



RVSM/TF/2

INTERNATIONAL CIVIL AVIATION ORGANIZATION

South American Regional Office

ATM COMMITTEE OF THE GREPECAS ATM/CNS/ SUBGROUP

SECOND MEETING OF THE RVSM TASK FORCE

RVSM/TF/2

REPORT

(Sao José Dos Campos, Sao Paulo, Brazil, 8 to 12 July 2002)

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HISTORY OF THE MEETING

ii-1 PLACE AND DURATION OF THE MEETING

The Second Meeting of RVSM Task Force, was held at the premises at the Carlton Plaza Hotel, in Sao José dos Campos, Sao Paulo, Brazil, from 8 to 12 July 2002.

ii-3 OPENING CEREMONY AND OTHER MATTERS

Mr. José Carlos Coelho, head of the Air Traffic Management Unit of the Brazilian Air Navigation Management Center (CGNA), the facility that will host the CAR/SAM Monitoring Agency, welcomed the participants and highlighted the objectives of the meeting, emphasizing the importance of the issues to be dealt with due to the necessity of increasing airspace capacity in CAR/SAM Regions.

ii-4 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 out the schedule of the Meeting to discuss certain items on the Agenda.

Due to the absence of the RVSM Task Force Rapporteur at the opening, Ms. Leslie Cary, member from the United States Delegation, was unanimously elected as Chairperson of the Meeting, and Mr. Saulo José da Silva, from the Delegation of Brazil was elected as Vice-Chairman. Mr. Saulo José da Silva, acted as Secretary, being assisted by Mr. Brian Troop and Mr. Robert L. Miller, from the United States Delegation and Mr. Roberto Arca from Uruguay, the Task Force Rapporteur, who joined the meeting in the afternoon of 8 July.

ii-5 WORKING LANGUAGES

The working language of the Meeting and its relevant documentation were in English.

ii-6 AGENDA

After some debate and considering that items 3 and 5 of the proposed agenda were similar, the group agreed to the following agenda:

Agenda Item 1:

Analyze the Conclusions on RVSM matters adopted by the Third Meeting/workshop of Air Traffic Management Authorities and Planners

Agenda Item 2:

Develop and update the RVSM Task Force Terms of Reference as well as its Work Program

Agenda Item 3:

Update the RVSM Implementation Plan and develop the Task List including target dates and responsibilities for each task taking into consideration fleet preparation and ATC simulations

Agenda Item 4:

Study and develop the necessary procedures to conduct aircraft height keeping performance monitoring

Agenda Item 5:

Any other business

Sixteen working papers and 2 information papers were presented to the meeting. The list of working papers and information papers is contained in Appendix G to the report.

ii-7 ATTENDANCE

Experts from two States of the CAR Region, Trinidad and Tobago and USA, 3 States of the SAM Region, Argentina, Brazil and Uruguay, and 2 International Organizations, IATA and IFATCA totalling 15 participants, attended the meeting. The list of participants is shown in Appendix H.

Agenda Item 1: Analysis of the Conclusions on RVSM matters adopted by the Third Meeting/workshop of Air Traffic Management Authorities and Planners.

1.1 Under this agenda item the meeting was invited to analyze the conclusions adopted in the AP/ATM/3 Meeting, and make the appropriate proposals to the ATM Committee in order to facilitate RVSM implementation.

1.2 The meeting decided that each of the conclusions adopted in the AP/ATM/3 would be considered under the appropriate agenda item of the RVSM TF 2 meeting.

Agenda Item 2: To develop and update the RVSM Task Force Terms of Reference as well as its Work Program and set up of three working subgroups in order to achieve the implementation objectives.

2.1 RVSM has been successfully implemented in many regions throughout the world. The Caribbean and South American Regions have the option of adapting an established terms of reference building on experiences gained in these other areas. The meeting decided to adopt the following terms of reference for the RVSM TF:

Decision RVSM 2/1 – Terms of reference for the RVSM TF

- a) To develop a strategic, benefits-driven implementation plan (based on cost benefit studies), in concert with airspace users, for RVSM operations within airspace of the CAR/SAM Regions, ensuring intra and inter regional harmonization;
- b) To implement RVSM in the CAR/SAM Regions in accordance with the operational concept developed by the States/Organizations in the RVSM TF;
- c) To consider any amendments to RVSM guidance material that may be proposed by States and International Organizations;
- d) To include participation from States and International Organizations that are considering or involved with the implementation of RVSM; and
- e) To report to the ATM/CNS Subgroup.

2.2 Establishment of three working groups

2.2.1 The meeting analyzed the Conclusion AP/ATM/3/21 concerning the establishment of 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. Taking into account the aforementioned, the meeting made the following decision:

Decision RVSM 2/2 – Establishment of three working groups

The meeting unanimously concurred to establish three working groups, as follows:

- a) ATC Operations Work Group (ATC/WG)
- b) Safety and Airspace Monitoring Work Group (SAM/WG)
- c) Operations and Airworthiness Work Group (OPS/AIR/WG)

2.2.2 The work programme for the groups mentioned above is contained in **Appendix A**.

2.2.3 The meeting elected **Mr. Brian Throop** of the United States will chair the ATC /WG.

2.2.4 Points of contact from the ATC/WG must be provided through the ICAO Regional Offices to the chair of the ATC/WG prior to RVSM TF/3. If possible, this point of contact should be the person who will directly participate in the ATC/WG addressing ATC issues as contained in Appendix A. The meeting concluded the following:

Conclusion 2/1 ATC workgroup points of contact

The ICAO Regional offices provide to the chairman of the ATC/WG the point of contact for every ATS service provider in the CAR/SAM Regions, no later than the beginning of RVSM TF/3.

2.2.5 The meeting elected Mr. Saulo José da Silva of Brazil will chair the SAM/WG. A chairperson for the OPS/AIR/WG has not yet been determined. It is critical to fill this position as soon as possible for RVSM implementation to proceed.

Decision 2/3 Chairperson for the OPS/AIR/WG

The meeting decided the ICAO Regional Offices must nominate an individual to chair the OPS/AIR/WG prior to RVSM TF3. The individual should have experience in airworthiness and operator approval processes.

2.2.6 The meeting discussed the controller – pilot phraseology for RVSM operations adopted by other Regions, contained in **Appendix B**, and decided the following:

Decision 2/4 Phraseology related to RVSM operations

The ATC/WG will review the phraseology and make a recommendation for its adoption by the CAR/SAM Regions.

2.2.7 The meeting discussed the proposal to develop an ATC Manual similar to that published by EUROCONTROL to address ATC operational and related issues and made the following decision:

Decision 2/5 Evaluation of the need for a Regional ATC Manual

The ATC/WG will review the EUROCONTROL ATC Manual and evaluate its applicability for the CAR/SAM Regions and make a recommendation to the RVSM TF.

