



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: Instrument Flight Procedure Validation (IFPV) of Satellite-based Instrument Flight Procedures (IFP)

Date: 05/01/2015

AC No: 90-113A

Initiated By: AFS-400

This advisory circular (AC) provides guidance for conducting instrument flight procedure validation (IFPV) of satellite-based performance-based navigation (PBN) instrument flight procedures (IFP) for both fixed-wing and helicopter aircraft. It also addresses validation of helicopter wide area augmentation system (WAAS) special IFP. This AC supplements and does not change the requirements of Federal Aviation Administration (FAA) Order 8200.1, United States Standard Flight Inspection Manual. Ground validation, preflight validation (including simulator evaluation and obstacle assessment), and flight validation are described in this document.

The primary audience for this AC is non-FAA service providers performing IFPV. The secondary audience is Flight Standards Service Aviation Safety Inspectors and Air Traffic Organization (ATO) personnel within the FAA who are directly associated with the FAA IFPV process and/or charged with the responsibility to authorize and provide oversight of non-FAA IFPV service providers.

This advisory circular cancels FAA AC 90-113, Instrument Flight Procedure Validation (IFPV) of Satellite-based Instrument Flight Procedures (IFP), dated 10/14/11.

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CHAPTER 1. INSTRUMENT FLIGHT PROCEDURE VALIDATION (IFPV) OVERVIEW

1.1 Process.

IFPV is a series of actions involving several distinct elements, ground validation, preflight validation (including simulator validation and obstacle assessment), and flight validation.

1.2 Authorization.

Non-FAA IFPV service providers must be authorized by the FAA prior to conducting any IFPV activities. Approval to conduct IFPV activities consists of classroom training and on-site observation of IFPV activities completed in accordance with the company's IFPV manual. Specific FAA authorization is required for ground obstacle assessment, simulator validation, airborne obstacle assessment, and flight validation. See FAA Order 8900.1, Volume 11, chapter 12 for examples of IFPV Letters of Authorization (LOA).

1.3 Notification of Planned IFPV Activity.

Service providers must notify the Flight Procedure Implementation and Oversight Branch (AFS-460) by email (AFS460IFPV@faa.gov) prior to conducting any IFPV activity. Upon receipt of the email, AFS-460 will notify the operator of the level of oversight for that activity. The operator must not perform the activity without AFS-460 collaboration. The operator must notify AFS-460 at least 15 business days prior to the intended activity date to allow for oversight planning.

1.4 Record Data Format.

Records required by current IFPV guidance must be submitted electronically to AFS-460. The preferred format is electronic transmittal of a TARGETS project file.

1.5 Data Accuracy and Sources.

Satellite-based PBN IFP, RNAV (GPS), RNAV (RNP), and WAAS require highly accurate data based on the World Geodetic System 1984 (WGS84). This requires all survey data used in the flight procedure to meet FAA Order 8260.19, Flight Procedures and Airspace, standards. It is mandatory that a quality assurance system covering all domains of data collection (surveys), processing, publication, and navigation database development be maintained (Ref. ICAO Convention on International Civil Aviation Annexes 4, 11, 14, 15, and DO 200A/EUROCAE ED 76). Input errors, particularly within the final approach segment (FAS) data block, can result in significant changes to the flight path in relation to the runway/point-in-space. The validation must ensure use of correct data for a valid flight procedure analysis. Sources of terrain, obstacle, and aeronautical data used, to include the source, type, date, version, and resolution of the data must be documented in accordance with FAA Order 8260.19.

1.6 Library.

A current copy of all relevant FAA documents, FAA-accepted IFPV operations manuals, publications, and correspondence pertinent to IFPV must be maintained by the non-FAA service provider. Libraries may be maintained in electronic format and must contain at a minimum, the publications listed in paragraph 5-2.

