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OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION
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CIVIL AVIATION REQUIREMENTS
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Subject: Design, validation and promulgation of instrument flight procedure (IFP) in India.

1. Introduction

1.1 General:

This CAR aims to ensure that all published IFP issued under the authority of DGCA, intended for use by all civil aircraft operating under instrument flight rules (IFR) within the territorial limits of India meet ICAO standards for instrument flight procedures, and:

- are safe, simple, economical (time & airspace) and flyable,
- meet the Air Traffic Management (ATM) requirement, and
- are environmentally friendly.

1.2 Objective

This CAR's objective is to specify the national standards and requirements ~~to be met by ANS Provider responsible~~ for:

- Development, validation, approval, promulgation and maintenance of instrument flight procedures, and
- Provision of aeronautical data for aircraft using the instrument flight procedures.

1.3 Applicability

This CAR is applicable to Airports Authority of India as the Instrument Flight Procedure Design Service Provider (IFPDSP), and ~~each person employed by AAI when developing and maintaining IFP.~~ aircraft operators involved in validation of instrument flight procedures.

- 1.4 All approved IFP intended for public use should be published in the Aeronautical Information Publication (AIP) India or as AIP Supplement.

2. Definitions

Accuracy. The degree of conformance between the estimated or measured value and its true value.

Aerodrome data. Data relating to an aerodrome including the dimensions, co-ordinates, elevations and other pertinent details of runways, taxiways, buildings, installations, equipment, facilities and local procedures.

Aeronautical data. ~~Data relating to aeronautical facts, such as, inter alia, airspace structure, airspace classifications (controlled, uncontrolled, Class A, B, C... F, G), name of controlling agency, communication frequencies, airways/air routes, altimeter transition altitudes/flight levels, collocated instrument procedure (and its airspace as assessed by design criteria), area of magnetic unreliability, magnetic variation.~~ A representation of aeronautical facts, concepts or instructions in a formalized manner suitable for communication, interpretation or processing.

Air traffic management (ATM). A generic term relating to the management of air traffic services (ATS).

Air traffic services (ATS). A generic term meaning, variously, flight information service, alerting service, air traffic advisory service and air traffic control service (area control service, approach control service or **aerodrome control service**).

Approved Procedure Designer (APD) – An APD is an instrument flight procedures designer who has met the laid down competency requirements and holds an approval for the design of instrument flight procedures for aerodromes or heliports.

Competency. A combination of skills, knowledge and attitudes required to perform a task to the prescribed standard.

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

Error. An action or inaction by the designer that leads to deviations from criteria.

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

Flight Validation Pilot (FVP) A person performing flight validation who meets the competency requirements as laid down by the States. (ICAO)

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

'Flyability' of an IFP – An assessment that the IFP is flyable by the anticipated range of aircraft types in various weight, speed and centre of gravity configurations, and in various weather conditions (temperature, wind effects and visibility). It is also designed to assess that the required aircraft manoeuvring is consistent with safe operating practices, and that flight crew workload is acceptable.

Independent Approved Procedure Designer (IAPD) – An APD who has not been involved in the design of the IFP which is being validated, but can be part of the same organisation.

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

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

Maintenance (cyclical). The cyclical maintenance of an instrument procedure is a planned systemic review at a predetermined interval of the procedure design.

Navaid data. Data relating to both ground-based and space-based navigational aids including service volume, frequency, identification, transmission power and limitations of operation.

Obstacle data. Any man-made fixed or temporary object which has vertical significance in relation to adjacent and surrounding features and which is considered as a potential hazard to the safe passage of aircraft, or man-made fixed or temporary objects that extend above a defined surface intended to protect aircraft in flight.

Procedure design service provider (PDSP). A body that provides procedure design services. It may also be a training provider providing procedure designer training.

Skills, knowledge, attitudes (SKA). The skills/knowledge/attitudes are what an individual requires to perform an enabling objective derived from performance criteria. A skill is the ability to perform an activity that contributes to the effective completion of a task. Knowledge is specific information required for the trainee to develop the skills and attitudes for the effective accomplishment of tasks. Attitude is the mental state of a person that influences behaviour, choices and expressed opinions.

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. (ICAO)

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

Terrain data. Data pertaining to the natural surface of the Earth excluding man-made obstacles, and can be represented as a cartographic map, an electronic raster map, an electronic vector data map or an electronic Digital Elevation Model (DEM).

Traceability. The degree that a system or a data product can provide a record of the changes made to that product and thereby enable an audit trail to be followed from the end-user to the data originator.

Validation. Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled (see [Annex 15 CAR Sec 9 Series I Part 1](#)— 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. Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled (see [Annex 15 CAR Sec 9 Series I Part 1](#)). The activity whereby the current value of a data element is checked against the value originally supplied.

3. Explanation of Terms

AAI

Airports Authority of India

AIP	Aeronautical Information Publication
AIS	Aeronautical Information Service
ANSP	Air Navigation Service Provider
AWO	Air Weather Operations
CAR	Civil Aviation Requirements
DGCA	Directorate General of Civil Aviation
FAS	Final Approach Segment
FPAP	Final Path Alignment Point
FPD	Flight Procedure Design
IFPDSP	Instrument Flight Procedure Design Service Provider
FV	Flight Validation
FVP	Flight Validation Pilot
GBAS	Ground Based Augmentation System
GLS	GBAS Landing System
HDOP	Horizontal Dilution of Precision
HPL	Horizontal Protection Level
IAP	Instrument Approach Procedure
IFP	Instrument Flight Procedure
LNAV	Lateral Navigation
LP	Localiser Performance
LPV	Localiser Performance with Vertical Guidance (SBAS)
LTP	Landing Threshold Point
MHA	Minimum Holding Altitude
MSA	Minimum Sector Altitude
NDB	Navigation Data Base
OCA/H	Obstacle Clearance Altitude/Height
OJT	On-the-job Training
PBN	Performance Based Navigation
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operations
PDOP	Position Dilution of Precision
SBAS	Satellite Based Augmentation System

SID	Standard Instrument Departure
STAR	Standard Terminal Arrival
VDOP	Vertical Dilution of Precision
VNAV	Vertical Navigation
VPL	Vertical Protection Limit
WGS-84	World Geodetic System 1984

4. Instrument flight procedure design service provider (IFPDSP)

- 4.1** Airports Authority of India as Air Navigation service provider has also been designated as the Instrument flight procedure design service provider (IFPDSP) in India and is responsible for design, implementation, promulgation and maintenance of IFP for all civil airports (including privately managed) in India on behalf of state (DGCA). AAI as the IFPDSP shall have to follow the provisions of regulatory control and monitoring system requirements specified in this CAR in order to ensure that designing, validation, promulgation, review and maintenance of IFP are in compliance with ICAO standards.

In the following paras AAI will be referred as IFPDSP.

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

5. Organisation of IFPDSP

5.1 Resource (Physical/ documentary) Requirements

- 5.1.1** IFPDSP shall maintain an appropriate instrument design office along with the facilities to enable the IFP designers to carry out design work of instrument flight procedures in accordance with the requirements set out in this CAR. IFPDSP shall have:

- (a) available equipment that is appropriate for the design, design verification, declaration, and maintenance of the types of IFP that are planned to be developed;
- (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 validation, and maintenance of the IFP; 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, declaration, and maintenance of the types of IFP they wish to manage.

5.2 Personnel (Human Resource) Requirements

5.2.1 AAI as IFPDS provider must —

- (a) designate a person as **Head of instrument flight procedure services provider organisation**, who must:

- (1) have the authority within the ANSP organization to ensure that the organization's IFPDS can be financed and provided in accordance with the requirements and standards prescribed by this CAR;
- (2) be responsible for ensuring that the designs of instrument flight procedure are in accordance with applicable standards set out or

- (b) designate a **Head of the FPD Section (Chief Procedure Designer)** responsible for—

- (1) Ensuring that AAI as IFPDSP complies with the organization's procedures for developing and validating IFP; and
- (2) Making the declaration of compliance required for every IFP provided by AAI for publication in the AIP India and otherwise made available for publication and operational use.
- (3) Declarations Concerning Instrument Flight Procedures: to declare that an IFP has been designed in accordance with and meets every applicable standard and requirement prescribed by this CAR and ICAO DOC 8168 Vol II or other applicable ICAO documents.

- (c) Provide sufficient personnel to plan, design, verify, and maintain the IFP services provided by AAI.

5.2.2 AAI must establish a procedure for initial induction, further training, and maintaining the competence of the personnel involved in the planning, design, verification, and maintenance of IFP. These procedures must comply with requirement of qualification and training of procedure designer.

5.3 Instrument Flight Procedure Design Operations Manual

5.3.1 General:

5.3.1.1 The IFPDSP shall develop and maintain an Operations Manual. The Operations/~~Procedures~~ Manual shall serve to demonstrate how the service provider will comply with the requirements set out in in this CAR.

