1. Objective

1.1. This directive contains guidance for approval of special navigation areas and systems.

1.2. This is a common directive for Airworthiness and Operation

1.2.1. Close coordination between AW and OPS inspectors executing this directive is required.

1.2.2. The OI will be the lead inspector in executing this directive.

1.2.3. Any amendments to this directive must be made to both AW Inspector Handbook and OPS Inspector Handbook

1.3.

2. General

2.1. Special areas of operation are geographic areas having unique characteristics that require the use of special equipment, procedures, and/or techniques to safely conduct flight operations. These special areas also include operational situations when the application of standard criteria is not sufficient and other than standard criteria are more appropriate and can be safely used. This section provides direction and guidance for the evaluation and approval or denial of an operator's request to conduct operations in these special areas of operation. Special areas of operation include the following:

- Areas requiring high levels of performance due to a reduction in separation standards;
- Areas where navigation by magnetic reference is unreliable and/or inappropriate;
- Areas where metric altitudes/flight levels (FL) are used (altitudes in meters);
- Areas where communication difficulties are frequently encountered;
- Areas where air traffic control (ATC) difficulties are frequently encountered;
- Areas where operations by ISRAELI operators have political or international sensitivity;
- Areas where aircraft with unique performance characteristics require special criteria; and
- Areas where dual long-range navigation systems (LRNS) are not normally required.

2.2. **AREAS REQUIRING HIGH LEVELS OF PERFORMANCE.**

In special areas of operation, the ATC system supports a reduction in separation standards. This reduction in separation standards requires improved levels of performance. Significant increases in air traffic over certain busy routes, such as U.S. National Air Space (NAS), European Domestic Airspace, and the North Atlantic, can be accommodated efficiently if the ATC separation minimums are reduced to permit more aircraft to operate in the same airspace, at the same time. However, this reduction in separation minimums can only be safely accomplished through significant improvements in ATC capabilities and the performance of all aircraft operating within that segment of airspace. The options currently available to permit reductions in ATC separation minimums include the use of the following:

- Independent surveillance (ATC radar),
- Automatic Dependent Surveillance (ADS) (data link of the aircraft's present position to the ATC system),
- Improved traffic flows through the use of time-based metering,
- Reduced lateral separation minimums,
- Reduced vertical separation minimums,
- Reduced longitudinal separation minimums, and
- Communication.

3. Reference Material, Forms & Job-Aids

3.1. Reference Material

3.1.1. AW/OPS 1.1.056

3.1.2. AW/OPS 1.1.058-59

3.1.3. AP 1.1.057

3.1.4. FAA Advisory Circular (AC) 91-70,

3.1.5. North Atlantic MNPS Airspace Manual, latest edition (available from the North Atlantic (NAT) Programme Coordination Office (PCO) Web site: http://www.nat-pco.org/.

3.1.6. Aeronautical Information Service (AIS) of NAT Air Traffic Service (ATS) Provider States.

3.1.7. International Civil Aviation Organization (ICAO) Consolidated Guidance and Information Material concerning Air Navigation in the North Atlantic Region (NAT

Doc. 001), published by the European and North Atlantic Office of ICAO.

3.1.8. ICAO Regional Supplementary Procedures (Doc. 7030)—NAT/RAC.

3.1.9. FAA AC 120-33.

4. Process

4.1. NORTH ATLANTIC MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS AIRSPACE (NAT/MNPS).

4.1.1. General.

The NAT/MNPS, as implemented in the North Atlantic Region, is a demanding standard. Safety of flight in this airspace is critically dependent on each operator achieving and continuously maintaining a high level of navigation accuracy. The references are IANR.OPS. and FAA Advisory Circular (AC) 91-70, Oceanic Operations, current edition. IANR.OPS. 34 requires each Israeli operator to acquire CAAI approval before conducting any operation in minimum navigation performance specification (MNPS) airspace. The operator must obtain this approval for each airplane and navigation/system combination used for operations in this airspace. To obtain MNPS approval, the operator must show compliance with the following conditions:

- Each aircraft is suitably equipped and capable of meeting the MNPS standards.
- The operator has established operating procedures that ensure MNPS standards are met.
- The flightcrews are trained and capable of operating to MNPS requirements.

4.1.2. Navigational Performance.

The NAT/MNPS represents navigational performance (necessary to reduce the risk of collision) on an internationally established level. (See Figure 1) While the NAT/MNPS airspace currently does not have a published Required Navigation Performance (RNP) value, it is anticipated that in the future an RNP requirement will be implemented. The NAT/MNPS predates the implementation of RNP, but is consistent with RNP principles. The MNPS establishes the following demanding criteria:

4.1.2.1 The average lateral deviation (for any cause) cannot be greater than 6.3 nautical miles (NM) from the centerline of the assigned route over any portion of the route.

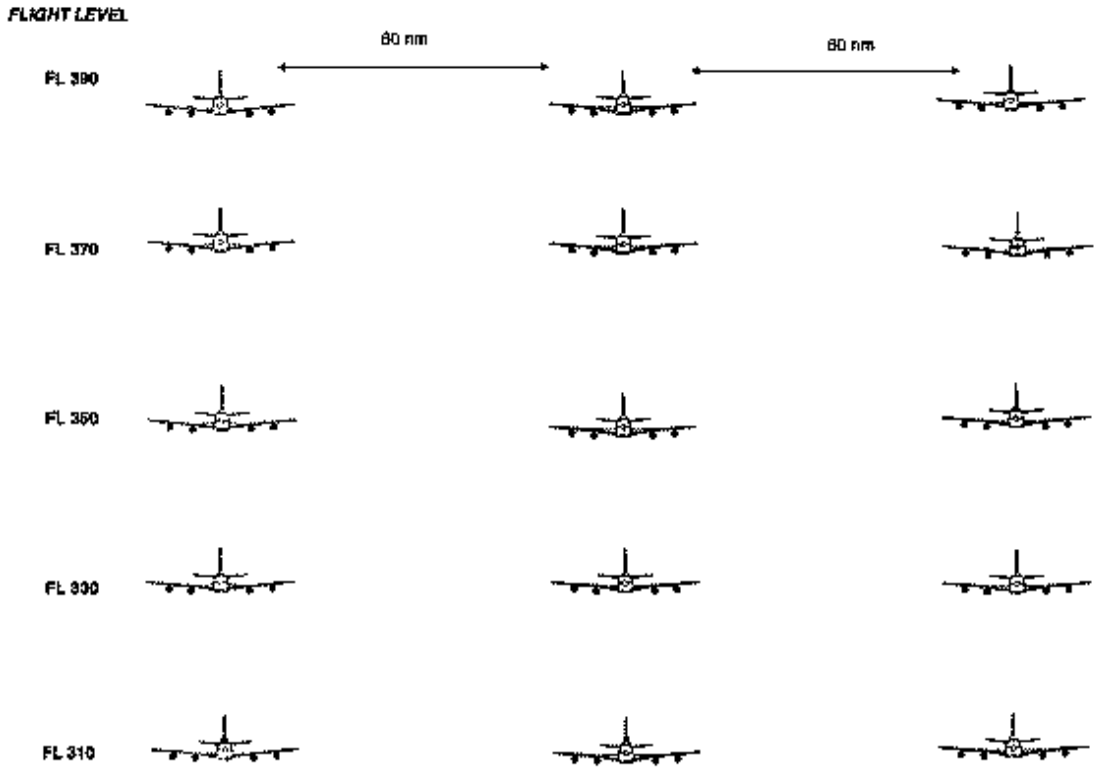
4.1.2.2 Ninety-five percent of all of the lateral displacements (for any cause) from the centerline of the assigned route cannot be greater than 12.6 NM for all flights over any portion of that route.

4.1.2.3 Each operator cannot have more than one lateral deviation (for any cause) of 30 NM or more in 1,887 flights in the NAT/MNPS airspace. When errors of these magnitudes occur, the aircraft has failed to navigate to the degree of accuracy required for the control of air traffic.

4.1.2.4 Each operator cannot have more than one lateral deviation (for any cause) which is within ±10 NM of a multiple of the separation minimums applied in 7,693 flights in the NAT/MNPS airspace. NAT/MNPS airspace routes are separated by 60 NM. If an error of 50-70 NM occurs, the aircraft has blundered into the airspace of an adjacent route. Errors of these magnitudes are extremely serious. The potential for a collision is high because the resulting flight path can overlap the flight path assigned to another aircraft (possibly coming from the opposite direction).

NOTE: Operational history in NAT/MNPS airspace clearly shows that most serious navigational errors are directly related to operator/pilot error. Equipment malfunction and equipment accuracy are usually not the primary cause for these errors. Most of these serious errors are caused by the flightcrew navigating very precisely to the wrong place while believing that the aircraft is complying with the "currently effective" ATC clearance.

