Civil Aviation Authority of Bangladesh

Gazette

Dhaka, …….,1430/……....., 2023

No, CAAB 30.31.0000.117.37.002 – In exercise of the power conferred by Section 47, read with Section 14 of the Civil Aviation Act, 2017 (Act No. 18 of 2017), hereinafter referred as the "Act", the Chairman of the Civil Aviation Authority of Bangladesh is pleased to issue the following Air Navigation Order (ANO).

2. It shall come into force immediately.

Air Vice Marshal M Mafidur Rahman
BBP, BSP, BUP, ndu, afwc, psc
Chairman
Civil Aviation Authority of Bangladesh

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CHAPTER 1 GENERAL

1.1 Short Title and Commencement

This Air Navigation Order (ANO) may be called the ANO on Instrument Flight Procedure (IFP) Design Criteria Regulations or in short ANO IFP, issued in accordance with ICAO Document 8168, Procedures for Air Navigation Services, Aircraft Operations: PANS-OPS. Vol-II and Quality Assurance Manual for Flight Procedure Design Doc. 9906 Vol. I & V, with such modifications as determined by the Flight Standards and Regulation Division and as applicable in Bangladesh. This ANO shall be effective immediately upon publishing in this Official Gazette.

1.2 Applicability, Foreword, Definitions and Abbreviations

1.2.1 Applicability

1.2.1.1 The ANO IFP shall be applicable to the ANS Directorate in establishing the national standards for design and maintenance of Instrument Flight Procedures within Dhaka FIR.

1.2.1.2 The ANO IFP shall also be applicable to the ANS Provider in the design and maintenance of Instrument Flight Procedures within Dhaka FIR for use by aircraft operating under Instrument Flight Rules (IFR).

1.2.1.3 The ANO IFP is intended for the guidance of procedures specialists and describes the essential areas and obstacle clearance requirements for the achievement of safe, regular instrument flight operations. It provides the basic guidelines to the Service Providers producing instrument flight charts that will result in uniform practices at all aerodromes where instrument flight procedures are carried out.

CHAPTER 2 DEFINITIONS

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

Aerodrome Elevation. The elevation of the highest point of the landing area.

Aerodrome Operating Minima. The limits of usability of an aerodrome either for take-off or landing usually expressed in terms of visibility or Runway visual range, decision altitude/height or Minimum Descent altitude/height and cloud conditions.

Along-track tolerance (ATT). A fix tolerance along the nominal track resulting from the airborne and ground equipment tolerances.

Altitude. The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).

Air navigation services (ANS). This term includes air traffic management (ATM), communications, navigation and surveillance systems (CNS), meteorological services for air navigation (MET), search and rescue (SAR) and aeronautical information services/aeronautical information management (AIS/AIM). These services are provided to air traffic during all phases of operations (approach, aerodrome and en route)

Air navigation services provider (ANSP). Any entity providing ATM and/or other air navigation services mentioned above

Base turn. A turn executed by the aircraft during the initial approach between the end of the outbound track and the beginning of the intermediate or final approach track. The tracks are not reciprocal.
Note. — Base turns may be designated as being made either in level flight or while descending, according to the circumstances of each individual procedure.
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Circling approach. An extension of an instrument approach procedure which provides for visual circling of the aerodrome prior to landing.

Cross-track tolerance (XTT). A fix tolerance measured perpendicularly to the nominal track resulting from the airborne and ground equipment tolerances and the flight technical tolerance (FTT).

Decision Altitude (DA) or decision height (DH). A specified altitude or height in the precision approach or approach with vertical guidance at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.

Elevation. The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.

Final Approach Segment. That segment of an instrument approach procedure in which alignment and descent for landing are accomplished.

Final approach track. The flight track in the final approach segment that is normally aligned with the runway centre line.

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

Heading. The direction in which the longitudinal axis of an aircraft is pointed, usually expressed in degrees from North (true, magnetic, compass or grid).

Height. The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

Holding procedure. A predetermined manoeuvre which keeps an aircraft within a specified airspace while awaiting further clearance.

Initial Approach Fix (IAF). A fix that marks the beginning of the initial segment and the end of the arrival segment, if applicable.

Initial approach segment. That segment of an instrument approach procedure between the initial approach fix and the intermediate approach fix or, where applicable, the final approach fix or point.

