INTERNATIONAL CIVIL AVIATION ORGANIZATION

MIDDLE EAST OFFICE

REPORT OF THE FIFTH MEETING OF MIDANPIRG RVSM TASK FORCE (MID RVSM TF/5)

(Abu Dhabi, 02 05 June 2002)

The views expressed in this Report should be taken as those of the RVSM Task Force and not the Organization. This Report will, however, be submitted to the MIDANPIRG and any formal action taken will be published in due course as a Supplement to the Report.

Approved by the Meeting
And published by authority of the Secretary General

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PART I HISTORY OF THE MEETING

1. PLACE AND DURATION

1.1 The Fifth Meeting of MIDANPIRG Reduced Vertical Separation Minimum Task Force (RVSM TF/5) was held at the conference room of the Hilton Hotel, Abu Dhabi, United Arab Emirates (UAE), from 02 05 June 2002.

2. OPENING

2.1 The meeting was officially opened by Mr. Khalifa Abu Jamhoor, Director, Administration and Finance from the UAE General Civil Aviation Authority (GCAA) on behalf of the Director General of the GCAA. Mr. Abu Jamhour extended the warmest welcome to all participants

wished them all a successful Task Force meeting. He pointed out that the RVSM Task Force, is recognized as one of the very active and productive body of the MIDANPIRG. The need for States of the MID region to ensure that all requirements are met for the safe implementation of RVSM on 27 November 2003. Mr. Abu Jamhour indicated that there has been a significant increase of traffic in the Region in recent months and, in particular, within the Emirates FIR. The implementation of RVSM would increase airspace capacity with a view to meet the challenges of future traffic growths.

2.2 Mr. M. R. Khonji, the Deputy Regional Director of the ICAO Middle East Office, Cairo, also welcomed the delegates to the meeting and thanked the GCAA of UAE for hosting this Task Force Meeting and the excellent cooperation and support which has always prevailed between the UAE and the ICAO MID Regional Office. He pointed out that at this phase of the planning process, States have to dedicate their efforts to the training of personnel involved with the implementation of RVSM and requested the meeting to identify the training requirements so that the CNS/ATM Human Resources Planning and Training Task Force established under MIDANPIRG/7 Decision 7/37 could assist States accordingly. Mr. Khonji stressed that in order to make the Target Level of Safety (TLS) there would be the requirement to establish a dual unidirectional ATS route in some areas of the MID region. He concluded by informing the meeting that the Draft ATC Manual for RVSM in the MID region, has been developed by the Secretariat, and would be distributed for finalization prior to implementation of RVSM in the MID region.

3. ATTENDANCE

3.1 The meeting was attended by a total of 47 participants from 11 States (Bahrain, Egypt, I.R. Iran, Jordan, Kuwait, Lebanon, Oman, Saudi Arabia, Syria, United Arab Emirates and Yemen) and two Organizations (IATA and Jeppesen). The list of participants is at **Appendix G** to the report.

4. OFFICERS AND SECRETARIAT

4.1 The meeting was Chaired by Mr. Sabri Said Al-Busaidy of Oman. Mr. D. Ramdoyal, Regional Officer, Air Traffic Management from the ICAO Middle East Office was Secretary of the meeting assisted by the Rapporteurs of the three work groups; Mr. Riis Johansen of the UAE (SAM/WG), Mr. Saleem M. Hassan Ali of Bahrain (ATC/WG) and Mr. Ibrahim Negm of Egypt (OPS/AIR/WG). Mr. M. R. Khonji, Deputy Regional Director, ICAO Middle East Office supported the meeting.

5. LANGUAGE

5.1 The discussions were conducted in English. Documentation was issued in English.

6. AGENDA

6.1 The following Agenda was adopted:

1) Review Status of Conclusions and Decisions from MIDANPIRG/7 meeting relating to RVSM and the Fourth meeting of the RVSM Task Force.

2) Safety and Airspace Monitoring aspects (SAM/WG)

3) ATC operations aspects (ATC/WG)

4) Aircraft Operations and Airworthiness aspects (OPS/AIR/WG)

5) Any other business

7. CONCLUSIONS AND DECISIONS - DEFINITION

7.1 All MIDANPIRG Sub-Groups and Task Forces record their actions in the form of Conclusions and Decisions with the following significance:

a) **Conclusions**
terms of reference, merit directly the attention of States on which further action will be initiated by ICAO in accordance with established procedures; and

b) **Decisions** deal with matters of concern only to the MIDANPIRG and its contributory bodies

8. LIST OF CONCLUSIONS AND DECISIONS

CONCLUSION 5/1: DUAL UNIDIRECTIONAL ROUTES

That:

with a view to meet the Target Level of Safety (TLS) for implementation of RVSM, the following improvements to the ATS route structure are required:

a) Introduction of two separated RNP routes:

i) connecting TURAIF to BANIAS (for eastbound traffic), and

ii) connecting CHEKKA to TONTU (for westbound traffic).

b) Introduction of an RNP route from TONTU, and parallel to UR219, to a point on the OEJD/OBBB FIR boundary some 8-10 NM south of GOLBI.

28 November 2002 in order to implement RVSM in the northern part of the Arabian Peninsula in November 2003.

CONCLUSION 5/2: DRAFT ATC MANUAL FOR RVSM IN THE MID REGION

That, States of the MID region review the Draft ATC Manual for RVSM in the MID region, which has been prepared by the Secretariat and send their comments to the ICAO MID Regional Office as soon as possible preferably prior to October 2002.

CONCLUSION 5/3: MID RVSM TRAINING GUIDELINES

That:

a) the MID region States take into account the training guidelines as indicated at **Appendix 3C** to the report on Agenda Item 3, when developing their training programme for the implementation of RVSM;

b) the CNS/ATM Human Resources Planning and Training Task Force take into -

training and simulation center capabilities in the MID Region.

CONCLUSION 5/4: REGIONAL RVSM INFORMATION CAMPAIGN

That MID region States:

a) notify their aircraft operators that RVSM will be implemented in the MID region on the AIRAC date of 27 November 2003; and

b) request the operators to obtain required regulatory approval to operate in the RVSM airspace.

PART II REPORT ON AGENDA ITEMS

REPORT ON AGENDA ITEM 1: REVIEW STATUS OF CONCLUSIONS AND DECISIONS FROM MIDANPIRG/7 MEETING RELATING TO RVSM AND THE FOURTH MEETING OF THE RVSM TASK FORCE.

1.1 Under this agenda item the meeting reviewed the status of implementation of conclusions and decisions emanating from the MIDANPIRG/7 meeting and the subsequent follow-up actions which have been taken. The list of conclusions/ decisions are indicated at **Appendix 1A** to the report on Agenda Item 1.

1.2 The meeting also agreed that with a view to facilitate informal contacts/consultations with the RVSM Programme Managers in the MID Region, the updated list be indicated in the report on this Task Force meeting (See **Appendix 1B** to the report on Agenda Item 1).

MID RVSM TF/5
Appendix 1A to the Report on Agenda Item 1

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	**STATUS**	**REMARKS**
CONCLUSION 7/9: ESTABLISHMENT OF A REGIONAL SAFETY AND MONITORING AGENCY That: a) the task of monitoring safety in conjunction with implementation of RVSM in the Middle East Regions be assigned to a Central Monitoring Agency; b) the monitoring agency, referred to as the Middle East Central Monitoring General Civil Aviation Authority (UAE - GCAA) based at the Head Office in Abu Dhabi; and c) the Terms of Reference of the MECMA is at **Appendix 5C** to the report on Agenda Item 5	action taken	
CONCLUSION 7/10: SAFETY ANALYSIS That, the safety analysis required for RVSM implementation in the Middle East Region be carried out by MECMA under the auspices of the UAE General Civil Aviation Authority initially based on information from, or in cooperation with one or more suitably qualified regional organizations.	ongoing	

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	**STATUS**	**REMARKS**
CONCLUSION 7/11: REPORTING OF DATA FOR CARRYING OUT SAFETY ASSESSMENT That: a) all States institute procedures for reporting of data, incidents and conditions necessary for performing the collision risk calculations prerequisite for RVSM implementation to MECMA. The data will include, but not necessarily be limited to: i) height deviations of 300 ft or more and use the altitude deviation form developed within the frame work of the RVSM Task Force for the reporting of the data to MECMA ; ii) total number of IFR movements for each month to MECMA; iii) the average time per movement spent in the level band FL290 - FL410 and report the value to MECMA along with the basis of the calculation; iv) ATC/ATC coordination failures; v) Turbulence; and vi) Traffic data.	ongoing	

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	**STATUS**	**REMARKS**
CONCLUSION 7/12: MONITORING REQUIREMENTS That, a) Operators having met the monitoring requirements indicated at **Appendix 5D** to the report on Agenda Item 5 for a given fleet/type of aircraft, will be accepted as having satisfied the RVSM monitoring requirements for the Middle East Region. For Middle East operators, documentation for monitoring shall be provided to MECMA; and b) MECMA will update the table in the light of data and experience gained in other Regions.	ongoing	
CONCLUSION 7/13: CIVIL/MILITARY COORDINATION That, in order to ensure the safe and coordinated implementation of RVSM in the MID Region, States should ensure that the Military Authorities are fully involved in the planning and implementation process and give due regard to LIM MID (COM/MET/RAC) RAN Meeting 1996, Recommendations 2/9 to 2/14.	ongoing	
CONCLUSION 7/14: CREATION OF NON EXCLUSION AREAS WITHIN RVSM AIRSPACE That, with a view to facilitate the integration of earlier generation aircraft not approved for RVSM operations, intending to operate on domestic networks within RVSM airspace, non exclusion areas be created in order to accommodate these operations.	ongoing	

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	**STATUS**	**REMARKS**
CONCLUSION 7/15: NOMINATION OF AN RVSM PROGRAMME MANAGER That, States/service providers nominate an RVSM Programme Manager who will be responsible for ensuring that the proper mechanism be put in place for the safe implementation of RVSM and will also act as the focal point contact person	ongoing	Details received from all MID States, except Afghanistan, Iraq & Israel
CONCLUSION 7/16: IMPLEMENTATION OF RVSM IN THE MID REGION That, a) RVSM will be implemented in the MID Region between FL 290 and FL 410 inclusive on 27 November 2003 b) States in the MID Region ensure that all requirements be met with a view to safely implement RVSM on the AIRAC date of 27 November 2003. c) Implementation of RVSM in the MID Region be harmonized and coordinated with the implementation timeframes adopted within the ASIA/PAC Region for States South of the Himalayas. *Note: States which do not fulfill their requirements regarding the implementation milestones for the implementation of RVSM within their respective FIRs, will be initially excluded from the MID RVSM area.*	ongoing	

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	**STATUS**	**REMARKS**
CONCLUSION 7/17: TRAINING OF ALL PERSONNEL INVOLVED WITH THE IMPLEMENTATION OF RVSM IN THE MID REGION That, a) ICAO explores the possibility of assisting States of the MID Region through a Special Implementation Project (SIP) for training of personnel involved with the implementation of RVSM in the MID Region; b) Seminars/Workshops be organized in the Region for training of air traffic services personnel in the RVSM field; c) States be invited to approach training institutions for the development of a training module in the RVSM field representative of the MID Region. d) States having difficulties in implementing RVSM implementation programme, may either individually or ingroup explore the possibility of seeking outside expertise		
CONCLUSION 7/18: GUIDANCE MATERIAL FOR AIRWORTHINESS AND OPERATIONAL APPROVAL That, States in the MID Region adopt the guidance material contained in both FAA Interim Guidance 91-RVSM and JAA Temporary Guidance Leaflet TGL No. 6 as amended for issuing Airworthiness and Operational Approval for aircraft and operators intending to operate within a designed RVSM airspace.	ongoing	Confirmation from States required

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	**STATUS**	**REMARKS**
CONCLUSION 7/19: RVSM LEGISLATION That, the MID Region States are invited to examine their legislations and regulations to identify any changes required for RVSM to confirm its compliance as indicated in ICAO ANNEX 6 Part 1 Chapter 7 Para. 7.2.3.	ongoing	Confirmation from States required
DECISION 7/20: PARTICIPATION OF REPRESENTATIVES OF STATES INVOLVED IN RVSM APPROVAL PROCESS That, representatives of States involved in the RVSM approval process of aircraft and operators, be invited to attend the future meetings of the Middle East RVSM Task Force.	ongoing	States should indicate whether action has been taken
CONCLUSION 7/21: FUNDING OF THE RVSM IMPLEMENTATION PROGRAMME That, regulatory bodies, operators, service providers, and other stakeholders be granted budgetary allocations during fiscal year 2002 and 2003 for acquisitions and other activities necessary for ensuring that all the requirements be met in a timely manner in order to safely implement RVSM in the MID Region on 27 November 2003.	ongoing	States should indicate status of implementation

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	**STATUS**	**REMARKS**
Status of Conclusions/Decisions emanating from the RVSM TF/4 Meeting (Abu Dhabi, 3-6 March 2002)		
CONCLUSION 4/1: REQUIREMENTS FOR MONITORING That, a) Operators having met the monitoring requirements for a given fleet/type of aircraft as indicated at **Appendix 2C** will be accepted as having satisfied the requirements for the Middle East Region; b) For Middle East operators, documentation for monitoring shall be provided to MECMA; and **c)** MECMA will update the table in the light of data and experience gained in other Regions.	On-going	
CONCLUSION 4/3: PASSING FREQUENCY That, With a view to ensure that TLS will continue to be met until the end of the decade: a) The overall passing rate shall not exceed 1.25 aircraft passings per flight hour within an appropriate evaluation area; b) While averaging of passing rates within evaluation areas may be done, States should take action to reduce passing rates at points or segments, where rates are found to be well beyond the agreed limit; and c) Measures to reduce passing rates should increase capacity rather than limit flow through restrictions.	On-going	

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	**STATUS**	**REMARKS**
CONCLUSION 4/4: AAD REPORTING AND INVESTIGATION That, a) All States institute revised procedures for reporting of assigned altitude deviations (AAD) of 300 ft or more with effect from 01 April 2002; b) Reports be structured as shown in **Appendix 2F** to the report and forwarded to the Middle East Central Monitoring Agency (MECMA); c) An Air Traffic Incident Report Form (type: procedure) be completed and processed in accordance with Appendix 4 to ICAO PANS-ATM, Doc 4444, and attached to the AAD report to MECMA. d) Reports total number of IFR movements in the level band FL290 - FL410 for each month to MECMA, and e) MECMA ensures further processing of this data in accordance with its terms of reference.	On-going	
CONCLUSION 4/5: MONITORING OF THE STATUS OF PREPAREDNESS FOR RVSM IMPLEMENTATION That, a) States send the RVSM evaluation forms to MECMA on a quarterly basis, with a copy to the ICAO MID Regional Office indicating the status of preparedness in the SAM,ATC and OPS/AIR fields as indicated in the evaluation forms at Appendix C (C1-C3) to the report; b) States send to the Rapporteur of the OPS/AIR Work Group before 1 May 2002 a copy of the evaluation form C-3 at Appendix C to the Report, and thereafter on a quarterly basis, with a view to follow-up on the status of	On-going	

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	**STATUS**	**REMARKS**
implementation of all requirements in the OPS/AIR fields necessary for ensuring the safe implementation of RVSM.		
DECISION 4/6: INCLUSION OF PROCEDURES FOR IN-FLIGHT CONTINGENCIES AND COMMUNICATION FAILURES IN DOC 7030 That, a) The OPS/AIR Work Group studies the proposal by the UAE for inclusion of procedures for in-flight contingencies in the Regional Supplementary Procedures Doc.7030; b) The Secretariat develops radio communications failure procedures for inclusion in Doc 7030 and ensures that the procedures are aligned with both the EUR and APAC regions.	On-going	
DECISION 4/7: ORGANIZATION OF INTERFACE MEETINGS That, with a view to harmonize RVSM procedures and implementation timeframes, the ICAO MID Regional Office, in consultation with the ICAO Regional Offices for AFI, Asia/Pacific, European Regions organize joint interface meetings as soon as possible, and preferably before the end of Year 2002.	ongoing	Initiated informal contact with the Asia/PAC Office

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REPORT ON AGENDA ITEM 2: SAFETY AND AIRSPACE MONITORING ASPECTS (SAM/WG)

2.1 The work group reviewed its terms of reference and noted in particular the requirement to:
"… devise suitable methodologies for incorporating the effects of projected traffic increases and system changes on occupancy and collision risk in the future environment";

"… establish a policy for investigating those errors that may jeopardize satisfaction of the Target Level of Safety (TLS)"; and

"… estimate periodically the vertical occupancies (traffic densities, passing frequencies, etc.) in the MID Region".

The working group's terms of reference is at **Appendix A** to the report on Agenda item 2.

2.1.1 Additionally, the normal working arrangements, whereby the Task Force Chairman, WG Rapporteurs and the ICAO Secretariat, to the widest possible extent, undertake co-ordination with other working group and with the Task Force as a whole, were noted. For issues requiring wider discussion, joint sessions of two WGs or plenary sessions of the Task Force will be held. While, such sessions are kept to a minimum, the SAM/WG has now reached the stage where information about results need to be brought to the attention of the ATM/WG.

2.2 The duties and responsibilities of the MECMA were reviewed. The work group noted the delineation in responsibilities between itself and the MECMA. The latter is responsible for the day-to-day and time-consuming tasks, such as establishing and maintaining databases and the conduct of readiness assessments and safety assessments.

2.2.1 ICAO Headquarters had pointed out the need to formalize allocation of responsibilities related to RNP monitoring in the MID Region and the MID RNP/RNAV Task Force concluded at its sixth meeting in Cairo in April 2002 that MECMA's terms of reference should be expanded (Appendix 5B to the report on agenda item 5). The contents of this conclusion were accepted by the United Arab Emirates and the resultant revision of MECMA's terms of reference has been forwarded to MIDANPIRG for endorsement. Responsibilities with respect to RNP/RNAV have been added to MECMA's terms of reference and are shown as items h-k (in italics) in **Appendix 2B** to the report on Agenda Item 2. It was noted that the expansion of responsibilities does not affect MECMA's duties with respect to RVSM.

2.2.2 The meeting noted that MECMA has expanded its website www.mecma.com, presenting the background and terms of reference of MECMA. Furthermore, forms for reporting of traffic data, coordination failures, calculation of flying time in the FL290-FL410 level band and large height deviations have been updated as indicated in Appendix 2C to the report on Agenda Item 2. Furthermore, links to ARINC and CSSI websites have been established to facilitate access to GMU monitoring services.

2.2.3 The GCAA has engaged a Flight Data Analyst & Software Specialist with effect from 01 April 2002. The individual was selected because of his experience in database management (particularly Access) and development of software applications.

2.2.4 The registry of aircraft approvals was established in May 2002.

2.2.5 MECMA's address is as follows:

Middle East Central Monitoring Agency (MECMA)
P.O. Box 666
Abu Dhabi
United Arab Emirates
Telephone: +971 2 405 4339 or +971 2 405 4320

Fax: +971 2 405 4316 (new number)
Email: traffic@mecma.com (for forwarding of traffic samples)
Website: www.mecma.com

AIRCRAFT PASSING FREQUENCIES

2.3 The Reich collision risk model is based on a number of parameters that must be established for the airspace being assessed. The formulation of the model depends on the structure and traffic pattern of the ATS route system at hand. For a single route, the aircraft passing frequency is an important parameter in calculation of risk.

Definition: A passing is an event when two aircraft navigating along the same track, and at adjacent levels, pass one another either in the same direction (overtaking) or in opposite direction.

2.3.1 ICAO guidance material specifies that all ATS routes within three adjacent ACCs should be examined on an individual basis when estimating aircraft passing frequencies or occupancy. If this is not practical, care should be taken that the routes analysed provide representative estimates. Each route should be divided into segments, for example, by reporting points or navigation aid locations. The traffic movement data, organized by flight level on each segment, must then be examined either manually or automatically to determine the number of pairs of aircraft at adjacent flight levels that pass each other in the same or in opposite directions. The number of same and opposite-direction aircraft passings should then be combined with similar counts from all other route segments analysed. The sum of the overall same and opposite-direction aircraft passings should then be multiplied by 2 and divided by the total number of flight hours above FL 290 in straight and level flight on the segments during the periods analysed, giving the same and opposite-direction aircraft passing frequency estimates. If occupancy analysis is deemed appropriate, vertical occupancies can be estimated in a manner analogous to that for estimating lateral occupancies shown in ICAO Doc 9426, Air Traffic Services Planning Manual.

2.3.2 However, taking into account the MID region conditions, where there are three very large FIRs and a number of small/medium size FIRs, it is necessary to expand the general criterion for three adjacent ACCs. Procedural separation minima are applied on long, homogeneous tracts of airspace, such as UR219, while radar separation is applied in other areas. Therefore, the MID safety analysis will consider five separate areas:

- Bahrain/Emirates/Muscat FIRs
- Amman/Beirut/Damascus FIRs
- R219 between ULOVO and TRF
- Tehran FIR
- Cairo FIR

2.3.3 Calculations on aircraft passing frequencies have been performed by MECMA and were presented to the Task Force and, to ensure robustness of the safety analysis, it was decided to limit pre-implementation passing frequency to 1.25 equivalent passings per hour. The results indicated that, except for airways with low traffic volumes, unidirectional route structures will be required to achieve the target level of safety required for implementation of RVSM. Implementation of RNP 5 provides the basis for this modernization of the route structure as indicated in para (c) of the MIDANPIRG/7 report

"CONCLUSION 7/5 – RNAV/RNP IMPLEMENTATION STRATEGY FOR THE MID REGION

That the Phase 2 implementation strategy for the RNAV/RNP implementation in the MID Region be as follows:

c) *unidirectional routes will be established in lieu of the present bi-directional routing network with a view to introduce parallel/flexible routes in an RNP 5 environment and thus paving the way for the safe introduction of RVSM in November 2003"*

2.3.4 MIDANPIRG Conclusion 7/5 was supported by a specific pledge by the two largest FIRs as recorded under agenda item 5, paragraph 5.2.22:

- "Saudi Arabia and Iran agreed to the extension of the proposed parallel RNP/RNAV routes from the adjoining FIRs of Bahrain and Emirates respectively."

- Passing frequencies have been established for a large number points in Amman, Bahrain, Emirates Muscat and Tehran FIRs, permitting identification of problem areas – i.e. where the passing frequency exceeded 1.25 per flying hour. These points are listed in order Nx(equiv) in Table 2.1, below:

Point	FIR	Same	Opp	Flights	Nx (same)	Nx (opp)	Nx(equiv)
ZELAF	OJAC/OSTT	50	1,976	4,050	0.10	3.90	4.08
TURAIF	OEJD	56	1,928	4,044	0.11	3.81	4.01
KIBIT	OOMM	1	279	918	0.01	2.43	2.45
PAPAR	OIIX	1	700	2,750	0.00	2.04	2.04
MAROB	OOMM	16	204	1,108	0.12	1.47	1.68
MITEX	OBBB/OEJD	2	937	4,542	0.00	1.65	1.66
LOTOS	OBBB/OEJD	3	256	1,369	0.02	1.50	1.53
ETUKO	OBBB/OOMM	2	181	1,131	0.01	1.28	1.31
ALPOR	OOMM	0	118	745	0.00	1.27	1.27
c1/c2							1.81

Table 2.1: Passing Frequencies

2.3.5 To meet the safety requirements for implementation of RVSM, the following measures have to be taken – or have been taken:

a) ZELAF and TURAIF (TRF). The very high passing frequency precludes RVSM implementation. Dual unidirectional routes with semi-circular level allocation are required.

Dual routes exists in Amman FIR via TONTU and TURAIF.

Consequently, establishment of two separated RNP routes:

- connecting TRF to BAN, and
- connecting CAK to TONTU

through Damascus FIR is identified as a requirement for implementation of RVSM in the northern part of the Arabian Peninsula.

This is a "red flag" item.

The Saudi Arabian PCA has agreed to establish an additional route, parallel to UR219 between Amman and Bahrain FIRs. Subject to unidirectional use of these routes, this re-structuring would produce the required reduction in collision risk. Furthermore, the PCA has expressed strong reservations about an RVSM implementation in Jeddah FIR if this results in RVSM/CVSM transition in the TRF area.

Syria is presently evaluating various options for establishing lateral separation between eastbound and westbound tracks through Damascus FIR.

b) ULOVO. The high passing frequency precludes RVSM implementation. Dual unidirectional routes with semi-circular level allocation are required.

The key is essentially to establish a route from TONTU – parallel to UR219 – to a point on the OEJD/OBBB FIR boundary some 8-10 NM south of GOLBI.

This is a "red flag" item.

c) PAPAR. Negotiations between Iran and the United Arab Emirates have resulted in a restructuring as follows:

- A418 via PAPAR and Shiraz will be restricted to westbound traffic, and
- Eastbound traffic transiting the Emirates FIR will be routed via a new airway UL223 aligned UMH – SNJ – KRD – LAM – SIR – TARDI.
- Eastbound traffic with destinations in the Emirates FIR will be routed G666 with new alignment LAM – LAV – ORSAR – DESDI.

These changes will be implemented on 28 November 2002 and will resolve the issue at PAPAR.

Traffic density through Tehran FIR between Ankara and Emirates FIRs is too high to permit RVSM implementation on a bi-directional route. Consequently, the route westbound route via Shiraz (SYZ) must remain laterally separated from UL223 throughout Tehran FIR until the Ankara FIR boundary.

d) KIBIT, MAROB and ALPOR. The two former points are problematic and Oman is in the process of restructuring its route system to resolve the issue. This has some repercussions on the western boundary of Muscat FIR where in-principle agreement has been reached with Emirates FIR regarding a number of changes. The issue needs to be monitored, but is not expected to hamper RVSM implementation.

2.3.6 Based on the foregoing, the meeting formulated the following conclusion:

CONCLUSION 5/1 DUAL UNIDIRECTIONAL ROUTES

That:

with a view to meet the Target Level of Safety (TLS) for implementation of RVSM, the following improvements to the ATS route structure are required:

a) Introduction of two separated RNP routes:

i) connecting TURAIF to BANIAS (for eastbound traffic), and

ii) connecting CHEKKA to TONTU (for westbound traffic).

b) Introduction of an RNP route from TONTU, and parallel to UR219, to a point on the Jeddah/Bahrain FIR boundary some 8-10 NM south of GOLBI.

Note: These issues were identified as "red flag items", for which progress is required by 28 November 2002 in order to implement RVSM in the northern part of the Arabian Peninsula in November 2003.

LACK OF TRAFFIC DATA

2.4 Traffic data for the readiness and safety analyses was collected during the period 20 January – 20 February 2001. This period was selected as it represented the inbound phase of the Haj season.

2.4.1 Nine States forwarded traffic samples that were used for preparation of the preliminary readiness assessment, presented in draft form at MID RVSM TF/2 in Dubai in April 2001 and in complete form at MID RVSM TF/3 in Abu Dhabi in August 2001. The reported data was adequate for this purpose, which is more limited in scope than the full safety analysis. However, only six States provided data with the contents and format required for data processing, upon which further progress in the safety analysis depends.

2.4.2 For other FIRs no conclusions can be drawn due to lack of data and, as implementation of RVSM requires positive conclusions (as distinct from absence of negative conclusions), additional traffic data is required to progress towards a GO/No-Go decision in August 2003:

Cairo FIR

2.4.3 The traffic data provided by Egypt met the requirements for the readiness assessment. However, it did not permit identification of significant points and omitted information about entry and exit levels. Consequently, passing frequencies cannot be calculated on the basis of the initial traffic sample.

Jeddah FIR

2.4.4 The sample provided for Jeddah FIR was structured differently from the standard format and cannot be processed in a form that permits calculation of passing frequencies. Also, some data fields appeared to contain inconsistent data.

Beirut FIR

2.4.5 The sample provided by Beirut FIR was highly structured, but some of the level information represented "snapshot-type" intermediate passing levels that cannot be handled by a data processing system.

Damascus FIR

2.4.6 Traffic data for Damascus FIR is not available. Deductions made based on data for Amman FIR prove that a dual unidirectional route stricture for traffic between Jeddah FIR and the European Region is required. Also, it should be noted that traffic to/from Europe has been re-orientated in the intervening period due to EUR RVSM implementation.

Sanaa FIR

2.4.7 Traffic data for the month of August 2001 was supplied to MECMA during the meeting. [put in result of evaluation of suitability]

2.4.8 One month's data from the FIRs listed above is required by MECMA by 01 September 2002, in order to complete the preliminary safety assessment in preparation for MID RVSM TF/6 in October 2002.

2.4.9 MECMA made a demonstration of initial processing of raw traffic data in preparation for calculation of passing frequencies. Typical problems with handling of incorrectly formatted flight

data records were explained and demonstration runs were carried out on model data sets. Furthermore, soft copies were made available on diskettes for delegates at the meeting.

ASSIGNED ALTITUDE DEVIATIONS

2.5 Reporting of assigned altitude deviations (AAD) was introduced with effect from 01 July 2001 and the Middle East Central Monitoring Agency (MECMA) started to receive data in early August 2001.

2.5.1 Negative AAD reports have been received from two States.

2.5.2 AAD reports covering a total of 22 deviations have been received from two States :

a) Saudi Arabia had reported a total of 19 AADs. These reports have since been the subject of further investigations and information from mutually independent sources has been obtained and examined. This includes:

- Individual radar data recordings from the reporting agency.
- Radar data recordings from adjacent ACCs
- Flight data recordings from operators
- Flight crew reports
- The Saudi Arabian PCA had conducted an investigation of Mode C processing and display within the ATC system supporting operations in Jeddah ACC and established that Mode C display under certain circumstances could differ from that emitted from the transponder. This phenomenon was predominantly observed in areas of overlapping SSR coverage, where tracking was being transferred between different sensors being utilised in a mosaic grid. The PCA's findings had been verified by other sources and MECMA has closed the reported cases. All AADs previously reported by Saudi Arabia are disregarded as being the product of a transient display system aberration.

b) The Jordanian CAA had reported six AADs for the months of January and February 2002.

i) MAS20, 13 Jan 02: Transient transponder Mode C failure.

ii) Information received from UAE (EK) for UAE26, 26 Jan 02:

Data from the flight data recorder (FDR) for UAE26, A322, EDDM – OMDB, had been downloaded and examined. The aircraft was RVSM approved and the FDR indication was steady at FL370. No altitude alerts were registered and no ATC advice given.

