

THE SIERRA LEONE CIVIL AVIATION REGULATIONS



PART 24 – CONSTRUCTION OF INSTRUMENT FLIGHT PROCEDURES

DECEMBER 2022

PREAMBLE

WHEREAS, The Director-General shall have power to perform such acts, including the conduct of investigations, to issue and amend orders, rules, regulations and procedures pursuant to and in accordance with the Civil Aviation Act, 2019.

WHEREAS, the Director- General shall have power to publish all reports, orders, decisions, rules, and regulations issued under Civil Aviation Act, 2019 in such form and manner as may be best adapted for public information and use;

NOW THEREBY, The Director General under the powers given by Article 17(1) and 17(2) (a) of the Civil Aviation Act, 2019 issue the following regulations which supersedes previous regulations on Instrument Flight Procedure Design (IFPD) Service

1. SHORT TITLE

This regulation may be cited as Sierra Leone Civil Aviation Regulation “SLCAR Part 24- Instrument Flight Procedure Design (IFPD) Service”

2. EFFECTIVE DATE

This Regulation shall come into force as of the 21st day of December 2022.



Dr Moses Tiffa Bai
Director General

TABLE OF CONTENT

1. GENERAL	3
1.1 Definitions	3
1.2 Applicability	6
2. IFPD ORGANIZATION	7
3. IFP DESIGNER QUALIFICATIONS AND TRAINING	8
4. PROCEDURE DESIGN INFORMATION ACQUISITION	9
5. IFPD	10
6. INSTRUMENT FLIGHT PROCEDURE DESIGN VALIDATION	11
6.1 Ground Validation	11
6.2 Flight Validation.....	11
6.3 Flight Validation Pilot (FVP) Qualification	11
7. SAFETY ASSESSMENT	12
8. DESIGN APPROVAL AND PUBLICATION	12
9. PROCEDURE DESIGN AUTOMATION	13

GENERAL

In transposing Annexes and Docs to develop these regulations the latest Amendments have been considered

1. GENERAL

1.1 Definitions

- (a) Aeronautical chart” means a representation of a portion of the earth, its culture and relief, specifically designated to meet the requirements of air navigation;
- (b) Aeronautical data” means a representation of aeronautical facts, concepts or instructions in a formalized manner suitable for communication, interpretation or processing;
- (c) Aeronautical information” means information resulting from the assembly, analysis and formatting of aeronautical data;
- (d) Aeronautical Information Circular (AIC)” means a notice containing information that does not qualify for the origination of a Notice To Air Men or for inclusion in the Aeronautical Information Publication, but which relates to flight safety, air navigation, technical, administrative or legislative matters;
- (e) Aeronautical information product” means aeronautical data and aeronautical information provided either as digital data sets or as a standardized presentation in paper or electronic media and includes: —
 - (i) aeronautical information publication, including amendments and supplements;
 - (ii) aeronautical information circulars;
 - (iii) aeronautical charts;
 - (iv) notice to air men; and
 - (v) digital data sets;
- (f) Aeronautical information publication” means a publication issued by or with the authority of a state and containing aeronautical information of a lasting Character essential to air navigation;
- (g) Aeronautical information service” means a service established within the defined area of coverage responsible for the provision of aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation;
- (h) Aeronautical information publication amendment” means permanent change to information contained in the aeronautical information publication;
- (i) Aeronautical information publication supplement” means temporary changes to the information contained in the aeronautical information publication which are published by means of special pages;
- (j) Area navigation (RNAV).means 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;
- (k) Arrival routes.means routes identified in an instrument approach procedure by which aircraft may proceed from the en-route phase of flight to an initial approach fix;
- (l) Air traffic service route” means a specified route designed for channelling the flow of traffic as necessary for the provision of air traffic services;
- (m) Authority means Sierra Leone Civil Aviation Authority;

- (n) Flight procedure design service provider” means a service provider authorized through the issuance of a certificate to design, document, validate, maintain and periodically review flight procedures necessary for the safety, regularity and efficiency of air navigation;
- (o) Designer means a person adequately trained who performs the design of an instrument flight procedure.
- (p) Flight procedure design “means the complete package that includes all the considerations that went into the development of an instrument flight procedure.
- (q) Flight procedure designer” means a person responsible for flight procedure design who meets the competency requirements as laid down by the State.
- (r) Instrument approach procedure” 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;
- (s) Flight procedure design service” means a service established for the design, documentation, validation, maintenance and periodic review of flight procedures necessary for the safety, regularity and efficiency of air navigation;
- (t) Flight procedure process” means the overarching process from data origination to the publication of an instrument flight procedure
- (u) Integrity (aeronautical data)” means a degree of assurance that an aeronautical data and its value has not been lost nor altered since the data origination or authorized amendment;
- (v) Integrity classification (aeronautical data)” means classification based upon the potential risk resulting from the use of corrupted data classified as—
 - (i) routine data: there is a very low probability when using corrupted routine data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe;
 - (ii) essential data: there is a low probability when using corrupted essential data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe; and
 - (iii) critical data: there is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe;
- (w) Missed approach point” means 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;
- (x) Missed approach procedure” means that procedure to be followed if the approach cannot be continued;
- (y) Nautical mile” means the length equal to 1 852 metres exactly;
- (z) Navigation specification” means a set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace and there are two kinds of navigation specifications—

- (i) area Navigation specification — a navigation specification based on area navigation that does not include the requirement for on-board performance monitoring and alerting, designated by the prefix RNAV; and
- (ii) required navigation performance specification — a navigation specification based on area navigation that includes the requirement for on-board performance monitoring and alerting, designated by the prefix RNP;
- (aa) Obstacle” means all fixed (whether temporary or permanent) and mobile objects, or parts thereof, that—
 - (i) are located on an area intended for the surface movement of aircraft;
 - (ii) extend above a defined surface intended to protect aircraft in flight; or
 - (iii) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation;
- (bb) Obstacle clearance altitude or obstacle clearance height” means 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;
- (cc) Obstacle free zone” means 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 frangibly mounted one required for air navigation purposes;
- (dd) Obstacle or terrain data collection surface” means a defined surface intended for the purpose of collecting obstacle or terrain data;
- (ee) Operator” means a person, organization or enterprise engaged in or offering to engage in an aircraft operation;
- (ff) Operations manual” means a manual prepared by a service provider or a person applying for approval;
- (gg) Performance Based Navigation” means area navigation based on performance requirements for aircraft operating along an air traffic service route, on an instrument approach procedure or in a designated airspace;
- (hh) Precision approach procedure” means an instrument approach procedure utilizing azimuth and glide path information provided by an Instrument landing system or precision approach radar;
- (ii) Procedure altitude or height” means a specified altitude/height flown operationally at or above the minimum altitude/height and established to accommodate a stabilized descent at a prescribed descent gradient/angle in the intermediate or final approach segment;
- (jj) Procedure turn” means 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;
- (kk) Quality” means a degree to which a set of inherent characteristics fulfils requirements;
- (ll) Quality control” means part of quality management focused on fulfilling quality requirements;
- (mm) Quality management” means coordinated activities to direct and control an organization with regard to quality;

- (nn) Quality system” means the organisational structure, procedures, processes and resources needed to implement quality management;
- (oo) Reliability” means the probability that the service will perform its function or functions without failure for a specified period;
- (pp) Resolution” means a number of units or digits to which a measured or calculated value is expressed and used;
- (qq) Required navigation performance (RNP) means a statement of the navigation performance necessary for operation within a defined airspace;
- (rr) Safety management system” means a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures;
- (ss) Significant point” means a specified geographical location used in defining an air traffic service route or the flight path of an aircraft and for other navigation and air traffic service purposes;
- (tt) State safety programme” means an integrated set of regulations and activities aimed at improving safety;
- (uu) Terminal arrival altitude” means the lowest altitude that will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an arc of a circle defined by a 46 km (25 NM) radius centred on the initial approach fix, or where there is no initial approach fix on the intermediate approach fix, delimited by straight lines joining the extremity of the arc to the Intermediate Fix. The combined Terminal Arrival Altitude s associated with an approach procedure shall account for an area of 360 degrees around the Intermediate Fix;
- (vv) Terminal control area” means a control area normally established at the confluence of air traffic services routes in the vicinity of one or more major aerodromes;
- (ww) Terrain” means the surface of the Earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow, and excluding obstacles;
- (xx) Touchdown and lift-off area” means a load bearing area on which a helicopter may touch down or lift off;
- (yy) Touchdown zone” means the portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway;
- (zz) Transition altitude” means the altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes;
- (aaa) Waypoint” means a specified geographical location used to define an area navigation route or the flight path of an aircraft employing area navigation identified as either—
 - (i) fly-by waypoint” meaning a waypoint which requires turn anticipation to allow tangential interception of the next segment of a route or procedure, or
 - (ii) flyover waypoint” meaning a waypoint at which a turn is initiated in order to join the next segment of a route or procedure.

1.2 Applicability

- 1.2.1 This regulation prescribes the requirements for the design, continuous maintenance and periodic review of instrument flight procedures (IFP).