Instrument Approach Procedure (IAP). 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. An instrument approach procedure which utilizes lateral guidance but does not utilize vertical guidance.

Approach procedure with vertical guidance (APV). An instrument procedure which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

Precision approach (PA) procedure. An instrument approach procedure using precision lateral and vertical guidance with minima as determined by the category of operation.

Intermediate approach segment. That segment of an instrument approach procedure between either the intermediate approach fix and the final approach fix or point, or between the end of a reversal, racetrack or dead reckoning track procedure and the final approach fix or point, as appropriate.

Intermediate Fix (IF). A fix that marks the end of an initial segment and the beginning of the intermediate segment.

Minimum Descent Altitude (MDA) or minimum descent height (MDH). A specified altitude or height in a nonprecision approach or circling approach below which descent must not be made without the required visual reference.

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Minimum Obstacle Clearance Altitude (MOCA). The minimum altitude for a defined segment that provides the required obstacle clearance.

Minimum Sector Altitude (MSA). The lowest altitude which may be used which will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centred on a radio aid to navigation.

Missed Approach Point (MAPt). That point in an instrument approach procedure at or before which the prescribed missed approach procedure must be initiated in order to ensure that the minimum obstacle clearance is not infringed.

Missed approach procedure. The procedure to be followed if the approach cannot be continued.

Mountainous area. An area of changing terrain profile where the changes of terrain elevation exceed 900 m (3 000 ft) within a distance of 18.5 km (10.0 NM).

Obstacle Assessment Surface (OAS). A defined surface intended for the purpose of determining those obstacles to be considered in the calculation of obstacle clearance altitude/height for a specific APV or precision approach procedure.

Obstacle Clearance Altitude (OCA) or Obstacle Clearance Height (OCH). The lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

Precision approach procedure. An instrument approach procedure utilizing azimuth and glide path information provided by ILS or PAR.

Primary area. A defined area symmetrically disposed about the nominal flight track in which full obstacle clearance is provided. (See also Secondary area.)

Procedure altitude/height. A specified altitude/height flown operationally at or above the minimum altitude/height and established to accommodate a stabilized descent at a prescribed descent gradient/angle in the intermediate/final approach segment.

Procedure turn. A manoeuvre in which a turn is made away from a designated track followed by a turn in the opposite direction to permit the aircraft to intercept and proceed along the reciprocal of the designated track.

Racetrack procedure. A procedure designed to enable the aircraft to reduce altitude during the initial approach segment and/or establish the aircraft inbound when the entry into a reversal procedure is not practical.

Reference Datum Height (RDH). The height of the extended glide path or a nominal vertical path at the runway threshold.

Reversal procedure. A procedure designed to enable aircraft to reverse direction during the initial approach segment of an instrument approach procedure. The sequence may include procedure turns or base turns.

Secondary area. A defined area on each side of the primary area located along the nominal flight track in which decreasing obstacle clearance is provided. (See also Primary area.)

Significant obstacle. Any natural terrain feature or man-made fixed object, permanent or temporary, which has vertical significance in relation to adjacent and surrounding features and which is considered a potential hazard to the safe passage of aircraft in the type of operation for which the individual procedure is designed.

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

Standard Instrument Departure (SID). A designated instrument flight rule (IFR) departure route linking the aerodrome or a specified runway of the aerodrome with a specified significant point, normally on a designated ATS route, at which the en-route phase of a flight commences.

Terminal arrival altitude (TAA). The lowest altitude that will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an arc of a circle defined by a 46 km (25 NM) radius centred on the initial approach fix (IAF), or where there is no IAF on the intermediate approach fix (IF),

Threshold (THR). The beginning of that portion of the runway usable for landing.

Track. The projection on the earth's surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from North (true, magnetic or grid).

Visual Manoeuvring (Circling) Area. The area in which obstacle clearance should be taken into consideration for aircraft carrying out a circling approach.

