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WORKING PAPER

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Third NAM/CAR Air Navigation Implementation Working Group Meeting (ANI/WG/3)
Mexico City, Mexico, 4 to 6 April 2016

- Agenda Item 3: Global/Regional Air Navigation Developments**
3.4 Other Global/Regional Air Navigation Developments
3.4.1 Review of Regional Supplementary Procedures (*Doc 7030*)

REVIEW OF REGIONAL SUPPLEMENTARY PROCEDURES (DOC 7030)

(Presented by the Secretariat)

EXECUTIVE SUMMARY	
<p>This Working Paper presents a Proposal for amendment (PfA) to the Doc 7030 - <i>Regional Supplementary Procedures (SUPPs)</i>, Part CAR/SAM, for the implementation of Required Navigation Performance (RNP) 10, 50 Nautical Miles (NM) lateral separation; RNP4, 30 NM lateral separation and additional criteria of longitudinal separation minima for their application in the Oceanic airspace of Caribbean (CAR) Region.</p>	
Action:	The suggested action is presented in Section 3.
<i>Strategic Objectives:</i>	<ul style="list-style-type: none">• Safety• Air Navigation Capacity and Efficiency• Environmental Protection
<i>References:</i>	<ul style="list-style-type: none">• Doc 9613 - <i>Performance-based Navigation (PBN) Manual</i>• NAM/CAR Regional Performance-Based Air Navigation Implementation Plan (RPBANIP)• Final report of the Fifth North American, Central American And Caribbean Directors of Civil Aviation Meeting (NACC/DCA/5), Port-of-Spain, Trinidad and Tobago, 28 to 30 April 2014

1. Introduction

1.1 In 2013, ICAO began a comprehensive revision of the Doc 7030 so as to include all Flight Information Regions (FIRs) to the accredited ICAO Regional Office. Following this policy the new version of the document has integrated the ICAO Caribbean and South American (CAR/SAM) Regions as one single Region.

1.2 So far, the ICAO North American, Central American and Caribbean Office (NACC) Regional Office and ICAO Headquarters, Montreal, officers have reviewed and updated all information of the current Proposal for amendment (PfA) to the Doc 7030.

2. Discussion

2.1 After the process of revision between ICAO Headquarters and ICAO NACC the CAR PfA by the United States has been reworded so as to include its application to the whole CAR Region bearing in mind the upcoming implementation of new set of regional Air Traffic Service (ATS) routes based on ICAO PBN provisions.

2.2 The **Appendix** to this Working Paper contains the PfA to the CAR SUPPs that will enable reduction of lateral and longitudinal separation based on the implementation of RNP 10 and RNP 4 in the Oceanic airspace of the FIR in CAR Region.

2.3 Based on the outcome of the ICAO/IATA/CANSO Performance-Based Navigation (PBN) Harmonization, Modernization and Implementation Meeting for the CAR Region held in 28 March – 1 April 2016, the PBN TF presents in the WP/08 additional information so the Meeting may endorse the PfA.

2.4 The PfA is planned to be distributed for comments of States and International Organizations in May 2016. Once the PfA is approved, a new PfA of ATS Routes to the Doc 8733 - *Caribbean and South American Regions, Volume I, Basic ANP*, may be developed by the PBN Task Force (TF) for its implementation in the CAR Region. The ICAO NACC Regional Office will conduct timely coordination with both, the PBN TF and the ICAO SAM Regional Office.

3. Suggested action

3.1 The Meeting is invited to review and endorse the Draft PfA to the CAR SUPPs.

**PROPOSAL FOR AMENDMENT OF THE
REGIONAL SUPPLEMENTARY PROCEDURES
CARIBBEAN AND SOUTHAMERICAN (CAR/SAM) REGION (Doc. 7030/5)**

(Serial No. CAR-S 16/01-ATM)

- a) **Regional Supplementary Procedures:** CAR/SAM
- b) **Proposed by:** United States supported by CAR States
- c) **Proposed amendment:**

Editorial Note: Amendments are arranged to show deleted text using strikeout (~~text to be deleted~~), and added text with grey shading (text to be inserted).

