



## **CAR IFPD**

# **INSTRUMENT FLIGHT PROCEDURE DESIGN SERVICES**

**FOREWORD**

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**REVISION RECORD**

**LIST of EFFECTIVE PAGES**



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## **FOREWORD**

1. The Civil Aviation Authority Bahamas, known in these regulations as the “Authority”, has implemented CAR IFPD (Civil Aviation Regulations – Instrument Flight Procedure Design Services). The regulations are made under the Civil Aviation Authority Act - 2021.
2. CAR IFPD replaces CAGR Schedule 22C.
3. Other regulations involving Air Navigation Services are;
  - (a) CAR AIS - Aeronautical Information Services
  - (b) CAR CNS - Aeronautical Communications
  - (c) CAR MAP - Aeronautical Charts
  - (d) CAR MET - Aviation Meteorology Services
  - (e) CAR SAR - Search and Rescue
4. Unless otherwise stated, applicable Annex 11 definitions and abbreviations are used throughout this document. Refer also to CAR DEF for additional definitions and abbreviations.
5. The editing practices used in this document are as follows:
  - (a) ‘Shall’ or ‘Will’ or ‘Must’ is used to indicate a mandatory requirement.
  - (b) ‘Should’ is used to indicate a recommendation.
  - (c) ‘May’ is used to indicate discretion by the Authority, the industry or the applicant, as appropriate.

*Note: The use of the male gender implies all genders.*
6. Paragraphs and sub-paragraphs with new, amended and corrected text will be enclosed within brackets until a subsequent “amendment” is issued.

**REVISION RECORD**

<b>REVISION NO.</b>	<b>EFFECTIVE DATE</b>	<b>ENTERED BY</b> <i>(Hardcopy only)</i>
Initial Issue	25 March 2021	

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## CHAPTER 1

### GENERAL

#### 1.1 Applicability

- (a) In accordance with ICAO Annex 11 Appendix 8, the Authority shall;
  - (1) provide an instrument flight procedure design service; and/or
  - (2) agree with one or more Contracting State(s) to provide a joint service; and/or
  - (3) delegate the provision of the service to external agency(ies).
- (b) These regulations apply to the following;
  - (1) the granting of IFPD Approval to a person or organisation, termed the Flight Procedure Design organisation (FPDO), for the design of Instrument Flight Procedures (IFP);
  - (2) the approval of IFPs for publication in the Bahamas AIP and applicable charts; and
  - (3) approval requirements for Flight Validation Organisations
- (c) These regulations do not apply to the design of aircraft performance operating limitations or flight paths for critical engine inoperative emergency procedures.

#### 1.2 Approval Requirements

- (a) The Authority shall approve and remain responsible for all instrument flight procedures for aerodromes and airspace under their authority.
- (b) Any organisation or person responsible for the production of Instrument Flight Procedures shall be approved by the Authority.
- (c) The Authority shall ensure that an instrument procedure design service provider intending to design an instrument flight procedure for aerodromes or airspace under their authority meets the requirements established by the regulatory framework of The Bahamas.
- (d) The Authority shall ensure that an instrument flight procedure design service provider utilises a quality management system at each stage of the instrument flight procedure design process.
- (e) The Authority shall ensure that maintenance and periodic review of instrument flight procedures for aerodromes and airspace under their authority are conducted at an interval not exceeding five years.
- (f) The requirements of CAR IFPD apply to all organisations or persons (including sub-contractors) providing, or intending to provide, Instrument Flight Procedure Design (IFPD) and/or Flight Validation Services within The Bahamas' sovereign airspace.



- (g) The design, verification, maintenance, and promulgation of instrument flight procedures intended for use by aircraft operating under instrument flight rules (IFR) within The Bahamas Airspace shall meet or exceed criteria contained in the ICAO Doc 8168; Procedures for Air Navigation Services-Operations (PANS- OPS) Vol. II as well as any additional criteria stipulated by the Authority.
- (h) Whilst the function of producing an IFPD may be delegated to any organisation or person, the Authority retains the responsibility for all procedures used in The Bahamas airspace.
- (i) No person/organisation shall publish or submit for publishing an instrument procedure unless the procedure has been developed in accordance with the standards and criteria that are provided and has been approved by the Authority.
- (j) The IFPD must be produced only by persons that are suitably qualified and experienced in the application of PANS-OPS criteria, for the development of such procedures and have been authorised by the Authority for this task.
- (k) For the purposes of this CAR, an IFPDS provider may be either;
  - (1) an organisation employing one or more suitably qualified individuals; or
  - (2) a suitably qualified individual.
- (l) Where applicants for an IFPDS approval engage the services of a third party, the applicant shall ensure compliance with these regulations, subject to acceptance by the Authority.
- (m) The issuance of FPDO Approval or Flight Validation Organisation Approval, indicates only that the organisation is considered competent to design an IFP or conduct flight validation in accordance with the conditions prescribed by the Authority.
- (n) The failure of an FPDO, or flight validation organisation, to comply with any of the requirements of these regulations, or the provisions of any applicable operations manual issued as part of an approval may;
  - (1) constitute a breach of these regulations; and
  - (2) result in proceedings for any such breaches; and/or
  - (3) result in the refusal of an application for a renewal of IFPD Approval or Flight validation Organisation Approval; or
  - (4) result in action to suspend, revoke or impose conditions in respect of the provider's Acceptance or Approval.
- (o) The issue of an approval does not relieve any applicant or the pilot-in-command of a flight-check aircraft from the responsibility of compliance with these regulations and any other associated legislation in force.