CHAPTER 3 ABBREVIATIONS

AIP	**Aeronautical Information Publication**
ALS	**Aeronautical Lighting System**
AMSL	**Above Mean Sea Level**
ARP	**Aerodrome Reference Point**
APV	**Approach procedures with vertical guidance**
ATC	**Air Traffic Control**
ATS	**Air Traffic Services**
ATT	**Along-track tolerance**
BV	**Buffer value**
CAAB	**Civil Aviation Authority of Bangladesh.**
CAT	**Category**
CDI	**Course deviation indicator**
CRM	**Collision Risk Model**
DA/H	**Decision Altitude/Height**
DER	**Departure end of the runway**
DME	**Distance Measuring Equipment**
FAF	**Final Approach Fix**
FAP	**Final Approach Point**
FATO	**Final Approach And Take-Off Area**
FMC	**Flight Management Computer**
FMS	**Flight Management System**
FTT	**Flight technical tolerance**
FL	**Flight Level**
GP	**Glide Path**
GPA	**Glide path angle**
HF	**Holding/racetrack to a fix**
HL	**Height loss**
IAF	**Initial Approach Fix**
IAP	**Instrument approach procedure**
IAS	**Indicated Airspeed**
IF	**Intermediate Approach Fix**
IFP	**Instrument Flight Procedure**
IFR	**Instrument Flight Rules**
ILS	**Instrument Landing System**
IMC	**Instrument Meteorological Conditions**
ISA	**International Standard Atmosphere**
LOC	**Localizer**
MA/H	**Minimum altitude/height**
MAHF	**Missed approach holding fix**
MAPt	**Missed approach point**

MATF	**Missed approach turning fix**
MDA/H	**Minimum descent altitude/height**
MM	**Middle marker**
MOC	**Minimum Obstacle Clearance**
MOCA	**Minimum Obstacle Clearance Altitude**
MSA	**Minimum sector altitude**
MSD	**Minimum stabilization distance**
MSL	**Mean sea level**
NM	**Nautical mile**
NPA	**Non-precision approach**
OAS	**Obstacle assessment surface**
OCA/H	**Obstacle clearance altitude/height**
OCS	**Obstacle clearance surface**
OJT	**On-the-job training**
OLS	**Obstacle limitation surface**
OM	**Outer marker**
PA	**Precision approach**
PANS-OPS	**Procedure for Air Navigation Services – Aircraft Operations**
PDG	**Procedure design gradient**
PinS	**Point-in-space approach**
RAIM	**Receiver autonomous integrity monitoring**
RDH	**Reference datum height (for APV and PA)**
SI	**International system of units**
SID	**Standard instrument departure**
SOC	**Start of Climb**
STAR	**Standard instrument arrival**
TAA	**Terminal arrival altitude**
TA/H	**Turn at an altitude/height**
TAR	**Terminal area surveillance radar**
TAS	**True airspeed**
THR	**Threshold**
TMA	**Terminal control area**
TP	**Turning Point**
VPA	**Vertical path angle**
VSS	**Visual segment surface**
WGS	**World geodetic system**
XTT	**Cross-track tolerance**

CHAPTER 4 IFP ROLES AND RESPONSIBIOLITIES

4.1 Regulator (CAAB)

4.1.1 The Chairman CAAB is responsible for overall regulatory oversight of IFP-design service within Bangladesh airspace. IFP designs are published on behalf of the Bangladesh under the authority of CAAB.

4.1.2 CAAB shall be responsible for:

a) providing an instrument flight procedure design service; and/or

b) agreeing with one or more Contracting State(s) to provide a joint service; and/or

c) delegating the provision of the service to external agency(ies).

4.1.3 In all cases in paragraph 1 above, CAAB shall approve and remain responsible for all instrument flight procedures for aerodromes and airspace under it's the authority.

4.1.4 Instrument flight procedures shall be designed in accordance with State-approved design criteria.

4.1.5 CAAB shall ensure that the instrument flight procedure design service provider intending to design an instrument flight procedure for aerodromes or airspace under the authority of Bangladesh shall meet the requirements established by its regulatory framework.

4.1.2 The Air Navigation Services section - CAAB

4.1.2.1 The ANS section of CAAB is responsible for:

a) ensuring the provision of IFP as appropriate;

b) assisting Chairman CAAB for granting approval to IFP Designers, IFP Design Service Provider and IFP designs;

c) providing guidance to IFP Design Service Provider and IFP Designers as appropriate in developing IFP Designs;

d) ensuring regular inspections/ audits of IFP design service provider are conducted; and

e) providing sectional expertise on all regulatory aspects of IFP design.

