INTERNATIONAL CIVIL AVIATION ORGANIZATION

FIRST MEETING OF DIRECTORS OF CIVIL AVIATION OF THE CARIBBEAN REGION (CAR/DCA/1)

(Grand Cayman, Cayman Islands, 8-11 October 2002)

Agenda Item 4: Air Navigation

4.1 ATM Developments

Implementation of RNAV Routes, Required Navigation Performance (RNP) and Reduced Vertical Separation Minima (RVSM)

(Presented by the Secretariat)

SUMMARY
This working paper provides the civil aviation authorities of the CAR Region information on ATM developments such as: Implementation of RNAV Routes, Required Navigation Performance (RNP) and Reduced Vertical Separation Minima (RVSM)

References:

- Report of the CAR/SAM/3 RAN Meeting
- Report of the GREPECAS/10 Meeting
- Reports of the AP/ATM/1, AP/ATM/2 and AP/ATM/3 Meetings
- Project RLA/98/003
- Doc 9574 – Manual on Implementation of RVSM

1. Introduction

1.1 This working paper is aimed at presenting in a consolidated form several activities of Air Traffic Management (ATM) being carried out in a regional or interregional way in the CAR Region and CAR/SAM Regions respectively, that will allow Directors of Civil Aviation of the CAR Region to have an updated view on the following items: Implementation of RNAV Routes, Required Navigation Performance (RNP) and Reduced Vertical Separation Minima (RVSM).

2. **Discussion**

2.1 Implementation of RNAV Routes and Required Navigation Performance (RNP)

2.1.1 In keeping with the planning by the CAR/SAM Regional Planning and Implementation Group (GREPECAS), subsequently endorsed by the Third CAR/SAM RAN (CAR/SAM/3 RAN) Meeting, the decision was made to carry out pre-operational trials and demonstrations for long-haul flights between city pairs, to enable the gradual introduction of CNS/ATM elements in the CAR/SAM Regions and the use of avionics already installed on aircraft, thus allowing users to obtain substantial flight time and fuel savings.

2.1.2 Within the framework of Regional Project RLA/98/003 the First Meeting of Air Traffic Management (ATM) Authorities and Planners was held in Lima, Peru, on 18-21 July 2000, which decided to conduct pre-operational trials and demonstrations on three RNAV routes selected for implementation (Santiago de Chile-Lima/Miami, Sao Paulo/Miami and Rio de Janeiro/Miami).

2.1.3 The second meeting of ATM and Planners (AP/ATM/2) implemented three more routes (Buenos Aires/Miami, Sao Paulo/Los Angeles and Sao Paulo-Rio de Janeiro/New York).

2.1.4 As stated above, the tasks carried out by the two meetings have resulted in the implementation of pre-operational trials and demonstrations on six (6) RNAV routes and the process for their incorporation into the ATS route network of the CAR/SAM ANP and their definitive implementation has been started.

2.1.5 Furthermore, and as a result of the discussions held at the GREPECAS 10 meeting, another six RNAV routes were presented to the AP/ATM/3 Meeting (Lima, Peru, 20-24 May 2002) and a new implementation programme was approved for 5 of the 6 proposed routes [UL793 (Buenos Aires/New York), UL674 (Caracas/Houston), UL337 (Port of Spain/Miami), UL423 (Bogota/San Jose/Mexico) and UL471 (San Salvador/Miami)].

2.1.6 This last meeting also agreed to carry out pre-operational trials on **RNP/10** assignment on parallel routes UL 780 and UL 302 between Santiago de Chile and Lima, Peru, which will provide CAR/SAM Regions with the necessary experience for RNP implementation.

2.1.7 Project RLA/98/003 has turned out to be an excellent tool for implementation and assistance to States/International Organizations and at the same time has benefited users both technically and economically. **Appendix A** to this working paper shows the savings estimated by Project RLA 98/003 for RNAV routes implemented to date in the CAR/SAM Regions.

2.1.8 Information provided by IATA with regard to the benefits obtained by users shows that not only have the economic results been better than had been estimated earlier, but also, more important, improvements have been made which have a direct impact on safety. The main benefits obtained include the following:

a) Reduction of flight distances and times.
b) Significant savings of fuel and, consequently, of money.
c) Greater possibilities for attaining optimum flight levels.
d) Paths far from mountainous areas.

e) Flexible use of airspace by permitting the overflying of restricted areas and special use airspace.
f) Uniform application of longitudinal separation.
g) Improvement of some deficiencies in ground/air and ATS speech communications.

