CIVIL AVIATION DIRECTIVE – 6401

FLIGHT PROCEDURE DESIGN

CIVIL AVIATION AUTHORITY OF MALAYSIA

ISSUE 01
REVISION 00 – 1ST MAY 2021

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Introduction

In exercise of the powers conferred by section 24O of the Civil Aviation Act 1969 [*Act 3*], the Chief Executive Officer makes this Civil Aviation Directive 6401 – Flight Procedure Design (CAD 6401 – FPD), pursuant to Regulation 76, 189 and 193 of the Malaysian Civil Aviation Regulations (MCAR 2016).

This CAD contains the standards and requirements and procedures pertaining to units of measurement to be used in air and ground operations and is compliant with Malaysian Civil Aviation Regulations. The standards and requirements in this CAD are based mainly on the Standards and Recommended Practices (SARPs) contained in the International Civil Aviation Organisation (ICAO) Annex 6 to the Chicago Convention Operations of Aircraft (OPS) and Procedures for Air Navigation Services — Aircraft Operations, Volume II — Construction of Visual and Instrument Flight Procedures (PANS-OPS, Doc 8168).

This Civil Aviation Directives – Flight Procedure Design (CAD 6401 – FPD) is published by the Chief Executive Officer under Section 24O of the Civil Aviation Act 1969 [*Act 3*] and come into operation on 1 May 2021.

Non-compliance with this CAD

Any person who contravenes any provision in this CAD commits an offence and shall on conviction be liable to the punishments under Section 24O (2) of the Civil Aviation Act 1969 [*Act 3*] and/or under Malaysia Civil Aviation Regulation 2016.

(Captain Chester Voo Chee Soon)
Chief Executive Officer
Civil Aviation Authority of Malaysia

Civil Aviation Directive components and Editorial practices

This Civil Aviation Directive is made up of the following components and are defined as follows:

Standards: Usually preceded by words such as *"shall"* or *"must"*, are any specification for physical characteristics, configuration, performance, personnel or procedure, where uniform application is necessary for the safety or regularity of air navigation and to which Operators must conform. In the event of impossibility of compliance, notification to the CAAM is compulsory.

Recommended Practices: Usually preceded by the words such as "*should"* or "*may*", are any specification for physical characteristics, configuration, performance, personnel or procedure, where the uniform application is desirable in the interest of safety, regularity or efficiency of air navigation, and to which Operators will endeavour to conform.

Appendices: Material grouped separately for convenience but forms part of the Standards and Recommended Practices stipulated by the CAAM.

Definitions: Terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have an independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

Tables and Figures: These add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

Notes: Included in the text, where appropriate, Notes give factual information or references bearing on the Standards or Recommended Practices in question but not constituting part of the Standards or Recommended Practices;

Attachments: Material supplementary to the Standards and Recommended Practices or included as a guide to their application.

It is to be noted that some Standards in this Civil Aviation Directive incorporates, by reference, other specifications having the status of Recommended Practices. In such cases, the text of the Recommended Practice becomes part of the Standard.

The units of measurement used in this CAD are in accordance with the International System of Units (SI) as specified in CAD 5. Where CAD 5 permits the use of non-SI alternative units, these are shown in parentheses following the basic units. Where two sets of units are quoted it must not be assumed that the pairs of values are equal and interchangeable. It may, however, be inferred that an equivalent level of safety is achieved when either set of units is used exclusively.

Any reference to a portion of this CAD, which is identified by a number and/or title, includes all subdivisions of that portion.

Throughout this Civil Aviation Directive, the use of the male gender should be understood to include male and female persons.

Record of revisions

Revisions to this CAD shall be made by authorised personnel only. After inserting the revision, enter the required data in the revision sheet below. The *'Initials'* has to be signed off by the personnel responsible for the change.

Rev No.	Revision Date	Revision Details	Initials

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Table of Content

1 General

1.1 Citation

1.1.1 These Directives are the Civil Aviation Directive 6401 –Flight Procedure Design (CAD 6401 – FPD), Issue 01/Revision 00, and comes into operation on 1 May 2021.

1.1.2 This CAD contains the standards, requirements and procedures pertaining to the provision of Flight Procedure Design. The standards and requirements in this CAD are based mainly on standards and recommended practices (SARPs) stipulated in International Civil Aviation Organisation (ICAO) Annex 6 to the Chicago Convention Operations of Aircraft (OPS) and Procedures for Air Navigation Services — Aircraft Operations, Volume II — Construction of Visual and Instrument Flight Procedures (PANS-OPS, Doc 8168), including related guidelines stipulated in the following document:

a) Doc 9906 Vol 1 – Quality Assurance Manual for Flight Procedure Design Quality Assurance System;

b) Doc 9906 Vol 2 – Quality Assurance Manual for Flight Procedure Designer Training;

c) Doc 9906 Vol 3 – Quality Assurance Manual for Flight Procedure Design Software Validation;

d) Doc 9906 Vol 4 – Quality Assurance Manual for Flight Procedure Design Construction (to be incorporated later by ICAO);

e) Doc 9906 Vol 5 – Quality Assurance Manual for Validation of Instrument Flight Procedures;

f) Doc 9906 Vol 6 – Quality Assurance Manual for Flight Validation Pilot Training and Evaluation;

g) ICAO Doc 10068 – Manual on the Development of a Regulatory Framework for Instrument Flight Procedure Design Service;

h) ICAO Doc 9905–AN/ - RNP-AR Flight Procedure Design;

i) ICAO Doc 9724 – AN/904-Manual on the Use of the Collision Risk Model (CRM) for ILS Operations;

j) ICAO Doc 9674–World Geodetic System 1984 (WGS 84) Manual;

k) ICAO Doc 9613 – Performance Based Manual;

l) ICAO Doc 9371 – Template Manual;

m) ICAO Doc 9368 – IFP Construction Manual;

n) ICAO Doc 9365 – All Weather Operation manual;

o) ICAO Doc 8697 – Aeronautical Chart Manual;

p) ICAO Doc 4444 PANS-ATM;

q) ICAO Annex 4 - Aeronautical Charts;

r) ICAO Annex 5 - Units of Measurement;

s) ICAO Annex 6 - Aircraft Operations;

t) ICAO Annex 10 - Aeronautical Telecommunications Volume I Radio Navigational Aids;

u) ICAO Annex 14 Vol. I -Aerodromes;

v) ICAO Annex 14 Vol. II -Heliports;

w) ICAO Annex 15 - Aeronautical Information Services; and

x) ICAO Annex 19 – Safety Management.

1.2 Applicability

1.2.1 The standards specified in this CAD applies to all Flight Procedure Design Organisation and Flight Procedure Designer.

1.2.1.1 This CAD provides standards and requirements for the design and maintenance of instrument flight procedures (IFP). This is to ensure that all published IFP intended for use by aircraft operating under instrument flight rules (IFR) in Malaysian airspace meets ICAO requirements for instrument flight procedures.

1.2.1.2 This Directive also provides a means for CAAM to authorise FPDO and/or FPD to provide procedure design services within Malaysia airspace.

1.3 Revocation

1.3.1 This CAD revokes Air Traffic Inspectorate Directives – Approval Requirements for Flight Procedure Design Edition 2, published on 15 April 2016.

1.4 Definitions

Approved Flight Procedure Designer (AFPD) means a person who has met the competency requirements laid down by the Authority and holds an approval for the design of instrument flight procedures for aerodromes or heliports, which are under the jurisdiction of the CAA of Malaysia (CAAM).

Approved Flight Procedure Design Organisation (AFPDO) means an organisation who has met the competency requirements laid down by the Authority and holds an approval for the design of instrument flight procedures for aerodromes or heliports, which are under the jurisdiction of the CAA of Malaysia (CAAM).

Certification means an authoritative confirmation of meeting specific standards.

Competency means a dimension of human performance that is used to reliably predict successful performance on the job.

Flight inspection means the operation of a suitably equipped aircraft for the purpose of calibrating ground-based NAVAIDS or monitoring/evaluating the performance of the global navigation satellite system (GNSS).

Flight procedure design means the complete package that includes all the considerations that went into the development of an instrument flight procedure.

Flight procedure designer means a person responsible for flight procedure design who meets the competency requirements as laid down by the State.

Flight procedure design process means the process which is specific to the design of instrument flight procedures leading to the creation or modification of an instrument flight procedure.

Flight Validation Pilot (FVP) means a person performing flight validation flights or simulated flights who meet the competency requirements as stated down by the Authority.

Flyability means the ability to keep an aircraft within predefined tolerances of designed lateral and vertical flight track.