4.1.3 ANSP Responsible for IFP design service

The ANSP responsible for IFP design service is responsible for:

a) Maintenance of an IFP designs

b) initiating any new design or change to an IFP designs

c) ensuring that any new design or change to an IFP is undertaken by an IFP Designer

d) ensuring the validation as required of any new/changed IFP designs

e) ensuring that IFP designs are undertaken with relevant safety assessment and additionally in the submission of PBN safety assessment checklist in the case of RNAV design procedures

4.1.4 The ANS Provider shall ensure that the quality and safety of the procedure design product are assured through the review, verification, coordination and validation at appropriate points in the process, so that corrections could be made at the earliest opportunity in the process.

4.1.5 CAAB shall ensure that an instrument flight procedure design service provider utilizes a quality management system at each stage of the instrument flight procedure design process.

4.1.6 In the interest of safety, the ANS Provider shall implement the provisions in the ANO- IFP and PANS-OPS in a consistent manner, using processes that will minimize 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.

4.1.7 When the ANS Provider is not able to comply with any standards specified or referenced in this ANO, the ANS Provider shall apply to ANS Division for exemption or deviation from the relevant standards. Applications shall be supported in writing with the reasons for such exemption or deviation including any safety assessment or other studies undertaken, and here appropriate, an indication of when compliance with the current standards can be expected.

4.1.8 Any exemption or deviation granted to the ANS Provider shall also be recorded in the operations manual. The operations manual shall also contain the details of the exemption or deviation, such as the reason that the exemption or deviation was requested and any resultant limitations or conditions imposed.

4.1.9 The ANS Provider shall ensure that the units of measurement to be used in Air and Ground Operations shall be as specified in the ANO -5 are used, in the design of instrument flight procedures where applicable.

4.2 SAFETY ASSESSMENT

4.2.1 The IFP design office shall carry out a safety assessment in respect of proposals for new flight procedure designs or any significant changes in a revised procedure. Proposals shall be implemented only when the assessment has shown that an acceptable level of safety will be met.
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4.2.2 The safety assessment shall consider the following relevant factors determined to be safety- significant, including but not limited to:

(a) types of aircraft and their performance characteristics, including navigation capabilities and navigation performance;

(b) traffic density and distribution;

(c) airspace complexity; ATS route structure and classification of the airspace;

(d) aerodrome layout
(e) type and capabilities of ground navigation systems
(f) significant local/regional data (e.g. obstacles, infrastructures, operational factors, etc).

4.2.3 Safety risk control/mitigation process shall include hazard/consequence identification and safety risk assessment. Once hazards and consequences have been identified and safety risks assessed, the effectiveness and efficiency of existing aviation system defences relative to the hazards and consequences should be evaluated. As a consequence of this evaluation, existing defences shall be reinforced, new ones introduced, or both.

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

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

CHAPTER 5 ORGANIZATIONAL REQUIREMENTS

5.1 The ANS Provider shall maintain an appropriate instrument design office to enable the IFP designer to carry on design work in instrument flight procedures in accordance with the requirements set out in this ANO.

5.2 The ANS Provider shall ensure that the designs of instrument flight procedures are in accordance with:

(a) applicable standards set out or referred to in ICAO Doc 8168; and
(b) applicable standards as set out in this ANO IFP.

5.3 The ANS Provider shall employ a person (s) trained in IFP design to check and verify independently the plans of each instrument flight procedure design.

5.4 Instrument approaches, arrival and departure procedures shall be named in accordance with the naming convention contained in ICAO DOC 8168, Vol.-II.

5.2 SCALE OF MAPS

5.2.1 The following scale of maps should be used for plotting instrument flight procedure segments:

(a) 1:1000,000 and 1:500,000 for initial calculation of minimum sector altitudes.

(b) 1:250,000 for confirmation of minimum sector altitude, standard arrival routes, racetrack and reversal areas, initial, intermediate, and missed approach segments.

(c) 1:100,000 and 1:50.000 for detail checks within racetrack/reversal areas, intermediate areas, final approach area and missed approach area.

(d) 1:25,000 and 1:10,000 for check of the ILS precision segment and preparation of obstacle data for CRM.