2.2.8 The meeting discussed the proposal to modify the ICAO *Guidance Material on the Implementation of a 300m (1000ft) Vertical Separation Minimum (VSM) Between FL290 and FL410 Inclusive for Application in the Airspace of the ASIA/PACIFIC Region* for use in the CAR/SAM Regions. The group agreed to adopt the document as a draft and start the modifications necessary for utilization in the CAR/SAM Regions. The draft Guidance Material will be placed on the ICAO SAM and NACC web sites for review.

Decision 2/6 RVSM Guidance Material

The RVSM Task Force will develop the *Guidance Material on the Implementation of a 300m (1000ft) Vertical Separation Minimum (VSM) Between FL290 and FL410 Inclusive for Application in the Airspace of the Caribbean and South American Regions* and forward the document to ICAO for endorsement.

2.2.9 The meeting discussed Colombia's proposals regarding "separation composed" and time based RVSM implementation and determined there was insufficient background information provided for analyses.

Agenda Item 3: Update the RVSM Implementation Plan and develop the Task List including target dates and responsibilities for each task.

3.1 Under this agenda item the meeting was invited to update the Basic Implementation Plan in order to harmonize it with the U.S. Domestic RVSM implementation plan and to create a Task List assigning responsibilities and deadlines to accomplish them.

3.2 The meeting analyzed the Task List presented in **Appendix C** to this report, and found it was a suitable tool for the CAR/SAM RVSM Implementation Plan. The Task List was based on those used by other ICAO Regions during RVSM implementation. Each identified Task was followed by a “Start” and “Finish” date and assigned to a Working Group or appropriate body for completion. It was decided that the Task List would be reviewed and updated during all Task Force Meetings.

Decision RVSM 2/7 Task List Development

The Meeting adopted the Task List shown in Appendix C to this report, and will update the status of the tasks during all future Task Force Meetings.

3.3 In reviewing the Task List, the meeting considered the following recommendations:

- a) The decision was to analyze the task list as it is, having in mind the goal of harmonization with the U.S. implementation date (DEC 2004).
- b) The ATC/WG must develop an operational concept for RVSM in the CAR/SAM Regions and provide this information to the SAM/WG. The latter will use the operational concept to determine the airspace in which data is to be collected for the safety assessment.

3.4 In analysing the Aircraft and Operator Requirements the group concurred with Conclusion AP/ATM/3/19 regarding guidance material for RVSM approval of aircraft and operators.

Decision 2/8 Guidance material for RVSM approval of aircraft and operators

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

3.5 In analysing the need for ATC simulations addressed in Conclusion AP/ATM/3/17, the United States offered to provide guidance material for conducting RVSM simulations during RVSM Seminar 1. Additionally, the meeting recommended the following:

Conclusion 2/1 ATC simulations

States that are in a position to do so, and if deemed appropriate, carry out ATC simulations involving the use of RVSM in their operational environment. States are requested to forward the results of these simulations, including any specific problems encountered, to the chairman of the ATC/WG by 11 NOV 2002.

3.6 The meeting analyzed the best method for collecting data descriptive of traffic movements within airspace where RVSM will be applied, based on those used in other regions. It was agreed that data samples be collected over a 3-months period from each State/Organization and that the sampling be repeated annually.

3.7 A template for collecting data is contained in **Appendix D** to this report. CARSAMMA will advise the RVSM TF of the period during which data is to be collected.

Decision 2/9 Data collection for system performance monitoring

States/Organizations shall collect the necessary data for assessing traffic movements and submit them to CARSAMMA and the Regional ICAO Office using the approved form.(See Appendix D to this report). The data shall be collected during the time periods specified by CARSAMMA.

3.8 The meeting discussed the need for ATS providers to assess automated system modifications and/or upgrades to accommodate RVSM implementation. Those providers with automated systems (flight data processors and radar data processors) should determine at the earliest opportunity if these systems will provide the necessary RVSM status information to the ATCO. In the event the systems are unable to do so, ATS providers should assess if modifications and/or upgrades must be completed. The meeting remarked that providing RVSM status information to the ATCO is critical for application of RVSM whether this is done through automation or other method.

Conclusion 2/2 Controller automation systems

The meeting recommends ATS providers assess the impact of RVSM implementation on controller automation systems and plan for any necessary modifications and/or upgrades at the earliest opportunity.

3.8 The meeting reviewed a preliminary analysis of domestic operations within the Brasilia Upper FIR. The analysis addressed operations by flight levels based on repetitive flight plans. It was determined that 50% of total flights operate between FL290 and FL330 and 25% of total flights operate between FL350 and FL390.

3.9 The distribution provided above indicates the following consequences:

- a) The implementation of RVSM between FL 350 and 390 will include 25% of the users of Brasilia FIR upper airspace in the RVSM stratum; and

- b) The implementation of RVSM between FL 290 and 410 will include 75% of the users of Brasilia FIR upper airspace in the RVSM stratum;

3.10 Further analysis must be done to include all Brazilian FIRs and to achieve a final conclusion about flight level distribution in the Brazilian Airspace. Data supplied by Brazil is contained in **Appendix E** to this report. Taking into account the aforementioned, the meeting made the following conclusion:

Conclusion 2/3 Flight level occupancy analysis

Encourage ATS providers to conduct an analysis of flight level occupancy to help the TF develop the regional RVSM operational concept.

3.10 The research performed by IATA indicates 87% of airspace users (IATA and non-IATA, domestic and international, passenger and cargo flights, lasting longer than one hour (or 250NM)) will be RVSM capable.

3.11 The meeting noted the following observations provided by IATA:

- a) During the last ATM Authorities' meeting, Mexico and Cuba opted for implementing in a single phase regardless of the GREPECAS/11 decision.
- b) Implementing in two phases implies a more elaborated and expensive Safety Assessment.
- c) Implementing in two phases allows those airlines based in the CAR/SAM Region (25 % or less of the total aircraft population) to have more time to prepare for RVSM.
- d) Implementing in two phases will penalize those aircraft already RVSM approved and based in the CAR/SAM Region (75% percent or more).
- e) Implementing in a single phase will penalize only 12% of the total flights in the CAR/SAM Region.
- f) Implementing in two phases forces the USA to create a transition zone.
- g) Implementing in two phases increase the safety risk when controllers transfer aircraft in descent or climb, from an RVSM stratum to a non-RVSM stratum, and finally to an RVSM stratum again.
- h) Implementing in two phases can create confusion for crews flying from or into the CAR/SAM Region, using different IFR cruising levels depending of the altitude for the aircraft.
- i) The only experience of implementation in two phases was in the North Atlantic, where the traffic patterns are one directional flow.