Initiator means an aerodrome operator, aircraft operator, Air Navigation Service Provider (ANSP) or other relevant entity, who proposes a new design, changes to, or withdrawal of an IFP.

Instrument Approach Procedure (IAP) means a series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply. Instrument approach procedures are classified as follows:

> ***Non-precision approach (NPA) procedure*** means an *instrument approach procedure design for 2D instrument approach operation Type A.*
>
> ***Approach procedure with vertical guidance (APV)*** means a *performance-based navigation (PBN) instrument approach procedure designed for 3D instrument approach Type A.*

Precision approach (PA) procedure means an *instrument approach procedure based on navigation systems. (ILS, MLS, GLS, SBAS Cat I) designed for 3D instrument approach operations Type A and B.*

Instrument flight procedure means a description of a series of predetermined flight manoeuvres by reference to flight instruments, published by electronic and/or printed means.

Instrument flight procedure process means the overarching process from data origination to the publication of an instrument flight procedure.

Integrity (aeronautical data) means a degree of assurance that an aeronautical data and its value has not been lost or altered since the data origination or authorised amendment.

Process means a set of interrelated or interacting activities which transforms inputs into outputs (see ISO 9000:2000 Quality management systems — Fundamentals and vocabulary, section 3.4.1); hence “flight procedure design (FPD) process” or “instrument flight procedure process”.

Procedure means a specified way to carry out an activity or a process (see ISO 9000:2000 Quality management systems — Fundamentals and vocabulary, section 3.4.5).

Quality record means objective evidence which shows how well a quality requirement is being met or how well a quality process is performing. Quality records normally are audited in the quality evaluation process.

Review means an activity undertaken to determine the suitability, adequacy and effectiveness of the subject matter to achieve established objectives (see ISO 9000:2000 Quality management systems — Fundamentals and vocabulary, section 3.8.7).

Validation means confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled (see CAD 15 — Aeronautical Information Services). The activity whereby a data element is checked as having a value that is fully applicable to the identity given to the data element, or a set of data elements that is checked as being acceptable for their purpose.

Verification means confirmation, through the provision of objective evidence, that specified requirements have been fulfilled (see CAD 15). The activity whereby the current value of a data element is checked against the value originally supplied.

1.5 Abbreviations and Acronyms

When the following abbreviations are used, they have the following meanings:

AFPD	Approved Flight procedure designer
AFPDO	Flight Procedure Design Organisation
AIP	Aeronautical Information Publication
AIRAC	Aeronautical information regulation and control
AIS	Aeronautical information service
ANS	Air navigation services
ATC	Air traffic control
ATM	Air traffic management
ATS	Air traffic services
CAAM	Civil Aviation Authority of Malaysia
CAD	Computer aided design
FPD	Flight procedure designer
FPDO	Flight Procedure Design Organisation
ICAO	International Civil Aviation Organisation
IFP	Instrument flight procedure
IFPD	Instrument flight procedure design
ILS	Instrument landing system
ISO	International Standards Organisation
OJT	On-the-job training
QM	Quality manual
QMS	Quality management system
SARPS	Standards and Recommended Practices
SMS	Safety Management System

1.6 Design Criteria

1.6.1 IFP must be designed in accordance with Procedures for Air Navigation Services — Aircraft Operations, Volume II — Construction of Visual and Instrument Flight Procedures (PANS-OPS, Doc 8168).

1.6.2 Deviations from PANS-OPS, Volume II criteria shall be published in the Aeronautical Information Publication (AIP) in accordance with CAD 15 — Aeronautical Information Services.

1.7 Process and procedures

1.7.1 The FPDO shall establish its own process and procedures in accordance with SARPs and PANS Doc 9906, Volume 1.

1.8 Safety Risk Assessment

1.8.1 A safety risk assessment of an IFP is considered completed when the IFPD is in compliance with this directive.

1.8.2 A safety risk assessment must be conducted when there is a deviation from this directive.

1.9 Quality Management System

1.9.1 An FPDO shall implement a quality management system at each stage of the instrument flight procedure design process.

Note. — This requirement can be met by means of a quality assurance methodology, such as that described in PANS-OPS, Volume II, Part I, Section 2, Chapter 4 — Quality Assurance. Guidance for implementing such a methodology is contained in the Quality Assurance Manual for Flight Procedure Design (ICAO Doc 9906).

1.10 Continuous Maintenance and Periodic Review

1.10.1 An FPDO shall ensure that continuous maintenance and periodic review of IFP for aerodromes and airspace under their responsibility are conducted.

Note. — Guidance on continuous maintenance and periodic review is contained in Chapter 10 of this Directive.

1.11 Units of measurement

1.11.1 Units of measurement are expressed in conformance with CAD 5.

1.11.2 The values of the parameters are usually shown in integers. Where this does not provide the required accuracy, the parameter is shown with the required number of decimal places. Where the parameter directly affects the flight crew in its control of the aircraft, it is normally rounded as a multiple of five. In addition, slope

gradients are normally expressed in percentages. For slope gradients expressed in other units, see *Instrument Flight Procedures Construction Manual* (ICAO Doc 9368).

1.11.3 In order to ensure the required accuracy when using the parameters specified in this CAD, only the final results of computations should be rounded. Intermediate calculations should use the maximum resolution available.

1.11.4 Dimensions of areas related to ILS or MLS or GBAS/SBAS, when converted to non-SI units, should be rounded up to the integer foot.

1.11.5 The rounding of values to be published on aeronautical charts shall meet the corresponding chart resolution requirements in CAD 4, Appendix 6.

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2 FPDO/FPD Approval

2.1 General

2.1.1 IFP design works shall be conducted at FPDO approved by CAAM.

2.1.2 An application for issuance and renewal of approval or authorisation shall be made in accordance with Regulation 189 of the Civil Aviation Regulations 2016.

2.1.3 An application using Form CAAM/ANSSD/FPD 01 for FPDO (Attachment A), CAAM/ANSSD/FPD 02 for FPD (Attachment B) and a written exposition (suggested layout as in Appendix 1), shall be submitted to CAAM by any organisation intending to conduct IFP design works in Malaysia. The exposition shall detail the organisational set-up, facilities, equipment, staffing, training of technical personnel, design work processes and quality management system to enable the provision of professional standards in IFP design.

2.1.4 The application shall be submitted along with a copy of the proposed FPDO's operation manual which include design work processes and procedures, quality manual, list of personnel with job description for key personnel together with checklist verifying the compliance with all requirements and signed by an authorised person.

Note 1. — The requirements for the contents of the operation manual are stipulated in Chapter 3 and guidance on this subject is provided in Appendix 2.

Note 2. — The guidance for approval and oversight processes is provided in Appendix 3.

2.2 Approval Requirements

2.2.1 FPDO

2.2.1.1 The FPDO shall demonstrate that it has an established organisation to ensure that each design or any advice given with respect to any IFP issue conforms to:

a) applicable standards in ICAO Doc 8168 Vol. II and associated guidance materials;

b) ICAO Doc 9905 – Required Navigation Performance Authorisation Required (RNP-AR) Procedure Design Manual; and

c) applicable standards as set out in this directive.

2.2.1.2 The FPDO shall have in its employment at least two (2) Approved FPDs.

2.2.1.3 The FPDO shall establish provisions for each IFP design to be checked and verified by another Approved FPD who is not involved in the designing process.

2.2.1.4 The FPDO shall provide and maintain facilities for the design work on IFPs. This shall include:

a) having available equipment appropriate for the design, design verification, flight validation and maintenance of the types of IFPs;

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 IFPs; 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 IFP.

2.2.1.5 The FPDO shall ensure the integrity of the database and the data for designing an IFP. The data used shall be current, traceable and meets the required level of verifiable accuracy for the design.

2.2.1.6 The FPDO shall publish obstacle clearance altitude/height in all instrument approach flight procedures.

2.2.2 FPD

2.2.2.1 The FPD shall submit application under an Approved FPDO.

2.2.2.2 The FPD shall provide the following evidences with their application:

a) minimum qualification of Basic PANS-OPS courses;

b) demonstrate required competency level for flight procedure design;

c) acquire and maintain competency level through training and supervised on-the-job training (OJT) to ensure that the quality assurance in the procedure design process and its output, including the quality of aeronautical information/data, meets the requirement of CAD 4 – Aeronautical Charts and CAD 15 – Aeronautical Information Services;

d) proof of recent IFP design work which include details of specific designs that have been completed and over a period of time. Where possible, examples of the design process should be provided;

e) aviation experience. It is generally accepted that a high level of aviation experience is an important attribute for successful IFP design, ideally as aircrew or air traffic controller. It is not considered essential to hold a current licence nor to distinguish between a civil or military background. 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; and

f) references which include details of previous initiators/employers.