5.3 CHARTING FOR AIP

5.3.1 Publication procedure of charts to be followed is contained in:
a) Standard Departure Chart — Instrument (SID) — ANO 4;
b) Standard Arrival Chart — Instrument (STAR) — ANO 4,
c) Instrument Approach Chart — ANO 4.

5.4 CHARTING ACCURACY

5.4.1 Charting accuracy shall be taken into account by applying vertical and horizontal tolerances, in accordance with ICAO DOC 8168, Vol-II. When the application of these tolerances creates an unacceptable operational penalty, additional survey information shall be used to refine the obstacle location and height data

CHAPTER 6 OPERATIONS MANUAL

6.1 The ANS Provider shall develop and maintain an operations manual. The operations manual shall serve to demonstrate how the service provider will comply with the requirements set out in the ANO IFP.

6.2 The contents of the operations manual shall include but are not limited to the following:

(a) the information required of the ANS Provider as mentioned in this ANO IFP; and

(b) a description of the IFP design office that shows the role, responsibilities and job functions of the IFP design office personnel who are responsible for ensuring the compliance of the ANS Provider with the requirements in sub-paragraph (a).

6.3 The ANS Provider shall:

(a) keep the operations manual in a readily accessible form;
(b) ensure that the IFP designer has ready access to the operations manual; and
(c) amend the operations manual whenever necessary to keep its content up to date.

6.4 The ANS Provider shall submit a copy of the most current operations manual to ANS Division for approval.

6.5 The Procedure Designer Office documentation required to maintain transparency concerning the details and assumptions used by the procedure designer personnel who are responsible for ensuring the compliance and the validation requirement for accuracy and completeness prior to validation and publication shall be specified in the form of a Directive issued by the Director ATM. A sample Directive is attached as **Appendix A** to this ANO

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CHAPTER 7 RESOURCE REQUIREMENTS

7.1 The ANS Provider shall provide and maintain following facilities for the design work on instrument flight procedures. This would include:

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

(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 instrument flight procedures; and

(c) ready access to copies of relevant documentation comprising technical standards, practices, and instructions, and any other documentation that may be necessary for the design, design verification, flight validation, and maintenance of the types of instrument flight procedure.

7.2 If an aeronautical database and aeronautical data is required for designing an instrument flight procedure, the ANS Provider shall ensure the integrity of the database and the data. The data used shall be current, traceable, and meets the required level of verifiable accuracy for the design.

7.3 IFP Design office shall obtain approval from the Chairman, CAAB before undertaking any instrument flight procedure design.

7.4 IFP Design office shall ensure that adequate and competent personnel are assigned the task of construction of visual and instrument flight procedure design.

7.5 No person shall not act as a procedure designer unless specifically authorized by the Chairman, CAAB. The minimum qualification required for procedure designers are prescribed in Chapter-9 of this ANO.

CHAPTER 8 IFP DEVELOPMENT PROCESS & DOCUMENTS AND RECORDS CONTROL SYSTEM

8.1 The ANS Provider shall establish an IFP development process. The IFP development process shall cover the entire lifespan of a flight procedure, from the initial development, including the approval and publication, and up to the withdrawal of the flight procedure.

8.2 The IFP design process shall establish a quality system for the entire IFP development process.

8.3 The ANS Provider shall establish and put into effect, a system for controlling documents and records relating to the instrument flight procedures on which the designer carries on design work, including the policies and procedures for making, amending, preserving and disposing of those documents and records.

8.4 The ANS Provider shall, at ANS Division's request, make the documents and records, copies or extracts from them, available for inspection by ANS Division.

CHAPTER 9 INSTRUMENT FLIGHT PROCEDURE DESIGNER QUALIFICATIONS AND TRAINING

IFP Designer Qualifications

9.1 The ANS Provider shall ensure that a person designing or amending a flight instrument procedure demonstrates required competency level for flight procedure design. IFP designers shall acquire and maintain this competency level through training and by supervised on-the-job training (OJT). This is 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 as specified in ANO 4 and ANO 15.

Training for IFP Designers

9.2 The training for IFP designers shall include an initial and recurrent training at periodic intervals.

9.3 The ANS Provider shall ensure that the IFP designer is able to demonstrate a basic level of competency through initial training 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, 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 design;
(g) criteria for RNAV, GNSS and RNP; and
(h) practical exercises in the design of procedures.