- j) If implementation occurs in two phases, it will be necessary to decide the length of time it will take to replace non-RVSM aircraft for RVSM aircraft.

3.12 Taking into account the information above, the group agreed to make the following decision:

Decision 2/10 Airspace users' RVSM readiness

That IATA continue researching airspace users' RVSM readiness and provide the information to the TF to assist in planning for RVSM implementation.

Agenda Item 4: Study and develop the necessary procedures to accomplish the system performance monitoring.

4.1 Under this Agenda item, the meeting reviewed a presentation about monitoring issues.

4.2 The information provided by the experts from the U.S. was very useful and taken as a basis for discussions to analyze the most suitable system performance monitoring program for the CAR/SAM Regions.

4.3 Advantages and disadvantages of HMUs and GMUs

4.3.1 The Height-Monitoring Unit (HMU) is a set of ground stations (one master station and four slaves) arranged to receive aircraft SSR replies (Modes A, C and S) from which the geometric height and latitude/longitude of the aircraft are derived.

4.3.2 The HMU measures the geometric height of aircraft which pass within about 35 to 45 NM of the master station site yielding a large volume of data suitable for determining height-keeping characteristics of individual airframes.

4.3.3 Height keeping performance monitoring will normally be conducted without requiring any cooperation or involvement of aircraft operators, provided the aircraft remain in level flight for approximately 5 minutes within the coverage of the HMU.

4.3.4 It may be necessary to request some aircraft operators to make minor diversions from their normal routes in order to fly in the vicinity of a HMU.

4.3.5 The HMU works with a Total Vertical Error Measurement Unit (TMU) which calculates the geometric height of the assigned Flight Level using meteorological data and subtracts time dependant information from the aircraft measurements, enabling the components errors to be obtained.

4.3.6 The disadvantages of HMUs are the high cost (approximately USD \$ 8 Million for three units in Europe), a suitably located Mode S radar is required and only aircraft within 45 NM of the units can be monitored.

4.3.7 A GPS Monitoring Unit (GMU) is a portable self-contained unit, the size of a small suitcase weighing 5 Kgs. It contains a GPS receiver, a small computer and antennae. They are portable carry-on monitoring and recording units. They are produced to meet aircraft equipment standards.

4.3.8 With the cooperation of the aircraft operators, GMUs will be taken on board certain flights to collect height keeping performance data for post-flight processing. Specific aircraft can be targeted for monitoring with the data collected on their normal routes.

4.3.9 The installation procedure for the GMU does not interfere with the crew or the operation of the aircraft. The installation takes approximately 15 minutes and utilizes light antennae which are attached to the rear flight-deck windows.

4.3.10 The GMUs collect GPS pseudoranges, which, with ground station differential corrections, provide an accurate 4D position of the aircraft. The units are accompanied by the appropriate documentation to allow on-board carriage and use.

4.3.11 Furthermore, GMUs are relatively inexpensive (approximately USD \$ 10,000 each) albeit other costs such as operating staff and backup units have to be considered.

4.3.12 The disadvantage of GMUs is that they give a much smaller volume of data.

4.3.13 The meeting noted also that it should be recognized that monitoring data from other regions is valid for use in CAR/SAM assessments of height keeping performance and system safety. Based on the aforementioned, the meeting concluded the following:

CONCLUSION RVSM 2/4 System Performance Monitoring in the CAR/SAM Regions

The CAR/SAM Regions will use the GMU monitoring method. GMU assets used to support North American RVSM implementation will also be used in the CAR/SAM Regions to accomplish its monitoring programme. As a result, there will be no capital cost expenditures for establishment of a GMU-based height-keeping performance monitoring capability to support CAR/SAM RVSM.

4.3.14 The Meeting, taking into account the differences between Regions and States concerning monitoring requirements, decided to adopt the monitoring requirements used in the Asia/Pacific Region.

CONCLUSION RVSM 2/5 Minimum requirements for monitoring in the CAR/SAM Regions

The CAR/SAM Regions adopt the minimum requirements for monitoring that are established in **Appendix F**, updated as appropriate.

4.3.14 The meeting analyzed different options to conduct this monitoring. IATA informed the meeting that they have engaged monitoring contractors in other Regions to facilitate the system monitoring performance requirement necessary for RVSM implementation. IATA offered to once again be responsible for engaging a monitoring contractor.

4.3.15 The monitoring contractor's charges are expected to be similar to the costs currently incurred by operators in the North Atlantic and Asia/Pacific Regions. Taking into account the aforementioned the meeting decided the following:

Decision 2/11 Height keeping monitoring service

The height keeping monitoring service will be conducted through IATA who will engage a suitable, qualified monitoring contractor, provided that the contractor's measuring methodology and results are accepted by another regional monitoring agency such as APARMO or EUROCONTROL and the service will be available on equal terms to all airspace users of the CAR/SAM Regions.

4.3.16 The meeting discussed the proposal submitted by Colombia regarding altitude monitoring method based on SSR Mode C. It was agreed that additional information would be needed to determine the utility of acquiring data using this method. The United States offered to research this issue and present their findings to RVSM TF/3.

4.3.17 The meeting discussed the necessity of formalizing LOA between the RMA and ATC Units as a means of ensuring the necessary data collection is effected.

4.3.18 It was decided that LOA would not be necessary, however points of contact for every ATS provider in the CAR/SAM Regions must be identified. These points of contact must be able to provide flight data information, as and when requested by CAR/SAMMA. In addition, the meeting discussed the necessity of having points of contact from every State that will be approving aircraft and/or operators for RVSM operations.

4.3.19 The meeting made the following conclusions:

Conclusion 2/6 ATS provider points of contact

The ICAO Regional Offices provide to the RVSM task force rapporteur the following points of contact for every ATS provider involved in the implementation of RVSM not later than RVSM TF/3.

Conclusion 2/7 State points of contact for aircraft and/or operators approval

The ICAO Regional Offices provide to the RVSM task force rapporteur the points of contact for every State involved in approving aircraft and/or operators for RVSM not later than RVSM TF/3, if those contact points have not yet been identified to an RMA.

4.3.20 The meeting discussed the offer of Brazil to create a web site for CARSAMMA. The offer was wholeheartedly supported by the task force. The web site will contain items such as forms for data collection, reference documents and links to other monitoring agencies. Brazil will provide the address of this web site once it is established.

Agenda Item 5: Analyze and recommend the best implementation steps in the CAR/SAM Regions, taking into account the fleet preparation and ATC simulations.