Additional information has been requested from the Jordanian CAA.

iii) Information received from UAE (EK) for UAE24, 26 Jan 02:

Data from the flight data recorder (FDR) for UAE24, A332, LFPG – OMDB, had been downloaded and examined. The aircraft was RVSM approved and the FDR indication was steady at FL410. No altitude alerts were registered and no ATC advice given.

iv) CAL241, 27 Jan 02:

Mode C was within tolerance.

v) SVA103, 30 Jan 02:

Information has been requested from SVA who is disputing the report. The aircraft is RVSM approved. No altitude alerts were registered and no ATC advice given.

Additional information has been requested from the Jordanian CAA.

100 seconds altitude deviation has been attributed to this event.

vi) CAL254, 02 Feb 02:

Information has been requested from CAL; no reply received.

Additional information has been requested from the Jordanian CAA.

The transponder performed normally in Emirates FIR. Jeddah and Bahrain ACCs did not file reports. Considering the reported level is above the service ceiling of the aircraft, the deviation is deemed to be caused by a transient Mode C failure or an aberration in the ATC display system.

2.5.3 The meeting reviewed the results of AAD reporting so far and decided to base its further safety assessment work on the results, which are tabulated in **Appendix 2D** to the report on Agenda Item 2.

2.5.4 Assigned altitude deviations must be evaluated against the total number of flight hours in the level band FL290-FL410. To accomplish this task, regular reporting of flight hours by all ACCs is essential for the validity of the safety assessment.

2.5.4.1 As it is recognised that, within most ATC systems, it would not be practicable to perform a count of actual flight hours within a certain level band, there are various ways of performing estimations that are both relatively simple and sufficiently accurate.

2.5.4.2 The first step in the process is to analyse the traffic patterns within the airspace. For FIRs with few routes and/or significant traffic flows above FL285, this task is simple, while it can be more complex for FIRs with many and varied flows of traffic.

2.5.4.3 Each flow of traffic must then be quantified to create the basis for a weighted calculation of average flight time per movement.

2.5.4.4 The third step is to establish the percentage of flights that, at some portion of their trajectories, fly within the level band FL290-FL410.

2.5.4.5 Finally, the average time within the level band FL290-FL410 for each segment, or group of similar segments, needs to be established. This is best performed through an analysis of radar data, but can also be accomplished by non-radar units or segments through pilot reports.

2.5.5 The data listed in sub-paragraphs 2-5 above permits monthly calculation in a relatively simple spreadsheet, based on the main movement data that form part of the normal monthly reporting for ACCs. The calculation method for Emirates FIR is provided as **Appendix 2E** to the report on Agenda Item 2 and soft copies were distributed to delegates.

The requirement to report total flight time in the level band FL290-FL410 was instituted with effect from 01 July 2002 and part of the results are summarized below:

Egypt	9 months	Total flight time FL290-FL410:	63,753 hours
UAE:	11 months	Total flight time FL290-FL410:	30,258 hours

Additionally, Jordan had reported data. This data had not been registered by MECMA in time for inclusion in the report.
Bahrain has reported the number of IFR movements for each month and calculation of flying time in the level band FL290-FL410 is awaiting calculation of the average flying time per IFR movement.
The data reported by Egypt is included as **Appendix 2F** to the report on Agenda Item 2.
The data reported by the UAE is included as **Appendix 2G** to the report on Agenda Item 2.

2.5.6 Estimating the risk resulting from large height deviations require modeling of different scenarios into which the deviations can be categorized. A large atypical deviation can follow three main paths, which are illustrated in Figure 2.1. The figure depicts a scenario where aircraft 1 should climb to a certain flight level. The solid line shows the correct path of the aircraft. The dotted line paths A, B and C depict the three possible types of deviation, which aircraft 1 might make.

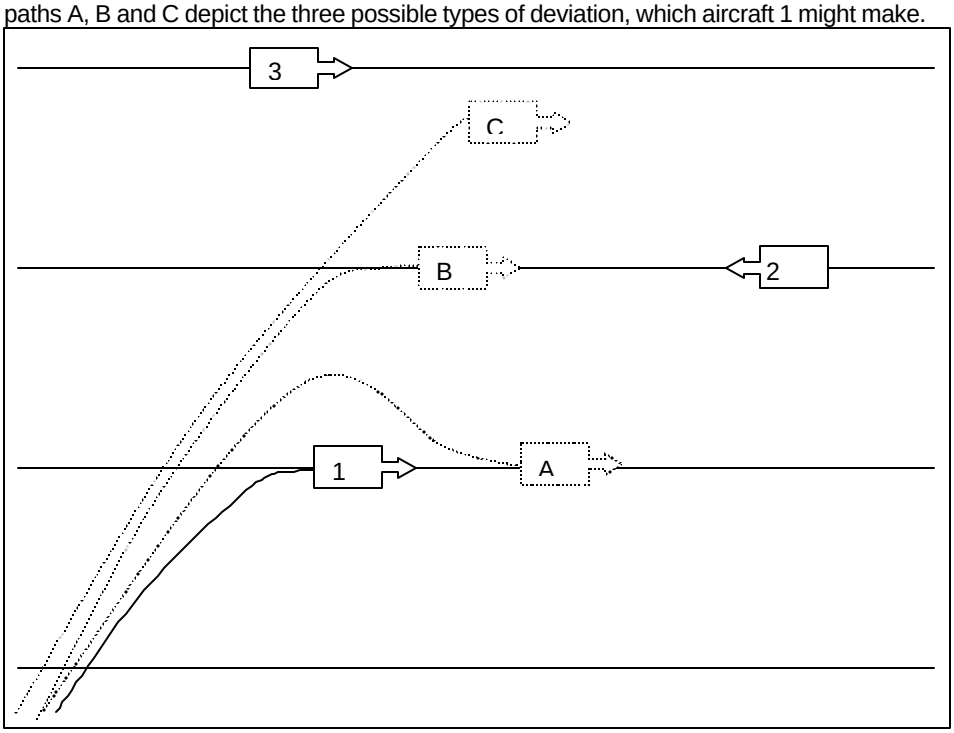

Figure 2.1 - Illustration of the Three Basic Deviation Paths

2.5.6.1 In scenario A, aircraft 1 fails to capture its correct flight level, and performs a height bust. This manoeuvre could result in a loss of separation with aircraft 2 on the adjacent level. In addition, although aircraft 1 does not reach the flight level of aircraft 2, there is still a small chance of collision due to the possible errors in the technical height keeping performance of the two aircraft. For example, if the height bust resulted in a nominal Mode C vertical separation of 500ft between the two aircraft, the actual vertical separation could be less (or greater) depending upon the technical height keeping error of the two aircraft.

2.5.6.2 In scenario B, aircraft 1 climbs to and joins an incorrect level. This results in a possibility of collision with aircraft 2, the risk being dependent on the relative horizontal velocity of the two aircraft (i.e. whether they are same or opposite direction traffic) and the length of time the aircraft spends on the incorrect level without the deviation being corrected in some way, either by a re-clearance or return to the correct flight level.

2.5.6.3 In scenario C, aircraft 1 climbs through an incorrect level. This again results in a possibility of collision with aircraft 2, the risk again being dependent on the relative horizontal velocity of the two aircraft, but also on the climb rate of aircraft 1, since this is directly proportional to the length of

time it takes aircraft 1 to pass through the level of aircraft 2. The aircraft could also have a loss of separation with aircraft 3.

2.5.6.4 From consideration of Figure 2.1, it can be seen that an individual deviation could contribute to more than one category of error. For example, once an aircraft has crossed an incorrect level, and is at scenario C, there are a number of different outcomes that could follow:

a) Aircraft 1 is given a new clearance to join the level of aircraft 3 or return to its own level. In this case aircraft 1 has only being involved in one crossing-level type risk.

b) Aircraft 1 is continues without clearance to join the level of aircraft 3. In this case aircraft 1 is involved in a further joining-level event with aircraft 3.

c) Aircraft 1 descends without clearance to join the level of aircraft 2. In this case, aircraft 1 is involved in a height-bust type event with aircraft 3, and joining-level event with aircraft 2.

d) Aircraft 1 descends without clearance to its correct flight level. In this case aircraft 1 is involved in the height-bust type event with aircraft 3, and another crossing-level event with aircraft 2.

e) Aircraft 1 continues to climb without clearance. In this case aircraft 1 is involved in another crossing-level event, this time with aircraft 3, and is in the position of needing a new clearance (outcome a) or being involved in further height-bust, joining-level or crossing-level events (outcomes b - e).

2.5.6.5 It should be noted that deviations falling into these categories can have any one of a number of causes, such as human error on the part of ATC and/or aircrew, or environmental factors such as turbulence or wake vortex. In all cases, these deviations have to be considered for their contribution to the total risk, which is assessed against the TLS of $5x10^{-9}$. They are not part of the assessment against the TLS of $2.5x10^{-9}$, which will be taken to relate only to the risk due to the performance of technical height-keeping equipment.

2.5.6.6 In each case, the risk resulting from the deviation must be calculated based on detailed information provided by the reporting unit. Alternatively, MECMA must perform its analysis based upon a number of assumptions as outlined below. However, it should be noted that this methodology is inferior in accuracy compared to an assessment based upon detailed data. In some cases the information provided is incomplete and/or conflicting and MECMA has established the following general guidelines for evaluation of the safety impact:

a) A documented statement is accepted in preference to a statement that is either undocumented or non-specific in nature.

b) In cases where the above order of preference cannot be applied, MECMA is applying a conservative approach – e.g. if only an undocumented AAD report is available, this report will included in calculation of the AAD ratio.

c) If information about duration is not available in the AAD report and cannot be established through other means, it will be considered as being equal to the default values used in the European RVSM assessment as set out in Table 2.2 below:

Cause of deviation	**Default value**
Level bust	800 ft
Level flight at incorrect level	100 seconds
Further deviation following ATC action, due to reaction time	400 ft

Table 2.2 - Default values

d) If information about climb/descent performance is not available in the AAD report and cannot be established through radar tape transcripts or flight data recordings, it will be considered as being equal to the assumed vertical speed values used in the European RVSM assessment as set out in Table 2.3 below:

Event	**Assumed vertical speed**
Engine failure (3 or 4 engines)	200 fpm (2 kts)
Engine failure (2 engines)	500 fpm (5 kts)
Normal Climb/descent	1500 fpm (15 kts)
Turbulence or TCAS incident	2000 fpm (20 kts)
Pressurisation failure	5000 fpm (50 kts)

Table 2.3 - Assumed Climb/Descent Rates

TURBULENCE

2.6 One airline (Emirates) had collected turbulence data for the safety analyses with a view to establishing the possible impact of turbulence on RVSM within the Middle East Region and ten turbulence reports for the period 31 March - 31 May 2002 had been forwarded to MECMA. These reports covered both clear air turbulence and wake turbulence and are categorised as set out in Table 2.4 below:

No. of reported cases	Light	Moderate	Severe
Wake turbulence	-	5	-
Met turbulence	1	3	1
Orographic turbulence	-	-	-

Table 2.4 – Turbulence Reports - EK

2.6.1 Two different types of reporting forms were used – both designed for reporting of wake turbulence. In cases where severity was not stated, Moderate was assumed. One Moderate/Severe report was registered as Severe.

2.6.2 The number of cases should be compared against the total number of flight hours within the MID Region in the level band FL290-FL410 and Emirates Airline is requested to provide an estimate of this figure.

2.6.3 Emirates was requested to provide an estimate of the total number of flight hours within the MID Region in the level band FL290-FL410 while IATA agreed to collect turbulence reports from other carriers and forward them to MECMA with a view of reaching firm conclusions about the possible safety implications of wake turbulence at MID RVSM TF/6.

COORDINATION FAILURES

2.7 Reporting of Operator Errors (OE) – usually referred to as ATC coordination failures – was introduced with effect from 01 July 2001 and MECMA is maintaining a database of all reported occurrences above FL285. A standardised form for reporting of ATC coordination failures is posted on the MECMA website along with guidance on completion of the form and Preliminary results were presented to MID RVSM TF/4 in March 2002.

2.7.1 To achieve uniform evaluation of coordination failures, the following definition is used by MECMA:

ATC Coordination Failure: An operational error in the ATC system whereby at least one of the ATC units or sectors involved in the transfer of control of a flight lacks, or has substantially incorrect, current flight plan data resulting in a flawed basis for decisions with respect to separation from other flights.

2.7.2 The results received by MECMA for January - April 2002 for Cairo ACC are tabulated in **Appendix 2H** to the report on Agenda Item 2. This reporting has highlighted a particular problem with scheduled services operating at VFR levels over the Red Sea along the common boundary between Cairo and Jeddah FIRs. This practice has been adopted as air traffic services are not being offered due to the departure or destination airport(s) for the flights concerned. Such flights constitute a type of coordination failures that are a regular and avoidable occurrence.

2.7.3 The meeting recognised that safe implementation of RVSM in the Red Sea area will be predicated on introduction of measures to mitigate the risk associated with the operational practice of navigating uncontrolled IFR flights at VFR levels along the FIR boundary.

2.7.4 IATA agreed to coordinate with the concerned air carriers with the objective of implementing an agreement whereby such flights will be conducted at one or two assigned level(s) in order to permit establishment of appropriate vertical separation for crossing traffic. Furthermore, the meeting agreed to call upon ICAO to utilise its good offices to ensure coordination of agreed measures between States in the area.

AIRCRAFT APPROVALS DATABASE

2.8 MECMA's duties and responsibilities include:

"to establish and maintain a central registry of State RVSM approvals of operators and aircraft using the Middle East Region airspace where RVSM will be applied";

and

"to facilitate the transfer of approval data to and from other RVSM regional monitoring agencies".

2.8.1 In pursuit of this tasking, MECMA has visited Eurocontrol and recently received a copy of their prototype database for airworthiness approval of aircraft and operators for RVSM operations. This database will be updated by MECMA with respect to aircraft registered in Middle East States and/or operated by Middle East aircraft operating agencies.

2.8.2 Considerable updating of the database would be required and MECMA carried out liaison with the 11 States present at the Task Force meeting as part of the process.

2.8.3 A demonstration of the database was made for the SAM Work Group.

MID RVSM TF/5
Appendix 2A to the Report on Agenda Item 2

Terms of Reference

SAFETY & AIRSPACE MONITORING WORK GROUP (SAM/WG)

The SAM/WG is responsible for mathematical and statistical analysis to assist with the maintenance and on-going monitoring of safety through the assessment of collision risk for Middle East Region RVSM and other tasks as agreed with the RVSM Task Force.

The main tasks of the SAM/WG are:

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

b) To review existing mathematical and statistical techniques to assure their appropriateness for MID Region RVSM;

c) To ensure the transferability of aircraft data collected from other airspace regions;

d) To support the assessment of the safety of RVSM prior to and during the Verification and Operational Trials by the production of collision risk assessments based on height deviation incidents and height monitoring data to determine whether the TLS is being met;

e) To devise suitable methodologies for incorporating the effects of projected traffic increases and system changes on occupancy and collision risk in the future environment;

f) To identify those elements which are critical in the assessment of collision risk and suggest areas where improvements might be effective in reducing risk;

g) To establish a policy for investigating those errors that may jeopardise satisfaction of the Target Level of Safety (TLS);

h) To estimate periodically the vertical occupancies (traffic densities, passing frequencies, etc.) in the MID Region; and

i) To perform periodically other data collections (e.g. ASE stability) in order to ensure that the parameter values used in the mathematical collision risk models remain current.

MID RVSM TF/5
Appendix 2B to the Report on Agenda Item 2

Duties and Responsibilities of MECMA

The Middle East Central Monitoring Agency (MECMA) for RVSM implementation has the following duties and responsibilities:

a) to establish and maintain a central registry of State RVSM approvals of operators and aircraft using the Middle East Region airspace where RVSM will be applied;

b) to facilitate the transfer of approval data to and from other RVSM regional monitoring agencies;

c) to establish and maintain a data base containing the results of height-keeping performance monitoring and all altitude deviations of 300 ft or more within Middle East Region airspace, and to include in the database the results of MECMA requests to operators and States for information explaining the causes of observed large height deviations;

e) provide timely information on changes of monitoring status of aircraft type classifications to State authorities and operators;

e) to assume overall responsibility for

i) coordination of the Global Positioning System Monitoring System (GMS); and
ii) assessing compliance of operators and aircraft with RVSM height-keeping performance requirements

in conjunction with RVSM introduction in the Middle East Region;

f) to provide the means for identifying non-RVSM approved operators using Middle East airspace where RVSM is applied; and notifying the appropriate State approval authority; and

g) to conduct readiness assessments and safety assessments as an aid for the Middle East RVSM Task Force for decision making in preparation for RVSM implementation on a specified date.

h) to establish and maintain a database containing results of navigation error monitoring;

i) to prepare, each six months, reports setting out the results of navigation error monitoring for the preceding six-month period. These results shall be presented to the ICAO Middle East Office, Cairo, and States as part of their decision process related to safety management;

j) to conduct safety assessments as an aid for the Middle East RNP/RNAV Task Force for decision making in conjunction with expansion or changes to the RNP route structure within the Middle East Region;

k) to liaise with other Regional monitoring agencies and organisations to harmonise RNP implementation and upgrading.

RVSM Traffic Sample Report Form

Date	Callsign	Type	ADEP	ADES	Entry Point	Entry Time	Entry Level	Exit Point	Exit Time	Exit Level

AAD Reports

Date	Time	C/S	TYPE	FROM	TO	FIR	Route	POSN	CFL	AFL	AAD	Duration	Conf.	MECMA Conclusion
2-Nov-01	0:40	GFA023	B763	OBBI	LIMC	OEJD	UR219	ULOVO	390	379	-1,100 ft		U	ATC eqpt. Error
2-Nov-01	2:22	EVA68	B747	EGLL	VTBD	OEJD	UR219	PAXAN	330	339	+900 ft		DD	ATC eqpt. Error
5-Nov-01	14:46	SVA1057	B777	OERK	OEJN	OEJD	G782	RAMIN	390	393	+300 ft		U	ATC eqpt. Error
5-Nov-01	14:58	SWAP61	L101	LCLK	OEPS	OEJD	A145	GAS	330	337	+700 ft		U	ATC eqpt. Error
5-Nov-01	23:49	SIA319	B744	EGLL	WSSS	OEJD	UR219	TOTAD	330	345	+1,500 ft		DD	ATC data error
7-Nov-01	0:22	SVA3940	B742	OEDF	EBBR	OEJD	T503	GOLBI	310	317	+700 ft		DD	ATC eqpt. Error
9-Nov-01	7:59	SYR517	B722	OSDI	OMAA	OEJD	UR219	KMC	330	335	+500 ft		DD	ATC eqpt. Error
12-Nov-01	20:15	AZA748	MD11	LIMC	OMDB	OEJD	T503	TOTAD	330	334	+400 ft		DD	ATC eqpt. Error
15-Nov-01	1:44	MSR664	B743	OEJN	HECA	OEJD	A411	YEN	430	444	+1,400 ft		U	ATC eqpt. Error
16-Nov-01	19:46	UAE02	B773	EGLL	OMDB	OEJD	UR219	ULOVO	370	365	-500 ft		DD	ATC eqpt. Error
16-Nov-01	20:09	RCH500	DC86	LIPA	OKBK	OEJD	A145	GIRSA	290	300	+1,000 ft		DD	ATC eqpt. Error
24-Nov-01	4:57	CLX799	B744	OMAA	ELLX	OEJD	UR219	ULOVO	310	307	-300 ft		N	ATC eqpt. Error
27-Nov-01	1:00	UAE05	A330	OMDB	EGLL	OEJD	UR219	KMC	390	394	+400 ft		N	Operated via OIIX FIR
30-Nov-01	15:46	MEA368	B742	OEJN	OLBA	OEJD	B544	TRF	390	383	-700 ft		N	ATC data error
9-Jan-02	14:17	SVA1740	B732	OEBH	OERK	OEJD	V33	UMRAN	290	293	+300 ft		N	Closed, not RVSM type
13-Jan-02	1:13	MAS20	B744	WMKK	LFPG	OJAC	50 TRF	ABBAS	350	Lost			n/a	Txpdr failure
20-Jan-02	18:44	UAE402	B772	HECA	OMDB	OEJD	A145	ALNAT	330	335	+500 ft		N	ATC eqpt. Error
26-Jan-02	17:37	UAE26	A332	EDDM	OMDB	OJAC	R785	TRF	370	366	-400 ft		I	FDR examined. Spurious report
26-Jan-02	17:51	UAE24	A332	LFPG	OMDB	OJAC	R785	ZELAF	410	414	+400 ft		I	FDR examined. Spurious report
27-Jan-02	6:28	CAL241	B747	OMAA	EDDF	OJAC	R785	TRF	310	311	+100 ft		I	Within limits
30-Jan-02	0:12	SVA103	B772	OERK	EGLL	OJAC	R785	TRF	310	305	-500 ft	100 secs.	D	AAD
2-Feb-02	20:47	CAL254	B744	ELLX	OMAA	OJAC	R785	TRF	290	444	+15,400 ft		I	Mode C error
8-Feb-02	17:50	SAF107	LR35	OETF	OERY	OEJD	V43	DFN	330	326	-400 ft		I	ATC eqpt. Error
18-Feb-02	12:49	HZSJP3	CL60	OERK	HECA	OEJD	A145	GAS	310	305	-500 ft		I	ATC eqpt. Error
21-Mar-02	8:55	FNY55A2	FA10	OEPS	HELX	OEJD	A145	WEJ	350	347	-300 ft		N	ATC eqpt. Error

Traffic Distribution and Times

		Movements	Percentage
Overflights - Jet		6,093	24.67%
Overflights - Prop		1,004	4.06%
Intl. ARRs		8,457	34.24%
Intl. DEPs		8,463	34.26%
Domestic		684	2.77%
Total movements		24,701	100.00%
Total flight time		2,591 hrs	

Category	Entry to Airspace	Exit from Airspace	Baseline	Percentage of total Movements	Proportion in FL290 - FL410 band	Time in FL290 - FL410 Band	Time in FL290 - FL410 Band per Movement
Overflights - Jet				24.67%	95%	22.8 mins.	5.3 mins.
Overflights - Propeller				4.06%	0%	0.0 mins.	0.0 mins.
Arrivals	DARAX	OMA*	0.05%	0.05%	100%	6.0 mins.	0.0 mins.
Arrivals	DARAX	OMNE	1.46%	1.31%	77%	7.6 mins.	0.1 mins.
Arrivals	PAPAR	OMA*	0.25%	0.23%	96%	11.5 mins.	0.0 mins.
Arrivals	PAPAR	OMNE	5.17%	4.64%	91%	2.8 mins.	0.1 mins.
Arrivals: BUNDU, GISMO, ITRAX, LALDO, MUSAP, ORSAR, SODEX			16.89%	15.13%	0%	0.0 mins.	0.0 mins.
Arrivals	SISOK	OMNE	1.10%	0.99%	16%	9.7 mins.	0.0 mins.
Arrivals	SISOK	OMA*	4.04%	3.62%	81%	5.1 mins.	0.1 mins.
Arrivals	TUGOS	OMNE	9.25%	8.28%	89%	2.7 mins.	0.2 mins.
Departures	OM**	BALUS	14.44%	12.95%	53%	4.5 mins.	0.3 mins.
Departures	OMA*	DARAX	0.05%	0.05%	100%	5.0 mins.	0.0 mins.
Departures	OMNE	DARAX	1.53%	1.38%	6%	0.0 mins.	0.0 mins.
Departures: BUNDU, DENBO, ENADA, LABRI, ORSAR, SODEX, TOSNA			17.96%	16.10%	0%	0.0 mins.	0.0 mins.
Departures	OMA*	PAPAR	0.11%	0.10%	67%	7.9 mins.	0.0 mins.
Departures	OMNE	PAPAR	4.11%	3.68%	45%	2.7 mins.	0.0 mins.
Domestic				2.77%	0%	0.0 mins.	0.0 mins.
Totals for All Movements in OMAE FIR				100.00%			**6.3 mins.**

HECC

2001	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01	2001
Overflights				3,205	3,205		
Intl. ARRs				2,675	2,675		
Intl. DEPs				2,988	2,988		
Domestic				2,401	2,401		
Total	0	11,746	10,869	11,269	11,269	12,155	57,308
Minutes per flight		33.00	33.00	33.00	33.00	33.00	
Total flying hours	0	6,460	5,978	6,198	6,198	6,685	31,519

2002	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02	2002
Overflights													
ARRs & DEPs													
Total	14,181	16,162	14,181	14,082									58,606
Minutes per flight	33.00	33.00	33.00	33.00									
Total flying hours	7,800	8,889	7,800	7,745									32,233

OMAE FIR

Total Flying Time FL290-FL410

2001	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01	2001
Overflights - Jet	4,053	4,150	4,863	7,758	8,375	8,626	
Overflights - Prop	347	370	418	704	649	705	
Intl. ARRs	8,053	8,124	7,715	7,647	7,842	8,060	
Intl. DEPs	8,066	8,129	7,720	7,628	7,888	8,026	
Domestic	530	506	561	617	536	489	
Total	21,049	21,279	21,277	24,354	25,290	25,906	
Minutes per flight	5.23	5.28	5.96	7.77	8.03	8.07	
Total flying hours	1,836	1,874	2,112	3,154	3,387	3,486	15,848

2002	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02	2002
Overflights - Jet	8,346	6,438	7,461	6,226	6,093								
Overflights - Prop	714	865	938	958	1,004								
Intl. ARRs	8,306	7,754	8,877	8,361	8,457								
Intl. DEPs	8,342	7,742	8,919	8,377	8,463								
Domestic	520	483	584	711	684								
Total	26,228	23,282	26,779	24,633	24,701								
Minutes per flight	7.77	6.91	6.96	6.42	6.29								
Total flying hours	3,398	2,682	3,105	2,634	2,591								14,410

Coordination Failures - Cairo FIR

Date	Time	Unit 1	Sep 1	COP	Level	TFC	Unit 2	Sep 2	Callsign	Atyp	SSR	From	To	Complaint	Fault
07 Jan 02	13:40	HECC		DIDLI	360	1	OEJD		ETH424	B762		HAAB	LLBG	Entered along HECC/OEJD FIR bdry without coordination. Crossing all AWYs.	Acft.
11 Jan 02	15:20	HECC		SILKA	340	1	OEJD		ELY9905	B747		LLBG	HKNA	Entered along HECC/OEJD FIR bdry without coordination. Crossing all AWYs.	Acft.
17 Jan 02	14:05	HECC		SILKA	320	1	OEJD		ELY535	B747		LLBG	HKNA	Entered along HECC/OEJD FIR bdry without coordination. Crossing all AWYs.	Acft.
24 Jan 02	16:15	HECC		SILKA	300	1	OEJD		ELY081	B747		LLBG	VTBD	Entered along HECC/OEJD FIR bdry without coordination. Crossing all AWYs.	Acft.
30 Jan 02	14:50	HECC		SILKA	360	1	OEJD		4XCOG	B747		LLBG	HKNA	Entered along HECC/OEJD FIR bdry without coordination. Crossing all AWYs.	Acft.
08 Feb 02	17:15	HECC		SML	390	1	OEJD		PRX102	B767	1550	HKMO	HEGN	No estimate received	OEJD
22 Feb 02	10:40	HECC		HESN	290	1	HELX		MSR136	A320	1443	HECA	HESN	No position reports	Acft.
26 Feb 02	12:11	HECC		GESAD	330	1	LGGG		RCH215	C135	2313	LIRA	OBBI	Transponder off after position DBA	Acft.
23 Mar 02	11:40	HECC		METRU	330	1	LGGG		N91384	B757	2132	LGKR	HELX	Entered HECC FIR without coordination	LGGG
24 Mar 02	22:40	HECC		NALSO	310	1	LLLL		ELY511	B767	2000	LLBG	FAJS	Entered HECC FIR without coordination	LLLL
02 Apr 02	09:01	OEJN		PASAM	290	1	HECC		VVMN803	B737	3124	OBBI	LICZ	Entered HECC FIR via GIBAL instead of PASAM	OEJD
12 Apr 02	10:25	LLBG		PASOS	295	1	HECA		LD12A	ZZZZ	2421	ZZZZ	ZZZZ	Entered HECC FIR without coordination, operated for 1½ hour	LLLL

REPORT ON AGENDA ITEM 3 : ATC OPERATIONS ASPECTS (ATC/WG)

3.1 In accordance with its Terms of Reference and Work Programme *(See* **Appendix 3*A*** to the Report on Agenda Item 3*)*, the ATC/WG is responsible for addressing all matters relating to air traffic services (ATS) within the RVSM and transition airspace. The Group adopted the following agenda:

Agenda 1: Review the Operational Implementation Plan.

_ RVSM Transition Plan.

_ Contingency Procedure

_ Degradation of aircraft equipment.

_ Severe Turbulence Procedures.

_ Congestion Problem.

Agenda 2: Review Implementation Issues.

_ ATM System requirements.

_ ATC Manual

_ Training guidelines of personnel involved in RVSM implementation.

Agenda 3:. Review of Evaluation Forms.

Agenda 4: Updating RVSM TF Task List.

Agenda 5: Other Issues.

SUMMARY OF DISCUSSIONS

3.2 Review the Operational Implementation Plan.

3.2.1 Under this agenda item, the meeting agreed that with a view to harmonize procedures within the MID Region, all materials developed by States be included in the Draft ATC Manual prepared by the Secretariat. It was pointed out that the draft Manual was inspired from the ATC Manual developed by Eurocontrol for the implementation of RVSM in Europe.The meeting also noted with appreciation the offer of Eurocontrol to review the materials once the first draft is completed.

RVSM Transition Plan

3.2.2 The meeting noted with appreciation the comprehensive procedures developed by Saudi Arabia for handling of RVSM traffic within the transition areas, in particular, for traffic operating to/from Jeddah FIR. Action to be taken by Saudi Arabia for ensuring that all requirements are met in a timely manner was also highlighted. The meeting agreed that other States in the MID region may wish to use the transition implementation plan for the preparation of their own action plans if necessary. In order to ensure that transition areas in the Region are kept to a minimum, the need for firm commitment of all parties concerned was emphasized.

3.2.3 The meeting was also apprised of transition procedures developed by Eurocontrol and it was agreed that these procedures be adopted in the MID Region and included in the draft ATC Manual for further review and consideration.

Contingency Procedure

3.2.4 The meeting also considered the contingency procedures to be applicable in the event of a degradation of aircraft equipment or during severe turbulences. The proposed draft procedures were reviewed and were endorsed for inclusion in the draft ATC Manual. It was however, agreed that these procedures will be further reviewed.