Figure 1, Illustration of NAT/MNPS Rectangular Separation



NORTH ATLANTIC MNPS SEPARATION STANDARDS. Aircraft are separated by one of the following methods:

A. Lateral Separation. Lateral separation between co-altitude aircraft (aircraft at the same flight level) is 60 nm.

B. Vertical Separation. Vertical separation between aircraft on the same track is 2,000 feet.

C. Longitudinal Separation. Basic longitudinal separation between aircraft on the same track is 10 minutes. If an aircraft is flying faster than the aircraft behind it (mach advantage), than this criteria may be reduced.

NOTE: Separation standards may be changed. Consult Regional Supplementary Procedures (ICAO Document 7030/3) for current standards applied in the NAT Region

4.1.3. **Reduced Vertical Separation Minimum (RVSM).**
RVSM is implemented at various FLs within the MNPS. Operations at these FLs have demanding vertical height-keeping performance requirements in addition to the NAT/MNPS navigation requirements. See the following for specific RVSM guidelines and requirements:

- IANR.OPS. 33(i) (appendix G of FAR Part 91),
- RVSM section of the FAA Web site (http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/rvsm/).

4.1.4. **Initial NAT/MNPS Approvals.**
Each operator, and each aircraft and navigation system combination must be approved before operating in NAT/MNPS airspace. Each operator must demonstrate (validate) that it can meet MNPS standards before receiving approval.

4.1.5. Validation flights must be conducted through NAT/MNPS airspace. See AWOPS 1.1.015 for guidance on validation flights. Navigation specialists must be consulted prior to proving/validation flights.

4.1.6. Inspectors must ensure that requirements of the applicable AC(s) and/or other CAAI official documentation for long-range navigation-C system (LORAN-C), global positioning system (GPS), or multisensors (or equivalent) are fully met by the operator using those systems before approving any operation in this airspace. All NAT/MNPS approvals are granted by issuing OpSpec Operations within North Atlantic (NAT) Minimum Navigation Performance Specifications (MNPS) Airspace, and by adding that area of en route operation to Authorized Areas of En Route Operation, Limitations, and Procedures, of the standard OpSpecs.

4.1.7. All operations using GPS in NAT/MNPS airspace must be approved.

4.1.8. **Maintaining NAT/MNPS Authorization.**
In addition to initially meeting MNPS criteria, each operator must continuously maintain the required level of navigational performance. Each gross navigational error (GNE) (errors 25 NM or more) has a significant impact on flight safety in this airspace and must be fully investigated in a timely manner. The cause of each error must be identified and effective action must be taken to prevent reoccurrence of similar errors. GNEs are detected by ATC and reported

to one of the regional monitoring agencies of the world. The regional monitoring agency then provides the notification of the GNE to not only the operator that made the GNE but also to the navigation specialists in the CAAI. When an inspector at CAAI learns of a GNE by one of his/her operators, the inspector must immediately contact the operator and advise that the GNE will be investigated. The inspector must ensure that the operator takes timely corrective action. After this notification, inspectors must determine the effectiveness of the operator's actions as follows:

4.1.8.1 If it is determined that an operator's actions will prevent the occurrence of similar errors, the operator should be permitted to continue NAT/MNPS operations with close surveillance of the operator's navigational performance. If similar errors occur (in subsequent operations) more frequently than permitted by the standard, stronger action must be taken.

4.1.8.2 If an operator fails to take action to improve navigation performance, action must be initiated to suspend NAT/MNPS authorization.

4.1.8.3 If it is determined that an operator's actions to improve navigational performance are inadequate or otherwise unsatisfactory, the operator must be notified that the corrective action is unacceptable. When an operator does not implement a satisfactory solution in a timely manner, the action must be initiated to suspend NAT/MNPS authorization and could include enforcement action.

NOTE: It is CAAI policy that one of flight operation instructor participate in the investigation of gross navigation errors. These specialists, at their option, may also participate in the evaluation of the actions proposed by the operator to preclude the occurrence of similar errors. The CAAI Director Flt. OPs must be notified as soon as possible when an inspector determines that actions should be taken to suspend NAT/MNPS authorization.

4.2. **CANADIAN MNPS AIRSPACE.**

Certain high altitude airspace in Northern Canada has been designated as MNPS airspace (see the Canadian Aeronautical Information Publication (AIP)). The navigational performance criteria for operation in Canadian MNPS airspace are identical to the criteria for NAT/MNPS airspace.

4.2.1. **General Criteria.**

In general, any aircraft/navigation system combination approved for unrestricted operation in NAT/MNPS airspace for a particular operator also meets Canadian MNPS

criteria. A particular operator can (under most circumstances) be authorized (without recertification under the current edition of AC 120-33, Operational Approval of Airborne Long-Range Navigation Systems for Flight within the North Atlantic Minimum Navigation Performance Specifications Airspace) to conduct Canadian MNPS operations with those aircraft and navigation system combinations authorized for that operator in NAT/MNPS airspace. However, due to the unique nature of operations in high latitudes and in AMUs, approval for Canadian MNPS operation is not automatic. Each proposed operation must be evaluated on its own merits.

4.2.2. **Special Factors.** The following special factors must be considered and carefully evaluated before granting air navigation approvals for operation in Canadian MNPS airspace.

4.2.2.1 The following directions apply for operators currently authorized to use an aircraft in NAT/MNPS airspace:

4.2.2.1.1. A primary means inertial navigation system (INS)/inertial reference system (IRS)/Inertial Reference Unit (IRU) meeting NAT/MNPS criteria automatically meets Canadian MNPS criteria.

4.2.2.1.2. Other LRNS meeting NAT/MNPS criteria automatically meet Canadian MNPS criteria except for operations in the areas of magnetic unreliability (AMU). The LRNS must be evaluated on a case-by-case basis for AMU authorization.

4.2.2.1.3. Operations at high latitude airports (greater than 67° N/S) must not be authorized unless INS platform alignment has been successfully demonstrated and approved for those latitudes. If operations are proposed for areas in the Canadian MNPS which falls within the AMU, a validation flight and AMU authorization is required. One of the CAAI navigation specialists must be consulted.

4.2.2.2 Training programs and crew procedures for operations at high latitudes must provide techniques and methods for the following:

- Approaches and departures using appropriate heading references other than magnetic;
- Use of ground-based Navigational Aids (NAVAID) oriented to appropriate directional references other than magnetic; and
- The following directions apply for operators who are not currently authorized to use an aircraft and a navigation

system combination in NAT/MNPS airspace, but propose to operate in the Canadian MNPS airspace.

4.2.2.2.1. The operator's equipment must meet the criteria in the appropriate AC (or equivalent), considering the conditions unique to Canadian MNPS airspace. The Canadian AIP should also be consulted for airspace requirements.

4.2.2.2.2. The operator must also meet the special factors specified in subparagraph 4.2.2.

4.2.3. **Canadian MNPS Approvals.**

For IANR.OPS. Chapt. 13 and Chapt.12 certificate holders, Canadian MNPS airspace approvals are granted by adding that area of en route operations to OpSpec.

4.3. **CENTRAL EAST PACIFIC (CEP) ROUTE SYSTEM.**

RVSM AND RNP IN CEP AND NORTH PACIFIC (NOPAC) AIRSPACE.

4.3.1. **General.** This paragraph provides revisions to OpSpecs Operations in Central East Pacific (CEP) Airspace, and North Pacific (NOPAC) Operations, to reflect the scheduled implementation of RVSM and RNP-10 approval requirements on the CEP and NOPAC route systems. This information is applicable to all operators and certificate holders that have been or wish to be authorized to operate on these route systems.

NOTE: We have adopted the acronym "CEP" in place of "CEPAC" to be congruent with the term that ATC is using for the Central East Pacific.

4.3.2. **Background.**

4.3.2.1 RVSM programs enable 1,000-foot vertical separation to be applied between aircraft above FL 290. `IANR.OPS. 33(i) Operations within airspace designed as Reduced Vertical Separation Minimum Airspace, and FAR part 91, appendix G, Operations in Reduced Vertical Separation Minimum (RVSM) Airspace, provide regulatory policy for RVSM programs.

4.3.2.2 Approval of operators and aircraft for RNP-10 enables a 50 NM lateral separation to be applied between aircraft operating in oceanic/remote areas..

4.3.2.3 The OpSpec providing general authority for RVSM operations . The general authority for RNP operations in oceanic/remote areas is Class II Navigation Using Multiple Long-Range Navigation systems.

4.3.2.4 The OpSpecs do not address requirements as they pertain to specific FLs or routes because Air Traffic Service

Providers (ATSP) notify operators of requirements for filing, flight and aircraft navigation equipage requirements on oceanic/remote area routes in aeronautical publications. Oakland and Anchorage Oceanic Centers publish such information in Notices to Airmen (NOTAM) and the Pacific and Alaska Chart Supplements. Tokyo Oceanic Center publishes such information in AIPs and NOTAMs.

4.3.3. **Policy.**

4.3.3.1 All operators conducting operations on the CEP and/or NOPAC route systems must be issued in the OpSpecs . The principal inspectors should inform their applicable certificate holders that this appendix contains in the OpSpec and applicable guidance. The principal inspectors shall issue these OpSpec paragraphs in accordance with the appropriate guidance for each authorization. These are both mandatory OpSpec for CEP and NOPAC authorizations. Inspectors will also need to review the guidance for RVSM authorization.