5.1 Under this agenda item the following issues were raised:

5.2 The meeting endorsed strongly the belief that, to achieve a successful RVSM implementation as per the GREPECAS mandate and the TF Terms of Reference, all States/Organizations involved in RVSM must participate in TF meetings. In this sense, the group commented that it will be very difficult to implement RVSM with the participation of just a few States due to the necessity of harmonizing national plans into a regional implementation. The meeting further endorsed strongly the agreement that every State/Organization be invited and encouraged to participate in this TF in view of the large amount of coordination required in this effort. It was remarked that RVSM implementation is a task for the States/Organizations and that the RVSM TF coordinates and harmonizes the regional implementation. Based on the discussion above the meeting concluded the following:

Conclusion 2/8 RVSM TF participation

Every State/Organization be strongly encouraged to participate in the RVSM TF in view of the large amount of coordination required in this effort and the potential negative impact on the States or Regions as a whole if there is not widespread participation and commitment.

5.3 The meeting discussed the working relationship between the RVSM TF, the ATM/CNS Subgroup and GREPECAS. Concern was expressed regarding the amount of authority the RVSM TF has for making changes to the implementation plan (eg. implementation date, altitudes stratum and go no go decision).

5.4 IATA suggested the best way to notify airlines about RVSM implementation is via NOTAM, rather than AIC.

5.5 A side discussion occurred between Brazil and the United States regarding assistance to be provided by the FAA's Technical Center to CARSAMMA in establishing procedures for RVSM monitoring. It was agreed that Brazilian specialists will travel to Atlantic City, NJ for training in monitoring procedures.

APPENDIX A

ATC Operations Work Group (ATC/WG)

The ATC/WG is responsible for addressing all matters relating to air traffic services within the RVSM and transition airspace, to include the following:

- a) To develop a CAR/SAM RVSM Operational Concept;
- b) To identify exclusionary RVSM airspace;
- c) To identify RVSM transition airspace
- d) To develop the procedures for all facets of RVSM operations, including:
 - RVSM operations within and between exclusionary and transition airspace;
 - RVSM operations between FIRs and ATC service providers;
 - Weather deviation procedures;
 - Turbulence mitigation procedures;
 - Necessary contingency procedures;
 - Procedures for discontinuing the use of RVSM for temporary periods;
 - Procedures for the accommodation of non-approved civil aircraft, including emergency and humanitarian flights and ferry and maintenance, if appropriate;
 - Procedures for the accommodation of non-approved State aircraft;
 - Procedures for providing RVSM status information to controllers at the operational position, including any necessary changes to existing Flight Data Processing (FDP) systems.
- e) To consider controller workload issues and identify the need for simulations;
- f) To assist States and Organizations with airspace changes;
- g) To recommend and develop RVSM training material and methods for ATC staff;
- h) To provide to the States common aeronautical information publications and AIP supplements related to RVSM implementation;
- i) To develop necessary changes to regional documentation;
- j) To develop ATC procedures for switchover day and to determine if a cell should be created to assist States, Organizations and Operators during the switchover;
- k) To provide appropriate material to the RVSM web site administrator;
- l) To assist the SAM/WG with developing a mechanism for receiving, collating, and analyzing information concerning operational errors;
- m) To track the progress of the States in implementing ATC-related RVSM tasks, and to report this progress regularly to the RVSM Task Force;
- n) To accomplish other tasks as directed by the full RVSM Task Force.

Safety and airspace monitoring work group (SAM/WG)

The SAM/WG is responsible for mathematical and statistical analysis to assist with the maintenance and on going monitoring of safety through the assessment of collision risk for the CAR/SAM Regions RVSM and other tasks as agreed with RVSM Task force. The main tasks of the SAM/WG are:

- a) To develop a monitoring program to ensure that the quantity and quality of data are collected to allow an assessment of vertical collision risk;

- b) To review existing mathematical and statistical techniques to assure their appropriateness for the CAR/SAM regions;
- c) To ensure the transferability of aircraft data collected from other airspace regions;
- d) To support the assessment of the safety of RVSM prior to and during the Verification and Operational Trials by the production of collision risk assessments based on altitude deviation incidents and altitude monitoring data to determine whether the TLS is being met;
- e) To devise suitable methodologies for incorporating the effects of projected traffic increases and system changes on occupancy and collision risk in the future environment;
- f) To identify those elements which are critical in the assessment of collision risk and suggest areas where improvements might be effective in reducing risk;
- g) To establish a policy for investigating those errors that may jeopardize satisfaction of the Target Level of Safety (TLS);
- h) To estimate periodically the vertical occupancies (traffic densities, passing frequencies, etc.) to support ongoing monitoring of the target level of safety;
- i) To perform periodically other data collections (e.g. ASE stability) in order to ensure that the parameter values used in the mathematical collision risk models remain current;
- j) To track the progress of the States under the task lists and to report States' progress to RVSM TF;
- k) To accomplish other tasks as directed by the full RVSM Task Force;
- l) To provide material for the RVSM web site administrator.

Aircraft Operations and Airworthiness Work Group (OPS/AIR/WG)

The OPS/AIR/WG is responsible for addressing pilot operations, airworthiness, and aircraft approval issues, and:

- a) To harmonize policy on operations and airworthiness issues related to RVSM;
- b) To develop and harmonize guidance related to the implementation of RVSM and co-ordinate on issues which may arise in the application of the RVSM Minimum Aircraft System Performance Specifications (MASPS);
- c) To initiate necessary action to amend aeronautical charts to reflect navigational requirements related to RVSM;
- d) To develop policy for use of Airborne Collision Avoidance System (ACAS) as it relates to RVSM;
- e) To review monitoring data prior to implementation and after implementation;
- f) To track the progress of the States under the task lists and to report States' progress to RVSM TF;
- g) To provide material for the RVSM web site administrator;
- m) To accomplish other tasks as directed by the full RVSM Task Force.

