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RNAV APPROACH BASED ON VOR / DME

1. PURPOSE

- 1.1 The purpose of this AIC is to introduce general criteria and to establish the approval for the Area Navigation (RNAV) based on VOR/DME facility [RNAV (VOR/DME)] as an option to Instrument Approach Procedures (IAP).

2. BACKGROUND

- 2.1 Area Navigation (RNAV) can be defined as a method of navigation that permits aircraft operation on any desired course within the coverage of station reference navigation signals or within the limits of a self contained system capability, or a combination of these.
- 2.2 Recognizing of the capability of RNAV system for use in the Instrument Approach procedures, ICAO has developed SARPS for the criteria and constructions of the RNAV Instrument Approach Procedures in the Doc. 8168 (Vol. I and II) - OPS/611, Doc. 9613 - AN/973 (RNP Manual), Annexes 2, 6, 10 and 11.
- 2.3 The RNAV (VOR/DME) Approach Procedure is two dimensional (2D) non- precision approach procedures and is very similar to a traditional approach. The differences include the navigational information displayed on the RNAV equipment and the terminology used to describe some of the features.
- 2.4 RNAV (VOR/DME) approach procedures are assumed to be based on one reference facility composed of a VOR and co-located DME equipment.

3. AIRCRAFT INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENT

- 3.1 The air traffic rules and procedures applicable to air traffic in Malaysian airspace using RNAV (VOR/DME) must conform to the general rules and procedures as specified in this AIC and in the AIP Malaysia section ENR. 1.1
- 3.2 IFR aircraft equipped with RNAV system must obtain approval from DCA Malaysia before conducting RNAV (VOR/DME) approach procedures or from their state of registry.

4. FACTORS AFFECTING THE ACCURACY OF VOR/DME RNAV SYSTEM

4.1 Navigation accuracy of VOR/DME RNAV depends on;

- Ground station tolerance.
- Airborne receiving system tolerance
- Flight technical tolerance
- System computation tolerance
- Distance from reference facility

4.2 The accuracy and the limitation of RNAV System are that the computer/s are data based driven. The computer cannot identify data input error/s. Pilots or the operators should not attempt to manually input the navigational database promulgated.

5. OPERATIONAL REQUIREMENTS

5.1 Aircraft equipped with RNAV systems which have been approved for the appropriate level of RNAV operations may use these systems to carry out Area Navigation (RNAV) Approach Procedures based on VOR/DME providing that before conducting any flight it is ensured that:

- a The RNAV equipment must be serviceable;
- b Operating instructions for the RNAV navigation equipment fitted to the aircraft must be carried on board and, for commercial operation, incorporated into the operator's operation manual.;
- c RNAV navigation equipment must be operated in accordance with the operating instructions, and any additional requirements specified in the approved aircraft flight manual supplement;

5.2 The pilot has current knowledge of how to operate the equipment so as to achieve the optimum level of navigation accuracy;

5.3 The published VOR/DME facility upon which the procedure is based on is serviceable;

5.4 Pilot shall not commence a RNAV (VOR/DME) approach if either the VOR or DME component of the reference facility is unserviceable.

5.5 The Aid used in the construction of the procedure is the reference VOR/DME indicated on the approach plate. The passage of the stipulated fixes shall be verified by means of the reference facility.

5.6 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 updated by the current AIRAC cycle.

5.7 The fixes used in the procedure are indicated as way-points. These way-points are referred to by alphanumeric indicators and their positions are specified in latitude and longitude (degrees, minutes and seconds with accuracy to the nearest second of an arc or equivalent). A Radial and DME distance (to an accuracy of 0.18 km (0.1 NM)) from the reference facility are also provided

5.8 In addition to RNAV systems, aircraft must be equipped with serviceable radio navigation systems

6. APPROACH DESIGN

6.1 The procedure design is developed in 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 are 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 manoeuvre. (See Appendix 1 and 2)

6.2 RNAV (VOR/DME) Approach is a stand-alone procedure. Whenever possible, the design will be in the form of overlay to the conventional approaches for safety and operational experience benefit.

6.3 The final approach segment is generally aligned with the runway and a runway threshold waypoint is provided.

6.4 When the procedure requires a track reversal, a racetrack pattern may be established.

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

8.1 The missed approach way-point (MAWP) is defined by a flyover way-point. From the earliest MAWP, the area splays at 15° on each side of the missed approach track, at least until the start of climb (SOC) is reached, to take into account the limitations of some RNAV system, and the pilot's workload at the beginning of the missed approach holding phase. A missed approach holding way-point MAHWP defines the end of the missed approach segment and is located at or after the point where the aircraft, climbing at the minimum prescribed gradient, reaches the minimum altitude for en route or holding, whichever is appropriate.

9. FLIGHT NOTIFICATION

9.1 Aircraft that are RNAV-equipped shall include an appropriate equipment suffix 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 RNAV applications.

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RNAV Approach Design Y - bar Concept