1.7 Records.

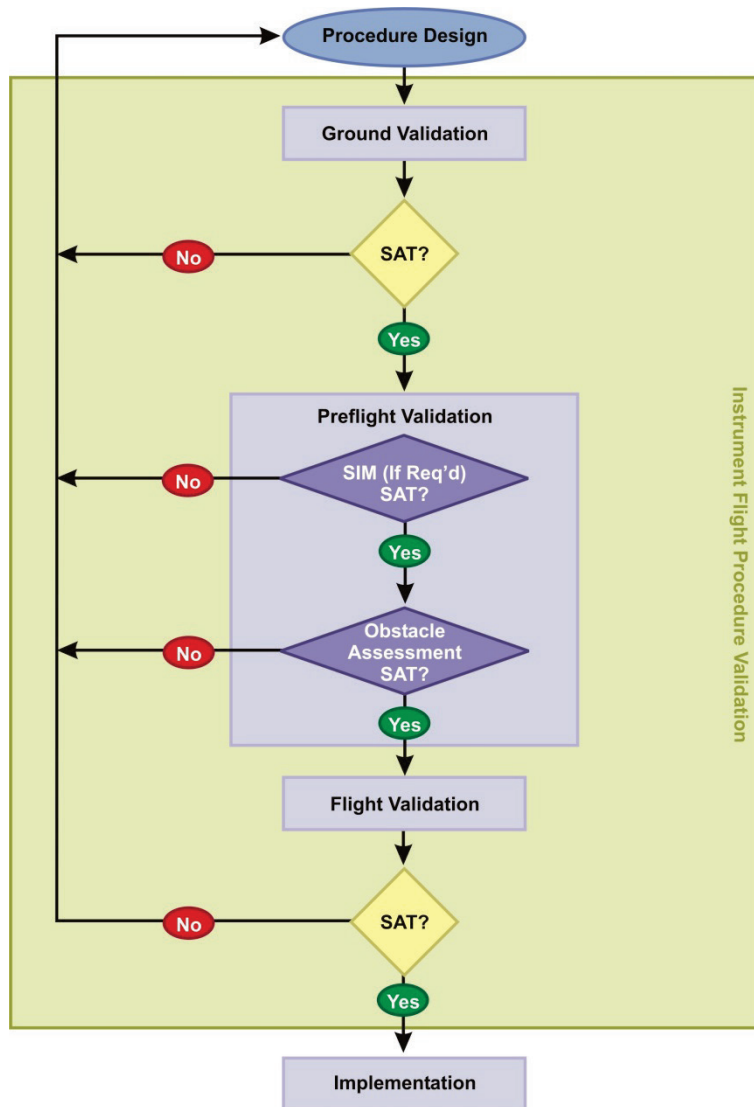
Records of the items listed below must be maintained for two years after an IFP is canceled and must be made available to the FAA for audit purposes on request. The FAA ATO's Technical Operations' flight inspection record keeping policy meets the following requirements:

1.7.1 Obstacle assessment records.**1.7.2 Detailed survey reports.****1.7.3 Autonomous Global Positioning System Recording System (AGRS) recordings from ground and/or airborne obstacle assessment and flight validation activities.****1.7.3.1 Furnish the AGRS electronic file (compatible with FAA computer systems) from both the obstacle assessment and the flight validation to AFS-460.****1.7.3.2 Submit the report in conjunction with the procedure package. The report must contain at a minimum the following elements:**

- Processing data and time;
- Maximum number of satellites;
- Minimum number of satellites;
- Average position dilution of precision (PDOP);
- Vertical protection level (VPL) [WAAS procedures only];
- Maximum observed horizontal DOP (HDOP) [WAAS procedures only];
- Horizontal protection level (HPL) [WAAS procedures only];
- Maximum observed vertical DOP (VDOP) [WAAS procedures only];
- For each segment, the maximum and minimum altitude, ground speed, climb rate, and climb gradient, and

- A printed graphic of sufficient detail that depicts the flight track flown referenced to the desired track of the approach procedure, including procedure fixes.
- 1.7.4 Helicopter IFP utilizing FAS data block (WAAS). A documented analysis of the FAS data in relation to the landing threshold point or desired point-in-space for course error, glide path error, threshold crossing height error, and the cyclic redundancy code (CRC).
- 1.7.5 All IFPV activities. Use FAA Forms 8260-30.1, Simulator Validation Checklist; 8260-30.2, Obstacle Assessment Checklist, and 8260-30.3, Flight Validation Checklist.
- 1.7.5.1 **The evaluator will use FAA Forms 8260-30.1, 8260-30.2, and 8260-30.3 for Simulator Validation, Obstacle Assessment, and Flight Validation respectively.**
- 1.7.5.2 **Include all of the original forms in the initial procedure package submitted to AFS-460.**
- 1.7.5.3 **Forward signed copies of FAA Forms 8260-30.2 to AFS-460 at AFS460IFPV@faa.gov upon the completion of a periodic (540-day) obstacle assessment.**
- 1.7.5.4 **Forms are located in Order 8900.1, Flight Standards Information Management System (FSIMS), Volume 11, chapter 12, section 1, table 11-1, figures 11-30 through 11-32.**
- 1.7.6 Personnel training records related to IFPV.
- 1.7.7 Individual and company IFPV letters of authorization.
- 1.7.8 Any additional items listed in the non-FAA IFPV service provider's operation manual.

Figure 1-1. IFPV Process Flow



Note: Some of the steps may not be required or may be accomplished in a different order.

CHAPTER 2. SERVICE PROVIDER REQUIREMENTS**2.1 Operational Guidance.**

The organization must have AFS-460 accepted guidance (e.g., operations manual) describing the processes and policies the non-FAA service provider must follow when conducting IFPV activities. The guidance must, as a minimum, contain the following information:

2.1.1 General information containing:

2.1.1.1 Contact person/persons in charge and physical address of all saved records.

2.1.1.2 List of individuals authorized to conduct IFPV and their relevant endorsements (simulator evaluation, ground obstacle assessment, airborne obstacle assessment, and flight validation).

2.1.1.3 Process for periodic internal audits.

2.1.1.4 Process for communicating and coordinating with appropriate FAA offices to include the transfer of data, forms, and documents.

2.1.1.5 Process for acquiring and maintaining regulatory guidance material associated with each authorized function, to include processes for maintaining the currency of all reference material.