5.3.1.2 The IFPDSP shall submit this manual to DGCA for acceptance. This manual and its revision will be effective only after acceptance from DGCA.

5.3.1.3 The IFPDS provider must—

- a) Ensure that this manual is amended, as required, to remain a current description of the IFPDS provider's organization, personnel and procedures;
- b) Ensure that any amendments made to the manual meet the applicable requirements of this CAR;
- c) Amendment procedures contained in the manual shall be complied while amending it;
- d) Take approval from DGCA for each amendment to manual, before this amendment becomes applicable; and,
- e) Make such amendments to the manual as the DGCA may consider necessary in the interests of aviation safety.
- f) Keep the updated manual in a readily accessible form for IFP designers and for oversight.

g) Ensure that the policies and procedures contained in the manual are in accordance with applicable provisions specified in this CAR.

5.3.2 Operations Manual Contents:

5.3.2.1 The Operations Manual of the IFPDSP shall comply with the content requirements given in Appendix 5 of this CAR. The IFPDS provider must submit the manual to DGCA for approval containing—

~~—A statement signed by Head of instrument flight procedure services, on behalf of AAI as ANSP confirming that—~~

~~—The manual defines the organization and demonstrates its means and methods for ensuring ongoing compliance with this CAR; and~~

- ~~—The manual, and all associated manuals, operating and maintenance instructions, must be complied with by the organization's personnel at all times.~~
- ~~—The titles and names of the all the qualified designers including the Chief designer working in the organisation (Flight procedure designing section).~~
- ~~—The duties and responsibilities of the chief procedure designer and all qualified designers working in the FPD section.~~
- ~~—An organization chart depicting the:
 - ~~—lines of responsibility of the senior persons and the supervisory positions within the organisational structure.~~
 - ~~—a description of the chain of command established, or proposed to be established, by the IFPDSP.~~~~
- ~~—A summary of the organization's staffing structure for IFP design section. A statement (manpower methodology) showing how the IFPDSP determines the number of operational staff required including the number of operational supervisory staff;~~
- ~~—The detailed procedures required regarding IFP development.~~
- ~~—The detailed procedures required regarding IFP validation.~~
- ~~—The detailed procedures required regarding IFP design submissions and declarations.~~
- ~~—The detailed procedures required regarding IFP promulgation.~~
- ~~—The detailed procedures required regarding IFP maintenance.~~
- ~~—The detailed procedures required regarding quality assurance.~~
- ~~—~~
- ~~—The detailed procedures, or an outline of the procedures including information that identifies the documentation that contains the procedures regarding:
 - ~~—data integrity;~~~~

- ~~— the control, calibration, and maintenance of inspection, measuring, and test equipment; and~~
- ~~— the identification, collection, indexing, storage, maintenance, and disposal of records.~~
- ~~— a description of the:~~
 - ~~— training and checking program of the personnel;~~
 - ~~— procedures to be used in commissioning new facilities, equipment and services;~~
 - ~~— processes and documentation used to provide operational instructions to staff;~~
 - ~~— procedures to be followed to ensure all operational staff are familiar with any operational changes that have been issued since they last performed operational duties;~~
- ~~— a statement detailing any agreement, if any, entered into by the IFPDSP in relation to the provision of a design service provided by another party;~~
- ~~— Detailed procedures to control, amend, and distribute the manual.~~
- ~~— The policies and procedures contained in the manual must not be contrary to any applicable provisions specified in this CAR.~~

5.4 Reference Material & Documents

5.4.1 The following documents, as applicable, are required for the design of instrument flight procedures and management of the design process:

- a) ICAO Procedures for Air Navigation — Air Operations, Doc 8168-OPS/611, Volume II — Construction of Visual and Instrument Flight Procedures;
- b) ICAO Instrument Flight Procedures Construction Manual, Doc 9368-AN/911;
- c) ICAO Template Manual for Holding, Reversal and Racetrack Procedures, Doc 9371-AN/912/2;
- d) ICAO Required Navigation Performance Authorization Required Procedure Design Manual, Doc 9905-AN/471;

- e) ICAO Quality Assurance Manual for Flight Procedures Design, Doc 9906-AN/472, Volume 1 — Flight Procedures Design Quality Assurance System;
- f) ICAO Quality Assurance Manual for Flight Procedures Design, Doc 9906-AN/472, Volume 2 — Flight Procedure Designer Training (Development of a Flight Procedures Designer Training Programme);
- g) ICAO Quality Assurance Manual for Flight Procedures Design, Doc 9906-AN/472, Volume 3 — Flight Procedure Design Software Validation;
- h) ICAO Quality Assurance Manual for Flight Procedures Design, Doc 9906, Volume 5 — Validation of Instrument Flight Procedures;
- i) ICAO Doc 10066- Aeronautical Information Management.

5.4.2 IFPDSP must ensure that:

- a) documents are approved by the Chief Procedure Designer or a designated person;
- b) the currency of documentation can be readily determined;
- c) documents are available at locations where needed by staff;
- d) only current versions of documents are available;
- e) a master copy of all documentation is securely held; and
- f) all documents that are related to and referenced in the Operations/
~~Procedure~~ Manual are indexed.

5.5 Aeronautical Data Integrity

- 5.5.1 If an aeronautical database and aeronautical data is required for designing an instrument flight procedure, the IFPDSP shall ensure the integrity of the database and the data. The data used shall be current, traceable, and meet the required level of verifiable accuracy for the design.
- 5.5.2 Determination and reporting of aeronautical data must be in accordance with the accuracy and integrity requirements prescribed in ~~Annex 11 and Annex 14~~ CAR Section 9 Series I Part 1.
- 5.5.3 IFPDSP must ensure that integrity of aeronautical data is maintained throughout the data process from survey/ origin to the next intended user. The integrity classification related to aeronautical data must be as provided in ~~Tables~~

~~A7-1 to A7-5 of Appendix 7 of ICAO Annex 15. Appendix 1 of ICAO Doc 10066 – PANS-AIM.~~

5.5.4 Protection of electronic aeronautical data while stored or in transit must be totally monitored by the cyclic redundancy check (CRC). To achieve protection of the integrity a 32-bit CRC algorithm must apply.

5.5.5 Geographical coordinates indicating latitude and longitude must be determined and reported in terms of the World Geodetic System — 1984 (WGS 84) geodetic reference datum.

~~———— **Surveillance Inspections/Oversight by DGCA**~~

~~———— **AAI as IFPDS provider must allow the DGCA to make any inspections, at any time, in order to allow the DGCA to determine compliance with this CAR.**~~

6. Procedure Designer Qualification and Training

6.1 Induction level qualification: ATCO with minimum 5 years' experience and should have held ~~at least all the procedural ratings.~~ procedural or surveillance ratings.

6.2 Professional qualification:

(a) The IFPSDP must ensure that IFP designers have acquired and maintain the necessary competency level through training and supervised on-the-job training (OJT).

(b) Training for IFP designers must include an ab- initio training, initial training and recurrent training at periodic intervals not to exceed 3 years.

(c) Ab-initio training should cover Aerodrome safeguarding, Aeronautical information service, Air traffic management, Aircraft operations, aircraft performance, Navigation system & Geodesy.

(d) Initial training must ensure that the IFP designer is able to demonstrate a basic level of competency that includes at least the following elements:

1) Knowledge of information contained in the IFP design criteria prescribed in ICAO Doc 8168 Vol II and other related ICAO provisions relevant to procedure designs to include the following:

(i) over view of ICAO Standards relating to IFP design and promulgation;

- (ii) general criteria in IFP designing;
 - (iii) non-precision approach design;
 - (iv) precision approach design;
 - (v) instrument departure/arrival designs;
 - (vi) criteria for RNAV, GNSS and RNP; and
 - (vii) practical exercises in the design of procedures.
- 2) Skills in the design of procedures.
- (e) Recurrent training must ensure that the IFP designer is able to demonstrate a basic level of competency that includes at least the following elements:
- 1) Knowledge about updates in ICAO provisions and other provisions pertaining to IFP design; and
 - 2) Maintenance and enhancement of knowledge and skills in the design of IFP.
- (f) OJT is aimed at permitting the new IFP designer to integrate his basic knowledge with actual practice. The IFPDS Provider shall ensure that new IFP designers undergo an adequate, supervised OJT.
- (g) Completed **OJT for a period of six months** as Procedure Designer (Trainee) under the supervision of a current and qualified procedure designer carrying following tasks:
- 1) Develop at least two full-fledged non-precision IFPs during OJT. In case, no new non-precision IFP are planned, then a full-fledged review of at least three non-precision IFP during OJT.
 - 2) Develop at least one full-fledged precision IFP during OJT. In case, no new precision IFP are planned, then full-fledged review of at least two precision IFPs during OJT.
 - 3) Final assessment shall be conducted by the Chief Designer of the flight procedure development section for eligibility to work independently as Authorized Procedure Designer (APD).

6.3 Requirement of advanced Training (PBN)

6.3.1 Procedure designers may further be trained in development of IFP based on the Performance Based Navigation (PBN) ~~and satellite-based navigation (SBAS)~~ course at a recognised training institute.