Amend the following in the CAR/SAM SUPPS, Chapter 4.

Chapter 4. NAVIGATION

4.1 PERFORMANCE-BASED NAVIGATION (PBN)

Note. — ~~As the Caribbean (CAR) Region transitions to PBN as contained in the Performance-based Navigation (PBN) Manual (Doc 9613), the contents of 4.1 will be amended~~ Doc 9613 provides guidance to States, ANSPs and airspace users on how to implement RNAV and RNP applications, and how to ensure that the performance requirements are appropriate for the planned application.

4.1.1 Area navigation (RNAV) specifications

4.1.1.1 RNAV 10 (RNP 10)

Note. — ~~RNAV 10 retains the RNP 10 designation, as specified in the Performance-based Navigation (PBN) Manual (Doc 9613), 1.2.5.5, 14.1.1.1.1~~ A lateral separation minimum of 93 km (50 NM) may be applied between flights operating on oceanic routes or areas.

Area of applicability

- a) ~~within the control area of the San Juan FIR, the Atlantic portion of the Miami Oceanic control area or the West Atlantic Route System (WATRS); and~~
- b) ~~outside WATRS within the control area of the New York Oceanic FIR, except minimum lateral separation between aircraft transitioning from airspace in the New York Oceanic FIR/CTA to MNPS airspace shall be 110 km (60 NM).~~

~~*Note.* — The WATRS area is defined as beginning at a point 27°00'N/77°00'W direct to 20°00'N/67°00'W direct to 18°00'N/62°00'W direct to 18°00'N/60°00'W direct to 38°30'N/60°00'W direct to 38°30'N/69°15'W, thence counterclockwise along the New York Oceanic control area/FIR boundary to~~

~~the Miami Oceanic control area/FIR boundary, thence southbound along the Miami Oceanic control area/FIR boundary to the point of beginning.~~

~~————— Note. — The NAT MNPS are set forth in NAT SUPPS, 4.3. NAT MNPS airspace is identified in NAT SUPPS, 4.3.1.1.~~

4.1.1.1.1 The RNAV 10 (RNP 10) specifications shall be applicable to navigation systems used to support the separation minima specified in 6.2.1.1 b) when published in State AIPs. Additionally, the navigation performance shall be monitored to ensure that the following criteria are met in order for this separation minimum to be utilized in the New York Oceanic West FIR and Piarco FIRs:

- a) the proportion of the total flight time spent by aircraft 46 km (25 NM) or more off the cleared track shall be less than 9.11×10^{-5} ; and
- b) the proportion of the total flight time spent by aircraft between 74 and 111 km (40 and 60 NM) off the cleared track shall be less than 1.68×10^{-5} .

Means of compliance

~~4.1.1.1.2 — For application of 4.1.1.1.1, operators and civil aviation authorities must follow the provisions listed below.~~

4.1.1.1.2 The aircraft and operator shall be approved RNP 10 or RNP 4 by the State of the Operator or the State of Registry, as appropriate.

4.1.1.1.3 Operator programmes shall be established to mitigate the occurrence of navigational errors due to equipment malfunction or operational error:

- a) operator in-flight operating drills shall include mandatory navigation cross-checking procedures to identify navigation errors in sufficient time to prevent aircraft from inadvertent deviation from ATC-cleared route; and
- b) the operator shall establish programmes to provide for the continued airworthiness of aircraft navigation systems necessary to navigate to the degree of accuracy required.

~~4.1.1.1.3 — The aircraft and operator must be approved RNP 10 or RNP 4 by the State of the Operator or the State of Registry, as appropriate. RNP 10 is the minimum navigation specification for the application of 93 km (50 NM) lateral separation.~~

~~4.1.1.1.4 — States shall ensure, when granting approval for RNP 10 or RNP 4, that operators establish programmes to mitigate the occurrence of large lateral track errors due to equipment malfunction or operational error.~~

~~Note. — The Performance based Navigation (PBN) Manual (Doc 9613) provides guidance on aircraft, operations and maintenance programmes for the initial achievement and continued compliance with the authorized navigation specification.~~

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4.1.2 Required navigation performance (RNP) specifications

4.1.2.1 RNP 4

— Nil.

