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07/04

25 NOV 04

RVSM IMPLEMENTATION IN THE CURAÇAO FIR

1. INTRODUCTION

- 1.1 The constant global increase of air traffic, the operational need for aircraft to fly at, or nearest to, their optimum flight levels and the demand for a better use of the airspace, have promoted the implementation of the reduced vertical separation minima (RVSM) of 1000 feet above FL290 in the different ICAO regions, such as North Atlantic, Asia- Pacific, Europe, South Atlantic EUR/SAM corridor (SAT, WATRS /West Atlantic Route System) and the Middle East, largely demonstrating its advantages and, without a doubt, representing the best solution for increasing the availability of optimum flight levels, while maintaining or improving the required safety levels.
- 1.2 The Third CAR/ SAM Regional Air Navigation Meeting (RAN CAR/SAM/3, Buenos Aires, Argentina, 1999, entrusted the CAR/ SAM Regional Planning and Implementation Group (GREPECAS) with the development of the studies and evaluation of the needs and benefits resulting from RVSM implementation in both regions.
- 1.3 According to the analysis of major CAR/ SAM Traffic Flows carried out by the UNDP/ ICAO Regional Project RLA/98/003 "Transition to CNS/ ATM Systems in the CAR and SAM Regions", some sectors of the airspace are experiencing busy traffic especially during "peak" periods and hours. Consequently, a significant number of aircraft do not operate at their optimum flight level, negatively affecting the efficiency of operations.
- 1.4 GREPECAS/10 Meeting (Las Palmas, Canary Islands, Spain, October 2001) concluded that RVSM implementation would permit a better use of the airspace and benefit the air transport economy. In order to establish a seamless implementation strategy with the other ICAO regions, the decision for "**RVSM Implementation in the CAR/ SAM Regions**" was ratified by GREPECAS/11 (Manaus, Brazil, December 2002) and GREPECAS 12 (La Havana, Cuba, June 2004) Meetings, for **20 January 2005**, concurrent with the ICAO NAM Region.
- 1.5 The aircraft operators and the Air Traffic Services providers could obtain significant benefits with RVSM implementation in the CAR/ SAM regions that, among others, include:
 - a) Greater availability of optimum flight levels;
 - b) Better use of the airspace;
 - c) Increase in airspace capacity;
 - d) Use of standardized and harmonious ATS procedures;
 - e) Application of uniform separation minima;
 - f) Reduction of ground delays; and

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g) Fuel savings of approximately 1% for flights carried out at, or near to, the optimum cruise levels.

1.6 Doc 9574, ICAO Manual on the Implementation of a Vertical Separation Minima of 300 m (1000 ft.) between FL 290 and FL 410 Inclusive, contains an extensive explanation for a safe RVSM implementation.

1.7 Based on that document, the RVSM Task Force (RVSM/TF) of the GREPECAS ATM Committee has developed the documentation and the RVSM operational procedures for their application in the CAR/ SAM regions. The main documents are the following:

- a)** Guidance Material on the Implementation of a Vertical Separation Minima of 300 m (1000 ft.) between FL 290 and FL 410 Inclusive for Application in the Airspace of the Caribbean and South American Regions;
- b)** Caribbean and South American Regions RVSM Concept of Operations;
- c)** ATC Guidance Manual for RVSM Training in the CAR/ SAM Regions.

Note 1: These documents are published on the ICAO SAM Regional Office WEB site: www.lima.icao.int and on the ICAO NACC Regional Office WEB site: www.mexico.icao.int

Note 2: The procedures for RVSM operations applicable to the CAR and SAM regions have also been included in ICAO Doc 7030 – Parts CAR and SAM, Regional Supplementary Procedures.

Note 3: The regulations and procedures indicated below do not necessarily cover all the aspects required for operations in RVSM airspace, aircraft approval or monitoring. The documents mentioned in paragraphs 1.6 and 1.7 of this AIC contain applicable procedures for RVSM operations in the CAR/ SAM regions. The WEB site of the Caribbean and South American Regional Monitoring Agency (CARSAMMA) www.cgna.gov.br presents detailed information required for RVSM approval and monitoring, as well as the applicable documents for the CAR/ SAM regions.