4.3.3.2 IANR.OPS. 2 operators conducting flights on the NOPAC and CEP Route Systems at FLs where RVSM and/or RNP-10 approval is required must be issued a letter of authorization (LOA) approving such operations. IANR.OPS. 2 operators currently holding an LOA authorizing RVSM and/or RNP-10 operations (including North Atlantic RVSM) are not required to be issued a separate LOA for individual areas of operation or route systems where RVSM and/or RNP-10 are implemented.

4.4. **AMUs.**

Two large areas of en route operation have unique features which significantly complicate air navigation. These two areas are centered around the earth’s magnetic poles.

4.4.1. **Concept.**

Conventional magnetic compasses sense magnetic direction by detecting the horizontal component of the earth's magnetic field. Since this horizontal component vanishes near the magnetic poles, magnetic compasses are highly unreliable and unusable in an area approximately 1,000 NM from each magnetic pole. Within these areas, air navigation tasks are further complicated by very rapid changes in magnetic variation over small distances. For example, when flying between the magnetic North Pole and the true North Pole, a heading of true North results in a magnetic heading of South (a magnetic variation of 180 degrees).

4.4.2. **Convergence of the Meridians.**

Since these two major AMUs also occur near the earth's geographic poles, the convergence of the meridians also presents additional directional complications. When flying "great circle" courses at latitudes greater than 67 degrees, convergence of the meridians can create rapid changes in true headings and true courses with small changes in aircraft position. As a result, relatively small errors in determining the aircraft's actual position can produce very large errors in determining the proper heading to fly and maintain the assigned flight path. When even small errors occur, very large navigation errors can develop over extremely short distances. An extreme example of this phenomenon occurs at the earth's geographic North Pole. Flight in any direction from the exact pole is initially due South (that is, the direction to Russia or the United States is South).

4.4.3. **Special Equipment, Techniques, and/or Procedures.**

Special navigation equipment, techniques, and/or procedures are critical to operate safely in polar areas, including the two AMUs. Operations based solely on magnetic references within AMUs are unsafe, unacceptable, and shall not be approved. Operations within these areas can only be conducted safely if the primary heading reference is derived from sources other than magnetic.

4.4.3.1 All INS/IRS/IRU are capable of calculating true North independently from other aircraft systems. INS/IRS/ IRU can be approved and safely used for operations in AMUs and polar areas provided the following conditions are met:

4.4.3.1.1. The INS is certified as airworthy for the highest latitude authorized for these operations.

4.4.3.1.2. Ground alignment of the INS/IRS/IRU is restricted to those airports where satisfactory alignment has been demonstrated or otherwise approved.

4.4.3.1.3. The operator's training programs and crew procedures provide acceptable techniques and methods for the following:

- Approaches and departures using appropriate heading references other than magnetic
- The use of ground-based NAVAIDs, which are oriented to appropriate directional references other than magnetic

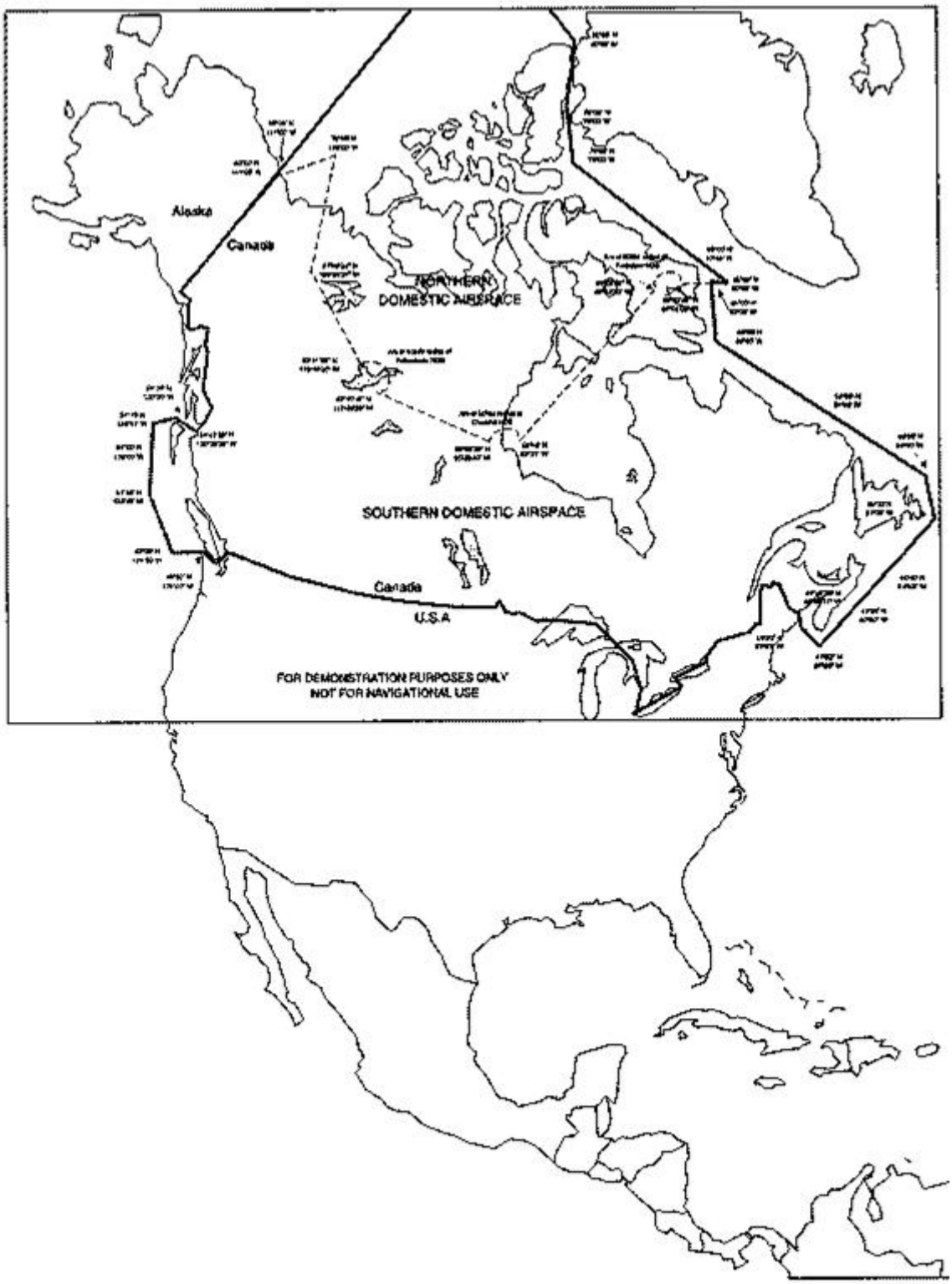
4.4.3.2 There is a wide variety of other methods, systems, techniques, and procedures that can be used for navigation in AMUs and polar areas. However, due to the variety of

means and the complexity of air navigation in these areas, specific direction and guidance for these other means of navigation are not provided in this handbook.

4.4.4. **Boundaries of the AMU.**

4.4.4.1 For the northern hemisphere, the Canadian AIP establishes the basic boundaries for the AMU. Canadian Air Navigation Order, current edition, states that no person may operate an aircraft in instrument flight rules (IFR) flight within Canadian northern domestic airspace unless it is equipped with a means of establishing direction that is not dependent on a magnetic source. The special equipment, training, and procedures discussed in this paragraph are required for all operations into the area of northern domestic airspace. The boundaries of this area are shown in Figure 2. This area is also outlined on Canadian en route charts. For the purposes of this paragraph, northern domestic airspace is considered to extend from ground level to infinity.

Figure 2, Canadian Domestic Airspace



4.4.4.2 For the southern hemisphere, any operation south of 65 degrees south latitude is considered to be within the AMU. Any proposal to operate within the AMU in the southern hemisphere must be reviewed and concurred with CAAI before approval.

4.4.5. **Approvals.**

All approvals for operations into AMUs and in Areas of Magnetic Unreliability are granted by issuing OpSpec . A checklist for operations in AMUs is available in the guidance subsystem in association with OpSpec.

4.5. **NORTH POLAR OPERATIONS.**

The north polar area of operations is defined as that area that lies north of latitude N 78°00'. The north polar routes across Russia are shown in the Russian AIP or in commercial charting publications for Eastern Europe and Eurasia. Authorizes north polar operations. See North Polar Operations, for more information on this authorization. In general, in addition to the authorization for operations in the AMUs, the following will be required for authorizing operations in the polar areas.

4.5.1. **Fuel Freeze Temperature.**

A procedure must be established to determine the fuel freeze temperature of the actual fuel load on board the aircraft that requires coordination between maintenance, dispatch, and assigned flightcrew. The operator may develop a fuel freeze analysis program in lieu of using the standard minimum fuel freeze temperatures for specific types of fuel used.

