



GOVERNMENT OF INDIA
CIVIL AVIATION DEPARTMENT
DIRECTOR GENERAL OF CIVIL AVIATION

Operations Circular 05 of 2018

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Subject: Use of RNAV Substitution to fly Conventional Instrument procedure up to Final approach segment of ILS Approach.

1. INTRODUCTION

This operations circular (OC) lays down the framework for operational guidance regarding the suitability and use of RNAV systems to fly conventional instrument approach procedures only up to Final approach Fix in the event of either ground based or air borne equipment failure of conventional Nav Aids like VOR or NDB. This OC is issued under Rule 133 A of the Aircraft Rules 1937.

2. APPLICABILITY

This OC is applicable to all operators and Aircrafts approved as per CAR Section 8 Series S Part IV and OC 8 of 2014.

3. PURPOSE. The circular is intended for the following purposes.

- 1) Use of a suitable RNAV system as a Substitute Means of Navigation when a very high frequency (VHF) Omni-directional Range (VOR), Distance Measuring Equipment (DME), VOR/DME or non-directional radio beacon (NDB) is out-of-service, i.e., the Navigation Aid (NAVAID) information is not available; an aircraft is not equipped with ADF, VOR or DME; or the installed ADF, VOR, or DME on an aircraft is not operational. For example, if equipped with a suitable RNAV system, a pilot may hold over an out-of-service NDB.

- 2) Use of a suitable RNAV system as an Alternate Means of Navigation when a VOR, DME, VOR/DME, NDB, outer marker or middle marker is operational and the respective aircraft is equipped with operational navigation equipment that is compatible with conventional NAVAIDs. For example, if equipped with a suitable RNAV system, a pilot may fly a procedure or route based on operational VOR using that RNAV system without monitoring the VOR.

NOTE: This OC does not address the use of RNAV systems on RNAV routes and RNAV terminal procedures. This OC also does not address the use of RNAV systems on instrument approach procedures (IAP) titled RNAV (GNSS).

4. **DEFINITIONS.** For the purposes of this circular, the following definitions are provided.

Aircraft-Based Augmentation System (ABAS). A system augmenting and/or integrating information obtained from other GNSS elements with information on board the aircraft. The most common form of ABAS is receiver autonomous integrity monitoring (RAIM).

Alternate Means of Navigation. The use of information from a RNAV system in lieu of that from operating conventional NAVAIDs and navigation equipment that is installed, operational and compatible with conventional NAVAIDs.

Area Navigation (RNAV). A method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these. For the purposes of this OC, the specified RNAV accuracy must be met 95% of the flight time.

RNAV 1 requires a total system error of not more than 1 NM for 95% of the total flight time.

RNAV 2 requires a total system error of not more than 2 NM for 95% of the total flight time.

of the capability of self-contained aids, or a combination of these. For the purposes of this OC, the specified RNAV accuracy must be met 95% of the flight time.

Area Navigation (RNAV) System. This OC only addresses RNAV systems using positioning inputs from GPS/GNSS and DME, and IRU. Criteria for RNAV systems are discussed in appendix 1 and 2.

Critical DME. A DME facility that, when unavailable, results in navigation service which is insufficient for DME/DME/IRU supported operations along a specific route or procedure. The required performance assumes an aircraft's RNAV system meets the minimum standard (baseline) for DME/DME RNAV

systems found in appendix 1, or the minimum standard for DME/DME/IRU systems found in appendix 2. For example, terminal RNAV DPs and STARs may be published with only two DMEs, in which case, both are critical.

DME/DME (D/D) RNAV refers to navigation using DME ranging from at least two DME facilities to determine position.

DME/DME/Inertial (D/D/I) RNAV refers to navigation using DME ranging from at least two DME facilities to determine position along with use of an inertial reference unit (IRU) to provide sufficient position information during limited DME gaps.

Global Navigation Satellite System (GNSS). The GNSS is a worldwide position and time determination system, which includes one or more satellite constellations, aircraft receivers, and system integrity monitoring. GNSS is augmented as necessary to support the required navigation performance for the actual phase of operation.

Global Positioning System (GPS). The GNSS core satellite constellation providing space-based positioning, velocity, and time. GPS is composed of space, control, and user elements.