2.1.1.6 Process to ensure all personnel authorized to perform IFPV activities are current and trained in accordance with current IFPV guidance.

2.1.1.7 Training attendance, including recurrent training documentation.

2.1.1.8 Process for ensuring that all IFPV processes are approved and current.

2.1.1.9 Procedures for revising the operations manual including a revision tracking system.

2.1.2 Ground validation information. Performance-based navigation (PBN) IFP QA review process (outline internal review process).

2.1.3 Preflight validation information containing:

2.1.3.1 Simulator validation process.

2.1.3.1.1 QA review process of the flight management system (FMS) NDB for correct coding of the PBN or WAAS IFP (outline process used to compare and ensure matching data).

- 2.1.3.1.2 Satellite-based RNAV simulator use requirements (i.e., methodology as to when a simulator check would be completed or required).
- 2.1.3.2 **Obstacle assessment process, to include accuracy codes achievable using company specific equipment and process.**
- 2.1.3.2.1 Ground obstacle assessment information (if applicable) containing:
1. Complete equipment list (hardware) to include type, make, model, software version, and revision if applicable (e.g., GPS Receiver – Global Sat BU-353).
 2. Complete equipment list (software) to include software manufacturer, title, version, and purpose (e.g., Magellan Mobile Mapper Office, release 3.40A) used to post process recorded GPS data.
 3. Step by step process for obstacle verification.
 4. Process for ensuring any new or different obstacles identified during ground obstacle assessment are documented and IFP re-evaluated, if necessary.
- 2.1.3.2.2 Airborne obstacle assessment information (if applicable) containing:
1. Complete equipment list (hardware) to include type, make, model, software version, and revision if applicable (e.g., GPS Receiver - Global Sat BU-353).
 2. Complete equipment list (software) to include software manufacturer, title, version, and purpose (e.g., CSSI, TARGETS Version 4.8) used for in-flight referencing of controlling obstacles and recording obstacle assessment tracks.
 3. Step by step process for obstacle verification.
 4. Company specific obstacle evaluation area (OEA) evaluation processes, if applicable.
 5. Process for ensuring any new or different obstacles identified during an airborne obstacle assessment are documented and IFP re-evaluated, if necessary.
 6. Process for briefing pilots, without IFPV authorization, on airborne obstacle assessment mission (e.g., briefing the pilot of a rented helicopter) [see appendix A].
- 2.1.4 Flight validation information containing:

1. Quality assurance review process of IFP chart, FAA 8260-series forms comparison with navigation database (outline process used to compare and ensure matching data).
2. Complete flight validation equipment list (hardware) and software version and revision if applicable, e.g., GPS Receiver - Global Sat BU-353.
3. Complete equipment list (software) to include software manufacturer, title, version, and purpose (e.g., TARGETS version 4.8) used for recording flight tracks.
4. Process for addressing issues concerning obstacles or flyability discovered during flight validation.
5. Process for assessing airport/heliport infrastructure.

2.2 **Safety Management System (SMS)/Operational Safety Assessment (OSA).**

The SMS/OSA must define the safety policies, processes, and practices for managing all aspects of all IFPV processes. The SMS/OSA must include the following elements.

- 2.2.1 Definition of the organization's safety objectives.
- 2.2.2 Ability to present the safety situation in respect to compliance with all relevant FAA, internal, and other safety related standards.
- 2.2.3 Definition of the safety accountabilities of all personnel.
- 2.2.4 Continual review process for effectiveness by all personnel.
- 2.2.5 Process for staff to identify safety hazards or concerns and to suggest methods for enhancement of safety.
- 2.2.6 Established internal procedures for the communication and processing of safety concerns within the organization as they relate to IFPV.
- 2.2.7 Definition of the interface arrangements between internal groups of the organization as they relate to IFPV.
- 2.2.8 Compliance process applicable to all personnel of the organization.
- 2.2.9 Safety hazard/risk analysis and risk control/mitigation assessment in accordance with an established methodology endorsed by the FAA.
- 2.2.10 Quality management system based on those elements of ISO 9001 relevant to IFPV.
- 2.2.11 Oversight and audit program.

Note: The SMS/OSA guidance will be located in the Operational Guidance referenced in paragraph 2-1.

CHAPTER 3. INSTRUMENT FLIGHT PROCEDURE VALIDATION (IFPV)**3.1 Process.**

IFPV consists of three elements: ground validation, preflight validation, and flight validation.

3.1.1 Ground validation is a quality assurance review of the entire IFP package. The purpose is to identify areas with the potential to impact the flyability and safety of the IFP (e.g., ARINC 424 coding errors, obstacles, OE/AAA and charting). The evaluator should address issues identified during the ground validation phase prior to the pre-flight validation phase.

3.1.2 Pre-flight validation will include an obstacle assessment and may include a simulator evaluation. Any issue identified during the pre-flight validation phase must be addressed prior to flight validation.