4.5.2. **Communication Capability.**

In accordance with IANR.OPS. Chap.12, IANR.OPS. 387, Communications facilities— flag operations, the operator must have effective communications capability with dispatch and with ATC for all portions of the flight route. The operator must show the CAAI the communications medium(s) that it intends to use to fulfill these requirements in the north polar area.

4.5.2.1 The communications medium used must meet CAAI regulatory requirements and fulfill policy/procedures established by each ATS unit providing control on the route of flight. Anchorage Center publishes this information in the U.S. Government Flight Information Publication Supplement for Alaska. Other countries publish ATS policies and procedures in their State AIPs.

4.5.2.2 High frequency (HF) voice has been considered the primary communications medium in the North Polar Area. However, other mediums may be used as a supplemental

means in accordance with the applicable policy. For example, although HF voice remains primary for communications with Anchorage Center, in areas where there is satellite coverage, satellite communication (SATCOM) voice may be used as a back-up to communicate with ARINC Radio and in non-routine situations to establish direct pilot-controller voice communications.

4.5.2.3 In areas of satellite coverage, Controller-Pilot Data Link Communications (CPDLC) may be used for ATC communications, provided the ATS unit has an approved capability. In addition, provided the capability is approved, HF datalink may also be used to fulfill communications requirements with ATS units having the capability and with airline dispatch. Inspectors must ensure the operators meet the regulatory and policy requirements for long-range communication systems (LRCS). HF voice capability is always required.

4.5.2.4 It is recognized that SATCOM may not be available for short periods during flight over the North Pole, particularly when operating on some designated polar routes. Communication capability with HF radios may also be affected during periods of solar flare activity. For each dispatched polar flight, the operator must take into consideration the predicted solar flare activity and its effect on communication capability.

4.5.3. **Minimum Equipment List (MEL).**

Before receiving CAAI authority to conduct polar operations, the MEL must indicate that the following systems/equipment is required for polar operations dispatch:

4.5.3.1 Fuel quantity indicating system (FQIS) (to include fuel tank temperature indicating system).

4.5.3.2 Autothrottle system.

4.5.3.3 Communication system(s) relied on by the flightcrew to satisfy the requirement for effective communication capability.

4.5.3.4 Except for all-cargo operations, expanded medical kit to include automated external defibrillators (AED).

4.5.3.5 For Extended Operations (ETOPS) aircraft:

4.5.3.5.1. All MEL restrictions for 180-minute operations are applicable.

4.5.3.5.2. Auxiliary power unit (APU) - for two-engine airplanes (including electrical and pneumatic supply to its designed capability)

4.5.4. **Training Program Requirements.**

The following must be in the approved training programs:

- Training on Barometric pressure for Standard Altimeter Setting (QNE)/ Barometric pressure for Local Altimeter Setting (QNH) and meter/feet issues is required for flightcrew and dispatcher training.
- Training on fuel freeze (included in maintenance, dispatch, and flightcrew training (special curriculum segments.))
- General area and route-specific training on weather patterns and aircraft system limitations.
- Training on special considerations, such as diversion decision-making into austere airport environments to include aircraft performance, crash, fire, and rescue availability, and passenger support.
- Flightcrew training in the use of the cold weather anti-exposure suit.

4.5.5. **Special Flightcrew Issues for Long-Range Operations.**

The operator needs to address the following special long-range flightcrew issues:

- Long-range flightcrew rest plan submitted to the principal operations inspector (POI) for review and approval.
- Multicrew (augmented flightcrews) flight proficiency/currency issues need to be addressed in the training program.
- The progression of pilot in command (PIC) authority, as designated in the operator's manual.
- A minimum of two cold weather anti-exposure suits will be required to be on board so that outside coordination at a diversion airport with extreme climatic conditions can be accomplished safely.

4.5.6. **En Route Polar Diversion Alternate Airport Requirements.**

Operators are expected to define a sufficient set of polar diversion alternate airports, such that one or more can be reasonably expected to be suitable and available in varying weather conditions (AC 120-42B, Extended Range Operation With Two-Engine Airplanes (ETOPS), provides additional guidance for two-engine airplanes).

4.5.7. **Aircraft and Passenger Recovery Plans.**

A recovery plan is required that will be initiated in the event of an unplanned diversion. The recovery plan should address the care and safety of passengers and flightcrew at the diversion airport and include the plan of operation to extract the passengers and flightcrew from that airport.

4.5.8. **Validation Flights.**

A CAAI-observed validation flight is required in which the operator exercises its reaction and recovery plan in the event of a diversion to one of its designated en route polar diversion alternate airports. The exercise of the operator's reaction and recovery plan may also be completed prior to the validation flight. The CAAI will give favorable consideration to a request by the operator, through the POI, to conduct the validation flight in a passenger revenue status only if the operator's reaction and recovery plan has been previously demonstrated to the satisfaction of the CAAI. If the operator elects to demonstrate its reaction and recovery plan as part of and during the validation flight, the flight cannot be conducted in a passenger revenue status. The carriage of cargo revenue is permissible in this case and encouraged, for airplane weight and balance purpose.

4.6. **AREAS WITH SIGNIFICANT COMMUNICATIONS AND/OR ATC DIFFICULTIES.**

The levels of sophistication in communication, navigation, and ATC capabilities in certain areas of operation outside North America and Europe vary widely. The following subparagraphs provide evaluation criteria that must be considered when approving operations in these areas.

4.6.1. **NAVAIDs.**

The ground-based facilities that are implemented to support air navigation in some of these areas are based on antiquated technology and frequently experience reliability problems. The NAS and the navigational performance requirements in many countries are based almost exclusively on non-directional radio beacons (NDB). Also, many of the NAVAIDs do not operate continuously. For example, NAVAIDs are shut down from dusk to dawn in certain countries.

4.6.2. **Communication.**

The primary means of en route communication with ATC in many areas of operation is almost exclusively HF radio. Atmospheric noise created by extensive thunderstorm activity in tropical areas and aurora activity in polar areas significantly increases the difficulty of using HF as a prime means of communication with ATC.

4.6.3. **ATC.**

The level of ATS varies from radar based services (equivalent to domestic U.S. operations) to a total absence of any ATC. Flight information regions (FIR) have been established in most areas of the world. Specific ICAO

member states have been assigned the responsibility of providing ATS in these FIRs. There are wide variations in the ATC services available. En route ATC radar is not available in all countries and ATS may rely heavily on position reports and airborne navigation performance capabilities for the separation of aircraft. Various levels of ATS provided in these areas are as follows:

NOTE: It is critical that flightcrews understand that subtle terminology differences and language barriers may exist in foreign countries where they operate. For example, crews must ensure they understand whether the altimeter setting issued by ATC is in hectopascals (millibars) or inches of mercury.

4.6.3.1 Within controlled airspace, ATC provides ATC service to prevent collisions between aircraft and to expedite and maintain an orderly flow of air traffic. This also includes air traffic advisory services and those alerting services related to weather and search and rescue.

4.6.3.2 Within advisory airspace, air traffic advisory service is available to provide separation, to the extent possible, between aircraft operating on IFR flight plans. It is important to understand that this is an advisory service (similar to a Flight Service Station (FSS)), not a control service (prevention of collision). In advisory airspace, flightcrews are provided information concerning the location of other aircraft. Prevention of collision is the responsibility of the PIC. Terrain clearance is also the responsibility of the PIC. The ATS available also include those alerting services related to search and rescue. In certain areas, special reporting procedures called “broadcasts in the blind” have been established to assist pilots in avoiding other aircraft. At designated intervals, each pilot broadcasts the aircraft’s position, route, and FL over a specified very high frequency (VHF). Awareness of the proximity of other aircraft is obtained by maintaining a continuous listening watch on the specified frequency. This procedure is an “expected” practice in large portions of Northwestern Africa (including the Dakar FIR) and South America (including most Brazilian airspace). In many of these areas, the “broadcast in the blind” procedure is used to augment the separation of IFR aircraft.

4.6.3.3 Flight information regions have not been established for a few areas in the world. These are commonly called uncontrolled information regions or no man’s land. The largest of these areas is in the South Atlantic Ocean, annotated as “No FIR.” Flight information services also do not exist in the high altitude structure in other large areas (above the top of controlled airspace). Within no man’s

land, aircraft separation (prevention of collision) is entirely the responsibility of the PIC. Advice and information for the safe and efficient conduct of flights is not provided from an ATS unit. An ATS unit does not provide alerting services related to search and rescue.

4.6.4. **Metric FLs.**

The NAS in the CIS, many Eastern European countries (former Eastern Bloc countries), and some mainland Asian countries are based on the use of metric flight altitudes/levels. Operations within these areas require special procedures for conversion charts between metric FLs and FLs based on feet. For example, a FL of 10,000 meters represents FL 328 or a flight altitude of 1,000 meters represents an altitude of 3,280 feet.