APPENDIX B

Phraseology Related to RVSM Operations

Controller-pilot phraseology:

Message	Phraseology
For a controller to ascertain the RVSM approval status of an aircraft:	(call sign) CONFIRM RVSM APPROVED
For a pilot to report non-RVSM approval status: i. on the initial call on any frequency within the RVSM airspace (controllers shall provide a readback with this same phrase), and ii. in all requests for flight level changes pertaining to flight levels within the RVSM airspace; and iii. in all read-backs to flight level clearances pertaining to flight levels within the RVSM airspace. Additionally, except for State aircraft, pilots shall include this phrase to read back flight level clearances involving the vertical transit through FL 290 or FL 410. <i>See examples that follow.</i>	NEGATIVE RVSM*
For a pilot to report RVSM approval status.	AFFIRM RVSM*
For a pilot of a non-RVSM approved State aircraft to report non-RVSM approval status, in response to the phrase (call sign) CONFIRM RVSM APPROVED.	NEGATIVE RVSM STATE AIRCRAFT*
Denial of clearance into the RVSM airspace:	(call sign) UNABLE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN [or DESCEND TO, or CLIMB TO] FLIGHT LEVEL (number)
For a pilot to report when severe turbulence affects the aircraft's capability to maintain the height-keeping requirements for RVSM.	UNABLE RVSM DUE TURBULENCE*
For a pilot to report that the aircraft's equipment has degraded below the MASPS required for flight within the RVSM airspace. <i>(This phrase is to be used to convey both the initial indication of the non-MASPS compliance, and henceforth, on initial contact on all frequencies within the lateral limits of the RVSM airspace until such time as the problem ceases to exist, or the aircraft has exited the RVSM airspace.)</i>	UNABLE RVSM DUE EQUIPMENT*
For a pilot to report the ability to resume operations within the RVSM airspace after an equipment or weather-related contingency.	READY TO RESUME RVSM*

Message	Phraseology
For a controller to confirm that an aircraft has regained its RVSM approval status, or to confirm that the pilot is ready to resume RVSM operations.	REPORT ABLE TO RESUME RVSM

Example 1: A non-RVSM approved State aircraft, maintaining FL 260, subsequently requests a climb to FL 320.

Pilot: (call sign) REQUEST FL 320, NEGATIVE RVSM
 Controller: (call sign) CLIMB TO FL 320
 Pilot: (call sign) CLIMB TO FL 320, NEGATIVE RVSM

Example 2: A non-RVSM approved State aircraft, maintaining FL 260, subsequently requests a climb to FL 430.

Pilot: (call sign) REQUEST FL 430, NEGATIVE RVSM
 Controller: (call sign) CLIMB TO FL 430
 Pilot: (call sign) CLIMB TO FL 430, NEGATIVE RVSM

Example 3: A non-RVSM approved State aircraft, maintaining FL 360, subsequently requests a climb to FL 380.

Pilot: (call sign) REQUEST FL 380, NEGATIVE RVSM
 Controller: (call sign) CLIMB TO FL 380
 Pilot: (call sign) CLIMB TO FL 380, NEGATIVE RVSM

Example 4: A non-RVSM approved civil aircraft maintaining FL 280, subsequently requests a climb to FL 320.

Pilot: (call sign) REQUEST FL 320, NEGATIVE RVSM
 Controller:(call sign) UNABLE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN FL 280

Coordination between ATS units:

Para	Message	Phraseology
1	To verbally supplement an automated estimate message exchange which does not automatically transfer Item 18 flight plan information.	NEGATIVE RVSM or NEGATIVE RVSM STATE AIRCRAFT [as applicable]
2	To verbally supplement estimate messages of non-RVSM approved aircraft.	NEGATIVE RVSM or NEGATIVE RVSM STATE AIRCRAFT [as applicable]
3	To communicate the cause of a contingency relating to an aircraft that is unable to conduct RVSM operations due to severe turbulence or other severe weather-related phenomenon [or equipment failure, as applicable].	UNABLE RVSM DUE TURBULENCE [or EQUIPMENT , as applicable]

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APPENDIX C

TASK LIST

CAR/SAM RVSM Implementation Task List				
ID	Description	Start	Finish	Resource Names
1	Identify Operational Need			
2	Agree operational concept for CAR/SAM traffic flow	11-Jul-02	23-Nov-02	ATC/WG, RVSM Task Force
3	Conduct Cost Benefits Analysis	11-Jul-02	-6 months	
4	Conduct preliminary benefit cost analysis	11-Jul-02	31-Oct-02	SAM WG
5	Finalize benefit cost analysis	11-Jul-02	-6 months	SAM WG
6	Safety Assessment	11-Jul-02	-45 days	
7	Review available summary data (non-compliant aircraft, aberrant aircraft etc)	11-Jul-02	-45 days	SAM/WG, RVSM Task Force
8	Examine history of height keeping errors related to ATC clearances and assess possible RVSM	11-Jul-02	-45 days	SAM/WG, RVSM Task Force
9	Confirm RVSM risk model assumptions/parameters are consistent with airspace where RVSM	11-Jul-02	Jun-03	SAM/WG, RVSM Task Force
10	Conduct simulations to predict occupancy after RVSM implementation	11-Jul-02	Mar-04	SAM/WG, RVSM Task Force
11	Collect weather and turbulence data for analysis - this should include Andean standing wave analysis	11-Jul-02	-45 days	SAM/WG, RVSM Task Force
12	Report large height deviations to monitoring agency (including level assignment errors)	11-Jul-02	Ongoing	ATS Providers, Users
13	Feasibility Analysis	11-Jul-02	31-Dec-02	
14	Examine the operational factors and workload associated with implementation	11-Jul-02	31-Dec-02	ATC/WG, RVSM Task Force
15	Determination of Requirements (airborne & ground systems)	11-Jul-02	-1 year	
16	Determine need for additional GMUs	11-Jul-02	-1 year	SAM/WG, RVSM Task Force
17	States assess the impact of RVSM implementation on controller automation systems (e.g., equipment suffixes) and plan for upgrades/modifications	11-Jul-02	-1 year	States
18	Aircraft & Operator Approval Requirements	11-Jul-02	TBD	
19	Promulgate the operational approval process	11-Jul-02	Ongoing	OPS/AIR/WG, RVSM Task Force
20	Notify States when significant changes occur to RVSM documentation	11-Jul-02	Ongoing	OPS/AIR/WG, RVSM Task Force
21	Perform Rulemaking (if required)	11-Jul-02	TBD	
22	Recommend State airspace regulatory documentation	11-Jul-02	TBD	States
23	Perform Necessary Industry & International Co-ordination	11-Jul-02	TBD	
24	Establish target implementation date	11-Jul-02	08-Aug-02	RVSM Task Force
25	Report to GREPECAS	11-Jul-02	Oct/Nov-03	RVSM Task Force Rapporteur
26	Develop regional documentation	11-Jul-02	-1 year	ATC/WG, RVSM Task Force
27	Process Doc 7030 amendment	11-Jul-02	TBD	ICAO Regional Office
28	Publish advance AIC / NOTAM	11-Jul-02	-2 years	States
29	Publish AIP Supplement containing RVSM policy/procedures	11-Jul-02	-6 months	States
30	Review inter-facility coordination procedures	11-Jul-02	-30 days	States
31	Finalize changes to Letters of Agreement	01-Jan-04	-30 days	States
32	Approval of Aircraft & Operators	11-Jul-02	-60 days	
33	Establish approved operations readiness targets	11-Jul-02	-6 months	IATA, ATC/WG, RVSM Task Force
34	Assess readiness	11-Jul-02	-60 days	IATA, OPS/AIR/WG
35	Develop Pilot & ATC Procedures	11-Jul-02	TBD	
36	Review application of tactical offset procedure to mitigate the effects of wake turbulence and ACAS alerts	11-Jul-02	TBD	ATC/WG, OPS/AIR/WG, RVSM Task Force