Congestion Problem

3.2.5 The meeting was informed of the following urgent issues which have to be addressed as soon as possible, with a view to meet the target level of safety (TLS) for the implementation of RVSM:

i) Creation of a Dual route for channeling of traffic between Eastern Mediterranean to the MID Region

ii) Problems associated with uncoordinated flights transgressing the Cairo and Jeddah FIRs at non standard flight levels

Creation of a Dual route for channeling of traffic between Eastern Mediterranean to the MID Region

3.2.5.1 It was noted with concern that, to date, the alignment of the dual route which was proposed for the channeling of traffic from the Eastern Mediterranean to the MID Region was still not agreed upon. Preliminary results of the safety assessments carried out by MECMA indicate that the target level of safety (TLS) at points Turaif and ZELAF are well above the acceptable limit. It was pointed out that, in case the matter is not addressed urgently, this may delay the implementation of RVSM within the Amman, Beirut and Damascus FIRs respectively. Furthermore, Saudi Arabia indicated its willingness to implement the parallel route structure up to significant point TONTU. It was however clarified that it will not implement an RVSM transition area within its FIR for the handling of traffic to/from the Eastern Mediterranean area. States concerned were requested to explore ways and means of finding a solution to this outstanding problem. (The proposal made within the framework of EMARSSH TF/7 meeting (Iran, 13- 16 May 2002) is at **Appendix 3B** to the report on Agenda Item 3.

3.2.5.2 In view of the fact that the delay in the creation of the parallel route segments from Turaif and point TONTU may delay the implementation of RVSM for traffic to/from Eastern Mediterranean and the MID region, other States were requested to consider alternative routes with a view to split the traffic so as to meet the TLS value. The meeting noted that Cyprus has also offered many proposals for consideration by the parties concerned.

3.2.5.3 ICAO and IATA were requested to use their good offices with a view to resolve the issue as soon as possible and, before October 2002, so as to meet the agreed implementation date of 28 November 2002 for the introduction of the dual routes.

Problems associated with uncoordinated IFR flights transgressing the Cairo and Jeddah FIRs at non standard flight levels

3.2.5.4 The meeting was apprised of a very dangerous situation prevailing in the Red Sea area where some uncoordinated IFR flights, maintaining non standard flight levels, and for which no prior flight plan or departure information is made available, regularly transgress the Cairo and Jeddah FIRs This situation is further exacerbated by the fact that no communications/coordination are established with those flights. It was noted that RVSM will not be introduced in that area unless a solution is

reached concerning those uncoordinated IFR flights which presently operate at RVSM flight levels. The meeting considered several options, including, the reservation of a level band at which these aircraft could operate.

3.2.5.5 The meeting requested IATA to approach the operators *(El-Al, Air India and Ethiopian Airlines)* as a matter of urgency, and draw their attention to the nature and severity of the problem. ICAO was requested to closely monitor the situation and explore ways and means of finding a solution to the problem which is endangering the safety of international flights operating in the region.

3.3 Review Implementation Issues.

ATM System requirements

3.3.1 Under this agenda item the meeting was apprised of the ATM system requirements and capabilities needed for effective implementation and control of air traffic in an RVSM environment. It was pointed out that ATC systems support provisions will make possible the display of the related flight plan information which will enable the controllers to be systematically aware of any particular le of the type of information on the flight strips and the radar display was also noted by the meeting.

3.3.2 Different types of information which may be included in a flight progress strip and on a radar display was noted.

ATC Manual

3.3.3 The meeting considered the working draft on an ATC Manual developed by the Secretariat which is inspired from the ATC Manual application within the European RVSM airspace. The meeting agreed that the Manual will be updated with a view to reflect the MID environment and its specificities.

3.3.4 The offer by EUROCONTROL to review the draft Manual upon completion was noted with appreciation. States were invited to peruse the information contained therein, and to send their comments to the Secretariat as soon as possible and prior the next MID RVSM TF/6 meeting planned for October 2002. The draft will be further reviewed at the RVSM TF/6 meeting. The Working Draft of the Manual is at **Appendix H** to the report.

3.3.5 Based on the foregoing the meeting formulated the following conclusion:

Conclusion 5/2: Draft ATC Manual for RVSM in the MID Region

That, States of the MID region review the Draft ATC Manual for RVSM in the MID region, which has been prepared by the Secretariat and send their comments to the ICAO MID Regional Office as soon as possible preferably prior to October 2002.

Training guidelines of personnel involved in RVSM implementation

3.3.6 Under this agenda item the meeting recalled that MIDANPIRG/7 meeting under conclusion 7/17 highlighted the need for the training of all Personnel Involved with the Implementation of RVSM in the MID Region. Furthermore, the MIDANPIRG/7 while reviewing the report of the CNS/ATM/IC/SG/1 meeting adopted Decision 7/37 -Establishment of the CNS/ATM Human Resource Planning and Training Task Force which states as follows:

of priority for the MID Region with the Terms of Reference and Work Programme as presented at Appendix 6C to the report on Agenda Item 6. The composition will be decided at the first meeting of

3.3.7 The Fourth meeting of the MID RVSM Task Force had noted with appreciation the creation of a Human Resources Planning and Training Task Force by MIDANPIRG/7 and urged that the human resources training for the implementation of RVSM be also addressed within the framework of that Task Force created by MIDANPIRG/7.

3.3.8 The MID RVSM Task Force Work Programme (Task List) under point 29 of the ATC Operational Issues, indicates that, develop ATC regional training guidance material is targeted to be finalized by 02 October 2002, Bahrain to prepare a draft; and under point 31, requires, all States in the MID region to conduct local RVSM training for air traffic controllers, to start on 27 March 2003 and be finalized on 26 November 2003, by all MID region States.

3.3.9 The meeting accordingly noted with appreciation the training guidelines presented by Bahrain and urged all MID Sates to give due regard to the requirements indicated at **Appendix 3C** to the report on Agenda Item 3 while developing their own RVSM training programme.

3.3.10 Based on the foregoing the meeting framed the following conclusion:

Conclusion 5/3: MID RVSM Training Guidelines

That:

a) the MID region States take into account the training guidelines as indicated at **Appendix 3C** to the report on Agenda Item 3, when developing their training programme for the implementation of RVSM;

b) the CNS/ATM Human Resources Planning and Training Task Force take into account the requirements identified in the training guidelines and -
region.

3.3.11 The meeting was also apprised of the comprehensive RVSM training module developed by Oman. It was agreed that all the draft procedures being developed will eventually be included in the ATC Manual.

3.4 Review of Evaluation Forms.

3.4.1 The meeting recalled that the RVSM TF/4 meeting developed an evaluation form checklist with a view to have an indication on the status of preparedness by States for ensuring that the target date of 27 November 2003 for the implementation of RVSM in the MID Region is met. It was also agreed that the data should be sent to the ICAO MID Office on a quarterly basis. The meeting accordingly reviewed the inputs received from States and it was noted that many States have so far not provided the required data. The meeting requested the Secretariat to update the evaluation forms for further review by the RVSM TF/6 meeting in October 2002. The Evaluation Forms are at **Appendix C** to the report.

3.5 Updating RVSM TF Task List.

3.5.1 At each meeting, the RVSM Task Force reviews that Task List and ensures that prompt action is being taken by all parties concerned for the safe implementation of RVSM. The updated Task List is at **Appendix B** to the report.

3.6 Other issues

3.6.1 The Group agreed that many conclusions and materials developed by the Task Force (AICs, AIP Supplements, proposals for amendment of the Regional SUPPs for in-flight contingencies and

Secretariat to include these materials as an attachment to the report for reference purposes (See Appendices D *(Draft AIC)*, E *(Draft AIP Supplement-RVSM implementation policy and procedures* and F *(Draft proposal for the inclusion of procedures for in-flight contingencies developed by the ICAO, ASIA/PAC Office*)).

ATC OPERATIONS WORK GROUP (ATC/WG)

Terms of Reference

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

- To identify airspace in which RVSM will be applied based on statement of application and develop a regional operational concept, ensuring inter-regional harmonization;
- to develop procedures to mitigate wake turbulence;
- to establish transition areas and develop transition procedures;
- to develop contingency procedures; and
- to consider workload issues and identify the need for controller simulations

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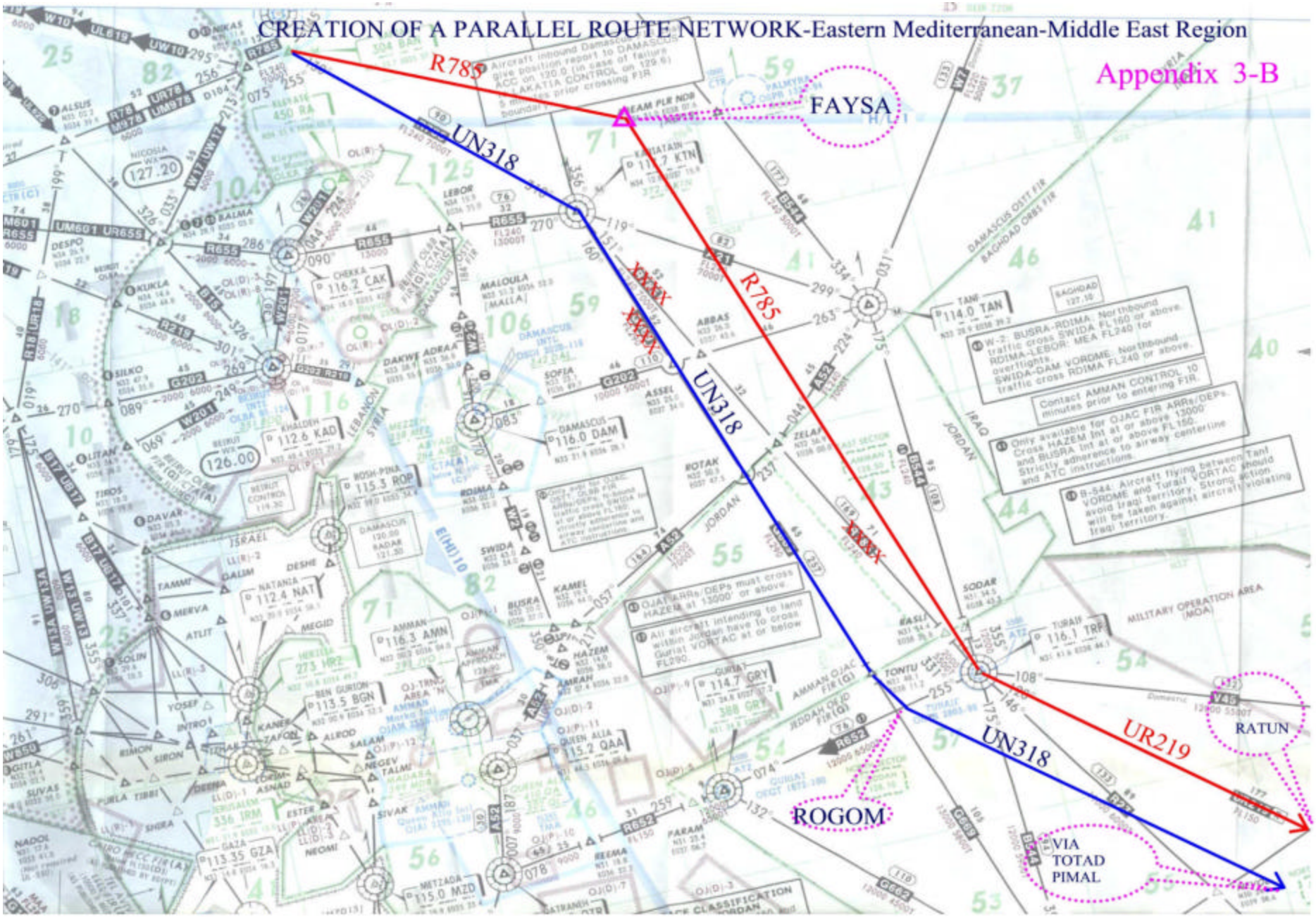
CREATION OF A PARALLEL ROUTE NETWORK-Eastern Mediterranean-Middle East Region
Appendix 3-B
R785
UN318
FAYSA
R785
UN318
UN318
UR219
RATUN
ROGOM
VIA
TOTAD
PIMAL

MID RVSM TF/5
Appendix 3C to the Report on Agenda Item 3

ATC Operations Aspects (ATC/WG)

(Task List No.29)

TRAINING GUIDELINES

(Presented by Bahrain)

1. INTRODUCTION

1.1. During the planning process for the introduction of RVSM in the North Atlantic and the European Regions, the need for awareness and skills training for air traffic controllers was recognized as critical to the safe and timely implementation of the programme. The subsequent ease with which control staff adapted to the new environment is testament to the success of this training programme. As with the above mentioned regions, the introduction of RVSM into the MID region is a major event which can only be accomplished safely and effectively through adequate awareness and skills training for all staff involved.

1.2 The detailed implementation of RVSM within each State will be highly individualized based on many factors including differing airspace structures, traffic density and working environments. Since each ACC will encounter slightly different technical and practical problems with the introduction of RVSM, training for these ACCs will have to be carried out at a national level using State resources so that it can be tailored to meet local needs; this paper will provide guidelines for the training process.

2. TRAINING OVERVIEW

2.1 Training, at a National level, is necessary for the safe and timely introduction of RVSM into the MID Region. The amount and scope of the training required is dependent on a large number of factors. Experience with the introduction of RVSM in the NAT and EUR Regions has shown that amount of skills training for air traffic controllers in the operational aspects of RVSM is surprisingly small; essentially, the skills required to handle aircraft within RVSM airspace are the same as those skills currently used. However, it is unlikely that most States will be introducing RVSM without other changes such as amendments to route structures, vertical and horizontal sectorization and inter-center Letters of Agreement. Additionally, supporting systems, such as RDPS and FDPS, will have to be changed to reflect the presence of both RVSM and non-RVSM approved aircraft; air traffic controllers will also require familiarization training with these changes.

2.2 Training for the introduction of RVSM will encompass three layers. Firstly, awareness training; secondly, formal briefings or presentations, and finally, practical training, preferably using simulators. Experience has proven that comprehensive and dynamic awareness training can significantly reduce the burden of formal theoretical and practical training. If air traffic controllers can obtain information about the operational aspects of RVSM, including the safety aspects and implementation at a National level, before training is due to take place, then the need for formal presentations on the background aspects of the programme can be reduced or even removed.

3. TRAINING AIM

3.1 The aim of RVSM air traffic control training at a national level is to ensure that air traffic controllers involved with RVSM have sufficient theoretical knowledge and practical skills with the RVSM operational procedures to enable the safe and timely implementation of RVSM within the MID region.

4. TRAINING OBJECTIVE

4.1 By the end of the national training programme, air traffic controllers should be able to implement the RVSM operational procedures, safely and efficiently, within their own airspace.

5. AWARENESS TRAINING

5.1 Controllers will need to be aware of the background to RVSM, the benefits that RVSM will provide and be reassured that safety will not be compromised. They will need an overview of the aircraft certification procedure and need to be aware of the authority for refusing entry into RVSM airspace for non-RVSM approved civil aircraft. On a practical level, they will need to be conversant with the regulations and operational procedures applicable to their airspace, including the flight planning requirements and the presentation of RVSM approval status on radar displays and flight strips.

6. THEORETICAL TRAINING

6.1 Theoretical training for the introduction of RVSM into the MID Region was achieved in

training for RVSM at a National level could contain the following subjects, topics and high-level objectives:

a) Introduction to RVSM. This subject will enable air traffic controllers to be aware of the background to RVSM in the MID Region. It should include the following topics:

   i) Background to RVSM

   ii) The need for RVSM

b) Safety. This subject will enable air traffic controllers to be aware of the safety aspects of RVSM. It should include the following topics:

   i) System safety

   ii) Minimum Aircraft System Performance Specification

   iii) RVSM Approval

   iv) Monitoring

c) Documentation. This subject will enable controllers to explain the regulatory documentation encompassing RVSM. It should include the following topics:

   i) ICAO documentation.

   ii) JAA/FAA documentation.

iii) National AIPs and/or AICs.

iv) Unit Documentation.

d). Operational Procedures. This subject will enable controllers to explain the RVSM operational procedures. It should include the following topics:

i) Overview of RVSM procedures.

ii) General procedures.

iii) Transition area procedures.

iv) Contingency procedures.

v) RTF procedures.

vi) Phraseology.

6.2 In addition to theoretical training on RVSM, national training will need to address the following topics:

a). Any changes to national airspace, sectorization and inter-centre Letters of Agreement.

b). Any airspace changes that will take place concurrently with the introduction of RVSM.

c). Any new or amended operating procedures relating to the planned airspace changes.

d) Changes to the Human/Machine Interface for Radar Display and Flight Data Processing Systems.

7. PRACTICAL TRAINING

7.1. Practical training for RVSM at national level should be conducted using simulation facilities that will allow air traffic controllers to familiarize themselves with the RVSM routine and contingency procedures. This will require that the simulation facilities include the software changes developed for the operational systems with respect to display of non-RVSM approval status, STCA within the RVSM airspace and aircraft label and flight strip changes. Moreover, the scope of simulation training will differ depending on whether the airspace is transition airspace or non-transition airspace.

7.2 Simulation training for transition airspace could contain the following elements

a). Introduction of RVSM no airspace changes. This simulation would allow controllers to familiarize themselves with the following tasks:

i) The recognition of non-RVSM approved aircraft.

ii) The handling of mixed RVSM and non-RVSM approved aircraft with associated differing vertical separation minima.

iii) The planning and handling of level changes for non-RVSM approved aircraft.

iv) The planning and handling of level changes for RVSM approved aircraft.

v) The handling of non-RVSM approved State aircraft entering RVSM airspace.

vi) Contingency handling for weather and equipment-related phenomena.

b) Additional Exercises. Subsequent simulation exercises could introduce any airspace and associated co-ordination procedure changes.

7.3. Simulation training for non-transition airspace could contain the following elements:

a) Introduction of RVSM no airspace changes. This simulation would allow controllers to familiarize themselves with the following tasks:

i) The recognition of non-RVSM approved aircraft if the sector involves non-RVSM levels.

ii) The planning and handling of RVSM approved aircraft within the RVSM airspace.

iii) The handling of non-RVSM approved State aircraft entering RVSM airspace.

iv) Contingency handling for weather and equipment-related phenomena.

b) Additional Exercises. Subsequent simulation exercises could introduce any airspace and associated co-ordination procedure changes.

8. CONCLUSION

8.1 States are invited to note the information in this paper and to focus on the following subjects in developing their training program:-

i) Application of RVSM;
ii) Coordination between en-route sectors;
iii) Coordination with adjacent ACCs;
iv) Transition from RVSM to CVSM levels and vice versa;
v) Transit of non-RVSM approved aircraft within RVSM airspace;
vi) Application of contingency procedures; and
vii) Suspension of RVSM operations.

MID RVSM TF/5
Report on Agenda Item 4

REPORT ON AGENDA ITEM 4: AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS (OPS/AIR/WG)

4.1 The OPS/AIR/WG indicated its satisfaction that the MID region had adopted the Guidance Material (FAA IG 91 RVSM, and JAA TGL.6) and discussed several items related to this subject in accordance with its terms of reference (see **Appendix 4A** to the report on Agenda Item 4).

4.2 The meeting reviewed the MID RVSM Task Force Work Programme (Task List), Conclusions and Decisions of the MIDANPIRG/7 meeting held in Cairo, 21-25 January 2002, in relation to RVSM and the MID RVSM TF/4 meeting report.

4.3 After reviewing the Guidance Material (FAA IG 91 RVSM, and JAA TGL.6) the meeting was of the view that
train .

4.4 The meeting also agreed that the Region endorse the JAA TGL No18 regarding the policy for use of Airborne Collision Avoidance Systems (ACAS) as these procedures specifically address the RVSM environment.

4.5 The meeting also urged Sates to forward on a timely manner the Evaluation Form Checklist developed by the RVSM TF/4 meeting. (See **Appendix C** to the Report).

4.6 The meeting was of the view that the Secretariat carries out as survey on action which was called for under MIDANPIRG/7 Conclusions 7/17 (Training of personnel involved with the implementation of RVSM), Conclusion 7/18 (Guidance material and airworthiness operational approval), Conclusion 7/19 (RVSM Legislation) and Conclusion 7/20 (Participation of representatives of States involved in RVSM approval process).

4.7 States to ensure that operators report within 72 hours altitude-keeping errors in accordance with *Annex 6* provisions.

4.8 The meeting expressed concerns with regards to operators which have not yet obtained approval to operate in RVSM airspace. Taking into account the fact that the implementation date of 27 November 2003 is approaching, it accordingly formulated the following conclusion:

CONCLUSION 5/4- REGIONAL RVSM INFORMATION CAMPAIGN

That MID region States:

a) notify their aircraft operators that RVSM will be implemented in the MID region on the AIRAC date of 27 November 2003; and

b) request the operators to obtain required regulatory approval to operate in the RVSM airspace.

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

TERMS OF REFERENCE

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

- To harmonize policy on operations and airworthiness issues related to RVSM;

- To develop and harmonize guidance related to the implementation of RVSM and coordinate on issues which may arise in the application of the RVSM Minimum Aircraft System Performance Specifications (MASPS);

- To initiate necessary action to amend aeronautical charts to reflect navigation requirements related to RVSM;

- To develop policy for use of Airborne Collision Avoidance Systems (ACAS) as it relates to RVSM; and

- To review monitoring data prior to implementation and after implementation.

REPORT ON AGENDA ITEM 5 : ANY OTHER BUSINESS

5.1 Under this agenda item the meeting, taking into account the amount of work necessary for the completion of all activities prior to the Go/No-Go decision regarding the implementation of RVSM in the MID region established a tentative schedule of meetings for the MID RVSM Task Force as follows:

MID RVSM TASK FORCE TENTATIVE FUTURE SCHEDULE OF MEETINGS

Date	Meeting	Venue
YEAR 2002		
12 13 October	MID RVSM Seminar/2	Abu Dhabi
14 17 October	MID RVSM TF/6	Abu Dhabi
YEAR 2003		
23 26 February	MID RVSM TF/7	Abu Dhabi
25 28 May	MID RVSM TF/8	Abu Dhabi
24 27 August	MID RVSM TF/9	Abu Dhabi
19 22 October	MID RVSM TF/10	Abu Dhabi
YEAR 2004		
January	MID RVSM TF/11	To be determined

5.2 The meeting also noted the requirement for the organization of joint meetings between the MID Region and the adjacent AFI, APAC and EUR Regions with a view to harmonize procedures and it was agreed that the Secretariat will expedite action with a view to liaise with the Regions concerned for the organization of these RVSM interface meetings.

TERMS OF REFERENCE FOR THE MID RVSM TASK FORCE

1. Develop a comprehensive implementation plan for RVSM in the MID Region, taking into account the requirements of the *Manual on Implementation of a 300 M (1000 ft) Vertical Separation Minimum between FL 290 and FL 410 Inclusive (Doc 9574)*, and the requirements of users.
2. Identify any areas within the MID Region where it may not be feasible to introduce RVSM in the initial implementation.
3. Determine the extent to which a cost-benefit analysis is required prior to implementation of RVSM.
4. Coordinate with the bodies responsible for the implementation of RVSM in adjacent Regions in order to harmonize implementation plans.
5. Develop guidance material for RVSM operations in the MID Region, taking into account existing guidance material which has been developed by other regions.
6. Address any other matters, as appropriate, which are relevant to the implementation of RVSM.

MID RVSM TASK FORCE - WORK PROGRAMME

ID	Description	Start	Finish	Resources
	Working Methods and Resources			
1	~~Agree on structure of TF to enable efficient handling of specialist technical tasks~~		~~5-Oct-00~~	~~RVSM TF~~ - Completed
2	Identify resources for performing specialist technical tasks	5-Oct-00	17-Oct-02	RVSM TF
3	Investigate methods of funding any outside assistance required	5-Oct-00	17-Oct-02	RVSM TF
	Cost Benefits Analysis			
4	~~Evaluate need for a cost benefit analysis~~	~~3-Oct-00~~	~~5-Oct-00~~	~~RVSM TF~~ - Completed
	Safety Assessment and Monitoring			
5	~~Conduct preliminary data collection and readiness assessment~~	~~1-Dec-00~~	~~29-Aug-01~~	~~States, SAM/WG, ASIA/PAC RVSM TF~~ - Completed
6	~~Evaluate options for setting up a central monitoring agency~~	~~3-Oct-00~~	~~10-Apr-01~~	~~SAM/WG~~ - Completed
7	~~Evaluate options for carrying out the safety analysis~~	~~3-Oct-00~~	~~29-Aug-01~~	~~SAM/WG~~ - Completed
8	~~Evaluate options for implementation of a height monitoring program~~	~~3-Oct-00~~	~~6-Mar-02~~	~~SAM/WG~~ - Completed
9	~~Develop procedures for reporting large height deviations in existing system~~	~~1-Apr-01~~	~~29-Aug-01~~	~~SAM/WG~~-completed
10	Collect weather and turbulence data for analysis	1-Apr-01	17-Oct-02	SAM/WG
11	Develop detailed program for safety analysis	6-Mar-02	TF/6	SAM/WG
12	~~Establish requirements for pre and post-implementation monitoring~~	~~TBD~~	~~6-Mar-02~~	~~SAM/WG - 4th qtr. 03 for post implementation monitoring~~ - Completed
13	~~Undertake initial safety analysis~~	~~TBD~~	~~4th qtr. 02~~	~~SAM/WG~~-completed
14	Carry out pre-implementation safety analysis	TBD	27-Aug-03	SAM/WG
15	Carry out pre-implementation readiness assessmsent	TBD	23-Feb-03	SAM/WG
16	Carry out post-implementation safety analysis during verification phase	TBD	Mid.-04	SAM/WG
17	Review of mathematical and statistical techniques to assure their appropriateness for MID RVSM	11-Apr-01	Jan-03	SAM/WG
18	~~Ensure Tranferability of aircraft data from other Regions~~	~~11-Apr-01~~	~~June-02~~	~~SAM/WG~~- completed
19	~~Devise methodologies for incorporating the effects of projected traffic growth and system changes on occupancy & collision risk in the future environment~~	~~11-Apr-01~~	~~June-02~~	~~SAM/WG~~- completed
20	Perform periodically other data collections (eg. ASE stability) in order to ensure that the parameter vlaues used in the mathematical collision risk models remain current	11-Apr-01	ONGOING	SAM/WG
	ATC Operational Issues			
21	~~Dertermine the limits of RVSM airspace (geographic and vertical)~~	~~10-Apr-01~~	~~6-Mar-02~~	~~ATC/WG~~ - Completed
22	Develop ATC operational policy & procedures for normal RVSM operations	1-Nov-02	26-Feb-03	ATC/WG
23	Identify transition areas and transition procedures	26-Aug-01	17-10-02	ATC/WG-Egypt,Iran, Saudi Arabia,Oman to prepare draft

MID RVSM TASK FORCE - WORK PROGRAMME

ID	Description	Start	Finish	Resources
24	~~States assess the impact of RVSM implementation on controller automation systems and plan for upgrades/modifications~~	~~10-Apr-01~~	~~5-Jun-02~~	~~ATC/WG~~-completed
25	~~Develop ATC procedures for non-approved State acft to transit RVSM airspace~~	~~10-Apr-01~~	~~5-Jun-02~~	~~ATC/WG~~-completed
26	~~Develop procedures for handling non-compliant civil aircraft (inc ferry & maintenance)~~	~~10-Apr-01~~	~~5-Jun-02~~	~~ATC/WG~~-completed
27	~~Develop procedures for suspension of RVSM~~	~~10-Apr-01~~	~~5-Jun-02~~	~~ATC/WG~~- completed
28	Evaluate the need for simulations to assess ATC workload and possible need for airspace/air route/Sector changes	2-Jun-02	26-Feb-03	ATC/WG-Outside expertise may be sought
29	~~Develop ATC regional training guidance material~~	~~TBD~~	~~Oct.02~~	~~ATC/WG-Bahrain to prepare draft~~-completed
29a)	Harmonization of ATC regional guidance material	5-Jun-02	17-Oct-02	Bahrain to coordinate inputs/Secretariat to follow-up
30	Identify issues to be adressed in Letters of Agreement	10-Apr-01	17-Oct.02	ATC/WG-Lebanon to prepare draft
31	States to conduct local RVSM training for air traffic controllers	27-Mar-03	26-Nov-03	States
	OPS/AIR Issues			
32	States to examine existing legislation and regulations to identify any changes required for RVSM	5-Oct-00	17-Oct-02	OPS/AIR/WG
33	~~Develop and promulgate information on the operational approval process~~	~~1-Apr-01~~	~~29-Aug-01~~	~~OPS/AIR/WG~~ - Completed
34	Develop procedures for aircraft found to be non-compliant through monitoring	11-Apr-01	17-Oct-02	OPS/AIR/WG
35	Evaluate the need for chart amendments related to RVSM	11-Apr-01	17-Oct-02	OPS/AIR/WG - Referred to ATC/WG
36	Develop regional guidance on pilot, maintenance personnel and dispatcher training	11-Apr-01	ONGOING	OPS/AIR/WG
37	~~Examine issues related to the use of ACAS in RVSM airspace~~	~~11-Apr-01~~	~~29-Aug-01~~	~~OPS/AIR/WG~~ - Completed
38	Monitor progress with operator approvals	11-Apr-01	ONGOING	OPS/AIR/WG- Transferred to SAM/WG
	Joint Tasks			
39	~~Review preliminary readiness assessment~~	~~1-Apr-01~~	~~29-Aug-01~~	~~RVSM TF~~ –Completed- 90% target achieved
40	Set target proportion of RVSM approved aircraft for full RVSM implementation	1-Apr-01	17-Oct-02	RVSM TF
41	Set target AIRAC implementation date(AIP Supplement to be published)	7-Apr-01	2-Oct-03	RVSM TF
42	Prepare/maintain regional status report detailing RVSM implementation plans	1-Apr-01	ONGOING	RVSM TF
43	Identify major milestone and targe dates	9-Apr-01	17-Oct-02	RVSM TF - Secretariat to prepare chart.
44	Develop a regional RVSM informational campaign	7-Apr-01	17-Oct-02	RVSM TF
45	Develop regional RVSM Guidance Material	1-Apr-01	17-Oct-02	RVSM TF- Draft to be prepared by Secretary-completed
46	Review weather and contingency procedures for applicability under RVSM	10-Apr-01	17-Oct-02	Draft completed(Secretariat will harmonize with other Regions)
47	~~Develop model AICs and NOTAMs~~	~~9-Apr-01~~	~~29-Aug-01~~	Draft completed(AIC already Issued)
48	~~Evaluate preliminary readiness and safety assessments~~	~~20-Jan-01~~	~~5-Jun-02~~	~~RVSM TF~~-completed