4.7. **EVALUATION CRITERIA FOR AREAS WITH COMMUNICATIONS AND ATC DIFFICULTIES.**

POIs must evaluate, on a case-by-case basis, all proposals to conduct operations in the sovereign airspace of countries that are not equivalent or similar to the U.S.or European NAS.

4.7.1. **General Criteria.**

The operator must show (considering factors unique to the proposed area of operation) that safe operations can be conducted within the area of operation and that the facilities and services necessary to conduct the operation are available and serviceable during the period when their use is required. The operator must also show that the proposed operation is in full compliance with the requirements in the OpSpecs that are applicable to that operation.

4.7.2. **Operations in Advisory Airspace.**

The operator must show that its training programs and operating procedures permit safe operations in advisory airspace and ensure compliance with the “expected” operating practices.

4.7.3. **Operations in Uncontrolled Information Regions (No Man’s Land).**

Since ATC, air traffic advisory, flight information, and alerting services are not available from ATS units when operating within these areas, the operator must show that acceptable, alternative means are available to ensure the following:

4.7.3.1 The appropriate organization can be notified in a timely manner when search and rescue aid is needed.

4.7.3.2 Changes in significant weather information can be provided to the flightcrew in a timely manner.

4.7.3.3 Changes in the serviceability of the required navigation aids are available to the flightcrew and the operator's operational control system.

4.7.3.4 Reliable information concerning other IFR aircraft operating within this area is available in-flight (e.g., Traffic Alert and Collision Avoidance System (TCAS), Automatic Dependent Surveillance-Broadcast (ADS-B)). This includes "broadcast in the blind" procedures and other "expected" practices.

4.7.3.5 The required navigation facilities necessary to safely conduct the operation are available and serviceable.

4.7.4. **Role of Navigation Specialists.**

The uniqueness of operations in advisory airspace and in no man's land usually requires assistance from persons with special navigational knowledge, skills, and expertise. Inspectors are expected to request the assistance of these specialists when evaluating proposals to conduct operations outside controlled airspace.

4.8. **RNP IN CLASS II AIRSPACE.**

The implementation of RNP is part of a worldwide ICAO effort for the implementation of the Future Air Navigation System (FANS), Communication, Navigation, and Surveillance (CNS), and air traffic management (ATM) concepts.

4.8.1. **General.**

Aircraft/operators that operate on routes where RNP separation standards are applied must be approved by the State of the operator or registry, as appropriate, as capable of navigating to prescribed RNP standards (e.g., RNP-10 for the entire route on which RNP-10 is required). Other separation standards are projected to require different RNP types (e.g., 30 NM lateral separation is projected to require Required Navigation Performance 4 (RNP-4)). The implementation of more stringent RNP and other CNS capabilities is part of an ICAO coordinated effort to introduce separation standards that will enable more efficient ATM while maintaining acceptable levels of safety. Benefits to users are increased availability of fuel/time efficient altitudes, routes and enhanced airspace capacity, and controller flexibility.

4.8.2. Operational Approval in Oceanic Airspace Where RNP-10 Is Required.

4.8.2.1 Background.

4.8.2.1.1. States and operators are implementing RNP as part of a worldwide ICAO effort to implement the FANS, CNS, and ATM concepts. To support this effort,

in 1998, the Pacific oceanic planning groups began a phased implementation of 50 NM lateral separation in Pacific oceanic airspace. In addition, 50 NM longitudinal separation has also been introduced for aircraft that are equipped with the required CNS equipment. In accordance with ICAO Document 7030, aircraft/operators that operate on routes where these separation standards are applied must be approved by the State of operator or registry, as appropriate, as capable of navigating to RNP-10 for the entire route on which RNP-10 is required.

NOTE: This navigation performance requirement is similar to MNPS over the Atlantic which is equivalent to Required Navigation Performance 12 (RNP-12).

4.8.2.1.2. The first oceanic airspace where RNP-10 and 50 NM lateral separation were implemented was the NOPAC Route System. Implementation in additional Pacific oceanic areas proceeded over the next two years.

4.8.2.1.3. Other separation standards require different RNP types (e.g., 30 NM lateral separation requires RNP-4). The implementation of more stringent RNP and other CNS capabilities is part of an ICAO coordinated effort to introduce separation standards that will enable more efficient air traffic management while maintaining acceptable levels of safety. Benefits to users are increased availability of fuel/time efficient altitudes, routes and enhanced airspace capacity, and controller flexibility.

4.8.2.2 Policy.

4.8.2.2.1. CAAI Ins. Handbook is a guide to RNP-10 aircraft and operator approval in any airspace where RNP-10 navigation criteria is required. The CAAI has determined that CAAI Ins. Handbook 4.1.5 provides acceptable criteria and processes for an operator to obtain authority to operate specific aircraft/navigation systems in areas or on routes where RNP-10 is required.

4.8.2.2.2. CNS requirements, policy and guidance for operation in oceanic airspace can be found on the Oceanic Operations Standards Group Web site (http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/oceanic/).

4.8.2.2.3. Operator applications for RNP-10 approval must be evaluated in accordance with CAAI Ins. Handbook and any additional criteria specified in this appendix. If an operator requests to deviate from the practices and procedures provided in CAAI Ins.

Handbook , the inspector should forward a request to the CAAI for assistance.

4.8.2.2.4. ANR.OPS. Chap. 13 and Chap. 12 certificate holders are approved for RNP-10 by the issuance of standard OpSpec paragraphs .

4.8.2.2.5. ANR.OPS. Chap. 12 operators will be approved through the issuance of operator LOA operations in RNP Airspace or, for short-term operations, LOA Flight in Special Areas of Operation For Short-Term Operations.

4.8.2.3 The principal inspectors should inform their certificate holders that this appendix contains the approval process for RNP-10 authorization. The steps in this process should be followed when an operator seeks authority to operate an airplane type/LRNS combination in Class II navigation areas where RNP-10 is applied and the operator has not previously received RNP-10 approval for that specific airplane type/LRNS combination. Normally, if an operator has received initial Class II navigation/RNP-10 approval for a specific airplane type/LRNS combination, that operator should not be required to re-apply for approval to conduct Class II navigation/RNP-10 operations on additional routes or areas.

4.8.2.3.1. The POI and the certificate holders may find it easier to use CAAI Ins. Handbook. The certificate holder should be made aware that references to the appropriate subparagraphs and sections of CAAI Ins. Handbook are indicated in subparagraphs below:

4.8.2.3.2. CAAI Ins. Handbook provides guidance on the content of an operator's RNP-10 application. The application should contain the items listed in subparagraphs below. Subparagraphs provide additional detail on application items.

- Airworthiness documents that establish the proposed aircraft/navigation system group, its RNP-10 approval status, and a list of airframes in that group.
- Approved or requested RNP-10 time limit for aircraft for which INS or IRU are the only source of long-range navigation (LRN).
- Documentation establishing the RNP-10 area of operations or routes for which the specific aircraft/navigation system is eligible.
- Documentation that the operator has adopted operating practices and procedures related to RNP-10 operations.
- Documentation showing that the pilot and, if applicable, dispatcher knowledge of RNP-10 operating practices and procedures will be adequate.

- Documentation that appropriate maintenance practices and procedures have been adopted.
- MEL updates, if applicable.
- Operating history that identifies past problems and incidents, if any, and actions taken to correct the situation.
- Awareness of the necessity to follow up action after navigation error reports, and the potential for removal of RNP-10 operating authority.

4.8.2.3.3. In accordance with CAAI Ins. Handbook, the operator must show the aircraft/navigation system groups that will be presented for approval of RNP-10 operations and provide a list of airframes that are determined to be in the specific aircraft/navigation system groups to be evaluated.

4.8.2.3.4. CAAI Ins. Handbook, Determining Aircraft Eligibility, requires that for aircraft navigation systems which have been approved by an aircraft certification authority to RNP-10 or better, the operator must provide appropriate sections of the Aircraft Flight Manual (AFM) that address RNP, including any associated time limits for INS and IRU navigation systems.

4.8.2.3.5. CAAI Ins. Handbook 4, Aircraft Equipped with Global Positioning Systems (GPS) Approved to Primary Means of Navigation Standards, requires that for aircraft equipped with GPS, where such GPS units are the only systems for LRN, the operator must show that it is approved in accordance with paragraph 12b(4). An RNP-10 time limit is not applicable.

4.8.2.3.6. CAAI Ins. Handbook , Multisensor Systems Integrating GPS (with GPS Integrity Provided by Receiver Autonomous Integrity Monitoring (RAIM)), requires that for multisensor systems incorporating GPS, the operator must show that systems are approved and operated in accordance with paragraph 12b(5). An RNP-10 time limit is not applicable.

4.8.2.3.7. GPS Equipage In Combination With Another Approved LRNS (e.g., INS or IRU); Reference the current editions of AC 90-94, Guidelines for using Global Positioning System Equipment for IFR En Route and Terminal Operations and for Nonprecision Instrument Approaches in the U.S. National Airspace System; and AC 20-138, Airworthiness Approval of Global Navigation Satellite System (GNSS) Equipment. The operator must show that aircraft equipped with GPS and one or more approved LRNS are installed and operated in accordance with AC 90-94, and AC 20-138. An RNP-10 tie limit is not applicable.