3.1.2.1 **Determine any special operational issues specific to the IFP e.g., climb gradients, close proximity to restricted areas, speed restrictions, etc.**

3.1.2.2 **Verify the RNAV navigation database for correct coding of the PBN or WAAS IFP.** Comparisons must be made between the RNAV or FMS navigation data as displayed on the control display unit and the applicable FAA 8260-series forms. Additionally, any notes and/or charted requirements and restrictions such as altitudes, speeds, courses, etc. must be validated.

3.1.2.3 **Simulator evaluations are a valuable tool to test the procedure flyability and to compare database coding.** They have the ability to test the procedure at the design limit and should be conducted where factors such as challenging terrain or specific operational considerations exist. Simulator evaluations are required (fixed wing only) whenever there is a request for a waiver or request for flight standards approval for deviations from standard criteria. All areas listed on FAA Form 8260-30.1 should be evaluated. Provide feedback to the procedure designer who, if feasible, should be involved in the simulator evaluation. The simulator evaluation must be conducted in a FAA-qualified Level “C” or Level “D” flight simulator capable of flying the procedure. Information on simulator capabilities is available in 14 CFR Part 60 and from the FAA National Simulator Program. Additionally, desktop simulators are a valuable tool to verify coding and evaluate basic flyability.

Note: For Special PBN IFP designed for a specific make/model/series and specific FMS, software part number, software version, and revision, the simulator evaluation must be flown in an FAA-qualified Level “C” or Level “D” simulator with the exact configuration specified.

- 3.1.2.4 **Conduct an obstacle assessment verifying the height and location of the documented controlling obstacle for each segment of the IFP.** Perform a visual inspection of the obstacle evaluation area (OEA) to determine the presence of undocumented or inaccurately documented obstacles. Obstacle assessment must be performed in accordance with FAA Order 8200.1 and must be documented on FAA Form 8260-30.2.
- 3.1.2.4.1 A ground obstacle assessment can produce the most accurate results; however, circumstances may prevent obstacle access.
- 3.1.2.4.2 An airborne obstacle assessment provides easier access to obstacles and OEA boundaries. Airborne obstacle assessments can be flown in any type of manned aircraft; however, assessments performed in helicopters or slow moving/small category aircraft are preferred. Obstacle assessment flight activities must comply with the flight rules contained in 14 CFR Part 91. Any deviation from a rule during an obstacle assessment (e.g., 14 CFR Part 91.119 minimum safe altitudes – general) must be authorized by the geographically respective Flight Standards District Office. Consistent with FAA Order 8260.19, an airborne obstacle assessment will result in an accuracy code of 4D being assigned to that obstacle.
- 3.1.2.4.3 Document incorrect obstacle data such as obstacles that no longer exist or obstacle data that is inaccurate or is missing from the FAA obstacle databases. This information must be provided to the IFP designer and documented on the FAA Form 8260-30.2. All supporting information including photos, survey data, etc. must be retained by the organization. Obstacle data inaccuracies, of any type, must be documented and accuracy codes assigned in accordance with FAA Order 8260.19.
- 3.1.2.4.4 If desired, a lower accuracy code specific to the process used by the IFPV provider may be coordinated with AFS-460. This authorization is specific to both the company and the individual performing the obstacle assessment. This accuracy code determination will be based upon the type of equipment used, its specifications, and a determination of process effectiveness.
- 3.1.3 Flight validation (FV).
- 3.1.3.1 **Review the results of the simulator and obstacle evaluations, and review any specific training, operational, or equipment requirements.**
- 3.1.3.2 **Review the PBN IFP package per guidelines established in FAA Order 8200.1.**
- 3.1.3.3 **Compare the aircraft navigation database, chart depiction, and appropriate FAA 8260-series forms.**

3.1.3.4 **Conduct an assessment of flyability to determine that all segments of the procedure can be safely flown considering required speeds, descent angles, climb gradients, etc.** Flight validation must be conducted on-course/on-path and must be flown at or below the maximum intended speed on the developed lateral and vertical flight path. Flight validation must be accomplished in an aircraft capable of flying the procedure as designed.

Note 1: Exercise caution when evaluating a procedure where a ground-based NAVAID is used. Instrument procedures are developed using the airport's magnetic variation. When flight procedures are coded, there may be a difference between the ARINC airport and the NAVAID magnetic variation record.

Note 2: If a NAVAID is used solely as a waypoint (latitude/longitude coordinates only), a flight validation is necessary for the flyability of the fix in the procedure design. If the electronic portion of the NAVAID is required to fly the procedure, a flight inspection of the signal must be performed by FAA Flight Inspection.

3.1.3.5 **Conduct a controlling obstacle verification to provide the final assurance that the controlling obstacle has been correctly identified for each segment.**

3.1.3.6 **Verify that all airport/heliport infrastructures, such as runway markings, lighting, and communications, are in place and operative.**

3.1.3.7 **Evaluate other operational factors, such as aircraft equipment, performance limitations, and human factors.**

3.1.3.8 **Document the Flight Validation on the FAA Form 8260-30.3.**

3.1.3.9 **Flight Validation must be conducted in a manned aircraft and not conducted during revenue operations.**

3.2 **Requirements.**

3.2.1 Pre-flight validation.

3.2.1.1 **Personnel.**

3.2.1.1.1 Simulator evaluation (fixed-wing only). In order to conduct a simulator evaluation, the designated evaluator must hold an LOA for simulator evaluation. Although preferred, there is no requirement for the LOA holder to be a pilot. However, if the simulator evaluator is not a pilot, an experienced pilot must accompany the LOA holder to provide an accurate assessment of flyability. For Special IFP designed for a particular airframe, FMS, software part number, software version, and revision, the

pilot assisting in that evaluation must have experience in that particular aircraft and its flight guidance and navigation system.