Receiver Autonomous Integrity Monitoring (RAIM). A technique used within a GPS receiver/processor to monitor GPS signal performance. This integrity determination is achieved by a consistency check among redundant measurements.

5. TYPES OF RNAV SYSTEMS THAT QUALIFY AS A SUITABLE RNAV SYSTEM.

As per OC 08 of 2014.

NOTE: Approved RNAV systems using DME/DME/IRU, without GPS or SBAS position input, may only be used as a substitute means of navigation when specifically authorized. The special authorization authorizing the use of DME/DME/IRU systems will also identify any required DME facilities based on an assessment of the DME navigation infrastructure.

6. USES OF SUITABLE RNAV SYSTEMS.

- a. **Usage of Suitable RNAV Systems.** Subject to the operating requirements in this circular, operators may use a suitable RNAV system in the following ways.
 - i. Determine aircraft position relative to or distance from a VOR, NDB, DME fix; a named fix defined by a VOR/DME, VOR radial, or NDB bearing,

- ii. Navigate to or from a VOR, or NDB and,
- iii. Hold over a VOR, NDB or DME fix.
- iv. Fly an arc based upon DME.

- b. **Specific Allowances.** The allowances described in this section apply even when a facility is identified as required on a procedure (for example, "Note ADF required").

7. USES OF SUITABLE RNAV SYSTEMS NOT ALLOWED BY THIS OC. An otherwise suitable RNAV system cannot be used for the following:

- a. **NOTAMed Procedures.** Unless otherwise specified, navigation on procedures that are identified as not authorized ("NA") without exception by a NOTAM. For example, an operator may not use a RNAV system to navigate on a procedure that is based upon a recently decommissioned NAVAID or a procedure affected by an expired or unsatisfactory flight inspection.
- b. **Substitution on a Final Approach Segment.** Substitution for the NAVAID (for example, a VOR or NDB) providing lateral guidance for the final approach segment
- c. **Lateral Navigation on LOC-Based Courses.** Lateral navigation on LOC-based courses (including LOC back-course guidance) without reference to raw LOC data.

8. OPERATING REQUIREMENTS AND CONSIDERATIONS.

a. General Considerations.

- 1) Pilots must comply with the guidelines contained in their Aircraft Flight Manual (AFM), AFM supplement, operating manual, or pilot's guide when operating their aircraft RNAV system.
- 2) Pilots may not use their RNAV system as a substitute or alternate means of navigation if their aircraft has an AFM or AFM supplement with a limitation to monitor the underlying NAVAIDs for the associated operation.
- 3) Pilots of aircraft with an AFM limitation that requires the aircraft to have other equipment appropriate to the route to be flown may only use their RNAV system as a substitute means of navigation for out-of-service NAVAIDs, but not for inoperable or not-installed aircraft equipment.

b. RNAV System Database Considerations.

- 1) Pilots must ensure their on-board navigation data is current, appropriate for the region of intended operation, and includes the waypoints, NAVAIDs, and fixes for departure, arrival, and alternate aerodromes.
- 2) Pilots must extract the routes, procedures way points, NAVAIDs, and fixes by name from the on-board navigation database and comply with the charted procedure or route. Heading-based legs associated with procedures may be flown using manual technique (based on indicated magnetic heading) or, if available, extracted from the aircraft database and flown using RNAV system guidance.

c. Procedure Validation

- 1) Procedures used with suitable GNSS-based area navigation systems, as either a substitute means of navigation or as an alternate means of navigation, must be verified for navigation data and operability using one of the following processes before being used:
 - i. on-going, system-wide checks of navigation data and operability;
 - ii. as needed, procedure specific checks of navigation data and operability.
- 2) These processes must ensure navigation data (e.g. waypoint names, waypoint sequence, distance between waypoints, heading/course/track information, and vertical path angles) used in airborne equipment conform to published information. The following methods to check the operability of procedure(s) are acceptable:
 - i. Suitable desktop analysis;
 - ii. Simulator evaluation; or
 - iii. Flight (in visual meteorological conditions).

d. Operating Requirements.

- 1) For the purposes described in this circular, pilots may not manually enter published procedure or route waypoints via latitude/longitude, place/bearing, or place/bearing/distance into the aircraft system.
- 2) Pilots are expected to accurately track procedure and route centrelines (CL), as depicted by on-board lateral deviation

indicators (LDI), displays, and/or flight guidance during all operations unless otherwise authorized to deviate by air traffic control (ATC) or in the instance of an emergency condition.