2.3 Validity period

2.3.1 Approval as AFPDO or AFPD shall be issued for the duration of the project or a maximum of 2 years. It shall remain valid unless:

a) the AFPDO or AFPD fails to demonstrate compliance with the applicable requirements; or

b) the ANS Standard Division is prevented by the AFPDO or AFPD, from performing its investigations, inspections or audits; or

c) the AFPD no longer meets the eligibility requirements for this approval; or

d) the certificate has been surrendered or revoked.

2.3.2 Upon surrender or revocation, the certificate shall be returned to CAAM.

2.4 Transferability

A Certificate of Approval granted in accordance with the requirements as set out in this directive is not transferable.

2.5 Validation of Foreign Designer Approval / Certificate

2.5.1 Validation of Foreign Designer Approval / Certificate may be issued to an individual or organisation who meets the following requirements:

a) able to provide to the Director of ANS Standards Division evidence of authorisation provided by another state; and

b) submit a referral letter from the state of issuance.

2.5.2 The Director of ANS Standards Division may request for additional evidence if required.

2.6 Renewal

2.6.1 An application using Form CAAM/ANSSD/FPD 01 (Attachment A) shall be submitted to CAAM for renewal of an approval not later than 3 months before the date of expiry together with the following documents:

a) an updated copy of written exposition (suggested layout as in Appendix 1), detail the current organisational set-up, facilities, equipment, training plan, staffing, design processes and quality management system to enable the provision of IFP design works of professional standards;

b) an updated copy of the AFPDO's operation manual with the contents as stipulated in Chapter 3;

c) an updated copy of corrective action report from previous regulatory audit; and

d) a copy of recent internal audit report including the corrective actions taken.

2.6.2 An AFPDO shall demonstrate that it meets all provisions set forth for the issuance of the approval including the personnel, facility, IFP designing device, approved design processes, and designing records meeting the prescribed requirements.

2.6.3 For the renewal of the approval certificate, an AFPDO shall have to be actively involved in the designing process.

2.7 Display of Approval Certificate

2.7.1 An AFPDO shall prominently display its approval certificate at its premises.

2.7.2 An AFPDO shall readily make its approval certificate available for scrutiny when requested by the authorised officials of CAAM.

2.8 Changes in the Scope of the Approval

2.8.1 Whenever AFPDO requires change in the scope their approval, it should provide supporting information to CAAM that will assess it using the applicable requirements. A variation to the approval document should be issued after a satisfactory assessment.

2.8.2 Changes or modifications in equipment, software, facilities, designing device, or key managerial personnel should be reported to CAAM to ensure that any required approvals are obtained without delay.

2.8.3 An application for a variation of approval shall be made using Form CAAM/ANSSD/FPD 01 (Attachment A) and shall be submitted to CAAM with the details of the variation.

2.9 Continued Surveillance

2.9.1 After receiving an approval, the AFPDO will be subjected to continued surveillance by CAAM to ensure that the AFPDO is operating within the terms of its approval.

2.9.2 Details on the continued surveillance to be conducted by CAAM are provided in Chapter 14.

3 Operation Manual

3.1 General

3.1.1 The FPDO shall develop an operation manual which serves to demonstrate how the service provider complies with the requirements set out in this directive.

3.1.2 The FPDO shall ensure that the contents of all operational documents be consistent with each other and consistent with regulations and other related requirements.

3.1.3 The FPDO shall:

a) keep the operation manual in a readily accessible form;

b) ensure that the operation manual is readily available to all FPDs; and

c) amend the operation manual whenever necessary to keep its contents up to date.

3.1.4 The FPDO shall submit a copy of the most current operation manual to the Director of Air Navigation Service Standards Division.

3.2 Documentation management

Note. — The operation manual may be issued in separate parts should the FPDO find it ungainly to have all the required content appear in one single document.

3.2.1 The FPDO shall ensure that these documents be maintained to ensure their continued relevancy and compliance with applicable national regulations.

3.3 Content

3.3.1 The content of the operation manual is detailed in *Appendix 2* to this CAD. Depending on the size, complexity and scope of the service provided by the organisation, some of the elements contained in the list can be reduced, combined or expanded further.

3.4 Organisation

3.4.1 The operation manual shall be organised according to criteria relating to the information, its importance and used.

3.4.2 The manual shall be consistent with the organisation’s philosophies, policies, processes and procedures.

3.5 Structure

3.5.1 The structure of the manual shall be easy to understand, appropriate for the information documented and clearly identified through headings and other formatting devices. An explanation of the document shall be provided at the beginning of the document, explaining organisational elements such as the headings, numbering scheme, main parts of the document and other sources of coding or groupings.

3.5.2 Precise language shall be used whenever possible. Terms for common items and actions shall be consistent throughout the manual and shall be clear and easily understood.

3.5.3 Writing style, terminology, formatting and use of graphics and symbols shall be consistent throughout the document, including the location of specific types of information and use of units of measurement and codes.

3.5.4 The manual shall contain a glossary of definitions and significant terms including a list of acronyms and/or abbreviations. The glossary shall be updated on a regular basis to ensure access to the most recent terminology.

3.5.5 For ease of amendment and distribution, an appropriate revision process shall be defined and set up when designing the manual.

3.5.6 The operation manual shall comply with the requirements of the organisation's quality assurance practices.

3.6 Validation

3.6.1 The operation manual shall be reviewed and tested under realistic conditions before its operational release.

3.7 Deployment and feedback

3.7.1 The FPDO shall monitor the use of the operation manual after its release. This will ensure appropriate and realistic use of the manual, based on the operational environment, in a way that is operationally relevant and beneficial to the personnel for whom it is intended.

3.7.2 Monitoring should include a formal feedback system to obtain input from principal users of the manual and other persons who would be affected by a new or revised policy, procedure or process.

3.8 Amendment

3.8.1 The FPDO shall develop an effective information gathering and review system to process information obtained from all sources relevant to the organisation, such as the Authority, regulators, end users, as well as a distribution and revision control system.

3.8.2 The FPDO shall also develop an information review, distribution and revision control system to process information resulting from changes that originate within the organisation. This includes changes to:

a) the organisation's policies, processes, procedures and practices;

b) respond to operating experience;

c) scope of services provided;

d) results stemming from the installation of new equipment;

e) an approval document or certificate; and

f) maintain standardisation.

3.8.3 The operation manual shall be reviewed in association with other operational documents that form the organisation's document control system:

a) on a regular basis;

b) after major events such as mergers, acquisitions, rapid growth or downsizing;

c) after technology changes, e.g. the introduction of new equipment; and

d) after changes to safety regulation.

3.8.4 Permanent changes to the operation manual shall be communicated through a formal amendment process. The manual shall be amended or revised as necessary to ensure that the information contained is kept up to date.

3.8.5 The FPDO shall establish a distribution procedure to ensure that all amendments and revisions are distributed promptly to all organisations or persons to whom the manual has been issued.

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4 Quality Manual

4.1 Introduction

4.1.1 With the advent of new navigation systems, the IFP process and its products have become key enablers of the worldwide air traffic management (ATM) system. They must therefore be managed effectively to ensure that quality assured procedures are provided in support of ATM operations.

4.2 Quality Manual

4.2.1 Organisations with a QMS will have their own quality manual (QM). In these cases, the procedure design process is also subject to this QM.

4.2.2 The QM may be a part of the FPDO's operations manual.

Note. — Considering the characteristics of an FPDO, implementation of a QMS can be achieved by implementing specific safety assurance methodologies developed for this service. Provisions to establish a quality assurance methodology are contained in PANS-OPS, Volume II, Part I, Section 2, Chapter 4 — Quality Assurance.

4.3 Quality Assurance (QA)

4.3.1 The FPDO shall establish a quality assurance system, acceptable to CAAM, which ensures that designing and training procedures and practices are developed, managed, delivered and sustained in accordance with ICAO Standards and Recommended Practices.

4.3.2 A formal system shall be in place to gather feedbacks from designers and end users.

4.3.3 ICAO Doc 9906, Volume 1 provides basic guidelines to establish a quality assurance system for an FPDO.

4.3.4 The following QA elements should be clearly identifiable in the operation manual:

a) the organisation's policy;

b) services to be provided;

c) training and qualification;

d) allocation of responsibility;

e) resources, organisation and operational instructions;

f) procedures to ensure compliance with regulation and verification;

g) procedures on design processes;

h) SMS and QA system;

i) procedures for identifying deviations from policy and standards and taking corrective action; and

j) the evaluation and analysis of experiences and trends concerning policy and design work standards, in order to provide feedback into the system for the continual improvement of the quality of design works.