- 3.2.1.1.2 Ground obstacle assessment. In order to conduct a ground obstacle assessment, the designated evaluator must hold an LOA for ground obstacle assessment.
- 3.2.1.1.3 Airborne obstacle assessment. In order to conduct an airborne obstacle assessment, the designated evaluator must hold an LOA for airborne obstacle assessment. If the designated evaluator is not also the pilot-in-command (PIC), the evaluator must provide an AFS-460 approved mission brief to the PIC. Airborne obstacle assessment must be conducted in a manned aircraft and not during revenue operations.
- 3.2.1.2 **Weather.** Airborne obstacle assessments must be conducted during day visual meteorological conditions (VMC) with sufficient in-flight ceiling and visibility to accomplish the assessment of obstacles.

3.2.2 Flight validation.

3.2.2.1 **Personnel.** The minimum crew complement is two pilots.

3.2.2.1.1 PIC must be:

1. Current and qualified in the appropriate aircraft and proficient with the specific FMS and associated software part number, software version, and revision.
2. Approved by AFS-400 or has received an AFS-460 approved brief.

3.2.2.1.2 Second-in-command (SIC) (if required) must be:

1. Current and qualified in the appropriate aircraft and proficient with the specific FMS and associated software part number, software version, and revision.
2. Approved by AFS-400 or has received an AFS-460 approved brief.

3.2.2.1.3 Flight validation evaluator. Although not required to be a crewmember, the evaluator may act as the PIC or SIC in accordance with the requirements above. The Flight Validation evaluator must be:

1. An FAA Aviation Safety Inspector (Operations) approved by AFS-460, or;
2. An individual with similar pilot qualifications who has completed AFS-460 approved training [see chapter 4] and received a Letter of Authorization from AFS-400, or

3. A current and qualified Aviation System Standards Airspace System Inspection Pilot (ASIP).
- 3.2.2.2 **Weather.** Flight validation must be conducted during day visual meteorological conditions (VMC) [except as noted in 3-1-2b(2)(a)] with sufficient in-flight ceiling and visibility to accomplish the assessment of obstacles and determine that the procedure flight track reflects the IFP design.
 - 3.2.2.2.1 Portions of the procedure above a published minimum IFR altitude (e.g., high-level portions of Standard Instrument Departures or Standard Terminal Arrival Routes) may be flown at night and/or in Instrument Meteorological Conditions (IMC).
 - 3.2.2.2.2 Approval of night minimums – A night evaluation is required when an IFR procedure is developed to an IFR or VFR airport/heliport with no prior night IFR service. An evaluation is also required when a procedure is developed to a newly constructed runway or when an existing procedure serves a runway that has been lengthened or shortened. The purpose of the evaluation is to determine the adequacy of airport infrastructure to include airport lighting systems prior to authorizing night minimums. Conduct all night evaluations during VMC with sufficient in-flight ceiling and visibility to assess the airport infrastructure.
 - 3.2.2.3 **Flight validation must be conducted in a manned aircraft and not during revenue operations.**
- 3.3 **Flight Validation of WAAS IFP.** When conducting flight validation of WAAS IFP utilize an in-flight data collection system that enables in-flight or post-flight analysis to validate that FAS data elements for course alignment, threshold crossing height, and glide path angle are providing navigation guidance, as designed, to the physical runway threshold or point-in-space. The system must be capable of performing the necessary evaluations in a documented, quantitative fashion.

CHAPTER 4. IFPV EVALUATOR TRAINING REQUIREMENTS

Note: See FAA Order 8900.1, Volume 11, chapter 12, section 2 for a description of the entire authorization process.

4.1 Initial Training Requirements for IFPV Authorization.

To receive an LOA for any IFPV activity, an evaluator applicant must first attend an AFS-460 approved training program that includes the following:

4.1.1 Familiarity with the PBN IFP design process and requirements for PBN operations. The requirements for PBN operations are outlined in the following FAA documents (use the latest revision)

- AC 90-100, U.S. Terminal and En Route Area Navigation (RNAV) Operations.
- AC 90-101, Approval Guidance for RNP Procedures with AR.
- AC 90-105, Guidelines for using Global Positioning System Equipment for IFR En Route and Terminal Operations and for Nonprecision Instrument Approaches in the U.S. National Airspace System.
- AC 120-40, Airplane Simulator Qualification.
- AC 150/5300-13, Airport Design.
- AC 150/5300-16, General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Control and Submission to the National Geodetic Survey.
- AC 150/5300-17, General Guidance and Specifications for Aeronautical Survey Airport Imagery Acquisition and Submission to the National Geodetic Survey.
- AC 150/5300-18, General Guidance and Specifications for Aeronautical Surveys to NGS: Field Data Collections and Geographic Information System (GIS) Standards.