### 1.3 Definitions

The definitions used throughout CAR IFPD may be found in CAR DEF.



## 1.4 Acronyms

ANS	Air Navigation Services
CRC	Cyclic Redundancy Check
BANS	Bahamas Air Navigation Services (Authority)
IFPD	Instrument Flight Design Procedure
IFP	Instrument Flight Procedure
RNAV	Area Navigation
RNP	Required Navigational Performance

## 1.5 Use of English

All IFPD related documentation, written communications and data (electronic or otherwise) for submission to the Authority, or used in the development or for the publishing of procedures, shall be provided in English.

## 1.6 Compliance with laws, requirements and procedures

An IFPDS provider or flight validation organisation shall ensure that all persons employed, engaged, or contracted to perform procedure design, validation, publication or maintenance activities, as may be applicable under their approval, are familiar with the appropriate sections of these regulations, including any applicable conditions of the provider's approval and the procedures specified in the approval holder's safety assurance documentation and or plan.



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## CHAPTER 2

### FLIGHT PROCEDURE DESIGN ORGANISATION (FPDO) APPROVAL

#### 2.1 Applicability

- (a) This Chapter applies to all IFPD organisations that currently provide or have submitted a request to the Authority to provide IFPD services in respect of the sovereign airspace of The Bahamas.
- (b) A person shall not provide an IFP service for procedures used within The Bahamas' airspace except under the authority of an instrument flight procedure service provision Approval, issued by the Authority.

#### 2.2 Application for Approval

- (a) An applicant for an IFPD approval, or a flight validation organisation approval, shall apply to the Authority, supplying;
  - (1) The applicant's name and address; and
  - (2) Payment of any applicable fees as required.
- (b) The applicant shall also provide to the Authority the following;
  - (1) An Operations Manual; and
  - (2) an IFP design report for each IFPD for approval by the Authority.

#### 2.3 Issue of Approval

- (a) IFPD approval will be granted when the applicant's operations manual provides sufficient evidence to satisfy the Authority that;
  - (1) the applicant has an appropriate and adequate management structure with detailed accountabilities and competencies for the safe design of IFPs;
  - (2) the applicant has appropriate and adequate quality management systems in operation to preserve the integrity of designed IFPs;
  - (3) the applicant has appropriate and adequate Safety Management Systems in place;
  - (4) any third-party use by the applicant is sufficiently controlled according to the quality and safety management systems as specified above; and
  - (5) the granting of the Approval is not contrary to the interests of aviation safety.
- (b) An applicant shall be granted an IFPD approval if the Authority is satisfied that;
  - (1) IFPs are designed by an FPDO that has complied with the specifications of Chapter 2; and
  - (2) the applicant sufficiently demonstrates in the IFP design report that;



- (i) if applicable, IFPs are designed by a third-party acceptable to the Authority;
- (ii) IFPs are appropriately flight validated; and
- (iii) IFP charts and description are appropriately disseminated.

## 2.4 Privileges of Approval

- (a) An IFPD Approval authorises a person or organisation to;
  - (1) Design, verify, validate, certify, and maintain instrument flight procedures; and
  - (2) Produce aeronautical information, including aeronautical data relating to instrument flight procedures that have been certified by the applicant and notified in the Bahamas' AIP, available for publication and operational use by an aircraft;
- (b) an IFPD approval shall specify the instrument procedure design services that the approval holder is authorised to provide.

## 2.5 Flight Procedure Design Organisation Approval

An applicant for the grant of an IFDS approval shall provide evidence of at least the following;

- (a) specialist procedure design training in accordance with a competency-based approach. (e.g. in accordance with ICAO Document 9906, Volume II, Flight Procedure Designer Training);
- (b) evidence of successful completion of a PANS-OPS training course based on ICAO PANS OPS Document 8168, given by an organisation or qualified individual acceptable to the Authority;
- (c) evidence of recent (within last 12 months) IFP design work which should include evidence of specific designs which have been approved for use;
- (d) appropriate references if experienced outside The Bahamas;

## 2.6 Operations Manual

An applicant shall provide the Authority with an operations manual containing;

- (a) a statement signed by the manager of the IFDS on behalf of the applicant's organisation confirming that the manual defines the organisation and demonstrates its means and methods for ensuring ongoing compliance with this part;
- (b) the titles and names of;
  - (1) a person identified as the Accountable Manager, who has the authority within the applicant's organisation to ensure that the service can be financed and is provided in accordance with the requirements of these regulations;
  - (2) a "Chief Designer" who is responsible for ensuring that the organisation complies with the design criteria requirements of this part, who authorises IFPs for promulgation and use;