37	Process Doc 7030 amendment to weather and contingency procedures	11-Jul-02	30-Jun-03	ICAO Regional Office
38	Publish appropriate ATC policy & procedures on RVSM website	11-Jul-02	Ongoing	RVSM Task Force
39	Identify transition areas and procedures	11-Jul-02	TBD	States, ATC/WG
40	Conduct simulations	11-Jul-02	TBD	States, ATC/WG
41	Report on simulation activity	11-Jul-02	TBD	ATC/WG, RVSM Task Force
42	Continue to recommend that RVSM operators adopt ACAS 2	11-Jul-02	01-Jan-04	OPS/AIR/WG, RVSM Task Force
43	Develop procedures for handling non-compliant aircraft (inc ferry & mntce) in ATS documents	11-Jul-02	30-Jun-03	OPS/AIR/WG, ATC/WG, RVSM Task Force
44	Develop mutually acceptable ATC procedures for non-approved State acft to transit RVSM airspace	11-Jul-02	30-Jun-03	ATC/WG, RVSM Task Force
45	Consider procedures for suspension of RVSM, including mountain wave effects	11-Jul-02	30-Jun-03	ATC/WG, RVSM Task Force
46	Liaise with State defense authorities regarding "due regard" military operations	11-Jul-02	30-Jun-03	States
47	Pilot & ATC Training	11-Jul-02	TBD	
48	Provide ATC training documentation to States based on past experience	11-Jul-02	Ongoing	ATC/WG, RVSM Task Force Rapporteur, ICAO
49	Conduct initial local RVSM training for air traffic controllers		TBD	States, ATC/WG
50	Conduct final local RVSM training for air traffic controllers		TBD	States, ATC/WG
51	Perform System Verification	11-Jul-02	-90 days	
52	Height keeping performance monitoring needed to undertake initial safety analysis	11-Jul-02	Dec-03	Monitoring Agency and SAM/WG, RVSM Task Force
53	Provide representative traffic movement data to monitoring agency (90 day sample, repeated)	11-Jul-02	Dec-02	States
54	Undertake initial safety analysis	11-Jul-02	Dec-03	SAM/WG, RVSM Task Force
55	Prepare/maintain regional status report detailing RVSM implementation plans	11-Jul-02	Ongoing	RVSM Task Force Rapporteur
56	Final Implementation Decision	11-Jul-02	-45 days	RVSM Task Force
57	Report status of implementation to GREPECAS/13		Oct/Nov 04	RVSM Task Force Rapporteur
58	Review aircraft altitude-keeping performance and operational errors	11-Jul-02	-45 days	SAM/WG, OPS/AIR/WG
59	ATS State documentation complete	11-Jul-02	-60 days	States
60	Publish Trigger NOTAM	20-Nov-03	-7 days	States
61	Complete readiness assessment		-45 days	Monitoring Agency
62	Complete safety analysis		-45 days	RVSM Task Force
63	Declare Initial Operational Capability (Implementation day)		TBD	Monitoring Agency and SAM/WG, RVSM Task Force
64	Monitor System Performance		+1 year	
65	Perform Follow-On Monitoring		Ongoing	OPS/AIR/WG, SAM/WG
66	Declare Full Operational Capability			RVSM Task Force
67	Seminar/1	05-Aug-02	07-Aug-02	RVSM Task Force
68	Task Force/3	08-Aug-02	09-Aug-02	RVSM Task Force
69	Task Force/4	17-Sep-02	18-Sep-02	RVSM Task Force
70	Seminar/2	TBD	TBD	RVSM Task Force
71	Task Force/5	TBD	TBD	RVSM Task Force
72	Task Force/6	TBD	TBD	RVSM Task Force
73	Task Force/7	TBD	TBD	RVSM Task Force
74	Task Force - 90 day Follow Up	TBD	TBD	RVSM Task Force
75	Task Force - 1 year Follow Up	TBD	TBD	RVSM Task Force

APPENDIX D

Information for each flight in the sample

The information requested for a flight in the sample is listed in the following table:

ITEM	EXAMPLE	NECESSARY OR OPTIONAL
Date (either month/day/year or day/month/year format)	5/01/00 or 01/05/00 for 1 May 2000	NECESSARY
Aircraft call sign	MAS704	NECESSARY
Aircraft Type	B734	NECESSARY
Origin Aerodrome	WMKK	NECESSARY
Destination Aerodrome	RPLL	NECESSARY
Entry Fix into RVSM Airspace	MESOK	NECESSARY
Time at Entry Fix	2:25 (or 0225)	NECESSARY
Flight Level at Entry Fix	330	NECESSARY
Exit Fix from RVSM Airspace	NISOR	NECESSARY
Time at Exit Fix	4:01 (or 0401)	NECESSARY
Flight Level at Exit Fix	330	NECESSARY
First Fix Within RVSM Airspace OR First Airway Within RVSM Airspace	MESOK OR G582	NECESSARY
Time at First Fix	02:25 OR 0225	NECESSARY
Flight Level at First Fix	330	NECESSARY
Second Fix Within RVSM Airspace OR Second Airway Within RVSM Airspace	MEVAS OR G577	
Time at Second Fix	02:50 OR 0250	NECESSARY
Flight Level at Second Fix	330	NECESSARY
(Continue with as many Fix/Time/Flight-Level entries as are required to describe the flight's movement within RVSM airspace)		OPTIONAL

Information Required for a Flight in Traffic Sample

APPENDIX E

FIR SBBS – UPPER AIRSPACE NOVEMBER 2001		
FLIGHT TYPE	QUANTITY	%
DOMESTIC AIRLINE	28699	91,38
INTERNATIONAL AIRLINE	2146	6,83
NATIONAL GENERAL AVIATION	163	0,52
INTERNATIONAL GENERAL AVIATION	140	0,46
MILITARY FLIGHTS	254	0,81
TOTAL	31402	100

Flight type distribution on upper airspace of Brasilia FIR

FIR SBBS – UPPER AIRSPACE REPETITIVE FLIGHT PLAN JULY 2002		
FLIGHT LEVEL	QUANTITY	%
410	8	0,13
390	277	4,45
370	410	6,58
350	782	12,55
330	1295	20,79
310	1186	19,04
290	664	10,66
280	642	10,31
270	559	8,98
260	379	6,09
250	26	0,42
TOTAL	6228	100

Flight level distribution on upper airspace of Brasilia FIR

APPENDIX F

CAR/SAM RVSM MINIMUM MONITORING REQUIREMENTS:

As of: 12 July 2002

1. INITIAL MONITORING. All CAR/SAM operators that operate or intend to operate in airspace where RVSM is applied are required to participate in the RVSM monitoring program. The attached chart of monitoring requirements establishes requirements for initial monitoring associated with the RVSM approval process. In their application to the appropriate State authority for RVSM approval, operators must show a plan for meeting the applicable initial monitoring requirements.

