAV IFP a test database for the full flight simulator produced by an appropriate navigation data provider for use in the flight management system (FMS) must be used.

(f) Where a ground validation cannot fully verify the accuracy and completeness of all obstacle and navigation data considered in the procedure design or the flyability of the IFP, a flight validation must be conducted. In determining whether a flight validation is required the custodian must consider a number of factors. These include, but are not limited to the following:

(1) Deviation from design criteria prescribed in Subpart D;

(2) Speed restrictions applied in the design;

(3) Any segment length less than minimum prescribed optimum length;

(4) A descent gradient used in the design greater than 6.1% for a non-precision approach and 3.5° for a precision approach;

(5) Procedures designed for use in a challenging terrain area and/or dense obstacle environment;

(6) Use of a Step Down Fix (SDF) in the final approach segment;

(7) A track change of greater than 90° at a waypoint has been used within an RNAV procedure;

(8) The introduction of new procedures at an aerodrome;

(9) A procedure type that is new; and

(10) Special crew procedures and/or operational techniques likely to be necessary to fly the procedures.

IFPDS.VAL.020. Flight Validation.

(a) Each IFPDS provider must establish detailed procedures for conducting the flight validation of an IFP as required by this section. The flight validation procedures must include the use of equipment that:

(1) Has the precision, and accuracy traceable to appropriate standards, that are necessary for the validation being performed;

(2) Has known measurement uncertainties including, but not limited to, the software, firmware and crosswind uncertainties;

(3) Records the actual flight path of the validation aircraft;

(4) Is checked before being released for use, and at intervals not exceeding the calibration intervals recommended by the manufacturer, to establish that the system is capable of verifying the integrity of the IFP; and

(5) Is operated in accordance with flight validation system procedures and criteria by persons who are competent and current on the system used.

(b) Except as provided in paragraph (c), each IFP must be flight validated in accordance with the procedures required under paragraph (a) to ensure that:

(1) The IFP allows aircraft using the procedure to maneuver consistently within safe operating practices and pilot workloads for the categories of aircraft that the procedure is intended for;

(2) The IFP provides azimuth and distance information, and vertical guidance information for a precision approach ensure that an aircraft using the procedure remains clear of obstacles;

(3) The IFP is not affected by any radio frequency interference; and

(4) Visual guidance systems and cues for the runway are appropriate for the IFP and are not confused by lighting, pyrotechnic or laser displays, or any other visual distraction.

(c) The following IFP procedures do not require flight validation if it can be shown that current obstacle data meets the design requirements of the IFP:

(1) An en-route or an instrument arrival procedure unless:

(i) There is doubt about the coverage of the navigation system supporting the requirements of the procedure; or

(ii) The procedure limits the flyability and performance characteristics of the class of aircraft the procedure is designed for.

(2) An instrument departure procedure unless the procedure limits the flyability and performance characteristics of the class of aircraft the procedure is designed for.

(3) An amendment of a previously flight validated IAP if:

(i) The design change can be verified during the design process; and

(ii) A safety assessment of the proposed amendment has been completed and confirms that no additional risks to the safety of the procedure are introduced by the amendment.

(d) Where a flight validation is conducted the following elements must be evaluated:

(1) All segments of the IFP must be flown;

(2) In the case of SIDs and PDRs, all segments of the procedure from the Departure End of the Runway (DER) to joining the en-route structure or termination point must be flown; and

(3) In the case of IAPs all segments of the procedure from the Arrival/ Initial Fix through to the end of the Missed Approach must be flown.

(4) Flight validation of the visual maneuvering area must also be carried out.

(e) Where procedures share the same segment of flight (e.g. initial), the shared segment needs only to be validated once.

(f) In the case of RNAV IFP a test database produced by an appropriate navigation data-coding provider for use in the RNAV system must be used.

(g) In the case of RNAV (GNSS) IAPs of a T- or Y- bar design, manual entry of the procedure into the RNAV system in use is acceptable. In this case the validating pilot will need to manually activate the Course Deviation Indicator (CDI) scaling changes during the different phases of the flight.

(h) Each custodian of the IFP must establish procedures for justifying the application of paragraph (c) to an instrument flight procedure.

(i) Unless it is not practical to do so, the IFP designer must participate in the initial validation flight to assist in its evaluation and obtain direct knowledge of issues related to the procedure's design from the flight validation pilot.

IFPDS.VAL.025. Crew Requirements.