- (3) a Head of Training responsible for ensuring that the organisation complies with the training requirements of this Chapter;
  - (4) a SMS manager responsible for the provision of a safety management system;
  - (5) a quality management manager responsible for the provision of a quality management system;
  - (6) a senior person responsible for compliance with all aspects of the IFPDS manual or manuals and/or other international or national requirements as may be specified by the Authority; and
  - (7) Sufficient personnel to manage, supervise, and support the approved procedure designers.
- (c) The duties and responsibilities of those listed above, including matters for which they have responsibility to deal directly with the Authority on behalf of the organisation;
- (d) An organisational chart showing lines of responsibility between the persons specified above;
- (e) Details of the organisation's staffing structure including job descriptions and safety responsibilities;
- (f) Policy, procedures, evidence or references supporting;
- (1) the integrity of the organisation;
  - (2) the implementation of Quality Management Systems;
  - (3) the implementation of Safety Management Systems;
  - (4) the implementation of any in house training mechanisms to maintain quality; and
  - (5) if applicable, the subcontracting of third parties.
- (g) a description of the entire operation;

## **2.7 Duration of Approval**

- (a) IFPD Approval shall be valid for a period of 2 years, unless it is previously suspended or revoked, and will be subject to such conditions as the Authority sees fit.
- (b) An IFPD approval, remains in force until it expires, or is suspended or revoked.
- (c) The holder of IFPD approval that have been suspended or revoked shall immediately surrender any certificate and associated approval to the Authority.

## **2.8 Quality Management System**

The applicant shall establish a documented Quality Management System compliant with ICAO Doc 9906 (Quality Assurance Manual for Flight Procedure Design) Volume 1 (Flight Procedure Design Quality Assurance System).

## 2.9 Safety Management System

- (a) The applicant shall establish a documented Safety Management System appropriate to the size and complexity of the operation in accordance with CAR SMS, for the proactive management of safety, that;
  - (1) integrates the management of operations and technical systems with financial and human resource management and that reflects quality assurance principles;
  - (2) includes policy and objectives for continuous improvement to the organisation's overall safety performance; and
  - (3) defines clear lines of safety accountability throughout the operator's organisation, including direct accountability for safety on the part of senior management.
- (b) The documented Safety Management System shall include;
  - (1) processes to identify actual and potential safety hazards and assess the associated risks;
  - (2) processes to develop and implement remedial action necessary to maintain agreed performance;
  - (3) provision for continuous monitoring and regular assessment of the appropriateness and effectiveness of the safety performance; and
  - (4) recurring processes for continuous improvement of the performance of the Safety Management System.

## 2.10 Personnel Training & Qualifications

- (a) The applicant shall provide evidence that;
  - (1) minimum technical qualifications, set by the organisation for its PANS-OPS procedure designers, have been met by all designers;
  - (2) an appropriate training programme, has been developed for its PANS-OPS technical staff, which will ensure that;
  - (3) IFP designers maintain competence through formal training courses and on the job training
  - (4) on the job training shall be compliant with the guidance and formats contained in ICAO Doc 9906 (Quality Assurance Manual for Flight Procedure Design), Volume 2 (Flight Procedure Designer Training).
  - (5) IFP designers have successfully completed formal training approved by the Authority, prior to commencing any IFP design related activity on behalf of The Bahamas.





- (6) specialist courses related to PBN operations as defined by ICAO Doc 9613 (Performance Based Navigation (PBN) Manual) shall be completed prior to commencing the design of any RNAV or RNP instrument flight procedure, if such training is not already part of the formal PANS-OPS course.
- (7) All training records are accurately and appropriately maintained for the PANS-OPS technical staff, and,
- (8) Records and procedures are established to;
  - (i) assess the level of competence of the authorised procedure designers;
  - (ii) maintain the level of competence of the authorised procedure designers;
  - (iii) provide their procedure designers with signed evidence of the scope of their authorisation; and
  - (iv) define job descriptions for the authorised procedure designers, containing safety responsibilities.
- (b) IFP designers shall, unless otherwise approved by the Authority, attend appropriate recurrent training courses suitable to the services being provided at least every 18 months.

### **2.11 IFP Design Tools Verification/Validation**

- (a) Automation in IFP design shall be introduced with the objective of improving the quality, efficiency and cost-effectiveness of service provision.
- (b) RNAV and RNP instrument flight procedures shall only be developed using expert procedure design tools or dedicated software packages with levels of automation that is acceptable to the Authority and validated in accordance with the requirements of sub-paragraph (e). The expert procedure design tools required under this sub- paragraph shall feature but is not limited to the following attributes;
  - (1) Interoperability with Aerodrome Mapping and Aeronautical Information Service databases.
  - (2) A Cyclic Redundancy Check (CRC) tool;
  - (3) Datum transformation and map projections;
  - (4) Geodetic computations to include distance and azimuth direct and inverse calculations, long line intersections between geodesics and geodetic and small circles, and slant ranges;
  - (5) Collinearity checks;
  - (6) Location checks within a geographic area;
  - (7) A convenient method of storing, tracking and retrieving data files; and
  - (8) User manual, data integrity guidance material, user training and software programme updates.