MID RVSM TASK FORCE - WORK PROGRAMME

ID	Description	Start	Finish	Resources
49	Undertake coordination and harmonization of procedures with adjacent Regions	1-Apr-01	ONGOING	RVSM TF-joint MID/ASIA,MID/EUR and MID/.AFI meetings planned
50	Evaluate the need for tactical offset procedures to mitigate the effects of turbulence and TCAS alerts	10-Apr-01	17-Oct-02	RVSM TF
51	Develop Doc 7030 amendment	10-Apr-01	17-Oct-02	RVSM TF- Draft prepared. Being harmonized with other Regions
52	Review aircraft altitude-keeping performance and operational errors	1-Jul-01	25-May-03	RVSM TF
53	~~Develop monitoring and evaluation program for the verification phase~~	~~TBD~~	~~5-Jun-02~~	~~RVSM TF~~-completed
54	Evaluate final readiness assessment	TBD	27-Aug-03	RVSM TF
55	Evaluate final safety analysis	30-Jan-03	27-Aug-03	RVSM TF(2nd quarter 2003)
56	Go/No-Go decision	TBD	27-Aug-03	RVSM TF

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: BAHRAIN

Appendix C

FIR(s): Bahrain FIR

Rev.002

EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003		01/06/2003		01/09/2003		

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
1.1 -To verify whether the following reports are regularly being sent to MECMA:	✓	-	
Assigned Altitude Deviation (AAD) forms	✓	-	
-Total IFR movements per month	✓	-	
-Average time spent per movement at assigned levels between FL290 and FL410	-	No	
-ATC/ATC Coordination failures	-	No	
1.2 Whether any turbulence data reports have been received and sent to MECMA	-	No	
1.3 Whether traffic data has been sent	✓	-	

ATC OPERATIONS ASPECTS				
	REQUIRMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	✓	-	
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment	-	No	
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of AIC	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now
2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.	-	No	
2.8	Conduct of local training for air traffic controllers	-	No	Awareness phase has started
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	Part of the FDPS upgrade
2.10	Is there any need for changes to FDPS?	✓	-	
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	

2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	-	No	Not applicable
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	-	No	Will be considered with future upgrade

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
3.1	National Regulations for RVSM Implementation	✓	-	
3.2	Aircraft and Operator approval/guidance	✓	-	
3.3	Procedures for non-compliant aircraft	✓	-	
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers	✓	-	
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval	✓	-	80 %
3.6	How many national operators have full RVSM approval	✓	-	One
3.7	What is the percentage ratio of aircraft fleet	✓	-	50%
3.8	Did you provide MECMA with RVSM approval documentation	-	No	Being provided
3.9	Did you nominate your State RVSM Programme Manager	✓	-	
3.10	Certification	-	-	
OTHER GENERAL REQUIRMENTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
	FUNDING/BUDGETARYALLOTMENT	✓	-	
	TRAINING	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: EGYPT

Appendix C

FIR(s): CAIRO

Rev.002

EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003		01/06/2003		01/09/2003		

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
1.1 -To verify whether the following reports are regularly being sent to MECMA:	✓	-	
Assigned Altitude Deviation (AAD) forms	✓	-	
-Total IFR movements per month	✓	-	
-Average time spent per movement at assigned levels between FL290 and FL410	✓	-	
-ATC/ATC Coordination failures	✓	-	
1.2 Whether any turbulence data reports have been received and sent to MECMA	✓	-	
1.3 Whether traffic data has been sent	✓	-	

ATC OPERATIONS ASPECTS				
	REQUIRMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	✓	-	
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment	- ✓	No -	 No LOAs have been signed with MID sates. LOAs signed with Athens and Nicosia ACCs
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of aic	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now
2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.		No	To be carried out shortly
2.8	Conduct of local training for air traffic controllers	✓	-	Theoretical part only
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	
2.10	Is there any need for changes to FDPS?	✓	-	
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	

2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	✓	-	
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	✓	-	

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
3.1	National Regulations for RVSM Implementation	✓	-	
3.2	Aircraft and Operators approval/guidance	✓	-	
3.3	Procedures for non-compliant aircraft	✓	-	
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers	✓	-	
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval	92%	-	
3.6	How many national operators have full RVSM approval	12 out of 13	-	
3.7	What is the percentage ratio of aircraft fleet	60%	-	
3.8	Did you provide MECMA with RVSM approval documentation	-	✓	RVSM data monitoring will be automatically interchanged among regional monitoring agencies
3.9	Did you nominate your State RVSM Programme Manager	✓	-	Mr. Mahmoud Elshanabary
3.10	Certification	-	-	
OTHER GENERAL REQUIRMENTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
	FUNDING/BUDGETARY ALLOTMENT	✓	-	
	TRAINING	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: I.R.IRAN

Appendix C

FIR(s): TEHRAN

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EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003		01/06/2003		01/09/2003			

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
1.1 -To verify whether the following reports are regularly being sent to MECMA:	✓	-	
Assigned Altitude Deviation (AAD) forms	✓	-	
-Total IFR movements per month	✓	-	
-Average time spent per movement at assigned levels between FL290 and FL410	✓	-	
-ATC/ATC Coordination failures	✓	-	
1.2 Whether any turbulence data reports have been received and sent to MECMA	-	No	
1.3 Whether traffic data has been sent	✓	-	

ATC OPERATIONS ASPECTS				
	REQUIRMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	✓	-	
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment	✓ -	- No	
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of AIC	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now
2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.	✓	-	
2.8	Conduct of local training for air traffic controllers	-	No	Awareness phase has started
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	Part of the FDPS upgrade
2.10	Is there any need for changes to FDPS?	✓	-	
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	

2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	✓	-	
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	✓	-	

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
3.1	National Regulations for RVSM Implementation		NO	Under development
3.2	Aircraft and Operators approval/guidance	✓	-	
3.3	Procedures for non-compliant aircraft		No	Under development
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers	✓	-	
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval	✓	-	20 aircraft approved. 25%
3.6	How many national operators have full RVSM approval	✓	-	2 Operators (IRAN AIRLINES and MAHAN AIRLINES
3.7	What is the percentage ratio of aircraft fleet	✓	-	19%
3.8	Did you provide MECMA with RVSM approval documentation	✓	-	Provided in advance
3.9	Did you nominate your State RVSM Programme Manager	✓	-	
3.10	Certification	✓	-	
OTHER GENERAL REQUIRMENTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
	FUNDING/BUDGETARY ALLOTMENT	-	No-	
	TRAINING	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: JORDAN

Appendix C

FIR(s): AMMAN

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EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003		01/06/2003		01/09/2003		

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
1.1 -To verify whether the following reports are regularly being sent to MECMA:	✓	-	
Assigned Altitude Deviation (AAD) forms	✓	-	
-Total IFR movements per month	✓	-	
-Average time spent per movement at assigned levels between FL290 and FL410	✓	-	
-ATC/ATC Coordination failures	-	No	
1.2 Whether any turbulence data reports have been received and sent to MECMA	-	No	
1.3 Whether traffic data has been sent	✓	-	

ATC OPERATIONS ASPECTS				
	REQUIRMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	✓	-	
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment	- -	No No	
2.3	Have training requirements been assessed	-	No	
2.4	Issue of aic	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now
2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.	-	No	
2.8	Conduct of local training for air traffic controllers	-	No	
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	
2.10	Is there any need for changes to FDPS?	✓	-	
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	

2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	✓	-	
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	-	No	

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
3.1	National Regulations for RVSM Implementation	✓		
3.2	Aircraft and Operators approval/guidance	✓		x C
3.3	Procedures for non-compliant aircraft	✓		Procedures shall be coordinated with ATC controlling airspace
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers	-	No	Operator procedure
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval	-	No	19 out of 27 aircraft are approved
3.6	How many national operators have full RVSM approval	-	No	2 operators (Royal Jordanian and Royal Squadron)
3.7	What is the percentage ratio of aircraft fleet	-	No	Royal Jordanian 10 out of 16 aircraft
3.8	Did you provide MECMA with RVSM approval documentation	-	No	
3.9	Did you nominate your State RVSM Programme Manager	✓		
3.10	Certification	✓		Operations specifications and/or letter of authorization
OTHER GENERAL REQUIRMENTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
	FUNDING/BUDGETARY ALLOTMENT	-	No-	
	TRAINING	-	No	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: KUWAIT

Appendix C

FIR(s): KUWAIT

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EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003		01/06/2003		01/09/2003		

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
1.1 -To verify whether the following reports are regularly being sent to MECMA:	✓	-	
Assigned Altitude Deviation (AAD) forms	✓	-	
-Total IFR movements per month	✓	-	
-Average time spent per movement at assigned levels between FL290 and FL410	✓	-	
-ATC/ATC Coordination failures	✓	-	
1.2 Whether any turbulence data reports have been received and sent to MECMA	-	No	
1.3 Whether traffic data has been sent	✓	-	

ATC OPERATIONS ASPECTS				
	REQUIRMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	-	No	Under preparation
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment	-	No	
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of aic	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now
2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.	✓	-	
2.8	Conduct of local training for air traffic controllers	-	No	Under preparation
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	
2.10	Is there any need for changes to FDPS?	-	No	Not applicable
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	

2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	-	No	Not applicable
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	-	No	Not applicable

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
3.1	National Regulations for RVSM Implementation			
3.2	Aircraft and Operators approval/guidance			
3.3	Procedures for non-compliant aircraft			
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers			
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval			
3.6	How many national operators have full RVSM approval			
3.7	What is the percentage ratio of aircraft fleet			
3.8	Did you provide MECMA with RVSM approval documentation			
3.9	Did you nominate your State RVSM Programme Manager			
3.10	Certification			
OTHER GENERAL REQUIRMENTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
	FUNDING/BUDGETARY ALLOTMENT	✓	-	
	TRAINING	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: LEBANON

Appendix C

FIR(s): BEIRUT

Rev.002

EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003		01/06/2003		01/09/2003		

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
1.1 -To verify whether the following reports are regularly being sent to MECMA:	✓	-	
Assigned Altitude Deviation (AAD) forms	✓	-	
-Total IFR movements per month	✓	-	
-Average time spent per movement at assigned levels between FL290 and FL410	✓	-	
-ATC/ATC Coordination failures	✓	-	
1.2 Whether any turbulence data reports have been received and sent to MECMA	-	No	
1.3 Whether traffic data has been sent	✓	-	

ATC OPERATIONS ASPECTS				
	REQUIRMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	✓	-	
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment	- -	No No	(Signed with Nicosia and Ankara FIRs. Not yet signed with adjacent MID States
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of AIC	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now
2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.	✓	-	
2.8	Conduct of local training for air traffic controllers	-	No	
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	
2.10	Is there any need for changes to FDPS?	✓	-	
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	

2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	✓	-	
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	-	No	

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
3.1	National Regulations for RVSM Implementation			
3.2	Aircraft and Operators approval/guidance			
3.3	Procedures for non-compliant aircraft			
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers			
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval			
3.6	How many national operators have full RVSM approval			
3.7	What is the percentage ratio of aircraft fleet			
3.8	Did you provide MECMA with RVSM approval documentation			
3.9	Did you nominate your State RVSM Programme Manager			
3.10	Certification			
OTHER GENERAL REQUIRMENTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
	FUNDING/BUDGETARY ALLOTMENT	-	No-	
	TRAINING	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: OMAN

Appendix C

FIR(s): MUSCAT

Rev.002

EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003		01/06/2003		01/09/2003		

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
1.1 -To verify whether the following reports are regularly being sent to MECMA:	✓	-	
Assigned Altitude Deviation (AAD) forms	✓	-	
-Total IFR movements per month	✓	-	
-Average time spent per movement at assigned levels between FL290 and FL410	✓	-	
-ATC/ATC Coordination failures	✓	-	
1.2 Whether any turbulence data reports have been received and sent to MECMA	-	No	
1.3 Whether traffic data has been sent	✓	-	

ATC OPERATIONS ASPECTS				
	REQUIRMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	✓	-	
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment	-	No	
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of AIC	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now
2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.	✓	-	
2.8	Conduct of local training for air traffic controllers	-	No	Awareness phase has started
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	Part of the FDPS upgrade
2.10	Is there any need for changes to FDPS?	✓	-	
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	

2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	✓	-	
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	✓	-	

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
3.1	National Regulations for RVSM Implementation			
3.2	Aircraft and Operators approval/guidance			
3.3	Procedures for non-compliant aircraft			
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers			
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval			
3.6	How many national operators have full RVSM approval			
3.7	What is the percentage ratio of aircraft fleet			
3.8	Did you provide MECMA with RVSM approval documentation			
3.9	Did you nominate your State RVSM Programme Manager			
3.10	Certification			
OTHER GENERAL REQUIRMENTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
	FUNDING/BUDGETARY ALLOTMENT	✓	-	
	TRAINING	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SAUDI ARABIA

Appendix C

FIR(s): JEDDAH

Rev.002

EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003		01/06/2003		01/09/2003		

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
1.1 -To verify whether the following reports are regularly being sent to MECMA:	✓	-	
Assigned Altitude Deviation (AAD) forms	✓	-	
-Total IFR movements per month	✓	-	
-Average time spent per movement at assigned levels between FL290 and FL410	✓	-	
-ATC/ATC Coordination failures	✓	-	
1.2 Whether any turbulence data reports have been received and sent to MECMA	-	No	
1.3 Whether traffic data has been sent	✓	-	

ATC OPERATIONS ASPECTS				
	REQUIRMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	✓	-	
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment	- -	No No	
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of AIC	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now
2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.	-	No	Not yet ready
2.8	Conduct of local training for air traffic controllers	-	No	Not yet ready
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	Part of the FDPS upgrade
2.10	Is there any need for changes to FDPS?	✓	-	
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	

2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	-	No	
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	-	No	In progress

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
3.1	National Regulations for RVSM Implementation			
3.2	Aircraft and Operators approval/guidance			
3.3	Procedures for non-compliant aircraft			
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers			
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval			
3.6	How many national operators have full RVSM approval			
3.7	What is the percentage ratio of aircraft fleet			
3.8	Did you provide MECMA with RVSM approval documentation			
3.9	Did you nominate your State RVSM Programme Manager			
3.10	Certification			
OTHER GENERAL REQUIRMENTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
	FUNDING/BUDGETARY ALLOTMENT	-	No-	
	TRAINING	-	No	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SYRIA

Appendix C

FIR(s): DAMASCUS

Rev.002

EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003		01/06/2003		01/09/2003		

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
1.1 -To verify whether the following reports are regularly being sent to MECMA:			**NO INFORMATION AVAILABLE AT THIS STAGE.** **RADAR DATA NOT AVAILABLE NO**W
Assigned Altitude Deviation (AAD) forms			
-Total IFR movements per month			
-Average time spent per movement at assigned levels between FL290 and FL410			
-ATC/ATC Coordination failures			
1.2 Whether any turbulence data reports have been received and sent to MECMA			
1.3 Whether traffic data has been sent			

ATC OPERATIONS ASPECTS				
	REQUIRMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems			
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment			
2.3	Have training requirements been assessed			
2.4	Issue of aic			
2.5	Issue of AIP Supplement (15 May 2003)			
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM			
2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.			
2.8	Conduct of local training for air traffic controllers			
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)			
2.10	Is there any need for changes to FDPS?			
2.11	Is there any need to changes in radar display systems? (*where applicable)*			
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)			
2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*			

2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*			

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
3.1	National Regulations for RVSM Implementation			
3.2	Aircraft and Operators approval/guidance			
3.3	Procedures for non-compliant aircraft			
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers			
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval			
3.6	How many national operators have full RVSM approval			
3.7	What is the percentage ratio of aircraft fleet			
3.8	Did you provide MECMA with RVSM approval documentation			
3.9	Did you nominate your State RVSM Programme Manager			
3.10	Certification			
OTHER GENERAL REQUIRMENTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
	FUNDING/BUDGETARY ALLOTMENT			INFORMATION TO BE PROVIDED AT A LATER STAGE
	TRAINING			

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: UNITED ARAB EMIRATES

Appendix C

FIR(s): EMIRATES

Rev.002

EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003		01/06/2003		01/09/2003		

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
1.1 -To verify whether the following reports are regularly being sent to MECMA:	✓	-	
Assigned Altitude Deviation (AAD) forms	✓	-	
-Total IFR movements per month	✓	-	
-Average time spent per movement at assigned levels between FL290 and FL410	✓	-	
-ATC/ATC Coordination failures	✓	-	
1.2 Whether any turbulence data reports have been received and sent to MECMA	-	No	
1.3 Whether traffic data has been sent	✓	-	

ATC OPERATIONS ASPECTS				
	REQUIRMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	✓	-	
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment	✓ -	- No	
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of AIC	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now
2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.	✓	-	
2.8	Conduct of local training for air traffic controllers	-	No	Awareness phase has started-Oct/Nov/03
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	Part of the FDPS upgrade
2.10	Is there any need for changes to FDPS?	✓	-	
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	

2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	✓	-	
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	✓	-	

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
3.1	National Regulations for RVSM Implementation	✓		
3.2	Aircraft and Operators approval/guidance	✓		
3.3	Procedures for non-compliant aircraft	✓		
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers	✓		
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval	89%	-	89% (55 out of 62 Jet Aircraft)
3.6	How many national operators have full RVSM approval	5		
3.7	What is the percentage ratio of aircraft fleet	93%		
3.8	Did you provide MECMA with RVSM approval documentation	✓		
3.9	Did you nominate your State RVSM Programme Manager	✓		
3.10	Certification	✓		
OTHER GENERAL REQUIRMENTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
	FUNDING/BUDGETARY ALLOTMENT	✓	-	
	TRAINING	✓	-	Material available planning in progress Scheduled for Oct/Nov.03

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: YEMEN

Appendix C

Rev.002

EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003		01/06/2003		01/09/2003			

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
1.1 -To verify whether the following reports are regularly being sent to MECMA:			**NO INFORMATION AVAILABLE AT THIS STAGE.** **RADAR DATA NOT AVAILABLE NO**W
Assigned Altitude Deviation (AAD) forms			
-Total IFR movements per month			
-Average time spent per movement at assigned levels between FL290 and FL410			
-ATC/ATC Coordination failures			
1.2 Whether any turbulence data reports have been received and sent to MECMA			
1.3 Whether traffic data has been sent			

ATC OPERATIONS ASPECTS				
	REQUIRMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems			
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment			
2.3	Have training requirements been assessed			
2.4	Issue of AIC			
2.5	Issue of AIP Supplement (15 May 2003)			
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM			
2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.			
2.8	Conduct of local training for air traffic controllers			
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)			
2.10	Is there any need for changes to FDPS?			
2.11	Is there any need to changes in radar display systems? (*where applicable)*			
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)			
2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*			

2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*			

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
3.1	National Regulations for RVSM Implementation			
3.2	Aircraft and Operators approval/guidance			
3.3	Procedures for non-compliant aircraft			
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers			
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval			
3.6	How many national operators have full RVSM approval			
3.7	What is the percentage ratio of aircraft fleet			
3.8	Did you provide MECMA with RVSM approval documentation			
3.9	Did you nominate your State RVSM Programme Manager			
3.10	Certification			
OTHER GENERAL REQUIRMENTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
	FUNDING/BUDGETARY ALLOTMENT			INFORMATION TO BE PROVIDED AT A LATER STAGE
	TRAINING			

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE:

Appendix C

FIR(s)

Rev.002

EVALUATION DATE(s):

01/06/2002	01/09/2002	01/12/2002	01/03/2003	01/06/2003	01/09/2003						

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
1.1 -To verify whether the following reports are regularly being sent to MECMA:			
-Assigned Altitude Deviation (AAD) forms			
-Total IFR movements per month			
-Average time spent per movement at assigned levels between FL290 and FL410			
-ATC/ATC Coordination failures			
1.2 Whether any turbulence data reports have been received and sent to MECMA			
1.3 Whether traffic data has been sent			

ATC OPERATIONS ASPECTS				
	REQUIRMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems			
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment			
2.3	Have training requirements been assessed			
2.4	Issue of AIC			
2.5	Issue of AIP Supplement (15 may 2003)			
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM			
2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.			
2.8	Conduct of local training for air traffic controllers			
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)			
2.10	Is there any need for changes to FDPS?			
2.11	Is there any need to changes in radar display systems? (*where applicable)*			
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)			

2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*			
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*			

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
3.1	National Regulations for RVSM Implementation			
3.2	Aircraft and Operators approval/guidance			
3.3	Procedures for non-compliant aircraft			
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers			
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval			
3.6	How many national operators have full RVSM approval			
3.7	What is the percentage ratio of aircraft fleet			
3.8	Did you provide MECMA with RVSM approval documentation			
3.9	Did you nominate your State RVSM Programme Manager			
3.10	Certification			
OTHER GENERAL REQUIRMENTS				
	REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
		YES	NO	
	FUNDING/BUDGETARY ALLOTMENT			
	TRAINING			

MID RVSM TF/5
Appendix D to the Report

DRAFT AERONAUTICAL INFORMATION CIRCULAR (AIC)

IMPLEMENTATION OF REDUCED VERTICAL SEPARATION MINIMA

Effective date: 27 November 2003.
Type: Permanent.
Appendix 3 - A
This AIC serves as Notice of Intent to implem
2003.

Reduced Vertical Separation Minimum (RVSM) is vertical separation of aircraft by 1,000 ft above FL 290. By 27 September 2003, operators should have received RVSM aircraft (airworthiness) and operational approval from the appropriate State authority. Operator/aircraft approval by 27 September 2003 will enable air traffic services (ATS) to plan for orderly RVSM implementation.

Starting 27 November 2003, only RVSM compliant aircraft will be cleared
FIR between FLs 290 and 410 (inclusive). Aircraft that are not RVSM compliant (e.g., ferry and

(inclusive) after prior coordination with the appropriate Center. 2,000 ft vertical separation will be

follow-up NOTAMS.

gional agreements. ICAO recommends that State authorities and operators use FAA Interim Guidance 91-RVSM (as amended); Joint Airworthiness Authorities (JAA) Temporary Guidance Leaflet 6 (TGL 6) or equivalent State documents as the basis for approving aircraft and operator programs for RVSM.

The Middle East Region has established the Middle East Central Monitoring Agency for implementation of RVSM (MECMA), which would host the database of all information regarding the RVSM approval process. Current information and RVSM approval documents, including revisions, can be found on the website maintained by the FAA, Eurocontrol, MECMA and on individual State websites.

To access the FAA, Eurocontrol and MECMA RVSM websites, type:

http://www.faa.gov/ats/ato/rvsm1.htm
http://www.eur-rvs.com
http://www.mecma.com

The RVSM Documentation section of the FAA, Eurocontrol websites contain guidance on aircraft/operator approval. Operators must begin coordination with the appropriate State authority as soon as possible to ensure that they are approved to begin RVSM operations on 27 November 2003.

For questions on the aircraft and operator approval process, the following contacts may be used:

MECMA:
MECMA : Tel : 971-2-405-4339; fax : 971-2-449-1599; e-mail : traffic@mecma.com

CAA

AIRAC
15 MAY 2003

DRAFT AERONAUTICAL INFORMATION PUBLICATIONS (AIP) SUPPLEMENT

1.0 Introduction

1.1 The International Civil Aviation Organization (ICAO) Sixth Middle East Air Navigation Planning and Implementation Regional Group (MIDANPIRG) meeting in order to contribute to the reduction of congestion in the Middle East (MID) region, agreed that Reduced Vertical Separation Minimum (RVSM) should be introduced in MID region after successful implementation in the North Atlantic, European and Asia/Pacific regions. ICAO Document 9574, *Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive*, contains an explanation of RVSM.

1.2 Benefits to be gained from RVSM include:

a) adoption of an ICAO endorsed navigation requirement;

b) improved utilization of airspace for ATC conflict resolution;

c) fuel savings of ≈ 1% for flight closer to optimum cruise altitude; and

d) reduction in ground delays.

1.3 CONTENT. The ICAO MID RVSM Task Force has harmonized the basic content of this document. The following policies are addressed in the paragraphs of this document:

2.0 Identification of RVSM airspace
3.0 Airworthiness and Operational Approval and Monitoring
4.0 ACAS II and Transponder Equipage
5.0 In-flight Procedures Within RVSM Airspace
6.0 Special procedures for in-flight contingencies within the MID Continental Airspace
7.0 Special procedures for In-flight Contingencies in Oceanic Airspace
8.0 In-flight Contingency Procedures for Subsonic Aircraft Requiring Rapid Descent, Turn-back or Diversion in Oceanic Airspace
9.0 Weather Deviation Procedures
10.0 Special Procedures to Mitigate Wake Turbulence Encounters and Distracting Aircraft System Alerts
11.0 Transition areas
12.0 Flight Planning Requirements
13.0 Procedures for Operation of non-RVSM Compliant Aircraft in RVSM Airspace
14.0 Delivery Flights for Aircraft that are RVSM Compliant on Delivery
15.0 Procedures for Suspension of RVSM
16.0 Guidance for Pilot and Controller for Actions in Event of Aircraft System Malfunction of Turbulence Greater than Moderate

2.0 Identification of RVSM airspace

2.1

(inclusive)

3.0 Airworthiness and Operational Approval and Monitoring

3.1 APPROVAL PROCESS. (Source Document: FAA Interim Guidance (IG) 91-RVSM/JAA TGL #6) Operators must obtain airworthiness and operational approval from the State of Registry or State of the Operator, as appropriate, to conduct RVSM operations. On behalf of the MID Region ATS providers, the MID Region is maintaining a website containing documents and policy for RVSM approval. The Internet address is: http://www.mecma.com.

3.2 AIRCRAFT MONITORING. (Source Document: IG 91-RVSM/TGL #6, Asia/Pacific Minimum Monitoring Requirements) Operators are required to participate in the RVSM aircraft monitoring program. This is an essential element of the RVSM implementation program in that it confirms that the aircraft altitude-keeping performance standard is being met The Middle East Central Monitoring agency (MECMA) will process the results of monitoring. For further information on RVSM monitoring, the MECMA web site can be accessed by:http://wwwe.mecma.com

3.2.1 Monitoring accomplished for other regions can be used to fulfill the monitoring requirements for the Middle East Region. MECMA will coordinate with other monitoring agencies to access this information. For monitoring services in the Middle East Region, operators should contact MECMA as follows:

Phone: 971-2-405-4339
Fax: 971-2-449-1599
Email: traffic@mecma.com

4.0 ACAS II and Transponder Equipage

4.1 All civil aircraft intending to operate within the Middle East RVSM airspace shall be equipped with ACAS II. (TCAS II systems with Version 7.0 incorporated meet ICAO ACAS II standards).

4.1.1 Operators must take action to inform themselves of ACAS II equipage requirements and plan for compliance. ICAO and individual States have established policies requiring ACAS II equipage and schedules for compliance. In addition, the MIDANPIRG has endorsed early ACAS II equipage in the region.

4.2 INTERNATIONAL GENERAL AVIATION (IGA) TRANSPONDER EQUIPAGE. ICAO Annex 6, Part II, states that, starting 1 January 2000, IGA airplanes shall be equipped with a pressure altitude reporting transponder certified by the appropriate State authority as meeting the provisions of Annex 10.

5.0 In-flight procedures within RVSM airspace

5.1 Before entering RVSM airspace, the pilot should review the status of required equipment. (See Appendix 4 of FAA IG 91-RVSM for pilot RVSM procedures). The following equipment should be operating normally:

a) two primary altimetry systems;

b) one automatic altitude-keeping device; and

c) one altitude-alerting device.

5.2 See **Attachment ____** to this AIP Supplement or Appendix 5 of FAA IG 91-RVSM for pilot and controller actions in contingencies. The pilot must notify ATC whenever the aircraft:

a) is no longer RVSM compliant due to equipment failure; or

b) experiences loss of redundancy of altimetry systems; or

c) encounters turbulence that affects the capability to maintain flight level.

5.3 -RVSM/TGL #6) During cleared transition between levels, the aircraft should not overshoot or undershoot the assigned FL by more than 150 ft (45 m).

5.4 PILOT LEVEL CALL. (Source Document: State AIP Supplement) Except in an ADS or radar environment, pilots shall report reaching any altitude assigned within RVSM airspace.

5.5 CONTINGENCY PROCEDURES. (Source Document: State AIP Supplement) Paragraphs 6.0, 7.0, 8.0, 9.0 and 10.0 below contain procedures for in-flight contingencies that have been updated for RVSM operations. The contingency procedures in paragraphs 7.0-8.0 and the off-set procedures in paragraph 10.0 should be applied in Oceanic operations. The weather deviation procedures in paragraph 9.0 will be applied in Oceanic airspace in the region.

6.0 SPECIAL PROCEDURES FOR IN-FLIGHT CONTINGENCIES INVOLVING A LOSS OF VERTICAL NAVIGATION PERFORMANCE REQUIRED FOR FLIGHT WITHIN THE MID CONTINENTAL RVSM AIRSPACE

6.1 General

6.1.1 An in-flight contingency affecting flight in the MID RVSM airspace pertains to unforeseen circumstances that directly impact on the ability of one or more aircraft to operate in accordance with the vertical navigation performance requirements of the MID RVSM airspace. Such in-flight contingencies can result from degradation of aircraft equipment associated with height-keeping and from turbulent atmospheric conditions.

6.1.2 The pilot shall inform ATC as soon as possible of any circumstances where the vertical navigation performance requirements for the MID RVSM airspace cannot be maintained. In such cases, the pilot shall obtain a revised ATC clearance prior to initiating any deviation from the cleared route and/or flight level, whenever possible. When a revised ATC clearance could not be obtained prior to such a deviation, the pilot shall obtain a revised clearance as soon as possible.

6.1.3 ATC shall render all possible assistance to a pilot experiencing an in-flight contingency. Subsequent ATC actions will be based on the intentions of the pilot, the overall air traffic situation and the real-time dynamics of the contingency.

6.2 Degradation of aircraft equipment pilot reported

6.2.1 When informed by the pilot of an RVSM approved aircraft operating in the MID RVSM

aircraft as non-RVSM approved.