(a) Flight validations must be performed by qualified and experienced flight validation pilots. The qualifications and experience for flight validation pilots are specified in Appendix B to this part.

(b) The minimum crew of the validation aircraft must be one pilot to validate the IFP and an observer to assist the pilot in the validation process while observing the "out of cockpit" environment. In the case of an aircraft requiring two pilots, one of the pilots may carry out the observer role. It is required that the observer has successfully completed an ICAO PANS-OPS training course, or a training course accepted by the LYCAA as an equivalent, for the design and validation of IFP.

(c) Where the procedure to be flight validated is an RNAV (GNSS) IFP of a T- or Y- bar design and is to be manually loaded into the RNAV system, the flight validation pilot must ensure that the observer is fully competent in the use of the RNAV system to be used for the flight.

IFPDS.VAL.030. Aircraft Requirements.

The aircraft to be used for flight validation of an IFP must have the performance capabilities appropriate to the categories for which the IFP has been designed.

IFPDS.VAL.035. Meteorological Conditions.

All IFP validation flights must be conducted during daylight hours in visual meteorological conditions (VMC), which allow the flight to be carried out with a flight visibility of not less than 8KM, and in sight of the surface throughout the flight validation of the procedure.

IFPDS.VAL.040. Navigation Database Validation.

(a) Navigation database validation must be performed for all RNAV instrument flight procedures. Such procedures are coded using ARINC 424 path terminators to define specific nominal tracks, which are defined by waypoint location, waypoint type, and path terminator and, where appropriate, speed constraint, altitude constraint and course.

(b) Navigation database validation must ensure that the coding of the procedure in the RNAV/FMS system does not compromise the flyability of the procedure.

(c) If the database validation is unable to take place until after the effective date of the IFP, then NOTAM action must be required to delay the effective date.

IFPDS.VAL.045. Validation Reports.

Where a ground and/or flight and navigation database validation has been conducted, a report must be completed by each of the following where applicable:

(a) IFP designer;

(b) IFP flight validating pilot; and

(c) Relevant ATS unit.

Subpart - F - Approval of Instrument Flight Procedures (APP)

IFPDS.APP.005. General.

This subpart prescribes the requirements for:

(a) The design submission that must be submitted by the IFPDS provider to the LYCAA prior to the approval of each IFP; and

(b) Formal declarations required to be made by the IFPDS provider's chief designer; and

(c) IFP approval by the LYCAA.

IFPDS.APP.010. Requirement for Approval.

Each IFP, including each terminal flight procedure, intended for use by aircraft operating under IFR within the territorial limits of Libya must be approved by the LYCAA.

IFPDS.APP.015. Design Submission.

(a) The IFPDS provider must prepare and submit to the LYCAA a design submission for each IFP for which approval is sought. The submission must conform to the design submission template prescribed in IFPDS.APP.020 and Appendix C to this part.

(b) Each IFPDS provider must establish detailed procedures for preparing IFP design submissions as required by this section.

IFPDS.APP.020. Design Submission Format and Content.

Each IFP design submission must include the following items in the prescribed format:

(a) *Procedure Designator*. Each IFP must be assigned a unique designator in accordance with procedures prescribed in the relevant ICAO Annexes and Documents.

(b) *Data and Information*.

(1) All data used in the design process must be submitted in source format as well as any modified formats created during the design process. The data handling process used by the designer must be documented including any quality assurance and quality control processes, procedures and documentation.

(2) Where any maps or charts have been scanned or digitized such scans or digitized drawings must be included in the submission. It is the responsibility of the IFPDS provider to ensure that all relevant data and information is submitted and data handling techniques and routines are subject to appropriate quality assurance and quality control measures.

(3) Data and information must be subdivided into the following main groups:

(i) Aerodrome data and information

(ii) Survey data (thresholds, RWY centreline, elevations etc.)

(iii) Aerodrome layout plan

(iv) LYCAR Part 139 obstacle surfaces applicable

(v) Aerodrome operating certificate including any restrictions and/or conditions

(vi) Obstacle data:

(A) Surveyed obstacles

(B) Additional obstacles identified

(vii) Terrain models, if used

(viii) Any other overlay data used

(ix) Navaids data and information:

(A) Survey data of all NAVAIDs

(B) Calibration and/or commissioning reports

(C) NAVAID information (HOO, DOC, Frequency, Power output etc.)