6.3.2 The PBN training course shall ensure that the flight procedure designer is able to demonstrate a basic level of competency that includes at least the following elements:

(a) Knowledge of information contained in the PBN Manual (DOC 9613), PANS-OPS, Volumes I and II and other related ICAO provisions regarding the criteria for RNAV, GNSS and RNP; and

(b) Skills in the design of PBN and SBAS (LP/ LPV), GBAS (GLS) IFP.

6.3.3 On the Job Training (OJT)

6.3.3.1 In order to qualify as the APD (PBN) the procedure designer shall undergo the OJT under an active APD (PBN) for a minimum period of six months and shall design/ review at least one SID/ STAR or LNAV/ LNAV-VNAV & LPV procedure.

6.3.4 Training Programme and Training Plan

6.3.4.1 IFPDSP shall develop training programme based on requirements of this CAR, and training plan based on the training programme and training need assessment for individual procedure designers.:-

6.4 Records of Training, OJT and approvals of Authorized procedure designers

6.4.1 The Chief Procedure Designer of FPD Section shall maintain record of:

(a) personnel qualifications and courses attended;

(b) staff training;

(c) proficiency checks conducted;

(d) staff approvals;

(e) staff recency.

6.5 Approvals

6.5.1 The Chief Procedure Designer shall provide written statement (certificate) to each Authorised Procedure Designer engaged in instrument flight procedure design, specifying:

- (a) that the person is a Qualified Designer;
- (b) the types of procedure that the person is authorised to design;
- (c) any limitations or supervision requirements that apply; and
- (d) any approval to supervise other design staff.

6.6 Competency verification: The competency of the IFP designer shall be subject to periodic verification at least once a year by Chief Procedure Designer to ensure continued compliance with the requirements in this CAR. ~~Intimation regarding the verification of competency shall be forwarded to DGCA in each case.~~

7. Data requirement and acquisition for Procedure Design

7.1 Current and complete survey data and information is crucial to the design of a safe IFP. Whenever new or revised survey is carried out, it should be brought to the notice of FPD Section for examining any effect on the relevant IFP.

7.2 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.

7.3 The procedure design data/ 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 ~~ICAO Annex 11, 14 and 15~~ CAR Sec 9 Series E Part 1, CAR Sec 9 Series I Part 1 and CAR Sec 4 Series B Part 1-requirements;

- (b) airspace requirements: It should be compatible with any air traffic service and associated procedure that is provided within the area or areas of airspace where the IFP is intended to be established;
- (c) user requirements: the needs of Air Traffic Service provider and operators intended to 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. Development of instrument flight procedures

8.1 General

- 8.1.1 In the interest of efficiency, regularity and economy, every effort must be made to ensure that instrument approach procedures (IAP) are evolved so as to keep to the minimum consistent with safety, both the time taken in executing an instrument approach and the airspace necessary for the associated manoeuvres.
- 8.1.2 As far as practicable, IFPDS provider must take steps during the development of IFP to minimize the disturbance to the local population caused by aircraft noise.

8.2 Design of Instrument Flight Procedures.

- 8.2.1 IFPDSP must establish detailed procedures for ensuring that every IFP developed is—
 - (a) Designed or amended by a qualified and authorised procedure designer, or trainee designer under supervision of a authorised designer, ensuring that the procedure meets the applicable design criteria prescribed in ICAO Doc 8168 Vol. II;
 - (b) Independently verified by a qualified and authorised designer who is independent of the person directly responsible for the design; and
 - (c) Validated as prescribed in Para 9 of this CAR.

8.3 Design Criteria

8.3.1 Every IFP must be designed in accordance with the appropriate design processes, standards, guidelines, and aeronautical data quality requirements contained in the following:

(a) ICAO Documents—

- (1) Doc. 8168, Procedures for Air Navigation Services Volume II, Construction of Visual and Instrument Flight Procedures;
- (2) Doc. 8697, Aeronautical Chart Manual;
- (3) Doc. 9365, Manual of All-Weather Operations;
- (4) Doc. 9613 Performance Based Navigation Manual — Volume I Concept and Implementation Guidance, and Volume II Implementing RNAV and RNP;
- (5) Doc. 9905 Required Navigation Performance Authorization Required (RNP Procedure Design Manual);
- (6) Doc. 9881, Guidelines for Electronic Terrain, Obstacle and Aerodrome Mapping Information; and
- (7) Doc. 9906, Quality Assurance Manual for Flight Procedure Design.
- (8) ICAO Doc. 10066, Aeronautical Information Management

(b) Any other guideline or standard that is applicable to a particular type of instrument flight procedure.

8.3.2 For the purposes of para [8.3.1](#) (a), if there is a ~~conflicting~~ difference between any of the applicable design processes, standards, guidelines, or aeronautical data quality requirements; then for the particular design process, standard or guideline to be used must be acceptable to, or specified by, the DGCA.

8.3.3 An IFP must not be designed for an aerodrome (including heliports) unless the operator of the aerodrome agrees in writing that the aerodrome may be used for IFR operations using the intended IFP procedure.

8.3.4 An IFP must not be designed on or use a ground based aeronautical facility unless:

- a) The aeronautical facility is operated and calibrated as per certification procedure of ANSP, or

- b) the equipment has been certified by DGCA for private airports.

8.3.5 NDBs are not subjected to periodic flight tests. However, Ground or Flight checks of the equipment shall be carried out as required, for purposes of para 8.3.4.

8.3.6 The following criteria shall be followed for Circling approaches:

(a) No Visual Circling Minima shall be published in IFPs for airports where all the runway ends are served by multiple straight-in approaches.

(b) No Visual Circling Minima shall be published for airports having multiple runways served by straight- in approaches.

(c) Visual Circling Minima may be published for airports with runways served by a single approach with no alternate procedure.

8.4 Terrain Data to be used in Instrument Flight Procedures Design

8.4.1 Terrain data and associated criteria relating to electronic terrain, obstacle and aerodrome mapping information must comply with the guidelines provide in ICAO Doc 9881 – Guidelines for Electronic Terrain, Obstacle and Aerodrome Mapping Information, and documents referenced by ICAO Doc 9881.

8.4.2 When designing IFP, an IFPDS provider may:

- (a) Utilize Shuttle Radar Terrain Model (SRTM) digital elevation data, provided the data meet applicable accuracy and resolution requirements; and/or
- (b) Apply such vertical and horizontal tolerances as are required based on the accuracy of available obstacle data, provided the tolerances applied are not less than any published ICAO tolerances for that obstacle type. All such added tolerances and their sources, must be clearly identified in the design submission.

8.5 Use of Design Automation Tools

8.5.1 IFPS provider must utilize design automation tools to the maximum extent practicable in the design of each IFP in order to minimize the potential for design errors as well as to standardize the application of the PANS-OPS criteria.

8.5.2 The IFPS Provider shall ensure that the software packages used in the procedure designing has been validated. A description of the validation 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 IFP designer.

8.6 Safety Assessment Requirements

8.6.1 The safety assessment for the procedures shall be carried out to ensure that the publication of a new/amended IFP and its implementation in the existing airspace and ATM environment may not create unacceptable safety issues. Any safety issues identified shall be considered and adequately mitigated prior to the operational use of the procedure.

8.6.2 The safety assessment shall be carried out in accordance with provisions of CAR Sec 9 Series E Part 1 by ATS team of the aerodrome for which procedures are being developed, with participation of all stakeholders including procedure designers.

8.6.3 The safety assessment outcome shall be submitted along with IFP package to support the approval of the IFP for publication.

9. Validation of instrument flight procedures

9.1 General

9.1.1 Validation 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.

9.1.2 Validation comprises a ground validation element and may also comprise a Simulator/flight validation element. In the case of RNAV procedures, a navigation database validation is also required.

9.2 Validation Package

9.2.1 IFPDS provider must compile an IFP validation package for use in the ground/flight validation process. Each validation package must include the following:

- (a) A plan view of the final approach obstacle evaluation template, drawn on an appropriate topographical map of scale preferably 1:50,000 to safely accommodate use for navigation, elevated terrain analysis, obstacles and obstructions evaluation;
- (b) Completed documents that identify associated terrain, obstacles and obstructions as applicable to the procedure. The controlling terrain/ obstacle must be identified and highlighted on the appropriate chart;
- (c) Minimum altitudes determined to be applicable from map studies and database information for each segment of the procedure;
- (d) A narrative description of the IFP;

- (e) Plan and profile pictorial views of the IFP;
- (f) Documented data as applicable for each fix, intersection, and/or holding pattern; and
- (g) The output from the NAVAID coverage analysis together with any supporting data and design assumptions.

9.2.2 The IFPDS provider is responsible for all elements of the IFP validation package and must document their proposed validation activities in a plan and submit to DGCA for seeking approval for simulator trial or flight trial as necessary.

9.3 Ground Validation

9.3.1 Ground validation is mandatory and shall always be undertaken. 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. The aim of ground validation is to reveal any errors in criteria application and documentation, and assess the flyability of the IFP. This process will be undertaken by an authorised procedure designer of IFPDSP other than the one who has designed the procedure.

9.3.2 Ground validation must comprise the following elements:

- (a) Aerodrome assessment** - Verification that the infrastructure required for the provision of an instrument runway is in place; or aerodrome is licensed for IFR operations by DGCA.
- (b) Navigational aid coverage** – Verification that the navigational aid coverage infrastructure required for the IFP as prescribed in ICAO Doc. 8071 is in place based on the calibration reports; and calibrated and commissioned by the competent authority.
- (c) Obstacle clearance review** – A review conducted by an authorized procedure designer not involved in the design of the considered IFP for each route segment;
- (d) Flyability assessment** – Verification that the IFP can actually be flown. The use of software (e.g. PC-based to full flight simulator) is preferred. However, flyability may also be verified if all the parameters (segment length, bank angle, MOC, descent gradient etc.) for procedure designing are within the criteria of Doc 8168 Vol II.

(e) Navigation Database Validation

- i. During the ground validation, Navigation database validation must be performed for all RNAV instrument flight procedures. Such procedures are coded using ARINC 424 path terminators to define specific nominal tracks, which are defined by waypoint location, waypoint type, and path terminator and, where appropriate, speed constraint, altitude constraint and course.
- ii. Navigation database validation must ensure that the coding of the procedure in the RNAV/ FMS system does not compromise the flyability of the procedure.

9.3.3 SIDs & STARs may be published based on the satisfactory ground validation reports, if approved by DGCA.

9.3.4 Ground validation will aid in evaluating, to the extent possible, those elements of the IFP that will be evaluated in a flight validation. Issues identified during Ground validation shall be addressed prior to undertaking Flight validation.

9.3.5 While conducting Ground validation, if, the accuracy and completeness of obstacle and navigation data considered while designing the procedure, and any other factors normally considered in the flight validation, can be verified, then the flight validation requirement for IFP may be dispensed with.

9.3.6 The ground validation in case of modifications/ amendments to existing IFP, will determine the requirement of flight validation. It will also determine if such modifications/ amendments can be promulgated without conducting any simulator or flight validation.

9.3.7 Where a ground validation cannot fully verify the accuracy and completeness of all obstacle and navigation data considered in the procedure design or the flyability of the IFP, a flight validation must be conducted.

9.3.8 Approval process of ground validation of IFP by DGCA shall be completed within 30 days of receiving the IFP from AAI.

9.4 Flight Validation

9.4.1 The objectives of the flight validation of IFP are:

- (a) to provide assurance that adequate obstacle clearance has been provided;
- (b) to verify that the navigation data to be published, and the data that used in the design of the IFP, are correct;

- (c) to verify that all required infrastructure, such as runway markings, lighting, visual aids and communications and navigation sources, are in place and operative for a new runway;
- (d) to conduct an assessment of flyability to determine that the IFP can be safely flown; and
- (e) to evaluate the charting, required infrastructure, visibility and other operational factors.

9.4.2 Flight Validation by Simulator Evaluation (Simulator Trial)

- 9.4.2.1 A simulator evaluation might be necessary based on the recommendation of Ground validation to provide an initial evaluation of database coding, flyability and feedback to the procedure designers.
- 9.4.2.2 Simulator Evaluation must be accomplished by a qualified and experienced Flight Validation Pilot (FVP).
- 9.4.2.3 Simulator evaluation must not be used for obstacle assessment. Preparation for the simulator evaluation include a comprehensive plan with description of the conditions to be evaluated, profiles to be flown and objectives to be achieved. Flight simulator evaluation will be accomplished by completing the Simulator evaluation form (Appendix 3/Form IFPV-02).
- 9.4.2.4 Required Navigation Performance Authorization Required (RNP AR) IFP should undergo simulator evaluation

Note: For RNP-APCH (LPV Minima) refer para 9.4.3.1 below.

9.4.3 Flight Validation by Actual flight (Flight Trial)

- 9.4.3.1 Flight evaluation by actual flight shall be performed in the following cases:
 - (a) New IFP is being implemented for the first time for a runway where no other procedure exists;
 - (b) If the flyability of a proposed IFP cannot be determined by other means;
 - (c) If the proposed IFP contains deviations from PANS-OPS (ICAO Doc 8168-Vol II) criteria;
 - (d) If the accuracy and/ or integrity of obstacle and terrain data cannot be determined by other means;

- (e) Procedure is designed for use in a challenging terrain area and/ or dense obstacle environment;
- (f) A track change of greater than 90° at a waypoint has been used within an RNAV procedure;
- (g) A descent gradient used in the design greater than 6.1% for a non-precision approach and 3.5° for a precision approach;
- (h) Special crew procedures and/ or operational techniques likely to be necessary to fly the procedure;
- (i) If modified/ amended IFP differ significantly from existing IFP;
- (j) For Helicopter Pins IFP;
- (k) RNP APCH (LPV minima or GAGAN procedures) provided that Flight simulator evaluation of the procedure for same runway with LNAV and LNAV/VNAV minima has either been conducted satisfactorily or the procedure has been published.

Note: Flight validation of LPV procedures may be conducted by flight inspection aircraft of AAI (IFPDSP), provided it is equipped with requisite GAGAN/ SBAS sensors, FMS, flight profile and GNSS performance recording equipment and with necessary arrangements in place with data coder to provide test Nav Data Base (NDB) for such procedures. However, AAI must obtain the operational approval from DGCA for conducting the flight trial by these aircrafts for this purpose.

- (l) Based on the recommendation of ground Validation, RNP APCH (LNAV & LNAV/VNAV minima) procedures for the runways where the simulator data is not available.

9.4.3.2 Flight evaluation **may not be required** in the following cases:

- (a) In the case of modification/ amendment to non-precision approach (NPA) IFP;
 - I. where final approach track (FAT) does not differ from the existing FAT by more than 5° ;
 - II. when there is no change in the OCA/H; and

III. when the other segments of the IFP remain unchanged. However, in case of change in initial/ intermediate/ missed approach segments but no change in the final approach segment and flyability of the IFP can be ensured either by ground validation or flight simulator validation.

(b) In the case of precision approach, where initial/ intermediate/ missed approach segment is/ are amended but the final approach segment and the OCA/H remain unchanged and the flyability of the IFP can be ensured either by ground validation or by flight simulator validation.

(c) RNP APCH Procedures: Whenever RNP APCH procedures are designed for the runways where procedures based on conventional nav aids (precision/ non-precision) have been published and the procedures share the following in common:

1) MSA

2) Minimum altitude at IF and FAF

3) Final approach track of non-precision approach (VOR) is not offset by more than 5 degrees, from extended runway C/L provided that,

I. Ground validation/ Simulator evaluation of the procedure is conducted and found SATISFACTORY for flyability and navigation data; and,

II. Periodicity of Survey data is maintained as per para 1.6 (Table I-1-2) of Aerodrome Survey Manual of AAI on the date when procedure designing is initiated by AAI.

9.4.3.3 Flight Validation Pilot/ Evaluator must either be:

(a) Line Training Captain (LTC)/ Type Rated Instructor (TRI)/ Designated Examiner (DE) or a pilot with minimum 1000 hours of flying experience as PIC in the aircraft type; or

(b) A DGCA Flight Standard Directorate Inspector (Operations) duly authorised; or

(c) An individual with similar pilot qualifications as in (a) who has been authorised by DGCA.

- 9.4.3.4 The minimum crew complement is two pilots comprising pilot-in-command (PIC) and co-pilot. Both the pilots need to be current and qualified in the appropriate aircraft and proficient with the specific FMS and associated software part number, software version, and revision. Flight Validation Evaluator, although not required to be a crew member, may act as the PIC or Co-pilot in accordance with the requirements above.

Note: Refer Appendix 1 of this CAR for qualification and experience requirement of Flight Validation Pilot).

- 9.4.3.5 DGCA may authorise AAI (IFPDSP) aircraft for the purpose of flight validation along with an authorised pilot from Flight Safety Directorate (FSD) and procedure designer on-board.

- 9.4.3.6 AAI may obtain services of other agencies having suitable aircraft with qualified and experienced FV pilot and/ or FV evaluator.

9.4.3.7 Visibility requirement for Flight Evaluation or Flight Trial

- 9.4.3.7.1 Flight trial shall be conducted in visibility to permit assessment of obstacles and determine that the IFP flight track reflects the IFP design. In no case; the minimum visibility for the conduct of FV shall be less than the landing minima for the IFP calculated with No ALS (NALS) as determined in accordance with AWO CAR.

9.4.3.8 Conducting Flight evaluation/ flight Trial

- 9.4.3.8.1 A review of the results of the Ground validation and/ or simulator evaluations should be completed before the flight evaluation.
- 9.4.3.8.2 The procedure designer may participate in the flight evaluation to assist in its evaluation and obtain direct knowledge of issues related to the IFP design from the flight validation pilot/ evaluator.
- 9.4.3.8.3 The procedure designer may be required to provide briefings to the flight validation crew in those cases where IFP have unique application or special features.
- 9.4.3.8.4 AAI shall ensure that navigational aid associated with the procedure has been successfully calibrated prior to the flight evaluation or the submission of final publication documentation of the procedure to DGCA, as the case may be.

9.4.3.8.5 NDBs are not subjected to periodic flight tests. However, Ground or Flight checks of the equipment shall be carried out as required, for purposes of para 9.4.3.8.4.

9.4.3.8.6 Flight evaluation will be accomplished by completing the form IFPV-03 provided at Appendix ~~5~~4 of this CAR.

9.4.3.8.7 Flight Validation shall be conducted in a manned aircraft and not conducted during revenue operations.

9.4.3.9 **Flight Evaluation of SBAS & GBAS IFP**

9.4.3.9.1 IFPs based on SBAS and GBAS require analysis of additional parameters contained in the Final Approach Segment (FAS) Data Block and datalink (GBAS). These parameters include:

- (a) Glide Path Angle
- (b) Threshold Crossing Height (LTP or FTP)
- (c) Landing Threshold Point (LTP) Coordinates or Fictional Threshold Point (FTP)
- (d) Final Path Alignment Point (FPAP) Coordinates
- (e) Verification of the spatial data contained in the final approach segment definition.
- (f) The FAS data evaluation system must be capable of performing the necessary analysis in a documented, quantitative process.

9.4.3.10 **Recording of Flight Evaluation activity (SBAS & GBAS)**

9.4.3.10.1 A recording device should be used that is capable of IFP storage, time and 3-dimensional position in space with an acceptable sampling rate (not less than 1 Hz), and ability to post-process recorded data. Record and save the minimum of following flight data:

- (a) Date and time
- (b) Number of satellites in view
- (c) Minimum number of satellites
- (d) Average Position Dilution of Precision (PDOP)

- (e) Maximum Observed Horizontal Dilution of Precision (HDOP) [LPV IFP only]
- (f) Vertical Protection Level (VPL) [LPV and GLS IFP only]
- (g) Horizontal Protection Level (HPL) [LPV, GLS IFP only]
- (h) Maximum Observed Vertical Dilution of Precision
- (i) VDOP [LPV IFP only]
- (j) For each segment, the maximum and minimum altitude, ground speed, climb rate and climb gradient.
- (k) A printed graphic or an electronic file of sufficient detail that depicts the horizontal (and the vertical for VNAV IFP) flight track flown referenced to the desired track of the instrument approach procedure (IAP), including procedure fixes.

Note1: The recording of HDOP, PDOP, VDOP, HPL and VPL are a collection of data in a limited timeframe and their purpose is to document the actual situation at the time of the validation flight.

Note 2: LPV & GLS IFP require analysis of additional parameters contained in the Final Approach Segment (FAS) Data Block.

9.4.3.11 Aircraft Requirements

9.4.3.11.1 The aircraft to be used for flight evaluation/ trial of an IFP must have the performance capabilities appropriate to the categories for which the IFP has been designed. However, based on the ground validation report and at the discretion of DGCA, flight validation by aircraft one Category lower may also be acceptable.

9.4.3.12 Validation Reports

9.4.3.12.1 Where a ground and/ or flight and navigation database validation has been conducted, a report must be completed by each of the following where applicable:

- (a) IFP designer; and
- (b) IFP flight evaluation/ trial pilot;

10. Approval of Instrument Flight Procedures

10.1 Requirement for Approval

10.1.1 Each IFP, including each terminal flight procedure, intended for use by aircraft operating under IFR within the territorial limits of India must be approved by the DGCA. The following steps are required for the approval of IFP.

10.1.1.1 The procedure design must be submitted by the IFPDS provider to DGCA prior to the approval of each IFP along with the declaration of compliance; and

10.1.1.2 IFP approval by the DG (CA).

10.2 Design Submission: General

10.2.1 The IFPDS provider must prepare and submit to the DGCA a design package for each IFP for which approval is sought.

10.2.2 IFPDS provider must establish detailed procedures for preparing IFP design package as required by following para.

10.2.3 Design Submission Format and Content

10.2.3.1 Each IFP design submission must include the following items:

(a) Procedure Designator (Title): Each IFP must be assigned a Title in accordance with procedures prescribed in the relevant DGCA CARs, ICAO Annexes and Documents.

(b) Data and Information

(1) All data used in the design process must be submitted in source format as well as any modified formats created during the design process. The data handling process used by the designer must be documented including any quality assurance and quality control processes, procedures and documentation.

(2) Where any maps or charts have been scanned or digitized such scans or digitized drawings must be included in the submission. It is the responsibility of the IFPDS provider to ensure that all relevant data and information is submitted and data handling techniques and routines are subject to appropriate quality assurance and quality control measures.

(3) Data and information must be subdivided into the following main groups:

- i. Aerodrome data and information
- ii. Survey data (thresholds, RWY centerline, elevations etc.)
- iii. Aerodrome layout plan (Grid map)
- iv. obstacle surfaces applicable
- v. Aerodrome code or operating certificate (in case of private aerodrome) including any restrictions and/or conditions
- vi. Obstacle data
- vii. Surveyed obstacles
- viii. Additional obstacles identified
- ix. Nav aids data and information
 - (A) Survey data of all NAVAIDs
 - (B) Calibration and/or commissioning reports
- x. Geodetic data and information
 - (A) Survey data on airfield geodetic reference points/monuments
- xi. Airspace data and information
- xii. Reference to any/all topographical maps used in design

(c) Drawings

- 1) All procedure design scaled drawings must be included in the submission. The drawings may be electronic drawing files generated using CAD tool and drawing format or paper drawings.
- 2) Drawings must be structured in such a way that each segment of the procedure can easily be identified and isolated on the drawing.

- 3) Obstacles and navigation aids must maintain same numbering and naming convention as used in the survey.
- 4) The dominant obstacle for each segment must be clearly marked, identified and referenced to the survey or other data source.
- 5) Drawing must be set-up in WGS 84 as a transverse Mercator projection and all set-up parameters must be declared.

(d) **Calculations**

- (1) All calculations and results of calculations must be presented in a manner that enables the DGCA to follow and trace the logic and resultant output. A record of all relevant calculations must be kept in order to prove compliance to or variation from the standard criteria.
- (2) The calculation record must be completed enough to prove and substantiate all the elements as required in the content prescribed in. Formulae used during calculation must be the standard formulae as declared in ICAO Doc. 8168 Volume II and related ICAO publications.
- (3) Units of measurement and conversion factors must be as prescribed by ICAO.
- (4) Rounding of results must follow the standard guidelines in ICAO Doc. 8168 Volume II and related ICAO publications. Rounding must only be made at the publication stage to facilitate usable figures on maps and charts. Where rounding is required at earlier stages rounding must be made to the pessimistic consideration i.e. Obstacle heights rounded up, speeds rounded up, turn altitudes rounded down etc.
- (5) Calculation records must be accompanied by an index and be cross-referenced to the procedures they apply.

(e) **Narratives.** A narrative which describes the IFP in textual format.

(f) **Charts.** A draft chart must reflect in graphic form the content of the narrative provided.

(g) **Design Reports.** A design report giving details of how the requirement has been satisfied.

(h) **Validation Reports.** Detailed Ground validation reports as required vide Para 9.3.1

(i) **Declarations.** The Chief procedure designer must formally declare that:

(1) The IFP has been developed, designed, and validated in accordance with the requirements of Doc 8168 Vol II and the provisions of this CAR.

(2) The IFP is to be maintained by the IFPS provider in accordance with the provisions at para 11 of this CAR.

10.2.3.2 The chief designer must not make declarations concerning an IFP unless the procedure has been checked & verified by a qualified designer who has not been involved in the design.

10.2.3.3 IFP Package Submission Form in accordance with Appendix 6 shall be submitted along with each IFP package.

10.3 Declaration of Compliance of Instrument Flight Procedures

10.3.1 The IFPDS provider must establish a detailed procedure for making the declaration of compliance of every IFP that is proposed to be promulgated.

10.3.2 The procedure required by para 10.3.1 must include details of the checks to be carried out by the Chief Procedure Designer concerning the particular type of IFP, to ensure that the IFP meets the applicable requirements and standards prescribed by this CAR.

10.4 Steps for Approval of Instrument Flight Procedures by DGCA

10.4.1 Based on the design package of the IFP along with the reports of ground validation, DGCA may take a decision whether there is a requirement of simulator and/ or the flight validation. DGCA may approve the IFP for promulgation provided the following conditions are satisfied:

(a) The IFP has been developed and validated in compliance with the applicable requirements and standards of this CAR.

(b) The IFPDS provider has made a valid declaration of compliance as required under this CAR.