6.2.2 ATC shall take action immediately to provide a minimum vertical separation of 600 m (2000ft) or an appropriate horizontal separation from all other aircraft concerned that are operating in the MID RVSM airspace. An RVSM compliant aircraft rendered non-RVSM approved shall normally be cleared out of the MID RVSM airspace by ATC when it is possible to do so.

6.2.3 Pilots shall inform ATC, as soon as practicable, of any restoration of the proper functioning of equipment required to meet the RVSM MASPS.

6.2.4
with adjacent ACCs, as appropriate.

6.3 Severe turbulence not forecast

6.3.1 When an aircraft operating in the MID RVSM airspace encounters severe turbulence due to

cleared flight level, the pilot shall inform ATC. ATC shall establish either an appropriate horizontal separation or an increased minimum vertical separation.

6.3.2 ATC shall, to the extent possible, accommodate pilot requests for flight level and/or route changes and shall pass on traffic information as required.

6.3.3 ATC shall solicit reports from other aircraft to determine whether RVSM should be suspended entirely or within a specific flight level band and/or area.

6.3.4 The ACC suspending RVSM shall coordinate such suspension(s) and any required adjacent ACCs, as appropriate, to ensure an orderly progression to the transfer of traffic.

6.4 Severe turbulence - forecast

6.4.1 When a meteorological forecast is predicting severe turbulence with the MID RVSM airspace, ATC shall determine when RVSM should be suspended and, if so, the period of time and specific flight level(s) and/or area.

6.4.2 In cases where RVSM will be suspended, the ACC suspending RVSM shall coordinate with adjacent ACCs with regard to the flight levels appropriate for the transfer of traffic, unless a contingency flight level allocation scheme has been determined by letter of agreement. The ACC suspending RVSM shall also coordinate applicable sector capacities with adjacent ACCs as appropriate.

7.0 Special Procedures for In-flight Contingencies in <u>Oceanic Airspace</u> in the ____FIR (Source Document : State AIP Supplement)

<u>General procedures</u>

7.1 The following general procedures apply to both subsonic and supersonic aircraft and are intended as guidance only. Although all possible contingencies cannot be covered, they provide for cases of inability to maintain assigned level due to:

a) weather;

b) aircraft performance;

c) pressurization failure; and

d) problems associated with high-level supersonic flight.

7.2 The procedures are applicable primarily when rapid descent and/or turn-back or diversion to an alt
taken, taking into account specific circumstances.

7.3 If an aircraft is unable to continue flight in accordance with its air traffic control clearance, a revised clearance shall, whenever possible, be obtained prior to initiating any action, using a distress or urgency signal as appropriate.

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

a) if possible, deviate away from an organized track or route system;

b) establish communications with and alert nearby aircraft by broadcasting, at suitable intervals: flight identification, flight level, aircraft position, (including the ATS route designator or the track code) and intentions on the frequency in use, as well as on frequency 121.5 MHz (or, as a back-up, the VHF inter-pilot air-to-air frequency 123.45);

c) watch for conflicting traffic both visually and by reference to ACAS (if equipped); and

d) turn on all aircraft exterior lights (commensurate with appropriate operating limitations).

8.0 In-flight Contingency Procedures for Subsonic Aircraft Requiring Rapid Descent, Turn-Back or Diversion in <u>Oceanic Airspace</u> in the ____FIR. (Source Document: State AIP Supplement)

<u>Initial action</u>

8.1 If unable to comply with the provisions of paragraph 7.3 to obtain a revised ATC clearance, the aircraft should leave its assigned route or track by turning 90 degrees right or left whenever this is possible. The direction of the turn should be determined by the position of the aircraft relative to any organized route or track system (for example, whether the aircraft is outside, at the edge of, or within the system). Other factors to consider are terrain clearance and the levels allocated to adjacent routes or tracks.

Subsequent action

8. 2 AIRCRAFT ABLE TO MAINTAIN LEVEL. An aircraft able to maintain its assigned level should acquire and maintain in either direction a track laterally separated by 25 NM from its assigned route or track and once established on the offset track, climb or descend 500 ft (150 m).

8.3 AIRCRAFT UNABLE TO MAINTAIN LEVEL. An aircraft NOT able to maintain its assigned level should, whenever possible, minimize its rate of descent while turning to acquire and maintain in either direction a track laterally separated by 25 NM from its assigned route or track. For subsequent level flight, a level should be selected which differs by 500 ft (150 m) from those normally used.

8.4 DIVERSION ACROSS THE FLOW OF ADJACENT TRAFFIC. Before commencing a diversion across the flow of adjacent traffic, the aircraft should, while maintaining the 25 NM offset, expedite climb above or descent below levels where the majority of aircraft operate (*e.g., to a level above FL 400 or below FL 290*) and then maintain a level which differs by 500 ft (150 m) from those normally used. However, if the pilot is unable or unwilling to carry out a major climb or descent, the aircraft should be flown at a level 500 ft above or below levels normally used until a new ATC clearance is obtained.

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

9.0 Weather Deviation Procedures in the ____FIR. (Oceanic Airspace)
(Source Document: State AIP Supplement)

General procedures

9.1 The following procedures are intended to provide guidance. All possible circumstances
ions taken and
ATC shall render all possible assistance.

9.2 If the aircraft is required to deviate from track to avoid weather and prior clearance cannot be obtained, an air traffic control clearance shall be obtained at the earliest possible time. In the meantime, the aircraft shall follow the procedures detailed in paragraph 9.9 below.

9.3 The pilot shall advise ATC when weather deviation is no longer required, or when a weather deviation has been completed and the aircraft has returned to the centerline of its cleared route.

9.4 When the pilot initiates communications with ATC, rapid response may be obtained by stating "WEATHER DEVIATION REQUIRED" to indicate that priority is desired on the frequency and for ATC response.

9.5 The pilot still retains the option of initiating the communications using the urgency call "PAN PAN" to alert all listening parties to a special handling condition, which may receive ATC priority for issuance of a clearance or assistance.

9.6 When controller-pilot communications are established, the pilot shall notify ATC and request clearance to deviate from track, advising, when possible, the extent of the deviation expected. ATC will take one of the following actions:

a) if there is no conflicting traffic in the horizontal dimension, ATC will issue clearance to deviate from track; or

b) if there is conflicting traffic in the horizontal dimension, ATC will separate aircraft by establishing vertical separation or, if unable to establish vertical separation, ATC shall:

i) advise the pilot unable to issue clearance for requested deviation
ii) advise pilot of conflicting traffic
iii)

SAMPLE PHRASEOLOGY:

9.7 The pilot will take the following actions:

(a) Advise ATC of intentions by the most expeditious means available.

(b)

(c) Execute the procedures detailed in 9.8 below. (ATC will issue essential traffic information to all affected aircraft).

(d) If necessary, establish voice communications with ATC to expedite dialogue on the situation

Actions to be taken if a revised air traffic control clearance cannot be obtained

9.8 The pilot shall take the actions listed in 9.9 below under the provision that the pilot may deviate from rules of the air (e.g., the requirement to operate on route or track center line unless otherwise directed by ATC), when it is absolutely necessary in the interests of safety to do so.

9.9 *If a revised air traffic control clearance cannot be obtained* and deviation from track is required to avoid weather, the pilot shall take the following actions:

a) if possible, deviate away from an organized track or route system;

b) establish communication with and alert nearby aircraft by broadcasting, at suitable intervals: flight identification, flight level, aircraft position (including the ATS route designator or the track code) and intentions (including the magnitude of the deviation expected) on the frequency in use, as well as on frequency 121.5 MHz (or, as a back-up, the VHF inter-pilot air-to-air frequency 123.45).

c) watch for conflicting traffic both visually and by reference to ACAS (if equipped);

d) turn on *all* aircraft exterior lights (commensurate with appropriate operating limitations);

e) for deviations of less than 19 km (10NM), aircraft should remain at the level assigned by ATC;

f) for deviations of greater than 19 km (10NM), when the aircraft is approximately 19 km (10NM) from track, initiate a level change based on the following criteria:

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

conflicting traffic and communicate air-to-air with near-by aircraft. If the pilot determines that there is another aircraft at or near the same FL with which his aircraft might conflict, then the pilot is expected to adjust the path of the aircraft, as necessary, to avoid conflict.

g) if contact was not established prior to deviating, continue to attempt to contact ATC to obtain a clearance. If contact was established, continue to keep ATC advised of intentions and obtain essential traffic information.

h) when returning to track, be at its assigned flight level, when the aircraft is within approximately 19 km (10NM) of center line.

10.0 Procedures to Mitigate Wake Turbulence Encounters and Distracting Aircraft System Alerts in the Oceanic Airspace of the _____ FIR. (Source Document: State AIP Supplement)

10.1 The following special procedures are applicable to mitigate wake turbulence or distracting aircraft system alerts (e.g., ACAS, Ground Proximity Warning System (GPWS Middle East Oceanic airspace where RVSM is applied:

NOTE: In the contingency circumstances below, ATC will not issue clearances for lateral offsets and will not normally respond to actions taken by the pilots.

10.2 An aircraft that encounters wake vortex turbulence or experiences distracting aircraft system alerts shall notify ATC and request a flight level, track or speed change to avoid the condition. However, in situations where such a change is not possible or practicable, the pilot may initiate the following temporary lateral offset procedure with the intention of returning to center line as soon as practicable:

a) the pilot should establish contact with other aircraft, if possible, on the appropriate VHF inter-pilot air to air frequency; 123.45 MHz, and

b) one (or both) aircraft may initiate lateral offset(s) not to exceed 2 NM from the assigned track, provided that:

i) as soon as practicable to do so, the offsetting aircraft notify ATC that *temporary* lateral offset action has been taken and specify the reason for doing so *(ATC will not normally respond)*; and

ii) the offsetting aircraft notify ATC when re-established on assigned route(s) or track(s) *(ATC will not normally respond)*.

11.0 Transition areas (Source Document: State AIP Supplement)

11.1 Transition areas and procedures for transition from RVSM to non-RVSM airspace within the .

12.0 Flight planning requirements (Source Document: State AIP Supplement)

12.1 Unless special arrangement is made as detailed below, RVSM approval is required for aircraft to operate within designated RVSM airspace. The operator must determine that the appropriate State authority has approved the aircraft and will meet the RVSM requirements for the filed route of flight

ICAO standard flight plan to indicate that the aircraft is RVSM approved aircraft.

13.0 Procedures for Operation of Non-RVSM Compliant Aircraft in RVSM airspace (Source Document: State AIP Supplement)

13.1 FLIGHT PRIORITY. It should be noted that RVSM approved aircraft will be given priority for level allocation over non-RVSM approved aircraft.

13.2 VERTICAL SEPARATION APPLIED. The vertical separation minimum between non-RVSM aircraft operating in the RVSM stratum and all other aircraft is 2,000 ft.

13.3 PHRASEOLGY. Non-RVSM compliant aircraft operating in RVSM airspace should use the phraseology contained in Attachment ___.

13.4 CONTINUOUS CLIMB/DESCENT OF NON-COMPLIANT AIRCRAFT THROUGH RVSM AIRSPACE (Source Document: State AIP Supplement). Non-RVSM compliant aircraft may be cleared to climb to and operate above FL____or descend to and operate below FL____ provided that they:

a) Do not climb or descend at less than the normal rate for the aircraft and

b) Do not level off at an intermediate level while passing through the RVSM stratum.

13.5 SPECIAL COORDINATION PROCEDURES FOR CRUISE OPERATION OF NON-RVSM COMPLIANT AIRCRAFT IN RVSM AIRSPACE (Source : State AIP Supplement).

13.5.1 Non-RVSM compliant aircraft may not flight plan between FL ____ and FL____ inclusive within RVSM airspace. However, after special coordination, the following non-RVSM aircraft may flight plan at RVSM flight levels in the RVSM stratum:

a) Is being initially delivered to the State of Registry or Operator (see Paragraph 14.0 for additional details and information); or

b) was formally RVSM approved but has experienced an equipment failure and is being flown to a maintenance facility for repair in order to meet RVSM requirements and/or obtain approval; or

c) is transporting a spare engine mounted under the wing; or

d) is being utilized for mercy or humanitarian purposes; or

e) State aircraft (those aircraft used in military, custom and police services shall be deemed state aircraft)

Note:-

1)
2) Approval means able to operate in the RVSM stratum.
3) Aircraft cruising levels will be subject to air traffic control

13.5.2 Contact details for approval request are as follows:

_____ Center Telephone:
AFTN:
FAX:
E-Mail:

13.5.3 These procedures are intended exclusively for the purposes indicated above and not as a means to circumvent the normal RVSM approval process.

14.0 Delivery Flights for Aircraft that are RVSM Compliant on Delivery (Source Document: State AIP Supplement)

14.1 An aircraft that is RVSM compliant on delivery may operate in RVSM airspace provided that the crew is trained on RVSM policies and procedures applicable in the airspace and the responsible State issues the operator a letter of authorization approving the operation. State notification to the MECMA should be in the form of a letter, e-mail or fax documenting the one-time flight. The planned date of the flight, flight identification, registration number and aircraft type/series should be included. Email address is ____. Fax number is ____.

15.0 Procedures for Suspension of RVSM (Source Document: State AIP Supplement)

15.1 Air traffic services will consider suspending RVSM procedures within affected areas of the _____FIR when there are pilot reports of greater than moderate turbulence. Within areas where RVSM procedures are suspended, the vertical separation minimum between all aircraft will be 2,000 ft.

16.0 Guidance for Pilots and Controllers for Actions in the Event of Aircraft System Malfunction or Turbulence Greater than Moderate (Source Document: State AIP Supplement)

16.1 See **Attachment** _____ for guidance in these circumstances.

ATTACHMENT

CONTINGENCY SCENARIOS. 2&($1,& $,563$&(The following paragraphs summarize pilot actions to mitigate the potential for conflict with other aircraft in certain contingency situations. They should be reviewed in conjunction with the expanded contingency scenarios detailed on pages ____ which contain additional technical and operational detail.

***Scenario 1: The pilot is: 1) unsure of the vertical position of the aircraft due to the loss or degradation of all primary altimetry systems, or 2) unsure of the capability to maintain cleared flight level (CFL) due to turbulence or loss of all automatic altitude control systems**.

The Pilot should:	ATC can be expected to:
Maintain CFL while evaluating the situation;	
Watch for conflicting traffic both visually and by reference to ACAS, if equipped;	
If considered necessary, alert nearby aircraft by 1) making maximum use of exterior lights; 2) broadcasting position, FL, and intentions on 121.5 MHz (as a back-up, the VHF inter-pilot air-to-air frequency, 123.45MHz, may be used).	
Notify ATC of the situation and intended course of action. Possible courses of action include:	Obtain the pilot's intentions and pass essential traffic information.
1) maintaining the CFL and route provided that ATC can provide lateral, longitudinal or conventional vertical separation.	1) If the pilot intends to continue in RVSM airspace, assess traffic situation to determine if the aircraft can be accommodated through the provision of lateral, longitudinal, or conventional vertical separation, and if so, apply the appropriate minimum.
2) requesting ATC clearance to climb above or descend below RVSM airspace if the aircraft cannot maintain CFL and ATC cannot establish adequate separation from other aircraft.	2) If the pilot requests clearance to exit RVSM airspace, accommodate expeditiously, if possible.
3) executing the contingency maneuver shown in paragraphs 7.0 and 8.0 of this AIP Supplement to offset from the assigned track and FL, if ATC clearance cannot be obtained and the aircraft cannot maintain CFL.	3) If adequate separation cannot be established and it is not possible to comply with the pilot's request for clearance to exit RVSM airspace, advise the pilot of essential traffic information, notify other aircraft in the vicinity and continue to monitor the situation.
	4) Notify adjoining ATC facilities/sectors of the situation.

Scenario 2: There is a failure or loss of accuracy of one primary altimetry system (e.g., greater than 200 foot difference between primary altimeters)

The Pilot should
Cross check standby altimeter, confirm the accuracy of a primary altimeter system and notify ATC of the loss of redundancy. If unable to confirm primary altimeter system accuracy, follow pilot actions listed in the preceding scenario.

EXPANDED EQUIPMENT FAILURE AND TURBULENCE ENCOUNTER SCENARIOS. 2&($1,&$,563$&(**Operators may consider this material for use in training programs.**

***Scenario 1: All automatic altitude control systems fail (e.g., Automatic Altitude Hold).**

The Pilot should	ATC can be expected to
Initially	
Maintain CFL	
Evaluate the aircraft's capability to maintain altitude through manual control.	
Subsequently	
Watch for conflicting traffic both visually and by reference to ACAS, if equipped.	
If considered necessary, alert nearby aircraft by 1) making maximum use of exterior lights; 2) broadcasting position, FL, and intentions on 121.5MHz (as a back-up, the VHF inter-pilot air-to-air frequency, 123.45MHz, may be used.)	
Notify ATC of the failure and intended course of action. Possible courses of action include:	
1) maintaining the CFL and route, provided that the aircraft can maintain level.	1) If the pilot intends to continue in RVSM airspace, assess traffic situation to determine if the aircraft can be accommodated through the provision of lateral, longitudinal, or conventional vertical separation, and if so, apply the appropriate minimum.
2) requesting ATC clearance to climb above or descend below RVSM airspace if the aircraft cannot maintain CFL and ATC cannot establish lateral, longitudinal or conventional vertical separation.	2) If the pilot requests clearance to exit RVSM airspace, accommodate expeditiously, if possible.
3) executing the contingency maneuver shown in paragraphs 7.0 and 8.0 of this AIP Supplement to offset from the assigned track and FL, if ATC clearance cannot be obtained and the aircraft cannot maintain CFL.	3) If adequate separation cannot be established and it is not possible to comply with the pilot's request for clearance to exit RVSM airspace, advise the pilot of essential traffic information, notify other aircraft in the vicinity and continue to monitor the situation.
	4) Notify adjoining ATC facilities/ sectors of the situation.

***Scenario 2: Loss of redundancy in primary altimetry systems**

The Pilot should	ATC can be expected to
If the remaining altimetry system is functioning normally, couple that system to the automatic altitude control system, notify ATC of the loss of redundancy and maintain vigilance of altitude keeping.	Acknowledge the situation and continue to monitor progress

Scenario 3: All primary altimetry systems are considered unreliable or fail

The Pilot should	ATC can be expected to
Maintain CFL by reference to the standby altimeter (if the aircraft is so equipped).	
Alert nearby aircraft by 1) making maximum use of exterior lights; 2) broadcasting position, FL, and intentions on 121.5 MHz (as a back-up, the VHF inter-pilot air-to-air frequency, 123.45MHz, may be used).	
Consider declaring an emergency. Notify ATC of the failure and intended course of action. Possible courses of action include:	Obtain pilot's intentions, and pass essential traffic information.
1) maintaining CFL and route provided that ATC can provide lateral, longitudinal or conventional vertical separation.	1) If the pilot intends to continue in RVSM airspace, assess traffic situation to determine if the aircraft can be accommodated through the provision of lateral, longitudinal, or conventional vertical separation, and if so, apply the appropriate minimum.
2) requesting ATC clearance to climb above or descend below RVSM airspace if ATC cannot establish adequate separation from other aircraft.	2) If the pilot requests clearance to exit RVSM airspace, accommodate expeditiously, if possible.
3) executing the contingency maneuver shown in paragraphs 7.0 and 8.0 of this AIP Supplement to offset from the assigned track and FL, if ATC clearance cannot be obtained.	3) If adequate separation cannot be established and it is not possible to comply with the pilot's request for clearance to exit RVSM airspace, advise the pilot of essential traffic information, notify other aircraft in the vicinity and continue to monitor the situation.
	4) Notify adjoining ATC facilities/sectors of the situation.

Scenario 4: The primary altimeters diverge by more than 200ft (60m)

The Pilot should
Attempt to determine the defective system through established trouble-shooting procedures and/or comparing the primary altimeter displace to the standby altimeter (as corrected by the correction cards, if required).
If the defective system can be determined, couple the functioning altimeter system to the altitude-keeping device.
If the defective system cannot be determined, follow the guidance in Scenario 3 for failure or unreliable altimeter indications of all primary altimeters.

***Scenario 5: Turbulence (greater than moderate) which the pilot believes will impact the aircraft's capability to maintain flight level.**

The Pilot should	ATC can be expected to
Watch for conflicting traffic both visually and by reference to ACAS, if equipped.	
If considered necessary, alert nearby aircraft by: 1) making maximum use of exterior lights; 2) broadcasting position, FL, and intentions on 121.5 MHz (as a back-up, the VHF inter-pilot air-to-air frequency, 123.45MHz, may be used).	

The Pilot should	ATC can be expected to
Notify ATC of intended course of action as soon as possible. Possible courses of action include:	
1) maintaining CFL and route provided ATC can provide lateral, longitudinal or conventional vertical separation.	1) Assess traffic situation to determine if the aircraft can be accommodated through the provision of lateral, longitudinal, or conventional vertical separation, and if so, apply the appropriate minimum.
2) requesting flight level change, if necessary.	2) If unable to provide adequate separation, advise the pilot of essential traffic information and request pilot's intentions.
3) executing the contingency maneuver shown in paragraphs 7.0 and 8.0 of this AIP Supplement to offset from the assigned track and FL, if ATC clearance cannot be obtained and the aircraft cannot maintain CFL.	3) Notify other aircraft in the vicinity and monitor the situation
	4) Notify adjoining ATC facilities/ sectors of the situation.

Proposal for Amendment of
Regional Supplementary Procedures ICAO Doc 7030/4
(Serial No. APAC-S 01/3 - MID/ASIA/PAC RAC)

Regional Supplementary Procedures, Doc 7030/4: MID/ASIA/RAC and PAC/RAC

b) **Proposing State:** The United Arab Emirates and the United States ~~of America~~

c) **Proposed Amendment:**

Editorial note: Amendments are arranged to show deleted text using strikeout (~~text to be deleted~~), and added text with grey shading (text to be inserted).

1. a) On page MID/ASIA/RAC-3 dated 13/2/00, and

b) On page PAC/RAC-3, dated 13/2/00,

~~**Replace** Section 4 entirely with the following:~~

4.0 SPECIAL PROCEDURES FOR IN-FLIGHT CONTINGENCIES

4.1 General Procedures

4.1.1 The following general procedures apply to both subsonic and supersonic aircraft and are intended for guidance only. Although all possible contingencies cannot be covered, they provide for cases of inability to maintain assigned level due to weather, aircraft performance, pressurization failure and problems associated with high-level supersonic flight. They are applicable primarily when rapid descent and/or turn-back or diversion to an alternate airport are required. The pilot-s judgment shall determine the sequence of actions taken, taking into account specific circumstances.

4.1.2 If an aircraft is unable to continue flight in accordance with its ~~air traffic control~~ ATC clearance, a revised clearance shall, whenever possible, be obtained prior to initiating any action, using a distress or urgency signal, as appropriate.

4.1.3 If prior clearance cannot be obtained, an ~~air traffic control~~ATC

clearance shall be obtained at the earliest possible time and, until a revised clearance is received, the ~~aircraft~~ pilot shall:

~~- broadcast, at suitable intervals, its position (including the ATS route designator or the track code, as appropriate) and intentions, on the frequency in use, as well as on frequency 121.5 MHz;~~

if possible, deviate away from an organized track or route system;

establish communications with and alert nearby aircraft by broadcasting, at suitable intervals: aircraft identification, flight level, aircraft position, (including the ATS route designator or the track code) and intentions on the frequency in use, as well as on frequency 121.5 MHz (or, as a back-up, the VHF inter-pilot air-to-air frequency 123.45 MHz);

watch for conflicting traffic both visually and by reference to ACAS (if equipped); and

turn on all aircraft exterior lights (commensurate with appropriate operating limitations).

4.2 Special Procedures for subsonic aircraft requiring rapid descent and/or turn-back or diversion to an alternate airport due to aircraft system malfunction or other contingencies

4.2.1 Initial action

4.2.1.1 If unable to comply with the provisions of 4.1.2 to obtain a revised ATC clearance, the aircraft should leave its assigned route or track by turning 90 degrees to the right or left whenever this is possible. The direction of the turn should, where possible, be determined by the position of the aircraft relative to any organized route or track system, e.g. whether the aircraft is outside, at the edge of, or within the system. Other factors to consider are the direction to the alternate airport, terrain clearance and the levels allocated to adjacent routes or tracks.

4.2.2 *Subsequent action (RVSM airspace)*

~~4.2.2.1 AIRCRAFT ABLE TO MAINTAIN LEVEL. An aircraft able to maintain its assigned level should acquire and maintain in either direction a track laterally separated by 25 NM from its assigned route or track and once established on the offset track, climb or descend 150 m (500 ft).~~

~~4.2.2.2 AIRCRAFT UNABLE TO MAINTAIN LEVEL. An aircraft NOT able to maintain its assigned level should, whenever possible, minimize its rate of descent while turning to acquire and maintain in either direction a track laterally separated by 25 NM from its assigned route or~~

~~track. For subsequent level flight, a level should be selected that differs by 150 m (500 ft) from those normally used.~~

4.2.2.1 In RVSM airspace, an aircraft able to maintain its assigned flight level should turn to acquire and maintain in either direction a track laterally separated by 46 km (25 NM) from its assigned route or track in a multi-track system spaced at 93 km (50 NM) or otherwise, at a distance which is the mid-point from the adjacent parallel route or track; and

a) if above FL 410, climb or descend 300 m (1 000 ft); or

b) if below FL 410, climb or descend 150 m (500 ft); or

c) if at FL 410, climb 300 m (1 000 ft) or descend 150 m (500 ft).

4.2.2.2 An aircraft that is unable to maintain its assigned flight level should:

a) initially minimize its rate of descent to the extent that it is operationally feasible;

b) turn while descending to acquire and maintain in either direction a track laterally separated by 46 km (25 NM) from its assigned route or track in a multi-track system spaced at 93 km (50 NM) or otherwise, at a distance which is the mid-point from the adjacent parallel route or track; and

c) for the subsequent level flight, select a level which differs from those normally used by 300 m (1 000 ft) if above FL 410, or by 150 m (500 ft) if below FL 410.

4.2.3 *Subsequent action (non-RVSM airspace)*

4.2.3.1 In non-RVSM airspace, an aircraft able to maintain its assigned flight level should turn to acquire and maintain in either direction a track laterally separated by 46 km (25 NM) from its assigned route or track in a multi-track system spaced 93 km (50 NM) or otherwise, at a distance which is the mid-point from the adjacent parallel route or track and:

a) if above FL 290, climb or descend 300 m (1 000 ft); or

b) if below FL 290, climb or descend 150 m (500 ft); or

c) if at FL 290, climb 300 m (1 000 ft) or descend 150 m (500 ft).

4.2.3.2 An aircraft unable to maintain its assigned level flight should:

a) initially minimize its rate of descent to the extent that it is

operationally feasible;

b) turn while descending to acquire and maintain in either direction a track laterally separated by 46 km (25 NM) from its assigned route or track in a multi-track system spaced at 93 km (50 NM) or otherwise, at a distance which is the mid-point from the adjacent parallel route or track; and

c) for the subsequent level flight, a level should be selected which differs from those normally used by 300 m (1 000 ft) if above FL 290 or by 150 m (500 ft) if below FL 290.

~~4.2.2.3~~4.2.4. DIVERSION ACROSS THE FLOW OF ADJACENT TRAFFIC. ~~Before commencing a diversion across the flow of adjacent traffic, the aircraft should, while maintaining the 25 NM offset, expedite climb above or descent below levels where the majority of oceanic traffic operates (e.g., to a level above FL 410 or below FL 285) and then maintain a level that differs by 150 m (500 ft) from those normally used. However, if the pilot is unable or unwilling to carry out a major climb or descent, the aircraft should be flown at a level 150 m (500 ft) above or below levels normally used until a new ATC clearance is obtained.~~Before diverting across the flow of adjacent traffic, the aircraft should climb above FL 410 or descend below FL 280 using the procedures specified in 4.2.1 or 4.2.2 or 4.2.3. However, if the pilot is unable or unwilling to carry out a major climb or descent, the aircraft should be flown at a level as defined in 4.2.2.1 or 4.2.3.1 until a revised ATC clearance is obtained.

~~4.2.2.4~~4.2.5 EXTENDED RANGE OPERATIONS BY AIRCRAFT WITH TWO-TURBINE POWER UNITS (ETOPS). If these contingency procedures are employed by a twin-engine aircraft as a result of an engine shutdown or a failure of an ETOPS critical system, the pilot should advise ATC as soon as practicable of the situation, reminding ATC of the type of aircraft involved and request expeditious handling.

4.3 Weather deviation procedures for oceanic-controlled airspace

4.3.1 General

4.3.1.1 The following procedures are intended to provide guidance. All possible circumstances cannot be covered. The pilot~~-~~s judgment shall ultimately determine the sequence of actions taken, and ATC shall render all possible assistance.

4.3.1.2 If the aircraft is required to deviate from track to avoid weather and prior clearance cannot be obtained, an ~~air traffic control~~ ATC clearance shall be obtained at the earliest possible time. ~~In the meantime, the aircraft shall broadcast its position (including the ATS route designator or the track code, as appropriate) and intentions, on the~~

~~frequency in use, as well as on frequency 121.5 MHz, at suitable intervals until ATC clearance is received.~~ Until an ATC clearance is received, the aircraft shall follow the procedures detailed in paragraph 4.3.4 below.

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

4.3.2 *Obtaining priority from ATC when weather deviation is required*

4.3.2.1 When the pilot initiates communications with ATC, rapid response may be obtained by stating AWEATHER DEVIATION REQUIRED@ to indicate that priority is desired on the frequency and for ATC response.

4.3.2.2 The pilot still retains the option of initiating the communications using the urgency call APAN PAN@ (preferably spoken three times) to alert all listening parties to a special handling condition which will receive ATC priority for issuance of a clearance or assistance.

4.3.3 *Actions to be taken when controller-pilot communications are established*

a) Pilot notifies ATC and requests clearance to deviate from track, advising, when possible, the extent of the deviation expected.

b) ATC takes one of the following actions:

if there is no conflicting traffic in the horizontal dimension, air traffic control will issue clearance to deviate from track; or

if there is conflicting traffic in the horizontal dimension, ATC separates aircraft by establishing vertical separation ~~600 m (2 000 ft) above FL 290, 300 m (1 000 ft) below FL 290)~~; or

if there is conflicting traffic in the horizontal dimension and ATC is unable to establish ~~vertical~~appropriate separation, ATC shall:

i) advise the pilot ~~that standard separation cannot be applied~~ of inability to issue clearance for requested deviation; and

ii) ~~provide essential traffic information for all affected aircraft~~ advise the pilot of conflicting traffic; and

~~iii) if possible, suggest a course of action. ATC may suggest that the pilot:~~

- ~~if operating in an airspace where a 600 m (2 000 ft) vertical separation minimum is applied, climb or descend 300 m (1 000 ft) from the assigned level ; or~~

- ~~if operating in an airspace where 300 m (1 000 ft) vertical separation minimum is applied, climb or descend 150 m (500 ft) from the assigned level ; or~~

- ~~if operating in an airspace where composite separation is applied, remain at the assigned level.~~

iii) request pilot's intentions.