2. IDENTIFICATION OF RVSM AIRSPACE

2.1 Starting at **0901 UTC on 20 January 2005**, the designation of **RVSM Airspace** will be given to the CURAÇAO FIR between **FL290 and FL410**, inclusive and between the following geographic coordinates:

1230N07030W-1230N07125W-1420N07400W
1600N07400W-1700N07300W-1700N07140W
1600N07140W-1600N06800W-1541N06704W
1124N06758W-1230N07030W;

This airspace extension will be designated as **RVSM airspace**.

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2.2 The minimum vertical separation to be applied in the RVSM airspace, will be 1000 ft.

2.3. RVSM Flight Level Allocation Scheme (FLAS)

The flight level allocations in RVSM airspace will be made according to the following table:

Flight Level Allocation Scheme (FLAS) For the CAR/SAM Regions	
Table of Cruising Levels of Appendix 3 to ICAO Annex 2	
Track from 180° to 359°	Track from 000° to 179°
← FL 430	(non-RVSM level)
	FL 410 →
← FL 400	
	FL 390 →
← FL 380	
	FL 370 →
← FL 360	
	FL 350 →
← FL 340	
	FL 330 →
← FL 320	
	FL 310 →
← FL 300	
	FL 290 →
← FL 280	(non-RVSM level)

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3. AIRWORTHINESS/ OPERATIONS APPROVAL AND MONITORING

3.1 RVSM Approval

Operators operating or intending to operate in the RVSM airspace must obtain RVSM approval from the State of Registry or the State of Operator as appropriate.

3.2 Aircraft monitoring

Operators operating or intending to operate in the RVSM airspace shall participate in an RVSM Monitoring Program, through which it is confirmed that the aircraft fulfills the height- keeping performance requirements.

3.2.1 Operators must present a plan for the completion of initial monitoring requirements to their respective Civil Aviation Authority.

3.2.2 The CAR/ SAM Monitoring Agency (**CARSAMMA**) is responsible for the RVSM Monitoring Program in the CAR/SAM Regions. The CARSAMMA shares monitoring information with other regions, including RVSM approval data.

3.3 The Ministerial Decree " Implementation of RVSM in the Curaçao FIR " provides the information and procedures for RVSM approval, monitoring and operation in the Netherlands Antilles.

4. FLIGHT PLANNING

4.1 RVSM APPROVED AIRCRAFT

4.1.1 Aircraft operators shall indicate their status of RVSM approval by inserting the letter "W" in item **10** of the Flight Plan form, independent of the flight level requested.

4.2 NON RVSM APPROVED AIRCRAFT

4.2.1 Non RVSM approved State aircraft will be permitted to operate in the RVSM airspace. The filing of a flight plan serves as advance notice to ATC that the aircraft is requesting to operate in RVSM airspace. Non RVSM approved state aircraft flight planning into RVSM airspace shall include the following in field **18** (Other Information) of their flight plan: **STS/NONRVSM**.

4.2.2 NON RVSM APPROVED CIVIL AIRCRAFT

4.2.1.1 Non RVSM approved civil aircraft shall not flight plan at RVSM flight levels, except in the following cases:

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- a) The aircraft is being initially delivered to the State of Registry or Operator.
- b) The aircraft was formerly RVSM approved but has experienced an equipment failure and is being flown to a maintenance facility for repairs in order to meet RVSM requirements and/or obtain approval.
- c) The aircraft is being used for mercy or humanitarian purposes.

Aircraft operators requesting clearance as above shall, if departing within Curacao FIR, obtain clearance from Curacao ACC normally no more than 12 hours and no less than 4 hours prior to the intended departure time.

The operator shall notify this clearance to all ACCs affected by the flight.

The operator shall insert "**STS/NONRVSM**" in item **18** of the flight plan form.

This clearance process is intended exclusively for the purpose indicated above and not as a means to circumvent the normal RVSM approval process.

The vertical separation of 2000 feet shall be applied between non- RVSM approved aircraft and all others.