(c) The IFP is safe and flyable.

(d) The IFP will be maintained by IFPDS provider.

10.4.2 DGCA will convey the approval of each IFP in writing.

10.4.3 Considering safety impact, prior approval from DGCA for promulgation of OCA/ H may not be required in the following cases:

- (a) Change in OCH of IFP as a result of amendment to aerodrome elevation or threshold elevation.
- (b) Publication of upward revision in IFP procedure altitude/s or OCA/H through NOTAM due to identification of new obstacle/s impacting safety.
- (c) Subsequently necessary documents regarding the change in OCA/H shall be forwarded to DGCA.

11. Promulgation and withdrawal of instrument flight procedures

11.1 The IFPDS provider must establish detailed procedures for promulgating and withdrawing IFP as required by this section.

11.2 Promulgation of Instrument Flight Procedures

11.2.1 An IFPDS provider must not promulgate an IFP for use by aircraft operating within the territorial limits of the India unless the IFP has been approved by the DGCA.

11.2.2 The IFPDS Provider shall ensure that instrument flight procedures designs/charts, are provided for publication in the AIP/AIP Supplement, shall be produced in accordance with the provisions contained in the documents listed below:

- (a) ~~ICAO Annex 4~~ CAR Sec 9 Series G Part 1— Aeronautical Charts
- (b) ICAO Doc 8168 Volumes II - Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS)
- (c) ICAO Doc 8697 – Aeronautical Chart Manual
- (d) ICAO Doc. 10066, Aeronautical Information Management

11.2.3 The aeronautical charts included in the AIP shall be kept up-to-date by means of replacement sheets where necessary. Significant amendments or revisions in the IFP shall be clearly indicated in the revised charts.

11.3 Withdrawal of Instrument Flight Procedure from Use

- 11.3.1 DGCA must approve, in advance, all withdrawals (temporary/permanent) of an IFP from AIP/AIP Supplement.
- 11.3.2 Except as provided in para 11.3.4, the IFPDSP must apply to DGCA for a withdrawal of an IFP from the AIP at least 60 days before the intended withdrawal, along with IFP Withdrawal form with all necessary documents as per Appendix 7 of this CAR-
- 11.3.3 If the DGCA approves the withdrawal, the IFPDSP must withdraw the IFP from use by—
- (a) Issuing a NOTAM which will identify the IFP and specify the date that the procedure is to be withdrawn from use;
 - (b) For private use only IFP, issuing a notice to each authorized user of the IFP which will identify the IFP and specify the date that the procedure is to be withdrawn from use;
 - (c) On the date of withdrawal, remove the details of the IFP from the AIP;
 - (d) Notify the DGCA that the IFP has been withdrawn.
- 11.3.4 Notwithstanding para 11.3.2, the DGCA may, by the most appropriate means, withdraw an IFP from use if the DGCA has reasonable grounds to believe that—
- (a) The IFP may be unsafe for use by aircraft operating under IFR; or
 - (b) The IFP is not being maintained in accordance with the applicable requirements of this CAR
- 11.3.5 If the DGCA approves the withdrawal of an IFP from use under para 11.3.3, the IFPDS provider will take appropriate action to ensure that the IFP is removed from the AIP India and from operational use.

12. Maintenance, amendment of errors and Cessation of Instrument Flight Procedures

12.1 Maintenance

- 12.1.1 IFPDS provider must establish detailed procedures for maintaining every IFP to ensure that they continue to comply with changing criteria, and meet user requirements.
- 12.1.2 The procedure required by para 12.1.1 must include details for every IFP to be reviewed, and flight validated, if necessary, —

- (a) On a periodic basis, not to exceed five years, ensuring that the IFP continues to meet the applicable standards and requirements; and
- (b) If there is a change in any of the following data that may affect the integrity of the IFP.
 - magnetic variation changes;
 - new survey information; and
 - changes to airspace structure;
 - The procedure design criteria is/are amended;
 - Change in location of navigation aid or runway threshold; or
 - The assessment of the impact of a proposed development or construction, or planned temporary obstacle, likely to affect aerodrome's operation.

12.1.3 IFPDSP shall ensure that the Permanent NOTAMs taken to amend the procedure are timely incorporated into AIP as per provisions of CAR Sec 9 Series I Part 1 to avoid NOTAM Proliferation.

12.2 Errors in Published Instrument Flight Procedures

12.2.1 The IFPDS provider must establish a procedure for recording, investigating, correcting, and reporting to the DGCA any identified error, and any identified non - conformance or suspected non- conformance with the standards and requirements of Doc 8168 Vol. II in an IFP that is published in the AIP and maintained by AAI.

12.2.2 The procedure required by para 12.2.1 must require that—

- (a) An IFP is immediately withdrawn from operational use if the error or non - conformance referred to in para 12.2.1 affects, or may affect, the safety of an aircraft operation; and
- (b) The error or non-conformance is corrected, and declared as compliant with this part by a ~~senior designated person~~ Chief Procedure designer ~~who is appropriately authorized in accordance with this CAR;~~ and

- (c) The correction required by para 12.2.1 is clearly identified and promulgated by the most appropriate means relative to the operational significance of the error or non-conformance; and
- (d) The source of the error or non-conformance is identified, and—
 - (1) If possible, eliminated to prevent a recurrence; and
 - (2) Preventive action is taken to ensure that the source of the error or non-conformance has not affected the integrity of any other IFP; and
- (e) The DGCA is notified, of a promulgated information incident relating to an error or non-conformance referred to in para 12.2.1.

12.3 Cessation of Maintenance of an Instrument Flight Procedure

- 12.3.1 If the IFPDS provider proposes to discontinue the maintenance of an IFP as required by this CAR, the requirements prescribed for withdrawal of IFP shall be complied.

13. Quality Assurance

- 13.1 The IFPDS provider must establish a flight procedure design quality assurance system as described in ICAO Doc. 9906 Volume 1 to ensure compliance with, and the adequacy of, the procedures required under this CAR.
- 13.2 The IFPDSP shall utilize a quality management system at each stage of the instrument flight procedure design process.
- 13.3 The quality assurance system must include the following:
- (a) A safety-quality policy and quality objectives including appointment of a quality manager responsible for quality assurance. ~~safety-policy procedures including the procedure required for investigating errors in promulgated instrument flight procedures~~
 - (b) A procedure to ensure quality indicators, including personnel and customer feedback, are monitored to identify existing problems or potential causes of problems within the quality assurance system;
 - (c) A procedure for corrective action to ensure existing problems, that have been identified within the quality assurance system, are corrected;

- (d) A procedure for preventive action to ensure that potential causes of problems that have been identified within the quality assurance system are remedied;
- (e) An internal audit program for the organization to ensure conformity with the procedures in the manual and to achieve the goals set in the safety policy; and
- (f) A procedure to record, track and analyze quality indicators referred to in para (b) above.

13.4 The procedure required under para 13.3(c) for corrective action must specify how—

- (a) To correct an existing quality problem
- (b) To follow up a corrective action to ensure the action is effective;
- (c) To amend any procedure required under this para as a result of a corrective action; and
- (d) ~~Management will~~ To measure the effectiveness of any corrective action taken.

13.5 The procedure required under para 13.3 (d) for preventive action must specify how—

- (a) To correct a potential quality problem;
- (b) To follow-up a preventive action to ensure the action is effective;
- (c) To amend any procedure required under this Part as a result of a preventive action; and
- (d) ~~Management will~~ To measure the effectiveness of any preventive action taken.

13.6 The internal audit program required under para 13.3 (e) must—

- (a) Specify the frequency and location of the audits taking into account the nature of the activity to be audited;
- (b) Specify the audit methodology including quality audit checklists to be followed;

- (c) Measure the effectiveness of any preventative or corrective action taken by the personnel responsible for the activity being audited since the last audit; and
- (d) Require preventive or corrective action to be taken by the personnel responsible for the activity being audited if problems are found by the audit.

13.7 The Quality Manager ~~senior person~~ responsible for the quality assurance system must:

- (a) Ensure that the safety policy and the safety policy procedures are understood, implemented, and maintained at all levels of the IFPDSP organization;
- (b) Ensure that the audits are performed by trained auditing personnel who are independent of those having direct responsibility for the activity being audited;
- (c) Ensure that the results of the audits are reported to the personnel responsible for the activity being audited;
- (d) Ensure that all corrective and preventative actions are followed up to review the effectiveness of those actions;
- (e) Ensure that the results of the management review are evaluated and recorded; and
- (f) Have direct access to the Head of instrument flight procedure services on matters affecting the quality of IFP developed, validated, approved, promulgated and maintained under this part.

13.8 The above procedures shall be detailed in a Quality Manual. The Quality Manual may be a part of IFPDSP's operations manual.

14. Procedure Design Documentation

- 14.1** The IFPDS 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.
- 14.2** The documentation provided by the IFPDS provider is divided into three categories and includes:

- (a) documentation required for publication in the AIP in accordance with ICAO ~~Annexes 4 and 15~~ CAR Sec 9 Series G Part 1 and CAR Sec 9 Series I Part 1;
- (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;
 - (iii) infrastructure assessment;
 - (iv) airspace constraints;
 - (v) for modifications or amendments to existing procedures, the reasons for any changes; and
 - (vi) for any deviation from existing standards, the reasons for such a deviation and details of the mitigations applied to assure continued safe operations.
- (c) additional documentation required to facilitate ground and flight validation of the procedure.

14.3 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.

14.4 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 ICAO ~~Annexes 4, 5 and 6~~ CAR Sec 9 Series G Part 1 and CAR Sec 1 Series B Part 1.

14.5 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.

- 14.6** All documentation shall undergo a final verification for accuracy and completeness prior to validation and publication.
- 14.7** 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. Records relating to procedure designs must be retained for the period that a procedure is available for use and for a period of one years after a procedure ceases to be available or is withdrawn.
- 14.8** Staff records must be retained during the time that staff are employed.
- 14.9** The IFPDS Provider shall, at DGCA request, make the documents and records, or copies of them or extracts from them, available for inspection by DGCA.

15. Promulgated Information Incident Reports

- 15.1** IFPS provider must submit a promulgated information incident report to the DGCA within 24 hours of the promulgated information incident.
- 15.2** The report must include the following information:
- (a) Date and time of the incident;
 - (b) Brief description of events;
 - (c) Details to identify the publication, map, chart, or other means by which the information or aeronautical data was promulgated;
 - (d) Details relating to the information or aeronautical data that gave rise to the incident;
 - (e) Name, organization, and contact details of the person notifying the incident.

16. Annual Reporting Requirements

- 16.1** The IFPSP shall submit a report detailing the following information to DGCA on annual basis, or as directed from time to time:
- (a) Any changes in the organizational structure, including appointments, reassignments, or departures of key personnel;
 - (b) Details of compliance with all applicable training requirements including competency checks carried out in calendar year;
 - (c) Details of procedures promulgated, and quality indicators including number of feedback received & resolved;
 - (d) Details of procedures withdrawn; and

(e) Action taken to address safety findings related to incidents, audits, or inspections.

17. Regulatory Oversight ~~of Flight Procedure Design Service Provider (IFPDSP)~~

17.1 DGCA may carry out regulatory oversight of the IFPDSP and aircraft operator involved in validation of instrument flight procedures to determine compliance with this CAR. Necessary access to safety, IFP design, ~~and~~ training records and other documents as applicable must be provided to DGCA inspectors for the purpose.

17.2 IFPDSP and the aircraft operator involved in validation of instrument flight procedures shall ensure full compliance with the provisions of this CAR.

17.3 In case of non-compliance with the provisions outlined in this CAR, either by failing to adhere to specified conditions or by not maintaining the prescribed operational and safety standards, DGCA may initiate appropriate enforcement actions.

Sd/-
(Faiz Ahmed Kidwai)
Directorate General of Civil Aviation

Appendix 1

FLIGHT EVALUATION PILOT TRAINING AND ASSESSMENT REQUIREMENTS

1. PRE-REQUISITE

- 1.1** In order to achieve the safety and quality assurance objectives of the flight evaluation and 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 ~~Annex 15~~ CAR Sec 9 Series I Part 1, flight evaluation pilots (licensed in accordance with Annex 1 provisions) must acquire and maintain minimum established competency level through initial training and supervised on-the-job training (OJT).
- 1.2** Initial training must ensure that the flight evaluation pilot is able to demonstrate a basic level of competency that includes at least the following elements:
- i. Knowledge of the information contained in ICAO Doc 8168 (PANS OPS), Vol. I & Vol. II and other related ICAO provisions relevant to the State; and
 - ii. Knowledge of and skills in ground and flight validation of IFP.
- 1.3** Recurrent training must ensure that the flight evaluation pilot is able to demonstrate a basic level of competency that includes at least the following elements:
- i. Knowledge about updates in ICAO provisions and other provisions pertaining to procedure design and flight validation of IFP; and
 - ii. Maintenance and enhancement of knowledge and skills on ground and flight validation of IFP.
- 1.4** It must ensure that flight evaluation pilots have undergone an adequate supervised OJT.
- 1.5** Competency of the flight evaluation pilot must be assessed at regular intervals.

2. INITIAL TRAINING

2.1 Knowledge and skills in ground and flight validation of IFP

2.1.1 Ground training in-flight and ground validation duties:

- i. Procedure package contents;

- ii. Procedure package review;
- iii. Requirements, techniques and considerations for verifying that the navigation data to be published, as well as that used in the design of the procedure, are correct;
- iv. Techniques and considerations for ground validation of obstacle data;
- v. Requirements, techniques and considerations for obstacle assessment in flight;
- vi. Techniques and considerations in the application of ICAO Doc 8168-Vol II (PANS-OPS) IFP design criteria in the ground and flight validation of IFP;
- vii. Airport infrastructure assessment
- viii. Flyability/ Human Factors assessment
- ix. Charting considerations
- x. Operational factors
- xi. Criteria to be met for waiving the requirement for a flight validation

2.1.2 Flight training in-flight validation duties:

- i. Obstacle assessment requirements, techniques and considerations;
- ii. Techniques and considerations in the applications of ICAO Doc 8168- Vol II (PANS-OPS) procedure design criteria in the flight validation of IFP.
- iii. Requirements, techniques and considerations for verifying that the navigation data to be published, as well as that used in the design of the procedure, are correct
- iv. Airport infrastructure assessment
- v. Flyability/ Human Factors
- vi. Charting considerations and
- vii. Operational factors

- 2.1.3** Supervised OJT adequate to achieve the required level of competency in flight and ground validation, knowledge and skills.

3. RECURRENT TRAINING

- 3.1** The following are the minimum competencies to be addressed in a recurrent training programme for flight evaluation pilots, which should be accomplished at least every two years, or when major changes occur:

- (i) Update on changes in ICAO Doc 8168-Vol II (PANS-OPS) criteria;
- (ii) Review portions of ICAO Doc 8168-Vol II (PANS-OPS) criteria most relevant to current or projected duties;
- (iii) Review changes in airport infrastructure requirements; and
- (iv) Knowledge and skills related to new developments in flight validation.

Appendix 2

GOVERNMENT OF INDIA			
DIRECTORATE GENERAL OF CIVIL AVIATION			
AIRSPACE AND AIR NAVIGATION SERVICES STANDARDS DIRECTORATE			
PRE-FLIGHT/GROUND VALIDATION CHECKLIST		IFPV-01	
	1	Procedure Title	
	2	Procedure applicable to categories of aircraft	
	3	New or Amended Procedure	
	4	Name of the Airport	
	5	Runway Designation	
	6	Evaluator name/phone/email	
	7	Procedure Designer name/phone/email	
	8	Navigation sensor/Nav-aid	
	9	PBN navigation specification	
B	PRE-FLIGHT VALIDATION		Satisfactory
	1	IFP package forms & procedure chart/s	
	2	Data verification (e.g. aerodrome/heliport, aeronautical, obstacle, ARINC coding)	
	3	Location of the controlling obstacle in respect of all IAP segments indicated in IFP package	
	4	Graphical depiction (chart) correctness	
	5	Intended use and special requirements	
	6	Overall design is meeting PANS-OPS Criteria	
	7	Consider impact on the procedure of waivers to standard design criteria, if applicable	
	8	Segment lengths and descent gradients allow for deceleration/configuration	
	9	Comparison of FMS navigation database with the IFP design, coding and relevant charting information (if applicable)	
	10	Charting of notification of cold/warm temperature limits (if applicable)	
	11	Flight Inspection report available	
	12	Remarks	
C	CONCLUSION		
	1	Simulator evaluation needed	
	2	Flight evaluation needed	
	3	PROCEDURE	
D	Evaluator's Signature		
	Date		

Appendix 3

GOVERNMENT OF INDIA			
DIRECTORATE GENERAL OF CIVIL AVIATION			
AIRSPACE AND AIR NAVIGATION SERVICES STANDARDS DIRECTORATE			
FLIGHT SIMULATOR EVALUATION CHECKLIST		IFPV-02	
	1	Procedure Title	
	2	Procedure applicable to categories of aircraft	
	3	New or Amended Procedure	
	4	Name of the Airport	
	5	Runway Designation	
	6	Evaluator name/phone/email	
	7	Navigation sensor/Nav-aid	
	8	PBN navigation specification	
B	SIMULATOR EVALUATION		Satisfactory
	1	Comparison of FMS navigation database and source documents, including proper ARINC 424 coding	
	2	Document simulator aircraft information including FMS software	
	3	Assessed faster and/or slower than charted	
	4	Assessed at allowed temperature limits-Minimum	
	5	Assessed at allowed temperature limits-Maximum	
	6	Assessed with adverse wind components	
	7	Flight track matches tracks depicted on the IAP chart	
	8	Flyability	
9	Human Factors assessment in respect of flightdeck workload		
C	IAP SEGMENT-WISE SIMULATOR EVALUATION		
C1	Initial Approach Segment		Completed
	1	Heading/Track	
	2	Distance	
	3	Wind Component	
	4	Temperature Conditions	
	5	Maximum Bank Angel Achieved during RF leg (if applicable)	
C2	Intermediate Approach Segment		Completed
	1	Heading/Track	
	2	Distance	
	3	Wind Component	
	4	Temperature Conditions	
	5	Maximum Bank Angel Achieved during RF leg (if applicable)	
C3	Final Approach Segment		Completed
	1	Heading/Track	