4.8.2.3.8. CAAI Ins. Handbook requires the operator to show that INS or IRU installation is approved in accordance with paragraph 12b(1), (2) or (3). Unless the operator takes action to extend the approved navigation system time limit and/or plans to update the system en route, a baseline RNP-10 time limit of 6.2 hours, starting at the time the system was placed in navigation mode, is applicable. See below on extending navigation system time limit and on en route updating.

4.8.2.3.9. CAAI Ins. Handbook, Aircraft Eligibility Through Data Collection, (Eligibility Group 3) specifies that for navigation systems not approved under existing criteria, the operator may demonstrate RNP-10 eligibility through data collection in accordance with using the processes detailed in CAAI Ins. Handbook.

4.8.2.3.10. CAAI Ins. Handbook , Route Evaluation for RNP-10 Time Limits for Aircraft Equipped with only INSs or IRUs, requires the operator to show the routes or areas where it is eligible to operate if restrictions (e.g., INS RNP-10 time limit) apply to navigation systems. In accordance with paragraph 15e, the operator can conduct a one-time evaluation of eligibility to fly in an RNP-10 area of operations or on specific RNP-10 routes or may elect to evaluate on a per-flight basis.

- For one-time evaluation of a specific RNP-10 area or track system, aviation safety inspectors (ASI) should expect the operator to accomplish the following:

a. Calculate the longest distance from either departure airports or en route update points (if applicable) to the point at which the aircraft will begin to navigate by reference to VHF omni-directional range station (VOR), distance measuring equipment (DME), NDB, or comes under ATC radar surveillance.

b. As detailed in paragraph 15e, using 75 percent probability wind component, convert this distance to en route time.

c. As detailed in paragraph 12e, if navigation systems are to be updated en route, adjust the base line RNP-10 time limit approved for the specific operator navigation system to account for update accuracy.

- Subtract 0.3 hour from the baseline for DME/DME.
- Subtract 0.5 hour from the baseline for VOR/DME.
- Subtract 1 hour from the baseline for manual update.

d. Compare calculated en route time to the navigation system RNP-10 time limit (adjusted for en route update, if applicable) to determine if the airplane is eligible for the operation.

e. If the aircraft navigation system is found eligible for operation on the specific routes evaluated, then the RNP-10 area of operations or routes on which RNP-10 operations can be conducted are established. If the aircraft navigation system is not found eligible for operation on all routes evaluated, then the operator will need to designate routes for which it is eligible or take action to gain approval for an extended RNP-10 time limit. See paragraph 9 B3)k).

4.8.2.3.11. CAAI Ins. Handbook, Calculation of Time Limit for Each Specific Flight. For a per-flight evaluation of eligibility to fly a specific RNP-10 route, follow the steps shown, using flight plan winds to determine en route time. If the RNP-10 time limit is exceeded, the flight must be re-routed or delayed.

4.8.2.3.12. CAAI Ins. Handbook, Obtaining Approval for an Extended Time Limit for INS or IRU Systems, specifies how the operator can show eligibility for an extended time limit by:

- Obtaining approval from an appropriate Aircraft Certification Office, or
- Conducting operational data collection using the processes established in CAAI Ins. Handbook.

4.8.2.3.13. CAAI Ins. Handbook, Continuing Airworthiness (Maintenance Requirements), specifies that the certificate holder must provide documentation that appropriate maintenance practices and procedures have been adopted.

4.8.2.3.14. CAAI Ins. Handbook, MEL, requires the operator to revise the MEL to address any new operating requirements.

4.8.2.3.15. Operations Programs.

- CAAI Ins. Handbook
- IANR.OPS. Chap. 13 and 12 certificate holders must provide revisions to manuals and checklists to show the adoption of the RNP-10 operating practices and procedures contained in the reference paragraphs and sections listed.
- If applicable, IANR.OPS. Chap. 12 operators should show appropriate sections of the AFM relating to RNP-10 aircraft/navigation system eligibility.

4.8.2.4 CAAI Ins. Handbook.

4.8.2.4.1. IANR.OPS. Chap. 13 and 12 certificate holders should show that training programs have been updated to include the practices in CAAI Ins. Handbook.

Initial and recurrent pilot testing programs should be updated with applicable information from these paragraphs.

4.8.2.4.2. In accordance with CAAI Ins. Handbook, IANR.OPS. Chap.12 operators must show during the application process that pilot will be adequate. ANR.OPS. Chap. 12 operators must fulfill this requirement.

4.8.2.4.3. The CAAI may authorize a certificate holder to deviate from the RNP-10 requirements for a specific flight in designated RNP-10 airspace if the ATS provider determines that the airplane may be provided appropriate separation and the flight will not interfere with, or impose a burden on other operators. For operations under such authority, the certificate holder shall not take off for flight in designated RNP-10 airspace, unless the following requirements are met:

- If fuel planning is predicated on en route climb to FLs where RNP-10 is normally required, an appropriate request must be coordinated with the ATS provider in advance of the flight.
- The appropriate information blocks on the ICAO flight plan filed with the ATS provider show that the airplane and/or certificate holder is not approved for RNP-10 as specified in the certificate holders OpSpec.
- For these flights either of the following conditions must be met:

a. At least one of the navigation system configurations listed below must be installed and operational:

b. At least two independent INS.

c. At least two flight management system/navigation sensor combinations (or equivalent).

d. At least two independent approved GPS navigation systems acceptable for primary means of Class II navigation in oceanic and remote areas.

e. At least two approved independent LRNS from the list below:

- INS.
- Flight management system/navigation sensor combination (or equivalent).
- GPS navigation system approved for Class II navigation in oceanic and remote areas.

4.8.2.4.4. CAAI Ins. Handbook, Evaluation of Application, Conditions for Removal of Authorization, and Error Reports. The operator should indicate awareness of the provisions for operator follow-up action on reported navigation errors and of the potential to remove RNP-10 operating authority.
4.8.2.4.5. Validation Tests and Validation Flights for IANR.OPS. Chap.13 and 12 operators, reference
. CAAI Ins. Handbook, Proving and Validation Tests.
4.8.2.4.6. The following is intended to provide broad guidance for establishing requirements for validation tests and/or validation flights. The POI should consider each application on its own merit and CAAI Ins. Handbook.

- Validation testing requires that ASIs evaluate operator programs and documents in accordance with the guidance in this section.
- The following is provided as guidance for ASIs to consider in determining whether or not validation flights are required.

a. For operators with previous Class II navigation experience with the same navigation equipment as that being proposed for RNP-10 approval, evaluation of the applicant's programs and documents should normally suffice. A validation flight should not normally be required.

b. For operators with previous Class II navigation experience navigating with an LRNS other than that being proposed for RNP-10 approval, evaluation of the applicant's programs and documents is required. A validation flight should normally be required. If conducted in Class I airspace, the validation flight may be conducted in revenue service. If conducted in Class II airspace, it must be non-revenue with the exception that cargo may be carried.

c. For operators with no previous Class II navigation experience proposing to operate where RNP-10 is required, evaluation of the operator's programs and documents is required. A validation flight should be required and should be conducted in Class II airspace. It should be a non-revenue flight with the exception that cargo may be carried.

- Conditions for Validation Flights.

a. At least one flight should be observed by an CAAI ASI.

b. A demonstration of any required dispatch procedures must be conducted for routes or areas where RNP-10 is required.

c. The flight(s) should be of adequate duration for the pilots to demonstrate knowledge of dispatch requirements, capability to navigate with the system, and to perform the normal and non-normal procedures.

4.8.2.5 WTS entries will be made.

4.9. **RVSM AIRSPACE.**

RVSM airspace is any airspace or route where aircraft are separated by 1,000 feet vertically between FL 290 and FL 410, inclusive. Generally, aircraft and operators that have not been authorized to conduct RVSM operations cannot operate at FLs where RVSM is applied. Exceptions to this rule are published by individual ATSPs. ATSPs have elected to implement RVSM as a means to provide more fuel/time efficient altitudes and routes to operators and to enhance en route airspace capacity.

4.9.1. **RVSM Areas of Operation.**

Table 3, RVSM Status, shows some examples of major areas where RVSM has been or is planned to be implemented. (For the latest information, see the RVSM Web site, http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/rvsm/, and click on the RVSM Status World Wide.)