- (c) All software that is used in the calculation of waypoints, coordinates and obstacle surfaces as part of an IFP shall be validated prior to use. According to the extent of the concerned procedure design tool's functions the following steps required for validation shall be included within the Design organisation's Quality Management System;
  - (1) The test procedures required to validate and check correct calculations from the software; and
  - (2) The maintenance procedures for patching or updating the software.
- (d) The software tool shall not be considered validated following the software update, until revalidated as stated above.
- (e) Test and validation procedures for software tools shall comply with ICAO Doc 9906 (Quality Assurance Manual for Flight Procedure Design), Volume 3 (Flight Procedure Design Software Validation) or equivalent.

## 2.12 Resource Requirements

- (a) An applicant for an instrument flight procedure design service approval shall;
  - (1) have available equipment appropriate for the design, design verification, certification, validation, and maintenance of the types of instrument flight procedure that are specified in the applicant's Operations Manual;
  - (2) have access to relevant and current data including, but not limited to, aeronautical data, any land contour data, and obstacle data for the design, design verification, validation, and maintenance of the instrument flight procedures certified by, and maintained by, the applicant's organisation; and
  - (3) 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, certification, flight validation, and maintenance of the types of instrument flight procedure that are specified in the applicant's Operations Manual.
- (b) An applicant for an instrument flight procedure service approval, shall establish a procedure for ensuring that;
  - (1) personnel have access to the data referred to in paragraph (a)(2) for the types of instrument flight procedure specified in the applicant's Operations Manual; and
  - (2) the data referred to in paragraph (a)(2) is current, traceable, and meets the required level of verifiable accuracy for the design, design verification, flight validation, and maintenance of instrument flight procedures specified in applicant's Operations Manual.
- (c) An applicant for an instrument flight procedure service certificate shall establish a procedure for controlling all documentation required by paragraph (a)(3) to ensure that;
  - (1) the documentation is reviewed and authorised by an appropriate person before issue and use;



- (2) current issues of relevant documentation are available to personnel at every location if access to the documentation is required;
- (3) every obsolete document is promptly removed from every point of issue and use;
- (4) a change to documentation is reviewed and authorised by an appropriate person before issue and use; and
- (5) the current version of every item of documentation can be identified to prevent the use of superseded material.

### **2.13 Use of Third Parties**

Where third parties are used the applicant shall;

- (a) identify the third party;
- (b) detail those requirements that will be satisfied by the third party;
- (c) remain responsible for ensuring third party compliance with these regulations; and
- (d) notify the Authority of any change to the third party.



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## CHAPTER 3

### INSTRUMENT FLIGHT PROCEDURE (IFP) APPROVAL

#### 3.1 Instrument Flight Procedure Approval

- (a) A Design Organisation approved to publish an IFP shall comply with these regulations at all times.
- (b) A Design organisation shall ensure the compliance of any third parties used while satisfying these regulations.
- (c) On Approval of the IFP design report;
  - (1) Instrument Flight Procedures shall be published in The Bahamas AIP in accordance with the Instrument Flight Procedures Review Period and any conditions that the Authority may prescribe;
  - (2) Applicants shall assume continuous ownership and responsibility for IFPs, including data management; and
  - (3) Applicants shall be responsible for safeguarding procedures and the assessment of new obstacles that requires a revalidation of IFPs.

#### 3.2 Approval submission

- (a) An IFP design report shall be provided to the Authority containing the evidence that any IFP has been constructed, designed, and will be maintained, in accordance with these regulations.
- (b) An IFP design report shall contain the following documentary evidence;
  - (1) Details of the design criteria used in the construction of the instrument flight procedure, including;
    - (i) a statement of the procedure's compliance with respect to the use of third parties and;
    - (ii) a comprehensive design rationale in text format; and
    - (iii) references to those parts of Doc 8168 (Procedures for Air Navigation Services Aircraft Operations) Volume 2 where a deviation from the standard criteria or policy has been employed.
  - (2) A description of the procedure, including;
    - (i) signatures of the procedure designer and nominated checker as respectively; and designated waypoint names, type and coordinates;
    - (ii) obstacles assessed in the construction of the procedure including height and position coordinates;



- (iii) a description of the source of obstacle, terrain and aerodrome data used as applicable in the design of the IFP;
  - (iv) a diagram detailing the obstacle surfaces used in plan and profile view;
  - (v) procedure chart; and
  - (vi) textual narrative that describes, in an unambiguous manner, the flight procedure.
- (3) A description of the flight validation procedure, including;
- (i) evidence of aircraft used;
  - (ii) flight crew and certification Approvals; and
  - (iii) the flight test report.

