



Flight Procedure Design Manual

TP-PANS OPS

Issue 02
July 2019

SAFETY & SECURITY REGULATION DEPARTMENT



DOCUMENT APPROVAL

This document, **Flight Procedure Design Manual**, reference **TP-PANS OPS**, Issue 02 of 05th July 2019, is approved by the Head ANS & ATC Licensing Inspectorate of Safety & Security Regulation Department for use by Authority Approved and applicant flight procedure design service providers.

Signature: _____

Date and official stamp: 05th July 2019





RECORD OF AMENDMENTS

Amendment No.	Subject	Source	Section affected	Entered by (Date)	Effective Date
-	Initial issue				01 Jan 2017
01	The regulatory process; Flight procedure designer approval; Flight procedure design approval; Roles and responsibilities; Maintenance, review and safeguarding; Flight procedure design flow process; Flight procedure design process description	ICAO Doc 8168, Vol II, 6 th Edition of 2014; ICAO Doc 9905, 2 nd Edition of 2016; ICAO Doc 9906, Vol. I, 1 st Edition of 2009.	Chapters 2 to 7; Appendices.	Joseph Lajoie (05 Jul 2019)	05 Jul 2019



FOREWORD

1. The Flight Procedure Design Manual is issued under the authority of the Chief Executive Officer of the Seychelles Civil Aviation Authority, pursuant to SCAA Amendment Act 2014.
2. The manual is directed at the applicant flight procedure design services wishing to provide their services to the Authority and Authority Approved flight procedure design service providers.
3. Application of the established procedures contained in this manual will ensure the smooth processing of flight procedure design services in a systematic, objective, fair and transparent. The ANS Inspector (PANS OPS) is to comply with the applicable procedures contained in this manual.
4. The latest version of this manual is published in electronic format on the Authority website at:
http://www.scaa.sc/index.php?option=com_content&view=article&id=140:scapans&catid=48&Itemid=836
or on request from the ANS & ATC Licensing Inspectorate at the email below.
5. The content of this manual is controlled by an approved amendment system and is not to be removed and used in any other format where it may be outside the control of the amendment system. The manual will only be distributed electronically by the Authority as a complete document and as such a list of effective pages is not considered necessary.
6. Amendments to the original issue shall be incorporated into the manual on receipt and the manual distributed as a complete revised document with amendment status indicated in the Record of Amendments page. All changes to the text from the previous version shall be identified by the use of strikethrough of the previous text and grey highlight of the new text until a subsequent amended document is issued. Each page will also indicate the amendment date and issue number. For clarity and simplification, all pages of the respective section will have the same amendment status upon amendment of one or more pages.

The Head ANS Inspectorate is responsible for amendments to this manual. Readers should forward advice of errors, inconsistencies or suggestions for improvement to the Head ANS & ATC Licensing Inspectorate at the email or the address below.

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ACRONYMS

AIP	Aeronautical Information Publication
ANSP	Air Navigation Service Provider
AFPD	Approved Flight Procedure Designer
ATM	Air Traffic Management
ATSP	Air Traffic Services Provider
CAD	Computer Aided Design
IAP	Instrument Approach Procedure
ICAO	International Civil Aviation Organisation
FPD	Flight Procedure Design
PANS-OPS	ICAO Doc. 8168, Procedures for Air Navigation Services Aircraft Operations – Volume II Construction of Visual and Instrument Flight Procedures
SID	Standard Instrument Departure
SOC	Start of Climb
SRD	Safety Regulation Division
STAR	Standard Instrument Arrival

Notes: Throughout this manual AIP is used to refer generically to Seychelles AIP.



Chapter 1

INTRODUCTION

1.1 Purpose of this manual

1.1.1 This manual has four purposes:

- a) To provide procedures and guidance to applicant flight procedure design services wishing to provide their services to the Seychelles;
- b) To provide procedures and guidance to Approved Flight Procedure Designers (AFPDs) for the Approval of flight procedure designs (FPDs);
- c) To indicate the Approval standards that are used for assessing an application;
- d) To describe how the responsibilities and accountabilities may be borne throughout the design process between the AFPD, the stakeholders and the Authority.

1.2 Definitions and terminologies

Approved Flight Procedure Designer (AFPD). An AFPD is a flight procedures designer who has met the competency standards laid down by the Authority and holds an Approval for the design of flight procedures for aerodromes or heliports, which are under the jurisdiction of the Authority.

Flight Procedures Designer. For the purposes of this manual a flight procedure designer shall be considered to be either:

- a) an organisation employing one or more suitably qualified individuals; or
- b) a suitably qualified individual.

Instrument Approach Procedure (IAP). A series of predetermined manoeuvres by reference to flight instruments, with specified protection from obstacles, from a specified point 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 other obstacle clearance criteria apply.

Instrument Flight Procedure (IFP). A standard instrument arrival, an instrument approach procedure, or a standard instrument departure.

Stakeholder. Air traffic services provider or other air navigation service providers, air operators, the airport authority, aviation associations, civil authority, military authority, environmental authority or an AFPD, who propose new FPDs, changes to existing flight procedures or withdrawal of flight procedures.