5 Staffing Requirement

5.1 Organisational structure

5.1.1 The design and make-up of its structure shall ensure that the delivery of service meets the client's needs and expectations while maintaining compliance with the applicable regulatory requirements. The FPDO shall have a management structure that is designed around best quality management practices.

5.1.2 The FPDO shall nominate an accountable executive who shall have the final corporate authority to ensure that all IFP intended for use by aircraft operating under IFR in Malaysian airspace meets ICAO requirements for instrument flight procedures.

5.1.3 The organisational and functional chart shall show the key personnel's responsibilities and accountabilities. Typical key positions include:

a) accountable executive;

b) supervisor;

c) chief designer;

d) senior designer;

e) designer; and

f) trainee designer, if applicable.

5.1.4 Depending on the size and scope of the organisation and the requirements of CAAM, some of the key positions may be supplemented by subordinates as illustrated in the organisational charts in Appendix 4. Small and less complex FPDOs may combine some key positions when it becomes clear that the resulting position's roles and responsibilities would not be adversely affected by such a decision.

5.1.5 A job description shall be available and clearly indicate the qualifications, responsibilities, functions and reporting hierarchy of each technical personnel.

5.1.6 The FPDO shall develop policy and organisation set up including the number of staff required to plan and carry out design works in accordance with the certification. The FPDO shall provide the number of qualified and competent designers appropriate to the size and scope of the intended services, who hold appropriate licences, certificates, qualifications and ratings or authorisations by CAAM.

5.1.7 A focal point for coordination with CAAM shall be nominated.

5.1.8 The FPDO shall have all their services authorised under the terms of their organisation's approval.

Note. — Appendix 4 provides several recommended organisational structures for consideration.

5.2 Qualification and training

5.2.1 The FPD shall have held a minimum qualification of Basic PANS OPS course. In addition, he shall be able to demonstrate the required competency level for flight procedure design.

5.2.2 The FPD shall acquire and maintain the competency level through training and supervised on-the-job training (OJT) to ensure that the quality assurance in the procedure design process and its output, including the quality of aeronautical information/data, meets the requirements of CAD 15 — Aeronautical Information Services.

5.2.3 The training for FPD shall include an initial training and recurrent training at periodic intervals. The appropriate interval for recurrent training is conducted on a regular basis.

5.2.4 Initial training shall ensure that the FPD is able to demonstrate a basic level of competency that includes at least the following elements:

a) overview of ICAO Standards and Recommended Practices (SARPs) relating to IFP design and promulgation;

b) knowledge of information contained in ICAO Doc 8168 – PANS-OPS, and other related ICAO provisions relevant to procedure designs;

c) general criteria in IFP designing;

d) non-precision approach design;

e) precision approach design;

f) instrument departure designs;

g) criteria for RNAV, GNSS and RNP; and

h) practical exercises in the design of procedures.

5.2.5 Recurrent training shall ensure that the FPD is able to demonstrate a basic level of competency that includes at least the following elements:

a) knowledge about updates in ICAO provisions and other provisions pertaining to procedure design; and

b) maintenance and enhancement of knowledge and skills in the design of procedures.

5.2.6 The FPDO shall develop training programme and maintain training record for all its FPDs.

5.2.7 The FPDO shall ensure that FPDs have undergone an adequate, supervised OJT.

5.2.8 The FPDO shall ensure that a person designing or amending an IFP demonstrates required competency level for flight procedure design.

5.2.9 Competency of the FPD shall be evaluated at regular intervals by Air Navigation Service Standards Division.

Note – Guidance material for planning, implementing and evaluating FPD training is provided in the ICAO Doc 9960 Vol. II – Flight Procedure Designer Training.

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6 Facilities and Equipment

6.1 Facilities

6.1.1 An FPDO shall have access to facilities appropriate to the size and scope of the intended services provided in an environment conducive to design works. These facilities shall include:

a) general areas which consist of sufficient office space for FPDO managerial, administrative and training staff;

b) design work room equip with a computer and access to scanner and printer;

c) reference/library facilities; and

d) storage areas, including secure areas for design records.

6.1.2 Any changes to the working conditions and any temporary mitigation measures shall be discussed with CAAM prior to continuing with the scheduled design works.

6.1.3 The design work room areas shall be appropriate for the task to be performed including:

a) walls, floors and roof and lighting or window provide comfortable and appropriate environment; and

b) ventilation or air conditioning system provide a conducive temperature for comfortable environment.

6.1.4 The FPDO shall ensure that basic first-aid facilities are made available for the wellbeing of all staff including any access to information, instruction, training and supervision needed to sustain environment that is safe from injury and risks to their health.

6.2 Design Work Equipment

6.2.1 The FPDO shall ensure that the design work equipment required are available and in good working order.

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7 Third-Party (Outsourcing) of Facilities & Equipment

7.1 Accountability of flight procedure design

7.1.1 The FPDO shall be accountable for the quality and suitability of its flight procedure designs.

7.2 Facilities and equipment

7.2.1 In certain circumstances, an FPDO may utilise another FPDO facilities or equipment. To protect against lapses in QA of temporary utilisation of another FPDO's facilities and equipment, the FPDOs shall develop and document contingency plans in their quality manual for instances when designing demands are such that the use of another FPDOs facilities and equipment are required. The temporary utilisation of another FPDO's facilities and equipment shall be subjected to the approval from CAAM.

7.2.2 Any flight procedure design conducted in other FPDO facilities shall be conducted in accordance with the original approval holder processes, and shall not be conducted under the host approved processes.

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8 IFP Process

8.1 Introduction

8.1.1 This chapter provides general provisions on quality assurance for the procedure design process. Detailed guidance can be found in the Quality Assurance Manual for Flight Procedure Design (ICAO Doc 9906).

8.1.2 The FPDO is responsible to ensure that all published instrument flight procedures in Malaysian airspace can be flown safely by the relevant aircraft. Safety is not only accomplished by application of the technical criteria in PANSOPS and associated ICAO provisions, but also requires measures that control the quality of the process used to apply that criteria, which may include regulation, air traffic monitoring, ground validation and flight validation. These measures shall ensure the quality and safety of the procedure design product through review, verification, coordination, and validation at appropriate points in the process, so that corrections can be made at the earliest opportunity in the process.

8.1.3 This chapter seeks to establish the framework for a quality process for procedure design, including inputs, key required elements, recommendations, and expected outputs.

8.1.4 In the interest of safety, and to promote a reasonable degree of standardisation, it is desirable, to the greatest degree possible, to implement the provisions in PANS-OPS in a consistent manner, using processes that will minimise the possibility of errors, identify errors that do occur before they impact safety, and provide for continuous improvement of the procedure design process in order to eliminate or reduce future errors. This is especially important in the modern aviation environment, where increasing reliance is placed on computers and the data they process, for navigation and obstacle awareness.

8.1.5 The safety of air navigation is highly dependent on the quality of aeronautical data. Processes for data quality assurance, from data origination through to publication in the Aeronautical Information Publication (AIP), is detailed in the Quality Assurance Manual for Flight Procedure Design (ICAO Doc 9906).

8.2 The IFP process

8.2.1 The Instrument Flight Procedure (IFP) process (see Appendix 5) encompasses the acquisition of data, design and promulgation of procedures. It starts with compilation and verification of the many inputs and ends with ground and/or flight validation of the finished product, and documentation for publication.

8.2.2 The elements of the process encompass enablers, constraints, output, and post-publication feedback for the procedure under consideration.

8.2.3 The IFP process shall be followed both for original procedure designs and periodic reviews of existing IFPs.

8.2.4 IFP shall be accompanied by a narrative, which describes the procedure in textual format.

8.3 Procedure design information acquisition

8.3.1 Current and complete survey data and information is crucial to the design of a safe IFP. The FPDO shall ensure that the survey and subsequent IFP design activities are controlled and monitored by a person(s) trained in procedure design.

8.3.2 In the obstacle survey for procedure design, the FPDO 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.

8.3.3 The procedure design information shall be coordinated with all relevant stakeholders. As input for the procedure design process the following aspects need to be assessed:

a) airport, navigation aid, obstacle, terrain coordinate and elevation data, based on verified surveys and complying with CAD 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.

8.4 Procedure design

8.4.1 Procedures shall be designed according to *ICAO Doc 8168 – PANS-OPS* criteria. 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.

8.4.2 Each new or revised procedure shall be verified by an FPD other than the one who designed the procedure, to ensure compliance with applicable criteria.

8.4.3 Published procedures shall be subjected to periodic review to ensure that they continue to comply with changing criteria, and meets user requirements. The maximum interval for this review is five years.