(x) Geodetic data and information:

(A) Survey data on airfield geodetic reference points/monuments

(B) Local transformation parameters

(C) Local values of "N" Geoidal separation

(xi) Airspace data and information

(xii) Reference to any/all topographical maps used in design

(c) Drawings:

(1) All procedure design drawings must be included in the submission. The drawings may be electronic drawing files generated using CAD tool and drawing format acceptable to the LYCAA or paper drawings.

(2) Drawings must be structured in such a way that each segment of the procedure can easily be identified and isolated on the drawing.

(3) Obstacles and navigation aids must maintain same numbering and naming convention as used in the survey.

(4) The dominant obstacle for each segment must be clearly marked, identified and referenced to the survey or other data source.

(5) Drawing must be set-up in WGS 84 as a transverse Mercator projection and all set-up parameters must be declared.

(d) Calculations:

(1) All calculations and results of calculations must be presented in a manner that enables the LYCAA to follow and trace the logic and resultant output. A record of all relevant calculations must be kept in order to prove compliance to or variation from the standard criteria.

(2) The calculation record must be completed enough to prove and substantiate all the elements as required in the content prescribed in Appendix C to this part. Formulae used during calculation must be the standard formulae as declared in ICAO Doc. 8168 Volume II and related ICAO publications.

(3) Units of measurement and conversion factors must be as prescribed in LYCAR ANSP.GEN.025.

(4) Rounding of results must follow the standard guidelines in ICAO Doc. 8168 Volume II and related ICAO publications. Rounding must only be made at the publication stage to facilitate usable figures on maps and charts. Where rounding is required at earlier stages rounding must be made to the pessimistic consideration i.e. Obstacle heights rounded up, speeds rounded up, turn altitudes rounded down etc.

(5) Calculation records must be accompanied by an index and be cross-referenced to the procedures they apply.

(e) *Narratives*: A narrative which describes the IFP in textual format.

(f) *Charts*: A draft chart must reflect in graphic form the content of the narrative provided.

(g) *Design Reports*: A design report giving details of how the requirement has been satisfied and why the eventual procedure has evolved in its proposed form.

(h) *Validation Reports*: All validation reports as required under LYCAR IFPDS.VAL.045. .

(i) *Declarations*: The chief designer must formally declare using procedures established under LYCAR IFPDS.APP.025. that:

(1) The IFP has been developed, designed, and validated in accordance with the requirements of this part, and the custodian's procedures prescribed in the manual.

(2) The IFP is to be maintained by the IFPDS provider in accordance with the custodian's procedures required by Subpart H.

The chief designer must not make declarations concerning an IFP that the person has designed unless the checks required under LYCAR IFPDS.APP.025. have been verified by a qualified designer in the certificate holder's organisation that has not been involved in the design.

IFPDS.APP.025. Declaration of Compliance of Instrument Flight Procedures.

(a) Each IFPDS provider must establish a detailed procedure for the making of a declaration of compliance of every IFP that the custodian's organization proposes to promulgate.

(b) The procedure required by paragraph (a) must include details of the checks to be carried out by the chief designer concerning the particular type of IFP, to ensure that the IFP meets the applicable requirements and standards prescribed by this part.

IFPDS.APP.030. Approval of Instrument Flight Procedures.

(a) Except as provided in paragraph (b) of this section, before approving an IFP, the LYCAA must be satisfied that:

(1) The IFP has been developed and validated in compliance with the applicable requirements and standards of this part;

(2) The IFPDS provider has made a valid declaration of compliance as required under LYCAR IFPDS.APP.025.; and

(3) The IFP is safe and in the public interest; and

(4) The IFP will be maintained by an authorized IFPDS provider.

(b) Notwithstanding paragraph (a)(1), when authorized by the LYCAA in the certificate holder's operations specifications, an IFP may be developed and validated by a foreign flight procedure design organisation approved by, and in compliance with regulations and standards of, another State.

(c) The LYCAA will indicate approval of each IFP in writing.

Subpart - G - Promulgation of Instrument Flight Procedures (PIP)

IFPDS.PIP.005. General.

(a) This subpart prescribes the requirements for the promulgation and withdrawal of IFP.

(b) Each IFPDS provider must establish detailed procedures for promulgating and withdrawing IFP as required by this section.

IFPDS.PIP.010. Promulgation of Instrument Flight Procedures.