2. AIRCRAFT STATUS FOR MONITORING. Aircraft engineering work that is required for the aircraft to receive RVSM airworthiness approval must be completed prior to the aircraft being monitored. Any exception to this rule will be coordinated with the State authority.

3. FOLLOW-ON MONITORING. Monitoring is an on-going program that will continue after the RVSM approval process. A follow-on sampling program for additional operator aircraft will be coordinated by the CAR/SAM RVSM Implementation Task Force.

4. MONITORING OF AIRFRAMES THAT ARE RVSM COMPLIANT ON DELIVERY. If an operator adds new RVSM compliant airframes of a type for which it already has RVSM operational approval and has completed monitoring requirements for the type in accordance with the attached chart, the new airframes are not required to be monitored - except as targeted at a later date in the follow-on monitoring program. If an operator adds new RVSM compliant airframes of an aircraft type for which it has NOT previously received RVSM operational approval, then the operator should complete monitoring in accordance with the attached chart.

5. APPLICABILITY OF MONITORING FROM OTHER REGIONS. Monitoring data obtained in conjunction with RVSM monitoring programs from other regions can be used to meet Asia-Pacific monitoring requirements. The CAR/SAM Monitoring Agency (CARSAMMA), which is responsible for administering the CAR/SAM monitoring program, has access to monitoring data from other regions and will coordinate with States and operators to inform them on the status of individual operator monitoring requirements.

6. UPDATE OF MONITORING REQUIREMENTS CHART AND WEBSITE. As significant data is obtained, monitoring requirements for specific aircraft types may change. When the chart is updated, a letter will be distributed to States and operators. The updated chart will be posted on the CARSAMMA web site being maintained by the Brazil Air Navigation Management Center (CGNA) on behalf of the GREPECAS regional planning group. The web site address is:

TBD

7. PRIOR RVSM EXPERIENCE. When a new-entrant-RVSM operator completes the regional monitoring requirements for State approval for all of its aircraft types that operate in another region, the operator is considered by CARSAMMA to have "Prior RVSM Experience."

For most aircraft types, monitoring is not required to be completed PRIOR to operational approval being granted, however participation in monitoring IS REQUIRED in accordance with the attached chart.

CAR/SAM MONITORING AGENCY

EFFECTIVE AS OF: 12 JULY 2002

MONITORING NOT REQUIRED PRIOR TO THE GRANT OF RVSM APPROVAL, HOWEVER PARTICIPATION IN MONITORING IS REQUIRED IN ACCORDANCE WITH THIS CHART			
CATEGORY	AIRCRAFT TYPE	MINIMUM OPERATOR MONITORING FOR EACH AIRCRAFT GROUP	
1	<p>OPERATORS PLANNING TO CONDUCT OPERATIONS IN CAR/SAM AIRSPACE WITH PRIOR RVSM EXPERIENCE</p>	<p>New aircraft types from a manufacturer with a demonstrable track record of the production of MASPS compliant airframes or</p> <p>[A30B, A306], A310 (GE), A310 (PW), [A319, A320, A321], A330, A340, B712, [B721, B722] [B733, B734, B735] [B736, B737/BBJ, B738, B739] [B741, B742, B743, B74S] B744, [B752, B753], [B762, B763], B764 [B772, B773], DC10, MD10, MD11, MD80, L101 CL60, GLEX, GLF3, GLF4, GLF5 [F900, F900EX] FA50, FA50EX, F2TH, LJ45 LJ60, H25B</p>	<p>Two airframes of each type* to be monitored as soon as possible but not later than 6 months after the issue of RVSM operational approval.</p> <p><i>* Note. For the purposes of the minimum monitoring requirement, aircraft within parenthesis [] may be considered as the same type.</i></p>
2	<p>OPERATORS WITHOUT PRIOR RVSM EXPERIENCE</p>	<p>Same types as above in section 1.</p> <p>At least 3 airframes of each type unless operator has only 1 or 2 of a type, then all operator airframes of that type should be monitored.</p> <p>Monitoring to be completed as soon as possible but not later than 3 months after the issue of RVSM operational approval or not later than 3 months after the start of CAR/SAM RVSM operations, whichever occurs later.</p>	

MONITORING REQUIRED PRIOR TO THE GRANT OF RVSM APPROVAL			
3	<p>OPERATORS OF AIRCRAFT TYPES SHOWN IN THE BLOCK TO THE RIGHT</p>	<p>Other group or non –group aircraft other than those listed above including:</p> <p>A124, ASTR, B707, B731, B732, C525, C560, C650, C750, DC8, DC9, E145, FA10, FA20, F100, GLF2, GALX, H25A, H25C, IL62, LJ31, LJ35, LJ55, MD90</p> <p style="text-align: center;">or</p> <p>new aircraft types from a manufacturer without a demonstrable track record of the production of MASPS compliant airframes.</p>	<p>60% of target number of airworthiness approved, same type, airframes of each operator to be monitored or individual monitoring of airworthiness approved airframes of a given operator.</p>

APPENDIX G**LIST OF WORKING PAPERS**

WP N°	Agenda Item	Title	Prepared by
WP/1		Agenda, working methods, schedule	Rapporteur
WP/2	1	Agenda Item 1: Analysis of the Conclusions on RVSM matters adopted in the Third Meeting/workshop of Air Traffic Management Authorities and Planners.	Rapporteur
WP/3	5	Agenda Item 5: Analyze and recommend the best implementation steps in the CAR/SAM Regions considering the fleet preparation and ATC simulations.	Rapporteur
WP/4	2	Agenda Item 2: Developing and updating the RVSM Task Force Terms of Reference as well as its Work Program and set up of three working groups in order to achieve the implementation objectives	Rapporteur
WP/5	2	Agenda Item 2: Developing and updating the RVSM Task Force Terms of Reference as well as its Work Program and set up of three working groups in order to achieve the implementation objectives.	Rapporteur
WP/6	4	Agenda Item 4: Study and develop the necessary procedures to accomplish the system performance monitoring.	Rapporteur
WP/7	4	Agenda Item 4: Study and develop the necessary procedures to accomplish the system performance monitoring. / Proposal of the altitude monitoring method, based on the SSR Mode C.	Colombia
WP/8	5	Agenda Item 5: Analyze and recommend the best implementation steps in the CAR/SAM Regions considering the fleet preparation and ATC simulations.	Colombia
WP/9	6	Agenda Item 6: Any other Business	Colombia
WP/10	5	Agenda Item 5: Analyze and recommend the best implementation steps in the CAR/SAM Regions, taking into account the fleet preparation and ATC simulations.	IATA
WP/11		RVSM Guidance Material	United States
WP/12		Terms of Reference for the Task Force Working Groups	United States
WP/13		RVSM Implementation Task List	United States
WP/14		Preliminary analysis in Brasilia FIR about FL distribution and Flight distribution forecasting the fleet preparation.	Brazil
WP/15		Proposal of LOA between ATS Units and CARSAMMA.	Brazil
WP/16		Proposes a CARSAMMA web site.	Brazil