8.5 Procedure design documentation

8.5.1 The documentation provided by the FPD is divided into three categories and includes:

a) documentation required for publication in the AIP in accordance with CAD 4 and 15;

b) documentation required to maintain transparency concerning the details and assumptions used by the FPD, which should include supporting information/data used in the design, such as:

1) controlling obstacle for each segment of the procedure;
2) effect of environmental considerations on the design of the procedure;
3) infrastructure assessment;
4) airspace constraints;
5) ATM operations requirement;
6) the results of the periodic review and, for modifications or amendments to existing procedures, the reasons for any changes;
7) for any deviation from existing standards, the reasons for such a deviation and details of the mitigations applied to assure continued safe operations; and
8) 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.

8.5.2 All calculations and results of calculations shall be presented in a manner that enables the reader to follow and trace the logic and resultant output. A record of all calculations shall be kept in order to prove compliance to or variation from the standard criteria.

8.5.3 Formulae used during calculation shall be the standard formulae as stated in ICAO Doc 8168 and related ICAO publications. Units of measurement and conversion factors between such units shall be in accordance to CAD 4, 5 and 6.

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

8.5.5 All documentation shall undergo a final verification for accuracy and completeness prior to validation and publication.

8.5.6 All documentation shall be retained to assist in recreating the procedure in the future in the case of incidents and for periodic review and maintenance. The periodic retention shall not be less than the operational life time of the procedure.

9 Validation Process

9.1 Introduction

9.1.1 Validation is the necessary final quality assurance step in the procedure design process, prior to publication.

9.1.2 The purpose of validation is the verification of all obstacle and navigation data, and assessment of flyability of the procedure.

9.1.3 Validation normally consists of ground validation and flight validation. Ground validation shall always be undertaken.

9.1.4 The process for the validation of flight procedures is detailed in the *Quality Assurance Manual for Flight Procedure Design,* Volume 5 — *Validation of Instrument Flight Procedures* (ICAO Doc 9906).

9.2 Ground validation

9.2.1 Ground validation is a review of the entire instrument flight procedure package by a person(s) trained in procedure design and with appropriate knowledge of flight validation issues. It is meant to catch errors in criteria and documentation, and evaluate on the ground, to the extent possible, those elements that will be evaluated in a flight validation. Issues identified in the ground validation should be addressed prior to any flight validation.

9.2.2 The ground validation would also determine if flight validation is needed for modifications and amendments to previously published procedures.

9.2.3 Ground validation consists of an independent IFP design review and a pre-flight validation. Flight validation consists of a flight simulator evaluation and/or an evaluation flown in an aircraft.

9.2.4 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.

9.3 Flight validation

9.3.1 Flight validation of instrument flight procedures should be carried out as part of the initial record and should also be included as part of the periodic quality assurance programme. It shall be accomplished by a qualified and experienced flight validation pilot (FVP).

9.3.2 The objectives of the flight validation of instrument flight procedures are to:

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 flyability to determine that the procedure can be safely flown; and

e) evaluate the charting, required infrastructure, visibility and other operational factors.

9.3.3 The FPD shall be the originator of all data applicable to conduct a flight validation. The FPD should be prepared to provide briefings to the FVP in those cases where flight procedures have unique application or special features.

9.3.4 The FPD may participate in the initial validation flight to assist in its evaluation and obtain direct knowledge of issues related to the procedure's design from the FVP.

9.3.5 All completed flight validation report must be submitted to the Authority using validation templates as in the *Appendix C or D ICAO Doc 9906 Vol. 5* as appropriate.

9.4 Flight inspection

9.4.1 Flight validation should not be confused with flight inspection. Flight inspection of instrument flight procedures is required to assure that the appropriate radio navigation aids adequately support the procedure. This is carried out as part of a formal flight inspection programme and is performed by a qualified flight inspector using an appropriately equipped aircraft.

9.4.2 The initial theoretical viability check should be subsequently confirmed by flight inspection. The flight inspection organisation should be provided with full details of the pre-design checks, including details of any critical DMEs.

9.4.3 The pre-promulgation flight check should include an analysis of the update history (use of DME stations for update). If the RNAV system uses DME stations outside their promulgated radio range, an additional check on the effect of the use of those stations should be made.

10 Periodic Review and Maintenance

10.1 Periodic review

10.1.1 All published IFPs must be subject to a periodic review of no longer than five (5) years.

10.1.2 Upon periodic review, the following tasks are to be conducted:

a) **Assessment of the impact of all changes to obstacle data.** This may be conducted by applying amended obstacle data to the design data (design document, design file, etc.) of the published IFP. For example, if the minimum obstacle clearance (MOC) is not ensured due to a newly developed obstacle, amendment to the existing IFP is required.

b) **Assessment of the impact of all changes to aerodrome, aeronautical and navaid data.** In most cases, changes to this data will require amendment to the existing IFP.

c) **Assessment of the impact of all criteria amendments and changes to depiction standards.** It is intended that all IFPs be maintained to current design criteria and depiction standards in accordance with a State's regulatory framework time frame.

The existing IFP can be maintained even upon the amendment of design criteria and/or depiction standards if it is determined that these amendments are not safety-related issues. However, even if the resulting IFP depiction is unchanged, the design file may be amended and updated to current criteria to facilitate IFP maintenance.

d) **Assessment of the impact of all changes to user requirements.** Such changes to user requirements include, but are not limited to:

1) fleet type (performance)
2) scheduled service route
3) ATM procedures
4) airspace.

Even if the user requirements are not a safety-related issue, IFP amendments and/or new IFPs may be needed to satisfy current user requirements.

10.1.3 In order to conduct a periodic review efficiently, it is essential to obtain and store design data.

10.1.4 If it is determined that any action is required, such as amendment to the existing IFP, due to new obstacle and/or changes in design criteria which have a safety impact, return to the "initiation" step (Step no. 1 in the FPD process, see Doc 9906, Volume 1) to reinitiate the FPD process.

10.1.5 A level of procedure design competency equivalent to that necessary for the design of a new procedure is required to conduct a periodic review.

10.1.6 It is important to note that the process, as such, does not have an “end” box. The quality process extends over the entire life cycle of the procedure. When the procedure is decommissioned, specific activities are needed to allow the withdrawal of an active procedure.

10.1.7 The quality assurance activities can be discontinued when the procedure has been removed from the publications and is no longer available for operation. It is recommended to keep the quality assurance documentation for an adequate period of time to allow traceability for later purposes.

10.2 Maintenance

10.2.1 On a continuous basis, FPDO shall ensure that significant changes to obstacles, aerodrome, aeronautical and navaid data are assessed for their impact on the IFP. If action is required, return to Step 1 in the FPD process, (see Doc 9906, Volume 1) to reinitiate the process.

10.2.2 Criteria changes are assessed only if required or during the next periodic review. Criteria changes may also be considered in cases where there would be a significant advantage to the user.

10.2.3 Maintenance of the flight procedures includes updates due to:

a) magnetic variation changes;

b) new survey information; and

c) changes to airspace structure.

10.3 Safeguarding of IFPs

10.3.1 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 should include the impact on an aerodrome’s IFPs. The aerodrome licensed holder is responsible for having the safeguarding assessment carried out.

10.3.2 The aerodrome licensed holder and/or initiator is responsible for initiating any NOTAM action required following a safeguarding assessment on temporary obstructions.

11 Procedure Design Automation

11.1 Design Automation

11.1.1 Procedure design automation tools have the potential to reduce errors in the procedure design process, as well as to standardise the application of the PANS-OPS criteria.

11.1.2 ICAO produces several tools automating elementary portions of the procedure design criteria, where the consequences of error are particularly significant to safety. Included in these tools are the PANS-OPS Obstacle Assessment Surface (OAS) Software and the PANS-OPS Software (CD-101), providing a means to evaluate the total risk of impact with an obstacle or the ground on precision approach.

11.1.3 The FPDO shall ensure that the software packages used in the design of procedures have been validated. A description of the procedures to be used to ensure that all equipment, including software is operated in accordance with the manufacturer's operating instructions and manuals, shall be made readily available to the FPD.

11.1.4 The Quality Assurance Manual for Flight Procedure Design, Volume 3 — Flight Procedure Design Software Validation (ICAO Doc 9906) provides guidance in this task.

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12 Safety Risk Assessment

12.1 Requirements

12.1.1 A safety risk assessment shall be conducted before implementing a new flight procedure or a change to an existing flight procedure.

12.1.2 A safety risk assessment is a formal process by which an FPDO may ensure that risks associated with a system change have been properly identified and mitigated prior to going into operation. The results and conclusions of a safety risk assessment are usually described in a safety case. Broadly, the safety case is the documented assurance of the achievement and maintenance of safety.