- 1.2.2 No person or entity shall provide an Instrument Flight Procedure Design (IFPD) service unless such organization has been approved to do so by the Authority.
- 1.2.3 The designated IFPD provider shall follow an instrument flight procedure process that encompasses acquisition of data, design and promulgation of procedures.
- 1.2.4 The designated IFPD provider shall ensure that the quality and safety of the procedure design product are assured through review, verification, coordination and validation of the procedure at appropriate points in the process.
- 1.2.5 The designated IFPD provider shall ensure that the units of measurement (ICAO Annex 5) are used in the design of IFP.

2. FLIGHT PROCEDURE DESIGN ORGANIZATION

- 2.1 The flight procedure design service provider shall maintain an appropriate instrument design office to enable the flight procedure designer to carry on design work in flight procedure in accordance with the requirements set out in this regulation.
- 2.2 The flight procedure design service provider shall ensure that the designs of instrument flight procedures are in accordance with:
 - a) applicable standards set out or referred to in PANS-OPS, ICAO Doc 8168, Vol I & II, and or
 - b) applicable standards as set out in this regulation.
- 2.3 The flight procedure design service provider shall make provisions for person(s) trained in flight procedure design to check and verify independently the plans of each instrument flight procedure designed.
- 2.4 The flight procedure design service provider shall develop and maintain operations manual which shall serve to demonstrate how the service provider will comply with the requirements set out in this regulation.
- 2.5 The contents of the operations manual shall include but not be limited to the following:
 - a) the information required of the flight procedure design service provider as mentioned in this regulation; and
 - b) a description of the flight procedure design office that shows the role, responsibilities and job functions of the flight procedure design office personnel who are responsible for ensuring the compliance of the organization with the requirements in sub-paragraph a).
- 2.6 The flight procedure design service provider shall:
 - a) keep the operations manual in a readily accessible form;
 - b) ensure that the flight procedure designer has ready access to the operations manual; and
 - c) amend the operations manual whenever necessary to keep its content up to date.
- 2.7 The flight procedure design service provider shall submit a copy of the most current operations manual to the Authority for approval
- 2.8 The flight procedure design service provider shall provide and maintain facilities for the design work on flight procedure as follows:
 - a) having available equipment appropriate for the design, design verification, flight validation, and maintenance of the types of flight procedure;

- b) 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 verification, and maintenance of the flight procedure; and
 - c) 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, and maintenance of the types of instrument flight procedure.
- 2.9 If an aeronautical database and aeronautical data is required for designing an instrument flight procedure, the flight procedure design organization shall ensure the integrity of the database and the data. The data used shall be current, traceable, and meets the required level of verifiable accuracy for the design.
- 2.10 The flight procedure design service provider shall establish an flight procedure development process. The flight procedure development process shall cover the entire lifespan of a flight procedure, from the initial development, including the approval and publication, and up to the withdrawal of the flight procedure.
- 2.11 The flight procedure design process shall establish a quality system for the entire flight procedure development process.
- 2.12 The flight procedure design service provider shall establish and put into effect, a system for controlling documents and records relating to the flight procedure on which the designer carries on design work, including the policies and procedures for making, amending, preserving and disposing of those documents and records.
- 2.13 The flight procedure design service provider shall, at the Authority's request, make the documents and records, or copies of them or extracts from them, available for inspection.

3. ENDORSEMENT OF FOREIGN DESIGNER APPROVAL / CERTIFICATE

- 3.1 An endorsement may be issued to an individual or organisation who meets requirements:
- a) able to provide to the Authority, evidence of authorisation provided by another State Civil Aviation Authority; and
 - b) submit a referral letter from the state of issuance.
- 3.2 The Authority may request for additional evidence if required.

4. FLIGHT PROCEDURE DESIGNER QUALIFICATIONS AND TRAINING

- 4.1 The flight procedure design service provider shall ensure that flight procedure designers are properly trained for their assigned functions and tasks. The flight procedure designers shall acquire and maintain this competency level through training and supervised on-the-job training (OJT).
- 4.2 The training for flight procedure designers shall include an initial training and recurrent training at periodic intervals.
- 4.3 The flight procedure design service provider shall ensure that the flight procedure design service provider designer is able to demonstrate a basic level of competency through initial training that includes at least the following elements:

- a) knowledge of information contained in PANS-OPS, ICAO Doc 8168, Volumes I and II and other related ICAO provisions relevant to procedure designs;
 - b) skills in the design of procedures; and
 - c) demonstration of competency as outlined in the competency framework for flight procedures design as outlined in ICAO Doc 9906 — Quality Assurance Manual for Flight Procedure Design, Volume 2 — Flight Procedure Designer Training.
- 4.4 The flight procedure design service provider shall develop and implement training programme and a training plan that is commensurate to the technical competence required by its staff;
- 4.5 The flight procedure design service provider shall maintain training records for their flight procedure designers.
- 4.6 Only designers approved by the Authority shall undertake the design, review, validation of Flight Procedures for operational use.
- 4.7 A person seeking approval as required in 4.6 shall:
- a) provide proof of successful completion of the training in the International Civil Aviation Organization Procedures for Air Navigation Services- Aircraft Operations criteria on the Construction of Instrument Flight Procedures;
 - b) demonstrate practical application of theoretical knowledge through the design of two flight procedures under supervision of a qualified designer; and
 - c) demonstrate ability to maintain a documented quality assurance process

5. PROCEDURE DESIGN INFORMATION ACQUISITION

- 5.1. The flight procedure design service provider shall ensure that the survey and subsequent flight procedure design activities are controlled and monitored by a person(s) trained in procedure design.
- 5.2 In the obstacle survey for procedure design, the flight procedure designer shall consider that:
- a) all obstacles be accounted for. Items, such as trees and heights of tall buildings shall be accounted for either by physical examination of the site or by addition of a suitable margin above terrain contours; and
 - b) the accuracy of the vertical and horizontal data obtained may be adjusted by adding an amount equal to the specified survey error to the height of all measured obstructions and by making a corresponding adjustment for specified horizontal error.
- 5.3 The procedure design data and information shall be coordinated with all relevant stakeholders. As input for the procedure design process the following aspects shall be assessed:
- a) airport, navigation aid, obstacle, terrain coordinate and elevation data, based on verified surveys and complying with with Sierra Leone Civil Aviation Regulations (SLCARs) Parts 11, 14 and 15 requirements
 - b) airspace requirements;
 - c) user requirements – the needs of Air Traffic Service provider and operators who will use this procedure;
 - d) airport infrastructure such as runway classification, lighting, communications, runway markings, and availability of local altimeter setting;
 - e) environmental considerations; and

f) any other potential issue associated with the procedure.

6. FLIGHT PROCEDURE DESIGN

- 6.1 Procedures shall be designed in accordance with the PANS-OPS criteria prescribed in ICAO Doc 8168, Vol I & II.
- 6.2 Coordination with all concerned parties shall continue throughout the procedure design and validation process to ensure that the procedure meets the needs of the user and the community.
- 6.3 The flight procedure design service provider shall ensure that each new or revised procedure shall be verified by a qualified procedure designer other than the one who designed the procedure, to ensure compliance with applicable criteria.
- 6.4 The flight procedure design service provider shall ensure that an obstacle clearance altitude / height (OCA/H) is published.
- 6.5 Published procedures shall be subject to periodic review at intervals not exceeding five years to ensure that they continue to comply with changing criteria, and continue to meet user requirements.

7. INSTRUMENT FLIGHT PROCEDURE DESIGN DOCUMENTATION

- 7.1 The flight procedure design service provider shall develop and maintain flight procedures design documentation that includes:
- a) information required for publication in the AIP;
 - b) details and assumptions made by the flight procedure designer such as:
 - (i) controlling obstacle for each segment of the procedure;
 - (ii) effect of environmental considerations on the design of the procedure;
 - (iii) infrastructure assessment;
 - (iv) airspace constraints;
 - (v) for modifications or amendments to existing procedures, the reasons for any changes;
 - (vi) for any deviation from existing standards, the reasons for such a deviation and details of the mitigations applied to assure continued safe operations; and
 - (vii) the results of the final verification for accuracy and completeness (quality assurance checks) prior to validation and then prior to publication.
 - c) additional documentation required to facilitate ground and flight validation of the procedure.
- 7.2 All documentation shall undergo a final verification for accuracy and completeness prior to validation and publication.
- 7.3 All procedure design documentation shall be retained, so as to allow any data anomalies or errors found during the production, maintenance or operational use of the procedure to be corrected. The periodic retention shall not be less than the operational lifetime of the procedure.

8. INSTRUMENT FLIGHT PROCEDURE DESIGN VALIDATION

Validation shall consist of ground validation and flight validation

8.1 Ground Validation

8.1.1 Ground validation shall always be undertaken.

8.1.2 When ground validation can verify the accuracy and completeness of all obstacle and navigation data considered in the procedure design, and any other factors normally considered in the flight validation, then the flight validation requirement may be dispensed with.

8.1.3 Ground validation shall review the entire instrument flight procedure package by a person(s) trained in procedure design and with appropriate knowledge of flight validation issues.

8.1.4 The ground validation shall be conducted to determine if flight validation is needed for modifications and amendments to previously published procedures.