SAMPLE PHRASEOLOGY:

~~ASStandard separation not available, deviate at pilot's discretion; suggest climb to flight level three five five; parallel traffic [Y distance Y] north at flight level three five zero; report deviation complete.@~~

AUNABLE *(requested deviation),* **TRAFFIC IS** *(call sign, position, altitude, direction),* **ADVISE INTENTIONS**.@

c) Pilot will take the following actions:

1) ~~comply with air traffic control clearance issued ; or~~ advise ATC of intentions by the most expeditious means available; and

2) ~~follow a level suggested by ATC when approximately 10 NM from track, along with the procedures detailed in 4.3.4.1 b), c) and d); or~~comply with ATC clearance issued; or

3) execute the procedures detailed in ~~4.3.4.1~~. 4.3.4 below. ~~The pilot shall immediately inform ATC of intentions and~~ (ATC will issue essential traffic information to all affected aircraft); and

4) if necessary, establish voice communications with ATC to expedite dialogue on the situation4.3.4 *Actions to be taken if ~~controller-pilot communications not established or~~ a revised ~~air traffic control~~ ATC clearance ~~not available~~ cannot be obtained*

4.3.4.1 The provisions of this section apply to situations where pilot has the need to exercise the authority of a pilot-in-command under the provisions of Annex 2 paragraph 2.3.1.

~~4.3.4.1~~4.3.4.2 If ~~contact cannot be established or~~ a revised ~~air traffic control~~ ATC clearance ~~or advisory is not available~~ cannot be obtained and deviation from track is required to avoid weather, the pilot shall take the following actions:

a) if possible, deviate away from an organized track or route system;

b) broadcast aircraft position and intentions on the frequency in use, as well as on frequency 121.5 MHz, as suitable intervals stating: flight identification (operator call sign), flight level, track code or ATS route designator, and extent of deviation expected establish communication with and alert nearby aircraft by broadcasting, at suitable intervals: aircraft identification, flight level, aircraft position (including the ATS route designator or the track code) and intentions (including the magnitude of the deviation expected) on the frequency in use, as well as on frequency 121.5 MHz (or, as a back-up, the VHF inter-pilot air-to-air frequency 123.45 MHz).

c) watch for conflicting traffic both visually and by reference to ACAS (if equipped);

*Note.**C** If, as a result of actions taken under paragraphs 4.3.4.2 b) and c) above, the pilot determines that there is another aircraft at or near the same flight level with which a conflict may occur, then the pilot is expected to adjust the path of the aircraft, as necessary, to avoid conflict.*

d) turn on all aircraft exterior lights (commensurate with appropriate operating limitations);

e) for deviations of less than 19 km (10 NM), ~~or operations within the composite route systems,~~ aircraft should remain at the level assigned by ATC;

f) for deviations of greater than 19 km (10NM), when the aircraft is approximately 19 km (10 NM) from track, initiate a level change based on the criteria in Table 1;

g) when returning to track, be at its assigned flight level, when the aircraft is within approximately 19 km (10 NM) of centre line; and

h) if contact was not established prior to deviating, continue to attempt to contact ATC to obtain a clearance. If contact was established, continue to keep ATC advised of intentions and obtain essential traffic information.

Table 1.

Route centre line Track	Deviations >19 km (10 NM)	Level change
EAST 000-179° magnetic	LEFT	DESCEND ~~150 m (500 ft)~~ 90 m (300 ft)
	RIGHT	CLIMB ~~150 m (500 ft)~~ 90 m (300 ft)
WEST 180-359° magnetic	LEFT	CLIMB ~~150 m (500 ft)~~ 90 m (300 ft)
	RIGHT	DESCEND ~~150 m (500 ft)~~ 90 m (300 ft)

Proposers' reasons for amendment:

The ICAO RVSM Implementation Task Force has reviewed special procedures for in-flight contingencies (including weather deviation procedures) following the implementation of RVSM in the Pacific in February 2000 and pending the implementation of RVSM in Asia and Middle East. This amendment updates the existing text based on operational experience following RVSM implementation in the Pacific;

Special procedures are required for aircraft requiring rapid descent and/or turn-back or diversion to an alternate airport due to aircraft system malfunction or other contingencies; and

The proposed revised weather deviation procedures for oceanic-controlled airspace include a change to the climb/descent from 150 m (500 ft) to 9091 m (300 ft) to accommodate organized track systems using different schemes and where RVSM is implemented. The introduction of 9091 m (300 ft) climb/descent will mitigate the risk associated with convective weather activity in airspace where RVSM is implemented.

Proposed implementation date of the amendment:

~~21 February 2002~~On approval by the ICAO Council

Proposal circulated to the following States and International Organizations:

fghanistan
lbania
lgeria
ngola
rgentina
rmenia
ustraliaAustria
zerbaijan
ahrain
angladesh
elarus
reece
uinea
uinea-Bissau Hungary
eland
dia
donesiaIran, Islamic Republic of
aq
eland
rael Italy
pan
upua New Guinea
eru
ilippines
oland
ortugal
atar
epublic of KoreaRepublic of Moldova
omania
ussian Federation
wanda

elgium
enin
nutan
osnia and Herzegovina
otswana
razil
runei Darussalam
ulgaria
urkina Faso
urundi
ambodia
ameroon
anada
ape Verde
entral African
Republic
had
hile
hina
c: Hong Kong, China)
c: Macao, China)
omoros
ongo
ook Islands
ote d'Ivoire
roatia
yprus
zech Republic
emocratic People's
epublic of Korea
enmark
jibouti
cuador
gypt
quatorial Guinea
ritrea
stonia
hiopia
ji
nland
ance
abon
ambia
eorgiaGermany
hana

rdan
azakhstan
enya
iribati
uwait
yrgyzstan
ao People's
emocratic Republic
atvia
ebanon
esotho
beria
byan Arab
amahiriya
thuania
uxembourg
adagascar
alawi
alaysia
aldives
ali
alta
arshall Islands
auritania
auritius
exico
icronesia,
Federated States of
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ongolia
orocco
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Tanzania
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anuatu
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ambia
aire
mbabwe
ATA
ALPA
ATCA

For information only

Secretariat comments:

A review following the implementation of RVSM in the airspace of the Pacific has necessitated an amendment to the existing weather deviation procedures in the Middle East/Asia and Pacific Regions;

This amendment proposal is in line with the one being developed for the North and South Atlantic; and

This proposal will enhance harmonization of procedures, in particular relating to weather deviations, for the Middle East/Asia and Pacific Regions.

MID RVSM TF/5
Appendix G to the Report

INTERNATIONAL CIVIL AVIATION ORGANIZATION

FIFTH MEETING OF THE MIDDLE EAST RVSM TASK FORCE

(Abu Dhabi, 02-05 June 2002)

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MIDDLE EAST REGION

Appendix H to the Report of the Fifth Meeting of the RVSM Task Force

(Dubai, 2 5 June 2002)

DRAFT
ATC MANUAL FOR A

REDUCED VERTICAL SEPARATION MINIMUM (RVSM) IN MID REGION

Note: These procedures will be applicable only in those FIRs/areas of the MID Region where RVSM will be implemented

Edition	**:**	**1.0**
Edition Date	**:**	**05/06/02**

This draft Document is inspired from the procedures applicable in Europe and has been developed within the framework of the MIDANPIRG RVSM Task Force

DOCUMENT IDENTIFICATION SHEET

DOCUMENT DESCRIPTION

Document Title

ATC Manual for a Reduced Vertical Separation Minimum (RVSM) in the Middle East Region

This manual represents an operational reference document intended for the use of ATS personnel involved in the planning, implementation and application of a Reduced Vertical Separation Minimum (RVSM) in the Middle East Region.

DOCUMENT STATUS AND TYPE

STATUS		
Working Draft	☑	
Draft	☐	
Proposed Issue	☐	
Released Issue	☐	

DOCUMENT APPROVAL

DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
1.0	05/06/-02	Working Draft Document	ALL

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AMENDMENT SUMMARY

Note: This document was developed by the MIDANPIRG RVSM TASK FORCE and will be amended as required.

Amendment NR/Year	Publication date	Date inserted	Effective date	Inserted by

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LIST OF ABBREVIATIONS

ACAS	Airborne Collision Avoidance System	**IFPS**	Integrated Initial Flight Plan
ACC	Area Control Centre	**IFPZ**	IFPS Zone
ACH	ATC Flight Plan Change Message (IFPS)	**IFR**	Instrument Flight Rules
ACI	Area of Common Interest	**JAA**	Joint Aviation Authorities
ACT	Activation Message (OLDI)	**JAA AMC**	JAA Acceptable Means of Compliance
ADEP	Aerodrome of Departure	**JAR**	Joint Aviation Requirements
ADES	Aerodrome of Destination	**LoA**	Letter of Agreement
AFIL	Flight Plan Filed in the Air	**MASPS**	Minimum Aircraft System Performance Specifications
AFP	ATC Flight Plan Proposal Message (IFPS)	**MECMA**	Middle East Central Monitoring Agency
		MEL	Minimum Equipment List
		MIDANPIRG	Middle East Air Navigation Planning and Implementation Regional Group
		MNPS	Minimum Navigation Performance Specifications
AIC	Aeronautical Information Circular	**MTCD**	Medium Term Conflict Detection
AIP	Aeronautical Information Publication	**NAT**	North Atlantic
AMC	Airspace Management Cell	**NAT CMA**	North Atlantic Region Central Monitoring Agency
ANT	Airspace and Navigation Team	**NATSPG**	North Atlantic Systems Planning Group
APDSG	ATM Procedures Development Sub-Group	**NOTAM**	Notice to Airmen
APL	ATC Flight Plan Message (IFPS)	**OAT**	Operational Air Traffic
ASE	Altimetry System Error	**OLDI**	On-Line Data Interchange
ATC	Air Traffic Control	**RA**	Resolution Advisory (ACAS)
ATM	Air Traffic Management	**REJ**	Reject message (IFPS)
ATS	Air Traffic Services	**RFL**	Requested Flight Level
CDB	Central Data Base	**RGCSP**	Review of the General Concept of Separation Panel
CFL	Cleared Flight Level	**RNAV**	Area Navigation
CFMU	Central Flow Management Unit	**RNP**	Required Navigation Performance
CHG	Modification Message (IFPS)	**RPL**	Repetitive Flight Plan
CMA	Central Monitoring Agency (NAT)		
CVSM	Conventional Vertical Separation Minimum	**RTF**	Radiotelephony
EANPG	European Air Navigation Planning Group	**RVSM**	Reduced Vertical Separation Minimum of 300 m/1 000 ft between FL 290 and FL 410 Inclusive
EATCHIP	European Air Traffic Control Harmonisation and Integration Programme	**SARPs**	Standards and Recommended Practices
EATMP	European Air Traffic Management Programme *(successor to EATCHIP)*	**SDB**	State Data Base
ECAC	European Civil Aviation Conference	**SSEC**	Static Source Error Correction
FAA	Federal Aviation Administration (USA)	**SSR**	Secondary Surveillance Radar
FDPS	Flight Data Processing System	**STCA**	Short Term Conflict Alert
FIR	Flight Information Region	**TA**	Traffic Advisory (ACAS)
FL	Flight Level	**TGL**	Temporary Guidance Leaflet (JAA)
FLAS	Flight Level Allocation Scheme	**TLS**	Target Level of Safety
FMP	Flow Management Position (ACC)	**TSA**	Temporary Segregated Area
FPL	Flight Plan	**TSE**	Total System Error
GAT	General Air Traffic	**TVE**	Total Vertical Error
GMU	GPS Height Monitoring Unit	**UAC**	Upper Area Control Centre
GPS	Global Positioning System	**UIR**	Upper Flight Information Region

HMU	Height Monitoring Unit	**VFR**	Visual Flight Rules
ICAO	International Civil Aviation Organization	**VSM**	Vertical Separation Minimum

DEFINITIONS

Flight Level Allocation Scheme (FLAS)

The scheme whereby specified flight levels may be assigned to specific route segments within the ATS route network.

General Air Traffic (GAT)

Flights conducted in accordance with the rules and provisions of ICAO.

Operational Air Traffic (OAT)

Flights which do not comply with the provisions stated for General Air Traffic (GAT), and for which rules and procedures have been specified by appropriate authorities.

RVSM Approval

The approval that is issued by the appropriate authority of the State in which the Operator is based, or of the State in which the aircraft is registered. To obtain such RVSM approval, Operators shall satisfy the said State that:

1) aircraft for which the RVSM Approval is sought have the vertical navigation performance capability required for RVSM operations through compliance with the criteria of the RVSM Minimum Aircraft Systems Performance Specifications (MASPS);

2) they have instituted procedures in respect of continued airworthiness (maintenance and repair) practices and programmes; and

3) they have instituted flight crew procedures for operations in the MID RVSM Airspace.

Note: An RVSM approval is not restricted to a specific region. Instead, it is valid globally on the understanding that any operating procedures specific to a given region, in this case the MID Region, should be stated in the operations manual or appropriate crew guidance.

DEFINITIONS

RVSM APPROVED AIRCRAFT

Aircraft that have received State approval for RVSM operations within the MID RVSM Airspace.

RVSM Entry Point

The first reporting point over which an aircraft passes or is expected to pass immediately before, upon, or immediately after initial entry into MID RVSM Airspace, normally the first reference point for applying a 300 m (1 000 ft) vertical separation minimum between RVSM approved aircraft.

RVSM Exit Point

The last reporting point over which an aircraft passes or is expected to pass immediately before, upon, or immediately after leaving MID RVSM Airspace, normally the last reference point for applying a 300 m (1 000 ft) vertical separation minimum between RVSM approved aircraft.

State Aircraft

For the purposes of MID RVSM, only aircraft used in military, customs and police services shall qualify as State aircraft.

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

Strategic Flight Level

A flight level which may be flight-planned in accordance with the ICAO Tables of Cruising Levels, Annex 2, Appendix 3, and/or a Flight Level Allocation Scheme (FLAS), as specified in the relevant Aeronautical Information Publications (AIPs).

Tactical Flight Level

A flight level which is reserved for tactical use by ATC, and, as such, should not be flight-planned.

EXECUTIVE SUMMARY

The application of a reduced vertical separation minimum in the airspace of the Middle East Region States and other States participating in the MID RVSM Programme, represents a change of major significance to the operational environments of those ACCs/UACs involved. Careful planning in advance of the implementation of RVSM will ensure that benefits in terms of capacity and operating efficiency are optimised, and that controllers will be able to successfully cope with the magnitude of the change to their operational environments, thereby ensuring continued levels of safety.

Text within this manual, highlighted through the use of a shaded box, describe ATC procedures and system support requirements as dictated by identified operational requirements and as endorsed by MIDANPIRG. In support of these ATC procedures and system support requirements, the manual serves as a guidance and reference document for those operational and management ATS personnel involved with the planning for the implementation of RVSM. As well, it will serve as a reference document for those personnel involved with the continuing ATC operations of ACCs/UACs in an RVSM environment.

The manual will address those elements of the MID ATM system which are impacted directly by, or have an impact on, RVSM implementation and application.

While the document describes the MID RVSM airspace, ATC procedures, ATC phraseologies and relevant flight crew procedures associated with the application of RVSM, it does not supersede the relevant ICAO and national documents.

MID RVSM airspace

to reflect the application of RVSM within the airspace not only of Member States of the Middle East Region, but also within certain States adjacent to MID, which have decided to participate in the RVSM Programme. Although originally intended for implementation only within the MID Region States as a capacity enhancing element, additional States bordering the MID Region will as well implement RVSM in their airspace, in order to achieve a homogeneous MID RVSM airspace and to share in the expected benefits of RVSM.

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1. INTRODUCTION

1.1 Background

The implementation of a reduced vertical separation minimum represents a major capacity enhancing objective of the MIDANPIRG RVSM Task Force. Effectively, the introduction of RVSM will permit the application of a 1 000 ft vertical separation minimum (VSM) between suitably equipped aircraft in the level band FL 290-FL 410 inclusive, thereby making available six additional usable flight levels. The purpose of the implementation of RVSM is to increase capacity, through the provision of these six additional flight levels, to reduce controller workload, while maintaining, or improving upon, current levels of safety, and to provide the airspace user community with an improved operating environment for optimising flight profiles.

The making available of these additional levels is one of the means which will enable controllers:

- to efficiently handle both the current and future levels of traffic within their areas of responsibility,
- to de-conflict strategically traffic over the major crossing points of the MID ATS route network more effectively, and
- to accommodate pilot requests for optimal cruising levels.

As described below, and as a pre-requisite to the introduction of RVSM in the MID Region, implementation of RVSM requires that levels of safety of operations within the MID RVSM airspace, when compared to current levels of safety, be either maintained or improved. Work undertaken by the Middle East Central Monitoring Agency (MECMA) in the form of real-time simulations and safety studies have confirmed the feasibility of implementing RVSM, both technically and operationally, within required levels of safety. Experience gained through the application of RVSM within the ICAO North Atlantic (NAT) Region and within European airspace has been used in the development of the relevant associated aspects of the implementation of RVSM in the MID airspace. In this way, consistency in flight operations across the two operational ATC environments was maintained to the maximum extent possible. The material developed as a result of the MID RVSM Programme is in accordance with all relevant ICAO Standards and Recommended Practices (SARPs) and associated

ICAO Guidance Material on both RVSM and ATS. Thus, the implementation of RVSM in the MID airspace is undertaken with due consideration for consistency with applications of the concept, both existing and planned, in other regions.

1.2 The Need for RVSM

OUTLOOK FOR THE MIDDLE EAST REGION

Economic Trends and Prospects

1.2.1 The Middle East economy has been characterized by several pronounced cycles over the past decade. The oil_producing countries in the region suffered from declines in crude oil prices during the 1980s and from the effects of the Gulf War in 1990_1991. With a return to political and economic stability in the region, GDP growth recovered quite strongly in 1992. Continuous growth, though varying in strength, was sustained in the following seven years. From 1989 to 1999, the aggregate GDP for the Middle East grew at an average annual rate of 3.2 per cent in real terms, while GDP per capita levelled off at 0.5 per cent per annum. The GDP for the region is expected to increase at an average annual rate of 2.5 per cent for the period 1999-2010.

Air Passenger Traffic Trends and Forecast

1.2.2 Over the 1989-1999 period, scheduled passenger traffic (in PKPs) of the airlines of the Middle East region increased at an average annual rate of 5.9 per cent. The year 2000 witnessed an impressive growth of traffic at 11.0 per cent over 1999.The long term average annual growth rate to the year 2010 is anticipated to be 4.5 per cent.

Aircraft movement forecasts for 2010-2015

1.2.3 The aircraft movement forecasts for the period 2000-2015 were developed assuming some maturity in growth for the route groups concerned. Aircraft movement forecast growth rates are projected to be somewhat lower for the period 2010-2015 compared to the period 2000-2010. These aircraft movements forecasts are shown in **Table 1**.

AIRCRAFT MOVEMENTS FORECAST BY ROUTE GROUP TO THE YEAR 2015

	2000 (000)	2010 (000)	2015 (000)	Average Annual Growth (%)	
				2000-2010	2010-2015
AFR_MEA	45.2	62.0	70.8	3.2	2.7
ASIA_MEA	86.3	162.0	211.8	6.5	5.5
EUR_MEA	133.2	227.5	283.5	5.5	4.5
INTRA MEA	116.0	228.2	305.4	7.0	6.0
NAM-MEA	6.3	9.3	11.1	4.0	3.5
Total	387.0	689.0	882.6	5.9	5.1

1.2.4 It is accepted that major changes to the ATM systems will be necessary in order to cope with this continued traffic growth. Of the various measures under consideration, the implementation of RVSM is considered to be the most cost effective means of meeting this need through the provision of six additional flight levels for use in the highly congested airspace from FL 290 to FL 410 inclusive. The RVSM Programme will result in the following benefits:

- Optimum Route Profiles.

  The availability of the additional flight levels in the busiest level band, will allow operators to plan for, and operate at or closer to, the optimum vertical route profile for the particular aircraft type. This will provide fuel economies in terms of both the fuel carried, and the fuel burn, for the flight.

- Increased ATC Capacity

  significant reduction in controller workload. Simulations carried out in France demonstrated that the capacity of those sectors simulated could be increased by approximately 20% when compared to a conventional vertical separation minimum (CVSM) environment[1]. There is also potential for further growth, through a revised airspace structure including, for example, resectorisation and/or the introduction of additional sectors.

  However, the presence of non-RVSM approved State aircraft, which have been exempted[2] from having to meet the RVSM Minimum Aircraft System Performance Specification (MASPS) requirements for operations in MID RVSM airspace (see Part 3), and which are required to operate regularly as GAT along the ATS route network, will decrease the expected capacity gains. Evidence from the continuing operation of RVSM in the NAT region indicates that a large proportion of State aircraft operating as GAT are nevertheless RVSM approved. This trend is expected to continue.

[1] 3rd Continental RVSM Real-Time Simulation, S08, (Conclusions)
[2] certain military tactical aircraft cannot, due to physical limitations, be adapted to meet RVSM MASPS

1.3 History

In the late 1950s it was recognised that, as a result of the reduction in accuracy of pressure-sensing of barometric altimeters with increasing altitude, there was a need above a certain flight level to increase the prescribed vertical separation minimum (VSM) of 1 000 ft. In 1960, an increased VSM of 2 000 ft was established for use between aircraft operating above FL 290 except where, on the basis of regional air navigation agreement, a lower flight level was prescribed for the increase. The selection of FL 290 was not so much an empirically-based decision but rather a function of the operational ceiling of aircraft at that time. In 1966, this change-over level was established at FL 290 on a global basis. At the same time, it was considered that the application of a reduced VSM above FL 290, on a regional basis and in carefully prescribed circumstances, was a distinct possibility in the not too distant future. Accordingly, ICAO provisions stated that such a reduced VSM could be applied under specified conditions within designated portions of airspace on the basis of regional air navigation agreements.

In the late 1970s, faced with rising fuel costs and growing demands for a more efficient utilisation of the available airspace, ICAO initiated a comprehensive programme of studies to examine the feasibility of reducing the 2 000 ft VSM applied above FL 290, to the same 1 000 ft VSM which is applied below FL 290. Throughout the 1980s, various studies were conducted, under the auspices of ICAO and in Europe, Canada, Japan, and the United States. The underlying approach of the programmes was to:

- determine the height keeping accuracy of the altimetry systems of the then current aircraft population.
- establish the causes of observed height keeping errors.
- determine the required safety levels for the implementation and use of a Reduced Vertical Separation Minimum (RVSM) of 1 000 ft in the level band FL 290 - FL 410 inclusive.
- define a MASPS, for aircraft altimetry and associated height keeping equipment, which would improve height keeping accuracy to a standard compatible with the agreed safety requirements for RVSM.
- determine whether the global implementation and use of RVSM was :
    1. technically feasible, subject to the over-riding need to satisfy the agreed safety standards, and
    2. cost beneficial.

The results of these exhaustive studies demonstrated that the reduction of vertical separation was safe, cost beneficial and feasible, - without the imposition of unduly demanding technical requirements.

The studies also showed that the types of aircraft and the essentially unidirectional flow of traffic in the North Atlantic Minimum Navigation Performance Specifications (MNPS) airspace, made the NAT Region an ideal candidate for the first implementation of RVSM.

Planning for RVSM in the NAT Region commenced in 1990. The first stage of the Operational Evaluation phase, using the 1 000 ft RVSM, began on the 27th March 1997 in the level band FL 330 and FL 370 inclusive. The application of RVSM was extended in a second stage to encompass FL 310, FL 320, FL 380 and FL 390 in October 1998.

~~From the outset it was clear that the complex nature of the European ATS route structure, the wide variety of aircraft types, high traffic density and the high percentage of climbing and descending aircraft, would be a more complex ATM environment than the North Atlantic Region for the implementation of RVSM. Thus, safety considerations were given a high priority in the initial ECAC RVSM feasibility studies which were conducted under the auspices of the EUROCONTROL Airspace and Navigation Team (ANT). These studies indicated that, subject to aircraft meeting the altimetry MASPS, RVSM could be introduced into the European Region without compromising required safety levels, and also that it would provide a positive benefit to cost ratio over a wide range of assumptions regarding future developments within the European aviation environment.~~

1.4 The MID Region RVSM Implementation Programme

The Programme consists of a series of co-ordinated activities, performed within the framework the MIDANPIRG RVSM Task Force, MECMA, ICAO, Joint Aviation Authorities (JAA), Participating States and User Organisations.

The programme has followed the general strategy set out in the ICAO Doc. 9574 (First Edition) - anual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum -step approach within four distinct phases :

Phase 1: Initial Planning

- Step 1: Assessment of Operational System Safety
- Step 2: Assessment of Costs and Benefits from RVSM
- Step 3: Elaboration of programme plans and production of technical specifications.

~~This phase was completed in June 1997. The EATCHIP Project Board reviewed the progress made on the RVSM Programme and recommended that work should continue so that full implementation can be achieved on the target date of November 2001[3]. This programme was endorsed by the European Air Navigation Planning Group (EANPG) in December 1997.~~

~~Subsequently, the EUROCONTROL Provisional Council requested the establishment of an adequate programme management structure to run the RVSM Programme effectively, and to confirm, with States and other RVSM stakeholders, a feasible target (to which full commitment could be given) for the implementation of RVSM in the European Region. In April 1999, the EUROCONTROL Provisional Council approved the RVSM Master Plan, with an implementation date of 24 January 2002.~~

[3] The tentative date for the implementation of RVSM has since been adjusted to 27 November 2003.

Phase 2: Advanced Planning and Preparation

In this phase the emphasis of the work programme moved from the theory and initial design of the total system to the practical application and introduction of the system requirements. The objectives of this phase were:

1. to prepare the aircraft for RVSM operations
2. to prepare a monitoring environment to allow confirmation of the technical performance of aircraft
3. to commence the preparation of the ATS environment for RVSM operation.

Note: Points 1 and 2 will allow Phase 3 to start, point 3 is pre-requisite to Phase 4.

Phase 3 : Verification of Aircraft Performance

The purpose of the Verification Phase, is to confirm, in a 2 000 ft vertical separation environment:

- the effectiveness of the RVSM approval process;
- the effectiveness of the MASPS, by measuring the height keeping performance accuracy of the maximum possible number of aircraft which have obtained RVSM airworthiness approval;
- that the safety levels of the proposed RVSM system will remain at, or be better than, those established by the Target Level of Safety (TLS).

This phase will continue until all aspects of the work programme necessary to the successful completion of the verification process have been completed. This is expected to take approximately one year.

Phase 4 : Introduction of RVSM

The introduction of RVSM does not mark the end to the Programme. This phase of the programme will be used to confirm that:

- all elements of the total system are operating satisfactorily,
-

This phase will support the resolution of any operational issues which might be revealed following the implementation of 1 000 ft VSM.

Phase 4 will continue until it is possible to confirm that the long term safety of 1 000 VSM can be assured without further monitoring.

1.5 Supporting Documentation

The following reference documents contain information pertaining to RVSM:

- ICAO Doc 9574 - Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum between FL 290 and FL 410 Inclusive

- ICAO Doc 7030/4 (EUR) - ICAO Regional Supplementary Procedures for European and MID Region

- ICAO EUR Doc 009 - Guidance Material on the Implementation and Application of a 300 m (1 000 ft) Vertical Separation Minimum in the European RVSM Airspace

- JAA Temporary Guidance Leaflet - Guidance Material on the Approval of Aircraft and Operators for Flight in Airspace above Flight Level 290 where a 300 m (1 000 ft) Vertical Separation Minimum is applied (TGL No.6, Revision 1)

- National Aeronautical Information Circulars (AICs) and/or Aeronautical Information Publications (AIPs)

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2.0 DESCRIPTION OF THE MID RVSM AIRSPACE

2.1 The MID RVSM Airspace

2.1.1 RVSM shall be applicable in that volume of airspace between FL 290 and FL 410 inclusive in the following Flight Information Regions (FIRs)/Upper Information Regions (UIRs):

Amman, Bahrain, Beirut, Cairo, Damas, Emirates, Jeddah, Kuwait, Muscat,

Note: At this phase of the planning process some States/FIRs/UIRs of the MID Region which have not joined the MID RVSM programme or have not met the minimum requirements will not implement RVSM on the tentative date of 27 November 2003 . This list will be accordingly updated based on the progress achieved and the status of implementation of the minimum requirements within each State/FIR/UIR.

2.1.2 RVSM shall be applicable in either all, or part of, that volume of airspace between FL 290 and FL 410 inclusive in the following FIRs/UIRs:

Karachi

2.1.3 The volume of airspace specified in paragraphs 2.1.1 and 2.1.2 is referred to as "MID RVSM Airspace" (Figure 2.a refers).

2.2 The MID RVSM Transition Airspace

2.2.1 Transition tasks associated with the application of a 300 m (1 000 ft) vertical separation minimum within the MID RVSM Airspace shall be carried out in all, or parts of, the following FIRs/UIRs:

Cairo, Jeddah, Muscat, , Tehran

2.2.2 The volume of airspace specified in paragraph 2.2.1 is referred to as "MID RVSM Transition Airspace" (Figure 2.a refers).

2.3 The MID/AFI/European/Asia Interface

2.3.1 In addition to the MID RVSM Transition Airspace, as described in paragraph 2.2.1, the State authorities responsible for the following FIRs may establish designated airspace within their FIRs for the purpose of transitioning non-RVSM approved civil aircraft operating to/from the EUR/AFI/Asia Region:

. (Figure 2.a refers).

Figure 2.a: The MID RVSM Area.

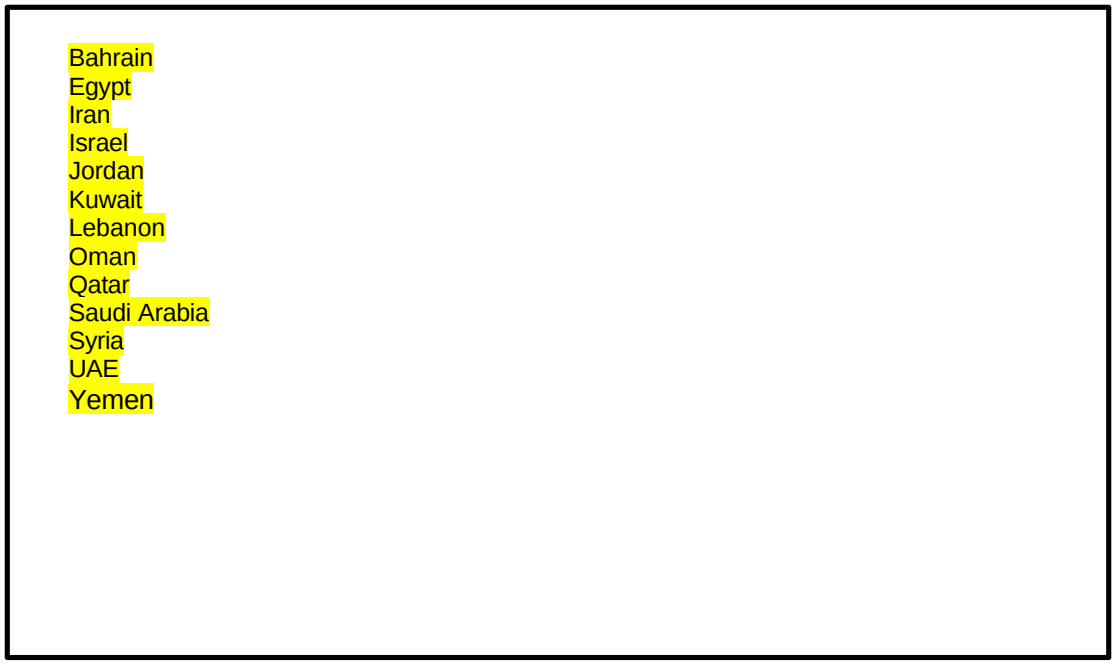
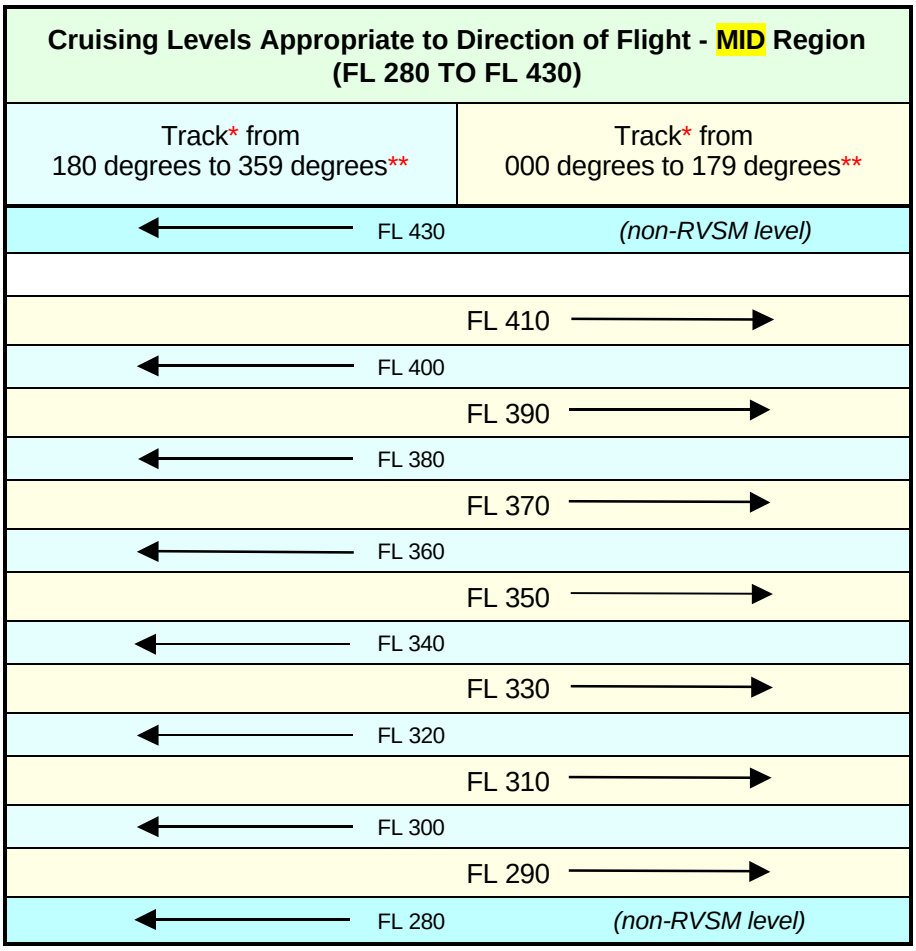


Figure 2.b: List of the 13 States participating in the MID RVSM Programme.

2.4 ICAO Table of Cruising Levels applicable to MID RVSM Airspace

2.4.1 With the implementation of RVSM, cruising levels within MID RVSM Airspace will be organised in accordance with the Table of Cruising Levels contained in ICAO Annex 2, Appendix 3, a). The cruising levels appropriate to direction of flight within the MID Region with the implementation of RVSM are illustrated below:



* Except where, on the basis of regional air navigation agreements, from 090 to 269 degrees and from 270 to 089 degrees is prescribed to accommodate predominant traffic directions and appropriate transition procedures to be associated therewith are specified.

2.4.2 The application of the ICAO Table of Cruising Levels for an RVSM environment has the effect of reversing the direction of flight for FL 310, FL 350 and FL 390. Flight levels 310, 350, and 390 are eastbound cruising levels in an RVSM environment, whereas they are westbound cruising levels in a non-RVSM environment.

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3.0 PROVISION OF SERVICE TO NON-RVSM APPROVED STATE AIRCRAFT

3.1 In consideration of the physical inability (due to limitations in aircraft design) of adapting the large majority of military tactical aircraft to the RVSM MASPS, **State aircraft were exempted** from the requirement to be RVSM approved in order to operate within the MID RVSM Airspace. However, MID Region States have been urged to adapt their State aircraft for RVSM approval, to the extent possible, and especially those aircraft used for GAT operations. Nonetheless, certain types of State aircraft cannot feasibly be adapted to meet the RVSM MASPS. These aircraft will be permitted to operate as either OAT or GAT within the MID RVSM Airspace.

3.2 Within the MID RVSM Airspace, non-RVSM approved State aircraft operating as GAT will be provided with a minimum vertical separation of 600 m (2 000 ft) from all other IFR aircraft. Although the number of non-RVSM approved State aircraft operating as GAT within the MID RVSM Airspace is expected to be very small, the impact of such flights on controller workload is not to be underestimated.

3.3 The requirement for ATC to accommodate non-RVSM approved State aircraft within the MID RVSM Airspace imposes significant operational considerations. Several real-time simulations carried out in support of the RVSM Programme confirm that significant increases in controller workload result from the requirement of having to selectively apply two distinct vertical separation minima (VSM) within the same volume of airspace, specifically:

300 m (1 000 ft): between any two aircraft operating as GAT where both aircraft are RVSM approved, and

600 m (2 000 ft): between any two aircraft operating as GAT where either:

- one of the aircraft involved is non-RVSM approved, or
- both of the aircraft involved are non-RVSM approved.

3.4 Of prime operational importance, therefore, is the need for controllers to be continuously aware of the RVSM approval status of all aircraft operating within, or in close proximity to, the MID RVSM Airspace. To meet this need, operational

requirements for ATS systems, and ATC procedures have been developed for the MID RVSM Airspace.

3.5 Specific ATC and flight planning requirements for the MID RVSM Airspace are contained in Section 5, whereas the automated system modifications necessary to support the ATC operational requirements for RVSM are detailed in Section 8.

*Note: See Section 5.5 with regards to the provision of service to non-RVSM approved **civil** aircraft within the MID RVSM transition airspace.*

4.0 FLIGHT OPERATIONS WITHIN THE MID RVSM AIRSPACE

4.1 Except for designated airspace where RVSM transition tasks are carried out, only RVSM approved aircraft and non-RVSM approved State aircraft shall be permitted to operate within the MID RVSM Airspace.

4.2 Except for State aircraft operating as OAT, flights shall be conducted in accordance with **IFR** when operated within or above the MID RVSM Airspace.

References: ICAO Annex 2, Chapter 4, paragraph 4.5
ICAO Regional Supplementary Procedures - Doc 7030/4 (EUR/MID)

4.3 The organisation of cruising levels within the MID RVSM Airspace, as described in paragraph 2.4.1, does not preclude the establishment of uni-directional ATS routes where deemed necessary.

4.3.1 Furthermore, it should be noted that within the MID RVSM Airspace all cruising levels are equally assignable by ATC to either RVSM approved or non-RVSM approved aircraft, provided that the applicable vertical separation minimum is applied.

5.0 RVSM PROCEDURES

5.1 Flight Planning Requirements

General Requirements

5.1.1 In addition to military operations, operators of customs or police aircraft shall

M *

5.1.1.1 Only aircraft used in military, customs, or police service shall qualify as State aircraft, and therefore be entitled to operate within the MID RVSM Airspace, regardless of the RVSM status of the aircraft.

5.1.1.2 The Integrated Initial Flight Plan Processing System (IFPS) shall disseminate Item 8 flight plan information to the flight data processing systems (FDPS) concerned for the purpose of providing a clear indication to ATC that where such non-RVSM

MID

RVSM Airspace.

5.1.2 All operators filing Repetitive Flight Plans (RPLs) shall include in Item Q of the RPL all equipment and capability information in conformity with Item 10 of the ICAO Flight Plan.

5.1.2.1 ICAO flight planning requirements for the MID Region require the inclusion of all ICAO Flight Plan Item 10 equipment and capability information (e.g. RVSM approved -

possession of this information for each flight on the day of operation.

5.1.2.2 For each flight on the day of operation, IFPS shall generate and distribute flight plans, from stored RPL information, containing the relevant RVSM approval status.

5.1.3 If a change of aircraft operated in accordance with a repetitive flight plan results in a modification of the RVSM approval status as stated in Item Q, a modification message (CHG) shall be submitted by the operator.

RVSM Approved Aircraft and Non-RVSM Approved State Aircraft

5.1.4 Operators of RVSM approved aircraft shall indicate the approval status by inserting the letter in Item 10 of the ICAO Flight Plan, and in Item Q of the Repetitive Flight Plan (RPL), regardless of the requested flight level.

5.1.4.1

5.1.4.2 Operators are required to indicate their RVSM approval status regardless of the requested flight level (RFL), since ATC must have a clear indication of the non-RVSM approval status of aircraft intending to operate within, or in close vertical proximity to, the MID RVSM Airspace. In the absence of such an indication, the controller shall solicit such information.

5.1.5 Operators of non-RVSM approved State aircraft with a requested flight level of FL in Item 18 of the ICAO Flight Plan.

5.1.5.1 by ATS, specifically the requirement for ATC to provide a minimum vertical separation of 600 m (2 000 ft) between non-RVSM approved State aircraft and any other aircraft operating within the MID RVSM Airspace.

5.1.5.2 Non-RVSM approved State aircraft filing a requested flight level above FL 410 shall also be required to insert in Item 18 of the ICAO Flight Plan, since special handling by ATC (600 m [2 000 ft] vertical separation minimum) shall be required for that portion of the flight pertaining to the climb/descent through the MID RVSM Airspace.

5.1.6 Operators of formation flights of State aircraft shall **not** insert the letter in Item 10 of the ICAO Flight Plan, regardless of the RVSM approval status of the aircraft concerned. Operators of formation flights of State aircraft intending to operate within the MID RVSM Airspace as General Air Traffic (GAT) shall include in Item 18 of the ICAO Flight Plan.

5.1.6.1 Formation flights of State aircraft shall be accommodated within the MID RVSM Airspace, and will be considered as being non-RVSM approved, regardless of the RVSM approval status of the individual aircraft involved. As such, they shall request special handling by ATC, and be provided with a minimum vertical separation of 600 m (2 000 ft) from all other aircraft operating within the MID RVSM Airspace.

5.1.7 Operators of RVSM approved aircraft and non-RVSM approved State aircraft intending to operate within the MID RVSM Airspace shall include the following in Item 15 of the ICAO Flight Plan:

- the **entry point** at the lateral limits of the MID RVSM Airspace, and the requested flight level for that portion of the route commencing immediately after the RVSM entry point; and
- the **exit point** at the lateral limits of the MID RVSM Airspace, and the requested flight level for that portion of the route commencing immediately after the RVSM exit point.

5.1.7.1 Due to the differences between the cruising levels applicable within the MID RVSM Airspace to those applicable within adjacent non-RVSM airspace, ATC will require precise information as to the requested flight level for the portion of the route immediately after RVSM entry and exit points.

5.1.7.2 Therefore, RVSM entry and exit points will be established on or near the boundaries of the MID RVSM Airspace for all ATS routes crossing the lateral limits of the MID RVSM Airspace.

5.1.7.3 Additionally, the MID RVSM entry and exit points will be designated as compulsory reporting points, in order to facilitate the application of the ICAO procedures in the event of an air-ground communication failure. Communication failure procedures are addressed in Section 7.0.

Non-RVSM Approved Civil Aircraft

5.1.8 Except for operations within the designated airspace where RVSM transition tasks are carried out, operators of non-RVSM approved civil aircraft shall flight plan to operate outside of the MID RVSM Airspace.

5.1.8.1 Operators of non-RVSM approved civil aircraft intending to operate from a **departure aerodrome outside** of the lateral limits of the MID RVSM Airspace to a **destination aerodrome within** the lateral limits of the MID RVSM Airspace shall include the following in Item 15 of the ICAO Flight Plan:

a) the entry point at the lateral limit of the MID RVSM Airspace; and

b) a requested flight level below FL 290 for that portion of the route commencing immediately after the entry point.

5.1.8.2 Operators of non-RVSM approved civil aircraft intending to operate from a **departure aerodrome to a destination aerodrome which are both within** the lateral limits of the MID RVSM Airspace shall include, in Item 15 of the ICAO Flight Plan, a requested flight level below FL 290.

5.1.8.3 Operators of non-RVSM approved civil aircraft intending to operate from a **departure aerodrome within** the lateral limits of the MID RVSM Airspace to a **destination aerodrome outside** of the lateral limits of the MID RVSM Airspace shall include the following in Item 15 of the ICAO Flight Plan:

a) a requested flight level below FL 290 for that portion of the route within the lateral limits of the MID RVSM Airspace; and

b) the exit point at the lateral limit of the MID RVSM Airspace, and the requested flight level for that portion of the route commencing immediately after the exit point.

5.1.8.4 Operators of non-RVSM approved civil aircraft intending to operate from a **departure aerodrome to a destination aerodrome which are both outside** of the lateral limits of the MID RVSM Airspace, with a portion of the route within the lateral limits of the MID RVSM Airspace, shall include the following in Item 15 of the ICAO Flight Plan:

a) the entry point at the lateral limit of the MID RVSM Airspace, and a requested flight level below FL 290 or above FL 410 for that portion of the route commencing immediately after the entry point; and

b) the exit point at the lateral limit of the MID RVSM Airspace, and the requested flight level for that portion of the route commencing immediately after the exit point.

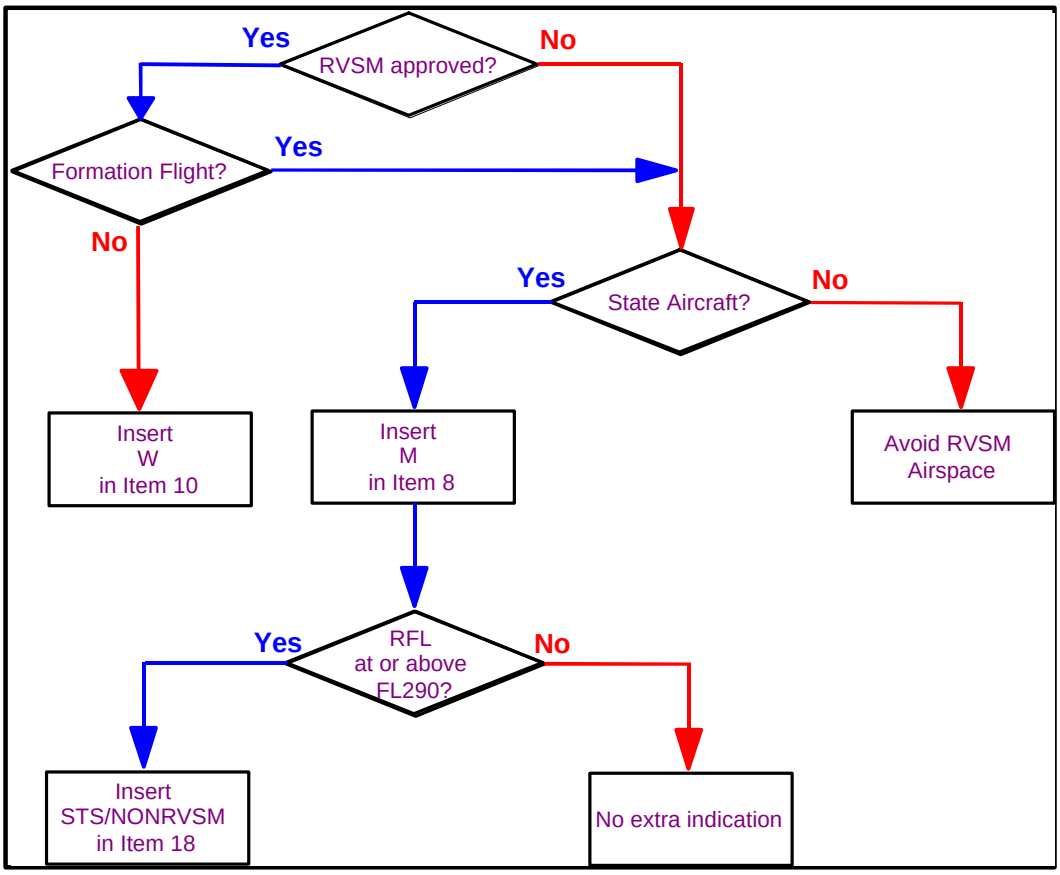


Figure 3: Overview of RVSM Flight Planning Requirements for Operators.

5.2 ATC Clearances

5.2.1 Except for operations within the MID RVSM Transition Airspace, as specified in paragraph 2.2.1, and within the airspace designated for the AFI/Asia/European interface, as specified in paragraph 2.3.1, only RVSM approved aircraft and non-RVSM approved State aircraft shall be issued an air traffic control clearance into the MID RVSM Airspace.

5.2.1.1 Except for designated airspace where RVSM transition tasks are carried out, operations within the MID RVSM Airspace are restricted to RVSM approved aircraft and non-RVSM approved State aircraft. Flight planning requirements in relation to RVSM will make possible the display of the RVSM-related flight plan -

RVSM approval status.

5.2.1.2 Where ATC has reason to doubt the RVSM approval status of an aircraft, the controller shall solicit such information from the pilot. If the pilot confirms , the controller shall consider the flight as being RVSM approved.

5.2.2 Formation flights of **civil** aircraft shall **not** be issued an air traffic control clearance into the MID RVSM Airspace.

5.2.2.1 ICAO Annex 2, Chapter 3, paragraph 3.1.8, provides that aircraft participating in formation flights are permitted to operate within 30 m (100 ft) above or below the flight leader. Consequently, formation flights could exceed the total vertical error (TVE) allowed within the MID RVSM Airspace (Appendix E refers). Formation flights shall therefore be considered as being non-RVSM approved.

5.2.3 ATC shall assign flight levels to non-RVSM approved **civil** aircraft in accordance with the table below:

	*ADES **within** lateral limits of MID RVSM Airspace*	*ADES **outside** lateral limits of MID RVSM Airspace*
*ADEP **within** lateral limits of MID RVSM Airspace*	Assign level **below** MID RVSM Airspace	Assign level **below** MID RVSM Airspace
*ADEP **outside** lateral limits of MID RVSM Airspace*	Assign level **below** MID RVSM Airspace	Assign level **below or above** MID RVSM Airspace

5.2.3.1 Non-RVSM approved **civil** aircraft, operating from a departure aerodrome to a destination aerodrome, both of which are situated outside of the lateral limits of the MID RVSM Airspace, could be cleared to a flight level **above** the MID RVSM Airspace, i.e. FL 430.

5.3 Vertical Separation Minima

5.3.1 The applicable vertical separation minimum between RVSM approved aircraft operating within the MID RVSM Airspace shall be 300 m (1 000 ft).

5.3.1.1 Within the MID RVSM Airspace, a vertical separation minimum of 300 m (1 000 ft) is applicable only when **both** aircraft are RVSM approved.

5.3.2 The applicable vertical separation minimum between non-RVSM approved State aircraft and any other aircraft operating within the MID RVSM Airspace shall be 600 m (2 000 ft).

5.3.3 Within the designated airspace where RVSM transition tasks are carried out, the applicable vertical separation minimum shall be 300 m (1 000 ft) between RVSM approved aircraft, and 600 m (2 000 ft) between any non-RVSM approved aircraft (civil or State) and any other aircraft.

5.3.4 The applicable vertical separation minimum between all formation flights of **State** aircraft and any other aircraft operating within the MID RVSM Airspace shall be 600 m (2 000 ft).

5.3.4.1 For the reason stated in paragraph 5.2.2.1, formation flights of State aircraft shall be considered as non-RVSM approved, regardless of the RVSM approval status of the individual aircraft concerned. Formation flights of State aircraft will be accommodated within the MID RVSM Airspace on the basis of an applicable vertical separation minimum of 600 m (2 000 ft), as described in paragraph 5.3.4.

5.3.5 The applicable vertical separation minimum between an aircraft experiencing a communication failure in flight and any other aircraft, where both aircraft are operating within the MID RVSM Airspace, shall be 600 m (2 000 ft), unless an appropriate horizontal separation minimum exists.

5.3.5.1 Since ATC is unable to determine the extent of any equipment failure for an aircraft experiencing a communication failure in flight, ATC shall provide a vertical separation minimum of 600 m (2 000 ft), as described in paragraph 5.3.5, unless an appropriate horizontal separation minimum exists.

5.4 State Aircraft operating as Operational Air Traffic (OAT) within MID RVSM Airspace

5.4.1 The majority of State aircraft operating as OAT will be non-RVSM MASPS compliant. Therefore, as a basic principle, and unless otherwise notified, State aircraft operating as OAT shall be considered as being non-RVSM approved.

5.4.1.1 It is not possible, for physical design limitation reasons, to adapt a majority of tactical military aircraft to meet the RVSM MASPS.

5.4.2 The applicable vertical separation minimum between State aircraft operating as OAT and any other aircraft operating as GAT, where both are operating within the MID RVSM Airspace, shall be 600 m (2 000 ft).

5.4.3 However, in an airspace environment where both the civil and military ATC units are fully aware as to the RVSM approval status of all traffic involved, a vertical separation minimum of 300 m (1 000 ft) may be applied between an RVSM approved State aircraft operating as OAT, and RVSM approved aircraft operating as GAT.

5.4.3.1 This provides for the application of a vertical separation minimum of 300 m (1 000 ft) between OAT and GAT aircraft where either advanced civil-military co-ordination systems which systematically display the RVSM approval status of all aircraft involved to the respective controllers are in use, or where verbal co-ordination, including RVSM approval information of the individual aircraft, is accomplished.

5.5 Transition of Aircraft operating to/from the MID RVSM Airspace

5.5.1 ACCs/UACs whose area of responsibility includes airspace where RVSM transition tasks are carried out shall ensure that:

a) both RVSM approved aircraft and non-RVSM approved aircraft entering the MID RVSM Airspace from adjacent non-RVSM airspace are accommodated within the MID RVSM Transition Airspace;

b) the appropriate vertical separation minimum is applied, based on the RVSM approval status of the aircraft;

c) aircraft are established at cruising levels appropriate for the MID RVSM Airspace or adjacent non-RVSM airspace, as applicable, and that the appropriate vertical separation minimum is achieved before the aircraft passes the transfer of control point to the adjacent ACC/UAC; and

d) non-RVSM approved civil aircraft operating from an adjacent non-RVSM environment to the MID RVSM Airspace are established at a cruising level outside the vertical dimensions of the MID RVSM Airspace before the aircraft passes the transfer of control point to the adjacent ACC/UAC.

Cruising Levels Appropriate to Direction of Flight

5.5.2 The cruising levels appropriate to direction of flight for RVSM and non-RVSM environments are contained in ICAO Annex 2, Appendix 3.

5.5.2.1 The organisation of cruising levels appropriate to direction of flight where non-RVSM airspace is located adjacent to, and east of, RVSM airspace is illustrated in Figure 4. Figure 5 illustrates the scenario where non-RVSM airspace is located adjacent to, and west of, RVSM airspace.

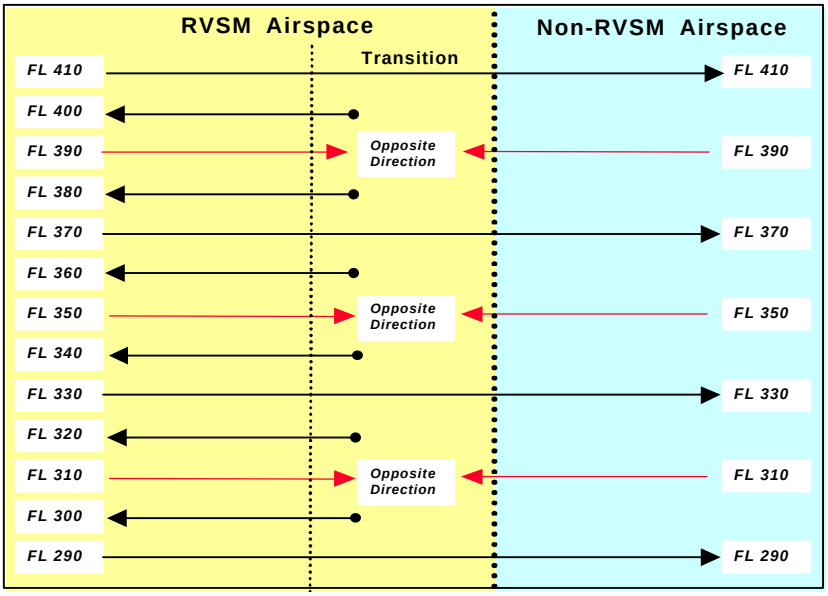


Figure 4: Scenario where non-RVSM airspace is located adjacent to, and east[1] of, RVSM airspace.

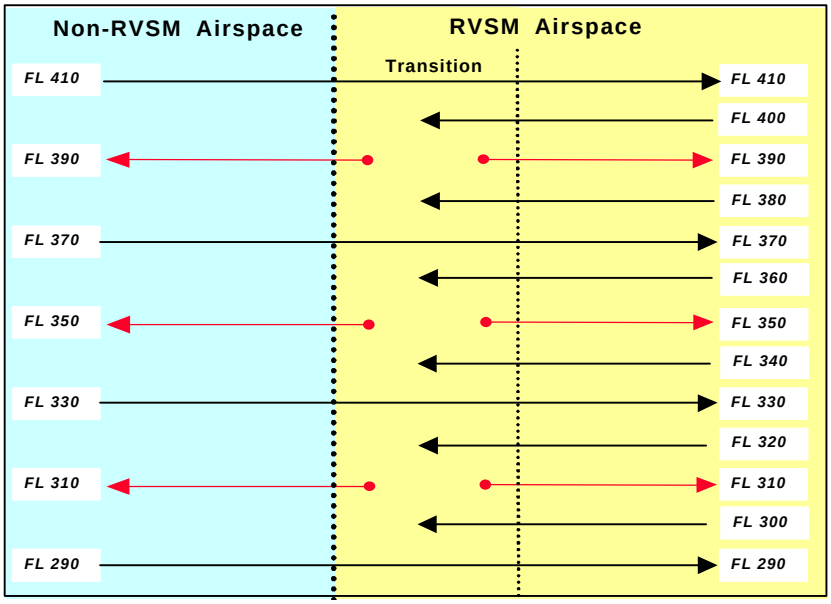


Figure 5: Scenario where non-RVSM airspace is located adjacent to, and west[2] of, RVSM airspace.

[1] ~~or south, where predominate traffic flows prescribe the use of flight levels, with regard to direction of flight, on a north/south basis.~~

[2] ~~or north, where predominate traffic flows prescribe the use of flight levels, with regard to direction of flight, on a north/south basis.~~

5.5.2.2 It is important to note the "opposite direction" cruising levels at flight levels 310, 350 and 390, as illustrated in Figure 4. Air traffic management options to facilitate the transition of aircraft operating from RVSM airspace to adjacent non-RVSM airspace and vice-versa, where non-RVSM airspace is adjacent to and east of RVSM airspace, are addressed in Section 9.

RVSM Approved Aircraft and Non-RVSM Approved State Aircraft

5.5.3 RVSM approved aircraft and non-RVSM approved State aircraft **entering the MID RVSM Airspace** from a non-RVSM environment shall be established at a flight level in accordance with:

a) the ICAO Tables of Cruising Levels, as published in ICAO Annex 2, Appendix 3. a); and/or

b) a flight level allocation scheme, if applicable; and/or

c) the Inter-Centre Letter of Agreement.

5.5.4 Any changes from non-RVSM cruising levels to RVSM cruising levels shall be initiated by the first ACC/UAC providing air traffic control service to the aircraft within the MID RVSM Airspace, and shall be achieved before the aircraft passes the transfer of control point to the adjacent ACC/UAC, unless otherwise specified in an Inter-Centre Letter of Agreement.

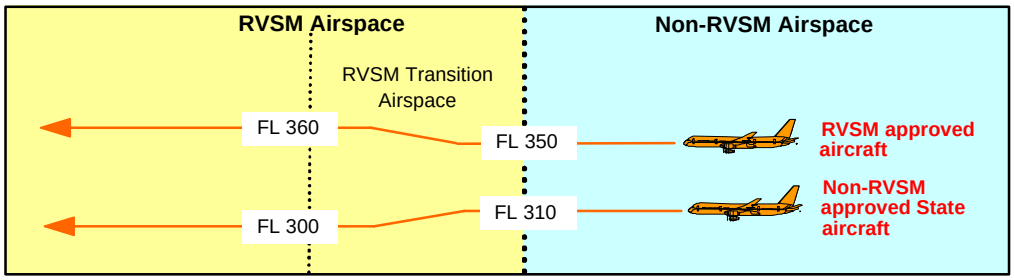


Figure 6: Transition of RVSM approved aircraft and non-RVSM approved State aircraft from non-RVSM airspace to RVSM airspace, where non-RVSM airspace is east of the RVSM airspace.