### 3.3 Design Safety Requirements

- (a) Applicants shall ensure that the IFP design construction is;
- (1) completed by a Design Organisation in possession of IFPD Approval and is compliant with the requirements of Chapter 2;
  - (2) undertaken with sufficient documented coordination between ATC, the Aerodrome Operator/Certificate holder, Airways Facility Services and the Design Organisation where applicable, and shall include;
    - (i) a review of the obstacles applicable to the procedure with the aerodrome Operator/certificate holder prior to any design work; and
    - (ii) development of a flight check plan, taking into account the requirement for operational ground navigation;
    - (iii) validation of both the operational and certification status of all applicable navigation aids.
- (b) The applicant shall establish formal records and procedures to ensure that;
- (1) there are sufficient cross checks to detect erroneous calculations;
  - (2) required separations in the proximity of adjacent air traffic routings are maintained;
  - (3) potential navigation database limitations are addressed before the procedure is coded and approved; and
  - (4) the Authority is informed and a reassessment of the IFP minimum altitudes undertaken when;
    - (i) there is a potential obstacle infringement of the IFP protected surfaces; or



- (ii) there is a potential breach of aerodrome protected surfaces stipulated through aerodrome safeguarding.
- (c) A NOTAM to suspend the IFP is promulgated when a potential infringement or breach as specified by sub- paragraph (b)(4) above, is confirmed.
- (d) All documentation used in the production of the IFPD, shall be kept securely and retained for traceability, from the commencement of the development of the design and should be made available to the designated ANS Inspector, within a specified period of time, upon request.

### 3.4 IFP Design Procedures

- (a) All IFPs shall be designed adhering to the methodology and design criteria specified in ICAO Doc 8168 (Procedures for Air Navigation Services – Aircraft Operations) Volume II ensuring, in particular, that required obstacle clearances are achieved.
- (b) When the IFP being developed is an RNAV based procedure, then the additional requirements from ICAO Doc 9613 (Performance Based Navigation (PBN) Manual) Volumes I, shall also apply.
- (c) As applicable, the provisions from ICAO Doc 9906 (The Quality Assurance Manual for Flight Procedure Design) in the construction of flight procedures shall apply.

### 3.5 IFP Review Period

- (a) All IFPs published in The Bahamas AIP, shall be reviewed every 12 months, but not exceeding 5 years, for change in criteria, obstacle clearance/OLS infringements, Navigational Aid functionality, user requirements or change to Aerodrome Physical Characteristics, which may affect published minima, procedure usability or charting information.
- (b) Reviewed procedures must follow the same process indicated for initial submission of an IFPD, to the Authority, for inspection.

### 3.6 IFP Source Data

- (a) Source data used in the development of IFP procedures shall include, as applicable, all aerodrome navigation aids, obstacle and terrain data as specified in ICAO Annex 14, Vol. I and the Operations Manual– Aeronautical Information Services.
- (b) All data used as the basis for IFP design shall be traceable to the origin and shall have as a minimum the following metadata available;
  - (1) the name of the source or entity originating the data;
  - (2) the function performed by the source or entity; and
  - (3) the date at which the function was performed.
- (c) The requirements for survey frequency are as follows;



- (1) A geodetic survey sufficient to meet the requirements of ICAO Annex 14, Vol. I and the Operations Manual- Aeronautical Information Services shall be undertaken for all aerodromes with instrument procedures;
  - (i) at the time of the initial aerodrome survey; and
  - (ii) when a more accurate reference frame for WGS-84 becomes available.
  - (iii) a full survey sufficient to meet the requirements of ICAO Annex 14, Vol. I and the Operations Manual- Aeronautical Information Services shall be undertaken for all aerodromes;
- (2) At the time of the initial aerodrome survey;
- (3) If a check survey is not carried out annually; and
- (4) If any doubt exists as to the validity of the previous survey.
- (5) A check survey shall be undertaken for all aerodromes on an annual basis following the initial survey to identify any changes, including significant tree growth or reduction, since the previous survey. Any change shall be surveyed to meet the requirements of ICAO Annex 14, Vol. I and the Operations Manual- Aeronautical Information Services.
- (6) All source data shall only be considered valid for use when the data is traceable according to the requirements of sub-paragraph (b) above and the period of last survey complies with the requirements of sub-paragraph (c) above.
- (7) All source data shall be in WGS-84 format as specified in ICAO Doc 9674 (World Geodetic System – 1984 (WGS-84) Manual) and compliant with the requirements of ICAO Doc 9613 (Performance Based Navigation (PBN) Manual) Volume I, Attachment 2. If source data is unavailable in WGS-84 format, then it shall be converted to WGS-84 prior to use. Source data and converted data shall also be made available.
- (8) Source data shall be provided by the relevant Aerodrome Operator/certificate holder or the Bahamas Air Navigation Services Authority, as applicable. Where valid source data is unavailable, the applicant shall conduct a survey to provide baseline data for the purposes of IFP design to meet these requirements.
- (9) Where a third party is contracted for the purpose of the survey, the applicant shall ensure that the data is consistent with the requirements of ICAO Annex 14 Vol. 1, Appendix 5 and Volume 2 Appendix 1, ICAO Annex 11 (Air Traffic Services) Appendix 5 and the Operations Manual- Aeronautical Information Services.