9.4 The ANS Provider shall ensure that the IFP designer is able to demonstrate a basic level of competency through recurrent training 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.

9.5 OJT is aimed at permitting the new IFP designer to integrate his basic knowledge with actual practice. The ANS Provider shall ensure that new IFP designers undergo an adequate, supervised OJT.

9.6 The competency of the IFP designer shall be subject to periodic verification by ANS Division to ensure continued compliance with the requirements in this ANO-IFP.

9.7 The ANS Provider shall maintain training records for their IFP designers.

CHAPTER 10 PROCEDURE DESIGN INFORMATION ACQUISITION

10.1 Information Acquisition

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

10.1.2 In the obstacle survey for procedure design, the IFP designer shall consider that:

(a) all obstacles be accounted for. Items, such as trees and heights of tall buildings shall be accounted for either by physical examination of the site or by addition of a suitable margin above terrain contours; and

(b) the accuracy of the vertical and horizontal data obtained may be adjusted by adding an amount equal to the specified survey error to the height of all measured obstructions and by making a corresponding adjustment for specified horizontal error.

10.1.3 The procedure design information shall be coordinated with all the users. 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 ANO 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.

10.1.4 The diagram 10.1 in the following page describes the information acquisition process in detail. Starting from design, going through the documentation process, subsequent validation of the information and publication of the processed information are all described in the diagram. This shall be used as guideline for the information acquisition process and its distribution.

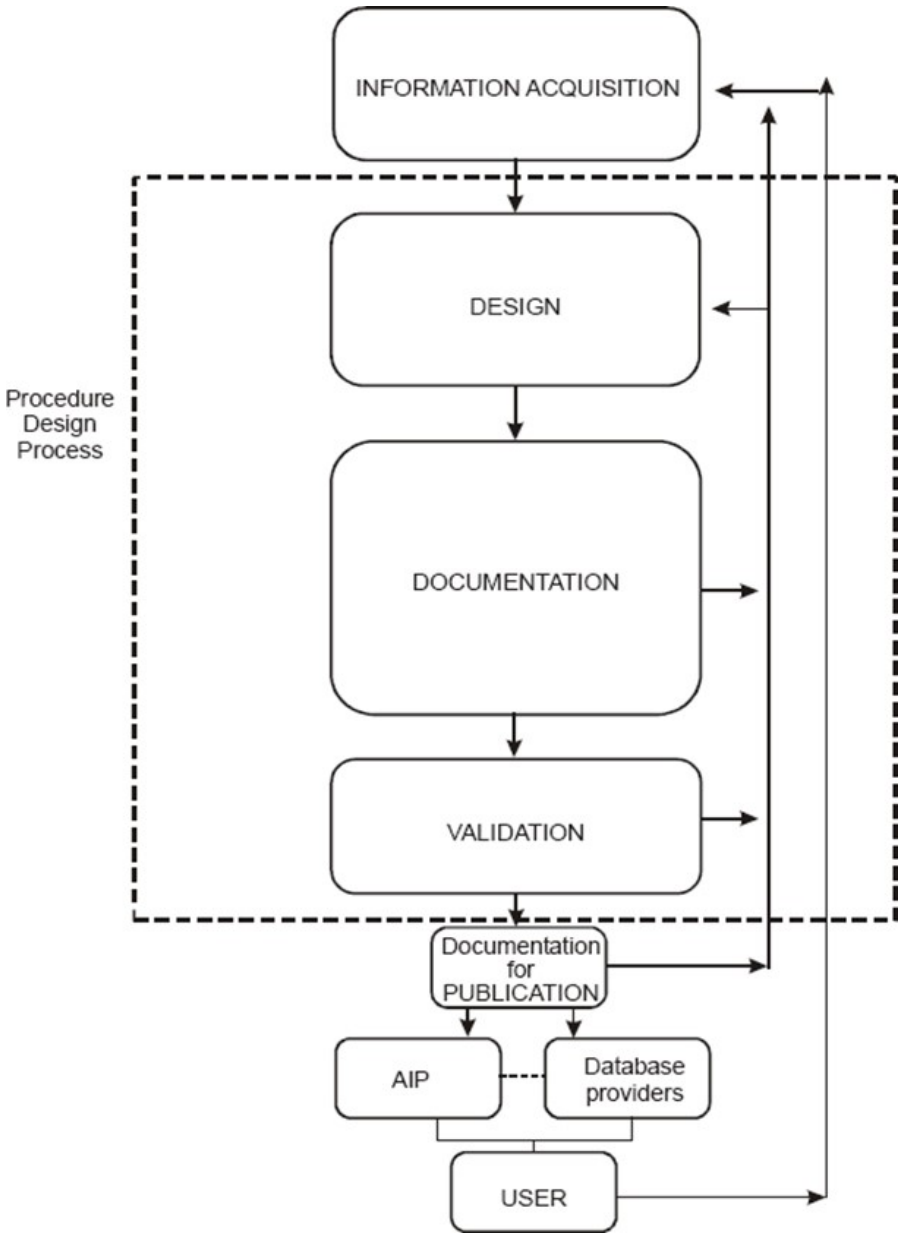
INFORMATION ACQUISITION
DESIGN
Procedure
Design
Process
DOCUMENTATION
VALIDATION
Documentation
for
PUBLICATION
AIP
Database
providers
USER

