

INSTITUTO DE AVIAÇÃO CIVIL DE MOÇAMBIQUE

MOÇAMBIQUE

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AIC
INTERNACIONAL

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AIR NAVIGATION PROCEDURES

RNAV (GNSS) OPERATIONS

OPERATION OF AIRCRAFT

IFR APPROVAL TO USE THE GLOBAL POSITIONING SYSTEM FOR EN-ROUTE OPERATIONS AND RNAV (GNSS) TERMINAL AND APPROACH PROCEDURES IN MOÇAMBIQUE

Introduction

Global Navigation Satellite System (GNSS) is a generic term encompassing all navigation satellite and augmentation systems. Current GNSS-based aircraft operations use signals from the global positioning system (GPS) to calculate a precise position anywhere in the world. GPS enhances the efficiency of aircraft operations by supporting area navigation (RNAV) for the en route, terminal and non-precision approach phases of flight. Until additional GNSS elements are operational and approved for use, aircraft must carry traditional avionics, as described below, for the infrequent occasions when there are not enough GPS satellites in view to support operations.

This aeronautical information circular (AIC) specifies the terms and conditions associated with the approval to use GPS for en-route and RNAV (GNSS) terminal and approach procedures for instrument flight rules (IFR) operations in Moçambique.

International standards covering the use of GPS for the above IFR operations are published in ICAO Annex 10 and in the ICAO PANS-OPS Volume II. All terminal and approach procedures authorised by this AIC meet these ICAO standards.

Proposed GNSS national regulations pertaining to requirements for:

1. Airworthiness
2. Maintenance
3. Pilot licence
4. Operations
5. Air traffic service
6. Aeronautical telecommunication,

are described in the Draft Model Legislation and can be obtained from the AIS Office Headquarters, Direcção dos Serviços de Navegação Aérea, from the Instituto de Aviação Civil de Moçambique, Maputo.

Terms and Conditions

En route operations

GPS may be used for IFR flight guidance for en route operations subject to the following provisions and limitations:

- (a) The GPS avionics shall meet *Technical Standard Order* (TSO) C129/C129a (any class), TSO C145a/C146a, or equivalent criteria, and be installed and approved in accordance with accepted standards and regulations.
- (b) The GPS avionics shall be operated in accordance with the aircraft flight manual or applicable flight manual supplement, both of which take precedence over the terms and conditions specified in this AIC.
- (c) Aircraft using GPS equipment under IFR shall be equipped with another approved and operational means of navigation. Should GPS navigation capability be lost, this equipment shall allow navigation along the planned route or suitable alternate route.
- (d) For flight plan purposes, the COM/NAV equipment suffix "G" shall be used to indicate area navigation (RNAV) capability.

RNAV (GNSS) Terminal and Approach Operations

GPS shall be used for IFR flight guidance during RNAV (GNSS) Procedures subject to the following terms and conditions:

- (a) All aircraft operators shall be authorised by the State of Registry to conduct terminal and approach procedures using GPS.
- (b) GPS avionics shall meet FAA TSO C129 or C129a (Class A1, B1, B3, C1, or C3) or C145a/C146a requirements or equivalent criteria and shall be installed and approved in accordance with accepted standards and regulations. The GPS avionics shall be operated in accordance with the aircraft flight manual or applicable flight manual supplement, both of which take precedence over the terms and conditions specified in this AIC.
- (c) The avionics navigation database shall be current. All RNAV (GNSS) procedures shall be retrieved from the avionics navigation database, which shall store the location of all waypoints required to define the procedures and present them in the order depicted on the published procedure charts. Pilots shall verify procedure waypoints either by verifying co-ordinates or by ensuring that bearings and distances between waypoints are consistent with charted data.

- (d) Receiver autonomous integrity monitoring (RAIM) shall be available upon commencement of an RNAV (GNSS) procedure and throughout the procedure to provide integrity for the navigation guidance. If a RAIM warning is displayed when the aircraft is established on the final approach course, the pilot shall not continue the approach using GPS guidance. Aircraft with integrated GPS/IRS systems may meet this requirement by alternate means if such means are authorised by the State of Registry. In the case of an instrument approach procedure, if an avionics RAIM prediction indicates that RAIM will not be available at the expected approach time, the pilot shall advise ATC of his/her intentions as soon as possible.
- (e) Aircraft using GPS equipment under IFR shall be equipped with another approved and operational means of navigation. Should GPS navigation capability be lost, this equipment shall allow navigation along the planned route or a suitable alternate route.
- (f) GPS may be used to identify all DME and ADF fixes, including fixes that are part of any instrument approach procedure, when the applicable named and charted DME or ADF fix is selected as a GPS waypoint. Where ATC requests a position based on a distance from a DME facility for separation purposes, the pilot may report GPS distance from that DME facility, stating the DME facility name, but omitting the term "DME" (e.g., "30 miles from Sunspot VOR").
- (g) For the purpose of longitudinal separation, pilots may be requested to provide GNSS distance reports from any fix. To this end, pilots should be familiar with their avionics equipment to be able to provide this information in an expeditious manner.
- (h) Where a take-off and/or en-route alternate is required, at least one non-GPS based approach procedure shall be available at the alternate(s).
- (i) When communicating with ATC, pilots shall identify and request a procedure by its published name, omitting the (GNSS) part of the name (e.g., "cleared for an RNAV RWY 24 approach)". Phraseology to be used is attached.

Application for approval to use RNAV (GNSS) should be made to:

Director Civil Aviation,
P. O. Box
City.
Fax:
E-mail:

Note: Approved users are invited to submit details of any anomalies experienced during the use of GNSS and/or any other comments in writing to the Instituto de Aviação Civil de Moçambique (IACM) for evaluation to the following address as shown above.

GNSS/RNAV Phraseology for AIC

Reporting distance:

For RNAV... "REPORT (number) 'MILES' FROM (waypoint, fix, significant point, NAVAID, etc.)"

For GNSS... "REPORT (number) 'MILES' FROM (waypoint, fix, significant point, NAVAID, etc.)"

For DME... "REPORT (number) 'DME' FROM ((DME) facility name)"

Issuing crossing instructions:

For DME equipped "CROSS 25 'DME' AT 10,000"...

For RNAV/GNSS equipped "CROSS 24 'MILES' FROM (waypoint, fix, significant point, NAVAID, etc.) AT 10,000"

Phraseology for reporting RAIM status:

"REPORT RAIM STATUS"

Different phraseology for reporting RAIM alerts:

... "RAIM OUTAGE"

... "RAIM FAILURE"

... "RAIM STATUS ANNUNCIATION"

... "RAIM FLAG"

... "RAIM NOT AVAILABLE"

... "RAIM HOLE"

... "RAIM WARNING"

... "RAIM ALERT"

Issuing clearance via arcs:

"CLEARED TO THE AIRPORT VIA 15 DME ARC... CLEARED VIA (number) MILE ARC – RNAV"

Requesting progress reports from aircraft on approach:

... "REPORT ESTABLISHED ON THE RNAV APPROACH COURSE"

Approach Clearances:

Clearances for RNAV_(GPS) approaches... "CLEARED TO THE (name) AIRPORT RNAV RWY 08 APPROACH"

Clearances for RNAV_(GNSS LNAV) approaches... "CLEARED TO THE (name) AIRPORT RNAV RWY 08 APPROACH"

Clearances for RNAV_(GNSS 3rd-VNAV) approaches... "CLEARED TO THE (name) AIRPORT RNAV RWY 08 APPROACH"

Clearances for RNAV_(GLS) approaches... "CLEARED TO THE (name) AIRPORT RNAV RWY 08 APPROACH"

Clearances via fixes of a GNSS approach:

... "CLEARED VIA INITIAL APPROACH FIX"

... "CLEARED VIA INTERMEDIATE FIX"

... "CLEARED TO THE FINAL APPROACH FIX"

Clearances for RNAV STARs/SIDs:

Clear an aircraft flying and RNAV STAR to fly direct to...

"CLEARED DIRECT (waypoint/fix) MAINTAIN (altitude) EXPECT VECTORS TO FINAL APPROACH"

GNSS Incident Report

For CAA Use Only

Occurrence No:						
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ORIGINATOR INFORMATION

Name:

Organisation:

Telephone:

Fax:

E-mail:

GNSS EQUIPMENT INSTALLATION

Aircraft registration:

GNSS Equipment Make/Model:

OCCURRENCE INFORMATION

Geographic location:

Altitude:

Latitude:

Longitude:

Date:

Time (UTC)

from:

to:

Satellite vehicle numbers, if known (please circle):

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

Total number of
satellites available

Flight rules

VFR

IFR

Phase of flight

En route (...)

Terminal (...)

Approach (...)

RAIM warning

Yes (...)

No (...)

Brief description of occurrence:

Corrective action (if any):

Assessment of effect on safety of flight or severity of problem:

Once completed please return this Form to:

Director, Air Navigation Services

Civil Aviation Authority (or ANS Service Provider)

Address.