12.1.3 A “safety risk assessment of changes” must be systematically and formally conducted each time an element is changed or newly introduced in the ATM system lying within the Air Traffic Service Provider's managerial control. However, existing elements not being affected by modifications may also be questioned in respect to safety. In such cases, the trigger is different but a “safety risk assessment of safety issues” may be conducted based on the usage and application of similar tools and principles.

12.1.4 Safety risk assessments for the flight procedure design should therefore focus on two (2) main elements. These are:

a) application of methods for the design of a flight procedure, looking at the methods from the reception of the requests, the application of the criteria, the handling of data throughout the process, the design aspects, including cross-checking, the publication process, etc.; and

b) the implementation of a procedure, looking at the interface with other procedures available in that location, the complexity and the workload imposed on ATC, cockpit workload, fly ability, etc.

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13 Record Keeping

13.1 Requirements

13.1.1 The record-keeping system of an FPDO shall have the following characteristics:

a) ***Completeness.*** The records kept by the FPDO shall be sufficient to provide documentary evidence of each IFP and allow the reconstruction of the design history; and

b) ***Integrity.*** It is important to maintain the integrity of records, ensuring that they are not removed or altered. A backup of the records is also necessary to ensure continuity in case of a major disaster.

13.2 Procedure design records

13.2.1 Traceability is the key element in the design of a new IFP. All assumptions made and methods used in the implementation of a new or modified flight procedure shall be documented in a uniform manner and kept available at least during the lifetime of the IFP.

13.2.2 All supporting documentation, such as spreadsheets, drawing files and other relevant files should, as far as practicable, remain in a common location, and for the lifetime of the procedures, be stored in an exploitable method.

13.2.3 After the withdrawal of a procedure, the FPDO shall strive to archive the digital data that were used during the flight procedure design process. As far as applicable, the archived data should remain available in a state permitting a repetition or validation of the process in a later stage.

13.2.4 This documentation must remain available no longer than five (5) years after a full re-documentation following a review of the procedure or a withdrawal of the existing procedure.

13.2.5 The documentation shall, when no longer needed and as far as practicable, be retained in an archive form for later consultation.

13.3 Personnel records

13.3.1 The FPDO shall maintain documents and records of training for procedure designers and technical staff. These documents shall include, but not limited to:

a) procedure designer's assessment/competency report to include documentary evidence of training exercises which can allow the reconstruction of the training history of each designer;

b) record of training programme and plan for every FPD;

c) record and copy of certificates of all related trainings for every FPD including where applicable, initial, OJT, recurrent and specialised training;

d) record of initial and periodic assessment for every FPD; and

e) record of malfunction or fault of designing work facilities and equipment.

13.3.2 The FPDO shall establish rules for archiving personnel employment and training records that are non-active.

13.3.3 The records for qualification and training of FPD shall be retained for a minimum period of seven (7) years after the FPD ceases to perform a function for the FPDO.

14 Safety Regulatory Oversight

14.1 General.

14.1.1 Pursuant to Regulation 204 of the Civil Aviation Regulations 2016, an FPDO shall be subjected to safety regulatory oversight to determine compliance with the regulations and established requirements.

14.1.2 The main elements of the FPDO activities that are subjected to oversight shall include but not limited to, the following:

a) Technical staff (FPD) adequacy in terms of number and qualifications;

b) validity of FPDO/FPD certificates and approval;

c) operation manual and/or administrative handbook for FPD;

d) appropriate and adequate facilities for the procedure design work;

e) documentation process (e.g. the review and update of the operation manual/administrative handbook for FPD), with particular emphasis on procedure design documentation, including records of design review;

f) QA practices;

g) FPDs training plan and programme; and

h) records of training, evaluation and assessment of FPDs.

14.1.3 Safety oversight audit shall be conducted on an annual basis using the established protocol questions (PQ).

14.1.4 In addition to the regular audits, random or non–schedule inspections shall be carried out for which no notification is issued.

Note. — The guidance for the audit, inspection process and the related activities is provided in *Appendix 3*.

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15 Appendices

15.1 Appendix 1 - Recommended Exposition Layout

In order to obtain the Approved FPDO certificate, a flight procedure design organisation shall submit an exposition containing the information as specified below. The exposition shall be typed, with paragraphs and pages numbered, following the specified sequence.

1. Cover Page

a. Name of training organisation;

b. Title of exposition;

c. Version number; and

d. Date of document.

2. Administrative Information

a. Name and address of the training organisation and, if different, name and address of the training centre to which this application refers;

b. The names, telephone and fax numbers, and email addresses of the following:

i) the Accountable Executive,

ii) the head of the flight procedure designer (if different from (i)); and

iii) title and name of person(s) nominated by the flight procedure design organisation as the focal point for communication with the Authority;

c. A statement signed by the Accountable Executive, describing the extent of compliance of the organisation with this CAD;

d. An organisation chart showing associated chains of responsibility of accountable executive and other key personnel; and

e. A list of flight procedure design personnel with supporting documents verifying each individual's qualifications and experience.

3. Facilities, Equipment, Material and Records

In this section, the flight procedure design organisation shall show how it complies with the requirements of this CAD in terms of these items.

4. Instrument Flight Procedure Approvals

The applicant shall also apply for the approval of instrument flight procedure if it has not done so previously.

Note 1.— For items 2d, 2e, 3 and 4, a reference to other supporting documents submitted together with the application form shall be sufficient.

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15.2 Appendix 2 - Content of Operation Manual

The following is a sample of the contents of an operations manual for a FPDO. The operations manual should be customised to the unique qualities of each organisation.

PART / Chapter	Contents	Reference
PART I. Administrative		
Chapter 1. Responsibility for revision of the operations manual	• Describe ➢ Under whom the operations manual is established ➢ Who is responsible for the technical contents • Version control	
PART II. General and Organisation		
Chapter 1. General	• Purpose of the operations manual • Precedence of the operations manual • Scope of the operations manual • Functions to be performed by the service provider	
Chapter 2. Roles and responsibilities	• Describe the roles and responsibilities of the department, section and/or position (Descriptions for each department, section and/or position follow.)	
Chapter 3. Staffing requirement	• Describe the staffing requirements such as: ➢ number of personnel per procedure, or ➢ number of procedures which can be designed by a designer (The statement does not have to be quantitative; a statement such as “a sufficient number of qualified staff is required…” may be acceptable.) • Define the hierarchy – e.g. supervisor, chief designer, senior designer, designer, trainee designer (depending on each organisation)	
Chapter 4. Training and qualification	• Provisions concerning training and qualification of personnel • Appointment of special position (e.g. chief or supervisor) • Describe types of training and their contents, duration, interval (frequency)	
Chapter 5. Facility and resources	• Define the facilities and resources to be utilised to perform the task such as: ➢ building, office, table, and other equipment ➢ software and design tool ➢ aircraft and on-board equipment	
Chapter 6. Agreements with other organisations	• Define the procedures and/or rules to establish agreements with other organisations, including procurement of service and/or goods (Reference to another document is acceptable)	

Chapter 7. Compliance	• Define the processes to comply with regulations and verification (Reference to another document is acceptable) • Describe how to demonstrate the compliance	
Chapter 8. Operational instructions	• Define the methodology to provide operational instructions to staff members such as: ➢ circular ➢ information bulletin ➢ amendment to existing document (including notification of changes in design criteria)	
Chapter 9. Services to be provided	• Define the services (and/or product) to be provided by the organisation such as: ➢ (Initial) design ➢ continuous maintenance ➢ periodic review ➢ documentation process ➢ validation process • Define the types of flight validation to be provided by the organisation such as: ➢ validation of newly designed flight procedures ➢ periodic validation (with its interval for each type of flight procedure) ➢ validation upon amendment of flight procedures ➢ other validation conducted for special needs • Describe the criteria needed to determine the necessity of these types of service • Describe the criteria needed to determine the necessity of simulator evaluation	
PART III. Flight procedure design process		
Chapter 1. Design process	• Define the process to be followed	Doc 9906, Vol. 1
Chapter 2. Acquisition of data/ information	• Define ➢ types of data/information required for the design of instrument flight procedures ➢ how to acquire such data/information ➢ from whom/where to acquire such data/information	
Chapter 3. Consultation with stakeholders	• Identify stakeholders • Describe ➢ on which matters consultation with stakeholders is needed ➢ with whom ➢ when ➢ how	PBN manual Doc 9906, Vol. 1 Doc 9906, Vol. 5