An IFPDS provider must not promulgate an IFP for use by aircraft operating within the territorial limits of Libya unless:

(a) The IFP has been approved by the LYCAA in accordance with Subpart F; and

(b) The details of the IFP are entered in the IFP register in accordance with LYCAR IFPDS.PIP.015.

IFPDS.PIP.015. Instrument Flight Procedure Register.

(a) Each IFPDS provider must establish and maintains an IFP register.

(b) The custodian must ensure that each IFP that is approved by the LYCAA in accordance with Subpart F will be entered into the IFP register. The register must contain the following information:

(1) The name or other appropriate identifier for the IFP:

(2) Aeronautical data to define and describe the IFP:

(3) The date that the IFP comes into effect; and

(4) For private use only IFP, the names of the private persons for whom the IFP is intended to be used.

(c) Each custodian must notify the LYCAA and each AIS provider authorized under LYCAR Part AIS of each amendment to the IFP register. When authorized by the LYCAA, approved IFP intended for private use only need not be published in the Libyan AIP.

(d) Each custodian must ensure that any transfer of aeronautical data associated with an IFP, from or to the IFP register complies with the standards specified in the Aeronautical Information Transfer Model (AIXM-5) document or other standards accepted by the LYCAA as an equivalent.

(e) When requested, the LYCAA may authorize the IFPDS provider to integrate the IFP register into the air navigation register that is required to be established and maintained under LYCAR IFPDS.MIP.010.

IFPDS.PIP.020. Withdrawal of Instrument Flight Procedure from Use.

(a) The LYCAA must approve, in advance, all withdrawals of an IFP from the IFP register.

(b) Except as provided in (d), each custodian must apply to the LYCAA for a withdrawal of an IFP from the IFP register at least 90 days before the intended withdrawal.

(c) If the LYCAA approves the withdrawal, the custodian of the IFP must withdraw the IFP from use by:

(1) Issuing a notice to each AIS provider authorized under LYCAR Part AIS and any other AIS provider publishing the IFP which will identify the IFP and specify the date that the procedure is to be withdrawn from use;

(2) For private use only IFP, issuing a notice to each authorized user of the IFP which will identify the IFP and specify the date that the procedure is to be withdrawn from use;

(3) On the date of withdrawal, remove the details of the IFP from the IFP register;

(4) Notify the LYCAA that the IFP has been withdrawn.

(d) Notwithstanding (b), the LYCAA may, by the most appropriate means, withdraw an IFP from use if the LYCAA has reasonable grounds to believe that:

(1) The IFP may be unsafe for use by aircraft operating under IFR; or

(2) The IFP is not being maintained in accordance with the applicable requirements of Subpart G.

(e) If the LYCAA approves the withdrawal of an IFP from use under paragraphs (c), the LYCAA will:

(1) Confirm in writing the withdrawal of the IFP with the custodian of the IFP; and

(2) Take appropriate action to ensure that the IFP is removed from the Libyan AIP and from operational use.

Subpart - H - Maintenance of Instrument Flight Procedures (MIP)

IFPDS.MIP.005. General.

This subpart prescribes the requirements for the maintenance of IFP.

IFPDS.MIP.010. Maintenance of Instrument Flight Procedures.

(a) Each IFPDS provider must establish detailed procedures for maintaining every IFP that, in accordance with the statement required under LYCAR IFPDS.APP.015. (h)(2), is maintained under the authority of the custodian.

(b) The procedure required by paragraph (a) must include details for every IFP to be reviewed, and flight validated if necessary:

(1) On a periodic basis, not to exceed five years, ensuring that the IFP continues to meet the applicable standards and requirements of this Part; and

(2) If there is a change in any of the data referred to in LYCAR IFPDS.GEN.030.(b) that may affect the integrity of the IFP.

(c) The procedure required under paragraph (a) must include and document the grounds and criteria for establishing or changing the interval between the periodic maintenance reviews for each IFP.

IFPDS.MIP.015. Errors in Published Instrument Flight Procedures.

(a) Each IFPDS provider must establish a procedure for recording, investigating, correcting, and reporting to the LYCAA any identified error, and any identified non-conformance or suspected non-conformance with the standards and requirements of this part, in an IFP that is maintained under the authority of the custodian.