4.1.2.1.1 The RNP 4 specification shall be applicable to navigation systems used to support the separation minima specified in 6.2.1.1 a) when published in State AIPs. Additionally, the navigation performance shall be monitored to ensure that the following criteria are met in order for this separation minimum to be utilized in the New York Oceanic West FIR and Piarco FIR:

- 1) the proportion of the total flight time spent by aircraft 28 km (15 NM) or more off the cleared track shall be less than 5.44×10^{-5} ; and
- 2) the proportion of the total flight time spent by aircraft between 44 and 67 km (24 and 36 NM) off the cleared track shall be less than 1.01×10^{-5} .

Means of compliance

4.1.2.1.3 The aircraft and operator shall be approved RNP 4 by the State of the Operator or the State of Registry, as appropriate.

4.1.2.1.4 Operator programmes shall be established to mitigate the occurrence of navigational errors due to equipment malfunction or operational error:

- a) operator in-flight operating drills shall include mandatory navigation cross-checking procedures to identify navigation errors in sufficient time to prevent aircraft from inadvertent deviation from ATC-cleared route; and
- b) the operator shall establish programmes to provide for the continued airworthiness of aircraft navigation systems necessary to navigate to the degree of accuracy required.

Amend the following in the CAR/SAM SUPPS, Chapter 6.

Chapter 6. AIR TRAFFIC SERVICES

6.2 SEPARATION

6.2.1 Lateral

(A11 – Attachment B; P-ATM – Chapters 5 and 15)

6.2.1.1 Minimum lateral separation shall be:

- a) 55.5 km (30 NM) between aircraft operating within the control area of the New York Oceanic West, Miami Oceanic, the oceanic area of the Gulf of Mexico, San Juan and Piarco FIRs provided that the following conditions are met:
 - 1) navigation – RNP-4 specification in accordance with the provisions of 4.1.2.1;
 - 2) communication – CPDLC shall be monitored against RCP 240; and
 - 3) surveillance – ADS-C shall be monitored against RSP 180.

Note – Guidance concerning RCP and RSP specifications, application and performance requirements can be found in the Global Operational Data Link Document (GOLD).

ab) 93 km (50 NM) between aircraft approved meeting RNP 10 or RNP 4 meeting the provisions in criteria specified in 4.1.1.1 or 4.1.2.1, respectively, operating in the control areas of the Miami Oceanic, the oceanic area of the Gulf of Mexico, New York Oceanic West, San Juan and Piarco FIRs.

1) — the control area of the San Juan FIR, the Atlantic portion of the Miami Oceanic control area or the New York Oceanic West FIR; and

2) — the control area of the New York Oceanic FIR, except minimum lateral separation between aircraft transitioning from airspace in the New York FIR/CTA to MNPS airspace shall be 110 km (60 NM).

Note.—The New York Oceanic West FIR area is defined as beginning at a point 27°00'N/77°00'W direct to 20°00'N/67°00'W direct to 18°00'N/62°00'W direct to 18°00'N/60°00'W direct to 38°30'N/60°00'W direct to 38°30'N/69°15'W, thence counterclockwise along the New York Oceanic control area/FIR boundary to the Miami Oceanic control area/FIR boundary, thence southbound along the Miami Oceanic control area/FIR boundary to the point of beginning.

b) 110 km (60 NM) between aircraft which meet the North Atlantic minimum navigation performance specifications (MNPS) which, while operating in the control area of San Juan FIR, are in transit to or from the NAT MNPS airspace;

Note.—The NAT MNPS area is set forth in NAT SUPPS, Chapter 4.