Chapter 4. Environmental consideration	• Describe what should be considered in the design or flight procedures	
Chapter 5. Documentation	• Describe ➢ how to record the activities ➢ how to maintain documents • Define the period of maintenance of records	
Chapter 6. Format	• Provide the format (template) for design documents to record: ➢ rationale for the design ➢ controlling obstacle ➢ summary of calculation process • Provide the format (template) for flight validation report	
Chapter 7. Validation	• Describe: ➢ who validates the procedures ➢ how the procedures are validated • Define the process to be followed • Define the items (charts, aeronautical data, obstacle, flyability, Navaid/lighting) to be validated for each type of validation • Define tolerance • Define the type of result (pass, pass on condition, fail) ➢ what are the actions to be taken for failed procedure	Doc 9906, Vol. 5
Chapter 8. Preparation of publication	• Define the types of material to be submitted to AIS (depending on the protocol with AIS) • Define the timing of submission	
PART IV. Safety and Quality		
Chapter 1. SMS and QA system	• Define how to be involved in the SMS (e.g. the SMS of an entire ANSP) • Provide a reference to the organisation's quality manual • Provide a statement on the resolution of safety/quality-related issues	Annex 19 - Safety Management Doc 9859 Doc 9906, Vol. 1
Chapter 2. Oversight by regulator	• Describe how to manage the oversight	

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15.3 Appendix 3 - Approval and Oversight Processes

Note. — This appendix provides the guidance for FPDO approval processes i.e. new approval, renewal and variation of the approval as well as the random inspection and training plan acceptance process. This guidance includes the related pre-audit, onsite audit and the post-audit activities.

1. Approval Process

Flight Procedure Design Organisation	CAAM
Submit: a. application form & exposition b. operation manual, administrative handbook for flight procedure designer, quality manual, list of personnel and job description, facilities, equipment and records c. checklist of documents submitted	a. Review exposition and related documents b. Notify FPDO for audit with proposed dates
Follow audit process – Decision on approval	

2. Audit Process

Flight Procedure Design Organisation	CAAM
Pre Audit	
Agree on audit dates	Prepare audit plan and programme
Prepare evidence for each PQ, for example a folder every PQ containing all related evidences	Pre-audit preparation by audit team
On-Site Audit	
Provide overview information on audit scope	Conduct open meeting
a. Provide evidence for each PQ b. Provide access to audited facilities, documents or personnel	a. Conduct on-site audit activities b. Draft audit finding
Take note on audit observations and findings	Conduct close meeting
Post Audit	
Prepare corrective actions or implement corrective actions	Prepare interim audit report (follow deadline)
a. Continue prepare or implement corrective actions b. Submit corrective action reports with evidence	a. Receive corrective action reports and evidence b. Prepare and submit final report (follow deadline)
Implement corrective actions in accordance with effective implementation dates	a. Decision on approval b. Take action (if any) in accordance with enforcement procedure

3. Renewal Process

Flight Procedure Design Organisation	CAAM
Submit: a. application form & updated exposition b. copy of approval certificate, operation manual, administrative handbook for flight procedure designer, quality manual, list of personnel and job description, facilities, equipment and records c. checklist of documents submitted d. internal audit and corrective actions report	a. Review exposition and other documents b. Notify flight procedure design organisation for audit with proposed dates
Follow audit process – Decision on renewal	

4. Variation Process

Flight Procedure Design Organisation	CAAM
Submit: a. application form b. copy of approval certificate, updated copy operation manual, administrative handbook for flight procedure designer, quality manual, list of personnel and job description, facilities, equipment and records c. details of variation	a. Review exposition and other documents b. Notify flight procedure design organisation for audit with proposed dates
Follow audit process – Decision on variation	

5. Random Inspection Process

Flight Procedure Design Organisation	CAAM
On-Site Inspection	
a. Provide access to inspected facilities / documents / personnel b. Take note on inspection observations and findings	a. Conduct on-site inspection activities b. Inform FPDO of any non-compliance c. Set deadlines for corrective actions d. Submit non-compliance report
Post Inspection	
a. Implement corrective actions b. Submit corrective action report	a. Review & verify corrective action report b. Take action (if any) accordance with enforcement procedure

6. Procedure Design Acceptance Process

Flight Procedure Design Organisation	CAAM
Submit procedure design and design documentations	a. Review document b. Submit observation (if any)
Submit reviewed procedure design and design documentations	Accept procedure design

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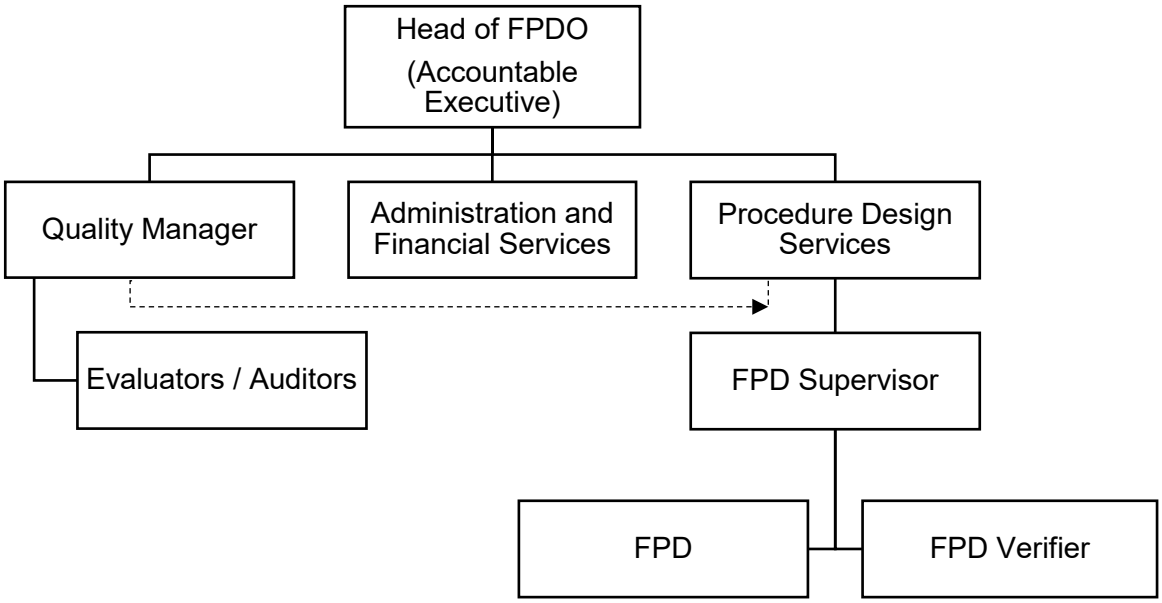
15.4 Appendix 4 - Organisational Structure of the Approved FPDO

The following organisational charts are by no means exhaustive and do not pretend to meet all operational requirements. They are provided only to assist procedure design organisations in developing and maintaining an organisational structure that is consistent with the needs of an effective quality system governance model.