(b) The procedure required by paragraph (a) must require that:

(1) An IFP is immediately withdrawn from operational use if the error or non-conformance referred to in paragraph (a) affects, or may affect, the safety of an aircraft operation; and

(2) The error or non-conformance is corrected, and declared as compliant with this part by a senior person who is appropriately authorized in accordance with LYCAR IFPDS.PER.010.; and

(3) The correction required by paragraph (2) is clearly identified and promulgated by the most appropriate means relative to the operational significance of the error or non-conformance; and

(4) The source of the error or non-conformance is identified, and:

(i) If possible, eliminated to prevent a recurrence; and

(ii) Preventive action is taken to ensure that the source of the error or non-conformance has not affected the integrity of any other IFP; and

(5) The LYCAA is notified, of a promulgated information incident relating to an error or non-conformance referred to in paragraph (a).

IFPDS.MIP.020. Cessation of Maintenance of an Instrument Flight Procedure.

If the IFPDS provider proposes to discontinue the maintenance of an IFP as required by this subpart, the custodian must comply with the requirements prescribed in LYCAR IFPDS.PIP.020.

Subpart - I - Quality Assurance (QAS)

IFPDS.QAS.005. Quality Assurance.

(a) Each IFPDS provider must establish a quality assurance system to ensure compliance with, and the adequacy of, the procedures required under this part.

(b) The quality system must incorporate the elements of a flight procedure design quality assurance system as described in ICAO Doc. 9906 and be in conformity with the International Organization for Standardization (ISO) 9000 series of quality assurance standards, and certified by an organization acceptable to the LYCAA.

(c) The quality assurance system must include:

(1) A safety policy and safety policy procedures, including the procedure required under LYCAR IFPDS.MIP.015. for investigating errors in promulgated instrument flight procedures;

(2) A procedure to ensure quality indicators, including personnel and customer feedback, are monitored to identify existing problems or potential causes of problems within the quality assurance system;

(3) A procedure for corrective action to ensure existing problems that have been identified within the quality assurance system are corrected;

(4) A procedure for preventive action to ensure that potential causes of problems that have been identified within the quality assurance system are remedied;

(5) An internal audit program for the organization to ensure conformity with the procedures in the manual and to achieve the goals set in the safety policy; and

(6) Management review procedures, that should include the use of statistical analysis if appropriate, to ensure the continuing suitability and effectiveness of the quality assurance system in satisfying the requirements of this Part.

(d) The procedure required under paragraph (c)(3) for corrective action must specify how:

(1) To correct an existing quality problem;

(2) To follow up a corrective action to ensure the action is effective;

(3) To amend any procedure required under this Part as a result of a corrective action; and

(4) Management will measure the effectiveness of any corrective action taken.

(e) The procedure required under paragraph (c)(4) for preventive action must specify how:

(1) To correct a potential quality problem;

(2) To follow-up a preventive action to ensure the action is effective;

(3) To amend any procedure required under this Part as a result of a preventive action; and

(4) Management will measure the effectiveness of any preventive action taken.

(f) The internal audit program required under paragraph (c)(5) must:

(1) Specify the frequency and location of the audits taking into account the nature of the activity to be audited;

(2) Measure the effectiveness of any preventative or corrective action taken by the personnel responsible for the activity being audited since the last audit; and

(3) Require preventative or corrective action to be taken by the personnel responsible for the activity being audited if problems are found by the audit.

(g) The procedure for management review required under paragraph (c)(6) must:

(1) Specify the frequency of management reviews of the quality assurance system taking into account the need for the continuing effectiveness of the system; and

(2) Identify the senior person responsible for the management reviews referred to in paragraph (g)(1).

(h) The senior person responsible for the quality assurance system must:

(1) Ensure that the safety policy and the safety policy procedures are understood, implemented, and maintained at all levels of the custodian's organization;

(2) Ensure that the audits are performed by trained auditing personnel who are independent of those having direct responsibility for the activity being audited;

(3) Ensure that the results of the audits are reported to the personnel responsible for the activity being audited;

(4) Ensure that all corrective and preventative actions are followed up to review the effectiveness of those actions;

(5) Ensure that the results of the management review are evaluated and recorded; and

(6) Have direct access to the director of instrument flight procedure services on matters affecting the quality of IFP developed, validated, approved, promulgated and maintained under this part.

Subpart - J - Records and Reports (REC)

IFPDS.REC.005. Management of Records.

(a) Each IFPDS provider must establish a procedure for the management of records that are required for the custodian organization's functions relating to the design, verification, declaration, registration and maintenance of IFP.