ec) 167 km (90 NM) between aircraft not approved RNP 10 or RNP 4 operating between the United States, Canada or Bermuda and points in the CAR Region in the control areas of the Atlantic portion of the Miami Oceanic, New York Oceanic West, the oceanic areas of the Gulf of Mexico, San Juan and Piarco control area FIRs;

d) 185 km (100 NM) west of 60°W (only in oceanic areas) between aircraft not covered in a), b) or c) above, and between aircraft in the control area of Piarco FIR west of 55°W; and

e) 223 km (120 NM) between aircraft operating west of 60°W in the New York Oceanic FIR, and between aircraft in the control area of Piarco FIR east of 55°W

except that lower minima as detailed in 5.4.1.1.2 of the PANS-ATM may be applied, or further reduced in accordance with 5.11, where the conditions specified in the relevant PANS-ATM provisions are met (see 5.4.1.1.2)

6.2.2 Longitudinal

(P-ATM, Chapter 5)

6.2.2.1 — Between turbo jet aircraft at or above FL 280 on oceanic published routes operating in the West Atlantic Route System (WATRS), or at or above FL 280 operating west of 60°W when transitioning to or from the WATRS area, the longitudinal separation shall be in accordance with the PANS-ATM, 5.4.2.4.

Note.—The WATRS area is defined as beginning at a point 27°00'N/77°00'W direct to 20°00'N/67°00'W direct to 18°00'N/62°00'W direct to 18°00'N/60°00'W direct to 38°30'N/60°00'W direct to 38°30'N/69°15'W, thence counterclockwise along the New York Oceanic control area/FIR boundary to the Miami Oceanic control area/FIR boundary, thence southbound along the Miami Oceanic control area/FIR boundary to the point of beginning.

6.2.2.21 Between turbo-jet aircraft operating at or above FL 200 and west of 60°W within the Houston Oceanic, Mexico FIR, Miami Oceanic, the New York Oceanic West, the oceanic areas of Mexico, San Juan and Piarco CTAFIR control areas, the longitudinal separation with Mach number technique should be applied in accordance with the relevant provisions of the PANS-ATM provisions, 5.4.2.4, shall be:

- a) 15 minutes; or
- b) this separation may be reduced to:
 - 1) 10 minutes at the entry point into oceanic controlled airspace, if the preceding aircraft is maintaining a speed of at least Mach 0.03 greater than that of the following aircraft; or
 - 2) 5 minutes at the entry point into oceanic controlled airspace, if the preceding aircraft is maintaining a speed of at least Mach 0.06 greater than that of the following aircraft.

6.2.2.3 Between aircraft operating below FL 200 west of 55°W and between aircraft operating at all levels west of 55°W within the San Juan and Piarco FIRs and the Paramaribo and Rochambeau upper flight information regions (UIRs), 20-minute longitudinal separation shall be applied. This minimum may also be applied if the aircraft have not reported over the same reporting point when it is possible to ensure, by radar or other means approved by the State, that the appropriate time interval will exist at the common point from which they follow either the same track or continuously diverging tracks.

6.2.2.4 Between turbo-jet aircraft meeting the MNPS and operating in the New York Oceanic control area wholly or partly in MNPS airspace, the minimum longitudinal separation with Mach number technique shall be in accordance with the PANS-ATM, 5.4.2.4. In cases where the aircraft concerned have reported over a common point and follow continuously diverging tracks until some other form of separation is provided:

- a) at least 10-minute longitudinal separation shall exist at the point where the tracks diverge; or
- b) at least 5-minute longitudinal separation will exist where lateral separation is achieved; and
- c) lateral separation will be achieved at or before the next significant point (normally 10 degrees of longitude along track(s)) or, if not, within 90 minutes of the time the second aircraft passes the common point or within 112 km (600 NM) of the common point, whichever is estimated to occur first.

6.2.2.5 For turbo-jet aircraft meeting the MNPS and operating in the New York Oceanic control area wholly or partly in MNPS airspace but not meeting the requirements of 6.2.2.4, 15-minute longitudinal separation shall be applied.