5. PROCEDURES FOR SUSPENSION OF RVSM

- 5.1 ATS will consider suspending RVSM procedures within all or part of the Curaçao FIR when there are pilot reports of greater than moderate turbulence, or other severe meteorological phenomena or ATC equipment failure.
- 5.2 When RVSM procedures are suspended, the vertical separation minimum between all aircraft will be 2000 feet.

6. OPERATIONAL PROCEDURES BEFORE ENTERING RVSM AIRSPACE - RVSM APPROVED AIRCRAFT

- 6.1 Before entering the RVSM airspace, the pilot in command of RVSM approved aircraft must check that the following required equipment for flight in RVSM airspace is operating normally:
 - a) two independent primary altimetry system;
 - b) a Mode- C- capable SSR transponder;
 - c) an altitude- alert system;
 - d) an automatic altitude- keeping device.
- 6.2 If any of the required equipment listed above is not operating normally, the pilot must notify ATC before entering RVSM airspace using the phraseology "**UNABLE RVSM DUE EQUIPMENT**"

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- 7. OPERATIONAL PROCEDURES AFTER ENTERING RVSM AIRSPACE – RVSM APPROVED AIRCRAFT**
- 7.1** During changes of level, an aircraft must not overshoot or undershoot its Cleared Flight Level (CFL) by more than 150 FT (45m)
- 7.2 Failure of One Primary Altimetry System**
- 7.2.1** If one of the primary altimetry systems fails, but the remaining altimetry system is functioning normally, the pilot must:
- a)** Couple that system to the AKD
 - b)** Maintain increased vigilance of altitude- keeping
 - c)** Notify ATC of the failure using the phraseology, **“For information, operating on one Primary Altimeter System Only”**
- 7.3 Failure of All Primary Altimetry Systems**
- 7.3.1** If all primary altimetry systems fail, or are considered unreliable, the pilot must:
- a)** Maintain the flight level indicated on the standby altimeter (if equipped) at time of failure or when considered unreliable;
 - b)** Alert nearby aircraft by turning on all exterior lights and, if not in direct contact with ATC, by broadcasting position, flight level, and intentions on 121.5 MHZ;
 - c)** Notify ATC of the failure using the phraseology **“UNABLE RVSM DUE EQUIPMENT”**
- 7.4 Divergence in Primary Altimetry Systems Indication**
- 7.4.1** If the primary altimeters diverge by more than 200 FT, the pilot must proceed as follows:
- a)** Attempt to determine the defective system through established “trouble- shooting” procedures and/ or comparing the primary altimeter displays to the standby altimeter (as corrected by correction card, if required)
 - b)** If the defective system can be determined, couple the functioning altimetry system to the AKD and proceed as paragraph 7.2
 - c)** If the defective system cannot be determined, proceed as in paragraph 7.3
- 7.5 Failure of the Mode C- capable SSR Transponder**
- 7.5.1** If the mode C capable transponder fails, the pilot must notify ATC of the failure using the phraseology **“UNABLE RVSM DUE EQUIPMENT”**

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7.6 Failure of the Altitude Alert System

7.6.1 If the altitude alert system fails, the pilot must notify ATC of the failure using the phraseology **“UNABLE RVSM DUE EQUIPMENT”**

7.7 Failure of the Automatic Altitude- Keeping Device

7.7.1 If the automatic altitude- keeping device (AKD) fails, the pilot must initiate the following actions sequentially:

- a) Maintain CFL
- b) Evaluate the aircraft's capability to maintain altitude through manual control;
- c) Watch for conflicting traffic both visually and by reference to ACAS;
- d) Alert nearby aircraft by turning on all exterior lights and, if not in direct contact with ATC, by broadcasting position, flight level, and intentions on 121.5 MHz;
- e) Notify ATC of the failure using the phraseology **“UNABLE RVSM DUE EQUIPMENT”**.

8. SPECIAL PROCEDURES FOR IN- FLIGHT CONTINGENCIES

8.1 Introduction

8.1.1 Although all possible contingencies cannot be covered, the following procedures provide for the more frequent cases such as:

- a) inability to maintain assigned flight level due to weather, aircraft performance or pressurization failure;
- b) en route diversion across the prevailing traffic flow; and
- c) loss of, or significant reduction in, the required navigation capability when operating in an airspace where the navigation performance accuracy is a prerequisite to the safe conduct of flight operations.