Diagram 10.1

CHAPTER 11 INSTRUMENT FLIGHT PROCEDURE DESIGN PROCESS

11.1 Introduction

11.2 The Instrument Flight Procedure Design process 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.

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

11.4 **Procedure Design**

11.4.1 Procedures shall be designed according to ICAO Doc 8168 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.

11.4.2 Each new or revised procedure shall be verified by a person(s) trained in procedure design other than the one who designed the procedure, to ensure compliance with applicable criteria.

11.4.3 Published procedures shall be subject 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.

11.4.4 Procedure Design Documentation

11.4.4.1The documentation provided by the IFP designer is divided into three categories and shall include:

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

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

(i) controlling obstacle for each segment of the procedure;

(ii) effect of environmental considerations on the design of the procedure;

c) additional documentation required to facilitate ground and flight validation of the procedure.

11.4.4.2 All documentation should undergo a final verification for accuracy and completeness prior to validation and publication.

11.4.4.3 Degrees true are used for track in designing the procedure, however all published procedures shall be in degrees magnetic in accordance with the provisions of ANO 4.

CHAPTER 12 PROCEDURE DESIGN

12.1 Taking into account all the design inputs, instrument flight procedures shall be designed by a procedure designer following to the criteria set out in ICAO Doc. 8168 (Volume I & II) including the exceptions in this ANO or instructions/circulars published by the ATM Division.

12.2 Coordination with all concerned parties should continue throughout the procedure design and validation process to ensure that the procedure meets the needs of the user and the aviation community.

12.3 Each new or revised procedure shall be verified by a qualified procedure designer, other than the one who designed the procedure, to ensure compliance with applicable criteria.

CHAPTER 13 NORMAL AND EMERGENCY OPERATIONS

13.1 The design of procedures in shall assume normal operations and that all engines of the aircraft are operating.

13.2 It is the responsibility of the operator to conduct an examination of all relevant obstacles and to ensure that the performance requirements of ANO 6 are met by the provision of contingency procedures for abnormal and emergency operations. Where terrain and/or obstacle considerations permit, the contingency procedure routing should follow that of the departure/arrival procedure.

13.3 The obstacle information described in ANO 4 and 6, and any additional information used in the design shall be made available in AIP.

CHAPTER 14 REVIEW OF PROCEDURE & RETENTION OF DOCUMENTS

14.1 Published instrument flight procedures shall be subjected to a periodic review to ensure that they continue to comply with changing criteria and meet user requirements. The maximum interval for this review will be **05 (five) years**.

14.2 All documents concerned to the instrument flight procedure design should be retained in the procedure design office to assist in recreating the procedure in the future in the case of incidents and for periodic review and maintenance. The period of retention shall not be less than the operational lifetime of the procedure.

CHAPTER 15 GROUND AND FLIGHT VALIDATION

15.1 VALIDATION

15.1.1 Validation is the final quality assurance step in the procedure design process, prior to publication. The purpose of validation is the verification of all obstacle and navigation data, and assessment of flyability of the procedure. Validation normally consists of ground validation and flight validation. Ground validation shall always be undertaken.

15.1.2 When it can be verified, by ground validation (para 15.2), 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.

15.2 GROUND VALIDATION

15.2.1 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.

15.2.2 Issues identified in the ground validation should be addressed prior to any flight validation. The ground validation will also determine if flight validation is needed for modifications and amendments to previously published procedures.

15.3 FLIGHT VALIDATION

15.3.1 Flight validation of instrument flight procedures should be carried out as part of the initial certification and should also be included as part of the periodic quality assurance programme.

15.3.2 The flight validation shall be accomplished by a qualified and experienced flight inspector, certified or approved by CAAB. 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.

15.3.3 Flight inspection of instrument flight procedures is required to assure that the appropriate radio navigation aids adequately support to the procedure. This is carried out in periodic intervals as part of a formal flight inspection programme and is performed by a qualified flight inspector using an appropriately equipped aircraft.

15.3.4 The procedure designer shall be the originator of all data applicable to conducting a flight validation provided to the flight inspection operations activity. The procedure designer should be

prepared to provide briefings to the flight inspection crews in those cases where flight procedures have unique application or special features.

15.3.5 The procedure designer, if required, shall participate in the initial validation flight to assist in its evaluation and obtain direct knowledge of issues related to the procedure's design from the flight inspection pilot and/or from the inspector.

15.3.6 ICAO Manual on Testing of Radio Navigation Aids, Volumes I, II, and III (Doc 8071) shall be followed for guidance concerning flight inspection and validation of instrument flight procedures as well as qualifications and certification of flight inspectors.

CHAPTERB 16 PROCEDURE DESIGN AUTOMATION

16.1 Procedure design office should use the available software packages to design their instrument flight procedures. Procedure design automation tools have the potential to greatly reduce errors in the procedure design process. The advantages are many, including maintaining the integrity of the source data throughout the design phase, reducing human errors, gaining the capability to develop "what-if" scenarios, and standardized application of the procedure design criteria.

16.2 Procedure design office shall carefully check if the software package used in the design of the procedures have been validated. While software developers test their software extensively, there is no absolute guarantee as to the accuracy of any individual application of the criteria.

CHAPTER 17 GUIDANCE ON ENVIRONMENTAL ISSUES

17.1 Although procedure designers are primarily concerned with obstacle clearance criteria, but attention must be given to other important elements in procedure design, namely airspace requirements, ATS operational requirements and, in many cases, environmental requirements imposed by the government.

17.2 When planning departure routes, procedure designers shall take into account aircraft noise, which is a major environmental issue and shall attempt to define the aircraft containment area and its distribution. This will allow either concentrating or spreading the aircraft noise.

17.3 The decision to use spread or concentrate aircraft noise method— or to combine both methods shall always be made for each airport individually, taking into account the density of population.

CHAPTER 18 DEPARTURE PROCEDURES

18.1 GENERAL

18.1.1 For each runway at aerodromes where instrument departures are expected to be used, a departure procedure shall be established and promulgated.

18.1.2 A departure procedure should be designed to accommodate all aircraft categories where possible. Where departures are limited to specific categories, the departure chart shall clearly identify the applicable categories.

18.1.3 A departure procedure shall provide obstacle clearance immediately after take-off until the aircraft intercepts an en-route segment. Departure procedures include, but are not limited to, standard departure routes and associated procedures..

18.1.4 A departure procedure shall not be determined by obstacle clearance requirements only but it shall also take into account the requirement of air traffic control, airspace management or other requirements (e.g. noise abatement). Departure procedures shall be developed in consultation with the operators, Air Traffic Control and other parties concerned.

18.1.5 In the interest of efficiency and economy, every effort should be made to ensure that departure procedures are designed, consistent with safety, to minimize both the time taken in executing a departure and the airspace required.

18.1.6 Departure procedures may be designed & published as specific routes or as omnidirectional departures.

CHAPTER 19 GNSS RNAV, RNP & BARO-VNAV APPROACH PROCEDURE

19.1 When designing Instrument Flight Procedures, the Designers shall follow the concerned chapters of Doc 8168, Vol-II.

20 REVISION OF THIS ANO

20.1 To be drafted by Legal Cell