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Chapter 2

THE REGULATORY PROCESS

2.1 General guidelines

2.1.1 The regulatory process is based upon:

- a) Authority Approval of a flight procedure designer through evaluation of training, experience, procedures and working practices, as required by STS-PANS OPS;
- b) Authority safety oversight of an Approved Flight Procedure Designer (AFPD), in accordance with the PANS OPS Safety Oversight Programme and the procedures set out in Chapter 4 of TP ANS 02, ANS Safety Oversight Manual; and
- c) Authority evaluation and Approval of completed FPDs.

2.1.2 The Authority shall only accept FPD submissions from an AFPD.

2.1.3 A list of AFPDs shall be maintained on the Authority website. The publication of this list does not absolve stakeholders from carrying out whatever checks they might consider necessary to satisfy their own requirements.

2.1.4 All applications for Authority Approval shall be based solely on merit and compliance with the STS-PANS OPS and the associated procedures of this manual.

2.1.5 An Authority Approval shall be issued to successful applicants only.

2.2 Environmental considerations

2.2.1 General guidance can be given by the Air Transport Division in the Commercial Department of SCAA on environmental objectives relating to the exercise of its air navigation functions.

2.2.2 Practically, the policy is to contain rather than spread noise with tracks being routed away from concentration of population where safety and operational considerations permit.



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Chapter 3

FLIGHT PROCEDURE DESIGNER APPROVAL

3.1 Overview

3.1.1 The Authority considers that a combination of proper management organisation, specialist knowledge and experience provides the basis for an effective and safe FPD, which, when coupled to an effective management and documentation system, should ensure the output of a quality product that can be subjected to regulatory oversight.

3.1.2 Flight procedure design services may be provided by either an organisation or an individual approved by the Authority as set out in STS-PANS OPS, Section 1, SUBPART B, PANS OPS.1010 (a).

3.2 Criteria for the Approval of flight procedure designers

3.2.1 Flight procedure designers seeking Approval to design flight procedures for use in Seychelles airspace shall provide evidence of the following:

- a) Management organisation;
- b) Specialist PANS-OPS training;
- c) Practical application of theoretical knowledge;
- d) References;
- e) Aviation experience; and
- f) Quality Assurance.

3.2.1.1 Management organisation

Applicant shall have a documented organizational structure with clearly defined lines of accountability of personnel in respect to the provision of services. All delegated functions shall be clearly defined and documented.

3.2.1.2 Specialist training

Proof of attendance and successful completion of a PANS OPS training course based upon ICAO Doc 8168, Vol II and ICAO Doc 9905. A typical PANS OPS course is based on 4 to 8 weeks training or equivalent part-time basis, given by an experienced lecturer, who is well grounded in procedure design and all aspects of PANS OPS. However, where no formal training course has been completed, it may be acceptable to the Authority to provide evidence of a comprehensive “apprenticeship” under the supervision and training of an approved designer.

3.2.1.3 Practical application of theoretical knowledge

The ability of an applicant to demonstrate practical application of theoretical knowledge is required. Applicants are expected to provide proof of recent flight procedure design work which should include details of specific designs that have been completed and over what period of time. Where possible, examples of the design process should be provided.

3.2.1.4 References

Applicants should be prepared to provide details of previous stakeholders/employers.

3.2.1.5 Aviation experience

It is generally accepted that a high level of aviation experience is an important attribute for successful flight procedure design, ideally as aircrew or air traffic controller. It is not essential to hold a current licence nor to distinguish between a civil or military background. Flight procedure designers who have undergone an “apprenticeship”, in lieu of aviation experience, should provide evidence that supports a minimum of three years PANS-OPS on-the-job design training;

3.2.1.6 Quality Assurance

Applicants shall demonstrate that they have established and are able to maintain a documented quality assurance. This quality assurance shall be such that it enables the organisation to ensure that each FPD or any advice given with respect to any flight procedure issue is consistently quality assured and



conforms to international and national standards. The quality assurance shall be described in a quality document that includes control procedures at each step of the FPD, to ensure that the necessary levels of accuracy and integrity are achieved and maintained. Those control procedures shall be for:

- a) Management responsibility;
- b) A quality assurance, including:
 - i) controlled documentation of the design process;
 - ii) record control system of design drawings and worksheets;
 - iii) record control system of input data including items such as survey data and charting;
 - iv) record control system of regulatory documents and reference material;
 - v) control procedures for validation of software tools;
 - vi) control of non-conforming design;
 - vii) records of personnel competence and qualifications;
 - viii) training of flight procedure designers;
 - ix) internal quality audits and corrective actions;
 - x) co-ordination throughout the process from design to notification with the stakeholder and PANS OPS Office.

3.3 Application for Authority Approval

3.3.1 Applications for Authority Approval to provide flight procedure design services shall be submitted using Form SR PANS OPS 7618-A for organisations or Form SR PANS OPS 7618-B for individuals, available on the Authority website at:

http://www.scaa.sc/index.php?option=com_content&view=article&id=143:ans-forms&catid=48&Itemid=836

The application form shall be submitted along with the documented evidence specified in 3.2.1 of this chapter.

3.3.2 Submissions may be presented in a bound form or electronic format accompanied by the full approval fee. Unless the applicant considers it essential, original documents should not be forwarded to the Authority. Where original documents are included, the Authority accepts no liability for any consequential loss.

3.3.3 Applications for Approval to design will be acknowledged within 5 working days of receipt. Subject to a satisfactory submission of application material, arrangements for an initial audit visit will be proposed by the Authority, in accordance with the procedures set out in Chapter 4 of TP-ANS 02, ANS Safety Oversight Manual.

3.3.4 In considering the application, the Authority may call upon the applicant to provide clarification or additional evidence to those provided.

3.3.5 Subject to the outcome of the audit, Approval may either be granted or rejected. Where the Authority is unable to approve a flight procedure design service, consultation between the Authority and the flight procedure design service shall be initiated to explore all possible solutions. Where Approval is withheld, the Authority will notify the applicant and provide a full explanation for the decision.

3.3.6 The Authority will issue an Approval Certificate to successful applicants.

3.4 Issue of Approval

A flight procedure designer shall be entitled to have an Approval issued by the Authority when it has demonstrated compliance with the applicable technical standards of STS-PANS OPS and the associated procedures of this manual.

3.5 Approved Flight Procedure Designer privileges

3.5.1 An AFPD shall be entitled to design flight procedures within the scope of the Approval.

3.5.2 Other privileges shall include:

- a) application for changes to existing flight procedures on behalf of the stakeholders; and



- b) application for new flight procedures on behalf of the stakeholders.

3.6 Duration and continued validity

3.6.1 An AFPD Certificate shall be issued for two years and it shall remain valid for the period unless:

- a) the AFPD fails to demonstrate compliance with the applicable technical standards and associated procedures;
- b) the Authority is prevented by the AFPD, or any of its partners or subcontractors, from performing its safety oversight obligations;
- c) the Approval has been surrendered or revoked.

3.6.2 Upon surrender or revocation, the AFPD Certificate shall be returned to the Authority.

3.7 Safety Oversight of AFPD

Safety oversight of an AFPD shall be in accordance with the PANS OPS Safety Oversight Programme and procedures set out in Chapter 4 of TP-ANS 02, ANS Safety Oversight Manual.

3.8 Transferability

An AFPD Certificate granted in accordance with the technical standards set out in STS-PANS OPS and the associated procedures of this manual is non-transferable.



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Chapter 4

FLIGHT PROCEDURE DESIGN APPROVAL

4.1 Process and criteria for the submission of flight procedure designs for Approval

4.1.1 Design process (see flow diagram in Appendix 1)

4.1.1.1 In line with ICAO Doc 9906 – Quality Assurance Manual for Flight Procedure Design, Volume I, the flight procedure design process encompasses:

- a) the initiation and collection of requirements and constraints, including negotiations between the stakeholder and designer;
- b) the acquisition and validation of all data;
- c) the creation of a conceptual design, covering key elements of the overall strategy;
- d) review of the conceptual design by the stakeholder for agreement and approval;
- e) standard design criteria application;
- f) documentation of the draft FPD layout, report, calculation outputs, parameters used, coordinates, textual description;
- g) specific validation requirements (ground, flight validation and flight inspection);
- h) the conduct of a safety assessment to determine the level of safety impact;
- i) consultation with all relevant stakeholders
- j) regulatory activities associated with Authority Approval, including allowance for amendments and corrections to original submission (*approximately 1-2 Months*);
- k) production of the draft FPD package, including a graphical depiction, to the AIS to create a draft publication. This also includes verification of the draft publication for completeness and consistency and validation;
- l) publication in the AIP by AIS through the AIRAC process;
- m) feedback requests from stakeholder on the acceptability of the FPD;
- n) maintenance of the FPD on continuous basis due to significant changes to obstacles, aerodrome, aeronautical and navigational aid data, and to criteria and design specification that affect FPD; and
- o) periodic review to ensure all changes to obstacles, aerodrome, aeronautical, navigational aid data, design criteria and design specification that affect the FPD are assess.

4.1.1.2 The process also covers the entire lifespan of a FPD, from the initial development up to the withdrawal, recognizing that some of the process steps, such as AIP publication and regulatory activities, belongs to other organisations.

4.1.1.3 It is recommended that the process be periodically reviewed by the AFPD to ensure continuous improvement, particularly after the release of updates to the reference material.

4.1.1.4 The process, supported by the other volumes of the ICAO Doc 9906, and properly applied, should provide consistent results with an appropriate level of quality.

4.1.2 Design process notification

4.1.2.1 The design process is initiated by a stakeholder's requirement for a new FPD or change to an existing flight procedure. The stakeholder shall notify the Authority of the intention to develop new or change existing flight procedures, through the PANS OPS Office, using the Form SR PANS OPS 7616, available on the Authority website at:

http://www.scaa.sc/index.php?option=com_content&view=article&id=143:ans-forms&catid=48&Itemid=836

4.1.2.2 Formal notification to the Authority, once completed, shall be sent to ANS Inspector (PANS OPS) as instructed on the form.

4.1.2.3 Following receipt of the form, an acknowledgement will be sent to the stakeholder within 5 working days by the ANS Inspector (PANS OPS), who will act as the regulatory point of contact for the project.



4.1.2.4 Stakeholders applying for new flight procedures shall consider the design process involved, as presented in 5.1.1 above, when establishing realistic implementation dates.

4.1.3 Design criteria

4.1.3.1 The criteria for FPD in Seychelles airspace shall be in accordance with the technical standards set out in PANS OPS.2001 of STS-PANS OPS, as amended.

4.1.3.2 In accordance with the latest ICAO policy, significant national differences to PANS OPS, as appropriate, shall be notified in the Seychelles AIP. Where further guidance is required, the ANS Inspector (PANS OPS) should be approached for clarification.

4.1.4 Design submission – Format and Content

4.1.4.1 Application for Authority Approval of new FPDs or change to existing flight procedures shall be submitted to the Authority using the Form SR PANS OPS 7617, available at the SCAA webpage link in 4.1.2.1 on the previous page.

4.1.4.2 New FPDs submitted for Approval by the Authority shall include components of the design process of 4.1.1.1, as follows:

- a) A statement of compliance with STS-PANS OPS design criteria and the associated procedures of this manual, together with detailed notes on any deviations and evidence of approval for each deviation;
- b) Documentation throughout the various stages, including:
 - i) the conceptual design with the planned implementation date and resources needed to achieve the task;
 - ii) the draft FPD layout for publication together with coding advice when applicable;
 - iii) all data sources;
 - iv) all parameters used in calculations (speeds, bank angles, wind velocity, temperature, descent gradient, climb gradient, timings, height loss margins, obstacle assessment surface coefficients, etc.);
 - v) calculation outputs;
 - vi) coordinates;
 - vii) an unambiguous textual description of the draft FPD with a table showing all tracks in degrees to applicable standard accuracy;
 - viii) design assumptions and constraints;
 - ix) stakeholders feedback during the FPD process;
 - x) a record of quality assurance and quality control;
 - xi) relevant signed validation reports (ground flight validation and flight inspection);
 - xii) any other pertinent points of interest resulting from the FPD process, e.g. software tools used for the design; advantages and drawbacks of the assessed scenarios; potential difficulties for the execution of certain phases of the procedure; environmental issues; financial aspects.

4.1.4.3 Submission of change to an existing flight procedure for Approval by the Authority shall include components of the FPD process as appropriate to the significance of the change.

4.1.4.4 All submissions will be acknowledged within 5 working days of receipt by the Authority.

4.1.5 Design submission – External data and information

4.1.5.1 External data used in the FPD process shall be submitted in source format as well as any modified formats created by the AFPD. The data handling process used by the AFPD shall be documented, including all quality assurance processes to provide demonstrable proof of data quality and integrity. A full reference to any maps or charts is required. Copies of paper maps used will be required unless electronic versions are available.

4.1.5.2 Where any maps or charts have been scanned or digitized, such scans or digitized drawings shall be included in the submission, subject to copyright.

4.1.5.3 Flight procedures will only be included in the AIP where the runway served by the procedure has



been assigned an instrument runway designation in accordance with local aerodrome technical standards.

4.1.5.4 Current survey data and information are crucial to the design of safe flight procedures. ICAO Doc 9674 - WGS-84 Manual details the survey standards and presentation required by the Authority for obstacle and aerodrome data. Aerodrome surveys used for FPD purposes shall comply with ICAO Doc 9674. Any change to the survey will require an assessment as to the impact upon current flight procedures.

4.1.5.5 The AFPD is responsible for ensuring that the survey and subsequent FPD activities are controlled and monitored to an appropriate standard. Quality assurance and quality control processes set out in

4.1.5.6 ISO 9001:2015 aimed at service provision is a recommended benchmark.

4.1.6 Drawings

Computer-Aided Design (CAD) is a prerequisite for FPD submission and any appropriate tool can be used as required by the stakeholder and the AFPD. When CAD drawings are submitted to the Authority, they should be in a generic format (e.g. dwg or dxf).

4.1.7 Calculations

The calculations shall be presented in a manner that enables the Authority to follow and trace the logic and resultant output including:

- a) a record of all relevant calculations kept in order to prove compliance with or variation from the criteria;
- b) formulae and conversion factors used during calculation, which must be the standard formulae as prescribed in ICAO Doc 8168, Vol. II, Doc 9905 and related publications; and
- c) Units of measurement, which shall be in accordance with GEN 2.1.1 of the AIP.

4.1.8 Rejected submissions

Where the Authority is unable to approve a FPD, consultation between the Authority, stakeholder and the AFPD shall be initiated to explore all possible solutions, which can include redesigning the FPD or reconsideration of the requirements by the stakeholder.



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Chapter 6

ROLES AND RESPONSIBILITIES

(Refer to Appendix 2 – Process Description)

6.1 PANS OPS Office

6.1.1 Request for new FPD or change to existing flight procedures can be initiated by any stakeholder such as air navigation service providers, air operators, the airport authority, aviation associations, civil authority, military authority, environmental authority and the AFPD. This must be done through the PANS OPS Office, a Division within the ANS Department. The PANS OPS Office is responsible for:

- a) management of all approved flight procedures (IAPs, SIDs and STARs);
- b) coordinating the initiation of any new FPD or change to an existing flight procedure to the AFPD;
- c) ensuring that any new FPD or change to an existing flight procedure is undertaken by an AFPD;
- d) the conduct of safety assessment in collaboration with the SCAA Aviation Safety Office, stakeholders and supported the AFPD;
- e) ensuring the flight validation, as required, of any new FPD or changed flight procedure;
- f) ensuring that the AIP Change Request Form is submitted; and
- g) ensuring compliance with this manual during coordination and consultations with an AFPD and stakeholders;
- h) ensuring maintenance of flight procedures by an AFPD.

6.2 AFPD

The AFPD is responsible for:

- a) ensuring the implementation of the quality assurance stages of the design process specified in 4.1.1 b), c), d), e), f), g) (*ground validation only*), i), k), n) and o) of this manual, in collaboration with stakeholders, PANS OPS Office, other organisations, as appropriate;
- b) providing the components of the design process, as specified in 4.1.4 and 4.1.5 of this manual with Form SR PANS OPS 7617 for the Authority Approval;

6.3 Head ANS & ATC Licensing Inspectorate (HANS&ATCLI)

The HANS&ATCLI is responsible for:

- a) ensuring the provision of flight procedures, as appropriate, in collaboration with PANS OPS Office;
- b) granting Approval of flight procedure designers;
- c) granting Approval of new FPDs and changes to existing flight procedures; and,
- d) providing guidance to stakeholders and AFPDs, as appropriate, regarding flight procedure queries;
- e) managing the PANS OPS Safety Oversight Programmes.

6.5 ANS Inspector (PANS OPS)

The ANS Inspector (PANS OPS) is responsible for:

- a) acting as the regulatory point of contact to stakeholders and AFPDs;
- b) compiling all elements of the regulatory evaluation for the Approval process;
- c) recommending Approval of flight procedure designers, new FPDs and changes to existing flight procedures to the HANS&ATCLI; and,
- d) providing guidance to stakeholders and AFPDs, as appropriate, regarding flight procedure queries;
- e) implementing the PANS OPS Safety Oversight Programmes.



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Chapter 7

MAINTENANCE, REVIEW AND SAFEGUARDING

7.1 Maintenance

7.1.1 Maintenance of flight procedures includes updates due to:

- a) magnetic variation changes;
- b) new survey information; and
- c) changes to airspace structure.

7.1.2 A full review of flight procedures is required on a 5 yearly basis.

7.1.3 Changes to SIDs at the two designated aerodromes, Seychelles International Airport and Praslin Domestic Airport, shall be agreed with Authority prior to promulgation, and the Authority shall be informed of updates due to changes in magnetic variation.

7.1.4 Records supporting the flight procedure designs shall be kept throughout the lifetime of the flight procedure and for five years after any change or withdrawal.

7.2 Safeguarding of flight procedures

7.2.1 The assessment of the impact a proposed development or construction, or planned temporary obstacle, might have on an aerodrome's operation is known as safeguarding. The assessment shall include the impact on an aerodrome's flight procedures. PANS OPS Office in collaboration with the Aerodrome Authority are responsible for having the safeguarding assessment carried out.

7.2.2 The PANS OPS Office and the Aerodrome Authority are responsible, following a safeguarding assessment, for any NOTAM action required for temporary obstructions.



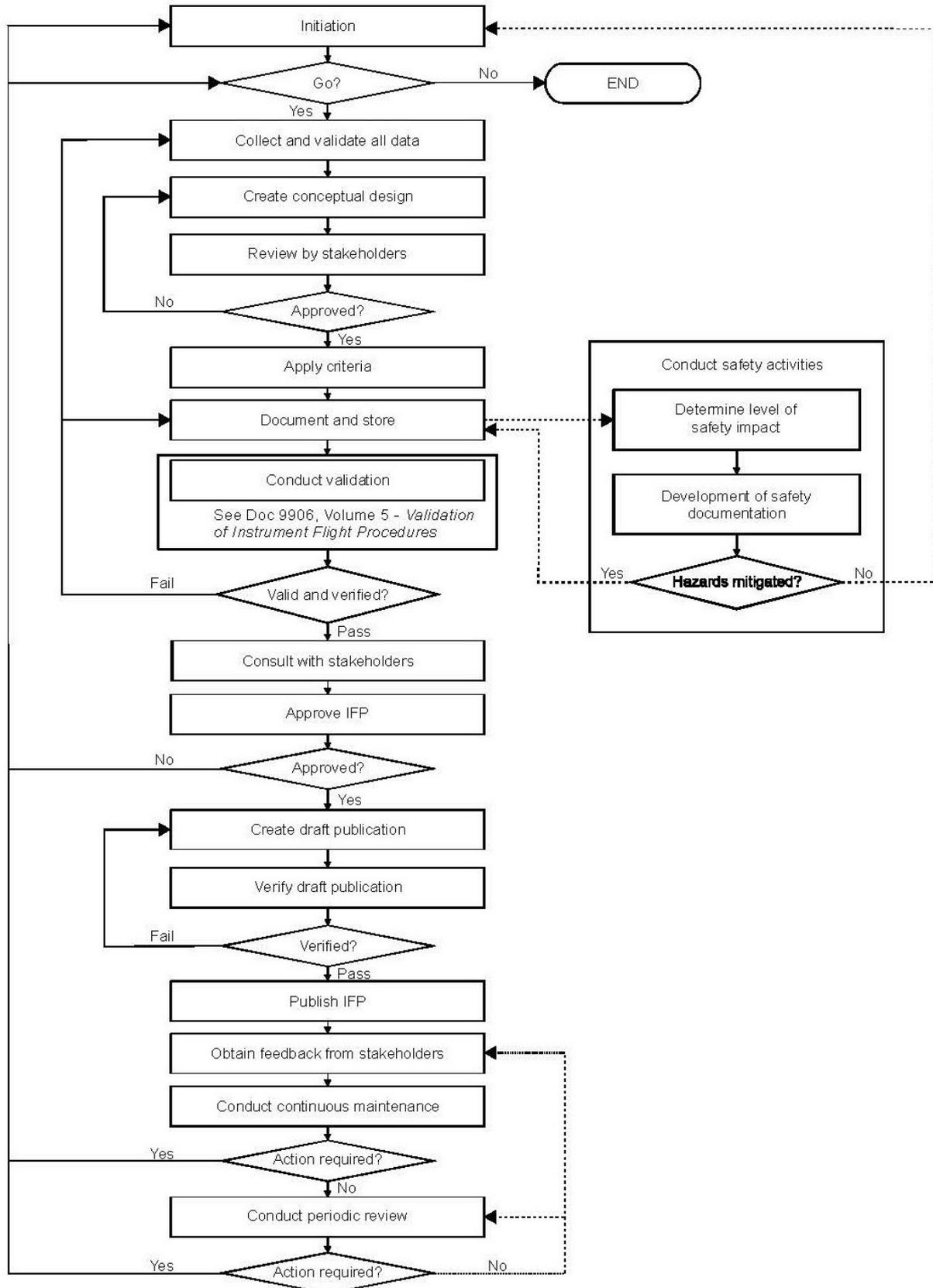
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APPENDIX 1

FLIGHT PROCEDURE DESIGN PROCESS FLOW DIAGRAM





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APPENDIX 2

FLIGHT PROCEDURE DESIGN PROCESS DESCRIPTION

Step	Description	Input	Output	Parties involved	Quality records	References
1	<p>INITIATION</p> <p>At the starting point a “pre-design” request is made for a new FPD or a change request to an existing FPD resulting from feedback, continuous maintenance or periodic review (see Steps 11 to 13).</p> <p>Justification for the FPD must be clearly stated and must be in accordance with the airspace concept and the State navigation strategy. It is a managerial responsibility to make a decision at this point to “go” or “no go”.</p>	<ul style="list-style-type: none"> • Request from a stakeholder for a new or a modified flight procedure. • Review of an existing flight procedure. • Navigation strategy considerations. • Resource planning. • Feedback on existing flight procedure. 	<ul style="list-style-type: none"> • Managerial decision to set up the FPD process or to discontinue the activity. 	<ul style="list-style-type: none"> • Stakeholders 		<ul style="list-style-type: none"> • ISO 9001:2015: section 8.2.2 “Determination of requirements for products and services”; section 8.2.3 “Review of the requirements for products and services”; section 8.3.2 “Design and development planning”; and section 8.3.3 “Design and development inputs”.
2	<p>COLLECT AND VALIDATE ALL DATA</p> <ul style="list-style-type: none"> • Specific ATS stakeholders’ requirements: local traffic patterns (altitude, direction, airspeed), feeder/transitions, arrival/departures, preferred routes, ATS routes, communication facilities, time, restrictions and any ATS needs, restrictions or problems. • The AFD is to collect from recognized sources, validate for resolution, integrity, reference geodetic datum and effective dates, and incorporate the following data into a FPD file: <ul style="list-style-type: none"> – Terrain data: electronic raster and/or vector data or paper cartographic maps. – Obstacle data: man-made and natural (tower/tree/vegetation height). – Aerodrome/heliport data: ARP/HRP, runway, lighting, magnetic variation and rate of change, weather statistics, altimetry source. 	<ul style="list-style-type: none"> • All stakeholder requirements. • Previous designs. • Data from State-recognized sources. • All other data. 	<ul style="list-style-type: none"> • Preliminary work file containing summary of stakeholder requirements, summary of all data. 	<ul style="list-style-type: none"> • AFD • PANS OPS Office. • AIS • Stakeholders • Data sources (e.g. surveyors, charting agencies, MET offices, etc.) 		<ul style="list-style-type: none"> • ICAO Doc 9906-<i>Quality Assurance Manual for Flight Procedure Design</i>. • ISO 9001:2015. • STS-ATS, STS-AIS, STS-AGA. • ICAO Doc 9674-<i>WGS-84 Manual</i>. • ICAO Doc 9881-<i>Guidelines for electronic terrain, obstacle and aerodrome mapping information</i>.



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	<ul style="list-style-type: none"> - Aeronautical data: airspace structure, classifications (controlled, uncontrolled, Class A, B, C, D, E, F, G, name of controlling agency), airways/air routes, altimeter transition altitudes/flight levels, other instrument procedure assessed airspace, area of magnetic unreliability. - Navaid data: coordinates, elevation, service volume, frequency, identifier, magnetic variation. • Existent waypoints significant to the planned navigation. 					
3	<p>CREATE CONCEPTUAL DESIGN A conceptual design is drafted with the key elements considering the overall strategy.</p>	<ul style="list-style-type: none"> • Preliminary work file. 	<ul style="list-style-type: none"> • Conceptual design. 	<ul style="list-style-type: none"> • AFPD. 		<ul style="list-style-type: none"> • ICAO Doc 8168, Vol. II Aircraft Operations , Construction of Visual and Instrument Flight Procedures. • ICAO Doc 9905- <i>RNP AR Procedure Design Manual</i>. • ISO 9001:2015: section 8.3.2 "Design and development planning".
4	<p>REVIEW BY STAKEHOLDERS Formal agreement and approval of the conceptual design is sought at this stage. If agreement and approval are not possible then either the AFPD must redesign the conceptual design or the stakeholders must reconsider their requirements.</p>	<ul style="list-style-type: none"> • Work programme to serve as basis for decision, including the scope of the activity to be performed. • Conceptual design. 	<ul style="list-style-type: none"> • Formally approved conceptual design or formal decision to discontinue, updated with any consequential changes, if applicable. • Planned implementation on AIRAC date, based on available resources and any other technical/ operational/ training constraints. 	<ul style="list-style-type: none"> • All concerned stakeholders. • AFPD. • PANS OPS Office. 	<ul style="list-style-type: none"> • Formally approved conceptual design or formal decision to discontinue, updated with any consequential changes, if applicable. 	<ul style="list-style-type: none"> • ISO 9001:2015: section 8.3.2 "Design and development planning"; and section 8.3.4 "Design and development controls".



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5	<p>APPLY CRITERIA Using the stakeholder-approved conceptual design, apply criteria.</p>	<ul style="list-style-type: none"> • Preliminary work file. • Formally approved conceptual design. • Planned implementation AIRAC date. • Resource allocation for the design and planning for publication. 	<ul style="list-style-type: none"> • FPD. • Draft procedure layout. • Report. • Calculation outputs • Coordinates. • Textual description of the procedure. 	<ul style="list-style-type: none"> • AFPD. 	<ul style="list-style-type: none"> • ICAO Doc 8168. • ICAO Doc 9905. • ISO 9001:2015, section 8.3 "Design and development of products and services".
6	<p>DOCUMENT AND STORE</p> <ul style="list-style-type: none"> • For traceability, complete necessary submission / calculation forms in paper and / or electronic formats. • Create a draft flight procedure graphical depiction. • Provide a summary of the logic and decisions used in the step-by-step design of the flight procedure. • Gather all information used and created in the design of the flight procedure and assemble into a submission package. • Obtain traceability of consensus from stakeholders via signatures. • Store submission package in a secure format and area, easily accessible for future considerations. 	<ul style="list-style-type: none"> • FPD. • Draft flight procedure layout. • Report. • Calculation outputs. • Coordinates. • Textual description of the flight procedure. 	<ul style="list-style-type: none"> • Data store FPD containing: all calculations; all forms and reports, including consensus from stakeholders; all charts/maps AIRAC textual description; path terminators (if applicable); and flight procedure plate (draft graphical depiction). 	<ul style="list-style-type: none"> • AFPD. 	<ul style="list-style-type: none"> • ICAO Doc 8168. • ICAO Doc 9905. • STS-AIS/ACS. • ICAO Doc 9906. • Authority forms.
7	<p>CONDUCT SAFETY ACTIVITIES</p> <p>Determine Level Of Safety Impact Perform an assessment of the magnitude of change to determine the amplitude needed for the safety case.</p> <p>Develop Safety Documentation Safety documentation to be provided for the implementation of a new flight procedure should be agreed at this stage. Normally the SMS to be used is defined for the stakeholder affected by the change or by the regulator responsible for the area where the flight procedure will be implemented.</p>	<ul style="list-style-type: none"> • FPD containing draft procedure layout, report, calculation outputs, coordinates, textual description of the flight procedure. 	<ul style="list-style-type: none"> • Formal statement on the significance of change, allowing to determine the amplitude of the safety case that needs to be performed. 	<ul style="list-style-type: none"> • Stakeholder Safety Office. • Affected stakeholders. • PANS OPS Office and AFPD support. 	<ul style="list-style-type: none"> • SMS technical standards, as applicable to the stakeholder. • Stakeholder SMS documentation • ICAO Doc 9859.



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8	CONDUCT VALIDATION AND CRITERIA VERIFICATION See ICAO Doc 9906, Volume V, "Validation of Instrument Flight Procedures" for detailed guidance.	<ul style="list-style-type: none"> • FPD package. • Safety case. 	<ul style="list-style-type: none"> • Validation report. 	<ul style="list-style-type: none"> • Validation personnel as per Doc 8168 (PANS-OPS), Vol. II, Part 1, Section 2, Chapter 4, 4.6 Ground and Flight Validation. 	<ul style="list-style-type: none"> • Results of validation. 	<ul style="list-style-type: none"> • ICAO Doc 8168. • ICAO Doc 9905. • STS-AIS/ACS. • ICAO Doc 9905, Vol. V. • ICAO Doc 9613.
9	CONSULT WITH STAKEHOLDERS <ul style="list-style-type: none"> • Submit all pertinent information to all relevant stakeholders for consultation. 	<ul style="list-style-type: none"> • Validated FPD. 	<ul style="list-style-type: none"> • Stakeholder endorsement. 	<ul style="list-style-type: none"> • AFPD. • Relevant stakeholders. 	<ul style="list-style-type: none"> • Stakeholder endorsement. 	<ul style="list-style-type: none"> • STS-PANS OPS. • TP PANS OPS. • ISO 9001:2015 section 8.2.1 c).
10	APPROVE FPD <ul style="list-style-type: none"> • Provide FPD documentation to the Authority for approval. 	<ul style="list-style-type: none"> • Validated FPD. • Stakeholder endorsement. 	<ul style="list-style-type: none"> • Approved FPD. 	<ul style="list-style-type: none"> • AFPD. • ANS Inspector (PANS OPS). • Head ANS & ATCL Inspectorate 	<ul style="list-style-type: none"> • Formal approval of the FPD for new procedures (or for relevant changes on existing flight procedures). 	<ul style="list-style-type: none"> • STS-PANS OPS. • TP PANS OPS.
11	CREATE DRAFT PUBLICATION <ul style="list-style-type: none"> • Provide FPD package, including a graphical depiction, to the AIS to create a draft publication. 	<ul style="list-style-type: none"> • Approved FPD. 	<ul style="list-style-type: none"> • Draft publication. 	<ul style="list-style-type: none"> • AFPD. • PANS OPS Office. • AIS. 		<ul style="list-style-type: none"> • STS-AIS/ACS. • ISO 9001:2015 Section 8.3.5, "Design and development outputs", section 8.3.4 Design and development controls, c) "Conduct of verification activities".
12	VERIFY DRAFT PUBLICATION <ul style="list-style-type: none"> • Verify the draft publication for completeness and consistency. 	<ul style="list-style-type: none"> • Draft publication. • Validated FPD. 	<ul style="list-style-type: none"> • Cross-checked draft publication. • Decision for publication release. 	<ul style="list-style-type: none"> • AFPD. • AIS PANS OPS Office. • ANS Inspector (PANS OPS) 		<ul style="list-style-type: none"> • STS-AIS/ACS. • ICAO Doc 8168, Volumes I and II. • ICAO Docs 9905. • ICAO Doc 8697 Aeronautical Chart Manual. • ISO 9001:2000 section 7.3.5 "Design and development verification"; and section 7.3.6 "Design and development validation".
13	PUBLISH FLIGHT PROCEDURE <ul style="list-style-type: none"> • AIS initiates the AIRAC process. 	<ul style="list-style-type: none"> • Cross-checked draft publication. • Decision for publication release. 	<ul style="list-style-type: none"> • AIP chart, documentation 	<ul style="list-style-type: none"> • AIS. 		<ul style="list-style-type: none"> • STS-AIS/ACS.



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14	<p>OBTAIN FEEDBACK FROM STAKEHOLDERS</p> <ul style="list-style-type: none"> • Request and analyse feedback from stakeholders on the accept- ability of the work performed. • Cross-check the AIP chart, documentation. 	<ul style="list-style-type: none"> • AIP chart, documentation. • Reports from stakeholders. 	<ul style="list-style-type: none"> • Decision for ongoing activities. 	<ul style="list-style-type: none"> • PANS OPS Office. • Stakeholders. 		<ul style="list-style-type: none"> • STS-AIS/ACS. • ISO 9001:2015, section 9.1.2 "Customer satisfaction".
15	<p>CONDUCT CONTINUOUS MAINTENANCE</p> <ul style="list-style-type: none"> • On a continuous basis ensure that: <ul style="list-style-type: none"> – significant changes to obstacles, aerodrome, aeronautical and navaid data are assessed. – significant changes to criteria and design specification that affect procedure design are assessed to determine if action is required prior to the periodic review. • If action is required, return to Step 1 to reinitiate process. 	<ul style="list-style-type: none"> • Significant changes in the FPD environment or design criteria changes that are safety related. 	<ul style="list-style-type: none"> • Revision as required. 	<ul style="list-style-type: none"> • AFPD. • PANS OPS Office. • Stakeholder . • Pilots (when applicable and possible). • Authority 	<ul style="list-style-type: none"> • If change is required, the reason(s) for the change. 	<ul style="list-style-type: none"> • STS-PANS OPS. • Doc 8168, Vol. II. • Doc 9905. • STS-AIS/ACS • ICAO Doc 9859. • ICAO Doc 9906.
16	<p>CONDUCT PERIODIC REVIEW</p> <ul style="list-style-type: none"> • On a periodic basis (periodicity determined by State, but no greater than five years) ensure: <ul style="list-style-type: none"> – that all changes to obstacles, aerodrome, aeronautical and navaid data are assessed; and – that all changes to criteria, user requirements and depiction standards are assessed. • If action is required, return to Step 1 to reinitiate process. 	<ul style="list-style-type: none"> • All changes in the FPD environment, design criteria or depiction standards. 	<ul style="list-style-type: none"> • Revisions as required. 	<ul style="list-style-type: none"> • AFPD. • AIS. • PANS OPS Office. 	<ul style="list-style-type: none"> • Results of the periodic review. • If change is required, the reason(s) for the change. 	<ul style="list-style-type: none"> • ICAO Doc 8168. • ICAO Doc 9905. • ICAO Doc 9859. • ICAO Doc 9906. • STS-PANS OPS. • STS-AIS/ACS



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