4.1.2 Knowledge of the procedure design criteria relevant to the type of IFP for which the individual is authorized to conduct as either pilot-in-command or evaluator. IFP design criteria are outlined in the following FAA documents:

- FAA Order 7100.9, Standard Terminal Arrival Program and Procedures.
- FAA Order 8200.1, United States Standard Flight Inspection Manual.
- FAA Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS).
- FAA Order 8260.19, Flight Procedures and Airspace.

- FAA Order 8260.42, United States Standard for Helicopter Area Navigation.
- FAA Order 8260.46, Departure Procedure (DP) Program.
- FAA Order 8260.58, United States Standard for Performance Based Navigation (PBN) Instrument Procedure Design.
- FAA Order 8260.60, Special Instrument Procedures.

4.1.3 Training in the operation and post processing of data. Only for flight validation crews.

4.1.4 Process of completing FAA forms. FAA Forms 8260-30.1, 8260-30.2, and 8260-30.3; and the process for providing feedback to the procedure designer. For 8260-30 series forms, see FAA Order 8900.1, Volume 11, chapter 12.

4.1.5 Flight validation requirements.

4.1.6 Procedure package review.

4.1.7 Requirements, techniques, and considerations for verifying that the navigation data to be published, as well as that used in the design of the procedure, is correct.

4.1.8 Techniques and considerations for validation of obstacle data.

4.1.9 Airport infrastructure assessment.

4.1.10 Communications coverage.

4.1.11 Flyability/human factors assessment.

4.1.12 Use of automation tools and simulators or ground validation.

4.1.13 Charting considerations.

4.1.14 Operational factors.

4.1.15 Supervised on-the-job training (OJT). Adequate to achieve the required level of competency in obstacle assessment techniques, simulator evaluation, and flight validation.

4.2 **Recurrent Training Requirements.**

In order to exercise the privileges of the IFPV LOA, each evaluator must have performed an evaluation *with* an approved ASI during the previous 24 calendar months. If the 24 calendar months has been exceeded, an approved ASI must accompany the evaluator on their next scheduled activity. The ASI will ensure that the evaluator is:

4.2.1 Aware of updates on relevant changes to design criteria.

- 4.2.2 Applying current IFPV policy.
- 4.2.3 Proficient in conducting the specific IFPV activity (i.e., simulator validation, ground obstacle assessment, airborne obstacle assessment, and/or flight validation).
- 4.2.4 AFS-460 or approved ASI will document recurrent training complete on the IFPV Evaluator Check Record.

CHAPTER 5. ADMINISTRATION INFORMATION

- 5.1 **Background.** Historically, FAA ATO's Technical Operations (AJW) has conducted flight inspections of all new or revised IFP including an assessment of ground-based navigation aids (NAVAID), procedure flyability, obstacle verification, and airport/heliport infrastructure. The term "flight inspection" specifically refers to the evaluation and analysis of NAVAIDs and systems. The term "flight validation" refers to the flight assessment of an IFP to confirm that the procedure is operationally safe. Flight Validation verifies the required obstacle clearance, flyability, Navigation Database (NDB) ARINC 424 coding, design accuracy, and required infrastructure (i.e., communications, approach lights, runway markings, runway lights, charting, etc.) with all supporting documentation. Flight Validation is the final step in the IFPV process defined in this advisory circular. Non-FAA service providers, with appropriate FAA authorization, who follow the IFPV process may design, develop, validate, and implement satellite-based IFP.
- 5.2 **Definitions.**
- 5.2.1 Accuracy codes. Standards for horizontal and vertical obstacle measurements are outlined in FAA Order 8260.19, appendix C.
- 5.2.2 Airborne obstacle assessment. An airborne assessment of obstacles considered to be of impact to the IFP, conducted in accordance with FAA Order 8200.1. This assessment may involve the verification of the controlling obstacle, the evaluation of obstacles or the identification of obstacles that are missing from, or not included in the IFP. Airborne obstacle assessment is conducted during the preflight validation phase of the IFPV process.
- 5.2.3 Area navigation (RNAV). A method of navigation which permits aircraft operation on any desired flight path within the coverage of ground or space-based NAVAIDS or within the limits of the capability of self-contained aids, or a combination of these.
- Note:** Area navigation includes performance-based navigation as well as other operations that do not meet the definition of performance-based navigation.
- 5.2.4 ARINC 424. This is an international standard file format for the preparation and transmission of data for assembly of airborne navigation system data bases.
- 5.2.5 Authorization required (AR). An authorization by the FAA to conduct RNP IFP designated as "Authorization Required." Standards and criteria for the development of RNP AR IFP are based on a higher level of aircraft equipage and additional aircrew requirements.
- 5.2.6 Autonomous Global Positioning System Recording System (AGRS). A positioning and recording system independent from the aircraft navigation system (and does not interfere with any aircraft system). The AGRS must be capable of the following: IFP storage, moving map display depicting the IFP course, and flight validation records including time and three-dimensional positions in space with a sampling rate of not less

than one hertz. The AGRS must also be compliant with minimum operational performance specifications for the Global Navigation Satellite System (GNSS) equipment or system appropriate for route of flight or procedure. The AGRS system can be one stand-alone unit, or a series of components connected together (i.e., laptop, GNSS receiver, etc.) as long as it meets the minimum specifications outlined in current IFPV guidance.

