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<p>Document No: TCAA/QSP/SR/AC/ANS - 06</p>	<p>Title: CONSTRUCTION OF VISUAL AND INSTRUMENT FLIGHT PROCEDURES</p>	<p style="text-align: right;">Page 1 of 10</p>

CONSTRUCTION OF VISUAL AND INSTRUMENT FLIGHT PROCEDURES

1. PURPOSE

- 1.1. This Advisory Circular provides guidance to personnel involved in construction of instrument and visual flight procedures for publication in the Aeronautical Information Publication.
- 1.2. Uniform application of the guidance material prescribed herein will enhance uniformity and ensure safety to aircraft executing the procedures.

2. REFERENCES

- 2.1. Applicable Standards and Guidance Material for development of flight procedures in compliance with the provisions of the following documents:
- 2.1.1. Civil Aviation (Certification of Air Navigation Services Provider) Regulations 2017
 - 2.1.2. Civil Aviation (Construction of Visual and Instrument Flight Procedures) Regulations, 2017
 - 2.1.3. Civil Aviation (Units of Measurement for Air and Ground Operations), Regulations ; 2017
 - 2.1.4. Civil Aviation (Aeronautical Charts) Regulations 2017
 - 2.1.5. Civil Aviation (Operation of Aircraft) Regulations: 2017
 - 2.1.6. Civil Aviation (Air Traffic Services) Regulations, 2017
 - 2.1.7. Civil Aviation (Aerodromes) Regulations, 2017
 - 2.1.8. Civil Aviation (Aeronautical Information Services) Regulations 2017
 - 2.1.9. Civil Aviation(Safety Management) Regulations 2017
 - 2.1.10. ICAO Doc 8168 – OPS/611 Procedure for Air Navigation Service - Aircraft Operations;
 - 2.1.11. ICAO Doc 9613 - Performance based Navigation Manual - Volume I Concept and Implementation Guidance and Volume II Implementing RNAV and RNP
 - 2.1.12. ICAO Doc 9274 – AN/904 Manual on the Use of the Collision Risk Model (CRM) for ILS operations;
 - 2.1.13. ICAO Doc 9368 – AN/911 Instrument Flight Procedure Construction Manual;
 - 2.1.14. ICAO Doc 9674 – AN/946 World Geodetic System 1984 (WGS-84) Manual;
 - 2.1.15. ICAO Doc 9906 – AN/472 Quality Assurance Manual for Flight Procedure Design.
 - 2.1.16. ICAO Doc 9365 - Manual of All-Weather Operations:

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2.1.17. ICAO Doc 9881 - Guidelines for Electronic Terrain, Obstacle and Aerodrome Mapping Information:

2.2. Action must be taken to ensure that latest editions of the applicable reference documents are used in the construction and review of flight procedures

3. GUIDANCE INFORMATION

3.1. Scope

3.1.1. Flight Procedures considered in this Advisory Circular include conventional and Performance Based Navigation (PBN) Flight Procedures (RNAV departure, arrival and approach including non precision and precision approaches).

3.1.2. The PANS OPS criteria contained in ICAO Doc 8168- PANS-OPS/611 shall be applied in developing instrument approach procedures(IAP).

3.1.3. The design and format for IAP charts shall be in accordance with Civil Aviation (Aeronautical Charts) Regulations 2017 and ICAO Doc 8697.

3.2. Organizational Responsibilities for Flight Procedures.

3.2.1 Flight Procedure Design Service Providers are responsible for planning, construction, and publication of flight procedures. The Authority is responsible for the applicable standards and approval of the flight procedures.

3.2.2 On receipt of a request for approval of a flight procedure for publication, the Authority will evaluate the proposal including the supporting documentation and respond to the applicant. Further guidance is provided in the Order of TCAA-QSP-SR-O-ANS-01 Approval of Visual and Instrument Approach Procedures on the approval process

3.2.3 The design of procedures in accordance with PANS-OPS criteria assumes normal operations. It is the responsibility of the operator to provide contingency procedures for abnormal and emergency operations.

Note: The Matrix of organizational responsibilities for Standard Flight Procedures design and approval is shown in Attachment 1 to this circular.

3.3. Requirement for new procedures

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3.3.1. Where an operational requirement exists for a new flight procedure, the Instrument Flight Procedure Design Services Provider shall ensure that such procedure is designed in accordance with the prescribed standards and submitted to the Authority for approval. The supporting documentation outlined in Section 3.8 below shall be included.

3.3.2. The Instrument Flight Procedure Design Services Provider may consult with the Authority in advance or during the design process to clarify on regulatory requirements.

3.4. Requirement for revision of flight procedures

3.4.1. Each flight procedure published in the AIP should be revised as follows:

- a) when a significant change to the obstacle environment occurs, requiring an amendment of procedural minimum altitudes;
- b) when a published bearing, track or radial would fall into error by 1⁰, consequent on a change to magnetic variation or station declination;
- c) to improve safety or operational efficiency, as identified by an interested party;
- d) to accommodate changes to aircraft category or characteristics;
- e) to accommodate route connectivity or airspace organisation change;
- f) necessitated by changes to the supporting navigation facility;
- g) to comply with amendments to applicable ICAO provisions and other international and national standards and recommended practices;
- h) where a change in procedural attitude is required;
- i) when a significant change occurs to aerodrome physical characteristics such as runways;
- j) when any other significant change occurs to aeronautical, cultural or topographical data

3.4.2. Each procedure should be reassessed at intervals of not more than five years or earlier depending when there is change in the data that was used in the initial design as documented in 3.4.1 above.

3.5. Proficiency of Procedure Designer

3.5.1. In order to ensure that flight procedures, submitted to the Authority for approval and publication in AIP, meet the required standard of quality assurance the proficiency of the designers is specified as follows:

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- a) a minimum of five years aviation experience as a pilot, air traffic controller, Engineer, Aeronautical Information Services Officer, or equivalent experience.
- b) successful completion of an ICAO PANS-OPS course for Conventional and/or PBN Flight Procedures; and
- c) completion of a minimum of two approved flight procedures designs under the supervision of a competent procedure designer;

3.5.2. Flight procedures submitted for approval should be accompanied by details of competence of the designer(s).

3.5.3. Further details on the on the training requirements of flight procedure design personnel are contained in TCAA-QSP-SR-AC-ANS 22.

3.6. Airspace Organization

3.6.1. Instrument flight paths should be contained within controlled airspace, where established.

3.6.2. Where instrument flight paths are contained within controlled airspace which lies above uncontrolled airspace, the minimum procedural altitude should be at least 500ft above the base of the controlled airspace.

3.6.3. Any proposal to establish a terminal instrument flight path in uncontrolled airspace will require a safety assessment including consideration of types and density of air traffic, risk analysis and acceptable mitigation.

3.7. Flight Procedure Construction Principle

In addition to the primary consideration of obstacle clearance, principles which should be applied to the design of flight procedures are that they should be safe, simple and economic in terms of time and airspace. Consistency between different procedures to the same runway should be applied to the extent feasible e.g. harmonization of platform altitudes and FAFs as may be applicable among other items.

3.8. Supporting Documentation

3.8.1. Documentation to be included with flight procedures submitted for approval should include, as appropriate:

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- a) obstacle survey data including dates of last full and update surveys;
- b) airfield and navigation facility data;
- c) diagram of each segment and holding areas showing dominant obstacles;
- d) procedural and minimum altitudes for each segment;
- e) track guidance;
- f) chart depicting the procedure;
- g) textual or abbreviated description and path terminators where applicable;
- h) associated positional data e.g. co-ordinates, bearings, distances;
- i) description of methodology and options considered;
- j) sufficient detail of significant calculation and design data to enable the proposal to be validated;
- k) other information considered relevant in support of the request for approval

3.9. Quality Assurance

3.9.1. The quality requirements for the procedures shall conform to ICAO Doc 9906 – AN/472 Quality Assurance Manual for Flight Procedure Design

3.9.2. Working Practices

- a) **Use of software** Where practicable calculation and drawing of flight paths and protected areas should be done using accredited software.
- b) **Data Processing** Data processing and transfer techniques shall, where practicable, be based on electronic rather than manual methods. Techniques for deriving positional data shall ensure that accuracy, resolution and integrity of such data complies with ICAO Doc 9674 AN/946 (WGS-84 Manual).

3.9.3. Survey and Charting Accuracies: Account must be taken of survey and charting accuracies by adding vertical and horizontal tolerances, as deemed appropriate.

3.10. Exceptions from PANS-OPS Criteria;

Any exceptions from PANS-OPS criteria applied in the procedure construction should be identified. Such exceptions will require to be considered in conjunction with operators before approval for publication is issued. Only where an identifiable operational advantage can be gained, without compromising safety taking account of the local environment will exceptions to the PANS-OPS criteria be accepted.

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3.11. Implementation of the Instrument Flight Procedure Process.

The flight procedure design organization shall ensure that:

- a) the construction of visual and instrument procedures is coordinated with all relevant stakeholders and integrated into a State's airspace design process, taking into account air traffic flows, separation issues, airspace user requirements, etc.
- b) the procedure design process encompasses: the initiation and collection of requirements and constraints, the acquisition of data, the FPD, ground validation, flight validation and flight inspection (when required), approval and publication. It also includes review, verification and validation processes which are necessary to minimize the possibility of errors. It considers the safety analysis necessary prior to implementation. The process also incorporates the periodic review of data, criteria and feedback from operational implementation.
- c) The ANSP is advised to consult with user representatives, where feasible, before submission of new procedures, particularly where there are complexities in the design. Such consultation may be informal but a note of the outcome may be included with the supporting documentation. During the evaluation process a determination will be made as to whether formal consultation with user representatives is required.

3.12. Consultation with User Representatives

The Instrument Flight Procedure Design Services Provider is advised to consult with user representatives, where feasible, before submission of new procedures, particularly where there are complexities in the design. Such consultation may be informal but a note of the outcome may be included with the supporting documentation. During the evaluation process a determination will be made as to whether formal consultation with user representatives is required.

3.13. Terms of Reference for Procedure Designers

The Services Provider shall develop terms of reference of personnel responsible for the construction of visual and instrument flight procedures.

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3.14. Retention of records

The Services Provider shall ensure that all documents produced from the time the need for the design or amendment of a procedure is determined to the actual request for approval are retained.

3.15. Ground and Flight Validation of instrument flight procedures

Validation of instrument flight procedures is the necessary 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 shall consist of ground validation and flight validation.

3.15.1. Ground validation

Ground validation shall consist of a review of the entire instrument flight procedure package by a person(s) qualified 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. The ground validation will also determine if flight validation is needed for modifications and amendments to previously published procedures.

3.15.2. Flight validation

Flight validation of instrument flight procedures should be carried out as part of the initial record and shall be accomplished by a qualified and experienced flight validation pilot, certified or approved by the Authority.

3.16. Flight Inspection of instrument flight procedures

The Services Provider shall conduct flight inspection on all instrument flight procedures. 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

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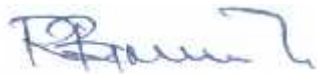
formal flight inspection programme and is performed by a qualified flight inspector using an appropriately equipped aircraft.

3.17. Publication of the obstacle clearance altitude/height (OCA/H)

In publishing the final product of the designed flight procedure the service provider shall take into consideration of the requirements of ICAO Doc 8168 Vol II part III section 5. The organization responsible for the development of flight procedures shall also publish obstacle clearance altitude/height (OCA/H)

3.18. Establishment aerodrome operating minima

When an aerodrome operating minima has been established, the organization responsible for developing flight procedures shall establish and publish operating minima (e.g. visibility, minimum descent altitude/height (MDA/H), decision altitude/height (DA/H)) for instrument approaches at aerodromes.



Tanzania Civil Aviation Authority

Note: See Attachment 1 - Matrix of organizational responsibilities next page.
Attachment 2: IFP process flow Diagram

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