### **3.7 IFP Flight Validation Requirements**

- (a) All IFPs shall be subject to flight check unless specifically permitted otherwise by the Authority.
- (b) All IFPs shall be subject to periodic flight check only utilising suitably equipped and approved aircraft, and aircrew qualified to carry out instrument flight procedure checks.





- (c) The flight check shall be in accordance with ICAO Doc 9613 (Performance Based Navigation (PBN) Manual) Volume 1, Part B Chapter 1, noting that the purpose of the Flight Validation shall be;
  - (1) to validate the obstacles as shown on the chart and used as the basis for minimum altitude;
  - (2) to ensure, in particular, the flyability of the procedure in maintaining safe operations for each category of aircraft; and
  - (3) to review the IFP for complexity of workload, correctness of information and ease of interpretation.
- (d) The Design Organisation shall prepare a Flight Validation plan prior to the Flight Validation to accompany the Flight Validation report detailing how the Flight Validation will;
  - (1) provide assurance that adequate obstacle clearance has been provided;
  - (2) verify that the navigation data to be published, as well as that used in the design of the procedure, are correct; and
  - (3) verify that all required infrastructure, such as runway markings, lighting and communications and navigation sources are in place and operative; and
  - (4) conduct an assessment of flyability to determine that the procedure can be safely flown; and
  - (5) evaluate the charting, required infrastructure, visibility and other operational factors.
- (e) The Flight Validation plan shall comply with the guidance and recommendations given in ICAO Doc 8071 (Manual on Testing of Radio Navigation Aids) and ICAO Doc 9906 (The Quality Assurance Manual for Flight Procedure Design).
- (f) The Design Organisation shall ensure that the Flight Validation report is issued as soon as possible following the Flight Validation.
- (g) The Flight Validation report shall be completed according to the templates shown in this Part or as stipulated in ICAO Doc 9906 (Quality Assurance Manual for Flight Procedure Design).

### 3.8 Aircraft Requirements

- (a) The aircraft used to conduct a flight validation shall meet the following minimum requirements;
  - (1) The aircraft shall be multi-engine and capable of safe flight within the intended operational envelope with a single engine operative;
  - (2) The aircraft shall be fully instrument equipped according to requirements for night and instrument flight rules; and



- (3) The aircraft shall be capable of being flown at speeds equivalent to categories of aircraft for which the IFP was designed.
- (b) As applicable, the aircraft used shall comply with the requirements of ICAO Doc 8071 (Manual on Testing of Radio Navigation Aids) Volume 1 (Testing of Ground Based Navigation Aids) Attachment 1 to Chapter 1.
- (c) Evidence of the aircraft's applicable certifications shall be presented to the Authority prior to carrying out any IFP checks.

### 3.9 Aircrew Requirements

- (a) Flight Validation aircrew;
  - (1) shall have received suitable training in accordance with ICAO Doc 9906 and relevant to the IFP for which the validation is being completed;
  - (2) shall be sufficiently trained to be able to recognise anomalous output from aircraft instruments that would require more detailed inspection with a more fully equipped aircraft and crew;
  - (3) may be single pilot only when it can be demonstrated to the Authority that flight can be conducted safely and that flight workload is acceptable; and
  - (4) shall include, where appropriate for the flight validation, engineers or technicians able to demonstrate sound knowledge and experience in flight testing and flight inspection procedures and requirements.

### 3.10 IFP Dissemination

- (a) The applicant shall be responsible for dissemination of the IFP and associated documentation to the designated AIS provider for publication following approval of the procedure by the Authority.
- (b) The applicant shall ensure that the design and format of the IFP charts are in a standardised format in accordance with the requirements of Annex 4, Annex 15, the Operations Manual– Aeronautical Information Services, ICAO Doc 8697 (Aeronautical Chart Manual) and ICAO Doc 8168 (Procedures for Air Navigation Services – Aircraft Operations) Volume II;
- (c) The applicable aerodrome operator shall be provided with charts detailing the obstacle surfaces used in plan and profile to aid safeguarding assessment;
- (d) Where the IFP is an RNAV procedure, it is described in a clear and unambiguous fashion as detailed in ICAO Doc 8168 (Procedures for Air Navigation Services – Aircraft Operations) Volume II and ICAO Annex 15 (Aeronautical Information Services);
- (e) Where the IFP is an RNAV procedure, prior to publication, it is validated to ensure that the dataset is complete, coherent and correct; and
- (f) The Design Organisation performs a final check of the published data in the AIP/chart amendment when issued to ensure that no errors have been introduced during the data transfer process.



