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RNAV APPROACH FOR BASIC GNSS RECEIVERS

1. PURPOSE

- 1.1 The purpose of this AIC is to introduce general criteria and to establish the approval for the Area Navigation (RNAV) for Basic GNSS Receivers [RNAV (GNSS)] as an option to Instrument Approach Procedures (IAP).
- 1.2 The Augmentation to the core satellite constellation used, will be in the form of Aircraft Based Augmentation System (ABAS). ABAS technique called Receiver Autonomous Integrity Monitoring (RAIM) may be used.

2. BACKGROUND

- 2.1 Global Navigation Satellite system (GNSS) is one of the methods of Area Navigation (RNAV), which utilizes satellite for navigation guidance system. Two major components of the ICAO designated GNSS are the Global Positioning System (GPS) and the Global Navigation Satellite System (GLONASS).
- 2.2 The term 'Basic GNSS Receiver' describes first generation GNSS receivers that at least meet RTCA DO 208, SC-181 and JAA TGL 3, and equivalent IFR certification standard.
- 2.3 Flying a basic GNSS non-precision approach procedure is very similar to a traditional approach. The differences include the navigational information displayed on the GNSS equipment and the terminology used to describe some of the features. The Basic GNSS approach is normally point-to-point navigation and independent of any ground based navigational aids.
- 2.4 GNSS procedures utilize a straight line (TO-TO) flight from way-point to way-point, as sequenced in the database. Slight differences between the published track and the track presented by the GNSS receiver may occur. These differences are usually due to rounding of the track bearing and/or the application of magnetic variation.

3. SUPPLEMENTAL MEANS

- 3.1 The Supplemental means GNSS must meet the accuracy and integrity requirement for the given operation or phase of flight.
- 3.2 Other navigation systems supporting a given operation or the phase of flight must be available.

3.3 GNSS cannot be considered as an alternate for basic IFR requirement.

4. AIRCRAFT INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENT

4.1 The air traffic rules and procedures applicable to air traffic in Malaysian airspace using GNSS must conform to the general rules and procedures as specified in this AIC and in the AIP Malaysia section ENR 1.1.

4.2 IFR aircraft that comply with the requirements of the basic GNSS receiver specifications as described in Doc 8168 PANS-OPS - Volume II, Attachment Q part III, may use RNAV Non-Approach Procedures for Basic GNSS Receivers as a supplemental means of navigation.

4.3 Receiver Autonomous Integrity Monitoring (RAIM) must have a minimum FAA Technical Standard Order TSO C-129 authorization or RTCA (EUROCAE) MOPS/MASPS RTCA DO-208 or UEROCAE ED-72A.

4.4 GNSS Receivers must be installed in accordance with standard avionic installation requirement.

4.5 Automatic barometric aiding function, as provided by TSO C-129 or better must be connected and functioning.

4.6 Basic GNSS receivers must include integrity monitoring routines and capable of turn anticipation.

5. OPERATIONAL REQUIREMENTS

5.1 The GNSS equipment used must be serviceable.

5.2 The approach can not be flown unless that instrument approach is retrievable from the avionics database which:

- i. Contains all the way-points depicted in the approach to be flown
- ii. Presents them in the same sequence as the published procedure chart; and
- iii. Is update for the current AIRAC cycle.

5.3 Operating instructions for the GNSS navigation equipment fitted to the aircraft must be carried on board and, for commercial operation, incorporated into the operator's operation manual.;

5.4 GNSS navigation equipment must be operated in accordance with the operating instructions, and any additional requirements specified in the approved aircraft flight manual supplement;

5.5 In addition to GNSS, aircraft must be equipped with serviceable radio navigation systems

5.6 A flight plan may be filed under the IFR Flight Plan to a destination served by a GNSS Non-Precision Approach procedure.

5.7 The pilot must have a current knowledge of how to operate the equipment so as to achieve the optimum level of navigation performance.

6. APPROACH DESIGN

- 6.1 The procedure design developed in the accordance with the criteria and concept recommended by ICAO as per DOC 8168 PANS-OPS. The "Y-pattern" with offset angle of 70° or "T-pattern" with offset angle of 90° between Initial Approach Waypoints and the final approach alignment. The approaches is essentially "straight-in" to the runway and can be joined at any of three Initial Approach waypoints without the need for a reversal or base turn maneuver.(See Appendix 1 and 2)

7. TERMINAL ARRIVAL ALTITUDE (TAA)

- 7.1 Terminal Arrival Altitude (TAA) is the lowest altitude that will provide a minimum clearance of 300 meters (984 feet) above all objects located in an area contained within a sector of circle of 46km (25nm) radius of the initial approach point of an RNAV approach. Terminal Arrival Altitude will be associated with the Y-concept or T-concept RNAV approach procedures and more suited than Minimum Sector Altitude.

8. MISSED APPROACH REQUIREMENTS

- 8.1 If a loss of RAIM or RAIM warning is indicated at any time after passing the initial Approach Fix, the pilot must immediately carry out a missed approach in accordance with published procedures.
- 8.2 The GNSS may be used for missed approach guidance if the RAIM warning ceases when the missed approach is selected on the GNSS receiver.
- 8.3 If the RAIM warning remains when the missed approach is selected, or should there be any doubt as to the accuracy of the GPS, then an alternative means of guidance or dead reckoning must be used to fly the missed-approach.

9. FLIGHT NOTIFICATION

- 9.1 Aircraft that are navigating by GNSS are considered to be RNAV-equipped aircraft, and the appropriate equipment suffix should be included in the flight plan.
- 9.2 Radio communication, navigation and approach aid equipment carried on board the aircraft intended for RNAV procedures shall be specified in the message field 10 and 18 as appropriate in the flight plan form.
10. This information is published for the guidance and information of all concerned and must be read in conjunction with other related ICAO document on the GNSS applications.

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RNAV Approach Design Concept