2.1.9 Despite successful RNAV route implementation, the co-ordination process has revealed that some factors are affecting it and should be corrected for a timely implementation of the RNAV routes proposed for the CAR/SAM Regions:

a) There is a tendency to assign the starting/end points of the proposed RNAV routes at a single point for all routes coming from the same sector, at already existing points and/or on FIR boundaries. This would make it impossible to implement parallel routes to relieve traffic congestion or to enable aircraft to fly in their optimum levels;

b) Existence of restricted and prohibited airspaces that affect some of the paths of the proposed RNAV routes and that significantly increase the distances to be flown; this requires close civil-military co-ordination; and

c) The preferred method is to incorporate the new RNAV routes into already existing arrival and departure paths, which suggests that the Administrations are not making a thorough analysis of the already existing conventional routes that coincide with or are close to the proposed RNAV routes.

2.1.10 This situation is due mainly to the fact that some States do not have a national programme for the implementation of RNAV routes, as well as the relevant study on the impact of the implementation of these routes on the airspaces and the efficient supply of air traffic services. It should be recalled that the responsibility of implementing improvements in CNS/ATM systems falls in the civil aviation administrations and it is not advisable to make isolated improvements, but rather they should be as co-ordinated as possible between adjacent administrations.

2.1.11 Based on the abovementioned, the Meeting could formulate the following Draft Conclusion:

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CONCLUSION 1/XX NATIONAL RNAV/RNP IMPLEMENTATION PROGRAMMES FOR THE CAR REGION

That civil aviation administrations in the Caribbean (CAR) Region develop, as soon as possible, national RNAV route and RNP implementation programmes that are consistent with the CAR/SAM regional RNAV route and RNP implementation programmes, allowing the study on the impact of the implementation of these routes and their RNP values on the airspace and air traffic services under their responsibility thus allowing that the implementation of these elements be performed in an integrated, harmonious and timely fashion in the CAR Region.

2.2 Reduced Vertical Separation Minima (RVSM)

2.2.1 The 1000-ft reduced vertical separation minimum (RVSM) between FL 290 and FL 410 has been successfully introduced in many ICAO regions, such as the North Atlantic airspace (NAT), Asia/Pacific (ASIA/PAC), the WATRS area (Northern Puerto Rico to New York), the South Atlantic (SAT) EUR/SAM corridor, and in the European Region (EUR). Other ICAO Regions also have short- and medium-term plans to implement RVSM. (See the chart in **Appendix B**).

2.2.2 The CAR and SAM Regions, for their part, have drawn up an RVSM implementation programme for 2004, which was approved by GREPECAS/10 through Conclusion 10/11, based on the evolution of Air Traffic Management (ATM) included in the Air Navigation Plan Facilities and Services Document (FASID).

2.2.3 Inasmuch as the United States of America has started an RVSM implementation programme in its domestic airspace, GREPECAS has requested that RVSM implementation programmes in CAR/SAM and NAM be harmonized to avoid, insofar as possible, dates and flight levels implementation incompatibilities that could jeopardize the safety of air operations on the borders of those regions

2.2.4 It is widely accepted that RVSM implementation will make it possible to use the airspace more efficiently without jeopardizing flight safety and that planning should be carried at a region-wide basis including a formal risk assessment and the establishment of safety management procedures.

2.2.5 In view of the above, GREPECAS has developed an implementation strategy that ensures an acceptable level of system safety in RVSM airspace at all times. It was agreed that an analysis of its impact on air traffic services (ATS) was needed to comply with CAR/SAM/3 Rec. 5/29 that established that to implement RVSM in the CAR/SAM Regions the risk of collision should be equal to or better than a level of safety (TLS) of 5×10^{-9} fatal accidents per flight hour due to the loss of vertical separation for all causes of risk.

2.2.6 The main benefit of RVSM is more efficient airspace use that permits a larger number of aircraft to fly at their optimum flight levels or as close as possible to them, with the resulting saving of fuel that translates into lower operating costs. This could result in cost savings for end consumers if possible increases in air fares can be delayed or reduced. According to information obtained from other regions where RVSM has already been implemented, the savings in fuel brought about by flying at more optimum levels amounts to between 1% and 1.5% per flight, resulting in larger economic benefits and lower costs than expected.

2.2.7 In order to obtain these benefits, many requirements need to be met and a series of commitments established before carrying out the RVSM implementation programme. This covers a series of aspects to be evaluated, such as administrative and economic, institutional and technical/operational matters, which will have a direct impact on the successful implementation of this programme.

2.2.8 With regard to administrative and economic aspects experience obtained in other regions indicates that implementation of this programme will require a complex and costly effort by

all of the parties and a formal commitment on the part of each of the actors involved, users, States, ATS service providers and international organizations.

2.2.9 Users must assume the costs of inspection, modification and certification of their aircraft by aircraft type or group. The first important step is the approval of aircraft and operators by the aeronautical authority. One of the major pitfalls that the Region must face is the characteristics of the fleet that operates in the CAR/SAM Regions, particularly its obsolescence in some States. Some of these aircraft will never be able to obtain approval to fly in RVSM environments because the very high costs of any modifications, replacements or additions necessary for their approval would make its implementation virtually impossible.

2.2.10 This is an aspect that has been taken into consideration in the approval of the implementation programme. A review of the fleet in the CAR/SAM Regions is being carried out to determine exactly what percentage of aircraft operating in the region will be unable to receive approval for RVSM flight and according to the results, review the two-stage RVSM implementation programme approved by GREPECAS/10. If the level or percentage of aircraft that will be unable to obtain RVSM approval is small, RVSM implementation should be carried out in a single phase to avoid the problems of two-phase implementation, in the understanding that the negative impact on aircraft lacking RVSM approval would be kept to the minimum required. It is expected that the GREPECAS/11 Meeting, (Brazil, December 2002) take a final decision on RVSM implementation in the CAR/SAM Regions.

2.2.11 In turn, the States will have to meet requirements with regard to regulations, safety oversight, procedure development, personnel training, quality assessment, preparation of handbooks and publications and, most important, the establishment of a national RVSM implementation programme.

2.2.12 This national RVSM programme should be compatible with and fall within the Regional RVSM implementation programme, with the assignment of officials who will be responsible for the programme and, at the same time, have sufficient authority to act as counterparts of the Regional Programme. Each State and ATS service provider must make a commitment to obtain the necessary funds and have an assigned budget so that the programme can be carried out without mishaps, by means of active participation in regional events, training programmes, dissemination of the programme, etc.

2.2.13 Regarding Institutional aspects, the RVSM implementation strategy is based on its execution in all of the CAR/SAM Flight Information Regions (FIRs), which means that regional agreements will be required for its implementation. Aspects such as the approval of the common documentation needed for the approval of RVSM aircraft, the training programmes for both pilots and controllers, airspace safety assessments and implementation of a monitoring agency are all regional issues and should be addressed as such.

2.2.14 Today, more than ever, a joint effort is required by all of the agents involved in order to make the most of the few available economic resources, utilise the capacities of the ATS systems to the fullest, lower operating costs, make more efficient use of the airspace and raise the levels of safety. ICAO promotes and encourages agreements to this effect. Project RLA 98/003– Transition to the CNS/ATM Systems in the CAR/SAM Regions itself is an example of this policy in the CAR/SAM Region.

2.2.15 The technical/operational aspects are being duly examined by the GREPECAS ATM/CNS Subgroup through the ATM Committee and their Task Forces and by the meetings of ATM authorities and planners sponsored by Project RLA 98/003.

2.2.16 The GREPECAS 10 meeting (Conclusion 10/12) accepted the proposal of Brazil to establish the agency to monitor the performance of safety systems in the CAR/SAM airspace until a regional agreement is reached for the implementation of a regional monitoring agency. This CAR/SAM Monitoring Agency (CAR/SAM MA), in coordination with the parties involved, should take appropriate measures to collect the relevant and necessary information for executing the implementation programme and carrying out the continuous monitoring of RVSM operations to ensure that the established minimum requirements are not violated.

2.2.17 A summary of the RVSM implementation programme for the CAR/SAM Regions, establishing the various tasks to be completed to ensure successful RVSM implementation is presented as **Appendix C** to this working paper.

2.2.18 Based on the aforementioned, the meeting is invited to formulate the following draft conclusion:

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CONCLUSION 1/X - DEVELOPMENT OF A NATIONAL RVSM IMPLEMENTATION PLAN IN THE STATES/TERRITORIES/COCESNA IN THE CAR REGION

The CAR States/Territories/COCESNA are urged to prepare, as soon as possible, a national plan for RVSM implementation within the framework of the CAR/SAM regional RVSM implementation programme that would consider the administrative, economic, institutional and technical/operational aspects required for its execution.

3. Suggested Action

3.1 The Meeting is invited to review the information on the different ATM aspects presented in this working paper, and if pertinent, approve actions suggested regarding implementation of RNAV/RNP and RVSM.

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