Example of a small generic FPDO

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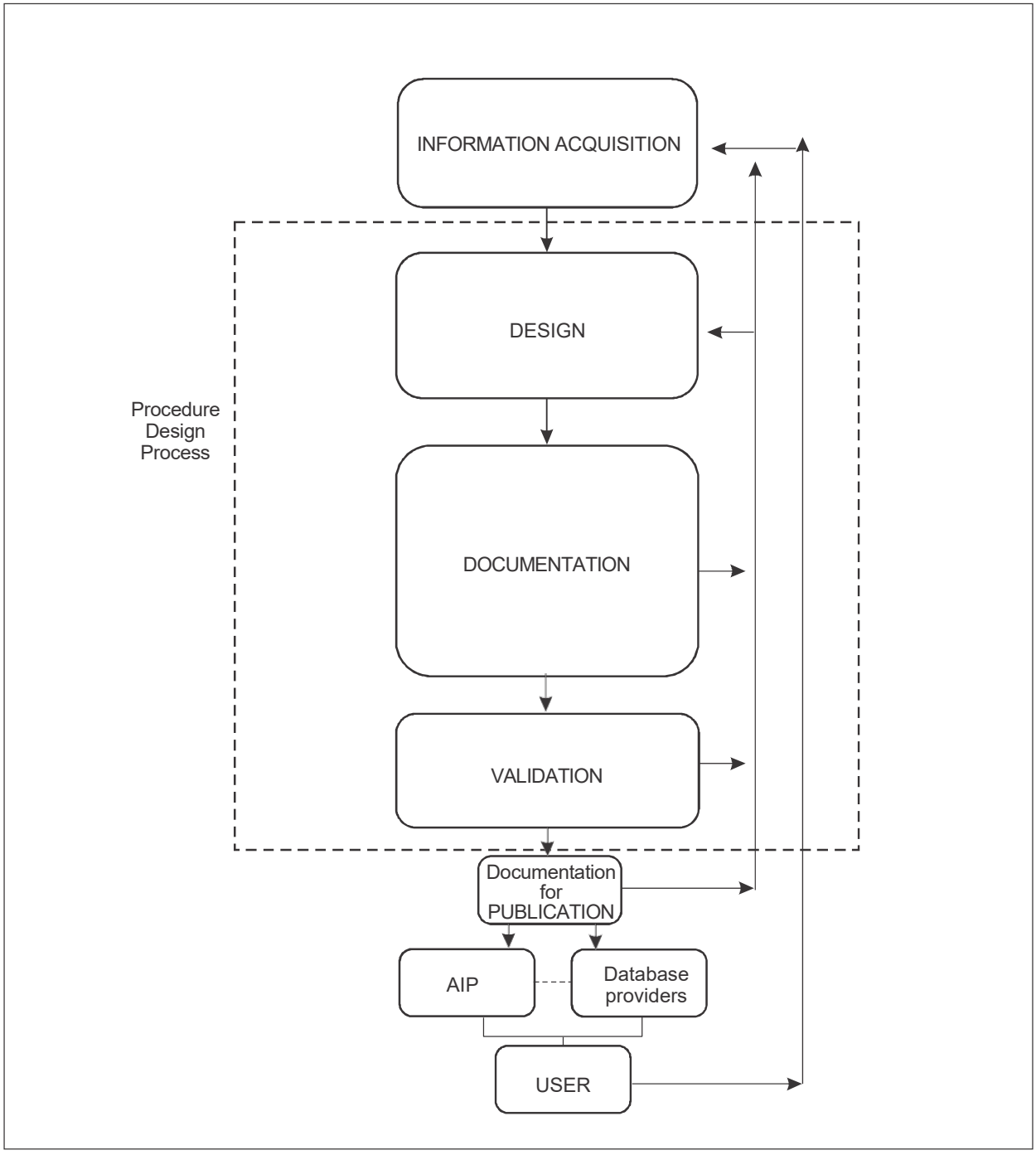
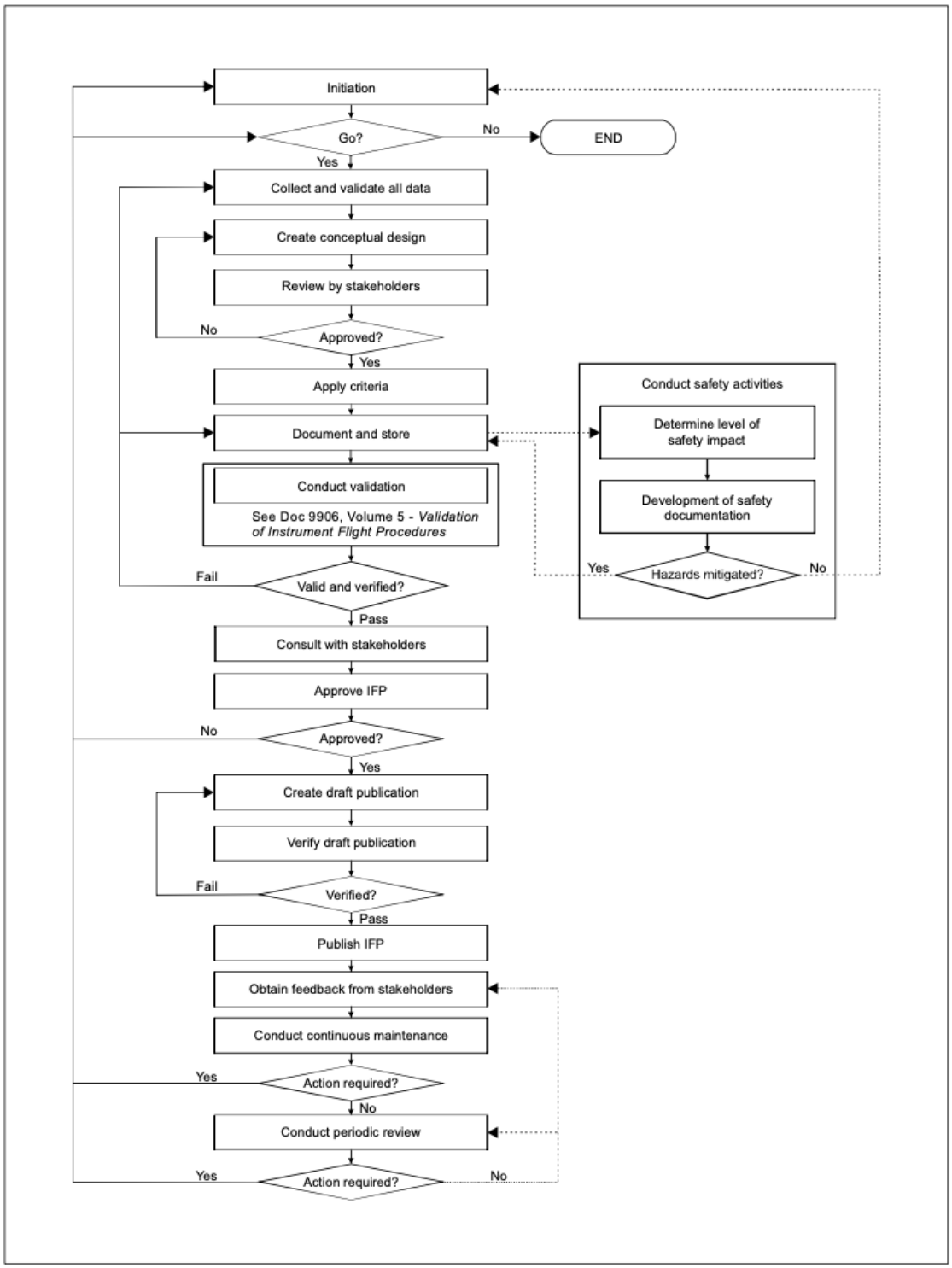
15.5 Appendix 5 - IFP Process



App E.1 - Instrument flight procedure process



App E.2 - IFP process flow

16 Attachments

16.1 Attachment A - AFPDO Application Form

CAAM/ANS/FPD 01

PIHAK BERKUASA PENERBANGAN AWAM MALAYSIA
(CIVIL AVIATION AUTHORITY OF MALAYSIA)

Approved Flight Procedure Designer Organisation (AFPDO)

Note: Please use attachment where necessary

1. Applicant Data	
Full Name	
Registered Company Name	
Office Address	
Telephone	
Fax	
Email	
Website address	

2. Declaration	
I apply for the approval specified and agree to comply with all the requirements and standard.	
Name	
Signature	
Date	

3. Completeness
Work will not start until this form has been complete, signed and approved.

4. Submission Instructions
Return the completed form and any accompanying documentation indicated in Section 6 to: Director Air Navigation Services Standard Division Civil Aviation Authority of Malaysia Level 3, Block Podium 27, Persiaran Perdana Precint 4 62618 Putrajaya Malaysia.

5. List of Procedure Designer and Professional Details
Name List and Professional Details (use separate sheet if required)
1.
2.
3.
5.
6.

6. Accompanying Documentation	
Written Exposition	☐
Operation Manual	☐
Foreign AFPD Certificate (if any)	☐
	☐
	☐

16.2 Attachment B - AFPD Application Form

CAAM/ANS/FPD 02

PIHAK BERKUASA PENERBANGAN AWAM MALAYSIA
(CIVIL AVIATION AUTHORITY OF MALAYSIA)

Approved Flight Procedure Designer (AFPD)

Note: Please use attachment where necessary

7. Applicant Data	
Full Name	
Passport/MyKad Number	
Address	
Telephone	
Fax	
Email	
Website address	

8. Declaration	
I apply for the approval specified and agree to comply with all the requirements and standard.	
Name	
Signature	
Date	

9. Completeness
Work will not start until this form has been complete, signed and approved.

10. Submission Instructions
Return the completed form and any accompanying documentation indicated in Section 6 to: Director Air Navigation Services Standard Division Civil Aviation Authority of Malaysia Level 3, Block Podium 27, Persiaran Perdana Precint 4 62618 Putrajaya Malaysia.

11. Professional Details	
Basic PANS-OPS Training Provider	
Date attended	
Tutor	
Advance PANS-OPS Training Provider	
Date attended	
Tutor	
Other relevant training (continue on separate sheet if required)	
Aviation Experience (if any)	
Qualification:	Date gained:

12. Accompanying Documentation	
Written Exposition	☐
Operation Manual	☐
Foreign AFPD Certificate (if any)	☐
	☐
	☐