Table 3, RVSM Status

AREA OF OPERATIONS	IMPLEMENTATION DATES	FLIGHT LEVELS
North Atlantic MNPS Airspace	March 1997 October 1998 January 2002	FL 330-370 FL 310-390 FL 290-410
Pacific Oceanic Airspace	February 2000	FL 290-390
Australia	November 2001	FL 290-410
West Atlantic Route System	January 2002	FL 290-410
All European Airspace	January 2002	FL 290-410
Western Pacific/South China Sea	February 2002	As published in ATS
Northern Canada	April 2002	FL 290-410
Middle East and Asia South of the Himalayas	November 2003	As published in ATS Documents
Domestic United States, Southern Canadian Domestic Airspace, Caribbean and South America	January 20, 2005	FL 290-410

4.9.2. **Inspector Action.**

Using the guidance provided in AW/OPS 1.1.056 Approval of Aircraft and Operators for Flight in Airspace above Flight Level (FL) 290 where a 1,000 Foot Vertical Separation Minimum is Applied, inspectors will ensure that operators and aircraft meet the standards of part 91, appendix G..

4.9.3. **Sources of Information.**

Sources of information on RVSM programs are:

4.9.3.1 The RVSM home page provides information on RVSM programs in various areas of the world. It provides a link to the Domestic RVSM Web page where information is posted on plans and programs to implement RVSM in the domestic United States. It also links to the RVSM Documentation page that provides specific information on aircraft and operator approval for RVSM operations. The RVSM home page can be accessed at http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/rvsm/.

4.9.4. **Regulations.**

ANR.OPS. 33(i) applies to RVSM operations require that the operator and the operator's aircraft comply with the standards of FAR part 91, appendix G and that the operator obtain CAAI authorization to conduct RVSM operations.

FAR Part 91, appendix G provides basic RVSM standards for aircraft and operator programs.

4.9.5. **Guidance.**

ATO Guidance 91-RVSM can be found on the RVSM Documentation Web page. It provides an acceptable means to authorize operators and aircraft to conduct flight in RVSM airspace. It provides detailed guidance for aircraft manufacturers, other engineering organizations and operators to follow when developing programs intended to meet the standards of FAR part 91, appendix G.

4.9.5.1 If an operator requests to deviate from the practices and procedures provided in ATO Guidance 91-RVSM, the POI should consult with the CAAI Dir. Flt. Ops.

4.9.5.2 ATO Guidance 91-RVSM was developed in national and international forums and is used by civil aviation authorities throughout the world. ICAO Document 9574, Edition 2, Manual on Implementation of a 1,000 ft. Vertical Separation Minimum Between FL 290 and FL 410 Inclusive, cites ATO Guidance 91-RVSM as an acceptable means for RVSM approval.

4.9.6. **Overview of the Authorization Process.**

The POI, principal avionics inspector (PAI), and principal maintenance inspector (PMI) should coordinate the issue of OpSpecs to grant the operator authority to conduct RVSM operations for a specific aircraft type or group. The CAAI will issue the OpSpecs if the following conditions exist:

4.9.6.1 The CAAI determines that operator aircraft comply with RVSM standards. For in-service aircraft, the CAAI determines that inspections and/or aircraft system modifications are completed as required by the applicable Service Bulletin, Service Letter, Supplemental Type Certificate or other Aircraft Certification Office approved document. For aircraft manufactured RVSM compliant, the CAAI determines that the AFM or type certificate data sheet (TCDS) contains a statement of RVSM eligibility. The following are involved with RVSM approval:

- The CAAI approves the operator's RVSM maintenance program.
- The CAAI approves the operator's RVSM operations program.
- The CAAI accepts the operator's plan to participate in monitoring programs.
- If required by the POI in coordination with the PAI and PMI, the operator successfully completes a validation flight.

4.9.7. RVSM Authorization Process and Policy.

4.9.7.1 Before issuing OpSpecs, inspectors must coordinate with the responsible operations, maintenance and avionics inspectors.

4.9.7.2 ATO Guidance 91-RVSM provides guidance on the major events in the RVSM authorization process. Also, the "Getting Started" section of the RVSM Documentation Web page contains an outline or checklist of the events or steps in the authorization process. It includes references to applicable document paragraphs and sections.

4.9.7.3 ATO Guidance 91-RVSM provides the following policy for IANR.OPS. Chap. 13 and 12operators: CAAI will authorize initial operational approval for RVSM operations by issuing OpSpecs. Areas of RVSM operation that are new to the operator will be authorized by adding OpSpec

4.9.7.4 Currently, in designated oceanic airspaces, operators are required to obtain both RVSM authorization and certain horizontal navigation authorizations. These are separate, specific authorization actions. For example, to operate in NAT/MNPS airspace, operators are required to obtain both RVSM and NAT/MNPS authority. In Pacific oceanic airspace, operators are required to obtain both RVSM and RNP-10 authorization.

4.9.7.5 Information on TCAS as it relates to RVSM operations can be found on the RVSM Documentation Web page.FAR Part 91 appendix G does not require aircraft be equipped with TCAS for RVSM operations. Appendix G, section 2 does require, however, that if an aircraft is equipped with TCAS II and is used in RVSM operations, then it must be a TCAS II that meets Technical Standard Order (TSO) C-119b (Version 7.0) or a later version. TCAS equipage requirements can be found in IANR.OPS. Chap. 13 and 12.

4.9.7.6 The phrases "determining aircraft RVSM compliance" and "initial RVSM airworthiness approval" both appear in RVSM documents to indicate that the CAAI has determined that the operator's aircraft comply with appendix G RVSM standards. The following is provided as guidance for inspectors.

4.9.7.6.1. ATO Guidance 91-RVSM provides guidance on inspector determination that aircraft are RVSM compliant. ATO Guidance 91-RVSM discusses the documents that the operator must submit to the CAAI to show that in-service aircraft or aircraft manufactured RVSM-compliant are in compliance with the RVSM requirements of FAR part 91, appendix G.

4.9.7.6.2. For most in-service aircraft, the RVSM airworthiness documents take the form of Service Bulletins (SB), Service Letters (SL), or Supplemental

Type Certificates (STC). These documents contain requirements that are specific to individual aircraft types or groups and generally require inspections and/or hardware or software modifications. The operator must submit documents to the CAAI to show that the required actions have been completed for each airframe that wil operate in RVSM airspace.

4.9.7.6.3. For aircraft manufactured RVSM-compliant, the AFM or TCDS must contain statements that show the aircraft to be eligible for RVSM operations.

4.9.7.6.4. When the inspector determines that individual operator airframes are RVSM compliant, the airframes must be listed in OpSpecs or an LOA, as appropriate.

4.9.7.7 Other volumes contain airworthiness inspector guidance for the evaluation and approval of an operator's RVSM maintenance program.

4.9.7.8 Evaluation of operations programs should be completed in conjunction with the evaluation of maintenance programs.

4.9.7.8.1. ATO Guidance 91-RVSM provides operating practices and procedures applicable to all RVSM operations. It also lists special emphasis items for pilot training.

4.9.7.8.2. ATO Guidance 91-RVSM, appendix 5 provides specific practices and procedures for RVSM operations in oceanic airspace.

4.9.7.9 Validation Tests and Flights.

4.9.7.9.1. ATO Guidance 91-RVSM provides guidance on the RVSM validation test. In some cases, review of the operator's RVSM application and program documents may suffice for validation test purposes. However, as determined by the POI, PMI, and PAI, the final step of the approval process may be the completion of a validation flight. The CAAI may accompany the operator on a flight to verify that RVSM operations and maintenance procedures and practices are used effectively. The validation flight may be accomplished during a revenue flight, as determined by the principal inspectors (PI) on a case-by-case basis.

4.9.7.9.2. Validation flights are *not* required to be conducted in conjunction with the monitoring flights described below. Also, the validation flight may be conducted before monitoring requirements are completed.

4.9.8. **Monitoring Programs.**

4.9.8.1 The primary goal of monitoring is to provide a quality control check on the altitude-keeping performance of the wide variety of operators and aircraft. It has been determined that this may be accomplished by sampling a number of airframes of each aircraft type that an operator will operate in RVSM airspace. Altitude-keeping performance data is analyzed to determine that the aircraft fleet, as well as individual operators, exhibit performance that is consistent with RVSM standards.

4.9.8.2 In its application for RVSM authority, ATO Guidance 91-RVSM calls for each operator to submit a plan to participate in monitoring programs.

NOTE: Operators are no longer required to complete monitoring prior to being granted operational approval.

4.9.8.3 Monitoring procedures for ground-based and GPS-based monitoring systems are published on the RVSM Documentation Web page. Operator aircraft of a specific type or group are monitored after they have been determined to be RVSM compliant. Currently, the operator can have its aircraft monitored by either the ground-based height monitoring unit (HMU) or a portable GPS-based Monitoring Unit (MU) that can be placed on the aircraft.

4.9.8.4 When an operator has successfully completed monitoring requirements for the specific aircraft type or group, the CAAI will be notified by the POI and/or PAI.

4.10. SPECIAL AREAS WHERE REDUNDANT LRNS ARE USUALLY NOT REQUIRED.

Certain special areas have been identified where LRN can be conducted with a single long-range navigation system (S-LRNS).