- 3) RAIM or other approved integrity monitor must be available during these operations

e. Equipage Considerations

- 1) Operators must also be equipped with at least one other independent navigation system in addition to an installed and operable RNAV system. This additional system must be suitable, in the event of loss of navigation capability of the RNAV system, for proceeding safely to a suitable airport and completing an instrument approach. For example,
 - i. For an aircraft equipped with FAA TSO- C145 (), FAA TSO-C146 () or FAA TSO-C196 () GNSS-based area navigation systems, an acceptable installation requires dual GNSS but no additional navigation equipment is required; and
 - ii. An aircraft equipped with FAA TSO-C129 GNSS-based area navigation systems requires operative VOR and/or ADF navigation equipment suitable for the intended en route, terminal, and approach operations, including any alternates.
- 2) ADF equipment need not be installed and operational, although operators of aircraft without an ADF will be bound by the operational requirements defined in this circular and may not have access to some procedures (that is, there may be instances when some operations might not be conducted without ADF equipment).
- 3) Operators of aircraft equipped with RNAV systems based solely upon GPS may experience some operational limitations in the future as conventional NAVAIDs are decommissioned. In addition, operators of aircraft with single-RNAV systems may expect some operational limitations as a result of considerations such as continuity of function. As with current operations, reversionary and backup capability will remain important considerations.
- 4) Use of an RNAV system as a substitute means of navigation may be applicable to normal in-flight use, to continuation of flight after failure, or to dispatch with inoperative conventional capability if

consistent with the applicable Master Minimum Equipment List (MMEL) for the aircraft type.

f. Alternate Airport Considerations.

For the purposes of flight planning, any required alternate aerodrome must have an available instrument approach procedure that does not require the use of GPS. This restriction includes conducting a conventional approach at the alternate airport using a substitute means of navigation that is based upon the use of GPS. For example, these restrictions would apply when planning to use GPS equipment as a substitute means of navigation for an out-of-service VOR that supports an ILS missed approach procedure at an alternate airport. In this case, some other approach not reliant upon the use of GPS must be available. This restriction does not apply to RNAV systems using TSO-C145/-C146 GAGAN equipment.

9. OPERATIONAL REQUIREMENTS FOR SPECIFIC SENSOR INPUTS.

The following sensor inputs have some associated operational requirements. For all RNAV systems, substitute and alternate means of navigation must be discontinued upon loss of integrity (for example, RAIM alert) or unacceptable degradation of system performance.

a. GNSS

- 1) RNAV systems using GNSS input may be used as an alternate means of navigation without restriction provided the aircraft is fitted with the equipment for the underlying navigation aid, the system is operative and the ground-based navigation aid is operative.
- 2) As part of flight planning, a prediction for GNSS integrity availability must be obtained where GNSS will be used as a substitute or alternate means of navigation.

b. DME/DME/IRU

- 1) RNAV systems using DME/DME/IRU, without GPS input, may be used as an alternate means of navigation where valid DME/DME position updating is published as available (for example, by NOTAM or authorization).
- 2) In order to use a substitute means of navigation on departure procedures, pilots of aircraft with RNAV systems using DME/DME/IRU, without GPS input, must ensure their aircraft

navigation system position is confirmed, within 1,000 feet, at the start point of take-off roll. The use of an automatic or manual runway update is an acceptable means of compliance with this requirement. A navigation map display may also be used to confirm aircraft position, if pilot procedures and display resolution allow for compliance with the 1,000-foot tolerance requirement.

10. SPECIFIC REQUIREMENTS TO FLY RNAV SEGMENTS PUBLISHED ON ILS PROCEDURES.

In order to fly RNAV transitions to an ILS final approach or RNAV missed approach segments of an ILS procedure, pilots must comply with the operating requirements of this OC. RNAV systems used for this type operation must allow for a means to become established on the ILS final approach course with minimal overshoot or undershoot.

11. RNAV FLIGHT CREW OPERATING PROCEDURES.

As per OC 08 of 2014.

12. PILOT KNOWLEDGE REQUIREMENTS AND TRAINING.

As per OC 08 of 2014.

Sd/
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