(b) The management of records under paragraph (a) includes the identification, collection, indexing, storage, safekeeping, accessibility, maintenance and disposal of records.

(c) The procedure required by paragraph (a) must provide for the following to be recorded for every IFP that is developed in accordance with Subpart D, validated in accordance with Subpart E, registered in accordance with Subpart G and every instrument flight procedure that is maintained in accordance with Subpart H :

(1) The details required by LYCAR IFPDS.PIP.015. for the IFP; and

(2) Details of each IFP design carried out in accordance including but not limited to design verification, amendment, validation, justification for not validating, and declaration activities; and

(3) Details of the promulgation and checking activities; and

(4) Details of any actions taken under LYCAR IFPDS.MIP.015. regarding errors and Non-conformances in an IFP; and

(5) Details of every maintenance review and flight validation carried out, in accordance with the procedures required by LYCAR IFPDS.MIP.010.

(d) The procedure required by paragraph (a) must also provide for the following:

(1) A record, that includes details of the qualifications, experience, training, assessments, and authorizations if applicable, for:

(i) The chief designer required by LYCAR IFPDS.PER.005. (a)(2);

(ii) Flight validation pilots required by LYCAR IFPDS.VAL.025.; and

(iii) Personnel required by LYCAR IFPDS.PER.005. (a)(3).

(2) The records required by paragraphs (c) and (d) to be legible, accurate, permanent, and retrievable in a legible format; and

(3) The records required by paragraph (c) must be retained for at least 1 year after the associated IFP is withdrawn from use.

IFPDS.REC.010. Promulgated Information Incident Reports.

(a) Each IFPDS provider must submit a promulgated information incident report to the LYCAA within 24 hours of the promulgated information incident.

(b) The report must include the following information:

(1) Date and time of the incident;

(2) Brief description of events;

(3) Details to identify the publication, map, chart, or other means by which the information or aeronautical data was promulgated;

(4) Details relating to the information or aeronautical data that gave rise to the incident;

(5) Name, organization, and contact details of the person notifying the incident.

Appendix A: Qualification and Experience Requirements

I. Chief Designer.

(a) The minimum standard for the qualifications and experience of a chief designer is:

(1) The qualification and experience requirements of a qualified IFP designer;

(2) Extensive experience in the design of the type of procedures to be designed and maintained by the certificate holder;

(3) Satisfactory completion of an advanced course in PANS-OPS procedure design;

(4) A thorough knowledge of current practices, LYCAA regulatory requirements, and ICAO standards relating to procedure design;

(5) A thorough knowledge of the principles of operation of relevant ground and space-based navigation systems;

(6) A thorough understanding of the operations manual and related systems, including application of the quality and safety management systems of the certificate holder.

(b) The minimum standard of recent experience for acceptance as a chief Designer is:

(1) Relevant design experience within the previous one year; or

(2) Satisfactory completion of an approved PANS-OPS procedures design course or an advanced course on PANS-OPS procedure design within the previous two years.

(c) In addition, a chief designer must have at least 10 years' general experience in the application of IFPDS through experience gained in air traffic control, as a flight crew member on IFR operations, in operational control of IFR operations, or other experience accepted by the LYCAA as equivalent. Experience may include time spent in the design of IFPDS.

II. Qualified Designers.

(a) The minimum standard for the qualifications and experience of a qualified designer is:

(1) Satisfactory completion of an approved PANS-OPS procedures design course or a training course accepted by the LYCAA as an equivalent;

(2) Satisfactory completion of a course of in-service training in procedures design as detailed in the designer's operations manual;

(3) Required minimum design experience in accordance with paragraph (c) of this section; and

(4) A written approval by the chief designer in accordance with paragraph (d) of this section.

(b) In addition, a qualified designer must have at least 5 years' general experience in the application of instrument flight procedures through experience gained in air traffic control, as a flight crew member on IFR operations, in operational control of IFR operations, or other experience accepted by the LYCAA as equivalent. Experience may include time spent in the design of IFPDS.

(c) Minimum Design Experience.

(1) Minimum design experience is required for each type of procedure to be designed.

(2) For the purposes of paragraph (a)(3) of this Subpart, the minimum practical design experience required is three designs of a particular procedure type, checked and approved by a chief designer, and completed within any twelve consecutive months.

Note: Once a designer has completed three designs of a particular type as indicated, and provided he has satisfied the other requirements, he may act as a qualified designer – but may only work unsupervised on those IFP types for which he has completed the experience requirement.