8.1.2 With regard to 8.1.1 a) and b), the procedures are applicable primarily when rapid descent and/ or turn- back or diversion is required. The pilot's judgment shall determine the sequence of actions to be taken, having regard to the prevailing circumstances. Air traffic control shall render all possible assistance.

8.2 General procedures

8.2.1 If an aircraft is unable to continue the flight in accordance with its ATC clearance, and/ or an aircraft is unable to maintain the navigation performance accuracy specified for the airspace, a revised clearance shall be obtained, whenever possible, prior to initiating any action.

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8.2.2 The radiotelephony distress signal (MAYDAY) or urgency signal (PAN PAN) preferably spoken three times shall be used as appropriate. Subsequent ATC action with respect to that aircraft shall be based on the intentions of the pilot and the overall air traffic situation.

8.2.3 If prior clearance cannot be obtained, an ATC clearance shall be obtained at the earliest possible time and, until a revised clearance is received, the pilot shall:

- a)** leave the assigned route or track by initially turning 90 degrees to the right or to the left. When possible, the direction of the turn should be determined by the position of the aircraft relative to any organized route or track system. Other factors that may affect the direction of the turn are:
 1. the direction to an alternate airport, terrain clearance;
 2. any lateral offset being flown, and
 3. the flight levels allocated on adjacent routes or tracks.
- b)** following the turn, the pilot should:
 1. if unable to maintain the assigned flight level, initially minimize the rate of descent to the extent that is operationally feasible;
 2. take account of other aircraft being laterally offset from its track;
 3. acquire and maintain in either direction a track laterally separated by 28 km (15 NM) from the assigned route or track in a multi-track system or otherwise, at a distance which is the mid-point from the adjacent parallel route or track; and
 4. once established on the offset track, climb or descend to select a flight level which differs from those normally used by 150 m (500 ft);
- c)** establish communications with and alert nearby aircraft by broadcasting, at suitable intervals: aircraft identification, flight level, position (including the ATS route designator or the track code, as appropriate) and intentions on the frequency in use and on 121.5 MHz (or, as a back-up, on the inter-pilot air-to-air frequency 123.45 MHz);
- d)** maintain a watch for conflicting traffic both visually and by reference to ACAS (if equipped);
- e)** turn on all aircraft exterior lights (commensurate with appropriate operating limitations);
- f)** keep the SSR transponder on at all times; and
- g)** take action as necessary to ensure the safety of the aircraft.

8.2.4 Extended range operations by airplanes with two-turbine power-units (ETOPS)

If the contingency procedures are employed by a twin-engine aircraft as a result of an engine shutdown or failure of an ETOPS critical system, the pilot should advise ATC as soon as practicable of the situation, reminding ATC of the type of aircraft involved, and request expeditious handling.

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8.3 Weather deviation procedures

8.3.1 General

The following procedures are intended for deviations around adverse weather.

8.3.1.1 When the pilot initiates communications with ATC, a rapid response may be obtained by stating **"WEATHER DEVIATION REQUIRED"** to indicate that priority is desired on the frequency and for ATC response. When necessary, the pilot should initiate the communications using the urgency call **"PAN PAN"** (preferably spoken three times)

8.3.1.2 The pilot shall inform ATC when weather deviation is no longer required, or when a weather deviation has been completed and the aircraft has returned to the centre line of its cleared route.

8.3.1.3 Actions to be taken when controller- pilot communications are established:

8.3.1.3.2 The pilot should notify ATC and request clearance to deviate from track, advising, when possible, the extent of the deviation expected.

8.3.1.3.2 ATC should take one of the following actions:

- a)** when appropriate separation can be applied, issue clearance to deviate from track; or
- b)** if there is conflicting traffic and ATC is unable to establish appropriate separation, ATC shall:
 1. advise the pilot of inability to issue clearance for the requested deviation;
 2. advise the pilot of conflicting traffic; and
 3. request the pilot's intentions.

SAMPLE PHRASEOLOGY:

"UNABLE (requested deviation), TRAFFIC IS (call sign, position, altitude, direction) ADVISE INTENTIONS"

8.3.1.3.3 The pilot should take the following actions:

- a)** comply with the ATC clearance issued; or
- b)** advise ATC of intentions and execute the procedures detailed in 8.3.1.3.4 below.

