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**AIP SUP**

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**Use of Global Positioning System (GPS) as  
Primary Means of IFR Navigation Aid in FIR PARAMARIBO**

**1. PURPOSE**

- 1.1 The purpose of this AIP Supplement (SUP) is to detail the procedures for the use of approved GPS installations as en-route IFR primary means navigation aid in Paramaribo FIR
- 1.2 A GPS system, fitted and operated in accordance with the provisions of this supplement may be used on FIR Paramaribo for the purpose of:
- a) position fixing;
  - b) long range navigation including operations on designated RNAV routes or RNAV areas;
  - c) deriving distance information, for en-route navigation, traffic information and ATC separation;
  - d) application of RNAV based separation.

**2. DEFINITIONS**

Sole Means Navigation System: A navigation system that, for a given phase of flight, must allow the aircraft to meet all four navigation system performance requirements – accuracy, integrity, availability and continuity of service.

Primary Means Navigation System: A navigation system that, for a given operation or phase of flight, must meet accuracy and integrity requirements, but need not meet full availability and continuity of service requirements. Safety is achieved by either limiting flights to specific time periods, or through appropriate procedural restrictions and operational requirements.

Supplement Means Navigation System: A navigation system that must be used in conjunction with a sole means navigation system.

Integrity: That quality which relates to the trust which can be placed in the correctness of information supplied by a system. It includes the ability of a system

to provide timely warnings to users when the system should not be used for navigation.

Receiver Autonomous Integrity Monitoring (RAIM): A technique whereby an airborne GPS receiver/processor autonomously monitors the integrity of the navigation signals from GPS satellites.

Note: System other than RAIM may be approved for providing integrity. Where reference to RAIM is made in this SUP, it includes any approved integrity monitoring systems.

### **3. GPS SIGNAL INTEGRITY**

- 3.1 System integrity is an essential element of the approval for use of GPS as a primary means navigation system. GPS receivers certified to US FAA TSO-C129 or equivalent provide integrity through the use of RAIM, or an approved equivalent integrity system. When RAIM is lost or not available, the accuracy of the system cannot be assumed to meet the required standard for navigation, or for the application of ATC separation standards. Therefore:
- 3.2 Except as provided in this SUP, GPS must not be used to fix position, provide distance information, or provide primary navigation, unless RAIM is available.

### **4. AIRWORTHINESS REQUIREMENTS**

- 4.1 Only GPS systems certified, and installations approved, by the State of Registry of the aircraft can be used.

### **5. PILOT TRAINING**

- 5.1 Prior to using GPS in FIR operations for any of the purpose specified in this SUP, the holder of an instrument rating must have completed a course of training as determined by the State of the Operator.
- 5.2 Normally, each course must have covered both general information and procedures applicable to all types of GPS equipment, as well as the essential operating procedures for a specific type of aircraft equipment.

### **6. OPERATIONAL REQUIREMENTS**

- 6.1 In addition to GPS, aircraft must be equipped with serviceable radio navigation systems as specified by the State of Registry or the State of the Operator for the airspace or routes concerned.

- 6.2 Operating instructions for GPS navigation equipment must be incorporated into the Company Operations Manual for commercial operations.
- 6.3 GPS navigation equipment must be operated in accordance with the operating instructions, and any additional requirements specified in the approved aircraft flight manual or flight manual supplement.
- 6.4 When within rated coverage of ground based navigation aids, pilots must monitor the ground based system, and maintain track as defined by the most accurate ground based radio navigation aid (VOR or NDB) available. If there is a discrepancy between the GPS and ground based system information, pilots must use the information provided by the ground based navigation system.
- 6.5 ATC may require GPS equipped aircraft to establish on, and track with reference to, a particular VOR radial or NDB track for the application of separation.
- 6.6 GPS must not be used as a navigation reference for flight below the Minimum Safe Altitude (MSA).

## **7 . OPERATIONS WITHOUT RAIM**

7.1. GPS systems normally provide three modes of operation:

- a) Navigation (Nav) Solution with RAIM;
- b) 2D or 3D Nav Solution without RAIM; and
- c) Dead Reckoning(DR), or Loss of Nav Solution.

7.2. ATS, and in particular ATC separation standards, are dependant on accurate navigation and position fixing. If RAIM is lost, the accuracy of the system is assumed not to meet the required standard for both navigation and application of ATC separation. Accordingly, when RAIM is lost, the following procedures must be adopted:

- a) Aircraft tracking must be closely monitored against other onboard systems.
- b) When the aircraft carries no other means of RNAV navigation, ATC must be advised if:
  - i. RAIM is lost for periods greater than ten minutes, even if GPS is still providing positional information; OR
  - ii. RAIM is not available when ATC request GPS distance, or if an ATC clearance or requirements based on GPS distance is imposed; or

- iii. The GPS receiver is in DR mode, or experiences loss of navigation function, for more than one minute; or
- iv. Indicated displacement from track centerline is found to exceed 2 NM. ATC may then adjust separation.

- b) If valid position information is lost (2D and DR Mode), or non RAIM operation exceeds ten minutes, the GPS information is to be considered unreliable, and another means of navigation should be used until RAIM is restored and the aircraft is re-established on track.
- c) Following re-establishment of RAIM, the appropriate ATS unit should be notified of RAIM restoration, prior to using GPS information. This will allow ATC to reassess the appropriate separation standards.
- d) When advising ATS of the status of GPS the phrases “RAIM FAILURE” or “RAIM RESTORED” must be used.

## **8. GPS DISTANCE INFORMATION TO ATS UNITS**

- 8.1. When a DME distance is requested by an ATS unit, DME derived distance information should normally be provided. Alternatively, GPS derived distance information may be provided to an ATS unit, unless RAIM is currently unavailable, and has been unavailable for the preceding ten minutes.
- 8.2. Notwithstanding para 8.1, if an ATC unit has issued a clearance or requirement based upon GPS distance (e.g. a requirement to reach a certain level by a GPS distance), pilots must inform ATC if RAIM is not available.
- 8.3. When a DME distance is not specifically requested, or when the provision of a DME distance is not possible, distance information based on GPS derived information may be provided. When providing GPS distance, transmission of distance information must include the source and point of reference- e.g. 250 NM GPS REC VOR, 80 NM GPS SAL NDB, 60 NM GPS RAKUD etc.
- 8.4. If a GPS distance is provided to an ATC unit, and RAIM is not currently available, but has been available in the preceding 10 minutes, the distance report should be suffixed ‘NEGATIVE RAIM’ e.g. 225 NM GPS TFN VOR, NEGATIVE RAIM.
- 8.5. Databases sometimes contain waypoint information which is not shown on published AIP charts and maps. Distance information must only be provided in relation to published way-points unless specifically requested by an ATS unit.

- 8.6. Where GPS distance is requested or provided from an NDB, VOR, DME, or published waypoint, the latitude and longitude of the navigation aid or waypoint must be derived from a validated database which cannot be modified by the operator or crew (refer par.9.).

## 9. DATA INTEGRITY

- 9.1. As a significant number of data errors, in general applications, occurs as a result of manual data entry errors, navigation aid and waypoint latitude and longitude data should be derived from a data base, if available, which cannot be modified by the operator or crew:
- 9.2. When data is entered manually, data entries must be cross-checked by at least two crew members for accuracy and reasonableness, or, for single pilot operations, an independent check (e.g. GPS computed tracks and distances against current chart date) must be made.
- 9.3. Both manually entered and database derived position and tracking information should be checked for reasonableness (confidence check) in the following cases:
  - a) prior to each compulsory reporting point;
  - b) at or prior to arrival at each en-route waypoint;
  - c) at hourly intervals during area type operations when operating off established routes; and
  - d) after insertion of new data –e.g. creation of new flight plan.

## 10. FLIGHT PLAN NOTIFICATION

Pilots of aircraft equipped with GPS systems, that comply with the requirements of this SUP, should insert “Z” in ICAO Flight Plan under item 10, and insert NAV/GPSRNAV under item 18.