- 5.2.7 FAA Flight Inspection System (FIS). The position recording and analysis system used by the FAA. It is independent from the aircraft navigation system used in flight inspection aircraft. The FAA FIS provides sufficient assessment and recording capabilities for flight validation.
- 5.2.8 Flight inspection. The operation of a suitably equipped aircraft for the purpose of calibrating ground-based NAVAIDs or monitoring/evaluating the performance of the GNSS.
- 5.2.9 Flight validation. The flight assessment of a new or revised IFP to confirm that the procedure is operationally acceptable for safety, flyability, and design accuracy, (including obstacle and database verification), with all supporting documentation. Flight validation is the final step in the IFPV process.
- 5.2.10 Flyability. A check or system of checks that ensure the procedure can be flown safely as designed. These checks may include, but are not limited to; acceptability of any deviations from standards, bank angles, airspeeds, climb/descent gradients, roll rates, track lengths, pilot workload issues, procedure complexity, runway alignment, etc.
- 5.2.11 Global Positioning System (GPS). GPS refers to the worldwide positioning, navigation and timing determination capability available from the U.S. satellite constellation. The service provided by GPS for civil use is defined in the GPS Standard Positioning System Signal Specification. The GPS meets the International Civil Aviation Organization (ICAO) GNSS requirements.
- 5.2.12 Ground obstacle assessment. An assessment of obstacles performed from the ground. This assessment involves the verification of the controlling obstacle, the evaluation of obstacles or the identification of obstacles that are missing from, or not included in the instrument flight procedure. Ground obstacle assessment is conducted during the preflight validation phase of the IFPV process.
- 5.2.13 Ground validation. An in-depth quality assurance (QA) review of the development criteria and documentation of a PBN IFP. Ground validation is the first step in the IFPV process.
- 5.2.14 Instrument flight procedure. A charted flight path defined by a series of navigation fixes, altitudes, and courses provided with lateral and vertical protection from obstacles from the beginning of the path to a termination point.
- 5.2.15 Instrument flight procedure service provider. An entity that provides IFP development services.

- 5.2.16 Instrument flight procedure validation (IFPV). The required QA steps in the procedure development process for satellite-based PBN IFP. The purpose of IFPV is the verification of pertinent obstacle and procedural data as well as an assessment of the flyability of the procedure. IFPV is broken down into three elements: ground validation, preflight validation, and flight validation.
- 5.2.17 IFPV evaluator. The evaluator is the individual responsible for conducting the IFPV activity and signing the respective FAA 8260- series form. Each IFPV activity requires a specific designation on the Letter of Authorization (LOA). Evaluators must complete the FAA Academy Flight Validation of Satellite-Based Performance-Based Instrument Flight Procedures course or equivalent, satisfactorily demonstrate IFPV to an FAA Aviation Safety Inspector, and have authorization from the Flight Technologies and Procedures Division (AFS-400).
- 5.2.18 Obstacle. All fixed (whether temporary or permanent) and mobile objects, or parts thereof, located on an area intended for the surface movement of aircraft or that extend above a defined surface intended to protect aircraft in flight.
- 5.2.19 Preflight validation. This is an operational review of the PBN IFP. The preflight validation step of the IFPV process consists of a simulator evaluation (if required) to test the flyability of the procedure and an obstacle assessment (either ground-based or airborne) to validate obstacle data. The preflight validation provides a preliminary review of the elements evaluated during the flight validation.
- 5.2.20 Public IFP. An IFP published in Title 14 Code of Federal Regulations (14 CFR) Part 97 and available to the general public.
- 5.2.21 Required navigation performance (RNP). A statement of the navigation performance necessary for operation within a defined airspace.
- 5.2.22 Special IFP. An IFP approved by the FAA in accordance with specific guidelines but not published in 14 CFR Part 97 for public use.
- 5.2.23 Terminal Area Route Generation Evaluation and Traffic Simulation (TARGETS). A software tool used to generate and evaluate terminal routes and conduct simulation and analysis.
- 5.2.24 Validation. The activity whereby the evaluator checks a data element as having a value that is fully applicable to the identity given to the data element, or a set of data elements, checked as being acceptable for their purpose.
- 5.2.25 Verification. The activity whereby the evaluator checks the current value of a data element against the value originally supplied.
- 5.3 **Related Publications (current editions).**
- 5.3.1 Regulations. Title 14 Code of Federal Regulations (14 CFR) Part 97.