### 3.11 Human Factors

- (a) The IFPD design organisation shall ensure that Human Factors (HF) aspects are taken into account as it pertains to air traffic services.
- (b) Areas to be considered include organisational issues, safety management concepts and learning from incident data.



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## CHAPTER 4

### FLIGHT VALIDATION ORGANISATION APPROVAL

#### 4.1 Applicability

This Chapter applies to all Flight Validation organisations that currently provide or have submitted a request to the Authority to provide Flight Validation services within the Sovereign Airspace of The Bahamas or other territory for which The Bahamas has assumed responsibility on the basis of Regional Air Navigation agreements.

#### 4.2 Application for Approval

- (a) An applicant for a Flight Validation service organisation Approval shall apply to the Authority with;
  - (1) an Operations Manual; and
  - (2) any required payment.
- (b) Unless the Authority is satisfied that the Operations Manual contains adequate evidence that the organisation has been approved to conduct Flight Validation in another State, the applicant shall;
  - (1) demonstrate position fixing accuracy using a process agreed by the Authority; and
  - (2) demonstrate overall system performance by making a trial commissioning inspection of a navigational aid using a process agreed by the Authority.
- (c) Trial results shall be included in the Operations Manual.
- (d) The Authority reserves the right to require a practical demonstration to provide evidence of compliance with these regulations.

#### 4.3 Privileges of an Approval holder

- (a) A Flight Validation Organisation Approval may include any conditions that the Authority may consider appropriate.
- (b) The applicant shall submit any proposed changes to the Flight Validation system, operation or organisation to the Authority, at least 30 days prior to the effective date, for approval before further flight validations are conducted.

#### 4.4 Duration of Approval

- (a) The Approval remains in force unless it is suspended or revoked.
- (b) The Flight Validation organisation shall surrender an Approval certificate that is suspended or revoked.

#### 4.5 Organisation Operations Manual

- (a) The applicant shall provide the Authority with an Operations Manual containing;

- (1) All the details as specified in Chapter 2, paragraph 2.6; plus
  - (2) Policy, procedures and evidence or references supporting the technical requirements for the Flight Validation system;
  - (3) Details regarding ground and flight validation periodicity;
  - (4) Details regarding maintenance of the flight validation system;
  - (5) Details regarding evidence as to meeting measurement uncertainty requirements;
  - (6) Details regarding flight validation system aerals;
  - (7) Details regarding the suitability of the aircraft and aircraft operator for the purpose of flight validation;
  - (8) Details regarding the use of aeronautical radio frequencies for the purpose of flight validation;
  - (9) Details regarding the operational implementation of the flight validation system; and
  - (10) Details regarding the implementation of quality management procedures; and
- (b) A description of the entire operation.

#### **4.6 Organisation**

- (a) The applicant shall nominate;
- (1) a senior person identified as the Accountable Manager who has the authority within the applicant's organisation to ensure;
    - (i) the organisation can be adequately financed and resourced;
    - (ii) that safety is given the highest priority when assessing commercial, operational, environmental or social pressures;
    - (iii) compliance is achieved and maintained with the requirements of this Part; and
    - (iv) a navigation aid inspector or other post is appointed with sufficient authority to be clearly accountable for the contents of flight validation reports; and
  - (2) a senior person or persons who are responsible for ensuring that the applicant's organisation complies with these regulations. Such nominated person or persons shall be ultimately responsible to the Accountable Manager; and
  - (3) sufficient, competent, qualified and trained personnel.
- (b) Written records and procedures shall be established to;



- (1) assess the competence of those authorised personnel;
- (2) maintain the competence of those authorised personnel;
- (3) establish a means to provide those personnel with signed written evidence of the scope of their authorisation; and
- (4) establish the job descriptions containing safety responsibilities.

#### **4.7 General Technical Requirements**

- (a) The applicant shall provide the Authority with;
  - (1) evidence that the Flight Validation equipment can measure the parameters required for the navigation aid being inspected;
  - (2) functional and technical descriptions, technical specifications and manufacturer's type number for all major items of the Flight Validation equipment;
  - (3) functional and technical descriptions, technical specifications and manufacturer's type number for equipment used to calibrate the flight validation equipment;
  - (4) build state documentation for all measuring equipment;
  - (5) the name of the design authority
  - (6) the location, characteristic and type of all fixed or temporary measurement aerials on the aircraft;
  - (7) the procedures used for the inspection of equipment used
  - (8) details the function and support of all software and firmware used in the measurement system.
- (b) Any equipment used as part of a flight check shall not interfere with the aircraft systems or normal navigation and general avionics equipment.
- (c) Identity transmissions should be verified throughout a flight validation.
- (d) The flight validation system shall include an independent system that can continuously determine and record the horizontal position in space of a known reference point on the aircraft. The uncertainty of this position shall be no more than the uncertainty requirement for the parameter being measured.
- (e) The applicant shall notify the Authority of all proposed equipment changes, modifications or change of aircraft.
- (f) The Flight Validation organisation shall comply with the guidance and recommendations given in ICAO Doc 8071, Manual on Testing of Radio Navigation Aids and inspect navigational aids against the Standards and, when applicable or otherwise specified, the Recommended practices of ICAO Annex 10.



#### **4.8 Ground and Flight Validation Periodicity**

- (a) As a condition to any approval granted by the Authority, any Flight Validation organisation approved by the Authority shall supply the Authority with a proposed Flight Validation Part that specifies the arrangements to conduct inspections of The Bahamas' Navigational Aids and surveillance equipment or any other NAVAIDs or surveillance equipment for which Bahamas has responsibility. The proposed Flight Validation Part shall correspond, at least, to the minimum periodicity specified in manuals produced by the applicable equipment manufacturer.
- (b) The final inspection Part shall be signed by the accountable manager and approved by the Authority prior to the effective date. The Flight Validation organisation shall provide the service in accordance with that Part unless otherwise specified by the Authority.
- (c) The periodicity specified in the final Part under sub-paragraph (b) above shall not be extended without Approval by the Authority.
- (d) The Authority may direct the Flight Validation organisation to amend the inspection Part where a quantitative or qualitative analysis of NAVAID or surveillance performance reveals that the interval specified in sub- paragraph (b) is not sufficient.

#### **4.9 Maintenance**

- (a) The applicant shall provide to the Authority details of;
  - (1) procedures for managing spares in relation to the flight inspection equipment;
  - (2) procedures for recording faults and taking subsequent action; and
  - (3) procedures for planned maintenance of the Flight Validation equipment.

#### **4.10 Measurement Uncertainty**

- (a) A minimum measurement uncertainty of 95% probability shall be achieved by each parameter to be measured by the equipment.
- (b) Uncertainty calculations shall be recorded in the Operations Manual and shall account for all errors in the measurement and recording system and shall be combined using RSS (the square root of the sum of the squares).
- (c) Uncertainty calculations shall account for environmental conditions such as expected temperature and humidity range. Manufacturer's data shall be submitted if used as evidence of compliance.
- (d) When modifications are made which affect the uncertainty of measurements the applicant shall submit new calculations in the Operations Manual.

#### **4.11 Aerials**

- (a) Any aerial used for the purpose of flight validation shall be;
  - (1) positioned so that it is not obscured from the navigation aid signal during all anticipated flying manoeuvres; and





- (2) positioned so that the distance between its phase centre and the reference point of the independent positioning system is accounted for when determining measurement uncertainty and crosswind limitations.
- (3) positioned so that propeller modulation is demonstrated to be reduced to an acceptably low level.

#### **4.12 Aircraft and Aircraft Operator**

- (a) Aircraft used for the purpose of the flight validation shall be;
  - (1) capable of safely flying the flight validation profile;
  - (2) operated under a certificate acceptable to the authority;
  - (3) compatible with inspection equipment; and
  - (4) adequately crewed (both flight crew and equipment engineer/operator) to conduct the inspection safely.

#### **4.13 Use of Radio**

The applicant, for the purpose of RTF used during trials, shall hold the relevant approval for the use of RT.

#### **4.14 Flight Validation System**

- (a) The applicant shall provide the Authority with;
  - (1) a list of navigation aids that can be calibrated by the Flight Validation organisation in compliance with these regulations; and
  - (2) a sample Flight Validation report containing at least those items of information prescribed under these regulations; and
  - (3) a sample structure measurement for applicable navigation aids; and
  - (4) a procedure to ensure communication with the navigation aid providing organisation of immediately notifiable deficiencies.
  - (5) the flight validation operating instructions for the inspector and flight crew including reference to;
    - (i) the flight profile to be used for individual measurements;
    - (ii) pre-flight validation of measuring equipment;
    - (iii) siting of any necessary ground tracking or position fixing equipment;
    - (iv) operation of measuring equipment;
    - (v) production of the flight validation report;

- (vi) the production of records and graphs in compliance with these regulations;
- (vii) production of a certificate attesting the result of a flight validation; and
- (viii) the method used to calculate results which are not output directly by the measuring equipment.

#### **4.15 Quality Procedures**

The applicant shall establish a Quality Management System that is acceptable to the Authority.

#### **4.16 Incidents of Interference**

- (a) The flight checking organisation shall establish procedures to report all known or suspected instances of radio frequency interference to the Authority and the Spectrum Management Authority.
- (b) Procedures shall also be established to report to the Authority and applicable Communication Navigation and Surveillance organisation, all other incidents involving interference of any other Air Navigation facility.

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The Director General, in exercise of the powers conferred by Section 17(1) of the Civil Aviation Authority Bahamas Act, 2021 (*No. 2 of 2021*) hereby issues the forgoing regulation.

**Issued the 25<sup>th</sup> day of March 2021**

A blue ink signature, appearing to be "A. J. Smith", is written over a horizontal line.

**DIRECTOR GENERAL  
CIVIL AVIATION AUTHORITY BAHAMAS**