8.2 Flight Validation

8.2.1 Flight validation of flight procedure when required shall be carried out as part of the initial record and shall be included as part of the periodic quality assurance programme. It shall be accomplished by a qualified and experienced Flight Validation Pilot (FVP).

8.2.2 The flight validation of flight procedure shall:

- a) provide assurance that adequate obstacle clearance has been provided;
- b) verify that the navigation data to be published, as well as that used in the design of the procedure, is correct;
- c) verify that all required infrastructure, such as runway markings, lighting, and communications and navigation sources, are in place and operative;
- d) conduct an assessment of fly ability to determine that the procedure can be safely flown; and
- e) evaluate the charting, required infrastructure, visibility and other operational factors.

8.2.4 The flight procedure design organization shall ensure that flight validation is conducted in accordance with the requirements of ICAO Doc 9906, Volume 5 — *Validation of IFP*.

8.3 Flight Validation Pilot (FVP) Qualification

8.3.1 The flight procedure design service provider shall ensure that a person conducting flight validation including simulator evaluation is a qualified and experienced flight validation pilot

8.3.2 The qualifications for FVP shall include:

- a) at least a commercial pilot licence with instrument rating. Alternatively, an equivalent authorization from the Authority meeting the SLCAR Part 1 knowledge and skill requirements for issuing the commercial pilot license and instrument rating is acceptable;
- b) the licence held by the FVP shall be for the aircraft category appropriate for the procedure to be validated; and

- c) meet all the experience requirements for the airline transport pilot licence in the relevant category of aircraft as describe in the personnel licensing regulations except that the FVP does not have to be the pilot-in-command of the validation flight nor is he required to have the type rating on the aircraft used for the validation flight.

8.3.3 The flight procedures designer shall provide all data required to conduct a flight validation, flight inspection, and flight simulator evaluation to the entity conducting the exercise.

9. SAFETY ASSESSMENT

9.1 The flight procedure design service provider shall carry out a safety assessment in respect of proposals for new flight procedure designs or any significant changes in a revised procedure. Proposals shall be implemented only when the assessment has shown that an acceptable level of safety will be met.

9.2 The safety assessment shall consider relevant factors determined to be safety-significant, including but not limited to:

- a) types of aircraft and their performance characteristics, including navigation capabilities and navigation performance;
- b) traffic density and distribution;
- c) airspace complexity; ATS route structure and classification of the airspace;
- d) aerodrome layout
- e) type and capabilities of ground navigation systems
- f) any significant local or regional data (e.g. obstacles, infrastructures, operational factors, etc).

9.3 Safety risk control/mitigation process shall include hazard/consequence identification and safety risk assessment.

9.4 As part of the safety assurance, the risk control/ mitigation process shall include a system of feedback. This is to ensure integrity, efficiency and effectiveness of the defences under the new operational conditions.

9.5 The flight procedure design service provider shall ensure that the results and conclusions of the safety assessment and mitigation process of a new or changed procedure are specifically documented, and that this documentation is maintained throughout the life of the instrument flight procedure.

10. APPROVAL OF FLIGHT PROCEDURES

10.1 A flight procedure for use by civil aircraft within Sierra Leone shall not be published unless the flight procedure is approved by the Authority.

10.2 The Authority shall only accept flight procedures for approval, submitted by approved procedure designers.

10.3 The approval process shall ensure that all the appropriate steps within the flight procedure design process have been completed, documented and signed off by the competent personnel.

- 10.4 Flight procedure designs submitted for evaluation and approval by the Authority are to be accompanied with:
- a) A complete record of the design process including copies of all source data, information, calculations and drawings used in the project;
 - b) A record of Quality Assurance and Quality Control;
 - c) A narrative, which unambiguously describes the procedure in textual format and table showing all tracks in degrees True to 1/100th degree;
 - d) A graphical representation which accurately reflects the content of the narrative provided;
 - e) Relevant signed validation reports;

11. FLIGHT PROCEDURE PUBLICATION

- 11.1 The flight procedure design service provider shall provide flight procedure designs or charts to the Aeronautical Information Service provider for publication in the AIP.
- 11.2 The flight procedure design shall be accompanied by a narrative, which describes the procedure in textual format and in compliance with the aeronautical cartographic requirements prescribed by the Authority.

12. USE OF AUTOMATION IN PROCEDURE DESIGN

- 12.1 The flight procedure design service provider using an automated flight procedure design tool shall ensure that such tool is validated.
- 12.2 Validation of the software shall be in accordance with the requirements of ICAO Doc 9906, Volume 3 — Flight Procedure Design Software Validation.