LIST OF INFORMATION PAPERS

IP N°	Agenda Item	Title	Prepared by
IP/1	--	General information	Secretariat
IP/2	--	List of working and information papers	Secretariat
IP/3	2	Agenda Item 2: Developing and updating the RVSM Task Force Terms of Reference as well as its Work Program and set up of three working groups in order to achieve the implementation objectives - Guidance Material	U.S.A.
IP/4	3	Agenda Item 3: Update the RVSM Implementation Plan and develop the Task List including target dates and responsibilities for each task.	U.S.A.
IP/5	2	Agenda Item 2: Developing and updating the RVSM Task Force Terms of Reference as well as its Work Program and set up of three working groups in order to achieve the implementation objectives. – RVSM Task Force	U.S.A.

LIST OF PARTICIPANTS

STATES/ ORGANIZATIONS	NAMES	FUNCTION	ADDRESS
ARGENTINA	Mr. JOSE ANTONIO ALVAREZ	CHIEF OF ATS DEPARTMENT	Calle Pedro Zanni 250 OF 165 Piso 1° Buenos Aires - Argentina Tel. : 54-11-43176408 Fax : 54-11-43176502 Email: ditraer@faa.mil.ar
BRAZIL	Mr. CARLOS ANTONIO NUNES	AIR TRAFFIC CONTROLLER	DECEA Avenida General Justo, 160 Rio de Janeiro – RJ – Brazil Tel. : 55 21 38146282 Fax : 55 21 38146088 Email: atm3-3@decea.gov.br cadan@ig.com.br
BRAZIL	Mr. JÚLIO CESAR DE S. PEREIRA	ATM OFFICER	DECEA Avenida General Justo, 160 Rio de Janeiro – RJ – Brazil Tel. : 55 21 38146282 Fax : 55 21 38146088 Email: atm3-9@decea.gov.br julioval@uol.com.br

STATES/ ORGANIZATIONS	NAMES	FUNCTION	ADDRESS
BRAZIL	Mr. LUIZ CARLOS ROCHA	ATM OFFICER	CGNA Avenida Brigadeiro Faria Lima, 1941 – São José dos Campos – SP CEP 12227-000 Tel. : 55 12 39133206 Fax : 55 12 39131822 Email: rocha@cgna.gov.br
BRAZIL	Mr. SAULO JOSE DA SILVA	ATM OFFICER	DECEA Avenida General Justo, 160 Rio de Janeiro – RJ – Brazil Tel.: 55 21 38146281 Fax: 55 21 38146088 Email: atm3-7@decea.gov.br safla@uol.com.br

STATES/ ORGANIZATIONS	NAMES	FUNCTION	ADDRESS
TRINIDAD AND TOBAGO	Mr. SAMUEL LAMPKIN	AIR TRAFFIC CONTROL SUPERVISOR	Piarco ATC Radar Bldg. Civil Aviation Division Caroni North Bank Road Piarco Int'l Airport Trinidad and Tobago Tel.: 1868-6259843 1868-6694806 1868-6690635 Fax: 1868-6253456 1868-6694806 (on request) 1868-6690635 (on request) Email: civilav@tstt.net.tt samlampk@tstt.net.tt
UNITED STATES	Mr. BRIAN COLAMOSCA	MANAGER, SEPARATION STANDARDS GROUP	FAA Technical Center Atlantic City – NJ – 08405 – USA Tel.: 1-609-4856603 Fax: 1-609-485-5117 Email: brian.colamosca@faa.gov
UNITED STATES	Mr. Brian Throop	OPERATIONS SPECIALIST	800, Independence Ave Washington, D.C. 20591 Tel.: 202-267-3160 Fax: 202-267-5110 Email: brian.throop@faa.gov

STATES/ ORGANIZATIONS	NAMES	FUNCTION	ADDRESS
UNITED STATES	Mr. José L. Pérez	RVSM IMPLEMENTATION TEAM	ACB-310 Atlantic City Int'l Airport Atlantic City NJ 08405 Tel.: 1 (609) 485-5365 Fax.: 1 (609) 485-5117 Email: jose.perez@faa.gov
UNITED STATES	Ms. Leslie Cary	AIR TRAFFIC SERVICES INTERNATIONAL	800, Independence Ave Washington, D.C. 20591 Tel.: 1-202-267-9601 Fax: 1-202-267-5120 Email: leslie.cary@faa.gov.br
UNITED STATES	Mr. Robert L. Miller, Jr	AIRSPACE PROGRAM MANAGER	400, Virginia Ave, SW, Suite 210 Washington D.C. 20024 1-202-484-3359 1-202-863-2398 Email: rmiller@cssiinc.com
URUGUAY	Mr. Roberto Luis Arca	TECHNICAL CHIEF OF AIR TRAFFIC	Aeropuerto Intl. de Carrasco 14000 Canelones – Uruguay Tel.: (598-2) 6040249 Fax: (598-2) 6040251 Email: rlarca@adinet.com.uy

STATES/ ORGANIZATIONS	NAMES	FUNCTION	ADDRESS
IATA	Mr. Angel Lucas	DEPUTY DIRECTOR	703 Waterford Way Suit 600 Tel.: 1-305-2667552 Fax: 1-305-2667718 Email: lucasa@iata.org
IFATCA	Mr. Omar E. Guerra Fedee	IFATCA COORDINTATOR AMA	Apartado 6 – 7658 – Panamá Tel.: (507) 232-5904 Fax: (507) 232-5303 Email: oegf@hotmail.com
IFATCA	Mr. Juan Perez Mafla	EVP-AMA	Apartado 6 – 7658 – Panamá Tel.: (507) 232-7658 Fax: (507) 232-6622 Email: cvpanama@ifatca.org