International Civil Aviation Organization SAM/IG/21-WP/15
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Twenty-First Workshop/Meeting of the SAM Implementation Group (SAM/IG/21) - Regional ProjectRLA/06/901
(Lima, Peru, 21 to 25 May 2018)

Agenda Item 2: Optimisation of SAM airspace

a) Progress made in regional PBN implementation

ADVISORY CIRCULAR ON FLIGHT PROCEDURE DESING

(Presented by Uruguay)

SUMMARY

This working paper presents the proposed Advisory Circular (CA) on Flight Procedure Design to guide States on acceptable methods for the development and maintenance of flight procedures and other aspects related to design quality assurance.
The experts on regional PBN implementation shall analyse the contents of the proposal so as to make it part of a regional CA.

References:
- LAR 211 “Air traffic management”
- LAR 91 “Flight rules and general operation”

1. Background

1.1 The priorities set forth in the Declaration of Bogota responded to the requirements of the Region for the period 2014-2016, which do not reflect all of the air navigation requirements of the Global Plan and the SAM Performance-based air navigation implementation plan (PBIP) to achieve system integration, interoperability and harmonisation in support of the concept of a “single sky” for international civil aviation, but allowed States to focus efforts on priority issues.

2. Discussion

2.1 Significant progress has been made in the implementation of air navigation improvements contemplated in the Declaration of Bogota and in the priorities for the period 2017-2019 with respect to PBN.

2.2 Progress made in PBN SID/STAR procedures reaches 72.9%, exceeding the 60% goal of the Declaration of Bogota. The design of arrival and departure procedures is associated to the implementation of CDO and CCO methods, which have reached a level of implementation of 34% and 26%, respectively, the goal of the Declaration of Bogota being 40% by the end of 2016.

2.3 Upon analysing the aforementioned implementation processes, the need was seen to establish an acceptable means of compliance with LAR 211, seeking a procedure to comply with the development and maintenance of flight procedure design, and other aspects related to quality assurance thereof.

2.4 Since the same PANS-OPS deficiencies in procedures and their verification by the CAA have been observed in other States, we have considered the possibility of submitting CA "Flight procedure design" to the SAMIG/21 meeting for regional consideration, as shown in the **Appendix** to this paper.

3. **Suggested action**

3.1 The Meeting is invited to:

a) take note of Appendix 1- Advisory circular on "*Flight procedure design*";

b) establish a group for its analysis, correction, and possible approval; and

c) consider it as a project for approval by the regional system.

APPENDIX

ADVISORY CIRCULAR

CA.PANS-OPS : 211-01
DATE :
REVISION : ORIGINAL
ISSUED BY : CAA

TOPIC : FLIGHT PROCEDURE DESIGN

1. PURPOSE

The purpose of this Advisory Circular (CA) is to establish acceptable methods—which will not be the only ones—to meet the requirements established in LAR 211, LAR 91, defining a standard process for the construction and maintenance of flight procedures and other aspects related to design quality assurance.

2. APPLICABILITY

This document is applicable to flight procedure design service providers (PDSP). In case a PDSP decides to use another methodology to meet the aforementioned requirements, it must demonstrate to the CAA that it is equivalent in meeting the objectives of such requirements.

If criteria different to those mentioned above were to be applied, these shall ensure an equivalent level of safety.

3. RELATED REGULATORY REQUIREMENTS

The procedures included in this circular will be designed and constructed in accordance with this Advisory Circular and based on the latest version of the following documents:

- LAR 211, “Air traffic management” item 211.230, 235, 240,250 Appendix 6 and 7.
- LAR 204, “Aeronautical charts”, Chapter B.
- LAR 91, “Flight and operational regulations”, Ch.B.
- LAR 135 “Operational requirements” Chapter B, FLIGHT OPERATIONS
- LAR 215, “Aeronautical information services”, Chapter 3 and Chapter 4.
- LAR 153, “Aerodrome operations”, Chapter C and Appendix 3.
- LAR 154, “Aerodrome design”, Chapter D.

ICAO documents:

- Doc 8168, Procedures for air navigation services – Aircraft operations - Volume I, Flight procedures, and Volume II, Construction of visual and instrument flight procedures.
- Doc 8697, Aeronautical chart manual
- Doc 9274, Manual on the use of the collision risk model (CRM) for ILS operations
- Doc 9365, Manual of all-weather operations
- Doc 9368, Flight procedures construction manual

- Doc 9613, Performance-based navigation manual - Volume I, Concept and implementation guidance, and Volume II, Implementing RNAV and RNP
- Doc 9674, World geodetic system - 1984 (WGS-84) manual

4. DEFINITIONS

- **Instrument flight procedure development**. Standard development from data origination to the publication of an instrument flight procedure.

- **Designer**. A person adequately trained who performs the design of an instrument flight procedure.

- **Conceptual design**. High-level graphical and/or textual description of the designer's interpretation of the stakeholders' requirements.

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

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

- **Flight procedure design process**. The process that is specific to the design of instrument flight procedures leading to the creation or modification of an instrument flight procedure.

- **Flight procedure design service provider (PDSP).** Entity that provides procedure design services. It could also be somebody that provides training to procedure designers.

- **Review**. 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).

- **Validation**. Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled. 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**. Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled. The activity whereby the current value of a data element is checked against the value originally supplied.

5. ABBREVIATIONS

CAA	Civil aviation authority
AIP	Aeronautical information publication
ANS	Air navigation services
ANSP	Air navigation service provider
APV	Approach procedure with vertical guidance
ATM	Air traffic management
Baro-VNAV	Barometric vertical navigation
CA	Advisory circular
CAD	Computer-aided design
CAT	Category
CNS	Communications, navigation and surveillance
CRM	Collision risk model
DA/H	Decision altitude/height
DME	Distance measuring equipment
DSA	Aeronautical Services Department
DSO	Safety Bureau
FAA	Federal Aviation Administration
FPD	Flight procedure design
GBAS	Ground-based augmentation system
GNSS	Global navigation satellite system
IAC	Instrument approach chart
IFP	Instrument flight procedure
ILS	Instrument landing system
ISO	International Organization for Standardization
MDA/H	Minimum descent altitude/height
MA/H	Minimum altitude/height
NM	Nautical miles
NPA	Non-precision approach
OAS	Obstacle assessment surface
OCA/H	Obstacle clearance altitude/height
OJT	On-the-job training
PA	Precision approach
PAPI	Precision approach path indicator
PDSP	Procedure design service provider
QMS	Quality management system
RNP/AR	Required navigation performance - Authorization required
SARPS	Standards and recommended practices
SBAS	Satellite-based augmentation system
SID	Standard instrument departure
STAR	Standard instrument arrival
WGS	World geodetic system

6. FLIGHT PROCEDURE DESIGN PROCESS

6.1 General

6.1.1 Construction and maintenance of visual and instrument flight procedures

The following entities can submit to the CAA flight procedures that are compliant with this Circular:

a) The State ATS service provider (ATSP) is responsible for the construction, publication and maintenance of flight procedures of public aerodromes, which must be published in the AIP through a supplement or amendment.

b) Private aerodrome operators may present flight procedures for their own use, which must be substantiated with a technical dossier for approval by the CAA and the corresponding publication in the AIP.

c) Aircraft operators may design and request approval by the CAA to execute flight procedures under customised criteria for public or private aerodromes, which must be substantiated through a technical dossier.

d) The CAA itself may request a PDSP to develop a specific flight procedure.

Note: Eventually, aerodrome operators and aircraft operators may be flight procedure design service providers.

6.1.2 Use of software for procedure design

Specialised software will be required for the design of flight procedures in a CAD environment to ensure the highest level of precision and efficiency. Whenever possible, recognised software shall be used for procedure calculation and design.

6.1.3 PDSP quality programme

The PDSP shall establish a quality system for the entire instrument flight procedure (IFP) design process. This system may consist of global quality assurance that includes all the steps, from the origination to the final publication, or of a quality assurance process more focused on procedure design. If a third party carries out all or part of the IFP process, it must also have an appropriate quality system. The QMS and the processes must be acceptable to the CAA.

6.1.3.1 Establishment of aerodrome operating minima

Aerodrome operating minima will be established in accordance with LAR 91 CHAPTER D FLIGHT OPERATIONS 91.540 Aerodrome, heliport or landing location operating minima LAR 91 Chapter B 91.1980 Aerodrome operating minima, LAR 135 135.125 Aerodrome and/or heliport or landing location operating minima, in addition to the associated documentation.

The PDSP will establish the values of aerodrome operating minima that will apply to any particular operation, taking into account the following:

a) the type, performance and handling characteristics of the aeroplane;

b) the composition of the flight crew, their competence and experience;

c) the dimensions and characteristics of the runways that may be selected for use;

d) the adequacy and performance of the available visual and non-visual ground aids;

e) the equipment available on the aeroplane for the purpose of navigation, acquisition of visual references or control of the flight path during the approach, landing and missed approach;

f) the obstacles in the approach and missed approach areas, and the obstacle clearance altitude/height for the instrument approach procedure;

g) the means to determine and report meteorological conditions;

h) the obstacles in the climb-out area and obstacle clearance required.

6.1.4 Flight procedure design process flow

The IFP design process covers the entire lifespan of an IFP, from the initial development up to its withdrawal. This process will be periodically reviewed to ensure continuous improvement, particularly after the release of updates to the reference material used.

The main phases applicable from the beginning to the end of the lifespan are described below:

6.1.4.1 Phase 1. Initiation

The origination or modification of an IFP is initiated as a result of a request, continuous maintenance, a periodic review of the IFP involved, or the development and implementation of a particular airspace concept.

The initiation or modification of a procedure may be requested by the entities listed in paragraph 6.1.1.

The proposal of a new design will be submitted to the CAA and shall correspond to the airspace concept applied in the State and to the strategy of the national air navigation plan. The request should specify:

a) the justification for the new IFP;

b) the nature of the changed or new IFP;

c) the reason for the change;

d) the expected benefits;

e) the expected users;

f) required operational implementation date;

g) consequences of not achieving the implementation date;

h) what coordination has been carried out with other stakeholders, if any; and

i) what responses have been received from other stakeholders.

Following the initial analysis by the CAA, the corresponding PDSP will be requested to assess if the proposed change:

a) fulfils the expected operational requirements;

b) meets the needs of the airspace users;

c) complies with the requirements of the State;

d) can be achieved within the proposed timescale;

e) is adequately funded and resourced; and

f) does not conflict with any other flight procedure or airspace plan foreseen or under development.

The CAA will approve the project submitted before moving on to the following phases.

6.1.4.2 Phase 2. Collect and validate all data

In this phase, a designer will be designated to be in charge of the process and will maintain continuous coordination with the stakeholders/affected parties during the entire design process.

The quality of the IFP process starts with the collection of data, and must include not only the selection and collection of physical data (such as measurements, coordinates, and technical specifications), but also the collection of information that may be provided by the personnel that will participate in the implementation and/or use of the procedures.

The designer shall collect information from recognised sources, validate for resolution, integrity, reference geodetic datum and effective dates.

Quality requirements of data to be used in the IFP process are key elements to ensure the adequate safety margins required by procedure design criteria. For example, an adequate obstacle clearance altitude/height (OCA/H) can only be determined if input data accuracy is known.

Data processing and transfer techniques shall be based on electronic systems in substitution of manual systems.

Position data acquisition techniques shall ensure that accuracy, resolution and integrity of such data comply with the provisions of LAR 204.

This process will involve the capture and/or validation of at least the following elements:

a) Runway data

i) threshold coordinates

ii) true heading

iii) dimensions

iv) elevations

v) undulation (height of the ellipsoid with respect to the geoid)

vi) slopes

vii) surface specifications

viii) runway direction and alignment

ix) signals

x) clearway and stopway specifications

xi) runway classification.

b) Navaids

i) type

ii) name, abbreviation, frequency, operational data

iii) coordinates

iv) declinations

v) calibration report

c) Radar facilities

i) types/classification

ii) chart coordinates/ references

iii) coverage

iv) performance specifications

v) operating hours

d) Communications

i) frequencies

ii) call signs

iii) coverage

iv) operating hours

e) Visual aids

i) Lighting

- runway
- approach
- apron
- taxiway
- obstacles

ii) PAPI

- location, composition
- approach slope
- calibration

f) Obstacles

i) coordinates

ii) elevation/height

g) Terrain

iii) lights

iv) signalling

v) constructions (characteristics)

vi) natural shape

vii) vegetation

i) Charts

- 1/10,000 (aerodrome chart)
- 1/50,000 (10NM radius)
- 1/250,000 (50NM radius)

- 1/500,000 (100NM radius)

ii) digital terrain data

A.- (Surrounding) airspace

1) prohibited, restricted and danger areas
2) designated airspace
3) training airspace
4) military airspace

B.- Routes / airways

h) Air navigation regulations

i) regulations for all-weather operations;
ii) regulations for communication failures;
iii) local agreements and regulations;
iv) other related regulations.

i) Weather statistics

Any available information covering a period of 5 years

6.1.4.3 Phase 3. Create conceptual design

Once the collection of requirements and constraints has been completed and all necessary data have been acquired and verified, the designer can commence with the conceptual design.

The purpose of this stage is to develop a design strategy for the procedure, based on the PANS-OPS (Doc 8168), this circular and/or the criteria specified in LAR 211. In a complex design environment, it might be helpful or even necessary to develop one or several design alternatives.

The conceptual design shall include a research of local operational requirements and practices. Account shall be taken that local meteorological conditions may affect the design and the procedure implementation process.

Local knowledge and experience of the following personnel is very relevant in this phase:

a) ATS provider

b) Aerodrome operator

c) Air traffic service personnel

d) Flight operators and personnel

e) Meteorological personnel

f) Technical personnel

g) Flight calibration personnel.

6.1.4.4 Phase 4. Review by stakeholders

The conceptual design must be reviewed by stakeholders. Therefore, it is important for stakeholders, the PDSP and the designated designer to agree on the conceptual design and on the scheduled date of implementation, taking into account AIRAC dates. This will allow a common understanding of the development stages of the design and will also increase the chances of a successful implementation.

If agreement and approval by stakeholders is not possible, then the designer shall draw the conceptual design again or the stakeholders shall reconsider their requirements.

6.1.4.5 Phase 5. Apply criteria for IFP construction

Once the relevant data have been collected and the draft IFP has been approved during the conceptual design phase, the design activity can commence.

Uruguay has adopted the procedure design criteria specified in LAR 211. Whenever changes to the criteria are published, the PDSP must review these to determine an appropriate implementation plan. If the change in the criteria is deemed to be a safety-critical element, it should be carried out immediately.

Obstacle clearance altitude/height.- The obstacle clearance altitude/height (OCA/H) will be published in accordance with the criteria established in LAR 211. On safety grounds, the CAA may establish the need to establish other operating minima, such as visibility, cloud ceiling, minimum descent altitude/height and decision altitude/height (DA/H), for instrument approach at aerodromes.

6.1.4.6 Phase 6. Register, save, and store documentation

Traceability is the key element in the design or modification of an IFP. All assumptions made and methods used in the implementation of a new or modified IFP should be documented in a uniform manner.

All procedure design documentation will be registered and stored in order to correct data anomalies and errors that may be detected during the production, maintenance and operational use phases. Likewise, when working in a CAD environment, an appropriate and auditable registration method

(recording) must be used.

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

After the withdrawal of the procedure, the documentation shall be stored in file format for subsequent consultation.

6.1.4.7 Phase 7. Conduct safety activities

During the design process, the PDSP must conduct a safety assessment and the corresponding risk analysis.

A safety assessment is a formal process. Through this risk analysis, the PDSP may ensure that risks associated to a system change have been properly identified and mitigated prior to going into operation. The results and conclusions of the risk analysis will be described in a safety plan that documents said analysis.

The safety study will be submitted to the CAA for approval.

6.1.4.8 Phase 8. Ground validation and criteria verification

Validation is the final step in the procedure design process, prior to its approval and publication. The purpose of validation is to verify all obstacle and navigation data, and assess the flyability of the procedure and make sure that criteria have been properly and accurately applied.

Validation normally consists of ground validation and flight validation. The flight validation requirement may be dispensed with when 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, can be verified by ground validation. Ground validation must always be undertaken.

Prior to ground validation, a designer that was not been involved in the original design shall perform a review of the procedure. This review of the IFP may be done by sampling or by a complete review based on complexity and downstream verification and validation processes.

Ground validation is a review of the entire instrument flight procedure package by a person or persons trained in procedure design and with appropriate knowledge of flight validation issues.

This process 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 shall 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.

The ground validation should also:

a) compare the intended use of the IFP to the initial stakeholder expectations and to the conceptual design; and

b) consider the outcome of the safety activities in regards to correct application.

Ground validation may include the use of desktop simulation tools and/or require the use of flight simulators.

The results of the validation can trigger changes to the initial design. The changes can be communicated to the original designer for review and incorporation, or, the verifier may make the changes and submit them to the designer for verification. It is important that any changes made are clearly documented and traceable.

6.1.4.9 Phase 9. Flight validation and data verification

When deemed necessary by the CAA, the corresponding flight validation will be performed to verify the accuracy of terrain, obstacle, aerodrome, aeronautical and navigation aid data.

A CAA inspector will conduct the validation flight. The validation flight must be conducted in such a way as to ensure that:

a) The instrument flight procedure allows aircraft using the procedure to manoeuvre consistently and safely with respect to pilot performance and workload, for the aircraft categories for which the procedure was designed;

b) The instrument flight procedure provides information on azimuth and distance, as well as information on vertical orientation for a precision approach, in accordance with ICAO and other international standards for aircraft operation, making sure obstacle-free procedures are used;

c) The instrument flight procedure is not affected by radio frequency interference;

d) Visual guidance systems and runway signalling are appropriate for the procedure and are not mistaken for adjacent lighting or any other visual distraction.

The result of flight validation, data verification and any other relevant data will be sent to the CAA, together with all other documentation when requesting authorisation for the procedure.

6.1.4.10 Phase 10. Consult with stakeholders

At this stage of the development, all stakeholders shall be consulted again, to which end all relevant information will be sent to them, in order to get their opinion on the proposed procedure and verify that the initially proposed requirements are being fulfilled. Stakeholders will be requested to make a written statement with their opinions, which will serve for the approval process of the IFP, and inclusion in the procedure records.

If applicable, at this stage, it will also be especially relevant to get comments and advice from navigation database providers.

6.1.4.11 Phase 11. Approve IFP

Any instrument flight procedure must be approved by the CAA, in writing, prior to its publication in the AIP. This approval process shall ensure that all the appropriate steps within the IFP process have been completed, documented and signed off by the authority.

The PDSP will submit the IFP to the CAA, attaching the following documentation to substantiate the design process:

a) full evaluation of obstacle data, based on the latest and most updated survey;

b) data on aerodrome navigation aids;

c) diagram of each segment and of the holding areas, showing prominent obstacles;

d) minimum altitudes and procedures for each segment;

e) track guidance;

f) a chart showing the procedure;

g) a short written description of the procedure;

h) data and coordinates of the corresponding position points, headings and distances;

i) description of meteorological data and options considered for the design;

j) details of all the data used for the calculation and design of the procedure;

k) results of flight verification, if applicable;

l) safety study; and

m) any other information deemed relevant in support of the request for approval.

The CAA will approve the construction and publication of an instrument flight procedure provided the PDSP complies with the following:

a) Delivery, 30 calendar days in advance, of the entire flight procedure construction dossier, with all the corresponding documentation, including ground and flight validations, as well as data validation;

b) A presentation to be made to the CAA by the procedure designer, explaining the criteria, information and methods used in the construction of the procedure;

c) In case of approval, the PDSP shall formally deliver to the CAA the instrument approach chart (IAC) to be published in the AIP, in the format established in LAR 204.

6.1.4.12 Phase 12. Obtain feedback from stakeholders

Once the approach chart has been published in the AIP, the CAA will obtain feedback from stakeholders regarding the operational implementation of the procedure. Navigation database companies, air traffic control and pilots that will effectively use or are using the procedure will be consulted. The information will be sent to the PSDP for analysis.

The elements that generate a positive evaluation shall be considered for other procedures. The procedure designers shall carefully assess any implementation issues identified, in order to initiate the relevant corrective action, which may range from minor corrections to the publication of a complete revision of the procedure.

6.1.4.13 Phase 13. Conduct continuous maintenance

Every 5 years, the PSDP will make sure that an assessment is made of all changes made to: obstacles, aerodrome, aeronautical data and air navigation aids. It will also make sure that an assessment is made of all changes in criteria, user requirements, and drawing standards. If any action is required, Phase 1 described above will be resumed to restart the process.

The verification process will extend over the entire lifespan of the procedure, until the procedure is withdrawn from the publications and is no longer operationally available.

When amendments are made to the criteria set forth in LAR 211 for procedure design, the procedure will be updated during the next periodic review.

6.1.4.14 Phase 14. Conduct periodic review

The PSDP must review every published instrument flight procedure, in the following cases:

a) when there is significant obstacle-related change that requires an amendment to the procedure;

b) when there is an error of more than 1° (one degree) in a published heading or radial, resulting from a change in magnetic variation or station declination;

c) when an operational efficiency improvement is intended;

d) to introduce changes related to aircraft categories or characteristics;

e) to permit route connectivity, or due to changes in airspace organisation approved by the CAA;

f) need to make changes in navigation aids that are used as a reference for a procedure;

g) to comply with ICAO applicable amendments to the procedures;

h) when a change in procedure altitudes is required;

i) when there is a significant change in the physical characteristics of the aerodrome (*e.g.*: runways)

j) when there is any other significant change in aeronautical or topographical data.

When a published procedure needs to be modified, the PDSP must prepare a dossier with the corresponding proposed revision and send it to the CAA, detailing the proposed changes and all the information to substantiate the proposal in order to obtain CAA approval.

6.1.5 Types of instrument flight procedures

a) Departure procedures

b) Non-precision approach and arrival procedures

c) APV barometric vertical navigation procedures

d) Precision approach procedures

e) Holding procedures

f) En route procedures

6.1.6 Terms of reference for PANS OPS procedure designers

The PDSP shall develop and implement an internal regulation with the terms of reference of PANS OPS procedure design experts, containing at least the organisational structure and positions, the main tasks of the procedure designer, as well as the criteria and principles to be taken into account for the fulfilment of their tasks.

The basic responsibilities of PANS OPS procedure designers will be to develop, review, maintain, and modify air navigation procedures.

The terms of reference will include principles such as compliance with the general and specific regulatory requirements of this Circular, as well as aspects concerning air navigation safety and efficiency, consistency with existing procedures, national plans and policies for the implementation of procedures and national policies on reduction of aircraft noise and gas emissions.

6.1.7 Qualifications and experience of flight procedure designers

In order to design instrument flight procedures, the PANS OPS expert shall have the following qualifications and experience:

a) Training – has successfully completed an ICAO PANS OPS course or an equivalent CAA-approved training course on instrument flight procedure design.

b) Experience in the application of instrument flight procedures – Demonstrate at least 5 years of experience in the application of instrument flight procedures acquired in air traffic control, as flight crew member in IFR operations or other type of experience accepted by the CAA as equivalent.

c) Experience in the design of instrument flight procedures – at least 3 years of experience in the design of instrument flight procedures, which must include:

i) under the supervision of a procedure designer, whose qualifications are accepted by the CAA, the design of at least 3 instrument flight procedures of the type that the person will be authorised to design; or

ii) for a new standard instrument flight procedure, experience in the design of similar instrument flight procedures, accepted by the CAA.

6.1.8 Stages in the flight procedure designer training programme

The competence framework of procedure designers must be based on the following competencies:

a) Departure procedures

b) Non-precision approach and arrival procedures

c) APV barometric vertical navigation procedures

d) Precision approach procedures

e) Holding procedures

f) En route procedures

A description follows of a basic guide and the objectives of the different stages of a training programme for flight procedure experts, following a competence-based approach:

Stage 1: Initial training

Acquire the basic skills and knowledge required to start the initial training course.

Stage 2: On-the-job training, initial

That the on-the-job expert, with the means available, improve the knowledge and skills in the design of precision approach (PA) and non-precision approach (NPA) procedures without RNAV, and arrival and departure procedures without RNAV, in accordance with the levels established in the frame of competence.

Stage 3: Advanced training I

That the expert, in a more restricted environment, design procedures related to advanced criteria for departure and approach procedures, in accordance with the levels of competence.

Stage 4: On-the-job training, Advanced I

That the expert is capable of designing a non-RNAV SID and STAR for selected procedures, in accordance with the levels of competence.

Stage 5: Advanced training II

That the expert is capable of designing SIDs, STARs, NPAs with RNAV and RNP, in addition to NPAs, SIDs, and STARs with RNAV (VOR/DME, DME/DME and GNSS) and RNP.

Stage 6: On-the-job training, Advanced II

That the expert is capable of designing different types of RNAV/RNP approaches, arrivals and

departures. With this training, they will improve, practice and gain confidence in the application of RNAV procedure criteria.

Stage 7: Advanced training III

That the expert design a GBAS, Baro-VNAV APV, SBAS APV procedure.

Stage 8: Refresher training

Maintain and update skills and knowledge, in accordance with the frame of competence.

7. CONTACTS FOR MORE INFORMATION

For any additional technical information concerning this Circular, contact the Air Navigation Technical Coordinator, Civil Aviation Authority:
Phone:
E-mail:
