



DESIGNS . OPERATIONS . REQUIREMENTS . STRATEGIES

"Satellite Navigation Solutions"

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## **INAC Directive for implementation of RNP LNAV/VNAV (GPS) approach and departure procedures**

### **Background:**

Venezuela has just completed a very extensive project to design GPS Approach and Departure procedures at 33 airports in Venezuela. We have ensured that all aircraft in Venezuela that want to use these procedures can easily use them by dividing them into RNP 0.3 procedures and LNAV/VNAV. The RNP 0.3 procedures are primarily for business aircraft and Transport category aircraft. The LNAV/VNAV procedures are designed for the GA aircraft. At many airports the minimums are the same for both of these procedures. At all of the airports we have achieved minimums that ensure descent to below minimums any time of the year. Many times minimums of 300ft have been achieved. This ensures aircraft will be able to land safely in almost all weather encountered in Venezuela.

### **The more important parts of this effort were;**

- Complete Airport Obstacle Data Base Surveys using WGS-84 as the basis. These surveys were validated by NGA and Simon Bolivar Institute to ensure quality.
- We then conducted on site surveys of each airport to ensure we understood the weather and operational issues at each airport.
- The final effort was to fly each of the procedures with a FAA Flight Inspection pilot to ensure he thought that these procedures met all requirements.

### **Implementation:**

The Venezuelan AIP now has these procedures published for use in Venezuela. To insure that every pilot and aircraft that wants to use these safely can easily understand the equipment and training necessary to start using these we are providing the steps necessary to accomplish this.

### **Summary of aircraft equipment requirements:**

#### **GA aircraft requirements:**

- Present documentation of TSO 129/145 GPS equipment in your aircraft by tail number
- Show that the manufactures suggested training plan has been completed by pilots you have designated

Note: It is recommended that your pilots first complete a day VFR procedure of each airport you intend to use.

### Business aircraft and Transport Category aircraft:

- Present documentation that your aircraft has an approved RNP 0.3 system in the aircraft. This will usually consist of an MMR and an FMS. This installation will usually have a STC assigned if this capability was not installed when the aircraft was manufactured.
- Show your training plan incorporating the manufactures suggested plan. We will work with you if you have special needs.
- Use a simulator or actual flight in VFR conditions to ensure that each pilot has conducted a GPS flight of the airports you want to be certified to use in Venezuela.
- An actual approach or a simulator flight should be conducted every year by each pilot to ensure currency.

The purpose of this document is to provide guidance material for aircraft operators to conduct Required Navigation Performance (RNP) instrument approach procedures in Venezuelan airspace.

## DEFINITIONS

- **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.
- **Estimate of Position Uncertainty (EPU).** A measure based on a defined scale in nautical miles, which conveys the current position estimation performance, also known as Actual Navigation Performance (ANP) and Estimate of Position Error (EPE) in certain aircraft. The EPU is not an estimate of the actual error, but a defined statistical indication.
- **Flight Management System (FMS).** An integrated system, consisting of airborne sensor, receiver and computer with both navigation and aircraft performance databases, which provides performance and RNAV guidance to a display and automatic flight control system.
- **Global Positioning System (GPS).** GPS is a U.S. satellite based radio navigation system that provides a positioning service anywhere in the world. The service provided by GPS for civil use is defined in the GPS Standard Positioning System Signal Specification.
- **Global Navigation Satellite System (GNSS).** GNSS is a generic term for satellite-based navigation, including GPS, Satellite Based Augmentation Systems (SBAS) such as the Wide Area Augmentation System (WAAS), Ground-Based Augmentation System (GBAS) such as the Local Area Augmentation System (LAAS), Global Orbiting Navigation Satellite System (GLONASS) and any other satellite navigation system.
- **Receiver Autonomous Integrity Monitoring (RAIM).** An algorithm that verifies the integrity of the position output using GPS measurements, or GPS measurements and barometric aiding.
- **Required Navigation Performance (RNP).** Required Navigation Performance is a statement of the navigation performance necessary for operation within a defined airspace.
- **RNP Value.** The RNP value designates the lateral performance requirement associated with a procedure. Examples of RNP values are: RNP 0.3 and RNP 0.15.

## PREFLIGHT CONSIDERATIONS

**A. Minimum Equipment List.** Operators minimum equipment list should be developed /revised to address the equipment requirements for RNP instrument approaches. Guidance for these equipment requirements is available from the aircraft manufacturer. The required equipment may depend on the intended RNP value and whether or not the missed approach requires RNP less than 1.0. For example, GNSS and autopilot are typically required for small RNP values. Dual equipment is typically required for approaches when using a line of minima less than RNP 0.3 and/or where the missed approach has an RNP less than 1.0. The flight crew must be cognizant of the required equipment.

**B. Dispatch RNP Assessment.** The operator must have a predictive performance capability, which can forecast whether or not the specified RNP will be available at the time and location of a desired RNP operation. This capability can be a ground service and need not be resident in the aircraft's avionics equipment. The operator must establish procedures requiring use of this capability as both a preflight dispatch tool and as a flight-following tool in the event of reported failures. The RNP assessment must consider the specific combination of the aircraft capability (sensors and integration).

(1) RNP assessment when GNSS updating. This predictive capability must account for known and predicted outages of GNSS satellites or other impacts on the navigation system's sensors. The prediction program should not use a mask angle below 5 degrees, as operational experience indicates that satellite signals at low elevations are not reliable. The prediction must use the actual GPS constellation with the (RAIM) (or equivalent) algorithm identical to that used in the actual equipment. For RNP approaches with high terrain, use a mask angle appropriate to the terrain.

(2) Initially, RNP procedures require GNSS updating. Therefore, there is no RNP assessment associated with DME/DME or VOR/DME updating of the aircraft's RNAV system.

**C. NAVAID Exclusion.** The operator must establish procedures to exclude NAVAID facilities in accordance with NOTAMs (e.g., DMEs, VORs, localizers). Internal avionics reasonableness checks may not be adequate for RNP operations.

**d. Navigation Database Currency.** During system initialization, pilots of aircraft equipped with an RNAV-certified system, must confirm that the navigation database is current. Navigation databases are expected to be current for the duration of the flight. If the database cycle will change during flight, operators and pilots must establish procedures to ensure the accuracy

## IN-FLIGHT CONSIDERATIONS

**A. Modification of Flight Plan.** Pilots are not authorized to fly a published RNP procedure unless it is retrievable by the procedure name from the aircraft navigation database and conforms to the charted procedure. The lateral path must not be modified; with the exception of accepting a clearance to go direct to a fix in the approach procedure that is before the FAF and that does not immediately precede an RF leg. The only other modification to the loaded procedure is to change altitude and/or airspeed waypoint constraints on the initial, intermediate, or missed approach segments (e.g., to apply cold temperature corrections or comply with an ATC clearance/instruction).

**B. Required List of Equipment.** The flight crew must have a required list of equipment for conducting RNP approaches or alternate methods to address in flight equipment failures that would prohibit RNP approaches (e.g. quick reference handbook).

**C. RNP Management.** The flight crew's operating procedures must ensure the navigation system uses the appropriate RNP values throughout the approach. If multiple lines of minima associated with different RNP values are shown on the approach chart, the crew must confirm that the desired RNP value is entered in the RNAV system. If the navigation system does not extract and set the RNP value from the on-board navigation database for each leg of the procedure, then the flight crew's operating procedures must ensure that the smallest RNP value required to complete the approach or the missed approach is selected before initiating the approach (e.g., before the initial approach fix (IAF)). Different IAF's may have different RNP values, which are annotated on the approach chart.

**D. GNSS Updating.** Initially all RNP instrument procedures require GNSS updating of the navigation position solution. The flight crew must verify GNSS updating is available prior to commencing the RNP approach. During the approach, if at any time GNSS updating is lost and the navigation system does not have the performance to continue the approach, the flight crew must abandon the RNP approach unless visual conditions exist between the aircraft and the runway of intended landing.

**E. Radio Updating.** Initiation of all RNP procedures is based on GNSS updating. Except where specifically designated on a procedure as Not Authorized, DME/DME updating can be used as a reversionary mode during the approach or missed approach when the system complies with the RNP value. VOR updating is not authorized at this time. The flight crew must comply with the operator's procedures for inhibiting specific facilities.

**F. Approach Procedure Confirmation.** The flight crew must confirm that the correct procedure has been selected. This process includes confirmation of the waypoint sequence, reasonableness of track angles and distances, and any other parameters that can be altered by the pilot, such as altitude or speed constraints. A procedure must not be used if validity of the navigation database is in doubt. A navigation system textual display or navigation map display must be used.

**G. Track Deviation Monitoring.** Operational qualification for RNP procedures requires flight crew monitoring of lateral and vertical cross-track deviations on the pilot's primary flight display (PFD) to ensure the aircraft remains within the bounds defined by the procedure. The deviation must be monitored, and action taken to minimize errors. The flight crew must initiate a go-around if either a lateral or vertical deviation is too large unless visual conditions exist between the aircraft and the runway of intended landing. The deviation limits must not exceed 1xRNP laterally and 75 feet vertically.

(1) Some aircraft navigation displays do not incorporate lateral and vertical deviations scaled for each RNP operation in the primary optimum field of view. Where a moving map, low-resolution vertical deviation indicator (VDI), or numeric display of deviations are to be used, flight crew training and procedures must ensure the effectiveness of these displays. Typically, this involves demonstration of the procedure with a number of trained crews and inclusion of this monitoring procedure in the recurrent RNP training program.

(2) For installations that use a CDI for lateral path tracking, the aircraft flight manual (AFM) or aircraft qualification guidance should state which RNP values and operations the aircraft supports and the operational effects on the CDI scale. The flight crew must know the CDI full-scale deflection

value. The avionics may automatically set the CDI scale (dependent on phase of flight) or the flight crew may manually set the scale. If the flight crew manually selects the CDI scale, the operator must have procedures and training in place to assure the selected CDI scale is appropriate for the intended RNP operation. The deviation limit must be readily apparent given the scale (e.g., full-scale deflection).

**H. Altimeter Setting.** Due to the reduced obstruction clearance inherent in RNP instrument procedures, the flight crew must verify the most current airport altimeter is set prior to the final approach fix (FAF) but no earlier than the IAF. Execution of an RNP instrument procedure requires the current altimeter setting for the airport of intended landing. **Remote altimeter settings are not allowed.**

**I. Altimeter Crosscheck.** The flight crew must complete an altimetry crosscheck ensuring both pilots' altimeters agree within  $\pm 75$  feet prior to the final approach fix (FAF) but no earlier than the IAF. If the altimetry crosscheck fails then the procedure must not be continued. If the avionics systems provide a comparator warning system for the pilots' altimeters, the flight crew procedures should also address actions to take if a comparator warning for the pilots' altimeters occurs while conducting an RNP procedure.

**J. Non-Standard Climb Gradient.** When the operator plans to use the DA associated with a non-standard missed approach climb gradient, he must ensure the aircraft will be able to comply with the published climb gradient for the planned aircraft loading, atmospheric conditions and operating procedures before conducting the operation. Where operators have performance personnel that determine if their aircraft can comply with published climb gradients, information should be provided to the pilots indicating the climb gradient they can expect to achieve.

#### **K. Go-Around or Missed Approach.**

**(1) Missed approach procedures that require RNP 1.0.** Where possible, the missed approach will require RNP 1.0. The missed approach portion of these procedures is similar to a missed approach of an RNAV (GPS) approach.

**(2)** In many aircraft when executing a go-around or missed approach activating Take-off/Go-around (TOGA) may cause a change in lateral navigation. In many aircraft, activating TOGA disengages the autopilot and flight director from LNAV guidance, and the flight director reverts to track-hold derived from the inertial system. LNAV guidance to the autopilot and flight director should be re-engaged as quickly as possible.

**(3)** The flight crew procedures and training must address the impact on navigation capability and flight guidance if the pilot initiates a go-around while the aircraft is in a turn.

**(4)** Upon loss of GNSS updates, the RNAV guidance may begin to "coast" on IRU, if installed, and drift, degrading the navigation position solution. Thus, when the RNP missed approach operations rely on IRU "coasting" the inertial guidance can only provide RNP guidance for a specified amount of time.

#### **L. Contingency Procedures.**

**(1) Failure while En Route.** The aircraft RNP capability is dependent on operational aircraft equipment and GNSS satellites. The flight crew must be able to assess the impact of equipment

failure on the anticipated RNP approach and take appropriate action. The flight crew also must be able to assess the impact of changes in the GNSS constellation and take appropriate action.

**(2) Failure on Approach.** The operator's contingency procedures need to address at least the following conditions:

- Failure of the RNP system components, including those affecting lateral and vertical deviation performance (e.g., failures of a GPS sensor, the flight director or automatic pilot)
- Loss of navigation signal-in-space (loss or degradation of external signal)

## TRAINING

**INTRODUCTION.** The operator must provide training for key personnel (e.g., flight crewmembers and dispatchers) in the use and application of RNP approach procedures. A thorough understanding of the operational procedures and best practices is critical to the safe operation of aircraft during RNP operations. This program must provide sufficient detail on the aircraft's navigation and flight control systems to enable the pilots to identify failures affecting the aircraft's RNP capability and the appropriate abnormal/emergency procedures. Required training must include both knowledge and skill assessments of the crewmembers and dispatchers duties.

### A. Flight Crew Training.

**(1)** Each operator is responsible for the training of flight crews for the specific RNP operations exercised by the operator. The operator must include training on the different types of RNP procedures and required equipment. Training must include discussion of RNP regulatory requirements. The operator must include these requirements and procedures in their flight operations and training manuals (as applicable). This material must cover all aspects of the operator's RNP operations including the applicable authorization (Ops Specs, MSpecs or LOA). An individual must have completed the appropriate ground and or flight training segment before engaging in RNP operations.

**(2)** Flight training segment's must include training and checking modules representative of the type of RNP operations the operator conducts during line flying activities. Many operators may train for RNP procedures under the established training standards and provisions for Advanced Qualification Programs (AQP). They may conduct evaluations in Line Oriented Flight Training (LOFT) scenarios, Selected Event Training (SET) scenarios or in a combination of both. The operator may conduct required flight-training modules in Flight Training Devices, Aircraft Simulators, and other enhanced training devices as long as these training mediums accurately replicate the operator's equipment and RNP approach operations.

### B. Flight Crew Qualification Training

**(1)** Operators must address initial RNP training and qualifications during initial, transition, upgrade, recurrent, differences, or stand-alone training and qualification programs in a respective qualification category. The qualification standards must assess each pilot's ability to properly understand and use RNP approach procedures. The operator must also develop recurrent qualification standards to ensure their flight crews maintain appropriate RNP knowledge and skills.

(2) Operators may address RNP operation topics separately or integrate them with other curriculum elements. For example, an RNP flight crew qualification may key on a specific aircraft during transition, upgrade, or differences courses. General training may also address RNP qualification (e.g., during recurrent training or checking events such as recurrent proficiency check/proficiency training (PC/PT), line oriented evaluation (LOE) or special purpose operational training (SPOT)). A separate, independent RNP qualification program may also address RNP training (e.g., by completion of a special RNP curriculum at an operator's training center or at designated crew bases).

**C. Flight Dispatcher Training.** Training for flight dispatchers must include: training on the different types of RNP procedures, the importance of specific navigation equipment and other equipment during RNP approach operations and discuss RNP regulatory requirements and procedures. Dispatcher procedure and training manual's must include these requirements (as applicable). This material must cover all aspects of the operator's RNP operations including the applicable authorization (Ops Specs, MSpecs or LOA). An individual must have completed the appropriate training course before engaging in RNP operations. Additionally, the dispatchers' training must address how to determine: RNP availability (considering aircraft equipment capabilities), MEL requirements, aircraft performance, and navigation signal availability (e.g., GPS RAIM/predictive RNP capability tool) for destination and alternate airports.

**2. GROUND TRAINING SEGMENTS.** Ground training segments must address the following subjects as training modules in approved RNP academic training during the initial introduction of a crewmember to RNP systems and operations. For recurrent programs, the curriculum need only review initial curriculum requirements and address new, revised, or emphasized items.

**A. General Concepts of RNP Operation.** RNP academic training must cover RNP systems theory to the extent appropriate to ensure proper operational use. Flight crews must understand basic concepts of RNP systems operation, classifications, and limitations. The training must include general knowledge and operational application of RNP instrument approach procedures. This training module must address the following specific elements:

- (1) Definitions of RNAV, RNAV (GPS), RNP, RNP SAAAR, RAIM, and containment areas.
- (2) The differences between RNAV and RNP.
- (3) The types of RNP approach procedures and familiarity with the charting of these procedures.
- (4) The programming and display of RNP and aircraft specific displays (e.g., Actual Navigation Performance).
- (5) How to enable and disable the navigation updating modes related to RNP.
- (6) RNP values appropriate for different phases of flight and RNP instrument procedures and how to select (if required).
- (7) The use of GPS RAIM (or equivalent) forecasts and the effects of RAIM "holes" on RNP procedures (flight crew and dispatchers).

- (8) When and how to terminate RNP navigation and transfer to traditional navigation due to loss of RNP and/or required equipment.
- (9) How to determine if the FMC database is current, contains required navigational data for use of GPS waypoints.
- (10) Explanation of the different components that contribute to the total system error and their characteristics (e.g., effect of temperature on baro-VNAV, drift characteristics when using IRU with no radio updating).
- (11) Temperature Compensation. Flight crews operating avionics systems with compensation for altimetry errors introduced by deviations from ISA may disregard the temperature limits on RNP procedures, if pilot training on use of the temperature compensation function is provided by the operator and the compensation function is utilized by the crew. However the training must also recognize the temperature compensation by the system is applicable to the VNAV guidance and is not a substitute for the flight crew compensating for the cold temperature effects on minimum altitudes or the decision altitude.

**B. ATC Communication and Coordination for Use of RNP.** Ground training must instruct the flight crews on proper flight plan classifications and any Air Traffic Control (ATC) procedures applicable to RNP operations. The flight crews must receive instruction on the need to advise ATC immediately when the performance of the aircraft's navigation system is no longer suitable to support continuation of an RNP procedure. Flight crews must also know what navigation sensors form the basis for their RNP compliance, and they must be able to assess the impact of failure of any avionics or a known loss of ground systems on the remainder of the flight plan.

**C. RNP Equipment Components, Controls, Displays, and Alerts.** Academic training must include discussion of RNP terminology, symbology, operation, optional controls, and display features including any items unique to an operator's implementation or systems. The training must address applicable failure alerts and limitations. The flight crews and dispatchers should achieve a thorough understanding of the equipment used in RNP operations and any limitations on the use of the equipment during those operations.

**D. AFM Information and Operating Procedures.** The AFM or other aircraft eligibility evidence must address normal and abnormal flight crew operating procedures, responses to failure alerts, and any limitations, including related information on RNP modes of operation. Training must also address contingency procedures for loss or degradation of RNP capability. The flight operations manuals approved for use by the flight crews (e.g., Flight Operations Manual (FOM) or Pilot Operating Handbook (POH)) should contain this information.

**E. MEL Operating Provisions.** Flight crews must have a thorough understanding of the MEL requirements supporting RNP operations.

**3. FLIGHT TRAINING SEGMENTS.** In addition to the academic training, the flight crews must receive appropriate operational use training. Training programs must cover the proper execution of RNP procedures in concert with the OEM's documentation. The operational training must include RNP procedures and limitations; standardization of the set-up of the cockpit's electronic displays during an RNP procedure; recognition of the aural advisories, alerts and other annunciations that can impact compliance with an RNP procedure; and the timely and correct responses to loss of RNP

capability in a variety of scenarios embracing the breadth of the RNP procedures the operator plans to complete. Such training may also use approved flight training devices or simulators. This training must address the following specific elements:

**a.** Procedures for verifying that each pilot's altimeter has the current setting before beginning the final approach of an RNP procedure, including any operational limitations associated with the source(s) for the altimeter setting and the latency of checking and setting the altimeters approaching the FAF.

**b.** Use of aircraft TAWS, GPWS, or other avionics systems to support the flight crew's track monitoring and weather and obstacle avoidance.

**c.** The effect of wind on aircraft performance during RNP procedures and the need to positively remain within RNP containment area, including any operational wind limitation and aircraft configuration essential to safely complete an RNP procedure.

**d.** The effect of groundspeed on compliance with RNP procedures and bank angle restrictions that may impact the ability to remain on the course centerline. For RNP procedures aircraft are expected to maintain the standard speeds associated with applicable category.

**e.** Relationship between RNP and the appropriate approach minima line on an approved published RNP procedure and any operational limitations if the available RNP degrades or is not available prior to an approach (this should include flight crew procedures outside the FAF versus inside the FAF).

**f.** Concise and complete flight crew briefings for all RNP procedures and the important role Cockpit Resource Management (CRM) plays in successfully completing an RNP procedure.

**g.** Understanding alerts that may occur from the loading and use of improper RNP values for a desired segment of an RNP procedure.

**h.** Understanding the performance requirement to couple the autopilot/flight director to the navigation system's lateral guidance on RNP procedures.

**i.** The importance of aircraft configuration to ensure the aircraft maintains any required speeds during RNP procedures.

**j.** The events that trigger a missed approach when using the aircraft's RNP capability to complete an RNP procedure.

**k.** Any bank angle restrictions or limitations on RNP procedures.

**l.** The potentially detrimental effect of reducing the flap setting, reducing the bank angle or increasing airspeeds may have on the ability to comply with an RNP procedure.

**m.** Develop flight crew knowledge and skills necessary to properly conduct RNP operations (RNP Procedure Training).

**n.** Ensure flight crews understand and are capable of programming and operating the FMC, autopilot, autothrottles, RADAR, GPS, INS, EFIS (including the moving map), and TAWS in support of RNP procedures.

- o.** Handling of TOGA while in a turn,
- p.** Monitoring of FTE and related go-around operation,
- q.** Handling of loss of GPS during a procedure,
- r.** Ensuring flight crews understand the performance issues associated with reversion to radio updating, know any limitations on the use of DME and VOR updating.
- s.** Flight crew contingency procedures for a loss of RNP capability during a missed approach. Due to the lack of navigation guidance, the training should emphasize the flight crew contingency actions that achieve separation from terrain and obstacles. The operator should tailor these contingency procedures to their specific, approved procedures.
- t.** As a minimum, each pilot must complete two RNP approach procedures that employ the unique characteristics of the operator's approved procedures (i.e., RF legs, RNP missed). One procedure must culminate in a transition to landing and one procedure must culminate in execution of an RNP missed approach procedure.

#### **4. EVALUATION MODULE.**

**A. Initial Evaluation of RNP Knowledge and Procedures.** The operator must evaluate each individual flight crewmember on their knowledge of RNP procedures prior to employing RNP procedures. As a minimum, the review must include a thorough evaluation of pilot procedures and specific aircraft performance requirements for RNP operations. An acceptable means for this initial assessment includes one of the following:

- (1)** An evaluation by an authorized instructor evaluator or check airman using an approved simulator or training device.
- (2)** An evaluation by an authorized instructor evaluator or check airman during line operations, training flights, PC/PT events, operating experience, route checks, and/or line checks.
- (3)** Line Oriented Flight Training (LOFT)/Line Oriented Evaluation (LOE). LOFT/LOE programs using an approved simulator that incorporates RNP operations that employ the unique characteristics of the operator's approved procedures (as appropriate).

#### **B. Specific elements that must be addressed in this evaluation module are:**

- (1)** Demonstrate the use of any RNP limits/minimums that may impact various approaches.
- (2)** Demonstrate the application of radio-updating procedures, such as enabling and disabling ground-based radio updating of the FMC (i.e., DME/DME and VOR/DME updating) and knowledge of when to use this feature. If the aircraft's avionics do not include the capability to disable radio updating, then the training must ensure the flight crew is able to accomplish the operational actions that mitigate the lack of this feature.
- (3)** Demonstrate the ability to monitor the actual lateral and vertical flight paths relative to programmed flight path and complete the appropriate flight crew procedures when exceeding a lateral or vertical FTE limit.

**(4)** Demonstrate the ability to read and adapt to a RAIM (or equivalent) forecast including forecasts predicting a lack of RAIM availability.

**(5)** Demonstrate the proper setup of the FMC, the weather RADAR, TAWS, and moving map for the various RNP operations and scenarios the operator plans to implement (as appropriate).

**(6)** Demonstrate the use of flight crew briefings and checklists for RNP operations with emphasis on CRM.

**(7)** Demonstrate knowledge of and ability to perform an RNP missed approach procedure in a variety of operational scenarios (i.e., loss of navigation or failure to acquire visual conditions).

**(8)** Demonstrate speed control during segments requiring speed restrictions to ensure compliance with an RNP procedure.

**(9)** Demonstrate competent use of RNP approach plates, briefing cards, and checklists.

**(10)** Demonstrate the ability to complete a stable RNP approach: bank angle, speed control, and remaining on the procedure's centerline.

**(11)** Know the operational limit for deviation below the desired flight path on an RNP approach and how to accurately monitor the aircraft's position relative to vertical flight path.

## **5. RECURRENT TRAINING OF RNP KNOWLEDGE AND PROCEDURES.**

**A.** RNP Recurrent Training. The operator should incorporate recurrent RNP training that employs the unique characteristics of the operator's approved procedures as part of the overall program.

**B.** A minimum of two RNP approaches must be flown by each pilot for each duty position (pilot flying and pilot monitoring), with one culminating in a landing and one culminating in a missed approach, and may be substituted for any required "precision-like" approach.

## RNP MONITORING PROGRAM

1. The operator must have an RNP monitoring program to ensure continued compliance and to identify any negative trends in performance. At a minimum, this program must address the following information. During the interim approval, the operator must submit the following information every 30 days. Thereafter, the operator must continue to collect and periodically review this data to identify potential safety concerns, and maintain summaries of this data.

- A. Total number of RNP procedures conducted.
- B. Number of satisfactory approaches by aircraft/system (Satisfactory if completed as planned without any navigation or guidance system anomalies).
- C. Reasons for unsatisfactory approaches, such as:
  - 1) UNABLE REQ NAV PERF, NAV ACCUR DOWNGRAD, or other RNP messages during approaches.
  - 2) Excessive lateral or vertical deviation.
  - 3) TAWS warning.
  - 4) Autopilot system disconnect.
  - 5) Nav data errors.
  - 6) Pilot report of any anomaly.
- D. Crew comments: