ATC Guidance Manual for RVSM Training in the CAR/SAM Regions

CAR/SAM RVSM **Draft Version 0.2**

CONTENTS

List of abbreviations

ACAS	Airborne Collision Avoidance System
ACC	Area Control Centre
ACI	Area of Common Interest
ACT	Activation Message (OLDI)
ADEP	Aerodrome of Departure
ADES	Aerodrome of Destination
AFIL	Air-Filed Flight Plan
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
ASE	Altimetry System Error
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Services
CARSAMMA	CAR/SAM Monitoring Agency
CFL	Cleared Flight Level
CFMU	Central Flow Management Unit
CVSM	Conventional Vertical Separation Minima
FAA	Federal Aviation Administration (USA)
FDPS	Flight Data Processing System
FIR	Flight Information Region
FL	Flight Level
MNPS	Minimum Navigation Performance Specifications
MTCD	Medium-Term Conflict Detection
NAT	North Atlantic
NOTAM	Notice to Airmen
OACI	International Civil Aviation Organization
OLDI	On-Line Data Interchange
RA	Resolution Advisory (ACAS)
RFL	Required Flight Level
RGCSP	Review of the General Concept of Separation Panel
RNAV	Area Navigation
RNP	Required Navigation Performance
RPL	Repetitive Flight Plan
RTF	Radiotelephony
RVSM	300 m/1000 ft Reduced Vertical Separation Minimum between FL 290 and FL 410 (both inclusive)
SARPs	Standards and Recommended Practices
SDB	State Data Base
SSR	Secondary Surveillance Radar
STCA	Short-Term Conflict Alert
TA	Traffic Advisory (ACAS)
TGL	Temporary GuidanceLeaflet (JAA)
TLS	Target Level of Safety

FLAS	Flight Level Assignment Schedule	**TSA**	Temporarily Segregated Area
FPL	Filed Flight Plan	**TSE**	Total System Error
IFR	Instrument Flight Rules	**TVE**	Total Vertical Error
JAA	Joint Aviation Authorities	**UAC**	Upper Area Control Centre
LoA	Letter of Agreement	**UIR**	Upper Flight Information Region
MASPS	Minimum Aircraft System Performance Specifications	**VFR**	Visual Flight Rules
MEL	Minimum Equipment List	**VSM**	Vertical Separation Minima

DEFINITIONS

Flight Level Assignment Schedule (FLAS)

Schedule for the assignment of specific flight levels to given route segments in the ATS route network.

RVSM approval

Approval given by the corresponding authority of the State where the operator is based, or of the State of registry of the aircraft. In order to obtain the RVSM approval, operators must assure the cited State that:

1) the aircraft for which the RVSM approval is being requested has the vertical navigation capability required for RVSM operations, in keeping with RVSM specifications (MASPS).

2) procedures regarding continuing airworthiness practices and programmes (maintenance and repair) have been established.

3) flight crew procedures for operations in CAR/SAM RVSM airspace have been established.

Note: RVSM approval is not restricted to a given region. Instead, it has worldwide validity, in the understanding that any operational procedure specific to a region, in this case the CAR/SAM Regions, should be included in the Operations Manual or in the corresponding crew training manual.

RVSM-approved aircraft

Aircraft which have been given State approval for RVSM operations in CAR/SAM RVSM airspace.

RVSM entry fix

The first fix crossed by an aircraft, or expected to be crossed immediately before, at, or immediately after its initial entry to CAR/SAM RVSM airspace; it normally serves as the first fix for the application of a 300 m (1000 ft) vertical separation minimum between RVSM-approved aircraft.

RVSM exit fix

Last fix crossed by an aircraft, or expected to be crossed immediately before, at, or immediately after leaving CAR/SAM RVSM airspace; it normally serves as the last fix for the application of a 300 m (1000 ft) vertical separation minimum between RVSM-approved aircraft.

State aircraft

For CAR/SAM RVSM purposes, only those aircraft used for military, customs, and police services shall be considered as State aircraft.

Ref: ICAO, Convention on International Civil Aviation, Article 3 (b.

Strategic flight level

Flight level which may be used for flight plan compliance, in keeping with the ICAO Cruising Level Table, Annex 2, Appendix 3, and/or a Flight Level Assignment Schedule (FLAS), as specified in the relevant Aeronautical Information Publications (AIPs).

Tactical flight level

Flight level reserved for ATC tactical use and, therefore, should not be used for flight plan compliance.

EXECUTIVE SUMMARY

The implementation of a Reduced Vertical Separation Minimum in the airspace of CAR/SAM States/Territories and Organizations represents a major change in the operational environment of the ACCs/UACs involved. An early detailed planning of RVSM implementation will ensure the optimisation of capacity and operational efficiency benefits, and the capability of controllers to successfully face this important change in their operational environment, thus ensuring continued levels of safety.

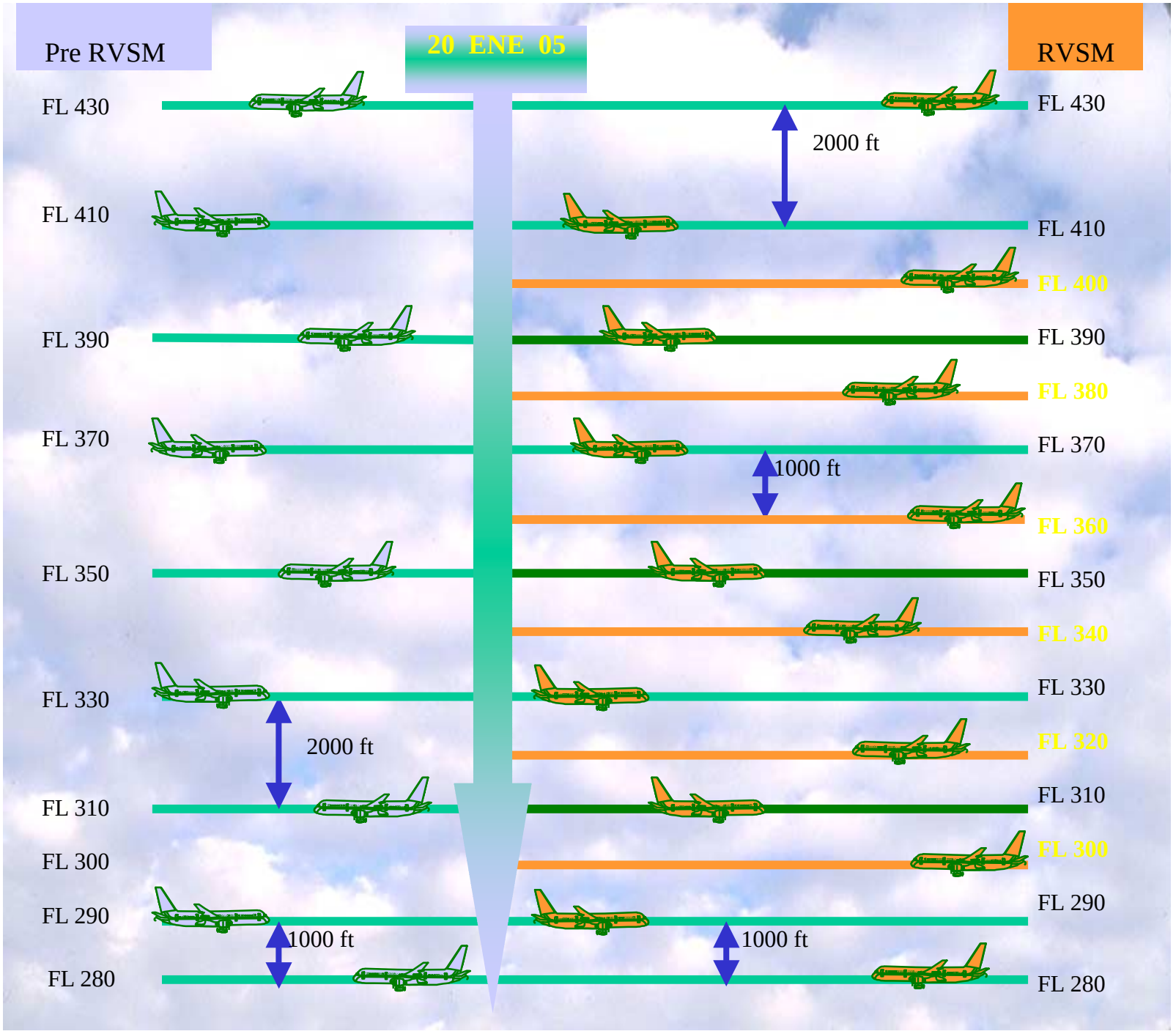
This Manual is based in the ATC Manual for RVSM in Europe prepared by Eurocontrol, in the ATC Manual for FIR Canarias and also in the ATC Manual and RVSM Concept of Operations (CONOPS) developed by the GREPECAS RVSM Task Force, within UNDP/ICAO RLA/98/003 Regional Project framework, and its objective is to provide guidance and serve as reference document for operational and management staff involved in RVSM implementation planning. It also serves as a reference document for the personnel involved in continued ACC/UAC ATC operations in an RVSM environment.

The manual addresses ATM system elements that are directly affected by or affect RVSM implementation and application.

This document introduces the use of the term "CAR/SAM RVSM airspace" to reflect RVSM application in the airspace of CAR/SAM States/Territories and Organizations that have decided to participate in the RVSM Programme. Likewise, although it has been decided that no transition area will be established within the CAR/SAM Regions, examples of possible situations in transition airspaces have been established so that those scenarios and situations can be studied in case its implementation is required, even though in a temporary basis.

Section 1:

INTRODUCTION


Pre RVSM
20 ENE 05
RVSM
FL 430
FL 410
FL 390
FL 370
FL 350
FL 330
FL 310
FL 300
FL 290
FL 280
2000 ft
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FL 430
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

1. INTRODUCTION

1.1 Background

The implementation of Reduced Vertical Separation Minima represents an important objective to improve airspace capacity in the CAR/SAM Regions. In fact, the introduction of RVSM will enable the application of a 1,000-ft Vertical Separation Minimum between duly-equipped aircraft in the FL 290 - FL 410 flight band, both inclusive, thus providing six additional flight levels. The purpose of RVSM implementation is to increase capacity through the introduction of these six additional flight levels, to reduce controller workload while maintaining, or even improving, current levels of safety, and to provide the airspace user community with an improved operational environment for optimising flight profiles.

The availability of these additional flight levels is one of the instruments that will allow controllers to:

- efficiently handle both current and future traffic volumes within their areas of responsibility;
- effectively avoid conflicts at the main CAR/SAM ATS route network crossing points during the strategic phase; and
- meet, inasmuch as possible, pilot requests for optimum cruising levels.

As described below, and as a prerequisite of RVSM implementation in CAR/SAM airspace, operational levels of safety in CAR/SAM RVSM airspace need to be maintained or improved with respect to current values. The work initiated by some States through real-time simulations and safety studies have confirmed the viability of RVSM implementation from both the technical and operational viewpoints. The experience obtained from RVSM application in the North Atlantic (NAT), Asia/Pacific and European Regions has been studied in terms of the relevant issues associated to RVSM implementation in CAR/SAM airspace. Furthermore, the CAR/SAM RVSM Programme has been developed in close coordination with FAA experts who had previous RVSM implementation experience in other Regions. The material emanating from the CAR/SAM RVSM Programme is consistent with the corresponding ICAO Standards and Recommended Practices (SARPs) and with the ICAO RVSM and ATS Guidance Material.

1.2. Need for RVSM

It is a fact that major changes in ATM systems will be required to address this continued traffic growth as established in CNS/ATM Regional Plans. Of the various steps being taken to meet this need, the most cost-efficient procedure is considered to be the implementation of RVSM through the introduction of six additional flight levels to be used in the highly-congested airspace between FL 290 and FL 410, both inclusive.

The RVSM Programme will provide the following benefits:

- Optimum route profiles

  The availability of six additional flight levels in the busiest level band will allow operators to plan for, operate at, or closer to, the optimum vertical route profile for each aircraft type. This will provide fuel savings, both in terms of the fuel carried and the fuel used for the flight. Savings are estimated between ..... and .....% of total fuel used, which translates into global savings of ..... million dollars in a 20-year period following RVSM implementation.

- Increased ATC capacity

  A series of real-time ATC simulations carried out by the FAA have shown that RVSM will reduce controller workload. They have revealed that the capacity of these simulated sectors could increase by a significant percentage--almost 20%, approximately--as compared to the Conventional Vertical Separation Minima (CVSM). Furthermore, there is potential for future growth through a revised airspace structure which includes, for instance, changes in sectorisation and/or the introduction of additional sectors.

  However, the presence of non-RVSM State aircraft which are exempt from the obligation of meeting RVSM Minimum Aircraft System Performance Specifications (MASPS) for CAR/SAM RVSM airspace operations will restrict expected capacity increases.

1.3. History

In the late 50's, due to the reduced precision of pressure altimeters as a result of increased altitudes, it was concluded that the prescribed 1000-ft Vertical Separation Minimum (VSM) had to be increased above a given flight level. In 1960, an increased VSM of 2000 ft was established between aircraft operating above FL 290, except where regional air navigation agreements prescribed a lower level. The selection of FL 290 was not a empirical decision but, rather, was based on the operational ceiling of existing aircraft. In 1966, this transition level was established at FL 290 on a global basis.

It was also felt that regional application of a reduced VSM above FL 290 under carefully defined circumstances was another specific possibility for a not-too-distant future. Consequently, ICAO provisions established that this reduced VSM could be applied, under specific conditions, in selected airspace portions as defined in regional air navigation agreements.

In the late 70's, in face of increasing fuel costs and growing demands for a more effective use of available airspace, ICAO began a complete programme of studies to examine the possibility of reducing the

2000-ft VSM applied above FL 290 to 1000 ft, as applied below FL 290. Throughout the 80's, under the auspices of ICAO, several studies were conducted in Europe, Canada, Japan and the United States. The main proposals of these studies were:

- to determine the height-keeping precision of altimetry systems of the existing fleet.
- to establish the causes of observed height-keeping errors.
- to determine the safety levels required for the implementation and use of a 1000-ft Reduced Vertical Separation Minimum (RVSM) in the FL 290 to FL 410 level band, both inclusive.
- to define a MASPS for aircraft altimetry systems and the associated height-keeping equipment that will enhance height-keeping precision up to a standard consistent with the safety requirements agreed upon for RVSM.
- to determine whether global implementation and use of RVSM is:

    1. technically feasible, subject to the primary need to meet the agreed safety standards; and
    2. cost-efficient.

The results of these thorough studies revealed that **the reduction of vertical separation was safe, cost-efficient and feasible**, without imposing unnecessary technical requirements.

Studies also showed that aircraft types and a basically one-way traffic flow in the North Atlantic Minimum Navigation Performance Specifications (MNPS) airspace made it the ideal candidate for the initial implementation of RVSM.

RVSM planning in the NAT Region started in 1990. The first stage of the Operational Assessment phase applying a 1000-ft RVSM started on 27 March 1997 in the level band between FL 330 and FL 370, both inclusive. In a second stage, in October 1998, RVSM application was extended to FL 310, FL 320, FL 380 and FL 390.

More recently, on 24 January 2002, 40 States implemented RVSM in the European airspace, and, that same year, RVSM was implemented in the EUR/SAM corridor.

From the beginning of CAR/SAM planning, it was noted that the complex nature of the CAR/SAM ATS route structure, the wide variety of aircraft types, the high traffic density in some FIRs, and the high percentage of aircraft in evolution, would represent a more complex ATM environment for RVSM implementation than the North Atlantic Region. Consequently, the initial RVSM feasibility studies in the CAR/SAM Regions, conducted by the GREPECAS contributory bodies, assigned high priority to safety considerations. These studies showed that, depending on the compliance of altimetry MASPS by aircraft, RVSM could be applied in the CAR/SAM

Regions without reducing the required safety levels and, furthermore, it would be cost-efficient in a large number of scenarios, taking into account future developments in the CAR/SAM environment.

1.3.1 Benefits of the RVSM programme

By providing the ATC with these additional flight levels, the RVSM programme will offer the following benefits:

- OPTIMUM FLIGHT PROFILES:

  By providing more flight levels, each aircraft type will be able to operate closer to its optimum flight level in each route segment. This translates into fuel savings estimated at approximately 0.5% – 1% of total operations.

- WORKLOAD REDUCTION ⇒ INCREASED ATC CAPACITY:

  Real-time simulations have shown that RVSM can reduce controller workload. They have also shown that the capacity of these sectors can increase as compared to a conventional vertical separation environment.

- ELIMINATION OF CONFLICTS IN THE STRATEGIC PHASE:

  The availability of six additional flight levels will eliminate traffic conflicts more efficiently in the strategic phase at the main CAR/SAM ATS route network crossings.

- POTENTIAL FOR FUTURE TRAFFIC INCREASES:

  There is also margin for subsequent growth, through a revision of airspace structures, including, for instance, changes in current sectorisation and the introduction of additional sectors.

However, the presence in this RVSM airspace of non-RVSM State aircraft, which, as we shall see later on in this document, are exempt from the obligation of meeting MASPS requirements, will restrict expected capacity increases.

1.3.2 Cost-benefit analysis

(Include analysis when completed)

1.4. The CAR/SAM RVSM implementation programme

The programme consists of a series of co-ordinated activities carried out within the structure of ICAO-GREPECAS, FAA and user organisations, sponsored by the ICAO-UNDP RLA/98/003 Project.

The programme has applied the general strategy defined in ICAO Doc 9574 (second edition), "Manual on implementation of a 300 m (1000 ft) vertical separation minimum between FL 290 and FL 410 inclusive", which includes a multiple-stage approach.

GREPECAS reviewed the progress made by the RVSM programme and recommended that work should continue towards full implementation by the target date of 20 January 2005. This programme was approved by GREPECAS in (date of approval).

1.5. Supporting documentation

The following reference documents contain RVSM-related information:

- OACI Doc. 9574 (second edition-2002)- Manual on implementation of a 1000-ft vertical separation minimum between FL 290 and FL 410 inclusive.
- OACI Doc. 7030 – Regional Supplementary Procedures - AFI and SAM amendments - SUPPs WACAF AFI/SAM 003; WACAF 001 and SAM 01/01
- JAA Temporary Guidance Leaflet – Guidance material on the approval of aircraft and flight operators in the airspace above FL 290 where a 300 m (1000 ft) vertical separation minimum is applied (TGL Nº.6, revision 1)
- Guidance material on the implementation of a 300m (1000 ft) vertical separation minimum between FL 290 and FL 410 inclusive in the CAR/SAM airspace
- National aeronautical information circulars (AICs) and/or aeronautical information publications (AIPs).
- FAA Provisional Guidance 91-RVSM (amended)

WEB pages:

www.lima.icao.int
www.cgna.gov.br/carsam/espanol/index.htm
www.cgna.gov.br/carsam/english.htm
www.faa.gov/ats/ato/rvsm1.htm

Section 2:

DESCRIPTION OF THE CAR/SAM RVSM AIRSPACE

2. DESCRIPTION OF THE CAR/SAM RVSM AIRSPACE

2.1. The CAR/SAM RVSM airspace

2.1.1

RVSM will be applied in the airspace between FL 290 and FL 410, both inclusive, in the following Flight Information Regions (FIRs)/Upper Flight Information Regions (UIRs): *Comodoro Rivadavia, Córdoba, Ezeiza, Mendoza, Resistencia, Central America, La Paz, Belem, Brasilia, Curitiba, Porto Velho, Manaus, Antofagasta, Puerto Montt, Punta Arenas, Santiago, Easter Island, Barranquilla, Bogotá, Havana, Santo Domingo, Guayaquil, Rochambeau, Georgetown, Port au Prince, Kingston, Mexico, Mazatlán Oceanic, Curaçao, Panama, Asunción, Lima, Paramaribo, Piarco, Houston Oceanic, San Juan, Montevideo, Maiquetía.*

2.1.2

RVSM will be applicable in all, or part, of the airspace between FL 290 and FL 410, both inclusive, in the following FIRs/UIRs:

Note: indicate the respective FIRs of each State

☞ ***The following*** *FIRs/UIRs (States) fall within CAR/SAM RVSM airspace and, in addition, have transition areas:*

Note: indicate the respective boundaries of the transition areas of each State

2.1.2.1 RVSM (State) space characteristics

2.1.2.2. All the airspace within the lateral boundaries of the FIR/UIR of (State/FIRs/UIRs), between FL 290 and FL 410, both inclusive, is RVSM airspace. This means that the 1000-ft vertical separation minimum between aircraft is applicable in these airspaces.

MAP of the CAR/SAM Regions

List of all States/International Organisations that participate in the CAR/SAM RVSM Programme

Netherlands Antilles, Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Ecuador, United States, French Guyana, Guyana, Haiti, Jamaica, Mexico, Panama, Paraguay, Peru, Suriname, Dominican Republic, Trinidad and Tobago, Uruguay, Venezuela and COCESNA

2.2. The CAR/SAM RVSM transition airspace

No transition airspace will be implemented within the CAR/SAM Regions as a result of RVSM implementation in January 2005 (AP/ATM/5 RVSM-RNAV-RNP Meeting, conclusion 5/31).

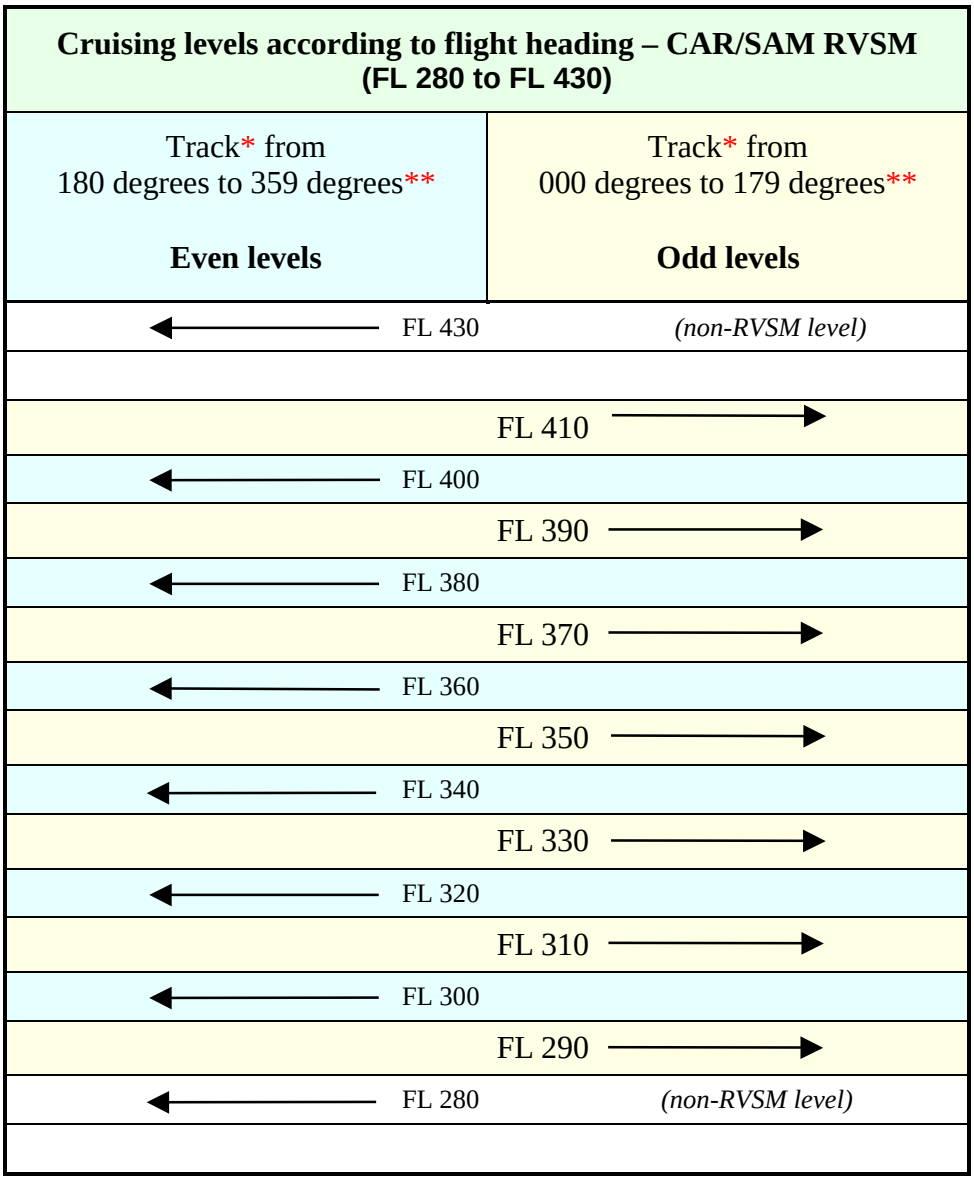
2.2.1 Transition tasks associated with the application of a 300 m (1000 ft) vertical separation minimum in the CAR/SAM RVSM airspace will be carried out in all, or part, of the following FIRs/UIRs:

2.3. The CAR/SAM-AFI interface

The barely RVSM traffic between the SAM and AFI Regions, in case that the AFI Region does not implement RVSM in the oceanic area adjacent to the SAM Region, as decided by SAT 11 Meeting, will be dealt with by means of Operational Letters of Agreement among the States involved.

2.4. ICAO cruising level table applicable to CAR/SAM airspace

2.4.1 With RVSM implementation in CAR/SAM RVSM airspace, cruising levels in the airspace of these regions will be organised in keeping with the cruising level tables contained in ICAO Annex 2, Appendix 3, paragraph a). With RVSM implementation, the appropriate cruising level in the CAR/SAM airspace, according to flight heading, is as follows:



* Magnetic track or, in polar areas in latitudes above 70° and within the extension of such areas that the relevant ATS authorities can dispense with, grid tracks, as determined by a network of lines that run parallel to the Greenwich meridian, overlapping a polar stereographic chart in which the direction to the North Pole is used as grid north.

** Except when, by virtue of regional air navigation agreements, areas from 090° to 269° and from 270° to 089° are to be used for prevailing traffic headings, and the appropriate transition procedures are specified.

2.4.2 Regarding the above, it should be noted that RVSM application has the effect of reversing the assignment of flight levels 310, 350 and 390, as compared to non-RVSM airspace.


FL 390
FL 370
FL 350
FL 330
FL 310
FL 390
FL 370
FL 350
FL 330
FL 310
ESPACIO RVSM
ESPACIO CVSM

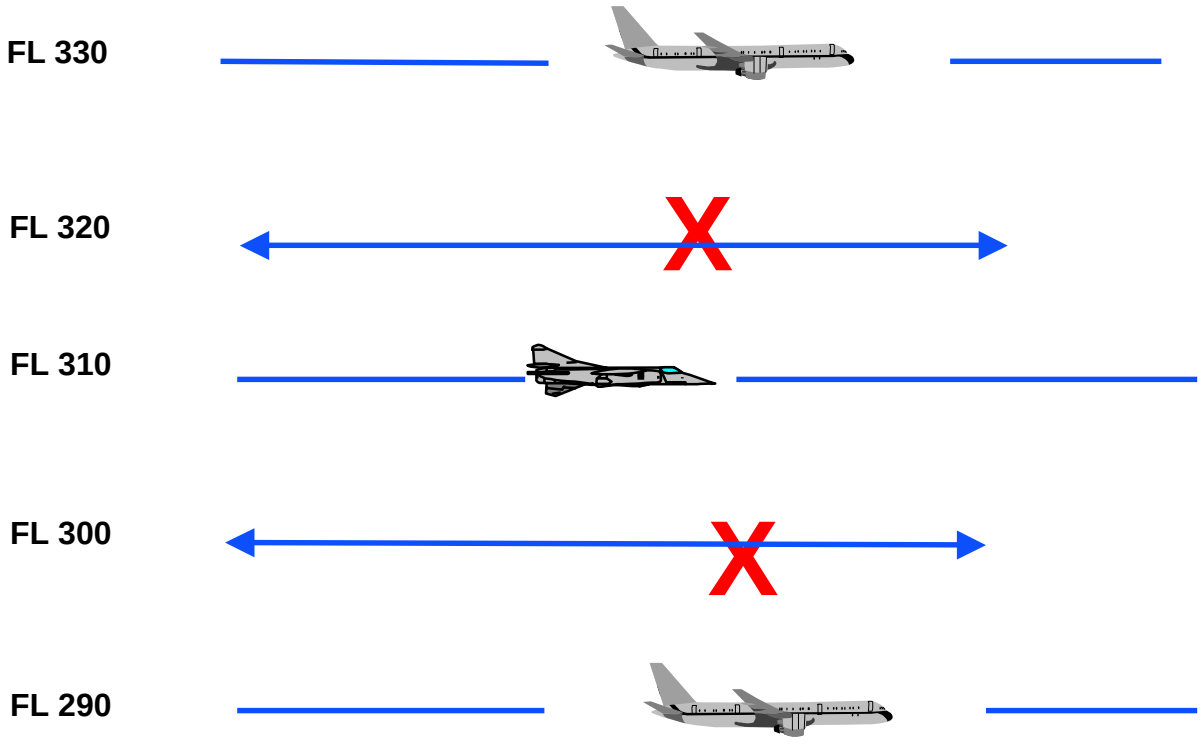
Section 3:

Provision of service to non-RVSM State aircraft and humanitarian, maintenance and ferry flights

3. PROVISION OF SERVICE TO NON-RVSM STATE AIRCRAFT AND HUMANITARIAN, MAINTENANCE AND FERRY FLIGHTS

3.1 Considering that it is physically impossible (due to aircraft design limitations) to adapt most military tactical aircraft to RVSM MASPS, it was decided that **State aircraft and humanitarian, maintenance and ferry flights should be exempt** from the obligation of meeting RVSM approval requirements in order to operate in CAR/SAM RVSM airspace.

3.2 State aircraft and humanitarian, maintenance and ferry flights in the CAR/SAM RVSM airspace will be provided a 600-m (2000-ft) Vertical Separation Minimum with respect to any other IFR aircraft. Although the number of non-RVSM State aircraft and humanitarian, maintenance and ferry flights is expected to be very low in the CAR/SAM RVSM airspace, the impact of handling such flights on controller workload should not be underestimated.



3.3 The requirement for the ATC to accommodate non-RVSM State aircraft and humanitarian, maintenance and ferry flights in CAR/SAM RVSM airspace imposes major operational considerations since two different vertical separation minima (VSM) will have be to selectively applied within the same volume of airspace, specifically:

300 m (1000 feet): between two aircraft, when both are RVSM-approved, and

600 m (2000 feet): between two aircraft, when:

- one of the aircraft involved is not RVSM-approved, or
- none of the two aircraft involved are RVSM-approved

3.4 Therefore, from the operational point of view, it is extremely important for controllers to be constantly aware of the RVSM approval status of all aircraft operating in or near the CAR/SAM RVSM airspace within the ACC/UAC area of responsibility. In order to meet this objective, ATC procedures have been developed and requirements have been defined for operating systems in CAR/SAM RVSM airspace.

3.5 Humanitarian, maintenance and ferry flights

3.5.1 In addition to State aircraft, those aircraft conducting humanitarian, ferry and maintenance flights in the CAR/SAM Regions will be able to operate in RVSM airspace after co-ordinations are made. This prior coordination will consist of the submission of a flight plan to the appropriate ATC unit, with the words **"STS/NON RVSM" (State, Humanitarian, Ferry, Maintenance).**

3.5.1 For practical purposes of this Guidance Manual, all procedures described in this Guidance Manual for non-RVSM State aircraft will also be applicable to non-RVSM humanitarian, ferry and maintenance flights.

3.5.2 RVSM-approved aircraft will have operational preference over non-RVSM aircraft for level allocation. The vertical separation minimum between non-RVSM aircraft operating in the RVSM stratum and the rest of aircraft is 2000 feet.

3.5.3 The ATC may authorise non-RVSM aircraft to climb or descend ***through*** RVSM airspace, as long as they do not climb or descend at a speed lower than standard speed, or level while crossing the RVSM stratum.

Section 4:

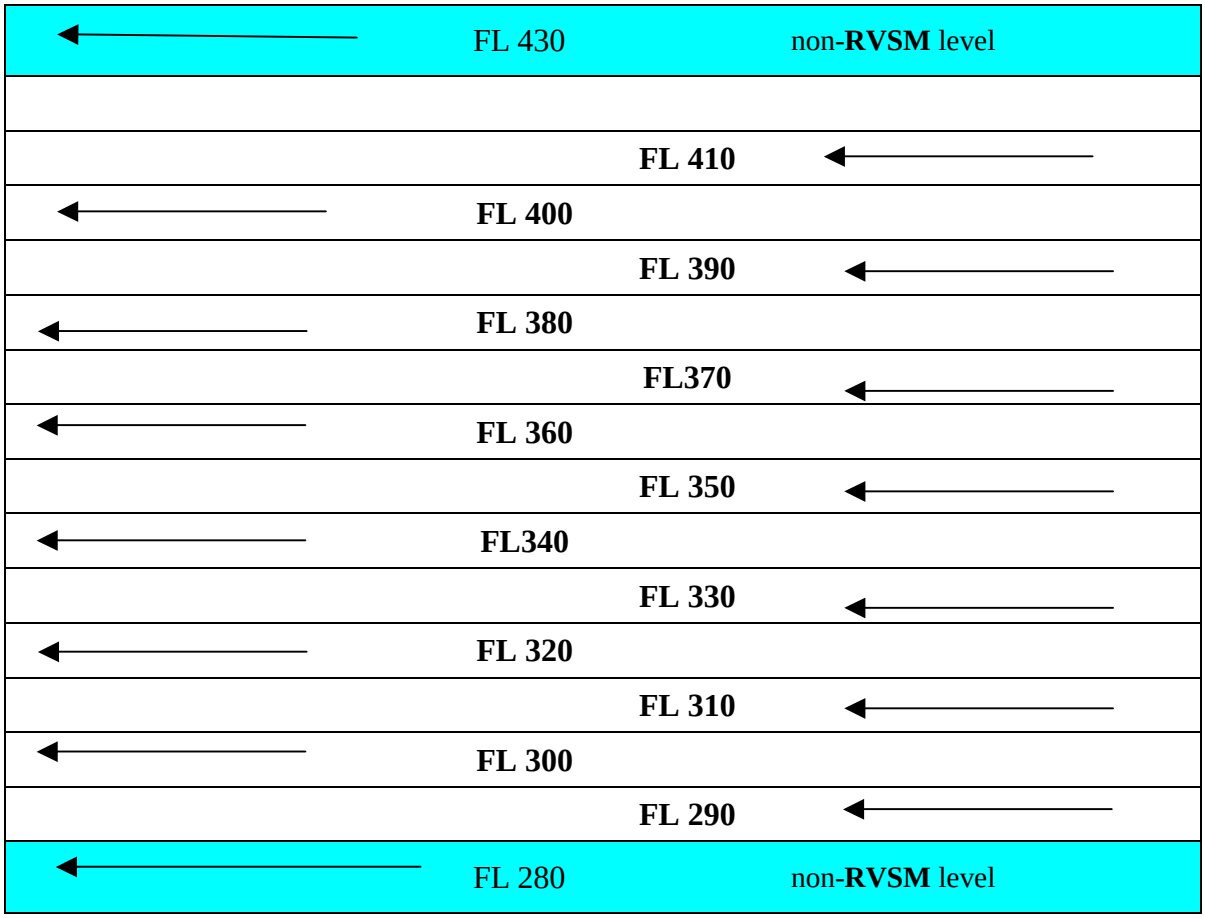
FLIGHT OPERATIONS IN CAR/SAM RVSM AIRSPACE

4. FLIGHT OPERATIONS IN CAR/SAM RVSM AIRSPACE

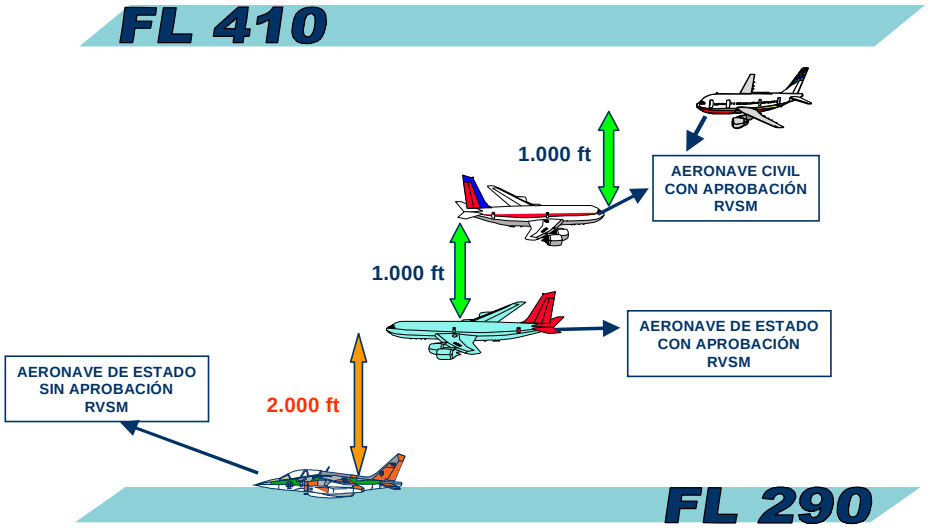
4.1 Only RVSM-approved aircraft and non-RVSM State aircraft will be allowed to operate in CAR/SAM RVSM airspace, except in those designated airspaces where RVSM transition tasks are carried out.

4.2 Within or above CAR/SAM RVSM airspace, all flights will be conducted following instrument flight rules (IFR). *References: ICAO Annex 2, Chapter 4, paragraph 4.5*

4.3 The organisation of cruising levels in CAR/SAM RVSM airspace, as described in paragraph 2.4.1, does not prevent the establishment, where necessary, of one-way ATS routes.



4.3.1 It should also be pointed out that all cruising levels in CAR/SAM RVSM airspace are assigned by the ATC, for both RVSM and non-RVSM aircraft, as long as the applicable vertical separation minimum is provided.



Type of vertical separation minimum to be applied by the ATC, depending on RVSM approval status

Section 5:

RVSM PROCEDURES

5.0 RVSM PROCEDURES

5.1 Requirements to fill out the Flight Plan

Figure 3: Summary of RVSM Requirements for Operator Flight Plans

General requirements

AIRCRAFT TYPE AND RVSM APPROVAL STATUS	REQUIREMENTS TO COMPLETE FLIGHT PLAN FORM
State aircraft WITH RSVM approval	• **Insert letter "M" in box nº 8 of the ICAO form** • **Insert letter "W" in box nº 10 of the ICAO form** • **Insert entry and exit fixes of CAR/SAM RVSM airspace as well as the required RFL for each of the subsequent parts of its route in box nº 15 of the ICAO form** • **In the case of RPLs, insert "EQPT/ W" in box Q.**
State aircraft WITHOUT RSVM approval	• **Insert letter "M" in box nº 8 of the ICAO form** • **Insert entry and exit fixes of CAR/SAM RVSM airspace as well as the required RFL for each of the subsequent parts of its route in box nº 15 of the ICAO form** • **Insert "STS/NON RVSM" in box nº 18 of the ICAO form** • **In the case of RPLs, insert "EQPT/ W" in box Q.**
State aircraft flying in formation	• **Insert letter "M" in box nº 8 of the ICAO form** • **Insert entry and exit fixes of CAR/SAM RVSM airspace as well as the required RFL for each part of its route in box nº 15 of the ICAO form** • **Insert "STS/NON RVSM" in box nº 18 of the ICAO form** • **In the case of RPLs, insert "EQPT/ W" in box Q.**
Civilian aircraft WITH RSVM approval	• **Insert letter "W" in box nº 10 of the ICAO form** • **Insert entry and exit fixes of CAR/SAM RVSM airspace as well as the required RFL for each of the subsequent parts of its route in box nº 15 of the ICAO form** • **In the case of RPLs, insert "EQPT/ W" in box Q.**

Civilian aircraft WITHOUT RSVM approval	• **Insert entry and exit fixes of CAR/SAM RVSM airspace as well as the required RFL above FL 410 or below FL 290 in the subsequent part of its route in box nº 15 of the ICAO form** • **In the case of RPLs, insert "EQPT/ W" in box Q.**

5.1.1 As in military operations, customs or police aircraft operators must insert the letter "M" in box 8 of the ICAO flight plan.

5.1.1.1 Aircraft used in military, customs or police services, are considered as State aircraft and, hence, are authorised to operate in CAR/SAM RVSM airspace, independently of the RVSM approval status of the aircraft.

5.1.1.2 The integrated system for initial flight plan processing must distribute the data collected in box 8 of the flight plan to the flight data processing systems (FDPS) involved, for purposes of providing the ATC with the necessary clear indication that, when such non-RVSM flights are "State aircraft", they are allowed to operate within CAR/SAM RVSM airspace.

5.1.2 All operators filing repetitive flight plans (RPLs) must include in box Q of the RPL all the information on aircraft equipment and capacity, in keeping with box n° 10 of the ICAO flight plan.

5.1.2.1 All the aircraft equipment and capacity data (for example, letter W for RVSM approval) collected in box 10 of the ICAO flight plan must be included in box Q of the RPL.. The ATC must have this information available for each flight every day it is in operation.

5.1.2.2 Flight plans containing the corresponding RVSM approval status shall be generated and distributed for every flight and day of operation, in keeping with the information stored in the RPL..

5.1.3 Should there be a change of aircraft for a flight to be carried out in keeping with an RPL, which involves a change in the RVSM approval status reflected in box Q of said RPL, the operator must send a change message (CHG).

RVSM-approved aircraft and non-RVSM State aircraft

5.1.4 RVSM-approved aircraft operators shall indicate the status of approval by inserting the letter **"W"** in box 10 of the ICAO flight plan and in box "Q" of the RPL, independently of the flight level required.

5.1.4.1 The letter "W" is required in box 10 to indicate the RVSM approval status.

5.1.4.2 Operators are requested to indicate their RVSM approval status without taking the RFL into account, since the ATC must have a clear indication of the status of the non-RVSM aircraft intending to operate within, or vertically very close to, CAR/SAM RVSM airspace. Should that indication be lacking, the controller must request that information.

5.1.5 Operators of non-RVSM State aircraft with a FL 290 or higher required flight level must insert "STS/NON RVSM" in box 18 of the ICAO flight plan.

5.1.5.1 **"STS/NON RVSM"** indicates the request for "special treatment" by ATS services, particularly the request for the ATC to provide a vertical separation minimum of 600m (2000ft) between non-RVSM State aircraft and any other aircraft operating within CAR/SAM RVSM airspace.

5.1.5.2 Non-RVSM State aircraft requesting a flight level above FL410 in its flight plan must also insert **"STS/NON RVSM"** in box 18 of the ICAO flight plan, since the ATC must apply this special treatment (600m [2000ft] vertical separation minimum) to that part of the flight which corresponds to traffic climbing/descending through CAR/SAM RVSM airspace.

5.1.6 Operators of State aircraft in formation flight shall **NOT** insert the letter **"W"** in box nº 10 of the ICAO flight plan, independently of the RSVM approval status of the aircraft making up the formation. Operators of State aircraft in formation flights intending to operate within CAR/SAM RVSM airspace must include the term **"STS/NON RVSM"** in box nº 18 of the ICAO flight plan.

5.1.6.1 Operations of State aircraft in formation flights within CAR/SAM RVSM airspace shall be allowed and shall be considered as non-RVSM flights, independently of the RVSM approval status of each of the affected aircraft. They shall therefore require a special treatment on the part of the ATC and must be provided a vertical separation minimum of 600m (2000ft) with respect to any other aircraft operating within CAR/SAM RVSM airspace.

5.1.7 Operators of RVSM-approved aircraft and of non-RVSM State aircraft intending to operate within CAR/SAM RVSM airspace must include the following in box nº 15 of the ICAO flight plan:

- The **entry fix** at the CAR/SAM RVSM airspace lateral boundaries, as well as the flight level required for that part of the route which starts immediately after the RVSM entry fix; and
- The **exit fix** at the CAR/SAM RVSM airspace lateral boundaries, as well as the flight level required for that part of the route which starts immediately after the RVSM exit fix.

5.1.7.1 Due to differences between the cruising levels applicable within CAR/SAM RVSM airspace and those applicable within the adjacent NON-RVSM airspaces, the ATC will need precise information regarding the flight level required for that part of the route immediately subsequent to the RVSM entry and exit fixes.

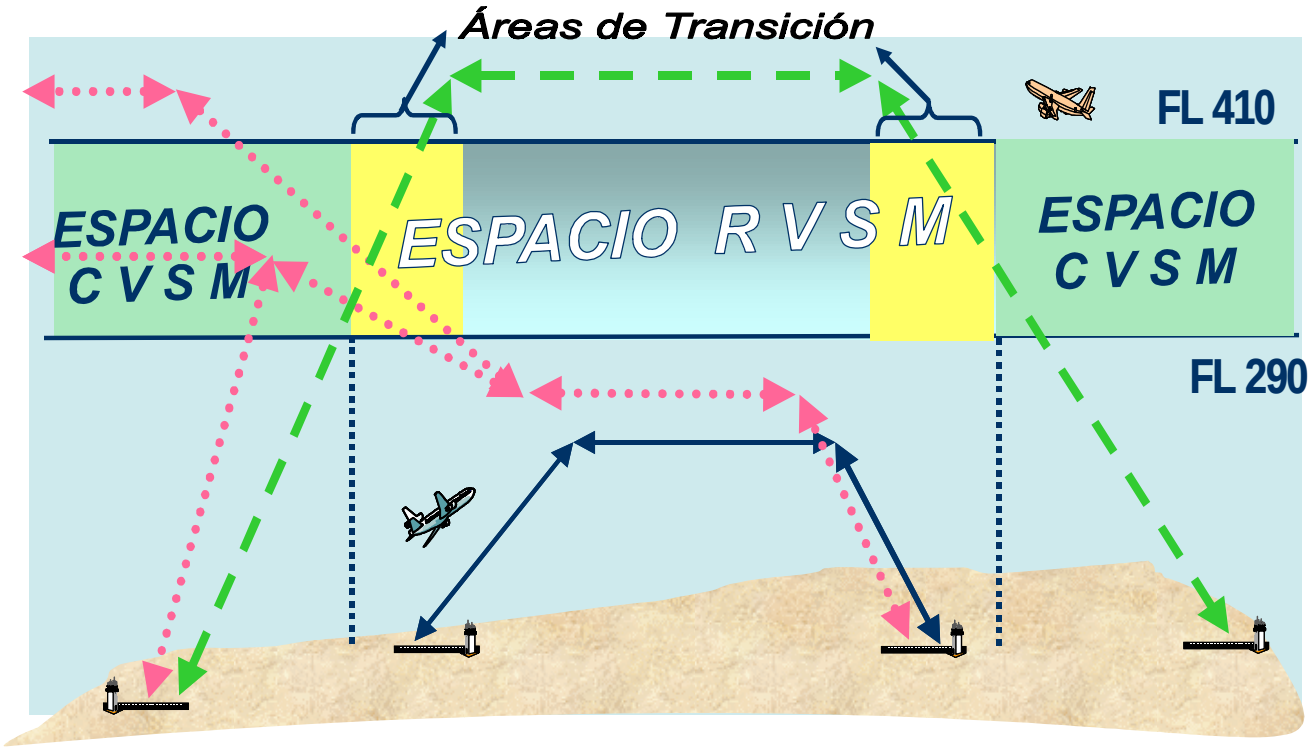
5.1.7.2 Consequently, RSVM entry and exit fixes shall be established over or in the surroundings of CAR/SAM RVSM airspace for all ATS routes which, whenever necessary, cross the lateral boundaries of CAR/SAM RVSM airspace.

5.1.7.3 Furthermore, the CAR/SAM RVSM entry and exit fixes shall be established as mandatory fixes for purposes of facilitating the application of ICAO procedures in case of failure of air-ground

purposes of facilitating the application of ICAO procedures in case of failure of air-ground communications. Communications failure procedures are described in Section 7.0

Non-RVSM *civilian aircraft*

5.1.8 Operators of non-RVSM civilian aircraft shall plan their flight plan to operate outside CAR/SAM RVSM airspace, except for operations within the airspace designated for transition tasks.



Assignment of flight levels for NON-RVSM CIVILIAN aircraft within CAR/SAM RVSM airspace

5.1.8.1 Operators of non-RVSM civilian aircraft intending to operate from a **departure aerodrome located outside** the lateral boundaries of CAR/SAM RVSM airspace **to a destination aerodrome located within** the lateral boundaries of CAR/SAM RVSM airspace, must include the following in box nº 15 of the ICAO flight plan:

a) The entry fix within the lateral boundaries of CAR/SAM RVSM airspace; and

b) A required flight level (RFL) below FL290 for that part of the route immediately beyond the entry fix.

5.1.8.2 Operators of non-RVSM civilian aircraft intending to operate from a departure aerodrome to a destination aerodrome both located within the lateral boundaries of CAR/SAM RVSM airspace

must include, within box nº 15 of the ICAO flight plan, a required flight level (RFL) below FL290.

5.1.8.3 Non-RVSM civilian aircraft operators intending to operate from a departure aerodrome located within the lateral boundaries of CAR/SAM RVSM airspace to a destination aerodrome located outside the lateral boundaries of CAR/SAM RVSM airspace, must include the following in box nº 15 of the ICAO flight plan:

a) A required flight level below FL 290 for that part of the route which is within the lateral boundaries of CAR/SAM RVSM airspace; and

b) The exit fix at the lateral boundaries of CAR/SAM RVSM airspace, and the flight level required for that part of the route which starts immediately after said exit fix.

5.1.8.4 Non-RVSM civilian aircraft operators intending to operate from a departure aerodrome to a destination aerodrome both located outside the lateral boundaries of CAR/SAM RVSM airspace, must include the following in box nº 15 of the ICAO flight plan:

a) The entry fix at the lateral boundaries of CAR/SAM RVSM airspace, and the flight level required below FL 290 or above FL 410 for that part of the route which starts immediately after said entry fix; and

b) The exit fix at the lateral boundaries of CAR/SAM RVSM airspace, and the flight level required for that part of the route which starts immediately after said exit fix.

5.2 ATC clearance

5.2.1 **Control clearance to enter RVSM airspace shall only be granted to RVSM-approved aircraft and non-RVSM State Aircraft,** except for operations being carried out within CAR/SAM RVSM transition airspace, and within airspace designated for the AFI/SAM interface.

5.2.1.1 Except for airspace designated for implementing transition tasks, operations within CAR/SAM RVSM airspace are restricted to RVSM-approved aircraft and to non-RVSM State aircraft. Flight plan requirements related to the RVSM shall make it possible to present to the controller the flight plan information related to the RVSM, thus enabling the controller to be aware of the non-approval status of aircraft at all times.

5.2.1.2 When having reasons to hold doubts regarding the RVSM approval status of an aircraft, the controller shall request such information from the pilot of the aircraft. If the pilot confirms "*Affirm RVSM*", the controller shall consider that the aircraft is RVSM-approved.

5.2.2 Formation flights of civilian aircraft shall **NOT** be cleared by air traffic control to enter CAR/SAM RVSM airspace.

5.2.2.1 Item 3.1.8, chapter 3, of ICAO Annex 2 stipulates that aircraft participating in formation flights may operate within a 30 m (100 feet) range above or below the leader aircraft. Hence, formation flights may exceed the total vertical error (TVE) allowed within CAR/SAM RVSM airspace.

5.2.3 The ATC shall assign flight levels for non-RVSM civilian aircraft in keeping with the following table:

	*ADES **inside** the lateral boundaries of CAR/SAM RVSM space*	*ADES **outside** the lateral boundaries of CAR/SAM RVSM space*
*ADEP **inside** the lateral boundaries of CAR/SAM RVSM space*	ATC shall assign FL **below** the CAR/SAM RVSM space	ATC shall assign FL **below** the CAR/SAM RVSM space
*ADEP **outside** the lateral boundaries of CAR/SAM RVSM space*	ATC shall assign FL **below** the CAR/SAM RVSM space	ATC shall assign FL **below** the CAR/SAM RVSM space

Note: **ADES** = destination aerodrome **ADEP** = departure aerodrome

5.2.3.1 Non-RVSM civilian aircraft operating from a departure aerodrome to a destination aerodrome, both located outside the lateral boundaries of CAR/SAM RVSM airspace, may be cleared at a flight level above CAR/SAM RVSM airspace, for example at FL 430.

5.3 Vertical Separation Minima

5.3.1 The vertical separation minimum applicable between RVSM-approved aircraft operating within CAR/SAM RVSM airspace is 300 m (1000 feet).

5.3.1.1 Within CAR/SAM RVSM airspace, the 300 m (1000 feet) vertical separation minimum is only applicable when both aircraft are RVSM-approved.

5.3.2 The vertical separation minimum applicable between a non-RVSM State Aircraft and any other aircraft operating inside CAR/SAM RVSM airspace is 600 m (2000 feet).

5.3.3 *Inside the airspace designated for implementation of transition tasks, the applicable vertical separation minimum shall be:*

a) 300 m (1000 feet) between RVSM-approved aircraft; and

b) 600 m (2000 feet) between a non-RVSM aircraft (whether civilian or State) and any other aircraft.

5.3.4 The vertical separation minimum applicable within CAR/SAM RVSM airspace between a State aircraft formation flight and any other aircraft is 600 m (2000 feet).

5.3.4.1 For the reason given in item 5.2.2.1, State aircraft formation flights are considered as non-RVSM flights, independently of the RVSM approval status of the aircraft making up the formation. State aircraft formation flights will be allowed within CAR/SAM RVSM airspace applying a vertical separation minimum of 600 m (2000 feet), as described in item 5.3.4.

5.3.5 The vertical separation minimum applicable between an aircraft with in-flight communications failure and any other aircraft, when both aircraft operate within CAR/SAM RVSM airspace, shall be 600 m (2000 feet), except if there is appropriate horizontal separation.

5.3.5.1 Since it is impossible for the ATC to determine the extent of the equipment failure of an aircraft suffering an in-flight communications failure, the ATC shall provide it with a 600 m (2000 ft) vertical separation minimum, as described in item 5.3.5, except if an appropriate horizontal separation already exists.

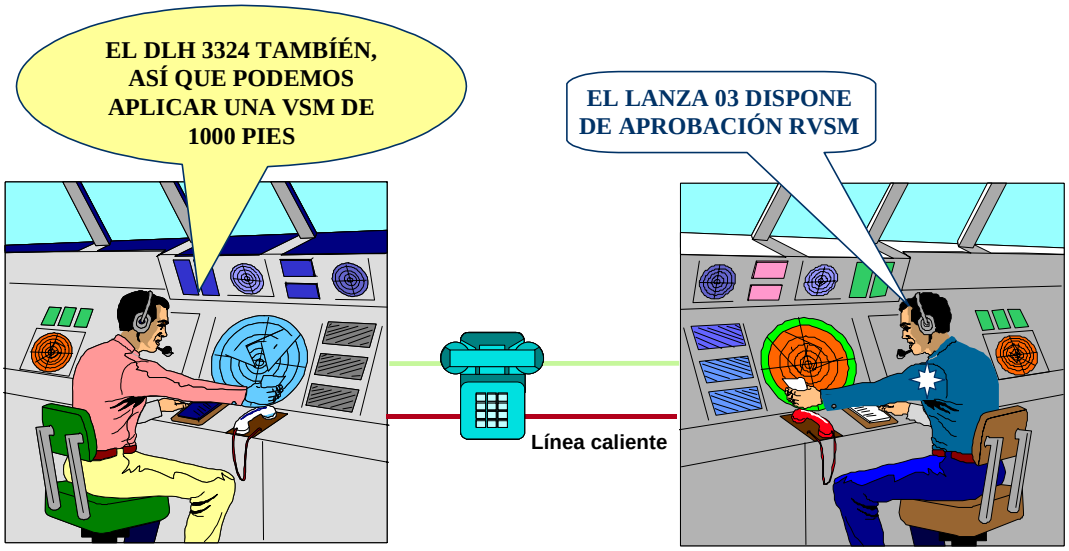
5.4 State aircraft operating in CAR/SAM RVSM airspace

5.4.1 Most State aircraft will not comply with the RVSM MASPS. Consequently, as a general rule and unless specification to the contrary, State aircraft shall be considered as non-RVSM aircraft.

5.4.1.1 Due to physical design limitations, it is not possible to adapt most military tactical aircraft to comply with the RVSM MASPS.

5.4.2 The vertical separation minimum applicable between State aircraft and any other aircraft, when both aircraft are operating within CAR/SAM RVSM airspace, shall be 600 m (2000 feet).

5.4.3 However, in an airspace environment in which both ATC units, civilian and military, are fully aware of the RVSM approval status of all traffic involved, a reduced vertical separation of 300 m (1.000 feet) may be applied between an RVSM-approved State aircraft and an RVSM-approved civilian aircraft.



Note: Remember that any tactical co-ordination with the military ATC must be carried out through some means which generates an automatic record, that is, direct access telephone lines.

5.4.3.1 The previous item allows for the application of a reduced vertical separation minimum of 300 m (1.000 feet) when using advanced civil-military co-ordination systems which constantly display to their respective controllers the approval status of **all** the aircraft involved, or when verbal co-ordination is carried out, including information on the RVSM approval status of each aircraft.

5.5 Transition of aircraft flying from/intoCAR/SAM RVSM airspace

5.5.1 The ACCs/UACs whose areas of responsibility include airspace in which transition tasks are carried out, must guarantee that:

a) Both RVSM-approved as well as non-RVSM aircraft entering CAR/SAM RVSM airspace from adjacent NON-RVSM airspaces are allowed to enter CAR/SAM RVSM Transition Airspace;

b) The corresponding vertical separation minimum is applied, in keeping with the RVSM approval status of the aircraft involved;

c) Aircraft are established at the cruising levels appropriate for CAR/SAM RVSM airspace or for the adjacent NON-RVSM space, as the case may be, and that the appropriate vertical separation minimum is established before the aircraft crosses the control transfer point with the adjacent ACC/UAC; and

d) Non-RVSM civilian aircraft operating from a NON-RVSM environment adjacent to CAR/SAM RVSM airspace are established at the cruising levels outside the vertical dimensions of CAR/SAM RVSM airspace before the aircraft crosses the control transfer point with the adjacent ACC/UAC.

Cruising levels appropriate to the track

5.5.2 The cruising levels appropriate to the track for RVSM and NON-RSVM environments are described in ICAO Annex 2, Appendix 3.

5.5.2.1 The organisation of the cruising levels appropriate to the track when NON-RVSM airspace is located adjacent to, and to the East of, RVSM airspace, is shown in figure 4. Figure 5 shows the scenario in which the NON-RSVM airspace is adjacent to, and to the West of, CAR/SAM RVSM airspace.

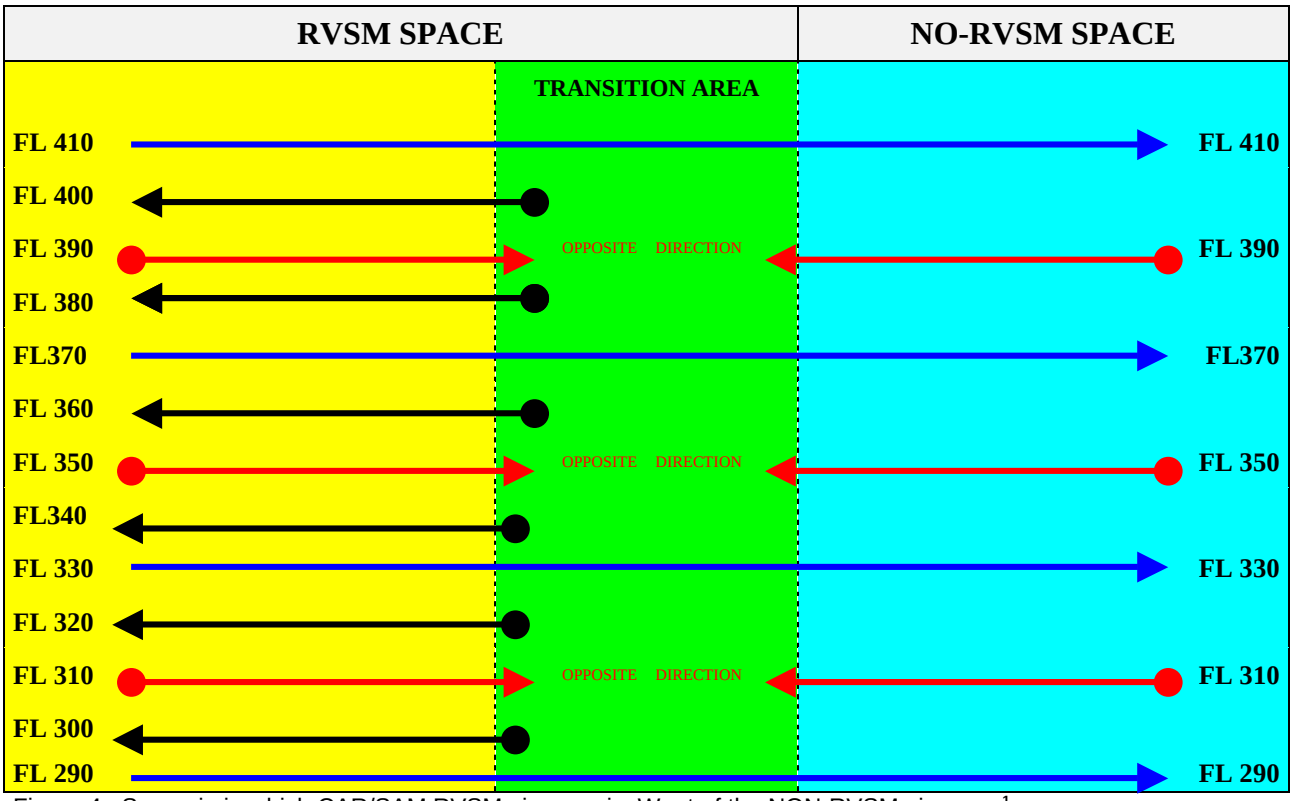


Figure 4: Scenario in which CAR/SAM RVSM airspace is West of the NON-RVSM airspace [1]

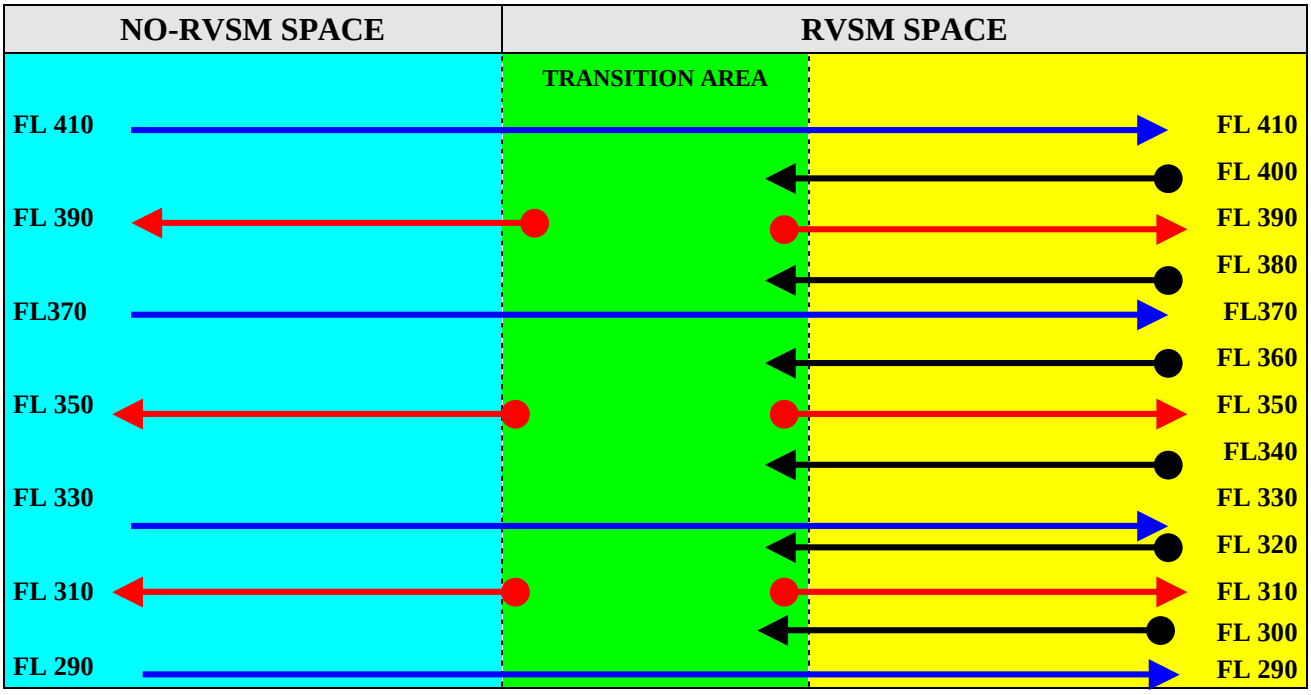


Figure 5: Scenario in which CAR/SAM RVSM airspace is East of the NON-RVSM airspace [2]

[4] or to the North when prevailing air traffic flow makes it advisable, as regards flight heading, to use flight levels with a North/South orientation.

[5] or to the South when prevailing air traffic flow makes it advisable, as regards flight heading, to use flight levels with a North/South orientation.

5.5.2.2 It is important to note "the use in the opposite direction" of cruising levels 310, 350 and 390, as shown in figure 4. The air traffic management options for the transition of aircraft operating from CAR/SAM RVSM airspace to the adjacent NON-RVSM airspace and *vice-versa*, in the case in which the NON-RVSM airspace is located East of the CAR/SAM RVSM airspace, are described in Section 9.

RVSM-approved aircraft and non-RVSM State aircraft

5.5.3 RVSM-approved aircraft and non-RVSM State aircraft heading to CAR/SAM RVSM airspace from a NON-RVSM environment must be established at a flight level in keeping with:

a) the ICAO Cruising Level tables, as they appear published in Appendix 3 a) of ICAO Annex 2; and/or

b) the flight level assignment schedule (FLAS), if applicable; and/or

c) the Letter of Agreement between units.

5.5.4 Any change from NON-RVSM cruising levels to RVSM cruising levels shall be initiated by the first ACC/UAC which provides air traffic control services to the affected aircraft within CAR/SAM RVSM airspace, and shall be completed before the aircraft crosses the control transfer point to the adjacent ACC/UAC, except if something different is indicated in the Letter of Agreement between units.

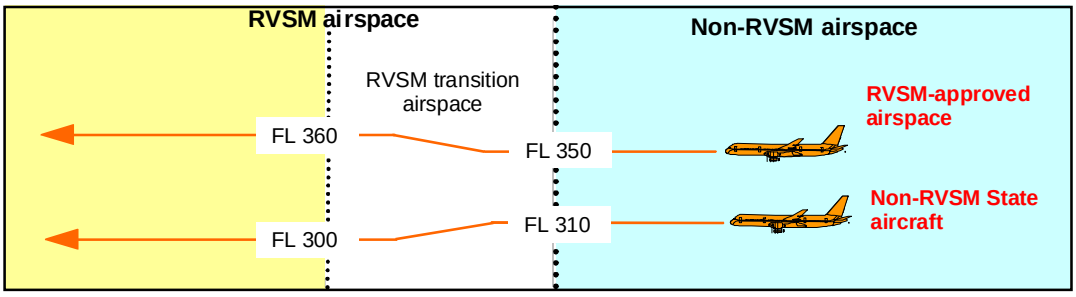


Figure 6: Transition of RVSM-approved aircraft and non-RVSM State aircraft from non-RVSM airspace to CAR/SAM RVSM airspace, where the non-RVSM airspace is found East/South of CAR/SAM RVSM airspace.

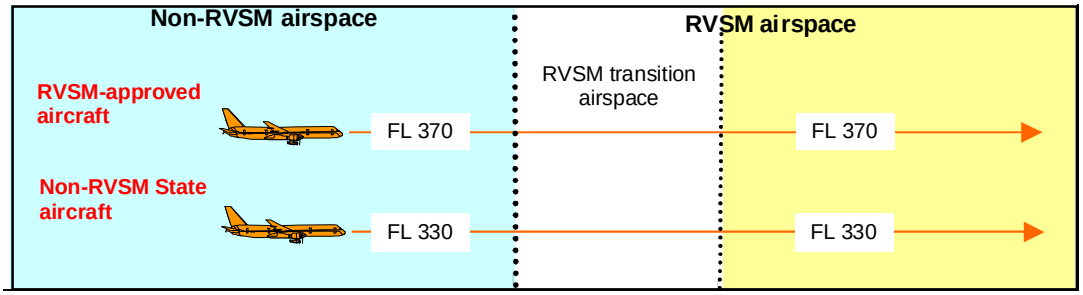


Figure 7: Example of transition of RVSM-approved aircraft and non-RVSM State aircraft from non-RVSM airspace to CAR/SAM RVSM airspace, where the non-RVSM airspace is found West/North of CAR/SAM RVSM airspace.

5.5.5 **The last ACC/UAC charged with providing the air traffic control service within CAR/SAM RVSM airspace shall be responsible for ensuring that the RVSM-approved aircraft and non-RVSM State aircraft entering a NON-RVSM environment from RVSM airspace, are established with the appropriate applicable vertical separation minimum.**

Said aircraft shall be established at a flight level in accordance with:

a) the ICAO Cruising Level tables, as they appear published in Appendix 3 b) of ICAO Annex 2; and/or

b) the flight level assignment schedule (FLAS), if applicable; and/or

c) the Letter of Agreement between units.

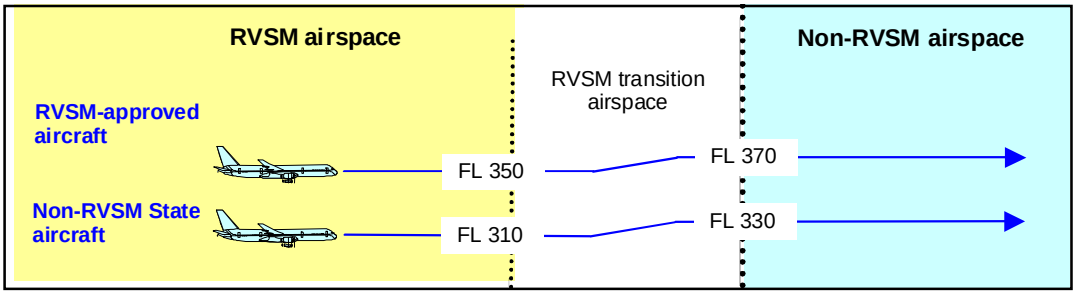


Figure 8: Transition of RVSm-approved aircraft and non-RVSM State aircraft from CAR/SAM RVSM airspace to non-RVSM airspace, where the no-RVSM airspace is found East/South of CAR/SAM RVSM airspace.

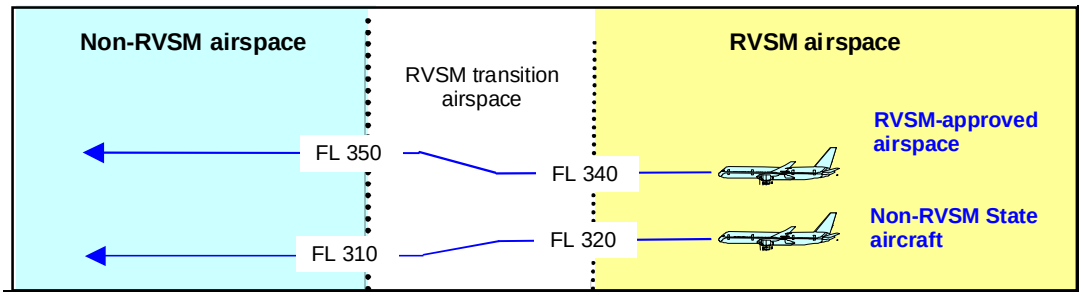


Figura 9: Transition of RVSM-approved aircraft and non-RVSM State aircraft from CAR/SAM RVSM airspace to non-RVSM airspace, where the non-RVSM airspace is found West/North of CAR/SAM RVSM airspace.

Non-RVSM civilian aircraft

5.5.6 Non-RVSM civilian aircraft operating from a departure aerodrome to a destination aerodrome, both located outside the lateral boundaries of CAR/SAM RVSM airspace, with part of the route located inside the lateral boundaries of CAR/SAM RVSM airspace:

a) shall be cleared at a flight level below FL 290 or above FL 410 by the first ACC/UAC charged with providing air traffic control services within CAR/SAM RVSM airspace, and such changes in level shall be completed before the aircraft crosses the control transfer point with the adjacent ACC/UAC, in keeping with the flight level assignment schedule (FLAS), if applicable, and/or as specified in the Letter of Agreement between units, and

b) may be subsequently cleared at a flight level located within CAR/SAM RVSM airspace by the last ACC/UAC charged with providing air traffic control services within CAR/SAM RVSM airspace, and said changes of level shall be completed before the aircraft crosses the control transfer point with the adjacent ACC/UAC.

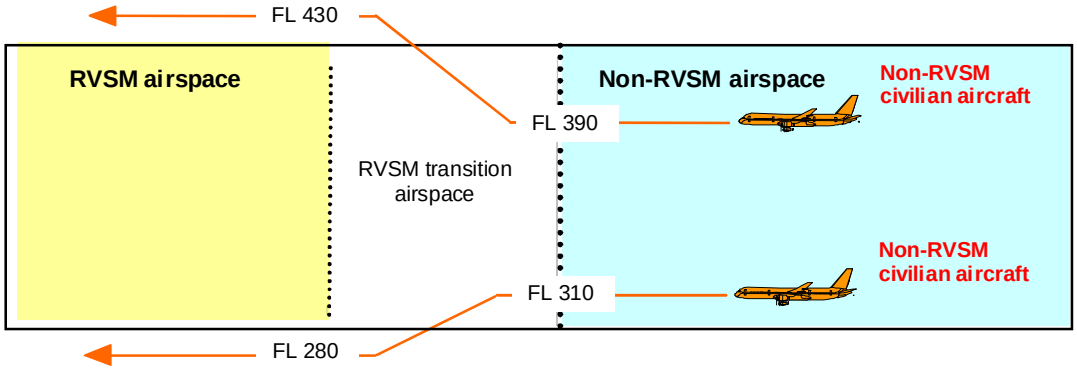


Figura 10: Transition of non-RVSM civilian aircraft from a non-RVSM airspace to CAR/SAM RVSM airspace, with origin and destination aerodromes outside the lateral boundaries of CAR/SAM RVSM airspace.

5.5.7 Non-RVSM civilian aircraft operating from a departure aerodrome located outside the lateral boundaries of CAR/SAM RVSM airspace to a destination aerodrome located inside the lateral boundaries of CAR/SAM RVSM airspace:

a) shall be cleared at a flight level below FL 290; and

b) any change in level shall be initiated by the first ACC/UAC in charge of providing air traffic control service inside the CAR/SAM RVSM airspace, and said changes in level shall be completed before the aircraft crosses the control transfer point with the adjacent ACC/UAC.

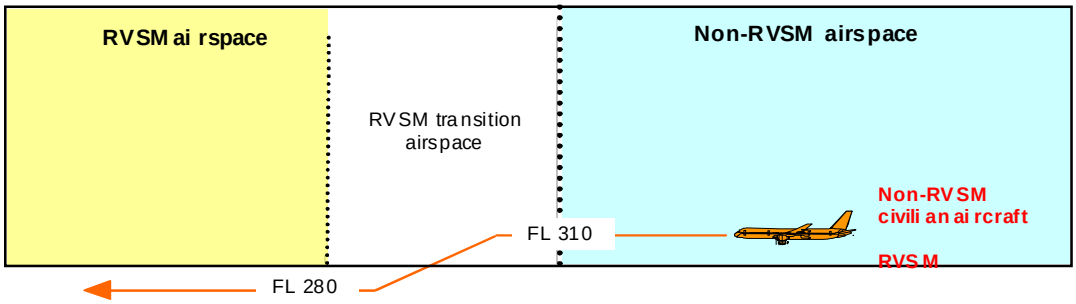


Figura 11: Transition of non-RVSM civilian aircraft from a non-RVSM airspace to CAR/SAM RVSM airspace, originating at an aerodrome outside the lateral boundaries of CAR/SAM RVSM airspace, and a destination aerodrome inside the lateral boundaries of CAR/SAM RVSM airspace.

5.5.8 Non-RVSM civilian aircraft operating from a departure aerodrome to a destination aerodrome, both located within the lateral boundaries of CAR/SAM RVSM airspace, shall be cleared at a flight level below FL 290.

5.5.9 Non-RVSM civilian aircraft operating from a departure aerodrome located inside the lateral bpundaries of CAR/SAM RVSM airspace to a destination aerodrome located outside the lateral boundaries of CAR/SAM RVSM airspace:

a) shall be cleared at a flight level below FL 290; and

b) may be cleared at FL 290, or higher, by the last ACC/UAC in charge of providing air traffic control services inside CAR/SAM RVSM airspace, and said changes in level shall be completed before the aircraft crosses the control transfer point with the adjacent ACC/UAC.

5.5.9.1 The ACCs/UACs charged with performing transition tasks may consider allowing non-RVSM civilian aircraft to operate inside CAR/SAM RVSM transition airspace so that said aircraft may reach the required FL 290, or higher, flight level before crossing the control transfer point with the adjacent NON-RVSM ACC/UAC.

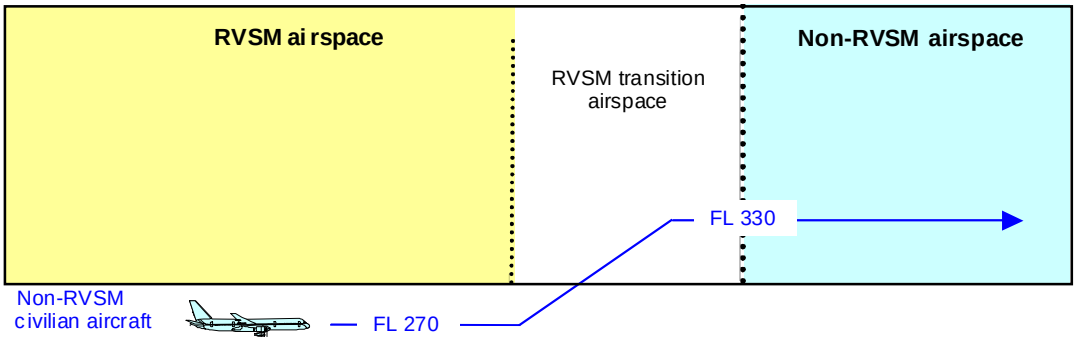


Figura 12: Transition of non-RVSM civilian aircraft from CAR/SAM RVSM airspace to non-RVSM airspace, originating at an aerodrome located within the lateral boundaries of CAR/SAM RVSM airspace, and a destination aerodrome located outside the lateral boundaries of CAR/SAM RVSM airspace.

CAR/SAM/AFI interface – Non-RVSM civilian aircraft

5.5.10 Will be accomplished through Operational Letters of Agreement.

5.6 In-flight contingency procedures

General

5.6.1 An in-flight contingency which affects a flight within CAR/SAM RVSM airspace has to do with unforeseen circumstances which directly affect one or more aircraft's capacity to operate in keeping with the vertical navigation performance requirements of CAR/SAM RVSM airspace.

5.6.1.1 The degradation of the aircraft's equipment or atmospheric turbulence conditions may annul the aircraft's capacity to meet the vertical navigation performance requirements of CAR/SAM RVSM airspace.

The RTF phraseology which the pilot must use to report the cause of an in-flight contingency to the ATC is shown in item 5.7.1.

5.6.2 As soon as possible, the pilot must report to the ATC any condition whereby the vertical navigation performance requirements of CAR/SAM RVSM airspace cannot be met. In these situations, the pilot must obtain a revised clearance from air traffic control before starting any deviation from the flight route and/or level, provided this is possible. If unable to obtain an ATC revised clearance before carrying out the deviation, the pilot must subsequently obtain a revised clearance as soon as possible.

5.6.3 The ATC shall render all assistance possible to the pilot suffering an in-flight contingency. Subsequent measures taken by air traffic control shall take into account the pilot's intention, the overall air traffic conditions and the dynamic evolution of the contingency.

5.6.4 In this Manual, the term "suspension of RVSM" refers to an interruption in the use of the 300 m (1000 ft) vertical separation minimum between RVSM-approved aircraft operating within CAR/SAM RVSM airspace.

5.6.4.1 In whatever period in which the RVSM has been suspended, a vertical separation minimum of 600 m (2000 feet) shall be applied among all aircraft operating within the CAR/SAM RVSM airspace portion in which the RVSM has been suspended, independently of the RVSM approval status of the affected aircraft.

5.6.4.2 Furthermore, during any RVSM suspension period, all "RVSM" cruising levels (290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400 and 410) shall remain as flight levels assignable by the ATC in keeping with:

a) the ICAO Cruising Level tables, such as they appear published in Appendix 3 a) of ICAO Annex 2; and/or

b) the flight level assignment schedule (FLAS), or the contingency flight level assignment schedule, if applicable; and/or

c) the Letter(s) of Agreement between units.

Degradation of aircraft equipment

5.6.5 The Minimum Equipment List (MEL) for operations within CAR/SAM RVSM airspace is as follows:

Two independent altimetry systems;

One secondary surveillance radar transponder, with an altitude reporting system which can be connected to the altimetry system used to maintain altitude;

One altitude alerting system;

One automatic altitude control system.

(Reference: JAA Temporary Guidance Leaflet (TGL) nº 6, 1st revision.)

5.6.5.1 In-flight failure of any of the components of the minimum equipment list for RVSM operations shown in the previous paragraph turns the aircraft into a non-RVSM aircraft. Pilots suffering such equipment failures while in flight must notify the ATC as soon as possible.

5.6.6 When the level displayed by an aircraft's Mode C differs from the CFL by 60 m (200 feet), or more, the controller must inform the pilot of this fact and will request the pilot to check the pressure setting and to confirm the aircraft level.

5.6.6.1 If after confirmation of the aircraft level, Mode C readings continues to differ from the CFL by 60 m (200 feet), or more, the ATC shall follow the ICAO procedures in force prescribed for in-flight failure of Mode C.

5.6.7 The allowable tolerance of 90 m (300 feet) for Mode C readings continues to be applicable within CAR/SAM RVSM airspace. This 60 m (200 ft) parameter refers only to SSR transponder operation. It does not refer to height-keeping precision required by the RVSM MASPS.

5.6.8 Once the pilot of an RVSM-approved aircraft operating within the CAR/SAM RVSM airspace has been advised that aircraft equipment no longer complies with the RVSM

MASPS, the controller shall consider the aircraft as non-RVSM.

5.6.8.1 The controller must act immediately to provide a vertical separation minimum of 600 m (2000 feet), or an appropriate horizontal separation minimum, with respect to any other aircraft operating in CAR/SAM RVSM airspace.

5.6.8.2 Non-RVSM aircraft must normally be cleared to abandon CAR/SAM RVSM airspace, when circumstances allow.

RVSM-approved *State aircraft* ***which suffer an equipment degradation*** *must also be cleared to abandon CAR/SAM RVSM space****.***

5.6.8.3 Pilots shall inform the ATC as soon as possible of any reestablishment of the equipment's proper operation that implies compliance with the RVSM MASPS.

As soon as the pilot of the aircraft which suffers a contingency advises the ATC that he/she is in a position to continue operations pursuant to the RVSM MASPS, either by a definite reestablishment of the equipment's operation or by the clearing of the weather phenomena, the ATC shall be in a position to:

1) again authorise the entry of said aircraft into RVSM airspace, if the aircraft had been so authorised while outside it, and
2) again apply to said aircraft a VSM of 1.000 feet within RVSM airspace.

In both cases, the ATC must update such information as well as the radar display data.

The pilot shall use the following phraseology to report that he/she is in a position to resume RVSM operations:

LISTO PARA REANUDAR RVSM / *READY TO RESUME RVSM*

The ATC shall use the following phraseology to request such information:

NOTIFIQUE LISTO PARA REANUDAR RVSM

REPORT ABLE TO RESUME RVSM

5.6.8.4 The first ACC to learn about the change in an aircraft's RVSM approval status must co-ordinate with the adjacent ACCs/UACs in the appropriate manner.

5.6.9 When a contingency related to the equipment causes an RVSM-approved aircraft which operates within CAR/SAM RVSM airspace to be considered as a non-RVSM aircraft, as indicated in item 5.6.8, the ATC, applying the locally established characteristics for the radar display of non-approved aircraft, must manually act upon the display of the associated radar label and/or radar symbol of the position of the affected aircraft in a manner which allows it to be clearly seen.

Note: See item 8.3 –Radar display systems

The ATC shall change the RVSM approval status of the affected aircraft and will make it known to the Head of Operations/Supervisor – as applicable.

This way, the radar display of the affected aircraft will show their current RVSM approval status and the system will transmit such updated information using the OLDI (if applicable).

Should the OLDI have transmitted a co-ordination message with respect to such aircraft prior to the change in the RVSM approval status, it will also automatically transmit a message regarding such change in status to the affected collateral sectors/units.

Both if OLDI is available for the exchange of estimate messages with collateral units as well as if such co-ordination is carried out through voice messages, in the case of a change in an aircraft's RVSM approval status, such estimate message must always be complemented by a voice message with the following phraseology:

RVSM IMPOSSIBLE DUE TO 1) EQUIPMENT, or

2) TURBULENCE

5.6.10 It is imperative that the ATC co-ordinate the specific information related to an RVSM-approved aircraft's inability to comply with the required vertical navigation CAR/SAM RVSM airspace, by using the corresponding associate co-ordination message, as shown below:

"RVSM IMPOSIBLE DEBIDO A EQUIPO" o **"RVSM IMPOSIBLE DEBIDO A TURBULENCIAS"**, *(el que sea aplicable)*

["UNABLE RVSM DUE EQUIPMENT" or "UNABLE RVSM DUE TURBULENCE"]

5.6.11 Once advised by the pilot of the definite reestablishment of the proper operation of the equipment required for operations within CAR/SAM RVSM airspace, the controller may consider clearing said aircraft into CAR/SAM RVSM airspace applying a vertical separation minimum of 300 m (1000 feet). In these situations, the ATC should manually eliminate from the radar display, the application of the locally established distinctive feature associated with non-RVSM aircraft and co-ordinate, as appropriate, with the adjacent ACCs/UACS.

Severe turbulence – Not forecast (one sole aircraft)

5.6.12 The pilot of an aircraft operating in CAR/SAM RVSM airspace shall report to the ATC whenever it meets severe turbulence due to meteorological conditions or wake vortex, which makes him/her think that the aircraft's capacity to maintain the cleared flight level might be affected. The ATC shall properly establish either an appropriate horizontal separation minimum or an increased vertical separation minimum of 600 m (2000 feet).

5.6.12.1 To the extent possible, the ATC must heed the pilot's request regarding changes in flight level and/or changes in route and provide whatever traffic information might be necessary.

5.6.12.2 The controller shall request reports from other aircraft to determine whether RVSM operations should be suspended either totally or within a band of levels and/or a given area.

5.6.12.3 To guarantee an orderly progression in the transfer of traffic, any ACC/UAC intending to suspend the RVSM must co-ordinate any suspension and the required adjustments to the sectors' capacity with the adjacent ACCs/UACs.

5.6.12.4 The specific actions which the ATC must implement shall be determined by the actual meteorological conditions and by the status of the traffic existing at every moment. It is expected that the ATC will make use of its best criteria to guarantee the separation between aircraft that find themselves under those circumstances.

5.6.13 The ATC must co-ordinate the circumstances in which an RVSM-approved aircraft is unable to maintain the cleared flight level due to severe turbulence by verbally complementing the estimate message with:

"RVSM IMPOSIBLE DEBIDO A TURBULENCIA" / *"UNABLE RVSM DUE TURBULENCE".*

5.6.14 The ATC must manually apply to these aircraft the differentiating feature of the radar label symbol and/or radar position symbol associated with non-RVSM aircraft, up to the time in which the pilot reports being in a condition to re-establish RVSM operations.

5.6.15 It is not necessary for the aircraft affected by severe turbulence to be cleared to abandon CAR/SAM RVSM airspace. Once the pilot has reported that the severe turbulence will affect the aircraft capability to maintain the cleared flight level, the ATC may establish an appropriate vertical separation minimum or an increased vertical separation minimum, if the traffic allows it.

Severe turbulence – Not forecast (several aircraft)

5.6.16 When a controller receives a pilot's report of the existence of some severe turbulence which has not been forecast and which could affect multiple aircraft in their capability of maintaining the cleared flight levels within CAR/SAM RVSM airspace, the controller must provide an increased vertical separation minimum or an appropriate horizontal separation minimum. Furthermore, the actions listed below, although not all-inclusive, should be taken into account:

- since every concrete situation will demand very specific and unequivocal actions, the controller must use his best criterion to guarantee the safety of the aircraft under his/her responsibility.
- the controller must supply all the information possible regarding traffic.
- the controller shall co-ordinate with the Head of Operations/Supervisor – as applicable – for purposes of deciding whether RVSM operations must be suspended totally or within some specific band of levels and/or given area.
- if it is deemed necessary to go back to a 600 m (2000 ft) vertical separation minimum, co-ordination with the adjacent ACCs/UACs must be implemented so as to guarantee an orderly transition to the use of a 600 m (2000 ft) vertical separation minimum in traffic transfers.
- the Heads of Operations/Supervisors – as applicable – may co-ordinate, to the extent they deem necessary, the request for deactivation of the airspace restrictions and/or reserves which may be necessary to supply additional airspace for radar vectoring which facilitates transition to a 600 m (2000 ft) vertical separation minimum.

- The Head of Operations/Supervisor - as applicable – must co-ordinate with his/her ACC's Flight Management Position (FMP) for purposes of adjusting the capacities applicable to the sector.

Severe turbulence – Forecast

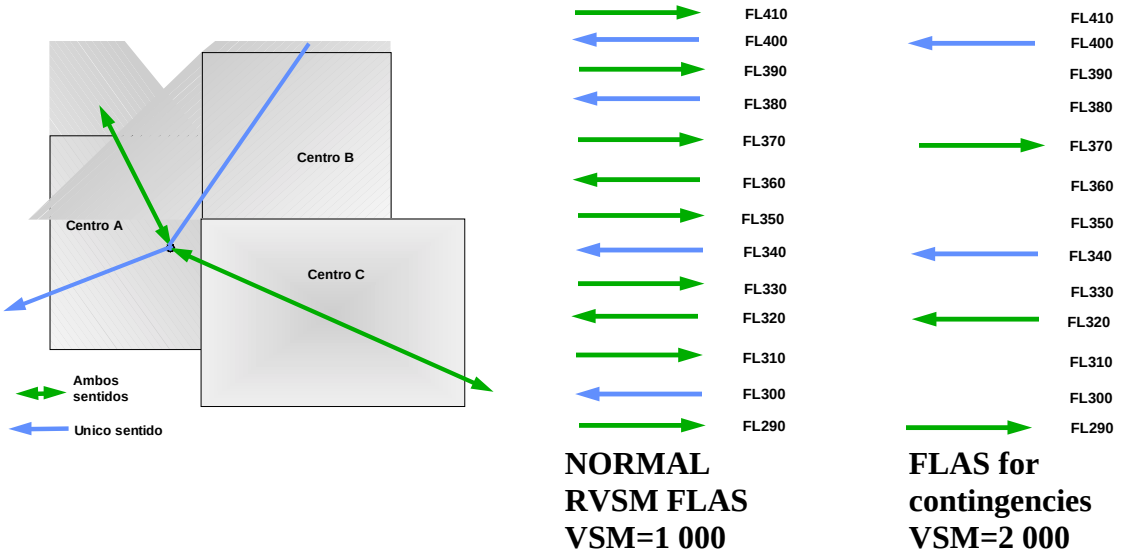
5.6.17 In the face of a weather forecast contemplating severe turbulence within CAR/SAM RVSM airspace, the ATC shall determine whether the RVSM must be suspended and, if so, the time period and the specific flight levels and/or area. There is no requirement to transfer the aircraft to "conventional" altitudes. If it is convenient in operational terms, the aircraft may use the RVSM levels, provided they keep a 2000 ft separation – for example, FL320 and FL340.

5.6.17.1 In those cases where the RVSM is suspended, the ACC/UAC responsible for the suspension of the RVSM must co-ordinate with the adjacent ACCs/UACs the flight

levels appropriate for the transfer of traffic, except if the Letter of Agreement between units has determined a contingency flight level assignment schedule. The ACC/UAC responsible for suspending the RVSM must co-ordinate the applicable sector capabilities with its Flow Management Position as well as with the adjacent ACCs/UACs in the manner that has been determined. Issuing a NOTAM must be considered if it is decided to suspend the RVSM. After determining the affected area and, if possible, the projected time for the resumption of the RVSM, a NOTAM/AIC with the appropriate information must be prepared for immediate distribution. Determination of the "affected area" is a judgement decision based on the pilot's reports and on the meteorological data in force. This determination should be made in consultation with the State weather information services and any regional traffic management facility.

5.6.18 The development of contingency FLASs as a complement to the FLASs already existing between ACCs/UACs, should be studied. These contingency FLASs must be included in the Letters of Agreement for purposes of their being applied, after the necessary co-ordination between control centres, when any contingencies related to meteorological phenomena, whether forecast or not, occur. Preparation of these contingency FLASs would greatly facilitate transition to a vertical separation minimum of 600 m (2000 feet) within CAR/SAM RVSM airspace.

5.6.18.1 The application of the contingency FLAS shall be facilitated by determining, within the contingency FLAS, levels which, as regards their contemplated use for flight direction, are compatible with those established in the corresponding normal FLAS for the RVSM.



Application of the contingency FLAS, when necessary, is facilitated due to the fact that the use of levels inside the "Contingency FLAS" is compatible with its use for the "FLAS for Normal RVSM".

Example: When Centre A reports that the contingency FLAS must be applied, request Centre C to suspend the use of FL 360 for the traffic it is going to transfer to Centre A, even though it will not request Centre B to change the use of FL 320. It is thus that the operational impact on Centre B is mitigated and Centre B's capacity to establish the aircraft at the levels appropriate to Centre A is greatly facilitated.

Figure 13: Descriptive example of a Flight Level Assignment Schedule (FLAS) for contingencies.

5.6.19 To facilitate co-ordination and the establishment of new capacity figures for the ACCs/UACs in the event of contingencies which require returning to a 600 m (2000 ft) vertical separation minimum within CAR/SAM RVSM airspace, the ACCs/UACs must study the predetermination of those capacity figures for purposes of allowing a rapid co-ordination with the local Flow Management position.

5.6.20 The importance of obtaining accurate forecasts regarding severe turbulence for a given area duly in advance must be stressed within the agreements with the appropriate meteorological services responsible for disseminating information.

5.7

5.7.1 **Special in-flight contingency procedures** *(under development)*

5.7.1.1 **Introduction**

The sole objective of the following procedures is that of serving as a guide, and shall be applicable within the EUR/SAM corridor. Even though not all possible contingencies can be covered, they contemplate those cases in which:

a) it is impossible to maintain the assigned flight level due to weather conditions, aircraft performance, pressurisation failure, and problems related to high-level supersonic flight;
b) there is loss or significant reduction of the navigation capacity needed to carry out operations in parts of the airspace in which precision in navigation performance is a prior requirement for the safe implementation of flight operations;
c) there is en-route diversion crossing the direction of EUR/SAM traffic flow.

5.7.1.2 *With respect to a) and c) above, the procedures are mainly applied when a rapid descent, a track reversion, or both, are required. On his/her own judgement, the pilot shall determine the sequence of the measures to be adopted. Air traffic control (ATC) shall provide all assistance possible.*

5.7.2 **General procedures**

5.7.2.1 The following general procedures apply to both subsonic as well as supersonic aircraft.

5.7.2.1.1 *If an aircraft cannot continue the flight in keeping with the clearance received from the ATC, and/or if an aircraft cannot maintain the precision of the navigation performance specified for the airspace, a revised clearance must be obtained before initiating any measure, through the use of emergency or urgency signals, as the case may be, provided this is possible. Subsequent ATC measures with regards to such aircraft shall be based on the intentions of the pilot and the general condition of traffic.*

5.7.2.1.2 *If no prior clearance can be obtained, a clearance from the ATC will be obtained as soon as possible, and until the revised clearance is received, the pilot must:*

a) if possible, deviate from the organised track or route system.
b) establish communications and alert other aircraft by broadcasting, at appropriate intervals, the aircraft's identification, flight level, position (including the ATS route designator or track code) as well as his/her intentions, in the frequency being used and in the 121.5 MHz frequency (or, as a backup, in the air-air inter-pilot 123.45 MHz frequency).
c) be vigilant, both by visual methods as well as by referring to the ACAS (if so equipped) of the existence of any traffic with which they could come into conflict;

equipped) of the existence of any traffic with which they could come into conflict;
d) turn on all the aircraft's exterior lights (in keeping with the appropriate operational limitations);
e) keep the SSR transponder activated at all times; and
f) initiate the necessary actions to guarantee the aircraft's safety.

5.7.3 **Subsonic aircraft**

5.7.3.1 Initial measures

5.7.3.1.1 If a subsonic aircraft is not able to comply with the procedures under item 4.2 to obtain a revised ATC clearance, the aircraft must abandon its assigned route or track turning 90 degrees to the right or to the left, provided that is possible. The direction of the turn should, if possible, be determined by the position of the aircraft in relation to any organised route or track system (for example, if the aircraft is outside, at the edge of, or inside the system). Other factors which could affect the direction of the turn are the direction leading to an alternate airport, the ground topography, and the flight levels assigned to adjacent routes.

5.7.3.2 Subsequent action (RVSM airspace)

5.7.3.2.1 In RVSM airspace, an aircraft capable of maintaining its assigned flight level should turn so as to acquire and maintain a track laterally separated 46 Km (25 NM), in any direction, from its assigned route or track in a multi-track system spaced at 93 Km (50 NM), or, otherwise, at a distance which represents the mid-point from adjacent parallel routes or tracks; and:

a) if above level FL410, climb or descend 300 m (1000 ft); or
b) if below level FL410, climb or descend 150 m (500 ft); or
c) if at level FL410 ascend 300 m (1000 ft) or descend 150m (500 ft)

5.7.3.2.2 An aircraft which is unable to maintain the assigned flight level should:

a) initially, reduce the descent rate to a minimum to the extent possible from the operational point of view;
b) while descending, turn to acquire and maintain in every direction a track laterally separated 46 Km (25 NM) from its route or track assigned within a multi-track system spaced at 93 Km (50 NM) or, otherwise, at a distance which represents the mid point from the adjacent parallel route or track; and
c) for the flight level, select a level 300 m (1000 ft) different from those normally used if above FL410, or by 150 m (500 ft) if below FL410.

5.7.3.3 *Subsequent measures (non-RVSM airspace)*

5.7.3.3.1 Within non-RVSM air space, the aircraft capable of maintaining its assigned flight level

should: turn to acquire and maintain in each direction a track laterally separated by 46 Km (25 NM) from its assigned route or track within a multi-track system at 93 Km (50 NM) spacing or, otherwise, at a distance which represents the mid-point from the adjacent parallel route or track; and

a) if above FL290, climb or descend 300 m (1000 ft); or
b) if below FL290, climb or descend 150 m (500 ft); or
c) if at FL290, climb 300 m (1000 ft) or descend 150m (500 ft).

5.7.3.3.2 *An aircraft which is unable to maintain its flight level should:*

a) initially, reduce its rate of descent to a minimum, to the extent possible from the operational point of view;
b) upon descending, turn to acquire and maintain, in each direction, a track laterally separated by 46 Km (25 NM) from its assigned route or track within a multi-track system at 93 Km (50 NM) spacing or, otherwise, at a distance which represents the mid-point from the adjacent parallel route or track; and
c) for the subsequent flight level, select a level 300 m (1000 ft) different from those normally used, if above FL290, or by 150 m (500 ft), if below FL290.

5.7.3.4 *En route diversion through the prevailing SAT air traffic flow*

5.7.3.4.1 Before diverting through the adjacent traffic flow, the aircraft should climb above level FL410 or descend below level FL280 using the procedures specified in 5.7.3.1 or 5.7.3.2 or 5.7.3.3. However, if the pilot is not qualified or does not wish to carry out significant climbs or descents, the aircraft should fly at the flight levels established in items 5.7.3.2.1 or 5.7.3.3.1 until a revised ATC clearance is obtained.

5.7.3.5 *Long-haul operations with aircraft with two turbine power units*

5.7.3.5.1 If these contingency proceedings are employed by a twin-engine aircraft as a result of one engine going off or of failure of some critical ETOPS system, the pilot should notify the ATC about the situation as soon as possible, reminding the ATC of the type of aircraft involved and requesting immediate assistance.

5.7.4 **Supersonic aircraft**

5.7.4.1 *Procedures to reverse the track*

5.7.4.1.1 *If a supersonic aircraft is incapable to continue the flight to its destination and needs to reverse the track, it should:*

a) Turn in the direction opposite the adjacent track, if operating on an outer track or in a multi-track system;
b) If operating on a random track or on an inner track within a multi-track system, turn either to the left or to the right in the following manner:

1) If going to turn right, the aircraft should get to a position 46 Km (25NM) to the left of the assigned track and then turn right towards its reciprocal course, at the highest angular turn speed possible;

2) If going to turn left, the aircraft should get to a position 46 Km (25NM) to the right of the assigned track and then turn left in its reciprocal course, at the highest angular turn speed possible;

c) Upon implementing the track reversal, the aircraft should lose altitude so that, upon concluding the reversal, it will be at least 1850 m (6000 ft) below the level at which it started the track reversal;
d) Once the track reversal is concluded, the course should be adjusted so as to maintain a 46 Km (25NM) lateral shift with respect to the original track in the opposite direction, maintaining, if at all possible, the flight level reached upon concluding the turn.

Note.— For other multi-track systems where the separation between routes is greater than 93 Km (50 NM), the mid-point distance would be used instead of the 46 Km (25NM).

5.7.5 **Procedures for diversion due to meteorological conditions**

5.7.5.1 *General*

5.7.5.1.1 *The objective of the following procedures is to provide guidance. All possible circumstances cannot be covered. In the final analysis, the pilot's judgement shall determine the sequence of the actions adopted. The ATC shall render all the assistance possible.*

5.7.5.1.2 *If what is required is that the aircraft deviate from its track to avoid adverse meteorological conditions and no prior clearance can be obtained, the ATC clearance shall be obtained as soon as possible. Until the ATC clearance is received, the procedures detailed in paragraph 5.7.5.4., below, shall be followed.*

5.7.5.1.3 *The pilot shall notify the ATC when the deviation due to meteorological conditions is no longer required or when the deviation has been completed and the aircraft has returned to its cleared route centre line.*

5.7.5.2 *Obtaining ATC priority when a deviation due to meteorological conditions is required.*

5.7.5.2.1 *When the pilot starts communications with the ATC, a rapid response may be obtained by stating "DEVIATION DUE TO METEOROLOGICAL CONDITIONS REQUIRED" to indicate that priority is desired in the ATC's frequency and response.*

5.7.5.2.2. *The pilot still has the option of initiating communications using the "PAN PAN" (preferably repeated three times) urgency call to alert all parties who are listening about a special attention condition which will receive ATC's priority for the provision of some*

clearance or assistance.

5.7.5.3 *Measures to be adopted when communications between the controller and the pilot are established:*

5.7.5.3.1 The pilot notifies the ATC and requests authorisation to divert from the track, indicating, if possible, the extent of the diversion envisaged.

5.7.5.3.2 The ATC adopts one of the following measures:

a) if there is no traffic which might be in conflict in the horizontal plane, the ATC shall issue the clearance to divert from the track; or
b) if there is traffic which might be in conflict in the horizontal plane, the ATC shall separate the aircraft establishing an appropriate separation; or
c) if there is traffic which might be in conflict in the horizontal plane and the ATC cannot establish an appropriate separation, the ATC:

1) shall notify the pilot that it is not possible to authorise the requested diversion;

2) shall warn the pilot of the conflict in traffic; and

3) shall request the pilot to state his/her intentions.

EXAMPLE DIALOGUE

"(requested diversion) IMPOSSIBLE, TRAFFIC IS (*call identification, position, altitude or flight level, direction),* REPORT INTENTIONS".

5.7.5.3.3 The pilot shall adopt the following measures:

a) report his/her intentions to the ATC; and

1) comply with the authorisation issued by the ATC; or
2) follow the procedures detailed in 5.7.5.4. below; and

b) if necessary, establish voice communications with the ATC to expedite dialogue during the situation.

5.7.5.4 *Measures to be adopted if no revised clearance can be obtained from air traffic control.*

5.7.5.4.1 The standards of this section apply to a situation where the pilot needs to exercise the pilot in command's authority under the standards contained in Annex 2, 2.3.1.

5.7.5.4.2 If no revised clearance can be obtained from the ATC and a deviation from the track is required to avoid adverse meteorological conditions, the pilot shall take the following action:

a) if possible, deviate in the direction opposite the organised system of tracks or routes;

b) establish communications and alert nearby aircraft by broadcasting at reasonable intervals: flight level, aircraft position (including ATS route designator or track code) and intentions, in the frequency in use and in the 121.5 MHz frequency (or, as a back up, in the air-air inter-pilot frequency);

c) be alert to possible traffic conflicts, both visually and using the ACAS (if available);

d) turn on all of the aircraft's exterior lights, in keeping with the appropriate operational limitations;

e) in the case of deviations of less than 19 Km (10 NM), the aircraft should be maintained at the level assigned by the ATC;

f) In the case of deviations greater than 19 Km (10 NM), when the aircraft is approximately at 19 Km (10 NM) from the route track, initiate a change in level based on the following criteria:

Route centre line track	**Deviations >19 km (10 NM)**	**Change in level**
EAST 000° - 179° magnetic	LEFT RIGHT	DESCEND 300 ft CLIMB 300ft
WEST 180° - 359° magnetic	LEFT RIGHT	CLIMB 300ft DESCEND 300 ft

Note: If, as a result of action taken under the standards of items 4.5.4.2 b) and c) mentioned above, the pilot determines that there is another aircraft at, or close to, that same flight level, with which a conflict could arise, the pilot shall adjust his/her flight path, to the extent necessary, to avoid said conflict.

g) upon returning to the track, remain at the assigned level when the aircraft is at approximately less than 19 Km (10 NM) from the centre line; and

if no contact was established before deviating, continue attempting to establish contact with the ATC to obtain clearance. If contact was achieved, keep the ATC informed regarding intentions and obtain essential information regarding traffic.

5.8 Phraseology

5.8.1 *Controller/pilot radiotelephony phraseology*

Meaning	Phraseology
For the controller to find out the RVSM approval status of a flight:	*(call sign)* **CONFIRME RVSM APROBADA / *CONFIRM RVSM APPROVED***
For the pilot to report NON-RVSM approval status: I. in the initial call in any frequency within the EUR RVSM airspace (the *controllers must provide confirmation with this same phrase*); and II. in all requests for change in flight level which correspond to flight levels within the EUR RVSM airspace; and III. in all flight level clearance confirmations related to flight levels within EUR RVSM airspace Additionally, except for State aircraft, pilots must respond to level authorisations which imply vertical traffic through FL 290 or FL410, with this phrase. *(See following examples)*	**RVSM NEGATIVA * / *NEGATIVE RVSM **** **AFIRMA RVSM* / *AFFIRM RVSM **** **AIRCRAFT DE ESTADO RVSM NEGATIVA*** ***NEGATIVE RVSM STATE AIRCRAFT ****
Pilot's indication of RVSM approval status:	
For the pilot of a non-RVSM STATE AIRCRAFT, to indicate that the status is that of a STATE AIRCRAFT, **in response** to the RTF phrase: (indicativo de llamada / call sign) **CONFIRME RVSM APROBADA / *CONFIRM RVSM APPROVED***	

For the controller: denying authorisation to enter EUR RVSM airspace:	*(indicativo de llamada)* **IMPOSIBLE APROBAR ENTRADA EN ESPACIO AÉREO RVSM, MANTENGA [***o* **DESCIENDA,** *o* **ASCIENDA] FLIGHT LEVEL** *(número)* *(call sign) UNABLE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN [or DESCEND TO or CLIMB TO] FLIGHT LEVEL (number)*
For the pilot to report severe turbulence which affects the aircraft capacity to comply with RVSM height-keeping requirements.	**RVSM IMPOSIBLE DEBIDO A TURBULENCIA */** ***UNABLE RVSM DUE TURBULENCE **
For the pilot to report that the aircraft's equipment has degraded below the MASPS required to fly within the EUR RVSM Air Space: *(This phrase is used both to transmit the initial indication of NON compliance with the altimetry MASPS as well as, from then on, in the initial contact in all frequencies within the lateral boundaries of EUR RVSM airspace, up to the moment in which the problem ceases to exist or the aircraft has abandoned EUR RVSM airspace*).	**RVSM IMPOSIBLE DEBIDO A EQUIPO* /** ***UNABLE RVSM DUE EQUIPMENT **
For the pilot to notify the ability to again start operating within EUR RVSM airspace after an equipment-related contingency, or the ability to resume RVSM operations after a weather-related contingency, with the phrase:	**LISTO PARA REANUDAR RVSM*** **/** ***READY TO RESUME RVSM **
For the controller to confirm that an aircraft has recovered its RVSM approval status or to confirm that the pilot is ready to resume RVSM operations.	**NOTIFIQUE LISTO PARA REANUDAR RVSM** **/ *REPORT ABLE TO RESUME RVSM***

5.8.2 Co-ordination between ATS units

Meaning	Phraseology
To verbally complement the exchange of an automated estimate message which does not automatically transfer the data from box 18.	**RVSM NEGATIVA *o* AIRCRAFT DE ESTADO, RVSM NEGATIVA [***lo que corresponda***]** ***NEGATIVE RVSM or NEGATIVE RVSM STATE AIRCRAFT (as applicable)***
To verbally complement estimate messages from non-RVSM aircraft:	**RVSM NEGATIVA** *o* **AIRCRAFT DE ESTADO, RVSM NEGATIVA [***lo que sea aplicable***]** ***NEGATIVE RVSM or NEGATIVE RVSM STATE AIRCRAFT (as applicable)***
For the pilot to report the cause of a contingency related to an aircraft unable to carry out RVSM operations due to severe turbulence or other severe weather phenomena {or to an equipment failure, as applicable} :	**RVSM NEGATIVA DEBIDO A TURBULENCIA [***o* **EQUIPO,** *lo que sea aplicable***]** ***UNABLE RVSM DUE TURBULENCE (or EQUIPMENT, as applicable)***

5.9 Co-ordination between ATS units

Flight Plans

5.9.1 If the receiving unit has not received a flight plan, the air traffic control unit must verbally report to the receiver whether the aircraft is, or is not, RVSM-approved.

Computer-assisted co-ordination of estimate messages

5.9.2 The On-Line Data Interchange (OLDI) system should permit co-ordination of the special treatment solicitations (that is, STS) as shown in box 18 of the ICAO Flight Plan.

5.9.2.1 Since the Activation Message (ACT) substitutes for the verbal estimate message, and

despite the fact that the data should remain within the local FDPS, a clear indication as to the status of the non-RVSM aircraft and of its request for special treatment should be included as an integral part of the automated estimate message:

- as confirmation of the data recorded in the flight plan, since it is essential for safety purposes
- to cover the case in which, for some particular flight, a failure in the operation of the flight plan systems has occurred, and
- to cover the case in which, for whatever reason, the accepting unit has not received the flight plan.

5.9.3 In the case of automated messages which do not contain the information provided in box 18 of the flight plan regarding RVSM operations, the transferring control unit must notify such information to the accepting control unit, verbally complementing the ACT message using the expression "**RVSM NEGATIVE"** or **"STATE AIRCRAFT, RVSM NEGATIVE"**, as applicable in each case.

Verbal co-ordination of estimate messages

5.9.4 When a verbal co-ordination procedure is used, the transferring control unit must include, at the end of the verbal estimate message, the information recorded in box 18 of the ICAO flight plan regarding RVSM operations, using the expression "**RVSM NEGATIVE"** or **"STATE AIRCRAFT RVSM NEGATIVE"**, as applicable in each case.

5.9.5 In the case that one sole aircraft is experiencing a flight contingency, the associated co-ordination messages must be verbally complemented through a description of the cause of the contingency.

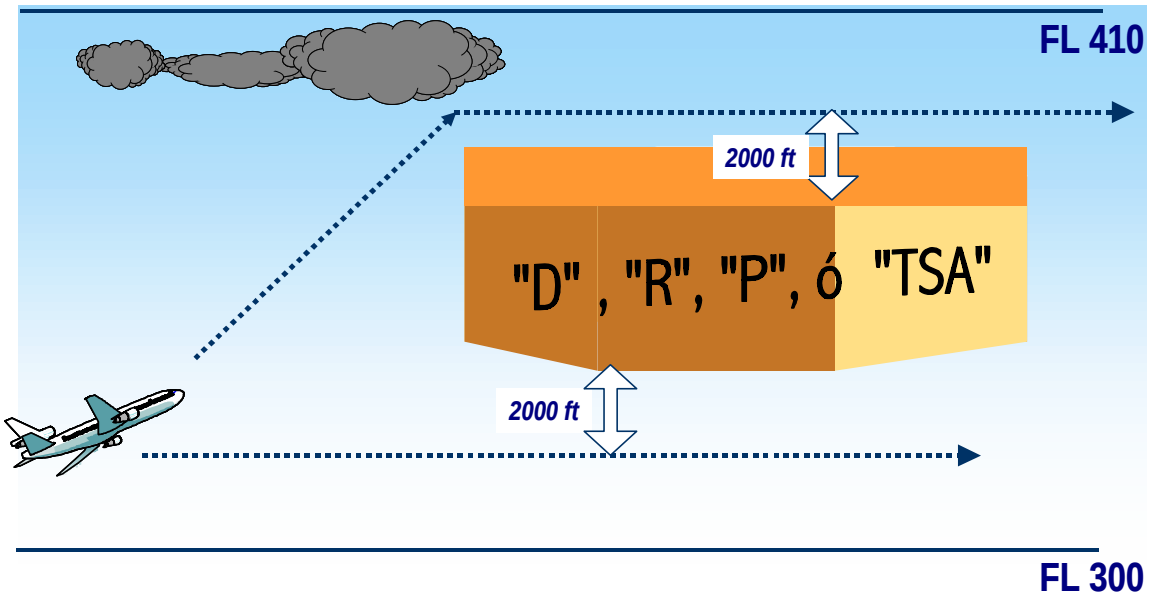
5.9.5.1 The associated co-ordination messages must incorporate one of the following expressions:

- **RVSM IMPOSSIBLE DUE TO EQUIPMENT,** or
- **RVSM IMPOSSIBLE DUE TO TURBULENCE**, as appropriate to the case.

Section 6:

VERTICAL SEPARATION OF PROHIBITED, RESTRICTED, DANGER AND TEMPORARILY SEGREGATED AREAS (TSAs)

6. VERTICAL SEPARATION OF PROHIBITED, RESTRICTED, DANGER AND TEMPORARILY SEGREGATED AREAS (TSAS)



Assignment of flight levels when flying over areas with restrictions

All activities carried out within airspace restrictions and/or reserves shall be considered as conducted by non-RVSM aircraft.

Consequently, the required vertical separation minimum between the vertical boundaries of activities conducted within these airspace restrictions and/or reserves and non-participating aircraft operating within CAR/SAM RVSM airspace, is:

- 600 m (2000 ft) above the upper limit of such activities, when such upper limit is at, or above, FL 290, and
- 600 m (2000 ft) below the lower limit of such activities, when such lower limit is at, or above, FL 300.

Therefore, RVSM implementation will require that the vertical separation minimum used prior to RVSM implementation continue to be used between activities carried out within airspace restrictions and/or reserves and aircraft which are not participating in those activities.

In the AIP, section ENR, it is advisable to establish, for each ATS route and where applicable, the corresponding first flight level to be used above/below airspace restrictions and/or reserves that will guarantee a 2000 ft vertical separation minimum (VSM) with respect to activities that may be carried out within such airspace volumes.

However, in an airspace environment where the affected ATS units are perfectly aware of the RVSM approval status of **all** the traffic involved, a 300 m (1000 ft) vertical separation minimum could be applied between RVSM-approved aircraft (see paragraph 5.2.2.1).

Section 7:

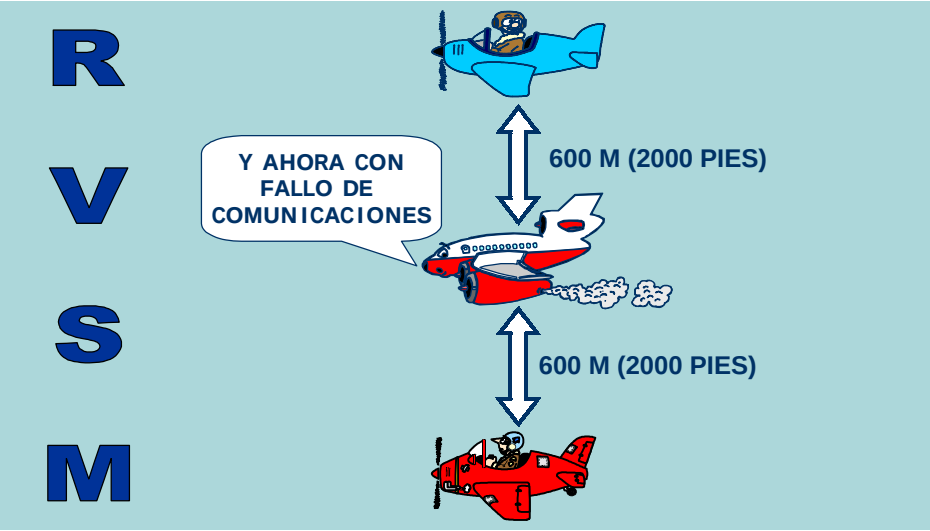
IN-FLIGHT COMMUNICATION FAILURE

7. IN-FLIGHT COMMUNICATION FAILURE

7.1. Communication failure procedures

Communication failure

As soon as the ATC becomes aware that an aircraft operating in CAR/SAM airspace is having a communication failure both ways, it will provide a 600 m (2000 ft) vertical separation minimum between said aircraft and any other aircraft flying in CAR/SAM RVSM airspace.



Vertical separation minimum to be applied in the event of a communication failure

The existing ICAO procedures in the event of communication failure are not applicable to RVSM transition airspace, since the times prescribed for the aircraft to adjust its level and speed to those of the filed flight plan are too long and allow aircraft in those conditions to operate for a long distance at a flight level which is inadequate for the adjacent flight level.

There are two different operational scenarios, depending on airspace orientation:

- when the RVSM airspace is located NORTH (or WEST) of the NON-RVSM airspace, and
- when the RVSM airspace is located SOUTH (or EAST) of the NON-RVSM airspace.

Let us take an example of the first scenario, that is, RVSM airspaces located North of NON-RVSM airspaces, as shown in the following figure:

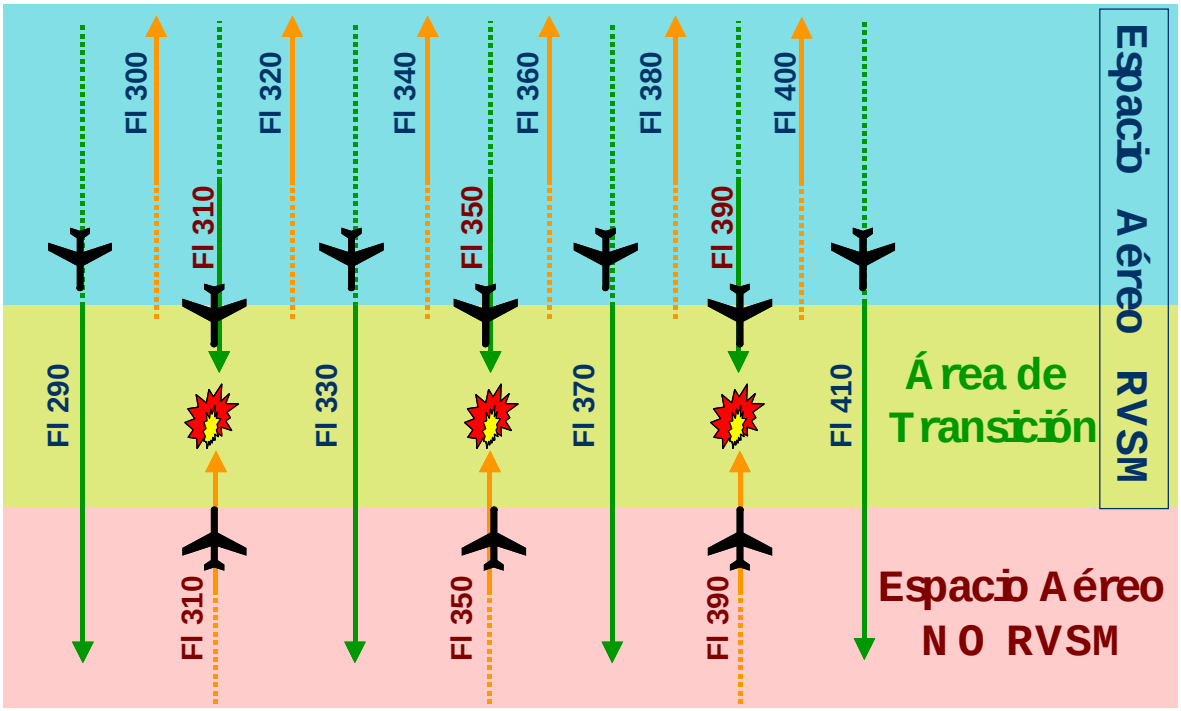


Fig. 6.8: Failure of communications with a transition area North of the NON-RVSM airspace.

The figure shows aircraft in both airspaces flying at FL 310, 350 and 390 in opposite directions. Therefore, it is necessary to develop specific procedures for each transition area in order to avoid any possible impact caused by aircraft with communication failures. These procedures can be based on a restructuring of routes (one-way parallel routes), the splitting of routes in transition areas, freezing the use of conflicting flight levels in a given direction, etc.

Local RVSM training manuals should describe local solutions adopted in each transition area to solve this problem. These solutions should be subject to negotiation with the adjacent ACCs and included in the corresponding Letters of Agreement.

ICAO Doc. 4444 8.8.3.1.1, Note

In any case, the current requirement of Doc. 4444, which states that "any transponder-equipped aircraft suffering an in-flight communication failure will operate the transponder in Mode A Code 7600" **is still in force**.

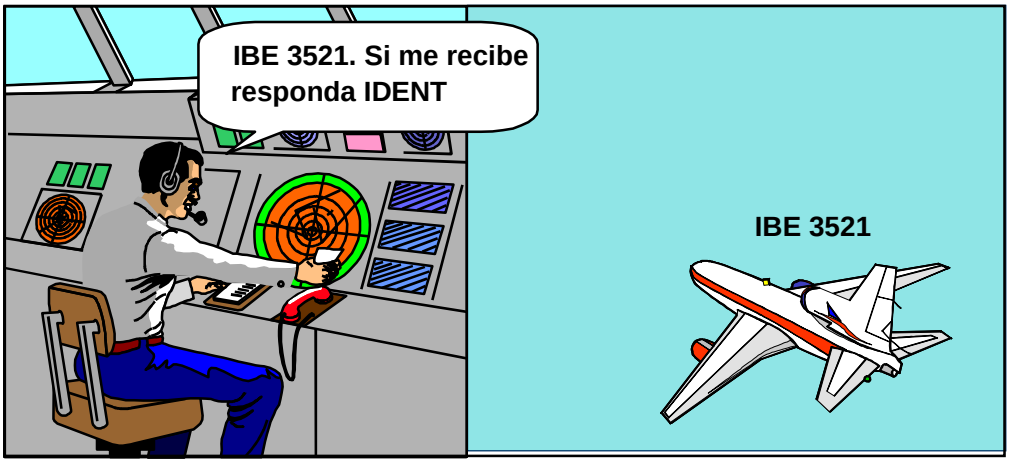
Also valid are the instructions contained in Doc. 4444, concerning action to be taken by the ATC in these cases:

ICAO Doc. 4444 8.8.3.1.1

"If communications are lost both ways, the radar controller must determine if the aircraft receiver is working or not, by requesting the aircraft, through the frequency in use, to acknowledge receipt by conducting a specific manoeuver, and observing the path of the aircraft, or by asking the pilot to activate IDENTIFICATION or to make changes in the code" and

ICAO Doc. 4444 8.8.3.1.2

"If the action prescribed in the previous paragraph is unsuccessful, it shall be repeated in any other available frequency which the aircraft could be listening".



Action to be taken by the ATC in the event of a communication failure

7.2 Communication failure procedures – CAR/SAM RVSM airspace

Mandatory reporting points

7.2.1 One of the methods used to determine a two-way communication failure between an aircraft and the ATC is the absence of the position report over a mandatory reporting point.

7.2.2 Mandatory reporting points can be strategically located so as to improve ATC ability to detect air-ground communication failures as soon as possible, taking into account ATC separation and co-ordination requirements. Items 7.2.6, 7.2.7 and 7.2.8 offer several options related to the placement of mandatory reporting points within the context of RVSM implementation, for their review and consideration.

7.2.3 There is a requirement to establish RVSM entry/exit fixes at, or near, the boundaries **between CAR/SAM RVSM airspace and the adjacent NON-RVSM airspace** for all ATS routes crossing the lateral boundaries of CAR/SAM RVSM airspace. The designation of these mandatory reporting points will improve the ATC ability to detect an air-ground communication failure.

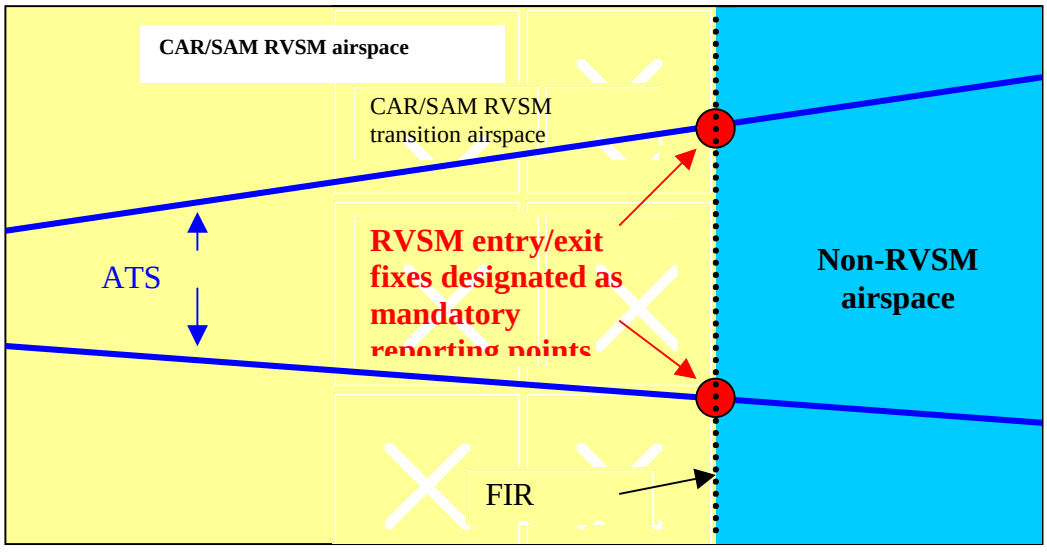


Figure 15: Mandatory reporting points in ATS routes at the boundary between CAR/SAM RVSM airspace and the adjacent non-RVSM airspace.

7.2.4 When the adjacent NON-RVSM airspace is located East/South of the CAR/SAM RVSM airspace, the establishment of mandatory reporting points over, or near, the boundaries **between CAR/SAM RVSM airspace and the CAR/SAM RVSM transition airspace** for

all routes that cross such boundaries, may also improve the ATC ability to detect air-ground communication failures.

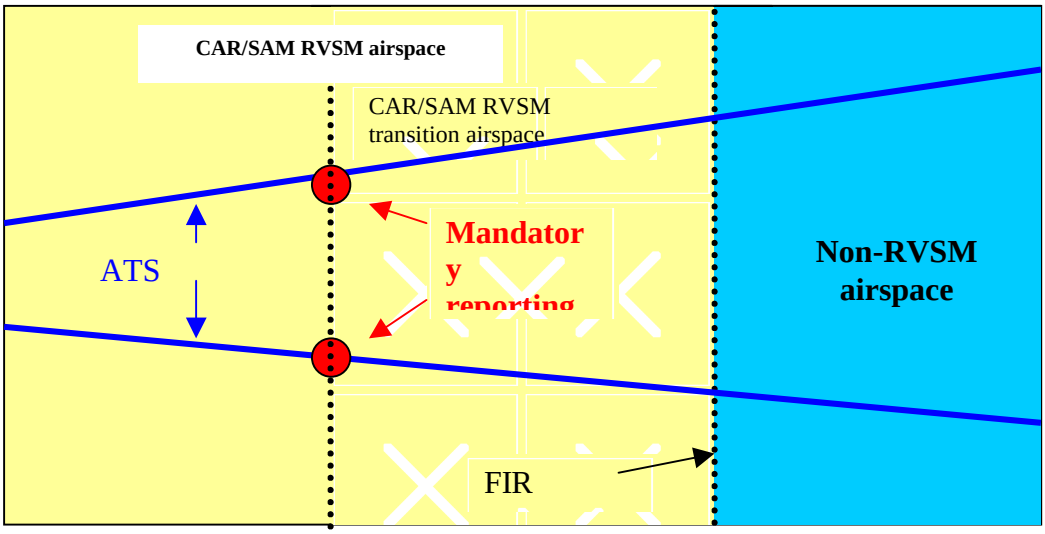


Figure 16: Mandatory reporting points in ATS routes at the boundaries between CAR/SAM RVSM airspace and the CAR/SAM RVSM transition airspace.

7.2.5 Furthermore, where the NON-RVSM airspace is adjacent to, and East of, the CAR/SAM RVSM airspace, the establishment of mandatory reporting points **within the adjacent NON-RVSM airspace** for all ATS routes that cross the lateral boundaries of CAR/SAM RVSM airspace will improve the ATC ability to detect air-ground communication failures.

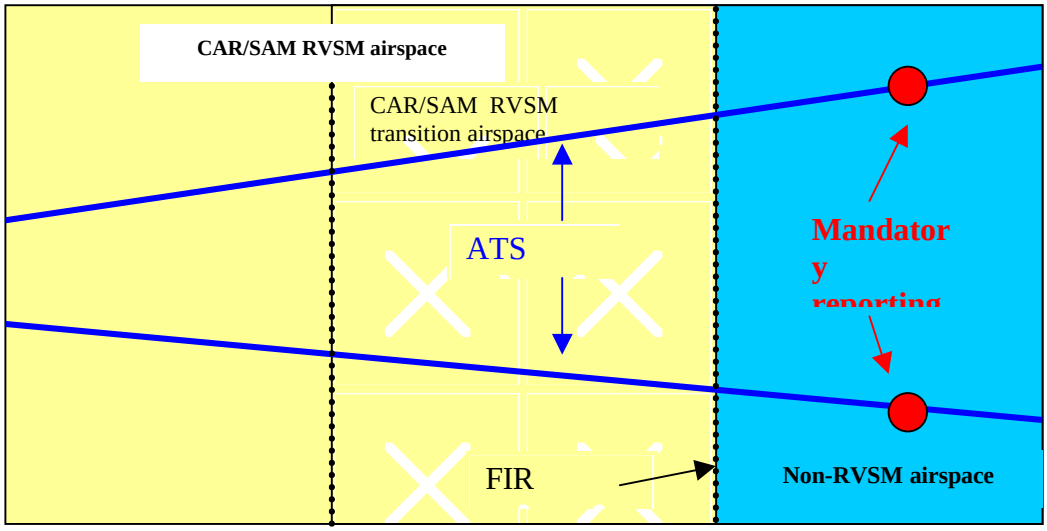


Figure 17: Mandatory reporting points within adjacent non-RVSM airspace in ATS routes that cross the lateral boundaries of CAR/SAM RVSM airspace.

One-way, laterally-spaced ATS routes

7.2.6 The use of one-way, laterally-spaced routes as a method for strategically separating traffic in opposite directions operating to/from CAR/SAM RVSM airspace is described in section 9. Within the context of air-ground communication failure procedures, the use of one-way, laterally-spaced routes between CAR/SAM RVSM transition airspace and the adjacent NON-RVSM airspace may contribute to mitigate the differences between cruising levels that are consistent with the direction of the flight in CAR/SAM RVSM airspace and the cruising levels applied in the adjacent NON-RVSM airspace.

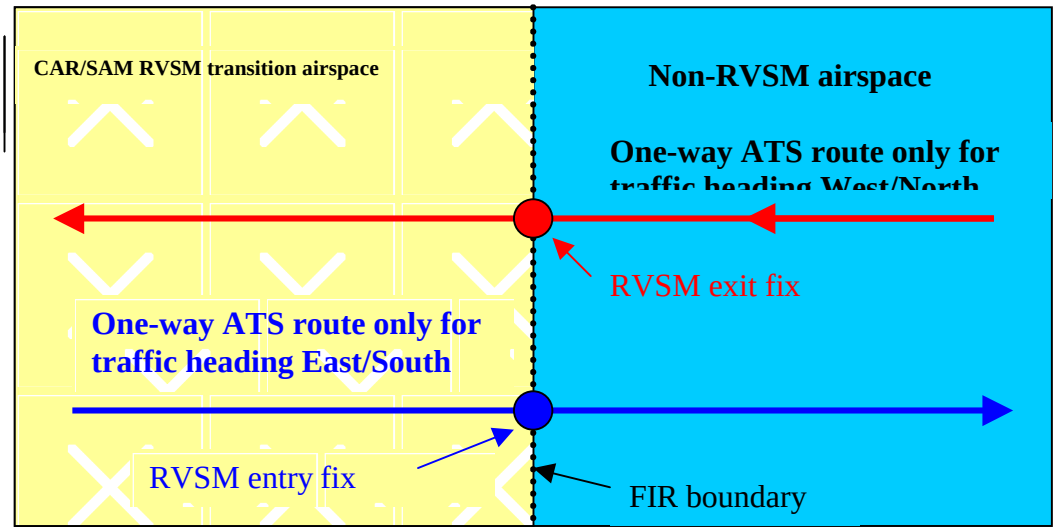


Figure 18: One-way, laterally-spaced ATS routes between CAR/SAM RVSM transition airspace and the adjacent non-RVSM airspace.

Flight level assignment schedule (FLAS)

7.2.7 The strategic use of the flight level assignment schedule is described in section 9. The FLAS could also be used within the context of communication failure procedures. For example: if the NON-RVSM airspace is adjacent to, and East/South of, CAR/SAM RVSM airspace, the FLAS can be used to establish the distance/time from the NON-RVSM airspace boundary starting from which flight levels 310, 350 and 390 can no longer be used as Eastbound cruising levels.

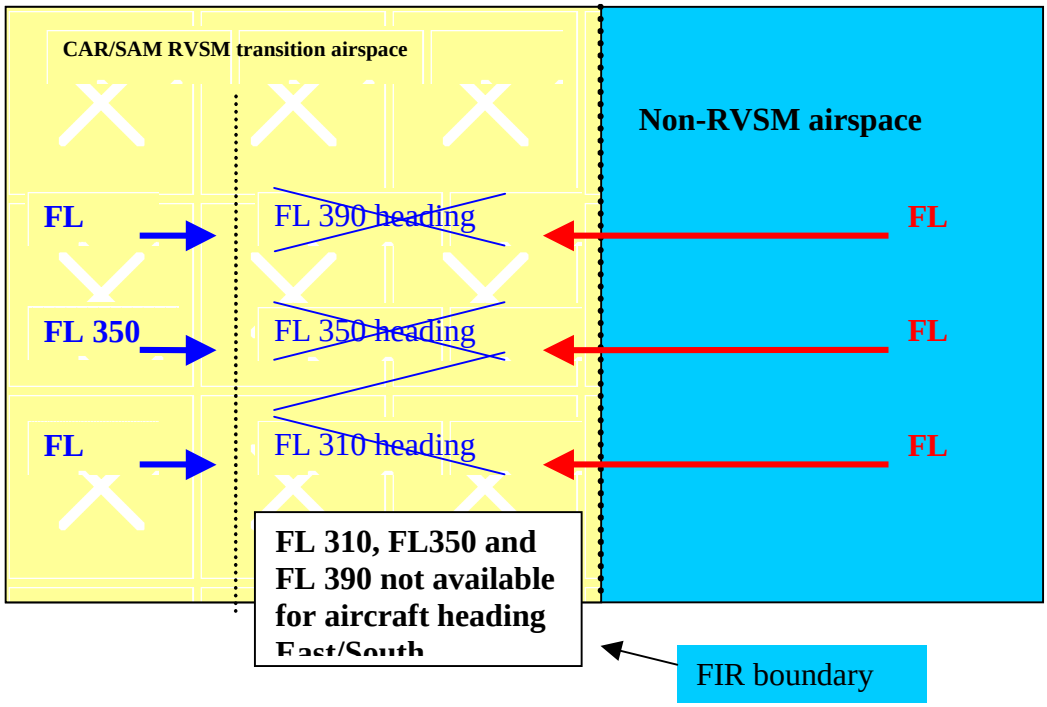


Figure 19: Discontinuous FLAS at FL 310, FL 350 and FL 390 for an aircraft heading East/South within CAR/SAM RVSM transition airspace.

Section 8:

SUPPORT TO ATS SYSTEMS

8. SUPPORT TO ATS SYSTEMS

The shaded text describes system-specific requirements.

8.1 General

8.1.1 Having established the requirement for the ATC to accommodate non-RVSM State aircraft operating in CAR/SAM RVSM airspace, it is essential for the ATC to be aware at all times of the RVSM approval status of all aircraft operating not only within, but also outside and near, CAR/SAM RVSM airspace. ATS system adaptations described in this section have been developed to support this operational requirement which is vital for safety.

8.1.2 Also significant is the operational requirement for the ATC to know the status of a State aircraft when such aircraft is requesting to operate within CAR/SAM RVSM airspace and has not reported its RVSM approval status.

8.1.3 Because of the requirement for the ATC to selectively apply two different vertical separation minima within CAR/SAM RVSM airspace as a result of the need to accommodate non-RVSM State aircraft within such airspace, flight plan requirements related to CAR/SAM RVSM implementation are essential for safety.

8.1.4 ATS system adaptations shall be made based on RVSM-related information submitted in the flight plan.

8.2 Flight plan processing systems

To be developed.

8.3. Radar display systems

8.3.1 Operational requirements related to radar display systems are applicable to radar display systems associated to ACCs/UACs whose areas of responsibility include CAR/SAM RVSM airspace.

8.3.2 The operational requirements related to radar display systems are essential to enable the ATC to be constantly, systematically and unequivocally aware of the RVSM approval status of *all* aircraft under its responsibility.

8.3.4 In a radar environment, radar position symbols and/or radar labels associated with aircraft operating within CAR/SAM RVSM airspace **must** provide clear indication of the current NON-RVSM status.

Note 1: Non-RVSM aircraft that can operate in CAR/SAM RVSM airspace may be State aircraft and/or civilian aircraft operating within CAR/SAM RVSM airspace in which transition tasks are being carried out.

Note 2: Controllers must be aware that the RVSM approval status, which is reflected in the updated flight plan, can be degraded from an RVSM-approved to a non-RVSM status, based on the information received directly from the pilot. Controllers must keep in mind that the RVSM approval status can be improved only in those circumstances associated with equipment contingency events.

8.3.5 When radar is used as the main tool for applying separation, radar position symbols and/or radar labels **should** provide clear indication of the current NON-RVSM status of those flights operating within the level band established by the local ATS authority above and below CAR/SAM RVSM airspace.

Note: The vertical range of the level band must be locally defined in function of the specific local operational requirements, such as sectorisation, etc.

8.3.6 The processing through which the differentiating feature is applied to radar position symbols and/or radar labels of the affected aircraft should be automatic.

Note: It is understood that, during the initial RVSM implementation period, it may be necessary for some radar display systems, to manually apply this differentiating feature, provided clear and

proven procedures are in place to ensure that this information, which is essential for safety, is available in the relevant radar control positions.

8.3.7 It **must** be possible to handle radar position symbols and aircraft radar labels manually.

Note: This manual handling shall be used as a means to update radar position symbols and/or radar labels of aircraft undergoing in-flight equipment contingencies which translate into a loss of RVSM approval status.

Conflict alert

Both medium- and short-term conflict alerts will inform the controller when approximations of less than 1000 or 2000 ft take place, depending on the approval status of aircraft and the airspace in which they are at that time, taking into account that the discrimination of RVSM areas within SACTA airspace only takes place in the vertical plane.

8.4. Flight progress strips (paper or electronic)

8.4.1 These operational requirements shall apply to flight progress strips generated within ACCs/UACs whose areas of responsibility include CAR/SAM RVSM airspace.

Note: If there are no paper or electronic flight progress strips, these requirements shall be applicable to the "extended label".

8.4.2 Local FDPSs must reflect in all flight progress strips (paper, electronic, or, in the absence of both, in the extended label) for non-RVSM aircraft, the information provided by the operators regarding both their RVSM approval status as well as their State aircraft condition (if applicable):

The information that operators include in the flight plan concerning the RVSM approval status of each aircraft should be clearly apparent to the controller in the flight progress strip, particularly if said aircraft is NOT RVSM-approved and/or if it is a State aircraft, irrespective of the flight level being flown by the aircraft or the RFL which appears in the flight plan.

As an example, the following presentation can be adopted, in which symbols and letters are used to clearly indicate the RVSM approval status of the aircraft:

a) In the right box, on the upper margin:

1. the letter "**W**" will indicate that the aircraft is RVSM-approved
2. the absence of said letter will indicate that the aircraft is NON-RVSM.

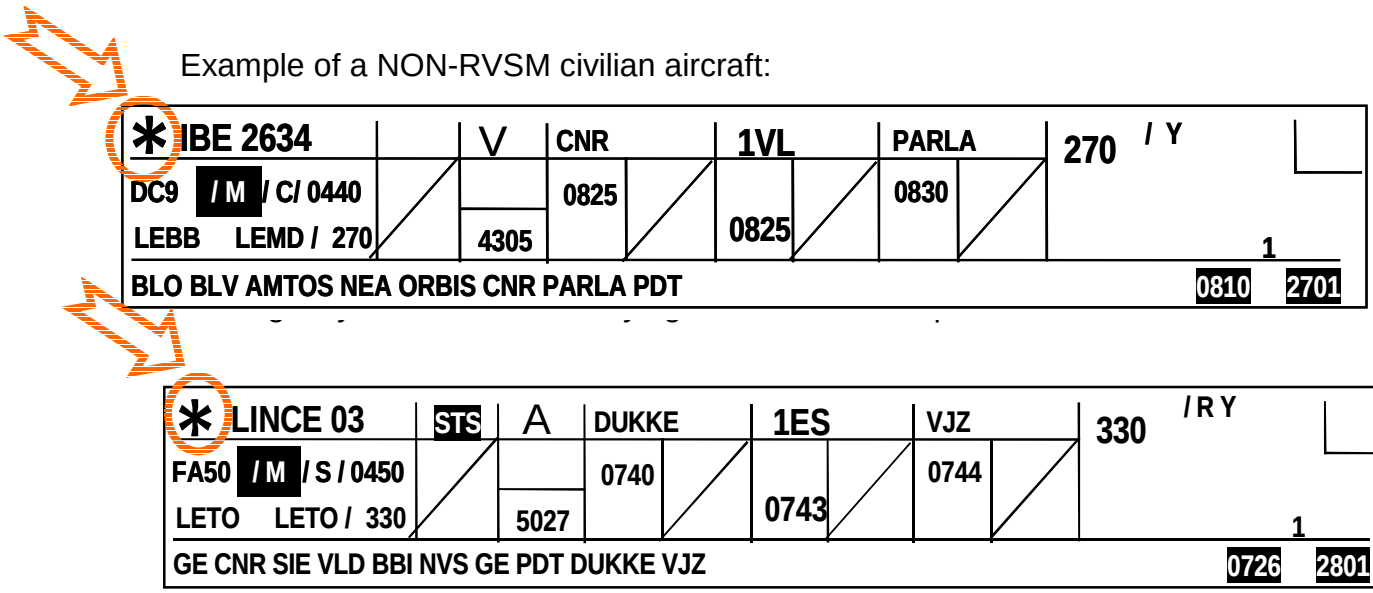
Furthermore, the STS field will indicate the State aircraft condition, if applicable, thus implying that the aircraft is exempt from the use of RVSM equipment.

b) The left box, before the aircraft CALL SIGN field, will contain the following symbology consistent with the radar display:

1. " * " indicates a NON-RVSM aircraft
2. " ** " indicates a State aircraft exempt from the RVSM approval requirement
3. " " (no symbol) indicates an RVSM-approved aircraft.

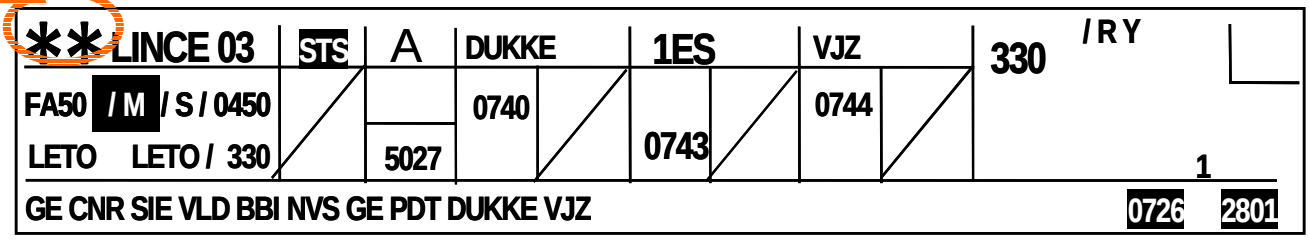
8.4.3 Information on the current non-RVSM status of a State or civilian aircraft **must** be included in the flight progress strip. (Example of message: **NON RVSM**).

Example of a NON-RVSM civilian aircraft:

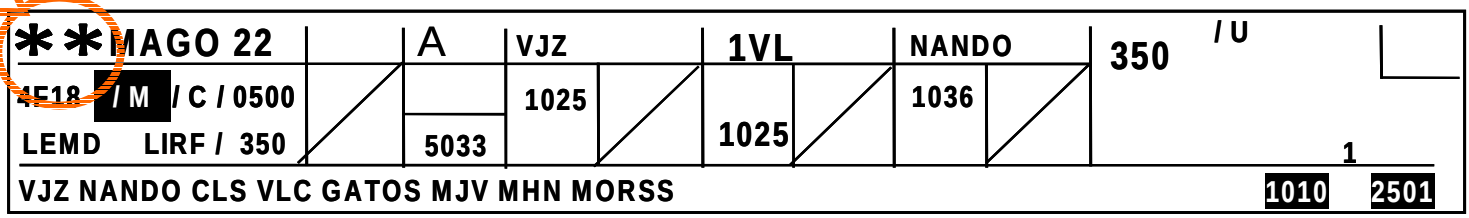


8.4.4 Whenever applicable, the indication that a non-RVSM aircraft is a State aircraft **should** be included in the flight progress strip. (Example of message: **STATE AIRCRAFT**)

Example of NON-RVSM State aircraft exempt from that requirement.

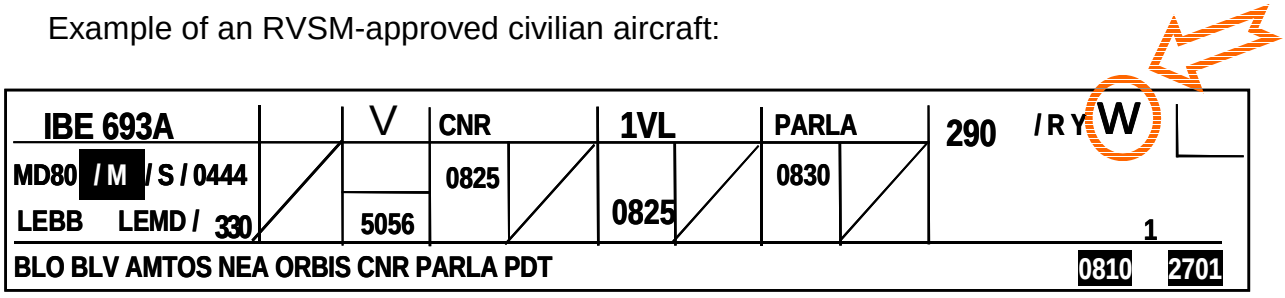


Example of a formation flight of NON-RVSM State aircraft exempt from that requirement.



8.4.5 RVSM-approved aircraft do not need that indication.

Example of an RVSM-approved civilian aircraft:



8.4.6 The ACCs/UACs should also consider adopting additional visual indications which may contribute to satisfy the need to be aware, at all times, of the RVSM approval status of all aircraft operating within their area or responsibility. These methods could include the assignment of a given colour to stripholders used for said flights, when paper flight progress strips are used, or the assignment of a given colour to the electronic strips associated to said aircraft.

8.4.6.1 **Changes in the RVSM approval status**

In all cases, the controller will be able to work on the flight plan to change the RVSM approval status of the aircraft.

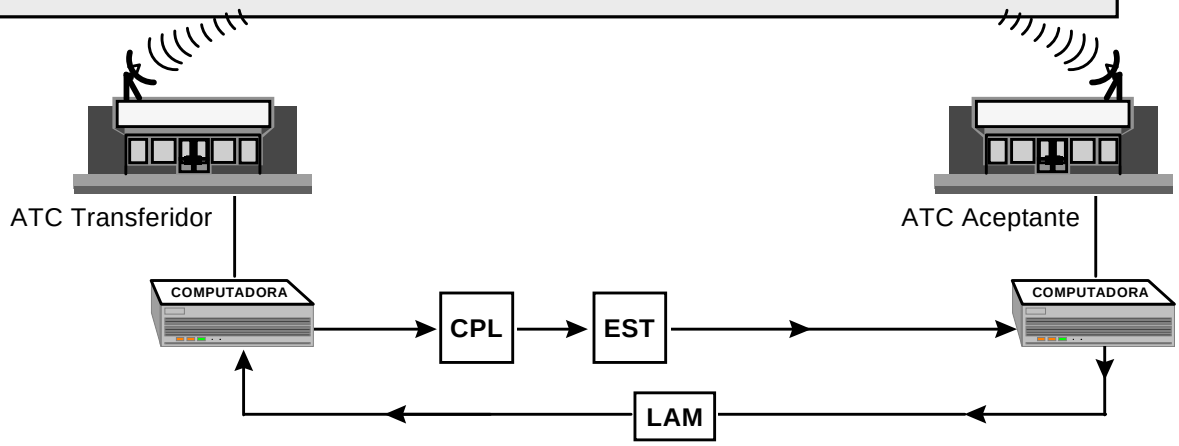
This information on the aircraft RVSM approval status can NOT be hidden or modified by other flight plan information.

Controlling changes in the RVSM approval status.

Any changes made by the ATC in the RVSM approval status of an aircraft, be it civilian or military, must be immediately reported to the Head of Operations/Supervisor (as applicable), so that it may be used for subsequent investigations and to avoid erroneous or unreasonable modifications.

8.5. On-line data interchange (OLID)

8.5.1 The OLDI **should** include the current RVSM approval status of the flight, as well as information in the sense that an aircraft is a “State” aircraft, if applicable.



The OLDI supports the traffic of messages on the RVSM approval status

8.5.2 The OLDI **should** systematically transfer information regarding requests for “Special Treatment” within CAR/SAM RVSM airspace, as reflected in box 18 of the ICAO Flight Plan (Message in box 18: **STS/NON RVSM**).

8.5.2.1 Since the automated OLDI message replaces the voice estimate message, the information on the special treatment request (STS/NON RVSM) should be transmitted just as indicated in box 18, in order to supply the information that would have been transmitted as item "e" at the end of the voice estimate message.

8.5.3 The support of OLDI to the transmission of RVSM information will be useful:

- to confirm flight plan data essential for safety
- in the event of degradation of the (height-keeping) capability of a given flight
- when, for whatever reason, the accepting unit does not have the flight plan.

8.5.4 Taking into account the significant operational impact caused by the inclusion of non-RVSM State aircraft in CAR/SAM RVSM airspace, and where **automated co-ordination systems** are used, a specific call to the controller of the receiving unit might be necessary in the case of such aircraft to obtain an explicit acceptance. To that end, co-ordination procedures could be agreed upon and included in the Letters of Agreement between control centres.

In the event of an OLDI failure, or when the information contained in the flight plan is not correct, or when the aircraft has modified its RVSM approval status due to a contingency, or simply because there is no automatic co-ordination system with the adjacent ACC, the controller will use the following phraseology in the voice co-ordination message with the other ATC unit/sector:

Message	Phraseology
To verbally complement an automated estimate message interchange in which the information contained in box nº 18 is not transferred automatically:	**RVSM NEGATIVA** o **AERONAVE DE ESTADO, RVSM NEGATIVA** [lo que sea aplicable] ***NEGATIVE RVSM*** *or* NEGATIVE RVSM STATE AIRCRAFT *(as applicable)*

To verbally complement estimate messages from non-RVSM aircraft:	**RVSM NEGATIVA** o **AERONAVE DE ESTADO, RVSM NEGATIVA** [lo que sea aplicable] ***NEGATIVE RVSM*** *or* NEGATIVE RVSM STATE AIRCRAFT *(as applicable)*

8.6. STCA/MTCD

Short-term conflict alert - STCA

8.6.1 The STCA systems of ACCs/UACs that apply RVSM **should** be capable of selectively determining the 300 m (1000 ft) or 600 m (2000 ft) vertical separation minimum to be applied, based on the current RVSM approval status of the affected aircraft operating in the level band between FL 290 and FL 410, both inclusive.

8.6.2 When the STCA system of an ACC/UAC that applies RVSM does not meet the requirements described in paragraph 8.6.1, it **should** be able to apply a 300 m (1000 ft) VSM up to FL 410 inclusive.

8.6.2.1. Serious disruptions caused by STCA systems in RVSM operational environments due to the generation of alerts resulting from the selection of a 600 m (2.000 ft) vertical separation minimum in the level band between FL 290 and FL 410, both inclusive, would be too numerous to be acceptable.

8.6.2.2. ACCs/UACs should be aware that, for those STCA systems that do not meet the requirements described in paragraph 8.6.1 above, the alerts related to those supposed losses of vertical separation which involve at least one non-RVSM aircraft operating in the level band between FL 290 and FL 410 both inclusive, are due to a vertical separation minimum that is not applicable to that particular case. However, in order to maintain the STCA concept of it being a safety net, alerts will be generated as a result of the selection of an adequate VSM to help avoid a collision.

Medium-term conflict detection - MTCD

8.6.3 The MTCD systems of the ACCs/UACs applying RVSM **must** be capable of selectively applying a 300 m (1000 ft) or a 600 m (2000 ft) vertical separation minimum, as determined by the current RVSM approval status of the affected aircraft operating in the level band between FL 290 and FL 410, both inclusive.

8.6.4 The affected ACCs/UACs must carry out their planning duly in advance so as to ensure that the required software adaptations are carried out within the schedule

established for initial RVSM implementation. The implementation of RVSM in the CAR/SAM Regions before completing the necessary adjustments to the STCA/MTCD systems will translate into such a high number of nuisance alerts that it might cause serious operational disruptions.

Section 9:

ATC CONSIDERATIONS

9. ATC CONSIDERATIONS

9.1 General

9.1.1 The introduction of RVSM will require that each ACC/UAC undertake a thorough review of its operational procedures in order to identify those areas that require adjustments or modifications.

9.1.2 Each ACC/UAC can also use this opportunity to enhance the operational benefits to be derived from the introduction of RVSM, by starting a broad and thorough operational analysis.

9.2. Improvement of the ATS route structure

9.2.1 The existing route network can be improved by means of a combination of FLAS, sectorisation, and, if necessary, to a lesser degree, changes in the route structure. In general terms, a vertical redistribution of traffic is expected as a result of RVSM implementation, with more flights operating close to their optimum flight level. The redistribution of flights in the airspace above FL290 may require changes in sector boundaries in order to balance workloads.

9.2.2 In two-way routes, climbing or descending traffic to/from the cruising flight phase will need to cross more flight levels than those currently crossed. Therefore, the potential benefits of expanding the one-way route system should be examined. Its viability will be determined by local needs (that is, airspace availability, sectorisation, crossing points), although in those segments where most of the traffic is in the in-flight phase, the establishment of one-way routes that facilitate the climb/descent to/from cruising levels may reduce controller workload.

9.2.3 The introduction of RVSM in the CAR/SAM airspace will permit the optimisation of any existing FLAS (flight level assignment schedule), through the assignment of new flight levels for specific ATS route segments. The additional availability of cruising levels will expedite the strategic elimination of conflicts at saturated crossing points. The FLAS can also be used where CAR/SAM RVSM airspace is

adjacent to a NON-RVSM airspace, particularly where the NON-RVSM airspace is located to the East/South of the CAR/SAM RVSM airspace.

9.3. ATC sectorisation

9.3.1 RVSM implementation in the CAR/SAM airspace may require a review of the optimum levels to be used for defining the vertical boundaries of control sectors within the ACCs/UACs. The affected operational experts must assess the need to redefine these vertical boundaries, based on the FLAS or on changes foreseen in the vertical profiles of the main traffic flows as a result of RVSM implementation.

9.3.2 In addition to taking into account the requirement to apply a 300 m (1000 ft) vertical separation minimum between RVSM-approved aircraft operating within CAR/SAM RVSM airspace, States must make sure that the vertical boundaries of ACC/UAC control sectors will also support the 600 m (2000 ft) vertical separation minimum requirement between:

a. non-RVSM State aircraft and any other aircraft operating in CAR/SAM RVSM airspace;
b. formation flights of State aircraft and any other aircraft operating in CAR/SAM RVSM airspace;
c. non-RVSM civilian aircraft and any other aircraft operating in CAR/SAM RVSM transition airspace.

9.3.3 Consideration should be given to the impact of ATC co-ordination on workload, as a result of the need to apply a 600 m (2000 ft) vertical separation minimum, as described in paragraph 9.3.2, to aircraft operating at levels immediately below/above the vertical sector boundaries within CAR/SAM RVSM airspace. Vertically-adjacent sectors will need to be constantly aware, through co-ordination, of the presence of traffic operating at flight levels immediately above/below the vertical sector boundary, so as to facilitate the implementation of the required vertical separation minimum.

9.4. Air traffic management options in CAR/SAM RVSM transition airspace

9.4.2 Controllers will need to adjust the cruising levels of aircraft operating from CAR/SAM RVSM airspace to NON-RVSM airspace and *viceversa*, due to the different levels applicable in said airspaces. Furthermore, where NON-RVSM airspace is adjacent to, and South/East of, CAR/SAM RVSM airspace, the fact that levels FL310, FL350, FL390 are cruising levels used for Southbound traffic in CAR/SAM RVSM airspace and Northbound traffic in NON-RVSM airspace is an important safety consideration.

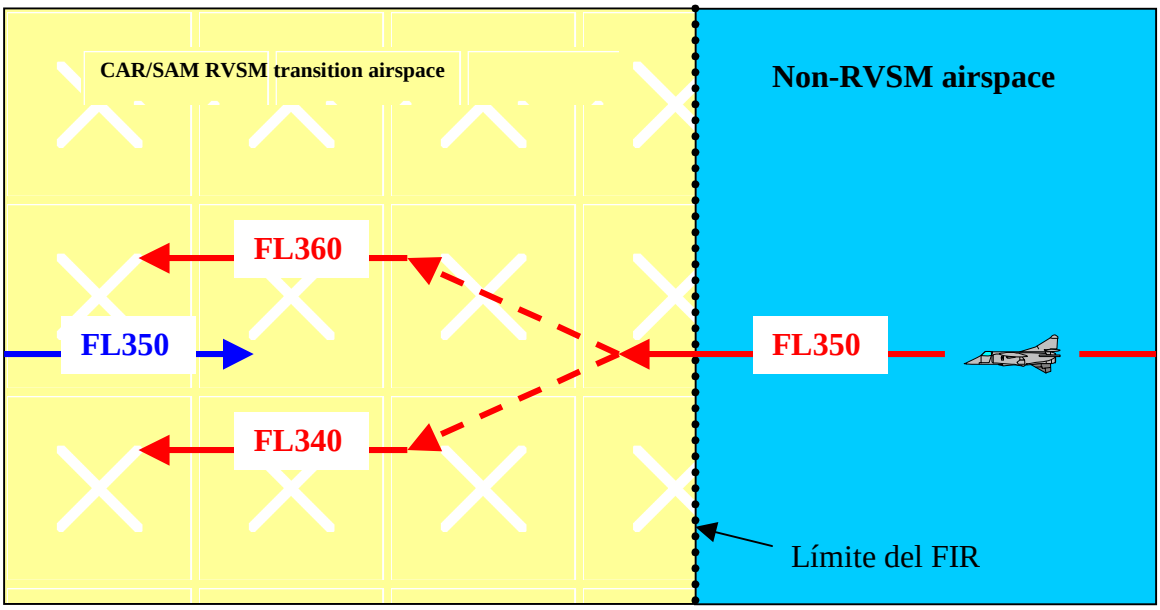


Figure 20: Traffic operating from an adjacent NON-RVSM airspace at FL350 heading North/West will be established at FL340 or FL360 within CAR/SAM RVSM transition airspace.

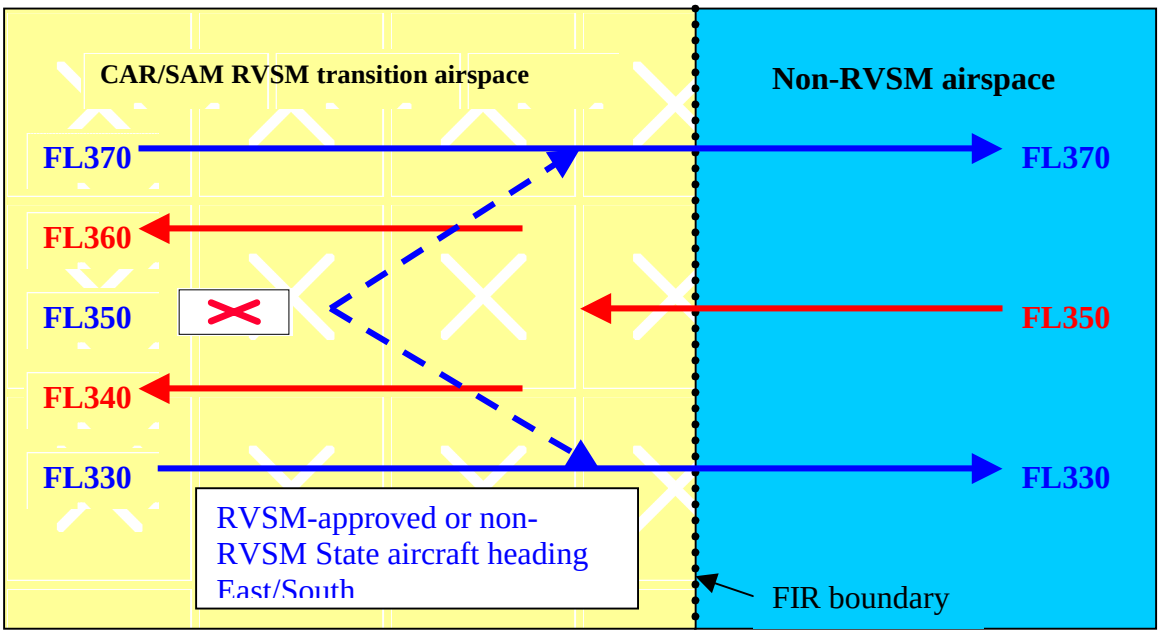


Figure 21: Traffic within CAR/SAM RVSM transition airspace heading East/South at FL 350 will be established at FL 330 or FL 370 prior to reaching the boundary with an adjacent non-RVSM airspace.

9.4.3 The ACCs/UACs performing RVSM transition tasks must consider the following options:

A) one-way, laterally-spaced ATS routes

B) flight level assignment schedules (FLAS)

One-way, laterally-spaced ATS routes

9.4.4. States responsible for the transition from CAR/SAM RVSM to NON-RVSM airspace and *viceversa*, could consider establishing one-way, laterally-spaced ATS routes to facilitate the transition of traffic operating from CAR/SAM RVSM airspace to the adjacent NON-RVSM airspace and *viceversa*, if warranted by the level of traffic and/or the complexity of RVSM transition tasks. This may be achieved across boundaries, following co-ordination with the adjacent NON-RVSM State (Letter of Agreement), or within the FIR of a specific State. Examples of one-way, laterally-spaced ATS routes may be seen below:

9.4.5.

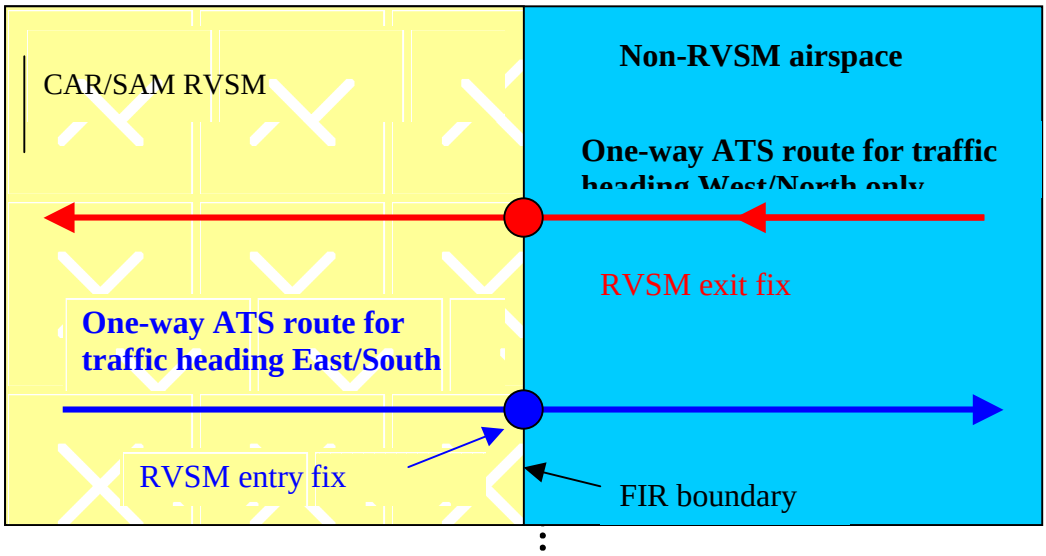


Figure 22: One-way, laterally-spaced ATS routes between CAR/SAM RVSM transition airspace and the adjacent non-RVSM airspace.

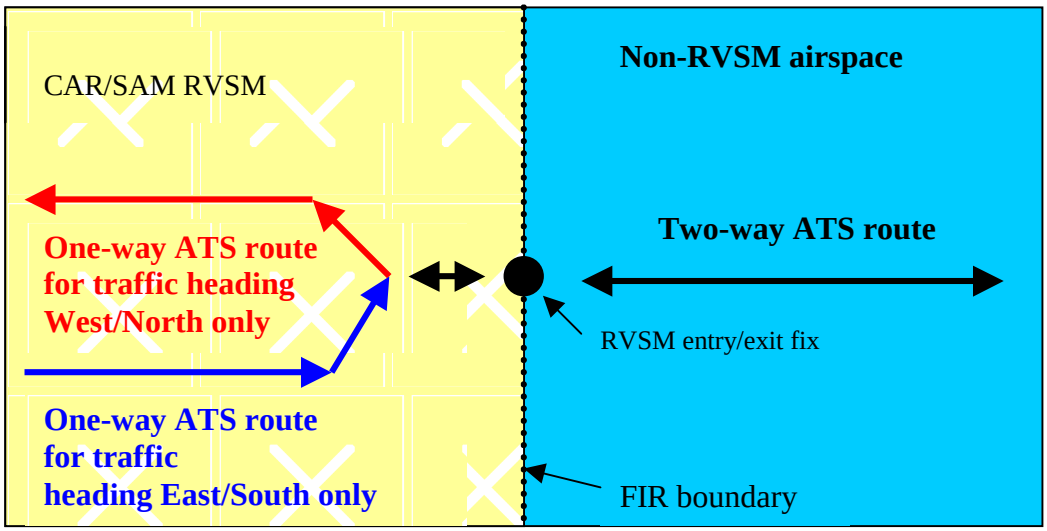


Figure 23: One-way, laterally-spaced ATS routes within CAR/SAM RVSM transition airspace.

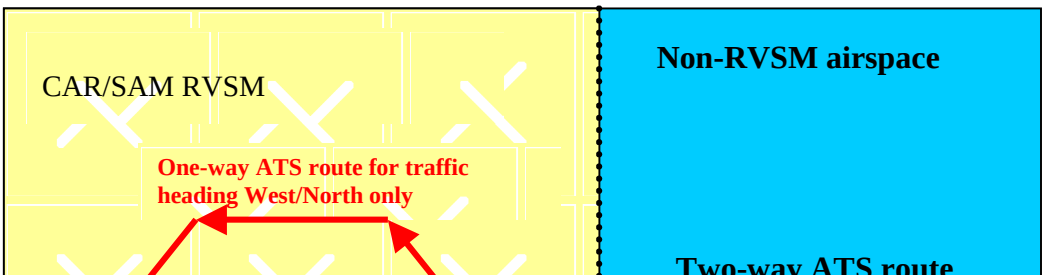


Figure 24: Two-way ATS route, split into two one-way, laterally-spaced routes within CAR/SAM RVSM transition airspace.

Flight level assignment schedule (FLAS)

9.4.5 Whenever an alternative and/or a supplement to the one-way, laterally-spaced ATS routes is needed, the application of a flight level assignment schedule should be considered. A FLAS is a schedule whereby specific flight levels are assigned to specific segments within the ATS route network. By organising the use--or lack of use--of flight levels in specific route segments, potential traffic conflicts may be avoided.

9.4.6. RVSM implementation requires that ACCs/UACs review and, if necessary, correct existing FLAS, bearing in mind the additional flight levels available. Furthermore, the ACCs/UACs responsible for the CAR/SAM RVSM transition airspace adjacent to non-RVSM airspace should consider the difference between CAR/SAM RVSM airspace and non-RVSM airspace in terms of the cruising levels applied according to flight headings. ACCs/UACs should also determine whether there is a need for developing and implementing a new FLAS.

9.4.7. It is advisable that, where appropriate, strategic solutions be developed to discontinue the use of flight levels FL310, FL350, FL390 for Eastbound/Southbound flights. Both scenarios should be taken into account; that

is, traffic in opposite directions and lateral traffic crossing at these three levels. Any agreed strategic solution should be included in the letters of agreement between centres and/or in the FLAS, as applicable.

Example of FL 310, FL 350 and FL 390 used as cruising levels for Eastbound/Southbound traffic:

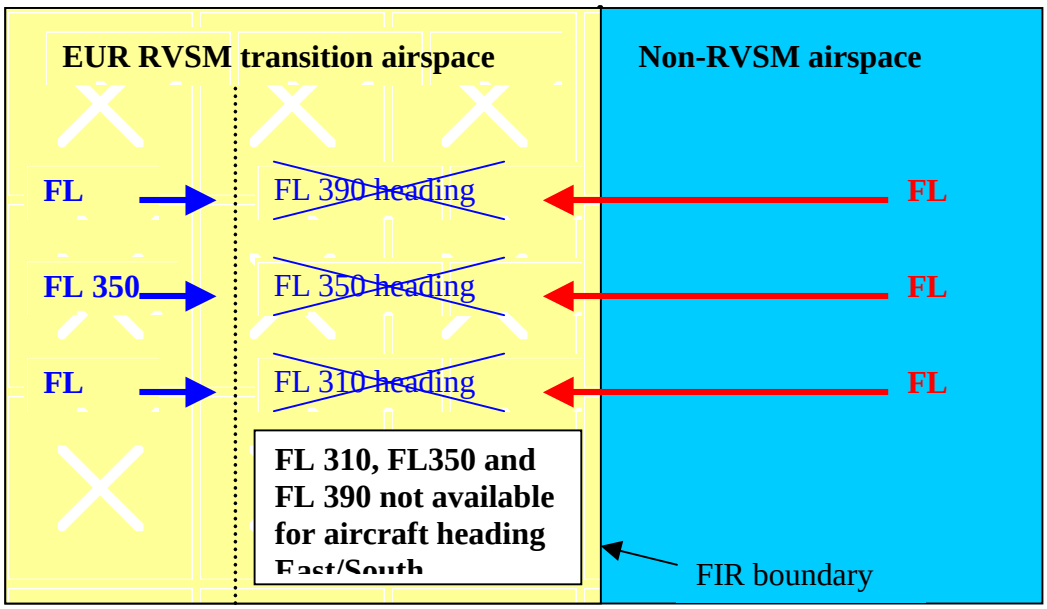


Figure 25: Diagram of discontinuous FLAS at flight levels FL 310, FL 350 and FL 390 for an aircraft heading East/South within CAR/SAM RVSM transition airspace

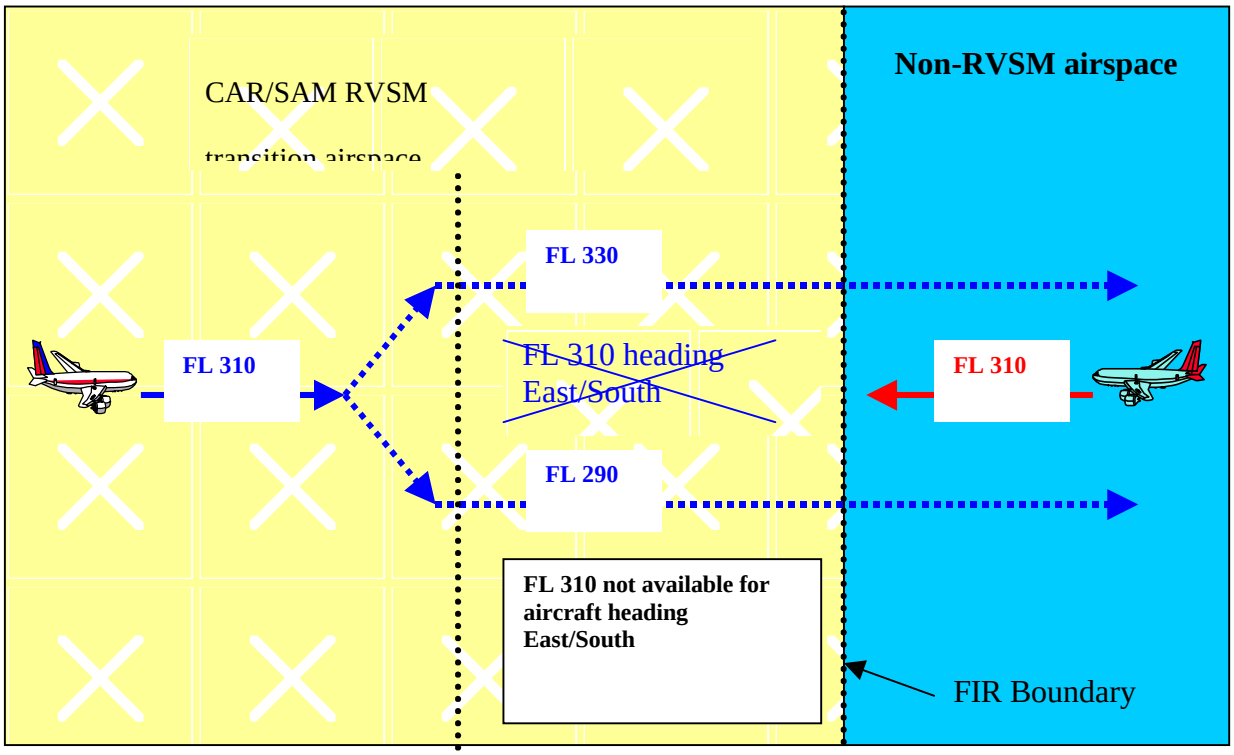


Figure 26: Aircraft in opposite directions at FL 310. The FLAS invalidates the use of FL 310 for an aircraft heading East/South within a portion of CAR/SAM RVSM transition airspace.

9.5 Letters of agreement between centres

9.5.1 Prior to RVSM implementation in CAR/SAM airspace, the ACCs/UACs must review their existing Letters of Agreement with other centres, in order to update their contents by incorporating the RVSM-related changes, as applicable.

9.5.2 ACCs/UACs should consider including a “Contingency FLAS” in their Letters of Agreement between centres. A Contingency FLAS can be applied under weather conditions that require the suspension of a 300 m (1000 ft) vertical separation minimum in CAR/SAM RVSM airspace. This will facilitate the co-ordination of levels for the transfer from adjacent ACCs/UACs of traffic requiring a vertical separation minimum of 600 m (2000 feet).

9.5.3 In addition, ACCs/UACs should consider the need to increase pre-reporting time parameters for the transmission of estimate messages involving non-RVSM aircraft

intending to operate in CAR/SAM RVSM airspace, in order to facilitate planning for the integration of this traffic, applying a 600 m (2000 ft) vertical separation minimum.

Section 10:

AIRBORNE COLLISION AVOIDANCE SYSTEM (ACAS)

10. AIRBORNE COLLISION AVOIDANCE SYSTEM (ACAS)

To be developed