(d) *Approvals.* The chief designer must provide each staff member engaged in instrument flight procedure design as a qualified designer with a written statement specifying:

(1) That the person is a qualified designer;

(2) The types of procedure that the person is approved to design;

(3) Any limitations or supervision requirements that apply; and

(4) Any approval to supervise other design staff.

III. Apprentice Designers.

(a) Personnel who are not qualified under this part must not:

(1) Design a procedure for which approval is required under LYCAR Part IFPDS, except under direct supervision; or

(2) Verify or check a procedure for which approval is required under LYCAR Part IFPDS.

Appendix B: Requirements for Flight Validation Pilots

(a) *Qualifications*. Each IFP flight validation pilot must hold an airline transport pilot certificate issued in accordance with LYCAR Part Air Crew or be otherwise acceptable to the LYCAA.

(b) *Training*. Each IFP flight validation pilot must have successfully completed:

(1) An ICAO PANS-OPS training course, or a training course accepted by the LYCAA that provides a thorough knowledge of ICAO PANS-OPS procedures design principles and methods related to the design and validation of instrument flight procedures;

(2) A flight validation course conducted by LYCAA or an organization acceptable to the LYCAA and possess a letter of competency issued by LYCAA certifying competence to conduct flight validations; and

(3) A course in aerodrome lighting and visual approach slope guidance systems conducted by LYCAA or an organization acceptable to the LYCAA and possess a letter of competency issued by LYCAA certifying competence to conduct aerodrome lighting inspections.

(c) *Experience*. Each IFP flight validation pilot must have:

(1) At least 2 years' experience in the flight validations of IFP; and

(2) Completed an IFP flight validation flight within the previous year.

(d) *Rotorcraft*. Rotorcraft IFP procedures must be flight validated by pilots who, in addition to the above qualifications, are certificated in the rotorcraft category and helicopter class rating and are familiar with rotorcraft procedure design and operations. Should the validation pilot not be qualified as pilot-in-command of a helicopter (or other type of aircraft) to be used for a validation flight, another qualified pilot may be assigned to be the pilot in command (PIC) provided the validation pilot occupies either a control seat or a seat in close proximity to the PIC, and directs the conduct of the validation.

(e) Where required by the LYCAA, flight validation pilots must also comply with any additional requirements contained in the Quality Assurance Manual for Flight Procedure Design (ICAO Doc. 9906) – Volume 5: Validation of Instrument Flight Procedures, and Volume 6: Flight Validation Pilot Training and Evaluation.

Appendix C: Design Submission Template

I. The following template prescribes the minimum content of an IFP design submission.

The LYCAA may specify additional or alternative requirements.

(a) General Section - Common to all IFPDS.

(1) Runway Parameters including magnetic and true direction, variation used, threshold coordinates (WGS 84), convergence used (if using CAD grid), and elevation.

(2) Navigation aids used including frequency, magnetic variation, DOC, declination, coordinates (WGS 84) and where appropriate whether DME zeroing applies.

(3) Aerodrome reference point elevation and magnetic variation.

(4) Airspace (ATZ, CTR, CTA) dimensions.

(5) Communication frequencies associated with the procedure.

(6) Purpose of the procedure and most common arrival routes.

(7) Minimum equipment required for the procedure.

(8) Any redundancy alternatives considered in the design.

(b) General Section - Relating to specific IFPDS:

(1) A comprehensive design rationale including references to applicable design criteria.

(2) Reference points for the start and finish of each segment.

(3) Details of obstacle field including controlling/dominant obstacles for each segment.

(4) MOC used (primary and secondary areas) and the resultant calculations including allowance for excessive length for each segment as applicable.

(5) Allowances used for vegetation and buildings.

(6) Segment length.

(7) Details of significant terrain.

(8) Descent gradient.

(9) Speeds used.

(10) Bank angle used.

(11) Wind velocity used.

(12) Altitudes (maximum and minimum) per segment.

(13) Timings.

(14) Reference navigation aid.

(15) Fixes (including step down fixes) and the relevant tolerances.

(16) Tracks, radials, QDRs and QDMs applicable.

(c) In addition to the general requirements prescribed in (a) and (b), the individual requirements for each segment and specific type of flight procedures are listed in the following paragraphs.

(1) Holding/Racetrack/Reversal.