6.2.2.6 ~~Between aircraft operating outside MNPS airspace in the New York Oceanic control area the minimum longitudinal separation shall be:~~

- a) ~~15 minutes between turbo jet aircraft, provided the Mach number technique is applied and, whether in level, climbing or descending flight:~~
 - 1) ~~the aircraft concerned have reported over a common point and follow the same track or continuously diverging tracks until some other form of separation is provided; or~~
 - 2) ~~if the aircraft have not reported over a common point, it is possible to ensure, by radar or other means approved by the State, that the appropriate time interval will exist at the common point from which they follow either the same track or continuously diverging tracks;~~
- b) ~~10 or 5 minutes only when it is possible to ensure, by radar or other means approved by the State, that the required time interval exists and will exist at the common point, provided the preceding aircraft is maintaining a greater Mach number than the following aircraft in accordance with the following:~~
 - 1) ~~10 minutes if the preceding aircraft is maintaining a speed of at least Mach 0.03 greater than that of the following aircraft; and~~
 - 2) ~~5 minutes if the preceding aircraft is maintaining a speed of at least Mach 0.06 greater than that of the following aircraft;~~
- c) ~~20 minutes between turbo jet aircraft not covered by a) and b);~~
- d) ~~20 minutes between other than turbo jet aircraft operating along routes extending between the United States, Canada or Bermuda and Caribbean terminals, or between the United States or Canada and Bermuda; and~~
- e) ~~30 minutes between other than turbo jet aircraft not covered in d).~~

6.2.2.2 Between aircraft operating in the control areas of the New York Oceanic West, the Miami Oceanic, the oceanic areas of the Gulf of Mexico, San Juan and Piarco FIRs, the minimum longitudinal separation based on distance shall be:

Note – Guidance concerning RCP and RSP specifications, application and performance requirements can be found in the Global Operational Data Link Document (GOLD).

- a) 93 km (50 NM) provided that the following conditions are met:
 - 1) navigation – RNP 10 or RNP 4 specification in accordance with the provisions of 4.1.1.1 or 4.1.2.1, respectively;
 - 2) communication – CPDLC shall be monitored against RCP 240; and
 - 3) surveillance – ADS-C shall be monitored against RSP 180.
- b) 55.5 km (30 NM) provided that the following conditions are met:
 - 1) navigation – RNP 4 specification in accordance with the provisions of 4.1.2.1;

- 2) communication – CPDLC shall be monitored against RCP240;
- 3) surveillance – ADS-C shall be monitored against RSP 180.

d) **Date when proposal received:**

12/02/2014

e) **Proposer's reason for amendment:**

- 1) In accordance with ICAO Doc 4444, the internationally agreed data link-based separation minima values available for application in oceanic and remote airspace are 50 NM longitudinal, 50 NM lateral, 30 NM longitudinal and 30 NM lateral. Specifics for 30 NM lateral separation are provided in paragraph 5.4.1.2.1.6, "Lateral separation of aircraft on parallel or non-intersecting tracks or ATS routes," with references to pertinent ICAO documents cited therein. Paragraph 5.4.2.2, "Longitudinal Distance-Based Separation Minima in an RNP RNAV Environment Using ADS-C" provides the corresponding details for the 50 NM and 30 NM longitudinal separation minima, again with references to other relevant ICAO documents.
- 2) In non-surveillance oceanic airspace where traffic is increasing by approximately five percent a year, flight efficiency (e.g., user preferred routes and altitude profiles) is dependent on reductions in the horizontal separation standards. ICAO has developed oceanic separation standards of 50 NM longitudinal, 50 NM lateral, 30 NM longitudinal and 30 NM lateral provided when a set of requirements are met or exceeded. These requirements include RNP 10 or RNP 4 approval, direct controller-pilot voice communications or CPDLC, and ADS-C position reports.
- 3) This amendment will allow application of 50 NM longitudinal, 50 NM lateral, 30 NM longitudinal and 30 NM lateral separation standards in the oceanic areas of CAR FIRs.
- 4) The application of the reduced minima is to enable level changes to transition through or to transition to the level of a longitudinally adjacent aircraft not presently available with the 10-minute longitudinal separation standard with Mach number technique (MNT). A level change is known to provide reduced fuel burn if an aircraft is transitioning in order to operate at a level recommended, for example, by the aircraft's flight management system; facilitating more level changes thus results in greater overall system fuel efficiency. A level change initiated by air traffic control (ATC) in the Oceanic areas of CAR FIRs will reduce operational complexity at intersections of published routes in the airspace, such as reducing controller workload relative to the present system; facilitating more level changes thus results in lowered operational complexity.
- 5) The North Atlantic Systems Planning Group (NAT SPG) has adopted a target level of safety (TLS) of 5×10^{-9} fatal accidents per flight hour per dimension to pertain for implementation of separation reductions after the year 2000. The resulting "Safety Assessment to Support Use of 30 NM Lateral Separation Standard in the New York Airspace" was developed. When separations of 50 NM longitudinal, 50 NM lateral, 30 NM longitudinal and 30 NM lateral is initially implemented, the risk estimate is expected to be below the TLS. The assessment shows that the separation minima will meet ICAO SARPS.