8.3.1.3.4 Actions to be taken if a revised ATC clearance cannot be obtained

Note: The provisions of this section apply to situations where a pilot needs to exercise the authority of a pilot- in- command under the provisions of Annex 2, 2.3.1.

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8.3.1.3.5 If the aircraft is required to deviate from track to avoid weather and prior clearance cannot be obtained, an ATC clearance shall be obtained at the earliest possible time. Until an ATC clearance is received the pilot shall take the following actions:

- a) if possible, deviate away from an organized track or route system;
- b) establish communications with and alert nearby aircraft by broadcasting, at suitable intervals: aircraft identification, flight level, position (including ATS route designator or the track code) and intentions, on the frequency in use and on 121.5 MHz (or, as a back-up, on the inter-pilot air-to-air frequency 123.45 MHz);
- c) watch for conflicting traffic both visually and by reference to ACAS (if equipped);

Note: If, as a result of actions taken under the provisions of b) and c) above, the pilot determines that there is another aircraft at or near the same flight level with which a conflict may occur, then the pilot is expected to adjust the path of the aircraft, as necessary, to avoid conflict.
- d) turn on all aircraft exterior lights (commensurate with appropriate operating limitations);
- e) for deviations of less than 19 km (10 NM) remain at a level assigned by ATC;
- f) for deviations greater than 19 km (10 NM), when the aircraft is approximately 19 km (10 NM) from track, initiate a level change in accordance with Table 1;

Table 1

Route center line track	Deviations > 19 km (10 MN)	Level change
EAST 000°- 179° magnetic	LEFT RIGHT	DESCEND 90 m (300 ft) CLIMB 90 m (300 ft)
WEST 180°- 359° magnetic	LEFT RIGHT	CLIMB 90 m (300 ft) DESCEND 90 m (300 ft)

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9. RVSM Phraseology

The following RVSM phraseology will be used in RVSM operations.

Circumstances		Phraseologies
12.3.1.11	REDUCED VERTICAL SEPARATION MINIMUM (RVSM) OPERATIONS	
	...to ascertain RVSM approval status of an aircraft	a) CONFIRM RVSM APPROVED
	.. to report RVSM approved status	* b) AFIRMM RVSM
	...to report RVSM non- approved status followed by supplementary information	* c) NEGATIVE RVSM [(supplementary information, e. g. State Aircraft)]
	Note: See 12.2.4 and 12.2.5 for procedures relating to operations in RVSM airspace by aircraft with non- approved status.	
	...to deny ATC clearance into RVSM airspace	d) UNABLE ISSUE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN [or DESCEND TO, or CLIMB TO] (level)
	...to report when severe turbulence affects the capability of an aircraft to maintain height- keeping requirements for RVSM	* e) UNABLE RVSM DUE TURBULENCE
	...to report that the equipment of an aircraft has degraded below minimum aviation system performance standards	*f) UNABLE RVSM DUE EQUIPMENT
	...to request an aircraft to provide information as soon as RVSM- approved status has been regained or the pilot is ready to resume RVSM operations	g) REPORT WHEN ABLE TO RESUME RVSM
	...to request confirmation that an aircraft has regained RVSM- approved status or a pilot is ready to resume RVSM operations	h) CONFIRM ABLE TO RESUME RVSM
	.. to report ability to resume RVSM operations after an equipment or weather-related contingency	*i) READY TO RESUME RVSM
		* Denotes pilot transmission

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10. Coordination between ATS units

12.3.5.8	REDUCED VERTICAL SEPARATION MINIMUM (RVSM) OPERATIONS	
	...to verbally supplement estimate messages of aircraft non-approved for RVSM or to verbally supplement an automated estimate message exchange that does not automatically transfer information from Item 18 of the flight plan followed by supplementary information, as appropriate	a) NEGATIVE RVSM [(supplementary information, e. g. State Aircraft)];
	...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 meteorological phenomena or equipment failure, as applicable	b) UNABLE RVSM DUE TURBULENCE (or EQUIPMENT, as applicable)