5.3.2 Reference Material. These publications address IFP development and implementation:

- FAA AC 90-100, U.S. Terminal and En Route Area Navigation (RNAV) Operations.
- FAA AC 90-101, Approval Guidance for RNP Procedures with AR.
- FAA AC 90-105, Guidelines for using Global Positioning System Equipment for IFR En Route and Terminal Operations and for Nonprecision Instrument Approaches in the U.S. National Airspace System.
- FAA AC 90-110, Instrument Flight Procedure Service Provider Authorization Guidance for Required Navigation Performance Procedures.
- FAA Advisory Circular (AC) 90-112, Development and Submission of Special Instrument Procedures to the Federal Aviation Administration.
- FAA AC 120-40, Airplane Simulator Qualification.
- FAA AC 150/5300-13, Airport Design.
- FAA AC 150/5300-16, General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Control and Submission to the National Geodetic Survey.
- FAA AC 150/5300-17, General Guidance and Specifications for Aeronautical Survey Airport Imagery Acquisition and Submission to the National Geodetic Survey.
- FAA AC 150/5300-18, General Guidance and Specifications for Aeronautical Surveys to NGS: Field Data Collections and Geographic Information System (GIS) Standards.
- FAA Order 7100.9, Standard Terminal Arrival Program and Procedures.
- FAA Order 8200.1, United States Standard Flight Inspection Manual.
- FAA Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS).
- FAA Order 8260.19, Flight Procedures and Airspace.
- FAA Order 8260.42, United States Standard for Helicopter Area Navigation (RNAV).
- FAA Order 8260.46, Departure Procedure (DP) Program.

- FAA Order 8260.58, United States Standard for Performance Based Navigation (PBN) Instrument Procedure Design.
- FAA Order 8260.60, Special Instrument Procedures.
- FAA Order 8900.1, Flight Standards Information Management System (FSIMS), Volume 11, chapter 12, Instrument Flight Procedure Validation.
- RTCA DO-236, Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation.

5.4 **Forms.**

- FAA Form 8260-30.1, Simulator Validation Checklist.
- FAA Form 8260-30.2, Obstacle Assessment Checklist.
- FAA Form 8260-30.3, Flight Validation Checklist.
- FAA Form 8260-30.4, IFPV Evaluator Check Record.

APPENDIX A. EXAMPLE OF A BRIEFING FOR NON-IFPV AUTHORIZED PILOTS**A.1 Introduction.**

- A.1.1 Operator's pilot-in-command (PIC) is responsible for all aspects of the flight.
- A.1.2 IFPV personnel will not ask or require them to do anything outside the regulations or their operations specifications.
- A.1.3 Comply with operator policies and procedures.

A.2 Mission.

- A.2.1 IFP locations. Cover all scheduled validation locations and intentions.
- A.2.2 Discuss procedure legs, altitudes, and airspeeds to be flown (i.e., initial, intermediate, final, missed approach, and holding).
- A.2.3 Discuss, if the OEAs are to be flown, how they will be flown, who will define the track to be flown, etc.
- A.2.4 If an airborne obstacle assessment is to be flown, discuss how it will be flown.
- A.2.5 Discuss a proposed route for efficiency, air traffic control, weather, fuel locations, and other operational needs.

A.3 Operating Rules.

- A.3.1 14 CFR Part 91.
- A.3.2 Flight plan type. Visual flight rules (VFR) and/or instrument flight rules (IFR) operations are authorized during IFPV activities. However, the weather at the location of the IFPV activity must meet the requirements of this chapter. Visual meteorological conditions (VMC) are *mandatory* during obstacle evaluation, night evaluation, VFR area evaluation, visual segment evaluation, and departure procedure evaluations.
- A.3.3 Weather – VFR / IFR, departure, en route, destination, alternate.
- A.3.4 NOTAMs – departure, en route, destination, alternate.
- A.3.5 Temporary flight restrictions.
- A.3.6 Emergencies. During an emergency the flight validation will terminate immediately.

A.4 Company/Operator Requirements.

- A.4.1 PIC will follow all company/operator requirements.

A.4.2 There will be no pressure to operate outside the company/operators rules.

A.4.3 PIC follows company/operators flight following rules.

A.5 **IFPV Requirements.**

A.5.1 Will comply with FAA IFPV requirements.

A.5.2 Brief the crew to ensure understanding and comfort with the mission requirements.

A.6 **Post Mission.**

Obtain/verify contact information for the Chief Pilot, Director of Operation, Principal Operations Inspector, and All Weather Operations individual (if possible).

Advisory Circular Feedback

If you find an error in this AC, have recommendations for improving it, or have suggestions for new items/subjects to be added, you may let us know by emailing this form to [\[AFS460IFPV@faa.gov\]](mailto:AFS460IFPV@faa.gov).

Subject: [AC 90-113A, IFPV of Satellite-based IFPs] Date:

Please check all appropriate line items:

- An error (procedural or typographical) has been noted in paragraph Click here to enter text. on page Click here to enter text..

- Recommend paragraph Click here to enter text. on page Click here to enter text. be changed as follows:

Click here to enter text.

- In a future change to this AC, please cover the following subject:
(Briefly describe what you want added.)

Click here to enter text.

- Other comments:

Click here to enter text.

- I would like to discuss the above. Please contact me.

Submitted by: _____ Date: _____