f) **Proposed implementation date of the amendment:**

As soon as practicable after approval.

g) **Proposal circulated to the following States and organizations:**

Anguilla	French Antilles	Saint Maarten
Antigua and Barbuda	French Guyana	Spain
Argentina	Grenada	Suriname
Aruba	Guatemala	Trinidad and Tobago
Bahamas	Guyana	Turks and Caicos Islands
Barbados	Haiti	United Kingdom
Belize	Honduras	United States
Bermuda	Iceland	Uruguay
Bolivia	Ireland	Venezuela
Brazil	Jamaica	Virgin Islands (USA)
British Virgin Islands	Mexico	
Canada	Montserrat	
Cayman Islands	Norway	COCESNA*
Chile	Netherlands	ECCAA*
Colombia	Nicaragua	IATA*
Costa Rica	Panama	IBAC*
Cuba	Peru	IFALPA*
Curacao	Portugal	IFATCA*
Denmark	Puerto Rico (USA)	
Dominican Republic	Saint Kitts and Nevis	<i>* For information purposes only</i>
Ecuador	Saint Lucia	
El Salvador	Saint Vincent and the Grenadines	
France		

h) **Action by the Secretary General**

The proposed has been circulated to the following States and International Organizations.

i) **Secretariat comments:**

- 1) The United States, working together with the North Atlantic Systems Planning Group (NAT SPG) and the sub regional Working Groups of the Caribbean Region has undertaken the task of the implementation of required navigation performance 10 (RNP 10) and required navigation performance 4 (RNP 4) specifications for use of 50 NM and 30 NM lateral separation minima.
- 2) The Third North American, Central American and Caribbean Working Group (NACC/DCA/3) Meeting supported the implementation of PBN Airspace Concept for the CAR Region (Conclusion 3/1 refers). This proposal for PBN implementation plans is based on the NAM/CAR Regional Performance Based Air Navigation Implementation Plan (RPBANIP), which was supported by the Fifth Meeting of North American, Central American and Caribbean Directors of Civil Aviation (NACC/DCA/5).
- 3) The RNP 4 specifications have been implemented within the Australian Eastern Oceanic airspace, Auckland Oceanic FIR, Honiara FIR, Nauru FIR, Nadi FIR and the Oakland Oceanic FIR. On

November 2010 lateral separation minimum of 93 km (50 NM) was implemented on oceanic routes or areas within the control area(s) of the Gulf of Mexico, Anchorage Arctic FIR and Edmonton FIR. In December 2013 the RNP 10, minimum lateral separation of 93 km (50 NM), and RNP 4, minimum lateral separation of 55.5 km (30 NM), were implemented in the York Oceanic East FIR in accordance with the provisions of ICAO *PBN Manual*, Doc 9613.

- 4) Extended implementation of RNP 10 and RNP 4 in the CAR FIRs will enable more aircraft to operate on time, on new direct and efficient routes and at optimum flight levels, thereby reducing route lengths, fuel burn and CO2 emissions. In addition, en route capacity and Air Traffic Management (ATM) flexibility will be enhanced.
- 5) Monitoring arrangements for pre and post RNP 10 implementation have been established through the North American Approvals Registry and Monitoring Organization (NAARMO).