



AP/ATM/3

INTERNATIONAL CIVIL AVIATION ORGANIZATION

South American Regional Office

UNDP/ICAO Regional Project RLA/98/003

Transition to the CNS/ATM Systems in the CAR/SAM Regions

REPORT

Third Meeting/Workshop of Air Traffic Management

Authorities and Planners

(AP/ATM/3)

(Lima, Peru, 20 to 24 May 2002)

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HISTORY OF THE MEETING

ii-1 PLACE AND DURATION OF THE MEETING

The Third Meeting/Workshop of Air Traffic Management (ATM) Authorities and Planners, was held in Lima, from 20 to 24 May 2002, at the premises of the South American Regional Office.

ii-2 OPENING CEREMONY AND OTHER MATTERS

Ms. Nohora Arias Fandiño, MET Officer, Lima, on behalf of Mr. José Miguel Ceppi, Regional Director, welcomed the participants and highlighted the objectives of the meeting, giving a brief explanation on the issues, which would be dealt with. Likewise, Mr. Julio Canaval Barroso, Air Navigation Director, on behalf of the General Director of Civil Aviation from Peru, addressed the meeting and welcomed the participants emphasizing the importance of the issues to be dealt with.

ii-3 SCHEDULE, ORGANIZATION, WORKING METHODS, OFFICERS AND SECRETARIAT

The Meeting held its sessions from 0900 to 1500 hours, with appropriate breaks. Work was done with the Meeting as a Single Committee, and Ad-hoc Groups worked during the schedule of the Meeting to discuss certain items on the Agenda.

Mr. Rodolfo Beltrán, member from the Bolivian Delegation, was unanimously elected as Chairman of the Meeting, and Mr. Randolph Jones, from the Delegation of Jamaica was elected as Vice-Chairman. Mr. Jorge Fernández, ATM/SAR Regional Office, Lima, acted as Secretary, being assisted by Mr. Gustavo De León, ATM/SAR Regional Officer, Mexico. Additional cooperation was received from the following ICAO Officers:

Mr. Alberto Orero, ATM/SAR Regional Officer, SAM Regional Office
Mr. José Moreno, ATM Consultant, Project RLA/98/003

On Wednesday 22 May, experts from the FAA of the United States, made a series of RVSM presentations, which were highly appreciated by the meeting.

ii-4 WORKING LANGUAGES

The working languages of the Meeting and its relevant documentation were English and Spanish.

ii-5 **AGENDA**

The following agenda was adopted:

- Agenda Item 1: Evaluation of pre-operational trials and demonstrations in RNAV routes UT 410 (Buenos Aires-Miami), UT 655 (Sao Paulo-Los Angeles) and UT 776/UT 419 (Sao Paulo/Rio de Janeiro-New York) for their definitive implementation.
- Agenda Item 2: Implementation of routes UL 670 (Bogotá/Kingston/New York), UL 793 (Buenos Aires/New York), UL 674 (Caracas/Houston), UL 337 (Port-of-Spain/Miami), UL 423 (Bogotá/San José/México) and UL 471 (San Salvador/Miami).
- Agenda Item 3: Analysis of the Action Plan for the Implementation of RNP 10 pre-operational Trials and Demonstrations Programme in the route UL 780 and its parallel route, for its approval.
- Agenda Item 4: Analysis of the Action Plan for RVSM Implementation in the CAR/SAM Regions.
- Agenda Item 5: Other matters.

ii-6 **ATTENDANCE**

Six States of the CAR Region, and 13 States of the SAM Region and 2 International Organizations, COCESNA and IATA, totaling 50 participants, attended the meeting. The list of participants is shown in pages iii-1 to iii-11.

ii-7 **LIST OF CONCLUSIONS OF THE AP/ATM/3 MEETING**

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Agenda Item 1: Evaluation of pre-operational trials and demonstrations in RNAV routes UT 410 (Buenos Aires-Miami), UT 655 (Sao Paulo-Los Angeles) and UT 776/UT 419 (Sao Paulo/Rio de Janeiro-New York) for their definitive implementation.

UT 410 / UT 655

1.1 The meeting took note of the information provided by States, the Secretariat and IATA on the results obtained during the evaluation of trials and demonstrations of RNAV routes UT 410 and UT 655.

1.2 From the information received, it emerged that pre-operational trials and demonstrations in routes RNAV UT 410 and UT 655 had been carried out totally normal, and without operational difficulties, and otherwise the achievements were of utmost importance. Among others, the main benefits obtained were as follows:

- a) Reduction of distances and flight times.
- b) Significant fuel savings with the consequent money saving. As reported by IATA on this regard, the estimated annual savings would be: **UT 655** Sao Paulo-Los Angeles (60 NM), estimated US\$ 2.800.000 of annual savings. **UT 410** Buenos Aires-Miami (40 NM) estimated US\$ 2.800.000 of annual savings.
- c) Greater possibilities to obtain optimum flight levels.
- d) Flexible use of the airspace permitting overflights in restricted areas and special use airspaces.
- e) Uniform application of longitudinal separation.
- f) Improvements of some deficiencies in ATS ground/air speech communications.
- g) Accomplishment of great experience of ATS services providers' personnel involved in planning and implementation.
- h) Use of the Mach Number Technique.
- i) Significant improvements in the process of coordination among all parties involved in these pre-operational trials and demonstrations.
- j) Progressive increase of users of commercial air transport as well as general aviation.

1.3 In general, from the deficiencies observed the following are emphasized:

- a) During the coordination stage previous to the trials and demonstrations commencement, last-minute changes have unilaterally been made in the trajectories, causing confusion among those involved in the identification and in the significant points and geographical coordinates. In order to avoid repetition, the trajectories agreed in the meeting should be maintained, and if some modifications were necessary, those involved should be informed with enough time.
- b) During the publication of geographical coordinates carried out by States and International Organizations, to indicate the degrees, minutes and seconds, different precision levels were used. The same situation occurred in the coordination process to establish definitive coordinates of the significant points located along the respective trajectories.

1.4 The meeting took note of the benefits and deficiencies aforementioned, which were particularly analyzed. In case of deficiencies, several comments were made with regard to the pertinent actions for its deletion. Among these actions, special attention was drawn to the following:

- a) **WGS-84 and precision level:** The meeting recognized the importance of using WGS-84 geographic coordinates (as required by GREPECAS and ICAO Annex 11), as well as the importance of using the same precision value to indicate geographic coordinates, keeping in mind Annex 4, Chapter 8, Area Chart, which establishes the use of degrees, minutes and seconds.
- b) **Reporting points:** The trend to establish excessive reporting points to facilitate air traffic control, complicates the preparation and interpretation of navigation charts, and also has influence in ATM automation. In this respect, the need to maintain a reasonable balance upon its establishment would arise.

1.5 From the information provided, the following emanates:

UT 655

- a) Pre-operational trials and demonstrations effective date was foreseen in the action plan prepared during the AP/ATM/2 meeting for 04 October 2001. In general terms, and after the coordinations carried out between the parties involved, which enable to overcome some difficulties, route UT 655 was finally implemented on 01 November 2001 to finalize 11 July 2002.
- b) Lack of publication of standardized exit/entry routes (SID/STARS) at the beginning, end and along the routes, which would have simplified instrument navigation to enter and/or exit the same.

UT 410

- a) 10-minutes minimum longitudinal separation and/or RNAV 80 NM was not homogeneously applied along all the route, thus affecting the efficient use of the airspace. However, the meeting acknowledged the fact that during the SAM ATM/CNS NNW/1 Informal Meeting (Lima, 8-12 April 2002), in which Bolivia, Brazil, Colombia and Perú participated, the application of 10-minutes minimum longitudinal separation and/or RNAV 80 NM was approved in ATS international routes crossing their FIR boundaries, as of 13 June 2002.
- b) Likewise, and with regard to a) above, Venezuela informed the meeting that they have programmed the finalization of installation of VHF communications equipment for the month of June, which shall enable the application of such longitudinal separation as of July 2002, once acceptance trials of this equipment have finalized.
- c) Pre-operational trials and demonstrations effective date was foreseen in the action plan prepared during the AP/ATM/2 meeting for 04 October 2001. In general terms, and after the coordinations carried out between the parties involved, which enable to overcome some difficulties, the route was finally implemented on 01 December 2001 to finalize 11 July 2002.
- d) Lack of publication of standardized exit/entry routes (SID/STARS) at the beginning, end and along the routes, which would have simplified instrument navigation to enter and/or exit the same.

1.6 Likewise, as per one of the delegate's observation the meeting agreed to change the designation of UT 410 by another, in order to avoid confusion between such designator and FL 410. To this effect, the Secretariat informed that the new designator for the implementation of such RNAV route will be **UL 417**.

UT 776 / UT 419

1.7 The meeting took note that among the minimum requirements to make trials and demonstrations, air traffic control services should be provided along all the routes, to which AP/ATM/2 Meeting formulated Conclusion 2/7 - Measures to complement trials and demonstrations on routes UT 776/UT 419, in which literal a) Guyana undertook to provide area control services in the Georgetown FIR starting in September 2001, to allow route UT 776/UT 419 to be a controlled ATS route all along.

1.8 However, in view of some delays, Georgetown ACC was finally implemented on 21 March 2002, which meant to postpone the implementation and beginning of pre-operational trials and demonstrations in routes UT 776 and UT 419 for 11 July 2002, with finalization date 10 July 2003. For this reason, the new dates of the activities under the responsibility of States/Organizations, users, IATA and ICAO established during the AP/ATM/2 Meeting, would be those shown in **Appendix A** to this part of the Report.

1.9 In this connection, the meeting expressed their congratulations to the Administration of Guyana for the great effort made in the management and economical aspects, carried out in the implementation of the ACC, which enhances even more their decision to reach the goals implicated for the Regional CNS/ATM implementation.

1.10 Likewise, it should be emphasized that the trajectory and significant points of route UT 776, which were established by AP/ATM/2 meeting and are shown as Appendix C to Agenda Item 3 report, have been modified in view of the following causes:

- a) Request of the aeronautical authority of United States, by means of which aircraft entering San Juan FIR by route UT 776, up to V. C. Bird VOR/DME, continue by the current route A 312 up to GRANN and then by route A 534 until VOR/DME JFK.
- b) Modifications in air circulation in the Brasilia FIR and Sao Paulo TMA as of 11 July 2002, as informed by Brazil on this respect.

1.11 With reference to the inclusion of route UT 419 to the CAR/SAM ANP ATS routes network, and taking into consideration that starting from TIRIO (boundary BELEM/PARAMARIBO FIR), the trajectory up to New York is coincident with the trajectory of route UT 776, the Brazilian delegation expressed its conformity to incorporate route UT 419 to the national ATS routes network, for use of international and national aviation, in the segment Rio de Janeiro/TIRIO. For this reason the meeting agreed to formulate the following conclusion:

Conclusion AP/ATM/3/1

Definitive implementation of RNAV route UT 419 in the Brazilian National ATS Routes Network

That, according to the proposal, Brazil incorporate route UT 419 to the national ATS routes network in the segment from Rio de Janeiro up to TIRIO, with designation UT 419.

1.12 Consequently, the meeting agreed the final trajectory of route UT 776 presented in **Appendix B** of this part of the report.

1.13 Likewise and in view of the above, the meeting agreed to formulate the following conclusion:

Conclusion AP/ATM/3/2

Definitive Implementation of RNAV Routes UT 410, UT 655 and UT 776 with their new designators UL 417, UL 655 and UL 776

That ICAO Secretariat, using the model presented in **Appendix C** of this part of the Report and on behalf of CAR/SAM States involved in the mentioned routes:

- a) Start the amendment process of the Basic CAR/SAM Air Navigation Plan to incorporate RNAV routes UL 417, UL 655 and UL 776;

- b) The following routes: UL 315, in the segment RIO BRANCO VOR/DME (RBC)/BIVAM, and UL 415 in the segment KOLSA/ PARANA VOR/DME (PAR) be deleted in the same amendment.

1.14 Consequent with the aforementioned conclusion, the States involved in the definitive implementation of route UT 776 should issue an AIP Supplement (AIRAC) using the guides presented in **Appendix D and its Annex 1** to this part of the report, describing the new routes structure with the modifications made during the current meeting and the procedures being applied, as well as their validity up to 10 July 2003, date in which they would be definitively implemented.

1.15 In addition, and in spite of the fact that an AIC has been issued with the general information on routes UT 410 (now UL 417), UT 655 and the procedures applied for same, the States involved should issue a new AIC similar to the previous one, reaffirming such information. As a result of the above, the meeting concluded the following:

Conclusion AP/ATM/3/3

AIP (AIRAC) and AIC Supplement Publication for the extension of validity of the routes use

That the States affected by the extension of validity of routes **UT 410, UT 655:**

- a) Issue an AIP (AIRAC) Supplement, describing the routes structure, starting date of pre-operational trials and demonstrations as well as the extension of validity, up to **10 July 2003;**
- b) Publish a new AIC with the general information of the route and the procedures applied in the same; and
- c) In the AIC mentioned in b) above, Argentina, Bolivia and Brazil shall inform that routes UL 315 in the segment RIO BRANCO VOR/DME (RBC) BIVAM, and UL 415 in the segment KOLSA and PARANA VOR/DME (PAR), continue suspended.
- d) For such activities, use guidelines shown in Appendix D to this part of the report and its Annex.

Appendix A

RNAV Route UT 776 (Sao Paulo / New York)

Schedule for the implementation of the pre-operational trials and demonstrations

- Publication of AIC and AIP Supplement
Completion date: **16/05/2002**
- Effective date of pre-operational trials and demonstrations:
Completion date: **11/07/2002**
- Data collection of trials and demonstrations:
Completion date: **05/09/2002**
- Target date of evaluation period of trials and
Demonstrations: **31/10/2002**
- Data Processing of trials and demonstrations: **31/10/2002**
- Coordinate data processing: **08/11/2002**
- Evaluation meeting (AP/ATM/4): (to be confirmed) **02-06/12/02**
- Completion of trials and demonstrations: **10/07/2003**

Appendix B

Approximate Geographical Coordinates of route UT 776

UT 776 SAO PAULO / NEW YORK			
FIR or significant points	LATITUDE	LONGITUDE	CODE
BRASILIA VOR/DME	S 15° 52' 25.20	W 048° 21' 16.80	BRS VOR/DME
BRASILIA / BELEM	S 10° 23' 58.20''	W 050° 30' 02.4''	MEVOS
BELEM / PARAMARIBO	N 02° 13' 08.40	W 055° 56' 30.60	TIR NDB
PARAMARIBO / GEORGETOWN	N 05° 32' 54	W 057° 12' 54	NEKOB
GEORGETOWN / PIARCO	N 08° 55'	W 058° 31' 24	KAISO
V C BIRD VOR/DME	N 17° 07' 36	W 061° 47' 53	ANU
PIARCO / SAN JUAN	N 17° 51' 03.4	W 062° 14' 12.1	ODKAM (1)
A 312	-----	-----	GRANN (2)
A 523	-----	-----	JFK VOR/DME
(1) A 312 (2) A 523			

FIRs involved: Brasilia, Belem, Paramaribo, Georgetown, Piarco, San Juan, New York Oceanic.

Appendix C

Proposal for amendment to incorporate routes UL 417, UL 655 and UL776 in Table ATS-1 ATS Routes Network to the CAR/SAM Basic ANP – ATM

Subject: Proposal for amendment to the CAR/SAM Air Navigation Plan (Serial N° SAM -XX-ATM)

a) **Plan:** Basic CAR/SAM ANP (Doc. 8733)

b) **Proposal for Amendment:**

1. **Add** the requirement for new ATS routes UL 417, UL 655 and UL 776, as follows:

Upper airspace UL 417	Upper Airspace UL 655
CERES (ERE) VOR/DME	BAURU (BRU) NDB
MONTE QUEMADO (MTQ) VOR	EGIMO
ELAKA	ISENA
ISARA	ASAPA
BRANCO (RBC) VOR/DME	PABON
ARUXA	ASEPI
PABON	EGODI
IROTI	ANDEM
EGAPO	ASOKU
MANLEY (MLY) VOR/DME	UGATA
PULKA	NAUTLA (NAU) VOR/DME
MANZANILLO (UMZ) VOR/DME	IREKO
	CONCEPCIÓN (CDR) VOR/DME
	UDIPO
	PEÑASCO (PPE) VOR/DME
	ASUTA
	JULIAN (JLI) VOR/DME

Upper airspace UL 776
BRASILIA (BRS) VOR/DME
MEVOS
TIRIOS (TIR) NDB
NEKOB
KAISO
ANU

(cf – Doc. 8733, Table ATS-1 – ARN)

2. **Suppress** the requirement of the segment RIO BRANCO VOR/DME (RBC)/BIVAM route UL 315 and the segment KOLSA/PARANA VOR/DME (PAR) route UL 415.

(cf.- Doc 8733, Table ATS-1 – ARN)

c) **Originated by:** Argentina, Bolivia, Brazil, Colombia, Cuba, Guyana, Jamaica, Mexico, Panama, Suriname, Trinidad and Tobago, United States.

d) **Reasons of the originator for the amendment:**

1. Within the framework of ATM Evolution as approved by the Third CAR/SAM Regional Air Navigation Meeting (RAN CAR/SAM/3) the States and International Organizations, which originate this proposal for amendment have carried out pre-operational trials and demonstrations in RNAV routes RNAV UT 410, UT 655 and UT 776 (now proposed as UL 417, UL 655 and UL 776, respectively), duly coordinated with users.
2. The result of these pre-operational trials and demonstrations has been highly satisfactory, reason for which it is considered that these routes are stable enough to be incorporated to the ATS routes network of the Basic CAR/SAM ANP. This agreement was taken at the Third Meeting/Workshop of Air Traffic Management (ATM) Authorities and Planners (AP/ATM/3) held in Lima, Peru, from 20 to 24 May 2002.
3. The deletion of routes UL 415 and UL 315 will optimize the CAR/SAM ATS routes network structure.

e) Proposed date for implementation:

Two AIRAC cycles after the proposal for amendment be approved by ICAO Council.

f) Proposal circulated to the following States/Territories and Organizations:

Antigua and Barbuda
Antillas Neerlandesas (NK)
Anguilla (UK)
Argentina*
Aruba (NK)
Bahamas
Barbados
Bermuda (UK)
Belize
Bolivia*
Brazil*
British Virgin Islands (UK)
Canada
Cayman Islands (UK)
Chile
Colombia*
Costa Rica
Cuba*
Dominica
Dominican Republic
Ecuador
El Salvador
France
French Antilles (France)
French Guyana (France)
Germany
Grenada
Guatemala
Guyana
Haïti

Honduras
Italy
Jamaica*
Mexico*
Montserrat
Nicaragua
Panamá*
Paraguay
Perú
Puerto Rico (USA)
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the Grenadines
Spain
Suriname*
Trinidad and Tobago*
Turks and Caicos Islands (UK)
United Kingdom
United States*
Uruguay
Venezuela
Virgin Islands (USA)

International Organizations
COCESNA*
IATA*
IFALPA*

* For information

g) Comments of the Secretariat:

1. The inclusion of routes UL 417, UL 655 and UL 776 in the Basic Air Navigation Plan for the CAR/SAM Regions is framed within the ATM evolution process in the CAR and SAM Regions, as approved by GREPECAS and further addressed through CAR/SAM/3 RAN Recommendations 5/14, 5/15 and 5/16.
2. The trajectories have been configured keeping in mind the need to save fuel and air operations economy and its inclusion in the ANP will permit a wider use of such routes, favoring a greater number of the mentioned airspace users.
3. These ATS routes are being used in pre-operational trials, as part of RNAV trials of the CAR/SAM Regions, within the framework of Project RLA/98/003.
4. The deletion of routes UL 415 and UL 315 will optimize the CAR/SAM ATS routes network structure.

Appendix D

Activities to extend the validity of RNAV routes UT410 and UT655

Activity	Publication date of the AIRAC Supplement	Validity date of routes UT 410 and UT 655	Remarks
Publication of AIP Supplement (AIRAC) extending the validity and publication of the corresponding AIC	13 June 2002	11 July 02 to 10 July 03	Step 2) and 5) (and 6 in case of modifications) of the Guide included as Annex 1 to this Appendix.

Attachment to Appendix D

COMMON REQUIREMENTS GUIDE FOR PROMULGATION OF RNAV TEMPORARY ROUTES

The purpose of this guide is to establish a common methodology for States affected in the implementation of temporary RNAV routes.

1. **Consider the dates scheduled in the AIRAC calendar to promulgate the AIP Supplement.**
2. An AIP Supplement identified by the acronym “AIRAC”, should be published and promulgated, indicating the validity period on a temporary basis of RNAV route along with technical-operational characteristics of the same.
3. An Appendix to the Supplement should be prepared, containing a graphic with the route trajectory within the respective airspace.
4. A final note to the Supplement should be included, clearly indicating that in order to obtain complementary information on the established route referring to the AIC Serial Number which will be promulgated together with the Supplement and which will contain all the information of an administrative nature regarding the implementation of the referred RNAV route.
5. For the enlargement of the validity period and/or modifications of the technical/operational aspects of the route, a NOTAM should be promulgated containing the reference of the Supplement Serial previously issued.
6. If necessary modify aspects related to the information promulgated in the AIC published, a new AIC replacing the previous one should be published.

* * * * *

Agenda Item 2: Implementation of routes UL 670 (Bogotá/Kingston/New York), UL 793 (Buenos Aires/New York), UL 674 (Caracas/Houston), UL 337 (Port of Spain/Miami), UL 423 (Bogotá/San José/México) y UL 471 (San Salvador/Miami).

2.1 The meeting took note of the information presented by the Secretariat, shown in **Appendix A** to this part of the report and, taking into account the problematic stated and with the purpose of expediting the discussion, considered that it was more convenient to establish Ad-hoc Groups composed by all the representatives of the FIRs involved in each one of the RNAV routes proposed, in order to analyze and seek for solutions that could solve the difficulties found, determine the trajectories of these six RNAV routes and establish the necessary agreements for the proposal for amendment to ANP CAR/SAM – Basic Vol. and its further implementation.

2.1.1 On the other hand, United States informed to the meeting that their national regulations do not consider the possibility to use RNAV designators within their airspace; those designators corresponding to those RNAV routes implemented or scheduled to be implemented by GREPECAS and which enter into their jurisdiction, shall be used up to the reporting point corresponding to the FIR boundary. Further, the trajectory of such routes shall be coincident with the trajectory of conventional routes established, using designators of these latter routes already published.

2.1.2 Notwithstanding this, United States also informed to the meeting that a survey is being carried out to change the national regulations in order to use ICAO designators within the United States' airspace.

2.2 The reports of the Ad-hoc Groups were the following:

Route UL 670 (Bogota/Kingston/New York), composed by Colombia, Jamaica, Cuba, Haiti and United States

2.2.1 The Ad-hoc Group was composed by IATA and delegates from Continental Airlines and Avianca, who would be the potential users of the route. From the corresponding analysis of the proposed trajectory of this route, it was concluded that:

- a) The proposed trajectory concurs with the trajectories of the current ATS routes;
- b) Such trajectory would end in the limit of the Havana and Miami Oceanic FIRs, in a distance higher to 1000 NM of the New York airport, point where the aircraft should incorporate to the current structure of conventional ATS routes; and
- c) The airlines representatives informed that the trajectory of the proposed route does not present operational advantages in respect to the current routes.

2.2.2 In order to direct the route to a more convenient point, United States is required to evaluate a new more direct trajectory that could be incorporated in the routes structure of the FIRs under their administration, in BURTT intersection (31° 40.1 N 073° 13.0 W.).

2.2.3 The Ad-hoc Group recommended to withdraw route UL 670 from the proposal for amendment until United States provides the definitive information in the AP/ATM/4 meeting. For which, the following conclusion was formulated:

Conclusion AP/ATM/3/4 Withdrawal of route UL 670 (Bogota/Kingston/New York) from the proposal for amendment to the ANDP CAR/SAM – Basic Vol.

That, considering that the proposed trajectory for route UL 670 (Bogota/Kingston/New York) would not enable to obtain operational advantages in comparison to the routes currently in use by the users operating among those cities, it is agreed:

- a) Not to include route UL 670 in the proposal for amendment to the ANP CAR/SAM – Basic Vol.
- b) Request United States to evaluate a new more direct trajectory that could be incorporated in the routes structure of the FIRs under their administration in BURTT intersection (31° 40.1 N 073° 13.0 W.); and
- c) That such information be provided in the AP/ATM/4 meeting.

Route UL 793 (Buenos Aires/New York), composed by Argentina, Paraguay, Bolivia, Brazil, Venezuela, Curaçao, Santo Domingo and United States

2.2.4 After reviewing the different alternatives for this route, the Ad-hoc Group proposed a modification in order that the route trajectory starts/ends in GUALEGUAYCHU (GUA) VOR/DME – OWENZ, according to the route description presented in **Appendix B** of this part of the report and continue in routes already established in Ezeiza and New York Oceanic FIRs.

2.2.5 Likewise, with the purpose of avoiding that the proposed route overlaps or interferes with the current routes, the Ad-hoc Group proposed the cancellation of route UL 216 in the segment Porto Velho (PVH) VOR/DME – Resistencia (SIS) VOR/DME; for this reason the following was agreed:

Conclusion AP/ATM/3/5 Implementation of route UL 793 (Buenos Aires/New York)

That:

- a) The SAM and NACC Regional Offices initiate the amendment process for the incorporation of route UL 793 (Buenos Aires/New York) in the ANP CAR/SAM – Basic Vol., according to the description presented in **Appendix B** to this part of the report;
- b) Route UL 793 (Buenos Aires/New York) two AIRAC cycles be implemented after the approval of the proposal for amendment by the ICAO Council;

- c) The Implementation Schedule included in **Appendix C** to this part of the report be applied; and
- d) The same process of amendment include the cancellation of route UL 216 in the segment PORTO VELHO (PVH) VOR/DME – RESISTENCIA (SIS) VOR/DME.

Route UL 674 (Caracas/Houston), composed by Venezuela, Curaçao, Santo Domingo, Jamaica, Cuba, Mexico and United States

2.2.6 Curaçao requested that the entrance and exit of this route be adjusted to the procedures used for conventional air traffic operating between Maiquetia and Curaçao:

- a) To the South – ABA (VOR Aruba) – ALCOT – PNA (VOR Punta San Juan) – MIQ (VOR Maiquetia);
- b) To the North – MIQ (VOR Maiquetia) – AVELO – PJG (VOR Curaçao) – ABA (VOR Aruba).

2.2.7 Minor modifications were made to the proposed route in order to align it to the current points. In this respect, the Ad-hoc Group formulated the following conclusion:

Conclusion AP/ATM/3/6 Implementation of route UL 674

That:

- a) The SAM and NACC Regional Offices initiate the amendment process for the incorporation of route UL 674 (Caracas/Houston) in the ANP CAR/SAM – Basic Vol, according to the description presented in **Appendix B** to this part of the report;
- b) Route UL 674 (Caracas/Houston) two AIRAC cycles be implemented after the approval of the proposal for amendment by the ICAO Council;
- c) The Implementation Schedule included in **Appendix C** to this part of the report be applied.

Route UL 337 (Port of Spain/Miami), composed by Venezuela, Dominican Republic, Haiti and United States

2.2.8 The Ad-hoc Group discussed all the operational and regulatory aspects which might motivate an eventual modification of route UL 337, taking into consideration the impact that the trajectory proposed would cause in the provision of Air Traffic Services, keeping in sight the convenience to keep the track as direct as possible.

2.2.9 After analyzing all the details involved, it was determined in a consensual manner to introduce the modifications shown in **Appendix B** to this part of the report, in which the definitive proposal for the structure of route UL 337 is presented. In view of the afore-mentioned and after discussing the most convenient date so that all aspects to be considered may be duly completed, the Ad-hoc Group agreed the following conclusion:

Conclusion AP/ATM/3/7 Implementation of route UL 337 (Port of Spain/Miami)

That:

- a) The SAM and NACC Regional Offices initiate the amendment process for the inclusion of route UL 337 (Port of Spain/Miami) in the ANP CAR/SAM – Basic Vol., according to the description shown in **Appendix B** to this part of the report;
- b) Route UL 337 (Port of Spain/Miami) two AIRAC cycles be implemented after the approval of the proposal for amendment by the ICAO Council; and
- c) The Implementation Schedule included in **Appendix C** to this part of the report be applied.

2.2.10 Additionally, the Ad-hoc Group discussed, jointly with the delegates of Netherlands Antilles, the convenience of the implementation of the segment Cabo Codera (CBC) VOR/DME - Great Inagua (ZIN) NDB of route UL 304, taking into account that, for many years, the users have requested and obtained the clearance of Air Traffic Control units to fly such segment, in a direct manner, which is already included in the ANP CAR/SAM – Basic Vol. In view of the above the following conclusion was formulated:

Conclusion AP/ATM/3/8 Implementation of segment Cabo Codera (CBC) VOR/DME – Great Inagua (ZIN) of route UL 304

Venezuela, Netherlands Antilles, Dominican Republic, Haiti and United States, considering that segment Cabo Codera (CBC) VOR/DME – Great Inagua (ZIN) NDB of route UL 304 is already included in ANP CAR/SAM – Basic Vol., agreed its implementation for 3 October 2002.

Route UL 423 (Bogota/San Jose/Mexico), composed by Colombia, Panama, Mexico, COCESNA and IATA

2.2.11 After reviewing the different alternatives for this route and in order to improve the routing of air traffic to San Jose and Mexico, the Ad-hoc Group proposed a modification so that the trajectory of route UL 423 (Bogota/San Jose/Mexico) starts/ends in AMBALEMA (ABL) NDB – TEQUIS (TEQ), according to the description of the route shown in Appendix B to this part of the report. In view of the above, the Ad-hoc Group formulated the following conclusion:

Conclusion AP/ATM/3/9 Implementation of route UL 423 (Bogota/San Jose/Mexico)

That:

- a) The SAM and NACC Regional Offices initiate the amendment process for the inclusion of route UL 423 (Bogota/San Jose/Mexico) in the ANP CAR/SAM – Basic Vol., according to the description shown in **Appendix B** to this part of the report;
- b) Route UL 423 (Bogota/San Jose/Mexico) two AIRAC cycles be implemented after the approval of the proposal for amendment by the ICAO Council; and
- c) The Implementation Schedule included in **Appendix C** to this part of the report be applied.

Route UL 471 (San Salvador/Miami), composed by Cuba, COCESNA and IATA

2.2.12 When reviewing the proposed trajectory of route UL 471 (San Salvador/Miami), the Ad-hoc Group analysed two relevant aspects affecting same:

- a) The existence of two dangerous areas that would be crossed by the route:
 - the dangerous zone MH (D)-5 (FL 300/8000) activated through NOTAM, located in Honduras airspace; and
 - the special use airspace K (W)-174 D (FL 700/MSL) activated through NOTAM, located in Havana FIR.
- b) The need that the proposed route changes the origin/destination points due to special requirements related with the transition to/from the airspaces administrated by El Salvador and the ARTCC (ACC) of Miami.

2.2.13 The Ad-hoc Group considered convenient to define the minimum flight level usable in the route, consistently with the minimum flight levels usable in the other RNAV routes to be implemented. In this respect, the following conclusion was formulated:

Conclusion AP/ATM/3/10 Implementation of route UL 423 (Bogota/San Jose/Mexico)

That:

- a) The SAM and NACC Regional Offices initiate the amendment process for the inclusion of route UL 471 (San Salvador/Miami) in the ANP CAR/SAM – Basic Vol., according to the description shown in **Appendix B** to this part of the report;
- b) Route UL 471 (San Salvador/Miami) two AIRAC cycles be implemented after the approval of the proposal for amendment by the ICAO Council; and
- c) The Implementation Schedule included in **Appendix C** to this part of the report be applied.

2.2.14 The delegate from COCESNA requested the meeting to include in the implementation process of the RNAV routes from the CAR/SAM regions, the route San Jose/Miami, taking into account that there is a significant traffic movement between these two city pairs. As this route is not included in the RNAV routes list approved by GREPECAS/10 and its implementation would only affect the Central American and Havana FIRs, the Secretariat informed on the most expeditious method to follow, for which reason the following conclusion was formulated:

Conclusion AP/ATM/3/11 Proposal for amendment to include the route San Juan/Miami in the ANP CAR/SAM Basic Vol.

That:

- a) COCESNA make the appropriate coordinations with Cuba and Central American States affected with the purpose to agree the establishment of a RNAV route San Jose/Miami; and
- b) The States affected and COCESNA present a proposal for amendment to include RNAV route San Jose/Miami in the ANP CAR/SAM – Basic Vol.

Bilateral Agreement between Brazil and Venezuela for the application of the 10 minutes longitudinal separation/80 NM (MNT) RNAV

2.3 Brazil and Venezuela created an Ad-hoc Group for the revision of the Letter of Agreement between the Maiquetia and Manaus ACCs and include the application of the 10 minutes longitudinal separation/80 NM (MNT) RNAV. Brazil informed the meeting that the next integration of the Manaus and Porto Velho FIRs and Belem by the Amazónica FIR, as presented in the RAN CAR/SAM/3 Meeting and agreed with Venezuela to prepare an Operational Letter of Agreement between Amazónico ACC and Maiquetía ACC. In this respect, they agreed to formulate the following conclusion:

**Conclusion AP/ATM/3/12 Agreement between Brazil and Venezuela for the application of the
10 minutes longitudinal separation/80 NM (MNT) RNAV**

Brazil and Venezuela agree to the application of 10 minutes longitudinal separation/80 NM (MNT) RNAV in the routes crossing the limits of the Manaus and Maiquetia FIRs as from 8 August 2002.

Appendix A

Difficulties found during the analysis for the implementation of RNAV routes

- a) Some States have pointed out that the routes would enter/leave their respective FIRs through the already established routes and significant points and that the traffic would subsequently be routed through those routes, creating a domino effect due to the fact that the proposed route would coincide with existing conventional routes in the adjacent FIRs.
- b) As a result of the above, the routes would no longer be orthodromic and, in most cases, would have several inflexions similar to those of conventional routes supported by radio aids, e.g. routes UL 670 (SKBO/KJFK), UL 793 (SAEZ/KJFK) and UL 674 SVMI/KIAH, which have inflexions of up to 30°.
- c) Furthermore, the trajectory initially approved as SPIM/SKBO/KJFK corresponding to route UL 670 had to be modified to trajectory SKBO/MKJP/KJFK, the latter being more suitable from an operational point of view, because RNAV route UL305 already exists in the SPIM/SKBO segment and the SPIM/KJFK trajectory coincides with route UT(UL) 780 up to URSUS.
- d) Another consequence would be that some routes would end at FIR boundaries and/or in the boundaries of the CAR Region, which means that the route would start/finish more than 650 NM and, in some cases, more than 1,000 NM before the arrival/departure airport.
- e) In most cases, the routes would run very close to already existing significant points at FIR boundaries. In some cases, the distances between such significant points and the new one for the route to be implemented are about 2-3 NM and, in other cases, between 7-10 NM. This would create a crowding of significant points at FIR boundaries, which is not advisable from the operational and ATC viewpoints. This occurs in almost overlapping routes and also in those that cross each other, the latter being the most frequent.
- f) If a significant point is proposed for each route, independently from the proximity of other significant points, States might request that it coincides with an existing point, therefore a significant point would appear in the proposal of amendment which would not indicate the FIR boundary. Consequently, the entire process would have to start again, in order to circulate another amendment.
- g) One solution would be to direct the proposed route towards the existing point. However, the disadvantage is that, in most cases, these points belong to conventional routes that could be cancelled in the future, and the orthodromic route would then have been moved a few miles. The advantage of this solution is that no major coordination need to be made to define and approve the coordinates of such points.

- h) In some cases, the route goes through the boundaries of three or even four FIRs in a flight distance of less than 100 NM (as occurs on route TTPP/KMIA, which passes 2.5 NM from SCAPA and involves Maiquetia, Curacao, San Juan and Santo Domingo. In 68 NM, there are approximately 23 NM between the Maiquetia/Curacao boundary and the Curacao/San Juan boundary and 45 NM to the San Juan/Santo Domingo boundary). This case is combined with item b) above. There are other similar cases of three FIRs involved, such as route SAEZ/KJFK, which enters the Maiquetia FIR from the Manaus FIR and then re-enters the Manaus and Maiquetia FIRs consecutively, within a distance of only 20 NM and then 80 NM, respectively.

Apéndice B / Appendix B

Descripción de las rutas RNAV / Description of RNAV Routes

UL 793 BUENOS AIRES / NEW YORK			
FIRs o puntos significativos/ FIRs or significant points	Latitud/ Latitude	Longitud/ Longitude	Código/ Code
GUALEGUAYCHU VOR/DME	33° 00' 40" S	058° 36' 50" W	GUA
EZEIZA/RESISTENCIA	30° 29' 45" S	058° 49' 14" W	TODES
RESISTENCIA VOR/DME	27° 26' 49" S	059° 03' 26" W	SIS
RESISTENCIA/ASUNCIÓN	24° 04' 24" S	059° 56' 48" W	KUBIR
ASUNCION/LA PAZ	19° 31' 54" S	061° 05' 36" W	OROMU
LA PAZ/PORTO VELHO	13° 02' 36" S	062° 37' 24" W	UDIDI
PORTO VELHO/MANAUS	05° 04' 00" S	064° 18' 00" W	ODIXO
MANAUS/MAIQUETÍA	00° 48' 42" N	065° 42' 00" W	UGAGA
MAIQUETÍA/CURAO	11° 26' 30" N	068° 03' 36" W	PAGAK
CURAO/SANTO DOMINGO	16° 00' 48" N	069° 06' 54" W	TEKOL
PUNTA CAUCEDO VOR/DME	18° 26' 00" N	069° 40' 00" W	CDO
SANTO DOMINGO / MIAMI OCEANIC	19° 57' 36" N	069° 41' 33" W	ASIVO*
Punto de Notificación/Reporting point	23° 00' 00" N	069° 44' 36" W	TOOMS
MIAMI OCEANIC / NEW YORK OCEANIC	25° 00' 00" N	070° 03' 06" W	LAMER
Punto de Notificación/Reporting point	33° 25' 54" N	071° 28' 54" W	ODEAL
Punto de Notificación/Reporting point	37° 31' 00" N	071° 41' 00" W	CHAMP
Punto de Notificación/Reporting point	39° 08' 00" N	072° 03' 06" W	BERGH
Punto de Notificación/Reporting point	39° 49' 24" N	072° 49' 50" W	OWENZ

FIRs involucrados/FIRs involved: Ezeiza, Resistencia, Asunción, La Paz, Porto Velho, Manaus, Maiquetía, Curaçao, Santo Domingo, Miami Oceanic, New York Oceanic.

FL mínimo utilizable / minimum FL usable: FL 290

Separación longitudinal mínima: 10 minutos y/o 80 NM (MNT) RNAV./

Longitudinal separation minima: 10 minutes and/or 80 NM (MNT) RNAV.

* Ver párrafo / See para. 2.1.1

UL 674 Caracas / Houston			
FIRs o puntos significativos/ FIRs or significant points	Latitud/ Latitude	Longitud/ Longitude	Código/ Code
ARUBA VOR/DME	10° 20' 30" N	069° 56' 30" W	ABA
CURAÇAO/KINGSTON	15° 15' 09" N	074° 00' 00" W	ELASO
Punto de Notificación/Reporting point	17° 50' 30" N	078° 02' 30" W	BOSOM
Punto de Notificación/Reporting point	18° 53' 43" N	079° 40' 26" W	BIKOG
KINGSTON/HAVANA	20° 00' 00" N	081° 25' 30" W	ATUVI
HAVANA/MÉXICO	22° 27' 58" N	086° 00' 00" W	ALURU
MEXICO/HOUSTON	24° 29' 14" N	089° 50' 28" W	KEHLI*

FIRs involucrados/FIRs involved: Curaçao, Kingston, Havana, Mexico, Houston

FL mínimo utilizable / minimun FL usable: FL 290

Separación longitudinal mínima: 10 minutos y/o 80 NM (MNT) RNAV.

Longitudinal separation minima: 10 minutes and/or 80 NM (MNT) RNAV

* Ver párrafo/See para. 2.1.1

UL 337 Port-of-Spain/Miami			
FIRs o puntos significativos/ FIRs or significant points	Latitud/ Latitude	Longitud/ Longitude	Código/ Code
PIARCO VOR/DME	10° 27' 58" N	061° 23' 31" W	POS
PIARCO/MAIQUETÍA	12° 27' 13" N	063° 24' 26" W	ARUMU
MAIQUETÍA/SAN JUAN	15° 32' 36" N	066° 38' 00" W	ARMUR
SAN JUAN/SANTO DOMINGO	16° 37' 18" N	068° 00' 00" W	ISEDU
SANTO DOMINGO/PORT-AU-PRINCE	19° 25' 43" N	071° 40' 55" W	OSIDU
CABO HAITIANO VOR	19° 43' 38" N	072° 11' 50" W	HCN
PORT-AU-PRINCE/MIAMI OCEANIC	20° 24' 23" N	W 073° 00' 29"	BODLO*
GREAT INAGUA NDB	20° 57' 35" N	073° 40' 39" W	ZIN
BIMINI VOR/DME	25° 42' 15" N	079° 17' 40" W	ZBV

FIRs involucrados/FIRs involved: Piarco, Maiquetía, San Juan, Santo Domingo, Port au Prince, Miami Oceanic.

FL mínimo utilizable / minimun FL usable: FL 290

Separación longitudinal mínima: 10 minutos y/o 80 NM (MNT) RNAV.

Longitudinal separation minima: 10 minutes and/or 80 NM (MNT) RNAV

* Ver párrafo/See para. 2.1.1

UL 423 Bogotá/San José/México			
FIRs o puntos significativos/ FIRs or significant points	Latitud/ Latitude	Longitud/ Longitude	Código/ Code
AMBALEMA NDB	04° 47' 24" N	074° 46' 30" W	ABL
FIR Bogotá/FIR Panamá	06° 50' 31" N	078° 12' 25" W	ILTUR
Intersección / Intersection UA321/UL423	07° 01' 34" N	078° 32' 14" W	OPKOL
FIR Panamá/FIR América Central	09° 32' 24" N	082° 52' 12" W	ISEBA
FIR América Central/FIR México	14° 47' 28" N	092° 22' 33" W	TAP
FIR México/CTA Mérida	16° 27' 52" N	095° 05' 45" W	IZT
FIR México/CTA Mérida/CTA México	16° 51' 48" N	095° 49' 42" W	UGERO
FIR México/CTA México	17° 09' 36" N	096° 22' 39" W	XOSVO
FIR México/CTA México	18° 40' 57" N	099° 15' 17" W	TEQ

FIRs involucrados/FIRs involved: Bogotá, Panamá, Cenamer, México

FL mínimo utilizable / minimum FL usable: FL 290

Separación longitudinal mínima: 10 minutos y/o 80 NM (MNT) RNAV.

Longitudinal separation minima: 10 minutes and/or 80 NM (MNT) RNAV

UL 471 San Salvador/Miami			
FIRs o puntos significativos/ FIRs or significant points	Latitud/ Latitude	Longitud/ Longitude	Código/ Code
Punto de notificación/Reporting point	14° 15' 48" N	088° 35' 24" W	NAGEL
FIR Centro América/FIR La Habana	20° 27' 12" N	083° 57' 06" W	PABEL
GERONA NDB	21° 45' 12" N	082° 52' 54" W	UNG
FIR La Habana/FIR Miami	24° 00' 00" N	081° 13' 00" W	TADPO*

FIRs involucrados/FIRs involved: América Central , La Habana, Miami

FL mínimo utilizable / minimum FL usable: FL 250

Separación longitudinal mínima: 10 minutos y/o 80 NM (MNT) RNAV.

Longitudinal separation minima: 10 minutes and/or 80 NM (MNT) RNAV

* Ver párrafo/See para. 2.1.1

Appendix C

TIMETABLE FOR THE IMPLEMENTATION PROGRAMME OF RNAV ROUTES IN THE CAR/SAM REGIONS

**UL 793 (Buenos Aires/New York), UL 674 (Caracas/Houston), UL 337 (Port-of-Spain/Miami),
UL 423 (Bogotá/San Jose/Mexico) and UL 471 (San Salvador/Miami)**

EXPLANATION OF THE TABLE

Column 1	Describes the activities to be carried out by the States/Organizations involved
Column 2	Shows the target dates for completion of the activities described in column 1
Column 3	Contains additional information

Activities under the responsibility of the States and International Organizations, which FIR/s are involved		
ACTIVITY	COMPLETION DATE	REMARKS
1	2	3
Agreement on the RNAV routes to be implemented	20/05/02	Route paths, reporting points, agreements, etc., to be defined at the Third Meeting/Workshop of ATM Authorities and Planners (20-24/5/02)
Review of bilateral/multilateral agreements between service suppliers and/or identification of cases requiring their execution	20/05/02	According to the route paths, reporting points (including the geographical coordinates), agreements, etc., established during the Third Meeting/Workshop of ATM Authorities and Planners.
Verification and approval of geographical coordinates	21/06/02	The geographical coordinates should be established in the course of the meeting. Otherwise, the necessary coordinations will be made for that purpose through the respective ICAO NACC and SAM Regional Offices.
Distribution of the proposal for amendment to the ANP CAR/SAM – Basic Vol. by the ICAO NACC and SAM Regional Offices.	01/07/02	The distribution of the proposal for amendment will enable parties involved expressing their comments or observations.
Remittance of comments or remarks on the proposal for amendment to the ANP CAR/SAM – Basic Vol. to the corresponding ICAO NACC and SAM Regional Offices.	31/07/02	The timely response to the proposal for amendment will enable a quick processing of the comments or remarks for submission to the ICAO Council and further approval.

Activities under the responsibility of the States and International Organizations, which FIR/s are involved		
ACTIVITY	COMPLETION DATE	REMARKS
1	2	3
Inclusion of agreements and procedures in national operating manuals	28/11/02	If necessary, States shall include the agreements and procedures in their operating manuals
Decision to continue with the Implementation Programme	02/12/02	During the AP/ATM/4 Meeting/Workshop an evaluation will be carried out with each State involved and decision will be taken so as to continue or postpone the implementation date.
Publication of AIC and AIP Supplement	26/12/02	States affected by RNAV routes should publish a common AIC and AIP Supplement
Entry into effect of the Implementation	20/02/03	RNAV routes agreed by the Third Meeting/Workshop of ATM Authorities and Planners (AP/ATM/3)

Activities under IATA/users responsibility		
ACTIVITY	COMPLETION DATE	REMARKS
1	2	3
Agreement on RNAV routes to be implemented	20/05/02	Route paths, reporting points, agreements, etc, to be defined at the Third Meeting/Workshop of ATM Authorities and Planners (20-24/05/02)
Coordination with Jeppesen to obtain precise route coordinates	21/06/02	Jeppesen should be contacted in order to obtain the precise geographical coordinates, which should be forwarded to the ICAO NACC and SAM Regional Offices for distribution to the States involved
Distribution of the proposal for amendment to the ANP CAR/SAM – Basic Vol. by the ICAO NACC and SAM Regional Offices.	01/07/02	The distribution of the proposal for amendment will enable parties involved expressing their comments or observations.
Remittance of comments or remarks on the proposal for amendment to the ANP CAR/SAM – Basic Vol. to the corresponding ICAO NACC and SAM Regional Offices.	31/07/02	The timely response to the proposal for amendment will enable a quick processing of the comments or remarks for submission to the ICAO Council and further approval.
Decision to continue with the Implementation Programme	02/12/02	During the AP/ATM/4 Meeting/Workshop an evaluation will be carried out with each State involved and decision will be taken so as to continue or postpone the implementation date.
Printing of charts incorporating the new RNAV routes to be implemented	26/12/02	Agreements should be reached with Jeppesen for the printing of the appropriate charts
Entry into effect of the Implementation	20/02/03	RNAV routes agreed by the Third Meeting of ATM Authorities and Planners (AP/ATM/3)

Activities under ICAO responsibility		
ACTIVITY	COMPLETION DATE	REMARKS
1	2	3
Agreement on the RNAV routes to be implemented	20/05/02	Route paths, reporting points, agreements, etc., to be defined at the Third Meeting/Workshop of ATM Authorities and Planners (20-24/05/01)
Coordination /assistance in reviewing the bilateral/multilateral agreements between service suppliers and/or identification of cases requiring their execution	20/05/02	According to the route paths, reporting points (including the geographical coordinates), agreements, etc., established during the Third Meeting/Workshop of ATM Authorities and Planners.
Remittance of geographical coordinates to the States involved	21/06/02	The ICAO NACC and SAM Regional Offices will coordinate the route information provided by IATA for its publication in the AIC and AIP Supplement
Distribution of the proposal for amendment to the ANP CAR/SAM – Basic Vol.	01/07/02	The distribution of the proposal for amendment will enable parties involved expressing their comments or observations.
Reception of comments or remarks regarding the proposal for amendment to the ANP CAR/SAM – Basic Vol.	31/07/02	The timely reception of the comments to the proposal for amendment will enable its quick processing for submission to the ICAO Council and further approval.
Remittance of the proposal for amendment to the ANP CAR/SAM – Basic Vol. to the ICAO Council	05/08/02	The timely remittance of the proposal for amendment to the ICAO Council will enable its early approval.
Decision to continue with the Implementation Programme	02/12/02	During the AP/ATM/4 Meeting/Workshop an evaluation will be carried out with each State involved and decision will be taken so as to continue or postpone the implementation date.

Activities under ICAO responsibility		
ACTIVITY	COMPLETION DATE	REMARKS
1	2	3
Verification with the States of the schedules for publication of the AIC and AIP Supplement	02/12/02	RNAV routes agreed by the Third Meeting/Workshop of ATM Authorities and Planners
Entry into effect of the Implementation	20/02/03	RNAV routes agreed by the Third Meeting of ATM Authorities and Planners

Agenda Item 3: Analysis of the Action Plan for the Implementation of RNP 10 pre-operational Trials and Demonstrations Programme in routes UL 780 and its parallel route.

3.1 When discussing this agenda item, based on presentations from the Secretariat and the delegates from Chile and IATA, and after an extensive discussion during which different points of view were expressed, the meeting understood that at the moment it was not feasible to start RNP 10 pre-operational trials and demonstrations implementation process in all the airspace extended from Santiago de Chile to Miami along route UL 780 and its parallel route, due to the difficulties encountered during the analysis made to that airspace, such as:

- a) The extension of route UL 302 along the East of route UL 780, which would cross over the Andes in the Lima and Guayaquil FIRs, was objected by IATA because some operators have aircraft that are restricted to fly over the mountain, since they lack the equipment to supply passengers with oxygen for more than 15 minutes in the event of a pressure loss;
- b) This route, which would continue along East of route UL 780, would be affected by prohibited areas in the Guayaquil FIR;
- c) The parallel route along the West would affect route UL 401 and the air traffic established in the FIR and TMA Santiago;
- d) The parallel route that runs West of route UL 780 would be affected by prohibited areas in the Lima, Guayaquil and Miami FIRs;
- e) Entrance into the Miami FIR is restricted to established routes; therefore, this route that would continue along West of route UL 780 would have to move even further West, thus increasing flight distance;
- f) Additionally, potential traffic conflicts would appear for the ATC in the segment Lima/Miami of the parallel routes along the East and West of route UL 780, as approved RNP 10 aircraft would coexist with those not approved to fly in an RNP environment.

3.2 However, as a result of the same analysis, it was established that routes UL 780 and UL 302, parallel in the Santiago-Lima segment (see graphic in **Appendix A** to this part of the report) and that particularly do not have any other routes crossing them, after the corresponding evaluation, would not have problems to be assigned for the trials and demonstrations of parallel routes with RNP 10 values in such segment, for which reason the meeting agreed the following conclusion:

Conclusion AP/ATM/3/13 Implementation of the RNAV RNP 10 Trials and Demonstrations Programme in the Santiago de Chile/Lima segment in parallel routes UL 780 and UL 302

That, Chile, Peru, IATA/Users and ICAO NACC and SAM Regional Offices continue with the activities of the RNAV RNP 10 Trials and Demonstrations Programme in the Santiago de Chile/Lima segment in parallel routes UL 780 and UL 302, according to the Action Plan presented in **Appendix B** to this part of the report.

Study for RNAV and RNP 10 Implementation in the CAR/SAM Regions by the ATM Committee RNAV/RNP Task Force of the GREPECAS ATM/CNS Subgroup

3.3 When discussing the global analysis of the Sao Paulo-Rio de Janeiro/Miami traffic flow, that stated the implementation of a parallel RNAV route between routes UL 304 and UL 795 with RNP 10 values and, considering that there would be difficulties in the airspace for the implementation of those parallel routes, such as: prohibited/restricted airspaces, crossing of current ATS routes, etc., the meeting considered the need to make a more in depth analysis in this respect.

3.4 In this regard and in order to make an exhaustive study of the problematic already exposed in the mentioned routes UL 780 and its parallel route in the Lima/Miami segment, as well as in the parallel route between routes UL 795 and UL 304 of the Sao Paulo-Rio de Janeiro/Miami, the meeting considered convenient that such study be made by the ATM Committee RNAV/RNP Task Force of the GREPECAS ATM/CNS Subgroup and the result obtained be informed during the next AP/ATM/4 meeting through the appropriate mechanisms.

3.5 To that effect, the RNAV/RNP Task Force should consider aspects that could affect RNP 10 implementation, such as: special use airspaces, current ATS routes, Terminal Control Areas, Mountain Zone Areas, Areas normally affected by adverse meteorological conditions (cyclones, tornados, etc.), crossing of RNAV RNP routes with “not RNP” routes and the subsequent mixed separations and other considerations that such Task Force considers convenient.

3.6 Likewise, the RNAV/RNP Task Force should establish a RNP implementation strategy in the CAR/SAM Regions, in which the most appropriate methodology for the ATS airspace characteristics of the CAR/SAM Regions would be established; such as: implementation selecting specific routes, designating homogeneous areas, traffic flows, etc.; for which reason the meeting agreed the following conclusion:

Conclusion AP/ATM/3/14 Study for RNAV and RNP 10 Implementation in the CAR/SAM Regions by the RNAV/RNP Task Force

That, the RNAV/RNP Task Force of the GREPECAS ATM Committee of the ATM/CNS Subgroup:

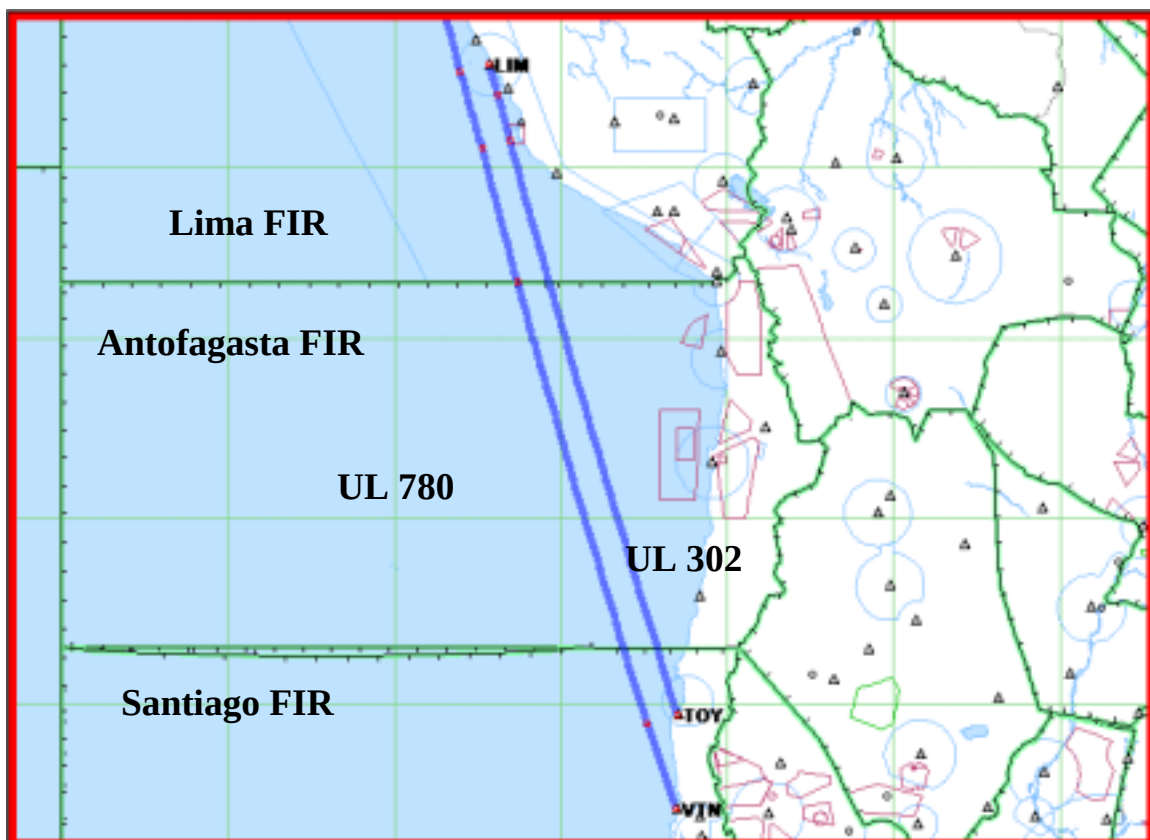
- a) Make an exhaustive study of routes UL 780 and its parallel route in the Lima/Miami segment and of the parallel route between routes UL 795 and UL 304 of the Sao Paulo-

Rio de Janeiro/Miami flow in order to determine the convenience of starting RNP implementation in airspaces defined by routes and apart from the rest of the region;

- b) Study and propose a RNP implementation strategy in which the most appropriate methodology for the ATS airspace characteristics of the CAR/SAM Regions would be established, such as: implementation by specific routes, traffic flows, homogeneous areas or by areas;
- c) Carry out an analysis of the aspects affecting RNP 10 implementation, such as: special use airspaces, current ATS routes, Terminal Control Areas, Mountain Zone Areas, Areas normally affected by adverse meteorological conditions (cyclones, tornados, etc.) crossing of RNAV RNP routes with “not RNP” routes and the subsequent mixed separations and other considerations that such Task Force considers convenient;
- d) Present the results of the analysis and studies completed to the next AP/ATM/4 meeting through the appropriate mechanisms.

Appendix A

Parallel Routes UL 780 and UL 302 RNP 10 proposed in the segment Santiago de Chile - Lima



Appendix B

ACTION PLAN FOR THE RNP 10 PRE-OPERATIONAL TRIALS AND DEMONSTRATIONS IMPLEMENTATION PROGRAMME IN THE RNAV UL 780 ROUTE AND UL 302

Activities	Responsible Area	Start Date	Finalization Date	Remarks
1. Regional Agreement for: - RNAV Route parallel to route UL 780; and - RNP 10/50 NM.	GREPECAS	23.10.01	27.10.01	COMPLETED During GREPECAS 10 it was achieved a regional agreement in order to implement the programme and the parallel routes.
2. Identification of operational needs.	GREPECAS	23.10.01	27.10.01	COMPLETED During the AP/ATM/2 Meeting, Lima, Peru, 14 to 18 May 2001, involved States identified the need to establish a pre-operational RNP 10 Implementation Programme in order to acquire experience in such implementation and in related procedures.
3. Establishment of a Monitoring Agency.	GREPECAS	23.10.01	27.10.01	COMPLETED GREPECAS 10 decided that while a regional agreement is achieved the monitoring agency will be in charge of Brasil.
4. Dissemination of Information.	States	June 2002	Permanent activity	Most of the information related to the pre-operational trials and demonstrations plan will ensure the success of the implementation in the target date.
5. Coordination with ATS providers and users.	States	June 2002	Permanent activity	Most of the dissemination of the programme will ensure the success of the implementation in the target date.
6. Study of the impact in the airspace.	States	June 2002	December 2002	The impact in airspace is essential, specially in the issues regarding the use of prohibited and/or restricted areas as well as geographic issues.

Activities	Responsible Area	Start Date	Finalization Date	Remarks
7. Cost-benefit analysis considering: - ATS services providers; and - Users.	States	June 2002	December 2002	Although economical benefits are expected, the expectations are centered in acquire experience in this type of implementation.
8. Establishment of procedures to: a) Approve the RNP 10 for aircraft; and b) RNP10.Operational Approval	a) Appropriate Aeronautical Authority; and b) Operator Status.	June 2002	December 2002	The establishment of the procedures will ensure the success of the implementation in its due time. Reference documentation: • FAA Order 8400.12 A for RNP 10 operation on the North Pacific route System; • CASA Civil Aviation Advisory Publication CAAP RNP 10-1 (FAA Order 8400.12A); • RNP Manual (Doc. 9689).
9. Updated establishment and maintenance of the listed RNP 10 approved aircraft	Monitoring Agency	June 2002	Permanent activity	The timely knowledge of RNP 10 approved aircraft will allow the monitor agency know the progress status of the RNP 10 approval and take pertinent actions.
10. Establishment of a minimal amount of RNP 10 approved aircraft before initiating the trials.	States	June 2002	July 2002	A minimum of 90% of the amount of aircraft that operate normally in the airspace that will be designated RNP 10 shall have to be RNP 10 approved before initiating the trials.

Activities	Responsible Area	Start Date	Finalization Date	Remarks
11. Establishment and implementation of: a) The organization who will evaluate safety; b) The programme to evaluate airspace safety; and c) The programme for the recollection of information for the evaluation.	a) GREPECAS b) GREPECAS and the Organization in 11 a). c) States and Organization in 11 a).	TBD TBD 27.10.01	TBD TBD TBD	a) The designated organization should have the necessary experience to carry out the safety assessment in airspace. b) Considering the goal of 5×10^{-9} (TLS) in fatal accidents by flight hour, safety assessment is a fundamental element to implement the programme. c) The required basic information to carry out the airspace safety evaluation is included in Attachment 2 .
12. Amendment to Doc. 7030 SUPPS.	NACC/SAM Regional Offices and States	June 2002	December 2002	A proposal of amendment to Doc. 7030 should be approved in order to apply the RNP 10 NM in routes of the involved FIRs. This amendment is to be circulated by the NACC and SAM Regional Offices for the approval of the ICAO Council.
13. Publication of an AIC that informs the aeronautical community about the introduction of procedures and requirements..	States	June 2002	N/A	
14. To include in the AIP all applicable procedures and requirements.	States	June 2002	N/A	States should include in their corresponding AIPs the minimum requirements and the applicable supplementary procedures.

Activities	Responsible Area	Start Date	Finalization Date	Remarks
15. Notification to the Monitor Agency of: a) RNP 10 Approved Aircraft; b) RNP10 Approved operational operators.	States	June 2002	Permanent activity	Timely notification will ensure the success of the implementation in the planned date.
16. Deadline to have at least, the minimum amount of RNP 10 approved aircraft.	States	N/A	July 2003	If the deadline is not accomplished, the implementation of the programme will be delayed.
17. Progress evaluation of the WGS-84 in the involved FIRs.	NACC and SAM Regional Offices	November 2001	Permanent activity	To accomplish the success in the implementation programme of the GNSS use, involved States should implement the WGS 84.
18. Establishment and implementation of a training programme	States and users	June 2002	July 2003	The establishment of a training programme for CTAs and crew is essential to accomplish the success of the implementation programme
19. Decision to continue and postpone the pre-operational trials	States	N/A	July 2003	The implementation will be continued as long as all involved parts have accomplished the tasks that have been specified in the action plan. The evaluation will be carried out through electronic means.
20. Date of implementation of the RNP 10/50 NM pre-operational trials and demonstrations.	States	N/A	4/9/03	

Attachment 1 to Appendix B

Basic Tasks of the Monitoring Agency

- The route system is necessary to ensure that the required navigation performance complies with the RNP 10 operations.
- States should establish the procedures for the systematic monitoring of the navigation performance. Such monitoring is to be made periodically and it should inform GREPECAS all obtained results. The TLS of 5×10^{-9} depends on the fact that the monitoring is complied with.
- All involved States are to maintain records of occurrences and incidents related with the required navigation performance of the aircraft.

The Agency should:

1. Coordinate with operators the monitoring of the navigation performance;
2. Coordinate with States that all operators comply and apply the established procedures, among others, to:
 - Flight dispatch;
 - Flight Planning;
 - Contingency procedures, etc;
3. Coordinate with States who are providers of radar services, the monitoring of the actual navigation performance observed in normal flight operations. A form should be used to collect the data information;
4. Coordinate with States who are providers of radar services at the beginning or at the end of route segments, and who only provide non-radar services for the verification of the navigation performance.
5. To coordinate with the authority responsible of flight standards and in-flight crew inspection, all appropriate procedures for the evaluation of the aircrew and of the operator.

Note 1 *It is required to develop detailed procedures that establish all the responsibilities of all parts involved.*

6. Collect, verify and distribute all data related to the established navigation specifications.
7. Collect and publish reports, among others:
 - Monthly reports on the amount of RNP 10 flight operations;

- Reports on the Gross Navigation Errors (GNEs) observed through radar and complemented with the information given by aircrews, by the operator and/or States, as well as by actions taken. (The GNE is a parameter that should be previously determined by the Agency who carries out the safety assessment);
- Similar reports of the errors observed by radar but obtained through other sources; and

Note 2 *Each State involved will establish the requirements for the registration and information by each ATC unit to the Monitoring Agency.*

8. It will contribute all participating States with an updated summary of the reports;

9. It will follow-up observed and notified diversions:

- The corresponding ATC unit will inform the pilot of the aircraft concerned that the diversion will be notified to the Monitoring Agency;
- All operators, including those in military aviation, and other ATC units should be informed of observed diversions; and
- Registered States of involved operators should receive a copy of the Reports.

Note 3 *The aforementioned information does not pretend to be exhaustive and it should be used as guidance material on the essential elements for the monitoring process. Further information can be obtained in the following documents: Guidance Material for North Atlantic Region (Doc. 001) Manual on Airspace Planning Methodology for the Determination of Separation Minima. (ICAO Doc. 9689) and the Air Traffic Services Planning Manual. (ICAO Doc. 9426).*

Attachment 2 to Appendix B

Basic Information for Safety Assessment

- States should assess their own system of routes or to compare it with a reference system;
- It is necessary to make an evaluation in order to confirm that the proposed parallel route system can be accomplished with the necessary safety level (TLS) of 5×10^{-9} mortal accidents by flight hour by dimension.
- When comparing airspace with the reference system the following has to be included:
 1. The collected information, regarding traffic and operation conditions for the particular configuration, in order to compare the specified parameters in the Collision Risk Model (CRM - Reich Model).

Note 1 *Examples of CRMs are indicated in the Air Traffic Services Planning Manual (ICAO Doc. 9426), for the Minimum Navigation Performance Specifications (MNPS) in airspace and in the Manual on Airspace Planning Methodology for the Determination of Separation Minima. (ICAO Doc. 9689), for the longitudinal separation of 50 NM.*
 2. The data will include, among others:
 - a) Lateral occupation Index;
 - b) Traffic flying in the same direction;
 - c) Traffic nominally flying in separated tracks by the minimum distance of lateral separation;
 - d) Traffic nominally flying at the same flight level; and
 - e) Aircraft within a longitudinal segment defined for another aircraft;
 3. A group of similar criteria to the aforementioned in order to define the occupation in the opposite direction;
 4. Reasons of annual growth for a ten-year period;

Note 2 *The required parameters should be specified in detail and a form should be given for the collection of data that will be used in the CRM to compare the reference system.*

Agenda Item 4: Analysis of the Action Plan for RVSM Implementation in the CAR/SAM Regions

4.1 When reviewing this agenda item, the meeting received information on RVSM from FAA experts highly experienced in RVSM implementation aspects.

4.2 Mr. Roy Grimes, Flight Standards, AFS-400, reported on the United States domestic RVSM programme, and on the timetable of activities and objectives of scheduled seminars. The meeting took note of the objectives, elements and expected benefits of the programme, factors taken into account for selecting the implementation date, as well as factors related to airworthiness and RVSM approval of aircraft and operators. A summary was presented of the tasks to be carried out, the sequence of events in the RVSM approval process for aircraft and operators and the documentation required for that purpose.

4.3 In turn, Mr. Drazen Gardilcic, Manager (A) International Staff, AAT30, presented the meeting with interesting aspects of air traffic management and ATC operations, and, with respect to the consequences of implementation on ATC procedures, emphasized the modifications that will need to be made to equipment and systems in order to comply with the implementation.

4.4 Mr. Brian Colamosca, Manager, NAS & International Airspace Analysis Branch, presented the meeting with aspects related to the monitoring of operations, the role, responsibilities and tasks of the monitoring agency, and the objectives pursued. The meeting also took note of the airspace safety oversight process during the utilisation of RVSM.

4.5 The information provided by the experts was very useful and taken as a basis for discussions on this agenda item. The aforementioned presentations will be posted on the SAM Office website, at www.lima.icao.int.

4.6 Moving to a different topic, the meeting noted that the Fourth Coordination Meeting of UNDP/ICAO Project RLA/98/003, “Transition to the CNS/ATM Systems in the CAR/SAM Regions” (Lima, Peru, December 2001) decided to include in the programme of the project the preparation and implementation of measures aimed at assisting States in the implementation of RVSM and RNP in the CAR/SAM Regions, reason why these matters were included in the agenda for the AP/ATM/3 meeting.

4.7 **CAR/SAM RVSM implementation programme**

4.7.1 The meeting recalled that GREPECAS/10 (Canary Islands, Spain, October 2001), based on the guidelines of the ICAO Manual for the implementation of a vertical separation minimum of 300 mt (1000 ft) between FL 290 and FL 410, decided, through *Conclusion 10/11 “RVSM implementation in the CAR/SAM Regions”*, to establish as of April 2004 a two-phased RVSM implementation programme encompassing all CAR/SAM FIRs:

- a) From FL 350 to FL 390, inclusive, effective 1 April 2004, and up to FL 410 for tactical use; and
- b) From FL 290 to FL 410, inclusive, on a date to be defined according to operational requirements.

4.7.2 GREPECAS/10 envisaged this implementation programme with the purpose of assessing the impact of implementation on the fleet operating in the two regions and to permit a gradual implementation of RVSM, enabling non-RVSM aircraft to fly up to FL 330 in a first phase. Subsequently, the date for RVSM implementation from FL 290 to FL 410, inclusive, would be defined in a regional agreement.

4.7.3 The meeting took note of the CAR/SAM RVSM implementation programme, which describes the activities to be carried out by the States, GREPECAS, the Regional Monitoring Agency, the body charged with conducting the safety assessment, users, IATA and ICAO. It also felt that many factors had to be taken into account in order to make a decision on possible modifications to the tasks to be carried out and to the proposed implementation dates.

4.8 **Review of the fleet operating in the CAR/SAM Regions**

4.8.1 The meeting examined the information submitted by IATA on the status of the fleet operating in the CAR/SAM Regions, a matter considered of vital importance for deciding on the implementation date and the implementation of RVSM in two phases.

4.8.2 The information submitted with respect to the fleet based in the CAR/SAM Regions corresponds to aircraft conducting one or more of the following activities:

- a) Scheduled passenger airlines.
- b) Scheduled cargo airlines.
- c) Charter passenger and cargo airlines.
- d) Hospital aircraft.
- e) Government or military passenger and cargo airlines.
- f) Air taxi.
- g) Airlines engaged in transportation of personnel for a specific activity, such as oil exploration, mining, etc.
- h) Aircraft engaged in aerial photography, mapping, surveying, etc.

4.8.3 Aircraft engaged in the following activities were not included:

- a) Military transport
- b) Government or presidential aircraft used for official purposes
- c) Private aircraft

4.8.4 In summary, it may be concluded from this review that the estimated percentage of readiness of the jet fleet based in the CAR/SAM Regions by the last quarter of 2004 would be as follows (**Appendix A** to this part of the report contains a complete analysis made by IATA):

- a) Caribbean sub-region:
68 RVSM jet aircraft
17 non-RVSM jet aircraft
Readiness percentage 80%
- b) Central America and Mexico sub-region:
268 RVSM jet aircraft
76 non-RVSM jet aircraft
Readiness percentage 78%
- c) South America sub-region:
562 RVSM jet aircraft
179 non-RVSM jet aircraft
Readiness percentage 76%.
- d) CAR/SAM Regions:
889 RVSM jet aircraft
272 non-RVSM jet aircraft
Preparedness percentage 76%

4.9 **Percentage of RVSM readiness of flights operating in the CAR/SAM Regions**

4.9.1 The meeting also took note of the information submitted by IATA on the percentage of RVSM readiness of flights operating in the CAR/SAM Regions.

4.9.2 This information is contained in three appendices: **Appendix B** to this part of the report shows the number of weekly RVSM and non-RVSM flights during 2002. Appendix C shows how and why non-RVSM flights will become RVSM flights in the next two years. Finally, Appendix D contains a forecast of weekly RVSM and non-RVSM flights for the last quarter of 2004.

4.9.3 This information refers to flights to/from the State and those overflying the State or FIR. International and domestic flights have been taken into account. Flights of less than 50 minutes or 250 nautical miles have not been recorded since they do not reach FL290, and if they do, it would be for a very short period of time. Likewise, flights between Bahamas and the United States have not been considered since they will operate in an RVSM environment irrespective of the decision made by the CAR/SAM Regions.

4.9.4 The data used for developing this information were taken by IATA from the “Official Airline Guide” and include scheduled passenger and cargo flights. In order to have a clear idea of how airlines will modernise their fleets, all IATA and non-IATA airlines based in the region were contacted by IATA and asked to specify how and when they plan to modernise their fleets. Flights are classified as international or domestic and entered in numeric form, showing the percentage of RVSM and non-RVSM flights by State or FIR.

4.9.5 States contained in the same FIR are presented under the name of the FIR. States with several FIRs are presented under the name of the State. Results are presented by State, group of States, sub-regions, and the CAR/SAM Regions as a whole.

4.9.6 The term “percentage of RVSM readiness” refers to the percentage of estimated international and domestic RVSM flights that operate or will operate on RVSM aircraft in a State or FIR. To summarise the aforementioned appendices, the estimated percentage of RVSM readiness by the last quarter of 2004, according to IATA, would be:

- a) Caribbean sub-region
98 percent of flights will be RVSM.
- b) Central America and México sub-region
91 percent of flights will be RVSM
- c) South America sub-region
81 percent of flights will be RVSM
- d) CAR/SAM Regions
87.7 percent of flights will be RVSM.

4.10 In view of the foregoing, the meeting considered that it was imperative, in the first place, to start a campaign to inform users of regional plans for the implementation of RVSM in 2004 and the benefits to be derived from such implementation, which might help to improve RVSM readiness percentages. In the second place, IATA and all the States/Territories and International Organisations involved should be requested to continue analysing this important matter so that updated information on the RVSM status of the fleet can be available at the next RVSM/TF meeting. In light of the foregoing, the meeting adopted the following conclusions:

Conclusion AP/ATM 3/15

Dissemination of the RVSM programme

That CAR/SAM States/Territories and International Organisations and IATA start a campaign to disseminate the CAR/SAM RVSM implementation programme.

Conclusion AP/ATM/3/16**Updating of data on RVSM readiness and status of the fleet operating in the CAR/SAM Regions**

That:

- a) CAR/SAM States/Territories and International Organisations that have not done so yet:
 - i) Begin a process of consultation with the users on RVSM readiness of fleets, both domestic and international; and
 - ii) Send this information as soon as possible to the corresponding ICAO NACC and SAM Offices for submission to the next meeting of the RVSM Task Force; and
- b) IATA continue analysing this matter.

4.11 Harmonisation of the United States and CAR/SAM RVSM implementation programmes

4.11.1 In this regard, the meeting took note that the United States had submitted an information paper to the C/CAR WG/2 meeting (Pétion Ville, Haiti, February 2002) stating that a national agreement had been reached to implement RVSM in the United States domestic airspace, including the Houston Oceanic FIR in the Gulf of Mexico, from FL 290 to FL 410, inclusive, as of December 2004. It had also reported that RVSM would be implemented in the airspace of the Miami Oceanic and San Juan FIRs as planned by GREPECAS and that it intended to work closely with neighbouring States to ensure an implementation in harmony with the CAR/SAM Regions.

4.11.2 The C/CAR WG/2 meeting expressed its concern over the implications of some discrepancies between the RVSM implementation plans of the United States and GREPECAS, such as the implementation date and the vertical stratum for RVSM application, since these discrepancies would affect CAR/SAM airspaces bordering on United States airspace. It therefore considered that both RVSM implementation plans had to be harmonised.

4.11.3 The meeting felt that the United States and GREPECAS, through its corresponding contributory body (RVSM task force), needed to make an effort to harmonise their respective RVSM implementation plans in order to have a seamless ATM airspace between the CAR/SAM Regions and the United States domestic airspace, as requested in the aforementioned Conclusion 2/2 of the C/CAR WG/2 meeting.

4.11.4 Following an intense debate in which different points of view were expressed about the information provided, some members of the group and users stated that users ready to fly in RVSM environments should be given facilities for making full use of their aircraft equipage and thus obtain early benefits from the investments made on their fleets. Therefore, it would be advisable to extend RVSM implementation from FL 290 to FL 410 following the way in which implementation would take place in the United States.

4.11.5 Some States, mainly those adjacent to the United States, also considered that it would be advisable to follow the implementation plan of said State; otherwise, the difficulties would be greater than the benefits.

4.11.6 Others expressed their concern about the impact on the regional fleet of RVSM implementation as envisaged, i.e., from FL 290 to FL 410 and not as approved by GREPECAS, i.e., in two phases.

4.11.7 The meeting also examined the possibility of applying RVSM on a non-exclusive basis, that is, allowing non-RVSM aircraft to operate in RVSM airspace through the application of ATC procedures. It was noted that other parts of the world had already applied such flexibility.

4.11.8 Other delegates stated that, before making a decision, those States in a position to do so should conduct ATC simulations and, based on the results, analyse the advisability of the various implementation options proposed.

4.11.9 Based on all the information received regarding the status of the fleet operating in the CAR/SAM Regions, the percentage of RVSM readiness and the United States RVSM implementation plans, the meeting felt it was more advisable to agree on a common date, December 2004 being a suitable one.

4.11.10 However, the meeting recognised that there was not enough information yet to modify CAR/SAM plans to apply RVSM in two phases, as approved by GREPECAS and that additional information should be submitted to the GREPECAS RVSM Task Force.

4.11.11 Therefore, the meeting agreed to request the United States and the GREPECAS RVSM Task Force to take appropriate steps for the harmonisation of their respective RVSM implementation plans so as to submit the results of such harmonisation to the GREPECAS/11 meeting for approval. In light of the above, the meeting formulated the following conclusions:

Conclusion AP/ATM/3/17

ATC simulations

That, in order to make a decision on the harmonisation of the United States and CAR/SAM RVSM implementation programmes, those States in a position to do so carry out ATC simulations and their results be sent to the corresponding ICAO NACC and SAM Offices for submission to the RVSM Task Force.

Conclusion AP/ATM/3/18**Harmonisation of the United States and CAR/SAM RVSM implementation programmes**

That, in order to achieve a seamless airspace between the CAR/SAM Regions and the United States domestic airspace, the United States and GREPECAS, through the RVSM Task Force, be urged to:

- a) Take relevant action to inform GREPECAS about the convenience of applying RVSM in the CAR/SAM Regions in December 2004 with a view to harmonising the entry into force of the respective RVSM implementation plans;
- b) Study the possibility of implementing RVSM between FL290 and FL410 in a single phase in the CAR/SAM Regions; and
- c) Submit the results of this harmonisation to the GREPECAS/11 meeting for approval.

4.12 Review of RVSM implementation requirements

4.12.1 In order to assist States/Territories/service providers with this implementation, the meeting deemed it necessary to adapt and develop guidelines on airworthiness and RVSM approval of aircraft and operators, air traffic management and ATC operations, and the monitoring of airspace and RVSM operations.

4.13 Aspects related to airworthiness and RVSM approval of aircraft and operators

4.13.1 The meeting noted that material related to airworthiness and RVSM approval of aircraft and operators had been developed at the regional level. The FAA has issued Interim Guidance Document 91 – RVSM, whereas in Europe, the Joint Aviation Authorities (JAA) has issued Temporary Guidance Leaflet TGL No. 6 Rev. 1.

4.13.2 On the other hand, it was also noted that, under Regional Project RLA/99/901, “Regional Safety Oversight Cooperation System”, the CAR/SAM Regions are developing the Latin American Aeronautical Regulations (LAR). This Project could give priority to the development of guidelines for RVSM approval of aircraft and operators. It is estimated that, if required, this material could be available by late 2002.

4.13.3 In view of the foregoing, and considering that the existing material could be used by CAR/SAM administrations, the meeting arrived at the following conclusion:

Conclusion AP/ATM/3/19**Guidance material for RVSM approval of aircraft and operators**

That, as long as regional guidance material is available, CAR/SAM States and Territories adopt the documents issued by the FAA, Interim Guidance 91-RVSM and the JAA Temporary Guidance Leaflet (TGL No. 6), Rev. 1, 1 October 1999, for the approval of aircraft and operators intending to operate in RVSM airspaces.

4.13.4 Furthermore, the group considered that Project RLA/99/901 could give priority to the development of material related to this matter, and thus formulated the following conclusion:

Conclusion AP/ATM/3/20**Development of regional guidance material for RVSM approval of aircraft and operators**

That Regional Project RLA/99/901, Regional Safety Oversight Cooperation System, when drawing up the Latin American Aeronautical Regulations (LAR), give priority to the development of guidance material for the approval of aircraft and operators intending to fly in RVSM airspace.

4.14 Aspects related to ATM and ATC operations

4.14.1 The meeting recognised that RVSM implementation requires a restructuring of the airspace. RVSM gateways, the possible need for airspace sectorisation, the review of air routes and possible modifications to reach acceptable safety levels, and reversing the direction of traffic in levels 310, 350 and 390 are tasks to be carried out in a harmonious and coordinated manner within the CAR/SAM Regions and with adjacent regions.

4.14.2 Another consequence of RVSM implementation is the need to modify ATC procedures, as well as to analyse air traffic systems to see whether they support RVSM implementation, and to study the modifications that would need to be made on equipment and systems in order to comply with the implementation.

4.14.3 A critical operational requirement could be flight plan processing and its planning. To a large extent, this task has been optimised with automated flight plan data processing systems, but not all participants in the programme have this tool available. The impact of RVSM implementation on ATFM must also be taken into account.

4.14.4 Furthermore, consideration should be given to the possible modification of control room equipment in aspects such as short- and medium-term conflict prediction warnings, radar data processing, scenario and air traffic simulators, software modifications, etc.

4.14.5 Together with the programme, but sufficiently in advance of RVSM operational verification, an RVSM training programme should be implemented for controllers, whereby proper training on normal and emergency operations, contingencies, adverse weather conditions for RVSM scenarios and specific phraseology is provided to ensure safe operation in RVSM scenarios. These changes will need to be reflected in ATC operational handbooks, regulations, letters of operational agreement, and regional agreements. This programme will need to be disseminated as broadly as possible so that all the parties involved are aware of the approved requirements and schedules for its implementation.

4.15 **Aspects related to the monitoring of RVSM airspace and operations**

4.15.1 It was also noted that the monitoring of RVSM airspace and operations includes several safety-related aspects:

- a) Height-keeping performance analysis
- b) Safety assessment before, during and after RVSM implementation
- c) Collection of operational data by control centres/pilots for safety assessment purposes
- d) Monitoring and operational management of the HMU and/or GMU equipment.

4.16 **Altimetry system error (ASE) monitoring**

4.16.1 The meeting noted that the monitoring of altimetry system errors was a pre-requisite for maintaining flight safety in an RVSM environment. Currently, there are two known methods for monitoring errors, the HMU and the GMU systems, which have enabled RVSM implementation in many ICAO Regions. Both systems have their advantages and disadvantages.

4.16.2 In the case of HMUs, many aircraft can be monitored simultaneously, but it is an extremely complex ground-based system and can only be used in a very limited area near its geographical location.

4.16.3 On the other hand, GMUs can be used in a broad area, but involves a portable system that has to be installed temporarily on board the aircraft to be monitored. It requires that an expert join the flight crew to handle the equipment, and a differential correction in the GPS receiver must be used to enhance the precision of the system.

4.16.4 The meeting recognised that the RVSM Task Force would need to examine this matter and suggest to the next meeting a methodology to be used in the region, taking into account operational safety and the cost involved in ASE monitoring.

4.17 **CAR/SAM regional airspace monitoring agency (CARSAMMA)**

4.17.1 It was recalled that GREPECAS/10, through Conclusion 10/12, agreed that, as long as an agreement for the implementation of a regional agency was not reached, Brazil would be assigned the tasks and responsibilities of the CAR/SAM monitoring agency (CARSAMMA).

4.17.2 As a follow up to this conclusion, the meeting noted that Brazilian authorities had decided to assign these tasks to the Air Navigation Management Centre (CGNA), the creation of which had also been put forward to GREPECAS 10. The CGNA is located in Sao José dos Campos, Sao Paulo. This organisation will soon be available through the following address: www.cgna.gov.br.

4.17.3 With respect to RVSM implementation, CARSAMMA will initially have the responsibilities listed in **Appendix E** to this part of the report, as approved by GREPECAS. Subsequently, the RVSM Task Force may review these tasks in detail and amend them as needed. Furthermore, the meeting deemed it advisable for CARSAMMA, once it became operational, to develop a web page where different RVSM aspects of interest to airspace users and service providers could be posted.

4.18 **Working methodology of the ATM Committee RVSM Task Force of the GREPECAS ATM/CNS Subgroup**

4.18.1 Taking into account all the aforementioned aspects and in view of the experience gained in other ICAO regions with this working methodology, the meeting deemed it advisable for the RVSM Task Force of the GREPECAS ATM Committee to establish three working groups to review issues related to airworthiness and RVSM approval of aircraft and operators, ATC operations and monitoring of RVSM airspace and operations.

4.18.2 Upon reviewing the work programmes of the aforementioned working groups, the meeting considered that said work programmes met existing requirements and agreed that they could be amended by the RVSM Task Force as needed. Finally, the meeting formulated the following conclusion:

Conclusion AP/ATM/3/21 Assignment of tasks to the RVSM Task Force of the ATM Committee of the GREPECAS ATM/CNS Subgroup

That, pursuant to the GREPECAS mandate, the RVSM Task Force of the ATM Committee:

- a) Establish three working groups to carry out the tasks on airworthiness and RVSM approval of aircraft and operators, air traffic management and ATC operations and monitoring of RVSM airspace and operations;

- b) The groups in question take into account the work programmes that appear in **Appendix F** to this part of the report; and
- c) Review the CAR/SAM RVSM implementation programme and make the necessary adjustments.

4.19 **CAR/SAM RVSM programme web page**

4.19.1 The meeting considered that it would be very beneficial for RVSM implementation to create a page exclusively for RVSM in the SAM Office website. Accordingly, the meeting approved the following conclusion.

Conclusion APATM 3/22

RVSM web page of the ICAO SAM Office

That the ICAO SAM Office take relevant measures to include in its website an RVSM page with information on the CAR/SAM RVSM programme and any other issue related to this programme.

4.19.2 Upon reviewing this matter, the United States offered to establish a link between the FAA website and the SAM Office RVSM website in order to enable the aeronautical community to obtain all the information related to RVSM.

4.20 **Airspace safety assessment**

4.20.1 The meeting noted that one of the main RVSM implementation pre-requisites to be taken into account was the airspace safety assessment. This matter was discussed at the CAR/SAM RAN/3 meeting, which formulated Conclusion 5/29 stating that, before implementing RVSM and while operations continue to be carried out with a vertical separation minimum of 2000 ft, the safety level in the proposed designated airspace should be equal to or better than a TLS of 5×10^{-9} fatal accidents per flight hour resulting from a loss of vertical separation for all causes of risk.

4.20.2 The meeting also recalled that Chapter 5 of the Manual on airspace planning methodology for the determination of separation (Doc. 9689-AN 953) establishes that the safety of a system shall depend on various characteristics of the airspace and two basic methods are identified to determine whether the safety conditions of the system are acceptable: benchmarking and risk assessment of the system in relation to a threshold value.

4.20.3 While several safety assessments have been carried out in different airspaces, (North Atlantic, Asia Pacific, Europe, South Atlantic, etc), the meeting recognised that no airspace safety assessment has been done yet in an airspace with to the characteristics similar to the CAR/SAM regions. For this reason, the decision to carry out a risk assessment of the system by comparing it to a threshold value would be the most adequate to use in the region.

4.20.4 The meeting reviewed in detail and in a realistic manner the following options available to carry out such assessment, especially taking into consideration the costs involved:

- a) Assign the responsibility to the CAR/SAM Monitoring Agency (CARSAMMA);
- b) Subcontract a duly qualified agency/company through CARSAMMA; and
- c) Seek the assistance of a qualified organisation to this end.

4.20.5 In the two first cases, it is essential to know the costs associated with the airspace safety assessment to be able to carry out an analysis on this matter. For the third case, it would be essential to establish certain mechanisms for regional understanding and cooperation. Likewise, it should be recalled that the decision on this respect should be made as soon as possible, so that the region may continue to follow the agreed implementation timetable.

4.20.6 In light of the above, the meeting formulated the following conclusion:

Conclusion AP/ATM/ 3/23

Airspace safety assessment

That the CARSAMMA study the different options for conducting the airspace safety assessments in the CAR/SAM Regions for the implementation of RVSM and reports on the results to the next meeting of the RVSM Task Force.

4.21 Assistance of the United States to the CAR/SAM RVSM Implementation Programme

4.21.1 On this issue, the meeting welcomed the offer made by the United States to support Brazil in the tasks related to the operation of the Regional Monitoring Agency (CARSAM-MA), and in the ATS and airworthiness areas, so as to contribute, inasmuch as possible, to the different activities to be carried out for RVSM implementation in the CAR/SAM Regions, taking into account the experience acquired by the United States in these RVSM processes in other regions, and in its RVSM implementation programme for its national airspace.

4.22 Programme for the collection of statistical data and information on navigation deviations

4.22.1 The meeting noted that GREPECAS/10 formulated Conclusion 10/11, approving RSM implementation in the Flight Information Regions (FIRs) of CAR/SAM States/Territories and COCESNA; Conclusion 10/17 requesting Project RLA/98/003 to begin an RNP-10 trial and demonstration programme in routes UL 780 and its parallel route; and Conclusion 10/14 requesting CAR/SAM States, Territories and International Organizations to start collecting data on navigation deviations, both on the lateral and on the vertical planes, to be used for the corresponding safety assessments for RNP and RVSM implementation, as requested previously through Conclusion 2/4 of the AP/ATM/2.

4.22.2 Given the importance of this issue and the need to have as much precise statistical data as possible, the meeting, with the aim of creating a database for use in safety assessments, reiterated the need to begin a data collection programme and formulated the following conclusion:

Conclusion AP/ATM/3/24

Programme for the collection of statistical data and information on navigation deviations

That:

- a) The States/Territories/International Organisations that have not done so yet, establish programmes in the appropriate ATC units for the collection of statistical data and information on navigation deviations needed to conduct airspace safety assessments, using as a basis **Appendices G, H and I** to this part of the report;
- b) Send this information to the CARSAMMA agency and to the respective ICAO NACC or SAM Regional Office, and
- c) In case no deviations are detected, submit the information on a monthly basis, indicating that, during the period evaluated, no deviations were found in the airspace concerned.

4.23 Guideline material for the preparation of a National RVSM Implementation Programme

4.23.1 The meeting recognised that the States should meet the requirements concerning regulations, safety assessment, development of procedures, personnel training, quality assessment, preparation of manuals and publications and, more important, the establishment of a national RVSM implementation programme that covers all of these aspects.

4.23.2 This national RVSM programme should be in line with, and fall within the regional RVSM implementation programme. Officials should be assigned to take responsibility for the programme and should have sufficient authority to act as counterparts to the Regional Programme. Furthermore, each State and service provider should make a commitment to obtain the necessary funds and assign a budget to ensure that the programme is carried out without any mishaps, through active involvement in the events carried out in the region, the training programmes, dissemination of the programme, etc.

4.23.3 In keeping with the above, the meeting reviewed guidance material for the drafting of a national programme for the implementation and operation of a 300-meter (1000 ft) vertical separation minimum between FL290 and FL410, which could be used by States and service providers to prepare their own RVSM implementation programmes.

4.23.4 The main purpose of the programme is to identify the activities and tasks to be carried out for the implementation and safe operation of the RVSM in the FIRs involved. This programme contains different chapters that are considered vital for RVSM implementation. They provide a general description of the tasks that each State should perform, establish the safety requirements and identify the impact on RVSM implementation of failure to perform the tasks in question in the way and by the deadlines specified for each of them.

4.23.5 In reviewing this matter, the meeting understood that it would be appropriate that each State prepare its own RVSM implementation programme, and formulated the following conclusion:

Conclusion AP/ATM3/25

National RVSM implementation programme

That CAR/SAM States, Territories and service providers:

- a) Draw up a national RVSM implementation programme that is in line with the regional RVSM implementation programme;
- b) Use the guidance material contained in **Appendix J** to this part of the Report as a basis for the development of said document;
- c) Inform the respective ICAO NACC and SAM Regional Offices the name, position and address of the contact person responsible for coordinating with the regional RVSM programme; and
- d) While c) above is not duly clarified, a person should be assigned to this effect, before 30 June 2002.

4.24 First seminar on RVSM implementation in the CAR/SAM Regions

4.24.1 The meeting noted that the First seminar on RVSM implementation in the CAR/SAM Regions will be held in Lima, Peru, on 5-7 August 2002. The main objective of this seminar is to provide the States, Territories and International Organisations of both regions providing with information on RVSM implementation and to ensure that an acceptable safety level is achieved in the RVSM airspace system.

4.25 Meetings of the RVSM Task Force of the ATM Committee

4.25.1 In view of the different activities and the volume of work to be carried out for the implementation of RVSM in the CAR/SAM Regions, the meeting deemed it advisable and requested that the RVSM Task Force, to the extent possible, comply with the following tentative meeting schedule:

- a) Following an invitation by Brazil to hold the RVSM/TF/2 meeting in Rio de Janeiro and/or Sao José dos Campos, Brazil, during the last week of June or first week of July 2002, the Rapporteur of the Group will coordinate with the Secretariat the definitive place and date in order to convene the meeting.

- b) In view of the fact that the CAR/SAM RVSM seminar will be held on 5-7 August 2002 in the city of Lima, the RVSM/TF/3 meeting should be carried out on 8-9 August 2002; and
- c) The RVSM/TF/4 meeting would be carried out from 16 to 20 September 2002, within the framework of the ATM/CNS/SG/2 Meeting in Rio de Janeiro, Brazil.

Appendix A

RVSM status of the aircraft jet fleet based in the CAR/SAM Region by the end of year 2001 and estimated status by 2004							
CARIBBEAN	2001				2004		NOTES
	ready	capable	non-capable	business jet	orders or modifications	readiness percentage	
Anguilla						100%	
Antigua & Barbuda	5					100%	
Aruba	1		3			25%	(1)
Bahamas		1	4		4	100%	(2)
Barbados						100%	
British Virgin Islands						100%	
Cayman Islands			4		3	75%	(3)
Cuba	8	2	13			43%	(4)
Dominica						100%	
Dominican Republic						100%	
French Antilles		2	1		1	100%	(5)
Grenada						100%	
Haiti						100%	
Jamaica	7	13				100%	
Montserrat						100%	
Netherland Antilles		3				100%	
Puerto Rico				3		100%	
St Kitts & Nevis						100%	
St Lucia						100%	
St Vincents & Grenadines						100%	
Trinidad & Tobago	4	10				100%	
Turks & Caicos						100%	
US Virgin Islands			1		1	100%	(6)
SUBTOTAL----->	25	31	26	3	9	80%	

CENTRAL AMERICA AND MEXICO	2001				2004		NOTES
	ready	capable	non-capable	business jet	orders or modifications	readiness percentage	
Belize						100%	
Costa Rica		5	7		7	100%	(7)
El Salvador		29	8		14	100%	(8)
Guatemala			8		5	62%	(9)
Honduras			1			0%	(10)
México	5	98	124	59	46	73%	(11)
Nicaragua						100%	
SUBTOTAL----->	5	132	148	59	72	78%	
SOUTH AMERICA	2001				2004		NOTES
	ready	capable	non-capable	business jet	orders or modifications	readiness percentage	
Argentina	13	29	66	24	18	64%	(13)
Bolivia		3	12			20%	(14)
Brazil	47	175	49	61	67	100%	
Chile	18	5	30	2	29	98%	(15)
Guyana		1				100%	
Guyane						100%	
Paraguay						100%	
Colombia	9	18	41	4	16	49%	(16)
Ecuador			12	1		8%	(17)
Surinam						100%	
Panama		8	14		4	55%	(12)
Peru	2	3	39	4		19%	(18)
Uruguay			4			0%	(19)
Venezuela	1		46			2%	(20)
SUBTOTAL----->	90	242	313	96	134	76%	
GRANDTOTAL----->	120	405	487	158	215	77%	

- 1) Aruba – 3 B707F belonging to a Belgium airlines, status is unknown
- 2) Bahamas – 2 B737-200 from Bahamasair used for flights to USA, will be replaced or upgraded. 2 B727 from Laker Airways have Bahamian registration but are based in Fort Lauderdale, must be also upgraded
- 3) Cayman Island – Cayman Airways has three B737-200 that are use on flights to USA, therefore they must be upgraded or replaced.
- 4) Cuba – Cubana de Aviacion and other airlines have 13 Yak-40, maybe they will be used below FL290 or in domestic flights.
- 5) French Antilles- Air Caraibes has a B737-200, for local flights and to flight to Miami, the airline is replacing the B727-300 fleet with ERJ-145.
- 6) US Virgin Island – There is a B727-200 registered, since US Virgin Island is under San Juan FIR this aircraft will be upgraded or replaced.
- 7) Costa Rica – LACSA part of the TACA group, owns 7 B737-200, they will be replaced by an order make by TACA of 27 A320-200.
- 8) El Salvador – Taca is replacing its B737-200 with A320-200
- 9) Guatemala – Aviateca is part of the TACA group and replacement of its fleet is in progress. The State has registered 2 BAC-111 and 1 YAK-40.
- 10) Honduras – The State has a YAK-40 registered.
- 11) Mexico – The two leaders airlines are in the process of replacing 38 aging aircraft. The Mexican Civil Aviation has forbidden operations of aircraft Stage I since 2004, this will make obsolete a large percentage of the aging fleet.
- 12) Panama – COPA is in the process of replacing 10 B737-200. DHL owns 4 B727-200F, unknown intentions.
- 13) Argentina – The Aerolineas Argentinas/Austral group owns 39 B737-200, unknown intentions. Dinar owns 5 DC9. It is presumed that due to the geographical situation of Argentina the area south of Buenos Aires could be utilized as a non-RVSM airspace.
- 14) Bolivia – Old fleet, intentions unknown.
- 15) Chile – 3 DC8-71F used for routes to USA, these aircraft will be grounded or upgraded.
- 16) Colombia – Aerorepublica is replacing the aging DC9 for MD80 series. There are 3 DC8-71F used for route to USA that will be replaced or upgraded. ACES is in the process of converting its whole fleet in to A320-200. Large percentage of the non-RVSM aircraft are old generations cargo aircraft.
- 17) Ecuador – Ecuador fleet is mostly used for domestic flights of short range, therefore operations underneath of FL290 will not affect financially the operation of the local airlines.
- 18) Peru – Aerocontinente owns 23 aircraft old generation, intentions are to renew fleet although there is not a schedule established.
- 19) Uruguay – 3 B737-200 from PLUNA mostly used to short flights, intentions unknown.
- 20) Venezuela - Domestic airlines with 14 B727 3 B737-200, 28 DC9, intentions unknown.

Appendix B

2002 CAR/SAM JET WEEKLY FLIGHTS OF MORE THAN 50 MINUTES OR 250 NM							
	International Flights		Domestic Flights		Total		Readiness in percentage
COUNTRY/FIR	RVSM ready	Non-RVSM	RVSM ready	Non-RVSM	RVSM ready	Non-RVSM	RVSM ready
Caribbean							
Cuba	2101	406	2	26	2103	432	83%
Curacao FIR	581	334	0	0	581	334	63%
Dominican Rep.	986	349	0	0	986	349	74%
Haiti	629	222	0	0	629	222	74%
Kingston FIR	1313	283	0	0	1313	283	82%
Piarco FIR	913	72	0	0	913	72	93%
San Juan FIR	2073	176	0	0	2073	176	92%
subtotal ----->	8596	1842	2	26	8598	1868	82%
Central America and Mexico							
Cenamer FIR	1435	302	0	0	1435	302	83%
Mexico	3553	483	2146	2198	5699	2681	68%
subtotal ----->	4988	785	2146	2198	7134	2983	71%
South America							
Argentina	779	272	346	1059	1125	1331	46%
Bolivia	224	149	0	107	224	256	47%
Brasil	1388	208	6569	862	7957	1070	88%
Chile	452	144	392	181	844	325	72%
Colombia	1176	379	208	149	1384	528	72%
Ecuador	501	136	0	0	501	136	79%
French Guyana	31	6	0	0	31	6	84%
Guyana	172	27	0	0	172	27	86%
Panama	833	277	0	0	833	277	75%
Paraguay	298	79	0	0	298	79	79%
Peru	561	168	134	260	695	428	62%
Surinam	31	13	0	0	31	13	70%
Uruguay	512	143	0	0	512	143	78%
Venezuela	992	435	0	324	992	759	57%
subtotal ----->	7950	2436	7649	2942	15599	5378	74%
grand total --->	21534	5063	9797	5166	31331	10229	75%

Appendix C

Explanation by States/FIR of the evolution of the non-RVSM flights into RVSM flights

Cuba

International: At the present time, 221 weekly flights operated over Cuba FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region are operating 132 flights per week over Cuba FIR with destination USA, therefore, if these flights are to continue to operate to USA they must be made RVSM ready by 2004. COPA is operating 14 flights with B737-200 that will be B737NG.

Domestic: There is traffic with Yak-42 that can be operated under FL290 with a low penalty in fuel.

Curaçao

International: At the present time, 48 weekly flights operated over Curaçao FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region are operating 160 flights per week over Curaçao FIR with destination USA, therefore, if these flights are to continue to operate to USA they must be made RVSM ready by 2004. COPA is operating 67 flights with B737-200 that will be B737NG.

Domestic: No traffic.

Dominican Republic

International: At the present time, 75 weekly flights operated over Dominican Republic FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region are operating 163 flights per week over Dominican Republic FIR with destination USA, therefore if these flights are to continue to operate to USA they must be made RVSM ready by 2004. COPA is operating 67 flights with B737-200 that will be B737NG.

Domestic: No traffic.

Haiti

International: At the present time, 68 weekly flights operated over Haiti FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region are operating 144 flights per week over Haiti FIR with destination USA, therefore, if these flights are to continue to operate to USA they must be made RVSM ready by 2004. COPA is operating 4 flights with B737-200 that will be B737NG.

Domestic: No traffic.

Kingston FIR

International: At the present time, 113 weekly flights operated over Kingston FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region are operating 118 flights per week over Kingston FIR with destination USA, therefore, if these flights are to continue to operate into USA they must be made RVSM ready by 2004. COPA is operating 29 flights with B737-200 that will be B737NG.

Domestic: No traffic

Piarco FIR

International: At the present time, 25 weekly flights operated over Piarco FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region are operating 16 flights per week over Piarco FIR with destination USA, therefore if these flights are to continue to operate into USA they must be made RVSM ready by 2004.

Domestic: No traffic. The flights of more than 250nm operated within the Piarco FIR have been considered as international flights.

San Juan FIR

International: At the present time, 84 weekly flights operated over San Juan FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region operate 66 flights per week over San Juan FIR with destination USA, therefore, if these flights are to continue to operate to USA they must be made RVSM ready by 2004. COPA is operating 24 flights with B737-200 that will be B737NG.

Domestic: No traffic.

Observations: San Juan FIR is under FAA jurisdiction, therefore will be RVSM. Beside of this fact, is reported the RVSM and non-RVSM for general knowledge.

Cenamer FIR

International: At the present time, 96 weekly flights operated over Cenamer FIR are USA carriers, therefore they will be RVSM by 2004. COPA is operating 148 flights with B737-200 that will be B737NG.

Domestic: No traffic.

Mexico

International: At the present time, 170 weekly flights operated over Mexico are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region operate 248 flights per week over Mexico's FIRs with destination USA, therefore if these flights are to continue to operate to USA they must be made RVSM ready by 2004. Aeromexico and Mexicana are operating 20 flights with be made with newer generation aircraft.

Domestic: Sixty percent of the non-RVSM domestic flights are operated by Aeromexico and Mexicana which will have their fleet renewed by 2004.

Observations: In 2004 the Mexican Civil Aviation Authority is implementing restrictions to aircraft with high noise levels. This will prohibit aircraft from early generations to operate in the Mexican territory.

Argentina

International: At the present time, 10 weekly flights operated over Argentina's FIRs are USA carriers, therefore, they will be RVSM by 2004. LAPA and Lan Chile are operating 89 flights non-RVSM flights per week; both airlines are in the process of renewing their fleet.

Domestic: LAPA operates 199 flights with B737-200 that will be operated with B737-700 in the near future.

Observations: Aerolineas Argentina/Austral own 39 B737-200, and the future renovation plans for these two airlines remain uncertain. Therefore, it is speculated that the RVSM readiness percentage of Argentina in the year 2004 will be only 58%. Perhaps the geographic location of Argentina will allow for

the possibility that the southern portion of the Argentinean airspace can be utilized as a non-RVSM airspace.

Bolivia

International: No comments

Domestic: No comments

Observations: Lloyd Aereo Boliviano and Aerosur operate B727-200. These aircraft are used for domestic flights and medium range international flights. Lloyd Aereo Boliviano is renewing its B727-200 fleet for B737-300 on a long-range plan.

Brazil

International: At the present time, 5 weekly flights operated over Brazil FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region are operating 22 flights per week over Brazil's FIRs with destination USA, therefore if these flights are to continue to operate to USA they must be made RVSM ready by 2004.

Domestic: The domestic traffic in Brazil is the eighty- percent of the total traffic. In general the airlines operating the domestic flight are equipped with a modern aircraft fleet.

Chile

International: At the present time, 10 weekly flights operated over Chile's FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region are operating 5 flights per week over Chile's FIRs with destination USA, therefore if these flights are to continue to operate into USA they must be made RVSM ready by 2004. Lan Chile operates 88 flights with B737-200 that will be operated by A320.

Domestic: Lan Chile operates 98 percent of the domestic flights. Lan Chile is replacing its B737-200 fleet for A320.

Colombia

International: At the present time, 46 weekly flights operated over Colombian FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region are operating 35 flights per week over Colombian FIRs with destination USA, therefore if these flights are to continue to operate into USA they must be made RVSM ready by 2004. COPA operates 147 flights over Colombian FIRs that will be performed by B737-700.

Domestic: ACES is in the process of replacing its B727-200 for A320. Aerorepublic is replacing their DC9 for MD80, but this was not taken into account since they do not have a schedule planned.

Ecuador

International: At the present time, 14 weekly flights operated over Guayaquil FIR are USA carriers, therefore they will be RVSM by 2004. Lan Chile operates 14 flights with B737-200 that will be operated by A320.

Domestic: No traffic.

French Guyana

International: No comments

Domestic: No traffic

Guyana

International: At the present time, 6 weekly flights operated over Georgetown FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region are operating 35 flights per week over Georgetown FIRs with destination USA, therefore, if these flights are to continue to operate into USA they must be made RVSM ready by 2004.

Domestic: No traffic.

Panama

International: At the present time, 44 weekly flights operated over Panama FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region are operating 32 flights per week over Panama FIR with destination USA, therefore if these flights are to continue to operate to USA they must be made RVSM ready by 2004. COPA is operating 175 flights with B737-200 that will be B737NG.

Domestic: No traffic

Paraguay

International: At the present time, 5 weekly flights operated over Paraguay are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region operate 12 flights per week over Paraguay with destination USA, therefore, if these flights are to continue to operate to USA they must be made RVSM ready by 2004.

Domestic: No traffic.

Peru

International: At the present time, 7 weekly flights operated over Lima FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region operate 17 flights per week over Lima FIR with destination USA, therefore, if these flights are to continue to operate to USA they must be made RVSM ready by 2004.

Domestic: Aviandina, TANS and Aerocontinente share 60 percent of the domestic flights with B737-200 and B727-200. Plans for renewal of the fleet are unknown.

Suriname

International: No comments:

Domestic: No traffic

Uruguay

International: At the present time, 12 weekly flights operated over Montevideo FIR are USA carriers, therefore they will be RVSM by 2004. Lan Chile is operating 12 flights with B737-200 that will be A320 by 2004.

12 flights made by airlines from the CAR/SAM to USA. 14 flights made by Lan Chile that will be operated in 2004 with A320. 12 flights made by LAPA that will use B737-700.

Domestic: No traffic

Venezuela

International: At the present time, 43 weekly flights operated over Maiquetia FIR are USA carriers, therefore they will be RVSM by 2004. The airlines based in CAR/SAM Region are operating 162 flights per week over Maiquetia FIR with destination USA, therefore if these flights are to continue to operate to USA they must be made RVSM ready by 2004. COPA is operating 12 flights with B737-200 that will be B737NG.

Domestic: The local airlines have 324 flights operated with non-RVSM capable aircraft, but these flights are no more than 60 minutes long and can be operated under FL290 with non or very little fuel penalty.

Observations: Four major airlines are based in Venezuela: Aeropostal, Aserca, Avensa and Servivensa. These airlines operated a total of 26 DC9, 13 B727-200 and 3 B737-200. They cover most of the domestic and international flights. The intention of fleet replacement is unknown, but it is important to note that the main market of these airlines is into United States destinations, with 190 of 349 international flights operated to USA. This fact will force these airlines to replace their fleet if they want to continue to fly into the USA.

Appendix D

2004 CAR/SAM JET WEEKLY FLIGHT OF MORE THAN 50 MINUTES OR 250 NM							
	International Flights		Domestic Flights		Total		Readiness in percentage
COUNTRY/FIR	RVSM ready	Non-RVSM	RVSM ready	Non-RVSM	RVSM ready	Non-RVSM	RVSM ready
Caribbean							
Cuba	2457	50	2	26	2459	76	97%
Curacao FIR	856	59	0	0	856	59	94%
Dominican Rep.	1291	44	0	0	1291	44	97%
Haiti	845	6	0	0	845	6	99%
Kingston FIR	1573	23	0	0	1573	23	99%
Piarco FIR	954	31	0	0	954	31	97%
San Juan FIR	2247	2	0	0	2247	2	100%
Subtotal ----->	10223	215	2	26	10225	241	98%
Central America and Mexico							
Cenamer FIR	1679	58	0	0	1679	58	97%
Mexico	3991	45	3520	824	7511	869	90%
Subtotal ----->	5670	103	3520	824	9190	927	91%
South America							
Argentina	878	173	545	860	1423	1033	58%
Bolivia	224	149	0	107	224	256	47%
Brazil	1415	181	6576	854	7991	1035	89%
Chile	555	41	531	42	1086	83	93%
Colombia	1404	151	278	79	1682	230	88%
Ecuador	530	107	0	0	530	107	83%
French Guyana	31	6	0	0	31	6	84%
Guyana	184	15	0	0	184	15	92%
Panama	1084	26	0	0	1084	26	98%
Paraguay	315	62	0	0	315	62	84%
Peru	585	144	134	260	719	404	64%
Surinam	31	13	0	0	31	13	70%
Uruguay	550	105	0	0	550	105	84%
Venezuela	1209	218	0	324	1209	542	69%
subtotal ----->	8995	1391	8064	2526	17059	3917	81%
grand total ---->	24888	1709	11586	3376	36474	5085	87.76%

Appendix E

1. **Role of the regional monitoring agency in the RVSM area**

1.1. Monitoring will be carried out by the regional monitoring agency and will include the monitoring of height-keeping accuracy and vertical errors. The additional duties are as follows:

- a) transferring and collating aircraft height-keeping performance data from other monitoring agencies;
- b) receiving reports from height monitoring systems of those height deviations which are in magnitude equal to, or greater than, the following criteria:
 - i) TVE : 300 ft;
 - ii) ASE : 245 ft; or
 - iii) AAD : 300 ft;
- c) receiving reports from provider States of details of operational errors and large height deviations identified in the region;

Note: The large height deviations can be divided into four main types:

- i) operational errors (ATC/Pilots loop error and incorrect clearances),
 - ii) aircraft contingency events,
 - iii) deviations due to meteorological effects; and
 - iv) deviations due to ACAS/TCAS resolution advisories.
- d) take necessary action with the relevant State and operator to:
 - i) determine the likely cause of the height deviation; and
 - ii) verify the approval status of the relevant operator;
- e) recommend, wherever possible, remedial action;
- f) analyze data to detect height deviation trends and to take action as in d) above;
- g) undertake data collections as required to:
 - i) investigate height-keeping performance of the aircraft in the core of the distribution;

- ii) establish or add to a data base on the height-keeping performance of:
 - the aircraft population;
 - aircraft types or categories; and
 - individual airframes;
- iii) provide additional data relevant to height-keeping performance needed to conduct studies which are deemed appropriate. Such studies might include analysis of FTE in the airspace based on the analysis of flight data recording;
- h) collect data on all flights entering the region from all provider States. These data should include the aircraft registration numbers to facilitate a check or approval status against a data base of approved users;
- i) monitor the level of risk of collision as a consequence of operational and technical errors and emergency procedures as follows:
 - i) establish a mechanism for receipt of all reports of height deviations of 90 m (300 ft) or more resulting from the above errors and/or procedures;
 - ii) determine, wherever possible, the root cause of the deviation together with its size and duration;
 - iii) calculate frequency of occurrence;
 - iv) assess level of risk in RVSM environment;
 - v) compare level of risk due to operational errors with the level experienced in the 600 m (2000 ft) environment; and
 - vi) initiate remedial action;
- j) maintain a central data base of approved users and initiate checks on the “approval status” of aircraft operating in the relevant RVSM environment;
- k) circulate monthly reports on all height-keeping deviations together with such graphs and tables necessary to illustrate the estimated relation of the system risk to the TLS, and
- l) to submit annual reports to the GREPECAS.

1.2. The Regional Monitoring Agency is responsible for the collection, collation and dissemination of data relevant to navigation performance. Additionally, it acts as a focal point for reports of height deviations of 300 feet or more. Although there is a formalized and universally agreed procedure for dealing with gross navigation errors (GNE), no such official procedure yet exists for dealing with height deviations. Accordingly, the regional monitoring agency, during and subsequent to the RVSM verification phase will, in addition to its existing tasks, be responsible for the following:

- a) initiation of checks of the approval status of aircraft operating in RVSM through tactical monitoring of the airspace;
- b) maintenance of a data base of aircraft approved to operate in RVSM airspace including details of GMS monitored performance;

-
- c) maintenance of a data base of “rogue” aircraft collated from all monitoring sources;
 - d) maintenance of such other data bases as necessary to monitor the TLS in respect of observed height-keeping performance criteria;
 - e) taking appropriate measures to ensure the minimum aircraft monitoring targets are met;
 - f) follow-up action and initiation of investigation of height deviations in excess of a pre-determined magnitude and develop recommendations for remedial action; and
 - g) production of routine reports and dissemination of monitoring data as required.

Appendix F

Working group: **Airworthiness and RVSM - aircraft and operators approval**

Work programme:

- a) to examine and harmonise the existing material related to airworthiness and RVSM aircraft and operators approval,
- b) to initiate the actions it deems advisable for amending the aeronautical charts to reflect RVSM navigation requirements,
- c) to examine and adapt the guidance material on ACAS for use by operators and recommend the equipment upgradings it deems necessary,
- d) to review the data provided by the entity made responsible for evaluating the height-keeping performance and make the necessary recommendations,
- e) to continuously monitor the RVSM capability of the approved fleet, the percentage of aircraft that fail to meet the requirements and the percentage of State aircraft that would be exempt from RVSM requirements,
- f) to prepare the material required by the RVSM web site administrator.

Working group: **Air traffic management and ATC operations**

Work programme:

- a) to examine the RVSM scenario in both regions and the material on this matter prepared by other regions, adjust it, harmonise it and make recommendations regarding:
- b) to develop turbulence mitigation procedures
- c) to establish necessary transition areas and related procedures,
- d) to develop contingency procedures,
- e) to develop an ATC guidance handbook
- f) to develop guidance material for establishing the work load and identifying the need for simulations for specific traffic flows,
- g) to recommend guidelines for airspace sectorization
- h) to study the impact of RVSM implementation on ATFM,

- i) to recommend a mechanism for receiving, collating and analysing information concerning ATC or pilot operational errors,
- j) to recommend the minimum requirements for RVSM training of ATC staff and RVSM simulations,
- k) to prepare material for aeronautical information publications and AIP supplements related to RVSM implementation,
- l) to assist in the development of procedures for the switchover day,
- m) to prepare material at the request of the RVSM web site administrator.

Working group: **Monitoring of RVSM operations**

Work programme:

- a) to recommend the procedures to be applied for the implementation, use of, download, delivery and analysis of data from the GMU or HMU, or both systems if necessary,
- b) to review height-keeping monitoring data before and after implementation,
- c) to identify those elements which might be seriously affecting safety assessment,
- d) to establish a method for investigating errors that could endanger the target level of safety (TLS) and study and propose solutions for reducing risks,
- e) to closely monitor the vertical occupancies level in terms of traffic density, passing frequency, etc.
- f) to regularly analyse data to ensure that the mathematical collision risk model remains within the agreed parameters,
- g) to design a suitable methodology that takes into account the effects of the estimated traffic increase and the changes in occupancy levels and collision risk,
- h) to help prepare the procedures for the switchover day,
- i) to prepare the material at the request of the RVSM web site administrator.

Appendix G

Proposal for the implementation of RVSM databases that should be under States' responsibility

1. All CAR/SAM States who participate directly or indirectly on the RVSM Programme are to supply whoever is making the safety assessment and to the regional monitoring agency all necessary information in order to carry out their corresponding tasks.

1.1 Considering the aforementioned, two areas have been identified, within the normal States' organization, to be organized in a way to respond future data requirements that might be necessary in order to complete a safety assessment of RVSM scenarios and to carry out a monitoring of the maintenance of RVSM specifications by all members of the programme in order to compare with the agreed regional TLS.

2. Area: Airworthiness

2.1 To keep a record of all aircraft who comply with the related requirements and functional characteristics in order to ensure the maintenance capacity of RVSM space altitude, as indicated in the Manuals and Guides detailed in Note 1C.

2.2 To keep a record of aircraft that complies with maintenance requirements, training of crews and calendars of approved and adapted service as well as operational manuals and checklists.

2.3 To keep a record of aircraft inspected and classified as eligible for operational approval.

2.4 To keep a record of reported and investigated altitude maintenance errors occurrences, such as:

- a) TVE equal or larger than 300 ft (90m)
- b) ASE equal or larger than 245 ft (75m)
- c) AAD equal or larger than 300 ft (90m)

2.5 To establish a specific programme for flight inspections.

2.6 To transmit all the aforementioned information to a central database (CDB).

3. Area: Air Traffic Control

3.1 To keep a record of data related to:

- a) aircraft that do not comply with the requirements of the Flight Plan;
- b) aircraft that do not comply with the RVSM airspace requirements; non authorized diversions, observed or reported, lateral and vertical;
- c) diversions caused by emergencies, contingencies or unexpected weather causes (e.g. volcanic ashes, severe turbulence);
- d) reported failures of on board equipment that have to be mandatory notified to the ATC by aircrews and that are detailed in the Manual Doc. 9574 or others that the ATC observes;
- e) failure of elements or functions of the CNS/ATM that are critical for the monitoring of the RVSM scenario;
- f) ATC and/or aircrew errors registry;
- g) registry of visual perceptions with opposite traffic reported by aircrews;
- h) registry of resolution notices due to the ACAS/TCAS,
- i) registry of all Flight Plans and older Flight Progress Strips that might be or that are related with the RVSM scenario flows that might be RVSM spaces;
- j) FPL and CPL registries with all the flight projection in case of automated systems; and
- k) expected growth based on the statistical analysis projected for a 10 year future period.

- Note 1 C:
- *Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 ICAO Doc. 9574.*
 - *JAA Temporary Guidance Leaflet) TGL6 REV.1 of 01/10/99*
 - *FAA Interim Guidance 91-RVSM.*

Appendix H

Basic information for safety assessment

- States should assess their own system of routes or to compare it with a reference system;
- It is necessary to make an evaluation in order to confirm that the proposed parallel route system can be accomplished with the necessary safety level (TLS) of 5×10^{-9} mortal accidents by flight hour by dimension.
- When comparing airspace with the reference system the following has to be included:

1. The collected information, regarding traffic and operation conditions for the particular configuration, in order to compare the specified parameters in the Collision Risk Model (CRM - Reich Model).

Note 1 Examples of CRMs are indicated in the Air Traffic Services Planning Manual (ICAO Doc. 9426), for the Minimum Navigation Performance Specifications (MNPS) in airspace and in the Manual on Airspace Planning Methodology for the Determination of Separation Minima. (ICAO Doc. 9689), for the longitudinal separation of 50 NM.

2. The data will include, among others:

- a) Lateral occupation Index;
- b) Traffic flying in the same direction;
- c) Traffic nominally flying in separated tracks by the minimum distance of lateral separation;
- d) Traffic nominally flying at the same flight level; and
- e) Aircraft within a longitudinal segment defined for another aircraft;

3. A group of similar criteria to the aforementioned in order to define the occupation in the opposite direction;

4. Reasons of annual growth for a ten-year period;

Note 2 The required parameters should be specified in detail and a form should be given for the collection of data that will be used in the CRM to compare the reference system.

Appendix I

<u>NAVIGATION DEVIATION INVESTIGATION FORM</u>				
Type of Report: PILOT – Flight CONTROLLER – ATC Unit				
Date/Time (UTC):	Type of Deviation: LATERAL Type (3.2 a - g) (*) VERTICAL Type (3.1 a - k)			
Causes: WEATHER (See 3.2-g) OTHERS (Specify)				
Conflict Alert Systems:				
DETAILS OF AIRCRAFT		First Aircraft		Second Aircraft (for vertical)
Aircraft Identification:				
Name of Owner/Operator:				
Aircraft Type:				
Departure Point:				
Destination:				
Route Segment:				
Flight Level:		Cleared	Actual	Cleared
				Actual
Cleared Track:				
Extent of deviation - magnitude and direction: (NM for lateral; feet for vertical)				
Amount of time at incorrect Flight Level/Track:				
Position where deviation was observed: (BRG/DIST from fixed point or LAT/LONG)				
WAS ATC Clearance obtained: YES NO		If ATC clearance NOT obtained WERE Contingency procedures Followed: YES NO		
Action Taken by ATC/Pilot:				
Other comments:				

(*) See deviation classification

Explanation of the navigation deviation investigation form

1. The ATCO/Pilot should fill as many items as possible.
2. Complementary data can be attached.
3. The notification of any deviation (vertical or lateral) has to be classified, when possible, according to the following types:

1.1 For Large Height Deviations (vertical deviation) (*See Attachment A, paragraph 2.4*)

- a. ATC system loop error (*)
- b. Contingency action due to engine fault
- c. Contingency action due to pressurisation failure
- d. Contingency action due to OTHER CAUSE
- e. Failure to climb/descend as cleared
- f. Climb/descend without ATC clearance
- g. Entry airspace at an incorrect level
- h. ATC FL re-clearance resulting in loss of lateral or longitudinal separation.
- i. Deviation due to ACAS/TCAS
- j. Aircraft unable to maintain level
- k. Other

3.2 For lateral deviations

- a. ATC system loop error (*)
- b. Equipment control error including inadvertent waypoint error
- c. Waypoint insertion error due to the correct entry of incorrect position
- d. Other with failure notified to ATC in time for action
- e. Other with failure notified to ATC too late for action
- f. Other with failure notified/received by ATC
- g. Lateral deviations due to weather when unable to obtain prior ATC clearance

Notes:

1. There are data that have to be notified by pilot.
2. As contingency procedures have to be followed, if a NO is included in “WERE the contingency Procedures followed”, an explanation (WHY) have to be included in “Other comments”.
3. (*) ATC system loop error: Any error caused by a misunderstanding between the pilot and controller regarding the assigned flight level, Mach number or route to be followed. Such errors can be caused by errors in coordination between ATC units or by misinterpretation by pilots of an clearance or re-clearance. (*Doc. 9689 – AN/953, Manual on airspace planning methodology for the determination of separation minima*).



DRAFT

GUIDANCE MATERIAL FOR THE ELABORATION OF A

NATIONAL PROGRAMME FOR THE IMPLEMENTATION AND OPERATION OF THE 300 M (1 000 FT) REDUCED VERTICAL SEPARATION MINIMUM BETWEEN FL 290 AND FL 410 (RVSM) IN (*name of the State*)

(Lima, 20 May, 2002)

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LIST OF ACRONYMS USED IN RVSM

AAD	assigned altitude deviation
ACAS	airborne collision avoidance system
ACC	area control centre
ASE	altimetry system error
ATC	air traffic control
ATS	air traffic services
CFL	cleared flight level
CMA	central monitoring agency
CRM	collision risk model
FAA	Federal Aviation Administration
FL	flight level
FMS	flight management system
FTE	flight technical error
GAT	general air traffic
GMS	GPS-based monitoring system
GMU	GPS-based monitoring unit
GPS	global positioning system
HF	high frequency
HMU	height monitoring unit
JAA	Joint Aviation Authority
MASPS	Minimum aircraft system performance specification
MNPS	minimum navigation performance specification
NAT	North Atlantic
NAT SPG	North Atlantic Systems Planning Group
NOTAM	notice to airmen
OAT	operational air traffic
PEC	position error correction
PMS	performance management system
QFE	atmospheric pressure at aerodrome elevation (<i>or</i> at runway threshold)
QNH	altimeter subscale setting to obtain elevation when on the ground++
RGCSP	Review of the General Concept of Separation Panel
RMA	regional monitoring agency
RNAV	area navigation
RPG	regional planning group
RVSM	reduced vertical separation minimum of 300 m (1 000 ft) between FL 290 and FL 410 inclusive
SD	standard deviation
SSE	static source error
SSR	secondary surveillance radar
TLS	target level of safety
TVE	total vertical error
VSM	vertical separation minimum

LIST OF DEFINITIONS MOSTLY USED IN RVSM

Altimetry system error (ASE). The difference between the altitude indicated by the altimeter display assuming a correct altimeter barometric setting and the pressure altitude corresponding to the undisturbed ambient pressure.

Altimetry system error distribution. The distribution of an aggregate altimetry system error.

Altitude-keeping device. Any equipment which is designed to automatically control the aircraft to a referenced pressure altitude.

Assigned altitude deviation (AAD). The difference between the transponded Mode C altitude and the assigned altitude/flight level.

Collision risk. The expected number of mid-air aircraft accidents in a prescribed volume of airspace for a specific number of flight hours due to loss of planned separation.

Note.— One collision is considered to produce two accidents.

Flight technical error (FTE). Difference between the altitude indicated by the altimeter display being used to control the aircraft and the assigned altitude/flight level.

Height-keeping capability. Aircraft height-keeping performance which can be expected under nominal environmental operating conditions with proper aircraft operating practices and maintenance.

Height-keeping performance. The observed performance of an aircraft with respect to adherence to cleared flight level.

Occupancy. A parameter of the collision risk model which is twice the count of aircraft proximate pairs in a single dimension divided by the total number of aircraft flying the candidate paths in the same time interval.

Passing frequency. The frequency of events in which two aircraft are in longitudinal overlap when traveling in the opposite or same direction on the same route at adjacent flight levels and at the planned vertical separation.

Position error. See static course error.

Rogue aircraft. Aircraft which have total vertical error (TVE) deviations of 300 feet or greater.

Static source error. The difference between the pressure sensed by the static system at the static port and the undisturbed ambient pressure.

Static source error correction (SSEC). A correction which may be applied to compensate for the static source error associated with an aircraft.

Target level of safety (TLS). A generic term representing the level of risk which is considered acceptable in particular circumstances.

Total vertical error (TVE). Vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level).

Vertical separation. The spacing provided between aircraft in the vertical plane to avoid collision.

Vertical separation minimum (VSM). VSM is documented in the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) as being a nominal 300 m (1 000 ft) below FL 290 and 600 m (2 000 ft) above FL 290 except where, on the basis of regional agreement, a value of less than 600 m (2 000 ft) but not less than 300 m (1 000 ft) is prescribed for use by aircraft operating above FL 290 within designated portions of the airspace.

INTRODUCTION

0 Introduction

0.1 Objective of the Programme

The programme for the implementation of the reduced vertical separation minimum (RVSM) was established to provide additional airspace capacity and improve the operational performance of users. The main objective of the RVSM is to ensure the implementation of the 1000 ft separation between FL 290 and FL 410 between duly equipped and approved aircraft in the CAR/SAM Flight Information Regions. These 6 additional flight levels in the most frequently used altitudes will enable users to fly at or near optimum flight levels, thus reducing fuel consumption and operating costs and increasing the capacity of the ATS route system in the Region.

This national RVSM Programme was drawn up within the framework of the CAR/SAM RVSM Implementation Programme (ref. Conclusion 10/11 Implementation of RVSM in the CAR/SAM Regions). Its purpose is to identify the activities and tasks that should be carried out by (include the name of the State/service provider, as the case may be) for the implementation and safe operation of the RVSM in the (identify the FIR(s) involved) FIR, as agreed by the CAR/SAM Regional Planning and Implementation Group (GREPECAS).

Maintaining an acceptable level of safety is the key factor on which this document is based, to which end (name the State/service provider) shall ensure that the level of air traffic services and ATS procedures applicable to the airspace in which the RVSM will be applied are appropriate and adequate for maintaining an acceptable level of safety in the provision of ATS.

The activities required for RVSM implementation are described in detail, in order to identify all the tasks required for the implementation, the standards that must be applied to carry out these activities and additional tasks to guide the administration in the implementation of RVSM in the airspace in question.

0.2 Contents

This Programme contains different chapters that are considered vital for RVSM implementation.

Chapter 1:	Modification of the airspace
Chapter 2:	Modification of ATC procedures
Chapter 3:	Modification of ATC equipment
Chapter 4:	RVSM training for air traffic controllers
Chapter 5:	RVSM switchover
Chapter 6:	Aircraft and operators RVSM approval
Chapter 7:	RVSM operation monitoring
Chapter 8:	Financial resources for RVSM programme implementation

Each chapter of the Programme:

- a) identifies the tasks to be fulfilled by the State;

- b) establishes safety requirements;
- c) identifies the impact that RVSM implementation would have if the task in question was not carried out;
- d) includes guidelines for drawing up the Programme, shown in italics. In any case, the State could adapt and include these guidelines in the text.

0.3 **Organisation and responsibilities**

This text is for illustration purposes. In this text, States/service providers could describe their own national organisations and arrangements for the approval of the Programme. The purpose of this description is to identify the individuals responsible for preparing and enforcing the Programme in its pre-implementation stages. Subsequent stages will be defined briefly in chapter 7.

The organisation for drawing up and enforcing this Programme and related activities is defined as follows:

- a) (insert name or unit) shall be responsible for drawing up the Programme and maintaining target safety levels at all times. The approval of the Programme confirms that it is acceptable and that it accurately describes the tasks required to verify the attainment of the target safety levels.
- b) Mr. (name of the responsible officer) has been appointed as the Officer Responsible for implementing the RVSM National Programme. In addition to his domestic responsibilities as the person responsible for implementing the national Programme, this Officer shall also be the contact and person responsible for coordinating with the regional RVSM programme and will attend all events related to the RVSM implementation. He will also be responsible for keeping the national Programme up to date and consistent with the regional programme. In addition, he must ensure that the national RVSM implementation Programme is duly and timely disseminated among the national aeronautical community so that all interested groups obtain general knowledge about the project.
- c) Mr.(insert name), Chief of Air Traffic Services, is responsible for ATS operating services. By approving the Programme, he is confirming that, as far as safety is concerned, all tasks required to ensure safety have been envisaged and will be implemented within the approved timetable, thus ensuring the implementation and safe operation of the RVSM.
- d) The Director General of Civil Aviation, Mr. (insert name) is the State-appointed authority responsible, among other things, for adequate provision of air traffic services within (name of State).
- e) By approving the programme, the DGCA is confirming that the programme was drawn up correctly and that the duties delegated to the aforementioned officials meet the safety and responsibility requirements for safe implementation and operation of the RVSM. It also guarantees that the official appointed to represent the DGCA at regional events for the implementation and operation of the RVSM is duly authorised to act on his behalf.

0.4 **References**

The following documents were used as reference for preparing this document:

- a) ICAO Appendix 11
- b) ICAO Doc 4444, PANS ATM
- c) ICAO Doc 9574, RVSM Manual
- d) Example Plan for the National RVSM Safety Plan (Eurocontrol)
- e) ICAO Doc 7030

SUBSEQUENTLY, INSERT ALL OTHER NATIONAL AND/OR INTERNATIONAL DOCUMENTS USED AS REFERENCE.

CHAPTER 1 – MODIFICATION OF THE AIRSPACE

1 Introduction

1.1 This chapter describes airspace modifications that would be required to ensure that RVSM operations develop in a safe and effective manner.

1.2 Safety requirements

1.2.1 Safety requirements related to airspace modifications are intended to show that such modifications are appropriate and consistent with the safety of RVSM operations in the airspace of (insert name of State).

1.3 Modifications of the airspace

1.3.1 Appendix A to this document contains an airspace modification programme that has been developed to support RVSM implementation. The main changes that have been made are as follows:

Examples

- a) *changes in the enter/exit points to a given airspace;*
- b) *modification of the route network structure within a given airspace;*
- c) *if required, the designation of airspaces to transition from RVSM to non- RVSM, and vice-versa.*
- d) *re-sectorisation of upper airspace*

Note: *Any changes to the airspace structure are likely to affect an adjacent ACC; it will therefore be necessary to amend the relevant letters of operational agreement.*

1.4 Monitoring changes to the airspace structure

1.4.1 For a safe and effective modification of the airspace, simulators will be used to verify compliance with all required airspace management reliability levels. This simulation of the new structure must show that controllers will be able to handle RVSM operations with absolute safety.

1.5 Impact of failure to modify RVSM airspace

1.5.1 Failure to modify the airspace will have a negative impact on RVSM implementation in (name of State) and could also cause a delay in RVSM implementation at the regional level, with the resulting loss of the investments made by other States/service providers and users of the Region.

CHAPTER 2 – MODIFICATION OF ATC PROCEDURES

2 Introduction

2.1 This chapter describes the changes required in ATC procedures as a result of RVSM implementation in the CAR/SAM Regions.

2.2 Safety requirements

2.2.1 Safety requirements related to the modification of ATC procedures are intended to show that the proposed changes have been approved for use. The new procedures are guaranteed to be appropriate, create no excessive work load for controllers and pilots and, if so required, have been coordinated with adjacent ACCs and/or ATC units.

2.3 Planned activities for the implementation of new ATC procedures

2.3.1 It is assumed that air operations carried out by State aircraft have no restrictions for operating in RVSM airspace. Within the scope of the Civil/Military Coordination Committee, arrangements have been made with State aircraft operators to apply special procedures, if applicable.

2.3.2 In view of the increased number of flights and the changes in traffic direction in each flight level with respect to the conventional 2000-ft vertical separation minimum (CVSM) above FL 290, RVSM implementation requires increased surveillance of aircraft clearances and making sure that crews fully understand and comply with such clearances.

2.3.3 Necessary steps must also be taken to cater to a possible increase in traffic and controllers must be informed of their responsibilities regarding the measures to be taken in the various cases.

2.3.4 At the regional level (Doc 7030, Regional Supplementary Procedures), in-flight contingency procedures have been developed for application in an RVSM environment, also to be applied in (name of State).

2.3.5 The changes in the procedures, as well as the phraseology to be used, have been included in the operational handbooks of ATS units (state which units).

2.3.6 The changes in the procedures have been coordinated with the adjacent..... (state which ATS units) ACCs/ATC units and included in the letters of operational agreement.

2.3.7 The new ATS procedures for RVSM operations appear in **Appendix B** to this document.

2.4 Monitoring changes to ATC procedures

2.4.1 The changes to ATC procedures are guaranteed to be appropriate and to have been made in a professional way.

2.4.2 Several elements have been identified which should give us confidence in the changes made, based on the following:

- a) Guidance material from appropriate ICAO documents has been used, following a thorough review and development.
- b) The changes to ATC procedures and related phraseology were included in the operational handbooks of the ATS units concerned and reviewed by the operational staff of each unit.
- c) The changes to ATC procedures affecting adjacent ATS units were coordinated, duly approved and included in the letters of operational agreement.
- d) The new ATC procedures, the related phraseology and the new airspace structure were subject to a simulation procedure. The simulation validated said procedures as well as the new airspace structure.

2.4.3 **Impact of non-modification of ATC procedures on implementation**

2.4.4 Failure to modify ATC procedures will have a negative impact on RVSM implementation in (name of State) and could also cause a delay in RVSM implementation at the regional level, with the resulting loss of the investments made by other States/service providers and users of the Region.

CHAPTER 3 - MODIFICATION OF ATC EQUIPMENT

3 Introduction

3.1 This chapter describes the changes required in ATS equipment as a result of RVSM implementation and operation in the CAR/SAM Regions.

3.2 Safety requirements

3.2.1 Safety requirements related to the modification of ATS equipment are intended to show that the proposed changes have been approved for operational use.

3.3 Planned activities for the modification of ATC equipment

3.3.1(name of State) has developed an ATC equipment modification programme that will enable RVSM implementation. Details of said modifications can be found in **Appendix C** to this document. The programme has been designed to ensure that the necessary modifications will be carried out well in advance of the RVSM implementation date.

3.3.2 The changes required are consistent with flight data processing (FDPS), radar data processing (RDPS), display systems, etc. *(it might be necessary to make modifications to the STCA or MTCA systems, ATC simulators, system software, etc.).*

3.4 Monitoring changes to ATC equipment

3.4.1 The modifications to ATC equipment are guaranteed to be appropriate and to have been made in a professional way.

3.4.2 The changes to ATC equipment have been made under strict control prior to their final installation in the ACC (name the ATS unit). Once the modifications were made, these were accepted by the operational unit concerned.

3.4.3 Likewise, there are various elements that will allow us to have confidence in such changes:

Note: *In this paragraph, the State should mention the elements that provide the certainty that the changes have been made and were duly monitored.*

Example:

As part of their RVSM training, controllers have assessed the human-machine interface, making sure that it is adequate and that it meets current needs.

3.5 **Impact of non-modification of ATS equipment on RVSM implementation**

3.5.1 Failure to modify ATC equipment will have a negative impact on RVSM implementation in (name of State) and could also cause a delay in RVSM implementation at the regional level, with the resulting loss of the investments made by other States/service providers and users of the Region.

CHAPTER 4 - RVSM TRAINING FOR AIR TRAFFIC CONTROLLERS (ATCOS)

4 Introduction

4.1 This chapter describes the activities that should be carried with respect to the training of air traffic controllers, in order to ensure that the staff is duly familiar with RVSM procedures.

4.2 Safety requirements

4.2.1 Safety requirements related to the training of air traffic controllers are intended to prove that the staff has been duly trained in RVSM procedures and is capable of controlling traffic in a RVSM environment.

4.3 Planned activities for RVSM training of ATCOs

4.3.1 The ATCO training programme has been designed to support RVSM implementation. Details of this training programme can be found in **Appendix D** to this document. The programme is addressed to all controllers who will be working at ATS units where RVSM will be applied, and will be completed before the RVSM implementation date established for the CAR/SAM Regions.

4.3.2 The training programme takes into account aspects related to the identified roles and responsibilities of ATCOs, the development of training material (RVSM Training Manual) which has been based on related ICAO documentation, the training sub-programme *per se* which will be carried out in XXX stages, and an on-the-job training (OJT) programme.

4.3.3 The training material has been prepared under strict control and approved by (name of the corresponding operational unit or CATC).

4.3.4 *Traffic controllers do not require a new license for RVSM implementation and training.. The approval and implementation of this programme means that the State/service provider agrees and is committed to ensure that the appropriate staff receives proper training in order to continue providing safe services in the new RVSM environment.*

4.4 Monitoring the training of ATCOs

4.4.1 *A significant number of causes of risk due to lack of ATCO training have been identified. The success of RVSM implementation depends on the training and qualification of the staff in charge of day-to-day operation of the system. Therefore, training is considered to be a key element for a successful implementation.*

4.4.2 ATCO training is guaranteed to have been the appropriate training conducted in a professional manner.

4.4.3 In order to ensure proper training of ATCOs, RVSM-related ICAO documentation was used as reference material, instructors with sufficient experience were engaged, and, during application in the ACC (insert name), they were duly qualified to provide on-the-job training (OJT). This will

guarantee that all RVSM-trained staff members are familiar with RVSM operations and have understood all the training material used.

4.4.4 (insert name of State) acknowledges that it is responsible for the competence of air traffic controllers working in the RVSM field of the (name of the FIR) FIR, and ensures that the necessary time was used for proper training, giving ATCOs who were undergoing training the opportunity to clarify aspects they had failed to understand, and establishing suitable refresher courses as needed.

4.5 **Impact of failure to provide ATC training on RVSM implementation**

4.5.1 The lack of ATC training will have a negative impact on RVSM implementation in (name of State) and could also cause a delay in RVSM implementation at regional level, with the resulting loss of the investments made by other States/service providers and users of the Region.

CHAPTER 5 - RVSM SWITCHOVER

5 Introduction

5.1 This chapter describes the activities that should be carried out during the RVSM switchover, from 24 hours before implementation to 24 hours after, and the relevant contingency plans. This is the period in which the 2000-ft conventional vertical separation minimum (CVSM) will switch over to the 1000-ft reduced vertical separation (RVSM).

5.2 Safety requirements

5.2.1 The safety requirements related to the RVSM switchover are intended to prove that the special procedures for this period have been established and their use approved.

5.3 Planned activities for the switchover

5.3.1 Certain measures have been adopted to enable a safe and effective switchover to the RVSM. These activities appear in **Appendix E** to this document.

5.4 Monitoring of special procedures for the RVSM switchover

5.4.1 *There are elements that will allow us to monitor the rate of effectiveness, such as the establishment of special procedures to be used during the RVSM switchover period and duly approved contingency plans. It must be ensured that RVSM switchover planning is complete and effective.*

5.4.2 Special procedures for use during the RVSM switchover period and the contingency plans duly approved by (the unit in charge of preparing and approving the special procedures) have been established.

5.4.3 Following RVSM implementation, procedures will be established for service providers and users to send information to the Regional Monitoring Agency within the first hour and then 12 and 24 hours after implementation. This information will refer to the status of implementation, the first impression and possible problems that could arise.

5.4.4 Impact of RVSM implementation without an effective planning of the RVSM switchover period.

5.4.5 The lack of an RVSM switchover programme and related contingency measures would place the effective implementation of RVSM at risk in (name of State) and, consequently, the safety of air operations carried out during the switchover period.

CHAPTER 6 - AIRCRAFT AND OPERATORS RVSM APPROVAL

6 Introduction

6.1 This chapter describes the activities required for the aircraft and operators approval that intend to fly in an RVSM environment in the CAR/SAM Regions.

6.2 Safety requirements

6.2.1 *Both operators and their aircraft require prior clearance to fly in RVSM airspaces. The State aeronautical authority is responsible for describing the regulatory activities in this respect.*

6.2.2 The safety requirements related to RVSM approval of aircraft and operators are intended to prove that all operators based in (name of State) are aware of the RVSM implementation programme and have obtained RVSM approval, both for their operations and for their aircraft.

6.3 Planned activities for RVSM approval of aircraft and operators

6.3.1 Certain measures have been adopted for the approval of operators and their aircraft. These measures have been included in an RVSM approval programme for operators and aircraft, which appears in **Appendix F** to this document.

6.3.2 In order to guarantee the transition between the regions, height-keeping capability specifications have been developed. These requirements have served as the basis for the development of the minimum aircraft system performance specifications (MASPS). These MASPS specifications also include specifications and procedures for type approval, released from production and continued airworthiness. MASPS are applicable worldwide and the following material has been prepared at a regional level:

- a) Joint Aviation Authority (JAA) Temporary Guidance Leaflet (TGL) N° 6 “*Guidance material on the approval of aircraft and operators for flight in airspaces above FL 290, where a 300 m (1000 ft) vertical separation minima is applied*”; or
- b) Federal Aviation Administration (FAA) Document 91 -RVSM “*Interim guidance on the approval of operators/aircraft for RVSM operations*”

Note: Under Regional Project RLA/99/901 “Regional Safety Surveillance Cooperation System”, the CAR/SAM Regions are developing the Latin American Aeronautical Regulations (LAR). This project has placed priority on formulating guidelines for RVSM approval of aircraft and operators, based on the documents mentioned in items a) and b) above. These guidelines are expected to be available by

6.3.3 The programme for the approval of aircraft and operators from (name of country) is sub-divided into two main activities, one aimed at the dissemination of the RVSM implementation program and the other aimed specifically at the tasks for the approval of aircraft and operators.

6.4 **Monitoring of approval activities**

6.4.1 Approval activities are effective and are aimed at the approval of aircraft capable of meeting the most stringent height-keeping criteria for RVSM operations in the CAR/SAM Regions and to ensure that crews are familiar with RVSM standards and procedures.

6.4.2 The programme for the approval of aircraft and operators covers airworthiness elements (including continued airworthiness) and operational approval, and includes the established procedures to be followed to that end.

6.5 **Airworthiness approval (including continued airworthiness)**

6.5.1 The aircraft will be approved, considering that it meets all the requirements set forth in the appropriate airworthiness document of (State), based on criteria regarding the height-keeping capability defined by the MASPS. Likewise, the aircraft altimetry and height-keeping equipment must be maintained in accordance with approved procedures and service schedules.

6.6 **Operational approval**

6.6.1 (State) has made certain that the operating programmes are adequate, that flight crew training and operational handbooks have been evaluated and that the operator has shown that it maintains high levels of height-keeping performance. The respective requirements appear in **Appendix F**.

6.7 **Monitoring operational errors**

6.7.1 The CAR/SAM Regional Planning and Implementation Group (GREPECAS) has established a programme for collecting and evaluating operational deviations and errors. The information is obtained from the Area Control Centres when deviations are equivalent to or greater than 300 feet (90 mts). This information is sent by the States to the CAR/SAM Regional Monitoring Agency (CAR/SAMMA)

6.8 Impact of RVSM approval of aircraft and operators on RVSM implementation

6.8.1 The region has set a date for continuing or postponing implementation, depending, among other aspects, on the degree of RVSM approval of aircraft and operators, which has been set at 90%.

6.8.2 The lack of an efficient RVSM approval programme for aircraft and operators would place the effective implementation of the RVSM at risk in (name of State), thus hindering RVSM implementation on a national and regional scale, and affecting aircraft operations.

CHAPTER 7 –RVSM OPERATION MONITORING

7 Introduction

7.1 This chapter describes the activities that should be carried out with respect to safety assessment, in order to make ensure that RVSM implementation meets the target level of safety (TLS) approved at the CAR/SAM RAN meeting.

7.2 Safety requirements

7.2.1 In Recommendation 5/29, the CAR/SAM RAN 3 meeting established that, before implementing RVSM and as long as operations in a 2000-ft vertical separation minimum setting continue, the proposed safety level of the designated airspace should be verified to ensure that it is equal to or less than 5×10^{-9} fatal accidents per hour of flight due to loss of vertical separation for all causes, in accordance with the following:

- a) The technical risk is the risk of collision associated to the height-keeping performance of the aircraft. Risks associated to operational errors are not included (e.g. pilot or controller error), nor are in-flight contingencies.
- b) Overall risk is the risk of collision due to all causes, which includes technical risk and all risks due to operational errors and in-flight contingencies. *(Relevant in-flight contingencies include: height deviations due to emergency procedures, turbulence and ACAS advisories).*

7.2.2 In turn, Annex 11 (paragraph 2.26) establishes that States shall implement systematic and adequate ATS safety management programmes to make sure that air traffic services remain safe within their airspace and at their airports.

7.2.3 In view of the above, any significant safety-related changes to the ATC system, including the implementation of a reduced separation minimum or a new procedure, shall only enter into force after a safety assessment has proven that the established target level of safety will be met.

7.2.4 In order to comply with the above and make sure that safety is maintained, appropriate measures will be established to monitor compliance with the established target level of safety after implementation.

7.3 Planned activities for monitoring RVSM operations

7.3.1 At a regional level, certain measures have been taken to guarantee safety before, during and after RVSM implementation. Safety objectives have been established for both technical risk and overall risk.

7.3.2 All CAR/SAM States that participate directly or indirectly in the RVSM implementation must provide the data required to conduct the safety assessment. To that end:

- a) (name of State) has implemented a data collection programme as shown in **Appendix G** to this document.
- b) this information will be sent to the CAR/SAM RMA monitoring agency.
- c) the monitoring agency shall coordinate the data processing with the body/unit in charge of the safety assessment.
- d) a safety evaluation will be conducted prior to implementation,.
- e) a system verification process will be carried out during a period agreed upon by the region, where the operating system will be fully assessed within a separation of 2000-ft environment.
- f) at the end of this period in which the integrity of the system has been verified, use of the RVSM separation will begin.
- g) an RVSM switchover period has been established.
- h) a continuous system monitoring programme has been established.
- i) post.-implementation assessment has been established to make sure that all RVSM requirements are met satisfactorily in the CAR/SAM Region.

7.4 **Monitoring of special RVSM transition procedures**

7.4.1 Monitoring activities involving continuous assessment of the system have been established to verify compliance with all RVSM requirements.

7.4.2 Impact of failure to have an effecting RVSM switchover programming on RVSM implementation.

7.4.3 RVSM operation monitoring is a key factor in RVSM implementation and its continuous operation. Failure to have such a programme, fulfilled within the established terms and time frames, would have a negative impact on RVSM implementation in (name of State) and could also cause a delay in RVSM implementation at the regional level, with the resulting loss of the investments made by other States/Service Providers and users in the Region.

CHAPTER 8 - FINANCIAL RESOURCES FOR RVSM PROGRAMME IMPLEMENTATION

8 Introduction

8.1 This chapter describes the activities, dates and costs involved in the national RVSM programme that will allow an efficient RVSM implementation. In order to implement the project and put it into operation, sufficient financial resources are required and the different funding alternatives should be evaluated.

8.2 Safety requirements

8.2.1 Safety requirements related to the allocation of resources are of vital importance. Investment estimates should take into account administrative, personnel and input costs involved in the installation of new equipment and facilities, revision of procedures, preparation of handbooks, training of staff, continuous participation in events related to the RVSM implementation programme, etc.

8.3 Planned activities

8.4 The measures described in this document have been adopted in order to enable a safe and efficient implementation of the RVSM. A summary of these measures, together with the target dates for implementation and the costs involved in each one, are shown in **Appendix H** to this document.

Note: This Appendix should include the Regional RVSM Implementation Programme and, specifically, the tasks that States/service providers are responsible for.

8.5 Monitoring of financial resources

8.5.1 The person responsible for allocating and monitoring financial resources in
(insert name of the State/territory/service provider) for the national RVSM programme implementation is
(insert name of the person, entity, unit, etc.).

8.5.2 The mechanism for the financial monitoring of the programme is..... (insert the mechanism used by the State/territory/service provider).

8.6 Impact of inadequate resources assigned to the national RVSM implementation programme on RVSM implementation

8.6.1 Failure to assign sufficient resources to the national RVSM implementation Programme would place the effective implementation of the RVSM in (name of State) at risk, and could also cause a delay in RVSM implementation at the regional level, with the resulting loss of the investments made by other States/service providers and users in the Region.

LIST OF APPENDICES

APPENDIX A	New airspace structure for RVSM implementation
APPENDIX B	ATC procedures in an RVSM environment
APPENDIX C	Modification of ATC equipment
APPENDIX D	RVSM training programme for air traffic controllers
APPENDIX E	RVSM switchover programme
APPENDIX F	RVSM approval programme for aircraft and operators
APPENDIX G	Data collection programme
APPENDIX H	Fund allocation for the implementation of the RVSM programme

Agenda Item 5: Other matters**5.1 CAR/SAM ATS Quality Assurance Workshop (San Salvador, El Salvador, 17-21 June 2002)**

5.1.1 The meeting took note of the information provided by the Secretariat about the CAR/SAM Air Traffic Services Quality Assurance Workshop to be held in Spanish, in San Salvador, El Salvador, on 17-21 June 2002, sponsored by ICAO and COCESNA.

5.1.2 The meeting considered that CAR/SAM Administrations should make an effort to send participants to this ATS Quality Assurance Workshop, where a detailed explanation would be given of the CAR/SAM ATS Quality Assurance Guidance Material (Version 1.0, 1 November 2001 – www.icao.int/nacc) through presentations and practical exercises.

5.2 ATM information provided by Brazil

5.2.1 Brazil provided detailed information about the changes to be made as of 8 August 2002 in Brazilian airspace, namely in the Brasilia and Curitiba FIRs and its main TMAs: Sao Paulo, Rio de Janeiro and Belo Horizonte. The purpose of these changes is to accommodate increased air traffic in its airspace and main airports, e.g. Congonhas, Guarulhos, Galeao and Santos Dumont.

5.2.2 Brazil also noted that these changes were expected to provide an adequate level of safety, aircraft control, reduced flight distances and an almost direct navigation that will differ as little as possible from flight plans, as well as procedures favoring air operations that have arrivals and departures in different sectors.

5.2.3 The meeting was also advised by Brazil of changes made in the management of route UT 795 (now UL 795) between Vumpi and Araraquara, to make it compatible with the new routing in the Sao Paulo TMA and the Brasilia and Curitiba FIRs.

5.2.4 Finally, Brazil reported on the progress made in the development of the Standardized Training Package (STP) on the Reduced Vertical Separation Minima by the TRAINAIR course development unit of the Flight Protection Institute (IPV) as part of the courses being developed on new airspace management methods and technologies.

5.2.5 **Fourth Meeting/Workshop of Air Traffic Management Authorities and Planners**

5.2.5.1 The Fourth Coordination Meeting of the UNDP/ICAO Regional Project RLA/98/003-Transition to the CNS/ATM Systems in the CAR/SAM Regions approved the holding of two meetings of the Air Traffic Management Authorities and Planners group in 2002.

5.2.5.2 In view of the above and of the discussions held under the different agenda items, the group considered that the Fourth Meeting/Workshop of Air Traffic Management Authorities and Planners should be carried out within the framework of the GREPECAS/11 meeting, between November/December 2002 and January 2003, in a venue yet to be defined. This information will be provided to CAR/SAM States/Territories/International Organizations in due time by ICAO.