4.10.1. Concept.

The ANR.OPS. 150 , 292 ,411 related to Class II navigation do not specifically require redundant or dual LRNS. The primary Class II navigation requirements are related to the level of navigational performance necessary for the control of air traffic. The objective of requirements for redundant navigational systems is to permit the flight to continue to navigate to the degree of accuracy necessary for the control of air traffic in the event a failure occurs in the navigational system being used.

4.10.2. Combination of Standard ICAO Ground-Based NAVAIDs and an S-LRNS.

4.10.2.1 Operations can also be safely conducted in much larger areas using a combination of redundant ICAO

standard NAVAIDs and an S-LRNS. These operations consider:

- The availability of ICAO standard NAVAIDs,
- The lateral separation minimums applied by ATC (the navigational performance required),
- The length of the route or route segment,
- The complexity of the route structure, and
- The density of the air traffic.

4.10.2.2 Approval of the use of an S-LRNS may be granted by the issuance of OpSpec Class II Navigation Using S-LRNS. It should be noted in OpSpec in association with the applicable areas of operation.

4.10.3. **West Atlantic Route System (WATRS).**

The WATRS, Caribbean Sea, and Gulf of Mexico routes are special case routes in which the use of an S-LRNS may be authorized for Class II navigation. These routes are located offshore in the WATRS control area, the Caribbean, and Gulf of Mexico control areas, as shown on en route charts and described in CAAI CAR 150.

NOTE: The WATRS is defined as North Atlantic Ocean west of a line that extends from 44°47'00" N/ 67°00'00" W to 39°00'00" N/ 67°00'00" W to 38°30'00" N/ 60°00'00" W south along the 60°00'00" W longitude line to the point where the line intersects with the northern coast of South America.

4.10.3.1 RNP for WATRS Plus Control Areas (CTA). On June 5th, 2008, the FAA is planning to introduce a redesigned route structure with a reduced lateral separation on oceanic routes or areas in the WATRS Plus CTAs. The existing lateral route separation is 90 NM. The WATRS Plus initiative will reduce the separation to 50 NM between aircraft that are authorized with a navigation specification of RNP 10 or RNP 4.

4.10.3.2 The WATRS Plus initiative builds upon the experience gained from:

- The FAA's introduction of the RNP-10 Navigation Specification for aircraft operating in the U.S.-controlled Pacific FIRs, and
- The ongoing operational trial with aircraft authorized for RNP-4 navigation specification.

4.10.3.3 Reference material and compliance procedures can be found on the FAA Web site at

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/oceanic/WATRS_Plus/.

4.10.4. **Special Provisions for the WATRS, Caribbean Sea, and Gulf of Mexico.**

The unique nature of the WATRS, the Caribbean Sea, and the Gulf of Mexico permits operations with turbine-powered airplanes and certain offshore helicopter operations to be safely conducted with an approved S-LRNS, in accordance with CAAI CAR 150.

4.10.5. **Special Provisions for Certain Routes in NAT/MNPS Airspace.**

Special contingency routes have been established in limited portions of NAT/MNPS airspace where aircraft equipped to use standard ICAO NAVAIDs can operate with an S-LRNS. These routes are specified in the International Flight Information Manual. Operations over these routes can be authorized, provided the operator shows that the LRNS/aircraft combination used and the operational procedures used meet the NAT/MNPS requirements. (For guidance, see AC 120-33.) The approval is granted in the OpSpecs and by adding that area of en route operation to the standard OpSpecs.

4.10.6. **Operational Approval for S-LRNS.**

4.10.6.1 All Class II navigation operations must be conducted so the aircraft is continuously navigated to the degree of accuracy established by ATC for operations in that airspace where applicable requirements are in force. For areas where these accuracy and navigation performance standards have *not* been formally established, the LRNS must be used to continuously navigate the aircraft. This is required so that the crosstrack and/or the along track errors will not equal or exceed 25 NM at any point along the flight plan route specified in the ATC clearance.

4.10.6.2 The navigation system must be operational.

4.10.6.3 Before conducting any operations authorized by the OpSpec , the flightcrew must be qualified, in accordance with the certificate holder's approved training program, for the system and procedures being used.

4.10.6.4 Before entering any airspace requiring the use of an LRNS, the aircraft position will be accurately fixed and recorded using airways navigation facilities or ATC radar. After exiting this airspace, the aircraft position will be accurately fixed and the LRNS error must be determined and logged in accordance with the operator's approved procedures.

4.10.6.5 An LRNS fix may be substituted for a required en route ground facility when that facility is temporarily out of service, provided the approved navigation system has sufficient accuracy to navigate the aircraft to the degree of accuracy required by ATC over that portion of the flight.

4.10.6.6 At dispatch, at least one of the navigation systems listed below must be installed and operational:

4.10.6.6.1. At least one independent INS. INS and IRS must be approved in accordance with Chapt. 13.

4.10.6.6.2. At least one flight management system/navigation sensor combination (or equivalent), where the navigation system must be suitable for the route to be flown. Multisensor systems must be approved in accordance with the guidance contained in AC 20-130A, Airworthiness Approval of Navigation or Flight Management Systems Integrating Multiple Navigation Sensors (or equivalent).

4.10.6.6.3. At least one independent IFR-approved GPS navigation system, approved in accordance with one of the following:

1. The guidelines for operational approval of GPS to provide the primary means of Class II navigation in oceanic and remote areas of operation apply. (See AC 90-94.) The guidelines must be followed with the exception that the operational control restrictions related to fault detection and exclusion (FDE) do not apply. This is because S-LRNS operations in oceanic/remote areas have only been approved on short-duration routes with options available to use other NAVAIDs in the event of an LRNS malfunction.

2. The guidelines for using GPS for IFR en route and terminal operations and for nonprecision instrument approaches in the U.S. NAS apply. These guidelines allow for single GPS units that have RAIM capability (or equivalent) and are approved for IFR operations to serve as the S-LRNS on oceanic routes where an S-LRNS is allowed.

3. Flightcrew procedures must be in place in the event of the loss of the S-LRNS after dispatch. The certificate holder must ensure that the pilots are trained on procedures to continue to navigate and to communicate with ATC in the event of an S-LRNS malfunction.

4. Currently, there are no RNP-type areas or routes where S-LRNS operations are authorized. Should such routes be authorized in the future, applicable guidance will be released.

4.10.7. **Other Special Areas.** Inspectors cannot authorize operations with S-LRNS in any other areas of operation without the review and concurrence of the navigation specialists in CAAI Flt. Ops.

4.10.7.1 When a request to operate with S-LRNS in areas not described in this paragraph is received, inspectors must request assistance from one of the agency's navigation specialists. If the responsible inspector and the navigation specialist determine that the proposed operation can be safely conducted, a request for review and concurrence should be forwarded to the CAAI Dir. Flt. Ops.

4.10.7.2 In general, the following are necessary for consideration of this request:

- The required justification for the request, and
- The ability to comply with the limitations and provisions set forth in the applicable guidance and the OpSpec for the authorization of the S-LRNS in another area.

4.11. PERFORMANCE-BASED EN ROUTE OPERATIONS.

4.11.1. **Performance-Based En Route High Altitude Area Navigation (RNAV) Routes.**

The first performance-based en route high altitude RNAV routes were published in 2004 as Q Routes. The initial implementation of Q Routes requires GPS, DME/DME/IRU, or DME/DME updating. The performance requirement for these operations is initially a 95 percent accuracy of 2 NM. This performance level is specified as RNAV-2. These routes can also be flown by aircraft that have an en route performance capability of RNP-2 or better. The route widths for this initial implementation are conventional + 4 NM and ATC radar is initially required as an operational mitigation. It is expected that the RNAV will be updated with GPS or DME/DME to obtain this accuracy. DMEs along Q Routes are being identified to support the routes and operators need to be aware that only DMEs that are part of the NAS can be used (normally no Tactical Air Navigational Aid (TACAN)) and if DMEs are in test mode radiating a signal they may not be used in navigation solution. Q Route operations must be approved in accordance with AC 90-100A, U.S Terminal and En Route Area Navigation (RNAV) Operations.

4.11.2. **Performance-Based Operations Aviation FAA Rulemaking Committee (PARC).**

The PARC has recommended that FAA establish en route operations throughout the Performance-based NAS with a route-to-route separation of 8 NM and obstacle clearance standards of ± 4 NM. These operations will initially be based on a required performance level of RNAV-2 and will use radar as an operational mitigation. PARC also recommended that RNP aircraft with an en route

performance of RNP-2 or better should also be authorized to conduct these operations.

4.11.2.1 As the RNP fleet matures, these operations are expected to transition to a performance value of RNP-2, without requiring radar as an operational mitigation. These operations must be approved.

4.11.2.2 It is also anticipated that some future routes will be established as RNP special aircraft and aircrew authorization required (SAAAR) routes with 4 NM route-to-route spacing and obstacle clearance of ± 2 NM, using a required performance value of RNP-1 or better. These operations must be approved in accordance with AC 90-101, Approval Guidance for RNP Procedures with SAAAR.

5. Task Outcomes

5.1. This directive will give the inspector basic tools and guidance for approving special navigation operations.