	2	Distance	
	3	Vertical Path Angle/Descent Gradient	
	4	Wind Component	
	5	Temperature Conditions	
	6	Maximum Bank Angel Achieved during RF leg (if applicable)	
C4	Missed Approach Segment		Completed
	1	Heading/Track	
	2	Distance	
	3	Wind Component	
	4	Temperature Conditions	
	5	Maximum Bank Angel Achieved during RF leg (if applicable)	
C5	SID		Completed
	1	Heading/Track	
	2	Distance	
	3	Wind Component	
	4	Temperature Conditions	
	5	Maximum Bank Angel Achieved during turn	
C6	STAR		Completed
	1	Heading/Track	
	2	Distance	
	3	Wind Component	
	4	Temperature Conditions	
	5	Maximum Bank Angel Achieved during RF leg (if applicable)	
D	Recorded Simulator data, to be provided as an attachment to this form		
E	REMARKS		
F	CONCLUSION		
	PROCEDURE		
G	Evaluator's Signature		
	Date		

Appendix 4

GOVERNMENT OF INDIA				
DIRECTORATE GENERAL OF CIVIL AVIATION				
AIRSPACE AND AIR NAVIGATION SERVICES STANDARDS DIRECTORATE				
FLIGHT VALIDATION (FV) REPORT				IFPV-03
	1	Procedure Title		
	2	Procedure applicable to categories of aircraft		
	3	New or Amended Procedure		
	4	Name of the Airport		
	5	Runway Designation		
	6	FV Pilot or Evaluators' name/phone/email		
	7	Navigation sensor/Nav-aid		
	8	PBN navigation specification		
B	FLIGHT VALIDATION (FV) PARAMETERS		Satisfactory	Unsatisfactory
B1	Holding Procedure			
	1	Inbound Course/Track		
	2	Minimum Holding Altitude		
B2	Procedure Outbound (Initial and Intermediate Approach Segment)			
	1	Outbound Course/Track		
	2	Rate of Descent		
	3	Turn Altitude		
	4	Outbound Distance		
	5	Maximum Distance in Turn		
	6	TAWS Alert		
	7	Segment length, turns and bank angles, speed restrictions		
B3	Procedure Inbound (Final Approach Segment)			
	1	Interception of Inbound Course/Final Approach Track/Localiser		
	2	Rate of Descent		
	3	Straight-In Approach		
	4	OCA/H to Touchdown (Visual Segment)		
	5	Threshold Crossing Height (LTP or FTP, if applicable)		
	6	FAS Data block (if applicable)		
	7	TAWS Alert		
B4	Missed Approach Segment			
	1	Missed approach, if done		

	2	Climb Gradient		
	3	TAWS Alert		
B5	Visual Aids			
	1	Performance of Visual Aids (PAPI/VASIS)		
	2	Approach Light System		
D	Night Evaluation			
	1	Aerodrome Ground Light		
	2	Instrument Approach Procedure usability		
E	Recommendation/Comment			
F	FV Pilot/Evaluators'			

Note: Flight validation form, in addition to the above information, must include the following:

- a. date of validation
- b. type of acft
- c. category of acft:
- ~~e~~.d. flight No.
- ~~d~~.e. Name of operator

Appendix 5

IFPDSP Operations Manual Content Requirements

The Operations Manual of IFPDSP shall contain at least the following:

- a) A statement signed by Head of instrument flight procedure services, on behalf of AAI as ANSP confirming that—
 - 1. The manual defines the organization and demonstrates its means and methods for ensuring ongoing compliance with this CAR; and
 - 2. The manual, and all associated manuals, operating and maintenance instructions, must be complied with by the organization's personnel at all times.
- b) The titles and names of the all the qualified designers including the Chief Procedure designer working in the organisation (Flight procedure designing section).
- c) The duties and responsibilities of the chief procedure designer and all qualified designers working in the FPD section.
- d) An organization chart depicting the:
 - 1) lines of responsibility of the senior persons and the supervisory positions within the organisational structure.
 - 2) a description of the chain of command established, or proposed to be established, by the IFPDSP.
- e) A summary of the organization's staffing structure for IFP design section. A statement (manpower assessment methodology) showing how the IFPDSP determines the number of operational staff required including the number of operational supervisory staff;
- f) A description of facilities, tools and resources to be utilized to perform duties.
- f) The detailed procedures to be followed for required regarding IFP design development.
- g) The detailed procedures to be followed for required regarding IFP validation.
- h) The detailed procedures to be followed for safety assessment.
- i) The detailed procedures to be followed for stakeholder consultation.
- j) The detailed procedures to be followed for required regarding IFP design submissions and declarations.
- k) The detailed procedures to be followed for required regarding IFP promulgation.

- l) The detailed procedures to be followed for required regarding IFP maintenance.
- m) The detailed procedures, or a reference to IFPDSP Quality Manual containing the procedures to be followed for required regarding quality assurance.
- n) The detailed procedures, or an outline of the procedures including information that identifies the documentation that contains the procedures to be followed for acquisition of data, its processing and the identification, collection, indexing, storage, maintenance and disposal of records regarding:
 - 1) ~~data integrity;~~
 - 2) ~~the control, calibration, and maintenance of inspection, measuring, and test equipment; and~~
 - 3) ~~the identification, collection, indexing, storage, maintenance, and disposal of records.~~
- o) a description of the:
 - 1) training programme and ~~checking program competency check~~ of the personnel;
 - 2) ~~procedures to be used in commissioning new facilities, equipment and services;~~
 - 3) processes and documentation used to provide operational instructions to staff;
 - 4) procedures to be followed to ensure all operational staff are familiar with any operational changes that have been issued since they last performed operational duties;
- p) ~~a statement detailing any agreement, if any, entered into by the IFPDSP in relation to the provision of a design service provided by another party;~~
- q) The detailed procedures to be followed to control, amend, and distribute the manual.
- r) ~~The policies and procedures contained in the manual must not be contrary to any applicable provisions specified in this CAR.~~

APPENDIX 6

IFP Package Submission Form

S.N.	Element	CAR ref	Submitted (yes/no/not applicable)	Reason for non- submis sion	Reference page in IFP package
1.	Procedure Designator	10.2.3.1 (a)			
	(a) Draft Chart				
	(b) Existing Chart, if any				
	(c) Comparative statement				
2.	Design Criteria & Tools used	8.3			
3.	Design Report	10.2.3.1 (g)			
4.	Obstacle evaluation report	8.4.2			
5.	Drawings with protected areas	10.2.3.1 (c)			
6.	Calculations	10.2.3.1 (d)			
7.	Textual Format Narrative	10.2.3.1 (e)			
8.	Data and Information	10.2.3.1 (b)			
	(a) All data used in design process including OLS data, nav aid data, etc				
	(b) Maps & Charts				
	(c) Date of Aeronautical Survey / Verification & Validation				
	(d) Data Quality/ Verification & Validation Certificate				
9.	Safety assessment report	8.6			
10.	Flight Calibration Report/Ground/Flight Checks report as applicable for Nav aids	8.3.4			
11.	Independent Ground Validation Report	10.2.3.1 (h)			
12.	Declarations by CPD	10.2.3.1 (i)			
13.	Declaration by Aerodrome Operator, if applicable	8.3.3			
14.	Stakeholder Consultation	7.1.3			
15.	Any other supporting document				

APPENDIX 7

IFP Withdrawal Form

Brief Description

Name of IFP to be withdrawn:

Runway:

Airport:

Duration:

Reason:

Alternate IFPs:

Any other relevant information:

Document Submission

S.N.	Document Name	Attached (Yes/No). If No, specify reason.
1	Safety assessment SCARs form	
2	Hazard analysis	
3	Safety risk mitigation	
4	Risk acceptance	
5	Attendance of participants	
6	Minutes of the meeting	
7	Undertaking for safety assessment	
8	Vetting of SCARs by Aviation Safety dte, AAI	
9	SOP (if applicable)	
10	Any other document	

Date:

Signature of GM-FPD
FPD Section, AAI CHQ

Notes:

- 1. Safety assessment form should be complete in all respects. Refer DGCA SSP Circular 01/2012 for SRM documentation.*
- 2. AAI to take all actions as per Para 11.3.3 of CAR Sec 9 Series P Part 1, and notify the DGCA of the compliance.*
- 3. All records to be retained as per Para 14 of said CAR.*