(i) Details of the holding facility or fix including tolerances

(ii) Inbound track, outbound track

(iii) Maximum speed

(iv) Maximum altitude

(v) Minimum altitude

(vi) Outbound limit

(vii) Entry procedures

(viii) Entry sector limitations if restricted joins applicable

(ix) ICAO template number if used
(x) Obstacle field
(xi) Dominant obstacle
(xii) Published parameters

(2) *Standard Arrival Routes*.
(i) Segment type and track guidance
(ii) Reference facilities
(iii) Track distances
(iv) Lead radials, and
(v) Changeover points
(vi) Step down fixes and minimum altitudes for each section

(3) Initial Segment.
(i) How many and why
(ii) Type (if a reversal is used confirm type)
(iii) All the design parameters including the speed, timings, minimum altitude, maximum altitude, inbound timings and/or distances, outbound timing, distances and/or limits, all tolerances used, all offset angles used and template number if used
(iv) Entry sectors for reversals and racetracks
(v) IAF and IF or start of Intermediate segment as applicable
(vi) Obstacle field applicable
(vii) Descent gradients and/or rates required
(viii) Dominant obstacle
(ix) Published parameters

(4) Intermediate Segment.
(i) IF or start of Intermediate segment
(ii) Alignment
(iii) Descent required
(iv) Proof of provision of a level portion of flight in this segment.
(v) Segment length
(vi) Obstacle field
(vii) Dominant obstacle
(viii) Maximum altitude
(ix) Minimum altitude
(x) Published parameters

(5) *Final Segment* - NPA with FAF:
(i) FAF and tolerances
(ii) Alignment and crossing point,
(iii) Reference facilities
(iv) Segment length
(v) Threshold crossing height
(vi) Missed Approach Point – how determined (timing, distance)
(vii) Missed Approach Point tolerances
(viii) Missed Approach Point distance from threshold
(ix) SOC parameters
(x) Obstacle field

(xi) Dominant obstacle
(xii) Step down fixes and minimum altitudes
(xiii) Minimum altitude - OCA(H)
(xiv) Descent gradient
(xv) Profile – distance vs. height
(xvi) Rate of descent required
(xvii) MOC applied
(xviii) Published parameters
(xix) Recommended profile*
(xx) Timing*
(xxi) Rate of descent*
(xxii) Distance from DME to threshold*

*(Note * = If DME available)*

(5a) Final Segment - NPA no FAF:

(i) Rate of descent
(ii) Timings

(6) Precision Segment.

(i) Final Approach Point
(ii) Basic ILS Surfaces infringements list
(iii) Localizer to threshold distances
(iv) Localizer sector width
(v) Glide path angle
(vi) Missed Approach Point
(vii) Threshold crossing height
(viii) Threshold elevation
(ix) OAS infringement list
(x) CRM including input criteria (*.obs file), and
(xi) OAS coefficients as used unchanged including any adjustments to the relevant constants
(xii) Obstacle field
(xiii) Dominant obstacle
(xiv) OCA(H)
(xv) SOC
(xvi) Height loss margins applied

(7) *Missed Approach* Segment.

(i) Start of climb
(ii) Climb gradient
(iii) OCA(H) due to missed approach obstacles
(iv) Proof of obstacle clearance to the missed approach obstacle (i.e. nominal altitude greater than required altitude)
(v) Turning point including tolerances (i.e. earliest turning point, latest turning point, minimum turn altitude etc.
(vi) Turn initialization area if turn altitude defined
(vii) Termination point & altitude of the procedure
(viii) All turn parameters (i.e. speed, altitude, temperature, ISA and TAS)
(ix) Textual missed approach instructions

(x) Obstacle field
(xi) Dominant obstacle

(8) Minimum Sector Altitudes.

(i) Reference(s) upon which center(s) based
(ii) Sector definitions
(iii) Distance between compound centers
(iv) DME subdivisions (if any)
(v) Obstacle field
(vi) Dominant obstacle for each sector
(vii) Published parameters

(9) Visual Maneuvering.

(i) Altitude
(ii) Speeds
(iii) Wind velocity
(iv) Bank angle
(v) Radius of turn
(vi) Rate of turn
(vii) Straight segment
(viii) Circling radius (referenced to ICAO Doc. 8168 PANS-OPS)
(ix) Divisions between circling Sectors (where appropriate)
(x) Obstacle field
(xi) Dominant obstacle for each circling sector