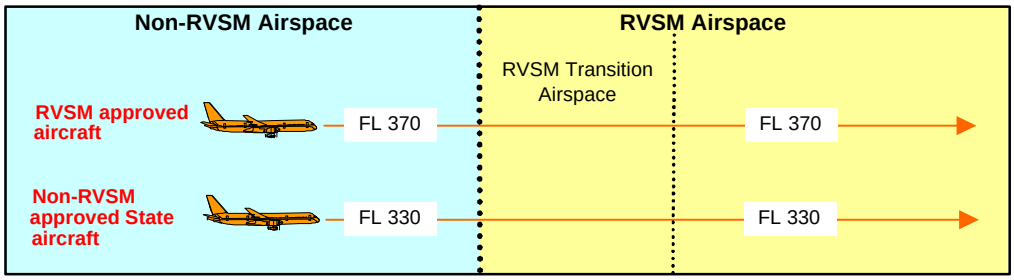


Figure 7: Transition of RVSM approved aircraft and non-RVSM approved State aircraft from non-RVSM airspace to RVSM airspace, where non-RVSM airspace is west of the RVSM airspace.

5.5.5 RVSM approved aircraft and non-RVSM approved State aircraft **entering a non-RVSM environment** from the MID RVSM Airspace shall be established with the applicable vertical separation minimum by the last ACC/UAC providing air traffic control service to the aircraft within the MID RVSM Airspace, and before the aircraft passes the transfer of control point to the adjacent non-RVSM ACC.

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

a) the ICAO Tables of Cruising Levels, as published in ICAO Annex 2, Appendix 3. b): and/or

b) a flight level allocation scheme, if applicable; and/or

c) the Inter-Centre Letter of Agreement.

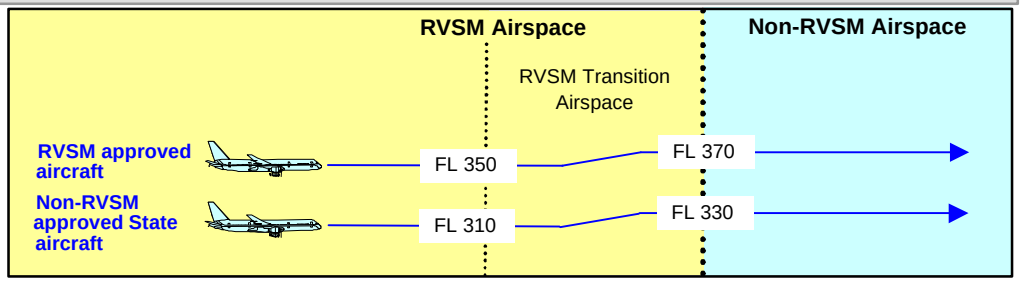


Figure 8: Transition of RVSM approved aircraft and non-RVSM approved State aircraft from RVSM airspace to non-RVSM airspace, where non-RVSM airspace is east of the RVSM airspace.

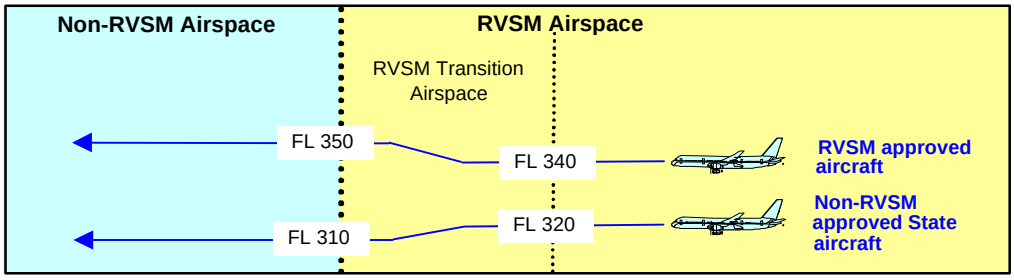


Figure 9: Transition of RVSM approved aircraft and non-RVSM approved State aircraft from RVSM airspace to non-RVSM airspace, where non-RVSM airspace is west of the RVSM airspace.

Non-RVSM Approved Civil Aircraft

5.5.6 Non-RVSM approved **civil** aircraft operating **from a departure aerodrome to a destination aerodrome which are both outside** of the lateral limits of the MID RVSM Airspace, with a portion of the route within the lateral limits of the MID RVSM Airspace:

a) shall be cleared to a flight level below FL 290 or above FL 410 by the first ACC/UAC providing air traffic control service to the aircraft within the MID RVSM Airspace, and any such flight level changes shall be achieved before the aircraft passes the transfer of control point to the adjacent ACC/UAC, in accordance with the flight level allocation scheme (FLAS), if applicable, and/or as specified in an Inter-Centre Letter of Agreement, and

b) may subsequently be cleared to a flight level within, or through, the MID RVSM Airspace by the last ACC/UAC providing air traffic control service to the aircraft within the MID RVSM Airspace, and any such flight level changes shall be achieved before the aircraft passes the transfer of control point to the adjacent ACC/UAC.

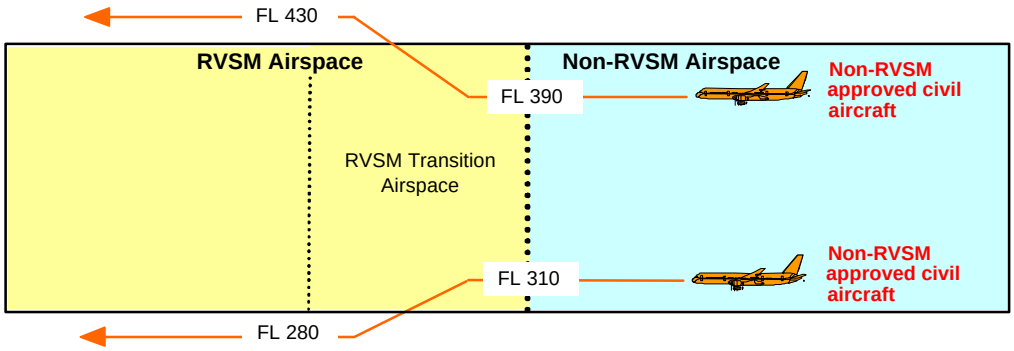


Figure 10: Transition of non-RVSM approved civil aircraft from non-RVSM airspace to RVSM airspace, with departure and destination aerodromes outside of the laterals limits of the RVSM airspace.

5.5.7 Non-RVSM approved **civil** aircraft operating **from a departure aerodrome outside of the lateral limits of the MID RVSM Airspace with a destination aerodrome within** the lateral limits of the MID RVSM Airspace:

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

b) any such flight level changes shall be initiated by the first ACC/UAC providing air traffic control service within the MID RVSM Airspace, before the aircraft passes the transfer of control point to the adjacent ACC/UAC.

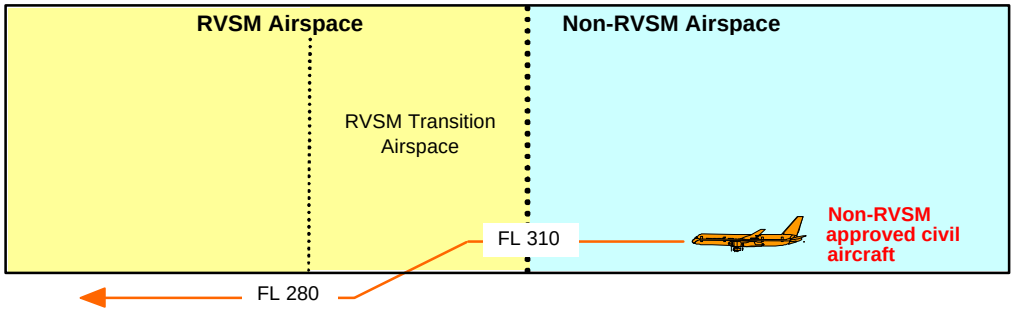


Figure 11: Transition of non-RVSM approved civil aircraft from non-RVSM airspace to RVSM airspace, with a departure aerodrome outside of the lateral limits of the RVSM airspace and a destination aerodrome within the lateral limits of the RVSM airspace.

5.5.8 Non-RVSM approved civil aircraft operating from a departure aerodrome to a destination aerodrome which are both within the lateral limits of the MID RVSM Airspace shall be cleared to a flight level below FL 290.

5.5.9 Non-RVSM approved **civil** aircraft operating **from a departure aerodrome within the lateral limits of the MID RVSM Airspace to a destination aerodrome outside** of the lateral limits of the MID RVSM Airspace:

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

b) may be cleared to FL 290 or above by the last ACC/UAC providing air traffic control service to the aircraft within the MID RVSM Airspace, and any such flight level changes shall be achieved before the aircraft passes the transfer of control point to the adjacent ACC/UAC.

5.5.9.1 ACCs/UACs which perform RVSM transition tasks may consider accommodating, within the MID Transition RVSM Airspace, non-RVSM approved civil aircraft proceeding directly into adjacent non-RVSM airspace, so as to permit such aircraft to reach a requested flight level of FL 290 or higher prior to the transfer of control point with the first ACC/UAC within the adjacent non- RVSM airspace.

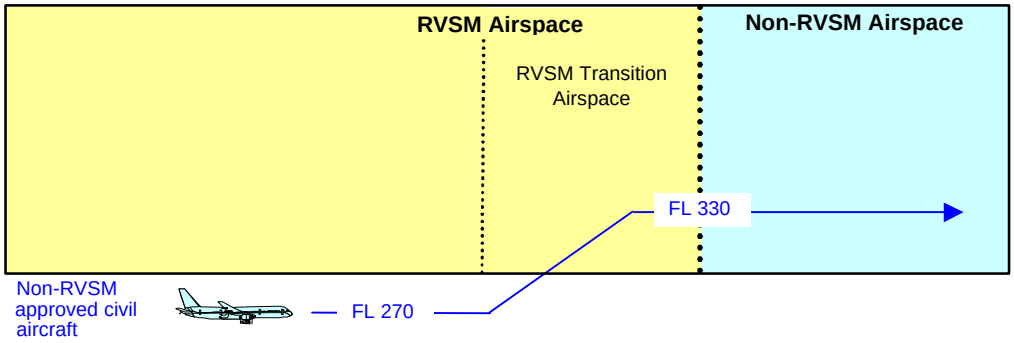


Figure 12: Transition of non-RVSM approved civil aircraft from RVSM airspace to non-RVSM airspace, with a departure aerodrome within the lateral limits of RVSM airspace and a destination aerodrome outside of the lateral limits of the RVSM airspace.

AFI/Asia/European Interface Non-RVSM Approved Civil Aircraft

5.5.10 ACCs/UACs providing air traffic control service within the airspace designated for the purpose of transitioning non-RVSM approved civil aircraft operating to/from the AFI/Asia or European Regions may clear such non-RVSM approved civil aircraft to climb/descend through RVSM Airspace.

Such climbs/descents through RVSM Airspace shall be achieved before the aircraft passes the transfer of control point to the adjacent ACC/UAC, if applicable, unless otherwise specified in an Inter-Centre Letter of Agreement.

5.6 In-flight Contingency Procedures

General

5.6.1 An in-flight contingency affecting flight in the MID RVSM Airspace pertains to unforeseen circumstances which directly impact on the ability of one or more aircraft to operate in accordance with the vertical navigation performance requirements of the MID RVSM Airspace.

5.6.1.1 Degradation of aircraft equipment or turbulent atmospheric conditions could negate an aircraft's ability to meet the vertical navigation performance requirements of RVSM airspace.

5.6.1.2 The RTF phraseology which shall be used by the pilot to inform ATC of the cause of an in-flight contingency is contained in paragraph 5.7.1.

5.6.2 The pilot shall inform ATC as soon as possible of any circumstances where the vertical navigation performance requirements for the MID RVSM Airspace cannot be maintained. In such cases, the pilot shall obtain a revised air traffic control clearance prior to initiating any deviation from the cleared route and/or flight level, whenever possible. Where a revised ATC clearance could not be obtained prior to such a deviation, the pilot shall obtain a revised clearance as soon as possible thereafter.

5.6.3 ATC shall render all possible assistance to a pilot experiencing an in-flight contingency. Subsequent air traffic control actions will be based on the intentions of the pilot, the overall air traffic situation, and the real-time dynamics of the contingency.

5.6.4 In this Manual, reference to suspension of RVSM refers to a discontinuance of the use of a vertical separation minimum of 300 m (1 000 ft) between RVSM approved aircraft operating within the MID RVSM Airspace.

5.6.4.1 During any period when RVSM has been suspended, a vertical separation minimum of 600 m (2 000 ft) shall be applied between all aircraft operating within the portion of the MID RVSM Airspace where RVSM has been suspended, regardless of the RVSM approval status of the aircraft.

5.6.4.2

(290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, and 410) remain assignable levels by ATC, in accordance with:

a. the Tables of Cruising Levels, ICAO Annex 2, Appendix 3. a.; and/or

b. a flight level allocation scheme, or a contingency flight level allocation scheme, if applicable; and/or

c. Inter-Centre Letter(s) of Agreement.

Degradation of Aircraft Equipment

5.6.5 The Minimum Equipment List (MEL) for operations within the MID RVSM Airspace is as follows:

1. two independent altitude measurement systems;
2. one secondary surveillance radar transponder, with an altitude reporting system that can be connected to the altitude measurement system in use for altitude keeping;
3. an altitude alerting system;
4. an automatic altitude-control system.

(Reference: JAA Temporary Guidance Leaflet No. 6, Revision 1)

5.6.5.1 The failure in flight of any component of the above minimum equipment list required for RVSM operations shall render the aircraft non-RVSM approved. Pilots experiencing such in-flight equipment failure(s) shall inform ATC as soon as possible.

5.6.6 from the cleared flight level by 90 m (300 ft) or more, the controller shall inform the pilot accordingly and the pilot

5.6.6.1 el, the Mode C readout continues to differ from the cleared flight level by 90 m (300 ft) or more, ATC will follow the existing ICAO procedures prescribed for the failure of Mode C in flight.

5.6.7 The allowable tolerance for Mode C readout of 90 m (300 ft) remains applicable within MID RVSM Airspace. The 90 m (300 ft) parameter relates solely to SSR transponder operation. It does not relate to the height-keeping accuracy required by the RVSM MASPS.

5.6.8 When informed by the pilot of an RVSM approved aircraft operating in the MID

the controller shall consider the aircraft as non-RVSM approved.

5.6.8.1 Air traffic control shall take action immediately to provide a minimum vertical separation of 600 m (2 000 ft), or an appropriate horizontal separation minimum, from all other aircraft concerned operating in the MID RVSM Airspace.

5.6.8.2 An aircraft rendered non-RVSM approved shall normally be cleared out of the MID RVSM Airspace by air traffic control, when it is possible to do so.

5.6.8.3 Pilots shall inform air traffic control, as soon as practicable, of any restoration of the proper functioning of equipment to meet the RVSM MASPS.

5.6.8.4 The first ACC/UAC to become aware o
shall co-ordinate with adjacent ACCs/UACs, as appropriate.

5.6.9 When an equipment-related contingency requires that an RVSM approved aircraft operating within the MID RVSM Airspace be considered as non-RVSM approved, as specified in paragraph 5.6.8, ATC shall manually apply the display of the

purpose of clearly distinguishing such radar label and/or radar position symbol, in accordance with established local radar display features applicable to non-RVSM approved aircraft.

Note: See paragraph 8.3 - Radar Display Systems.

5.6.10 It is imperative that ATC co-ordinate specific information related to the inability of an RVSM approved aircraft to continue to meet the vertical navigation required for operation within the MID RVSM Airspace, through the use of the appropriate associated co-ordination messages, as follows:

or ,

(*as applicable)*

5.6.11 When informed by the pilot of any eventual restoration of the proper functioning of equipment required for operation within the MID RVSM Airspace, ATC will be in a position to consider clearing the aircraft into the MID RVSM Airspace, applying a 300 m (1 000 ft) vertical separation minimum. In such cases, ATC will manually remove the application of the locally adapted distinguishing feature associated with non-RVSM approved aircraft from the radar display, and co-ordinate with adjacent ACCs/UACs, as appropriate.

Severe Turbulence Not Forecast (single aircraft)

5.6.12 When an aircraft operating in the MID RVSM Airspace encounters severe turbulence due to weather or wake vortex which the pilot believes will impact the aintain its cleared flight level, the pilot shall inform ATC. ATC shall establish either an appropriate horizontal separation minimum, or an increased vertical separation minimum of 600 m (2 000 ft).

5.6.12.1 ATC shall, to the extent possible, accommodate pilot requests for flight level and/or route changes, and pass traffic information, as required.

5.6.12.2 ATC shall solicit reports from other aircraft to determine whether RVSM should be suspended entirely, or within a specific flight level band and/or area.

5.6.12.3 An ACC/UAC suspending RVSM shall co-ordinate any such suspension(s), and any required adjustments to sector capacities with adjacent ACCs/UACs, as appropriate, to ensure an orderly progression to the transfer of traffic.

5.6.12.4 The specific actions to be taken by ATC will be dictated by the actual weather-related circumstances and the traffic situation existing at the time. ATC is expected to use best judgement to safeguard separation between aircraft in such circumstances.

5.6.13 ATC shall co-ordinate the circumstances of an RVSM approved aircraft that is unable to maintain its cleared flight level due to severe turbulence by verbally supplementing the estimate message with:

5.6.14 ATC shall manually apply the distinguishing feature of the radar label associated with non-RVSM approved aircraft and/or the radar position symbol to such an aircraft until such time as the pilot reports ready to resume RVSM.

5.6.15 An aircraft experiencing severe turbulence while operating within the MID RVSM Airspace need not be cleared out of RVSM airspace. If the pilot has informed

cleared flight level, the establishment of an appropriate horizontal separation minimum, or an increased vertical separation minimum may be accomplished within the MID RVSM Airspace, traffic permitting.

Severe Turbulence Not Forecast (multiple aircraft)

5.6.16 When a controller receives pilot reports of severe turbulence which had not been forecast, and which could impact multiple aircraft with regards to their ability to maintain cleared flight level within the MID RVSM Airspace, the controller shall provide for an increased vertical separation minimum or an appropriate horizontal separation minimum. Additionally, the following action(s), although not exhaustive, should be considered:

- since each real time situation will demand very specific, distinct actions, the controller should use his/her best judgement to ensure the safety of the aircraft under his/her responsibility;
- the controller should pass traffic information to the extent possible;
- the controller will co-ordinate with the Supervisor for the purpose of determining whether RVSM operations will be suspended entirely or within a specific level band and/or area;
- if a reversion to a 600 m (2 000 ft) vertical separation minimum is deemed necessary, co-ordination with adjacent ACCs/UACs shall be accomplished to ensure an orderly progression to the transfer of traffic using a 600 m (2 000 ft) vertical separation minimum;
- Supervisors may co-ordinate, to the extent deemed necessary, a request for the deactivation of any airspace restrictions and/or reservations required to provide additional radar vectoring airspace necessary to facilitate the transition to a 600 m (2 000 ft) vertical separation minimum;
- the Supervisor should co-ordinate with the parent Flight Management Position (FMP) to adjust the applicable sector capacities.

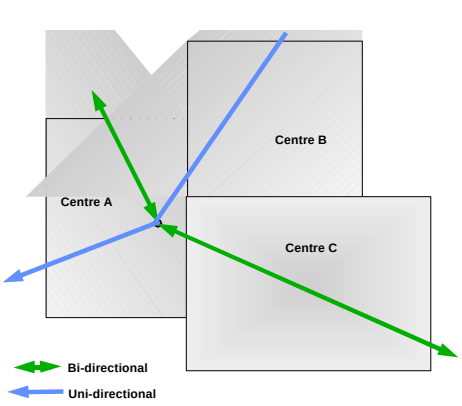
Severe Turbulence Forecast

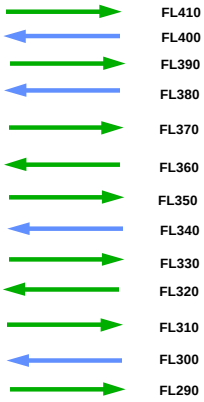
5.6.17 Where a meteorological forecast is predicting severe turbulence within the MID RVSM Airspace, ATC shall determine whether RVSM should be suspended, and, if so, the period of time, and specific flight level(s) and/or area.

5.6.17.1 In cases where RVSM will be suspended, the ACC/UAC suspending RVSM shall co-ordinate with adjacent ACCs/UACs with regards to the flight levels appropriate for the transfer of traffic, unless a contingency flight level allocation scheme has been determined by Inter-Centre Letter of Agreement. The ACC/UAC suspending RVSM shall also co-ordinate applicable sector capacities with the parent Flight Management Position, and adjacent ACCs/UACs, as appropriate. The issuance of a NOTAM should be considered.

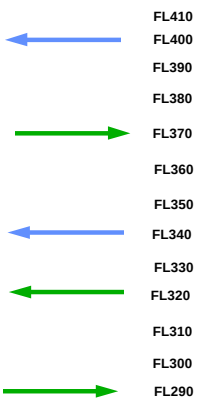
5.6.18 Consideration should be given to the development of a contingency FLAS to supplement any existing FLAS between ACCs/UACs. A contingency FLAS should be described in appropriate Inter-Centre Letters of Agreement for the purpose of being applied, after the necessary inter-centre co-ordination, during times of weather-related contingency events (forecast or not forecast). A contingency FLAS would facilitate the transition to a 600 m (2 000 ft) vertical separation minimum within the MID RVSM Airspace.

5.6.18.1 The application of a contingency FLAS will be facilitated through the designation of cruising levels within the contingency FLAS that are consistent with their designations in the corresponding normal RVSM FLAS, with regard to their intended use for direction of flight.





Normal RVSM FLAS, VSM = 1 000 ft



Contingency FLAS, VSM = 2 000 ft

The application of the contingency FLAS, when required, is facilitated by virtue of the fact that the use of the crui

Example: When informed by Centre A that the Contingency FLAS is to be applied, Centre C would be required to discontinue the use of FL 360 for traffic to be transferred to Centre A, however Centre B would **not** be required to alter the use of FL 320. In this way, the operational impact upon

greatly facilitated.

Figure 13: Example of a Contingency Flight Level Allocation Scheme.

5.6.19 With regards to facilitating the co-ordination and establishment of new capacity figures for the ACC/UAC during contingency events requiring the reversion to a 600 m (2 000 ft) vertical separation minimum within the MID RVSM Airspace, ACCs/UACs should consider pre-determining such capacity figures for the purpose of permitting rapid co-ordination with the local Flight Management Position.

5.6.20 The importance of obtaining timely accurate forecasts of severe turbulence should be stressed within agreements with the appropriate meteorological services office responsible for the dissemination of such information for the area concerned.

5.7 Phraseology

5.7.1 Controller/Pilot Radiotelephony Phraseology

(** indicates a pilot transmission)*

Meaning	Phraseology
For a controller to ascertain the RVSM approval status of an aircraft.	*(callsign)* **CONFIRM RVSM APPROVED**
For a pilot to report non-RVSM approval status: I. on the initial call on any frequency within the MID RVSM Airspace (*controllers shall provide a read-back with this same phrase)*; and II. in all requests for flight level changes pertaining to flight levels within the MID RVSM Airspace; and III. in all read-backs to flight level clearances pertaining to flight levels within the MID RVSM Airspace. Additionally, except for State aircraft, pilots shall include this RTF phrase to read-back flight level clearances involving the vertical transit through FL 290 or FL 410. *(See examples below)*	**NEGATIVE RVSM***
For a pilot to report RVSM approval status.	**AFFIRM RVSM***
For a pilot of a non-RVSM approved State aircraft to report non-RVSM approval status, in response to the RTF phrase (*callsign*) CONFIRM RVSM APPROVED.	**NEGATIVE RVSM STATE AIRCRAFT***
Denial of ATC clearance into the EUR RVSM Airspace.	*(callsign)* **UNABLE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN [***or* **DESCEND TO,** *or* **CLIMB TO] FLIGHT LEVEL** *(number)*

For a pilot to report when severe turbulence affects -keeping requirements for RVSM.	**UNABLE RVSM DUE TURBULENCE***
degraded below the MASPS required for flight within the MID RVSM Airspace. *(The phrase is to be used to convey both the initial indication of the non-MASPS compliance, and henceforth, on initial contact on all frequencies within the lateral limits of the MID RVSM Airspace until such time as the problem ceases to exist, or the aircraft has exited MID RVSM Airspace)*	**UNABLE RVSM DUE EQUIPMENT***
For a pilot to report the ability to resume operations within the MID RVSM airspace after an equipment or weather-related contingency.	**READY TO RESUME RVSM***
For a controller to confirm that an aircraft has regained its RVSM approval status, or to confirm that the pilot is ready to resume RVSM operations.	**REPORT ABLE TO RESUME RVSM**

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

Pilot RTF:	(*callsign*) **REQUEST FL 320, NEGATIVE RVSM**
Controller RTF:	(*callsign*) **CLIMB TO FL 320**
Pilot RTF:	(*callsign*) **CLIMB TO FL 320, NEGATIVE RVSM**

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

Pilot RTF:	(*callsign*) **REQUEST FL 430, NEGATIVE RVSM**
Controller RTF:	(*callsign*) **CLIMB TO FL 430**
Pilot RTF:	(*callsign*) **CLIMB TO FL 430, NEGATIVE RVSM**

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

Pilot RTF:	(*callsign*) **REQUEST FL 380, NEGATIVE RVSM**
Controller RTF:	(*callsign*) **CLIMB TO FL 380**
Pilot RTF:	(*callsign*) **CLIMB TO FL 380, NEGATIVE RVSM**

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

Pilot RTF:	(*callsign*) **REQUEST FL 320, NEGATIVE RVSM**
Controller RTF:	(*callsign*) **UNABLE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN FL 280**

5.7.2 Co-ordination between ATS Units

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

5.8 Inter-Centre Co-ordination

Flight Plans

5.8.1 If the receiving unit has not received a flight plan, the sending air traffic control unit shall verbally inform the receiving unit of whether or not the aircraft is RVSM approved.

Computer-assisted Co-ordination of Estimate Messages

5.8.2 The On-Line Data Interchange (OLDI) System should support the co-ordination of requests for special handling (i.e. STS) as filed in Item 18 of the ICAO Flight Plan.

5.8.2.1 Since the Activation (ACT) Message replaces the verbal estimate message, and notwithstanding the fact that the information should be contained within the local -RVSM approval status and its request for special handling, should be included as an integral part of the automated estimate message:

- as confirmation of the data filed in the flight plan, as it is safety critical;
- where degradation of capability in the performance of flight planning systems has occurred for a particular flight;
- where, for whatever reason, the accepting unit has not received the flight plan.

5.8.3 When an automated message does not contain the information filed in Item 18 of the ICAO flight plan relevant to RVSM operations, the sending ATC unit shall inform the receiving ATC unit of that information by supplementing the ACT

Verbal Co-ordination of Estimate Messages

5.8.4 When a verbal co-ordination process is being used, the sending ATC unit shall include the information filed in Item 18 of the ICAO flight plan relevant to RVSM

5.8.5 When a single aircraft is experiencing an in-flight contingency which impacts on RVSM operations, the associated co-ordination messages shall be supplemented verbally by a description of the cause of the contingency.

5.8.5.1 The associated co-ordination messages shall incorporate either:

- **UNABLE RVSM DUE EQUIPMENT,** or
- **UNABLE RVSM DUE TURBULENCE**, as appropriate.

6. VERTICAL SPACING FROM TSAS, PROHIBITED, RESTRICTED AND DANGER AREAS

All activities occurring within airspace restrictions and/or reservations are to be considered as being non-RVSM approved.

Consequently, the minimum vertical spacing required between the vertical limits of the activities contained within such airspace restrictions and/or reservations and non-participating aircraft operating within the RVSM airspace is:

- 2 000 ft, above the upper limit of such activities, for upper limits of FL 290 or above, and
- 2 000 ft, below the lower limit of such activities, for lower limits of FL 300 or above.

Therefore, the application of RVSM will continue to require that the same minimum vertical spacing be applied between activities occurring within airspace restrictions and/or reservations and non-participating aircraft, as were being applied prior to RVSM implementation.

States will, as stipulated in the ASM Handbook, promulgate the first usable flight levels above/below airspace restrictions and/or reservations, in the definition of the associated ATS routes. Depending on the methodology used to delineate and promulgate such airspace restrictions and/or reservations, the first usable flight levels will be situated either 1 000 ft or 2 000 ft above/below the *published* vertical limits of the airspace restrictions and/or reservations. Nevertheless, operation by non-participating aircraft at such first usable flight levels, defined as a function of one of the two delineation methodologies, will guarantee the application of the required minimum 2 000 ft vertical spacing from the activities occurring within airspace restrictions and/or reservations.

However, in an airspace environment where the responsible ATS units are fully aware as to the RVSM approval status of <u>all</u> traffic involved, a reduced vertical separation of 1 000 ft may be applied between RVSM approved aircraft.

7.0 COMMUNICATION FAILURE

7.1 Communication Failure Procedures - MID Region

7.1.1 The proposed procedures are intended for application throughout the MID Region, including the airspace between FL 290 and FL 410 inclusive. This proposal is subject to the ICAO procedure for the amendment of Regional Supplementary Procedures, which ultimately requires the approval of the President on behalf of the Council of ICAO. Amendment proposals approved in accordance with this procedure are then promulgated in ICAO Doc 7030/4.

7.2 Communication Failure Procedures - MID RVSM Airspace

7.2.1 The implementation of RVSM within the MID RVSM Airspace has implications with regards to air-ground communication failure procedures.

7.2.2 For example, the ICAO Regional Supplementary Procedures for MID Region specify that the applicable vertical separation minimum between an aircraft experiencing a communication failure in flight and any other aircraft, where both aircraft are operating within the MID RVSM Airspace, shall be 600 m (2 000 ft), unless an appropriate horizontal separation minimum exists.

7.2.3 Futhermore, within RVSM airspace there are thirteen cruising levels which may be assigned by ATC, as compared to seven within non-RVSM airspace between flight levels 290 and FL 410 inclusive. Flight levels 310, 350, and 390 are "eastbound" cruising levels within RVSM airspace, whereas they are "westbound" cruising levels within non-RVSM airspace. This is an important consideration, particularly where non-RVSM airspace is located adjacent to, and east of, RVSM Airspace.

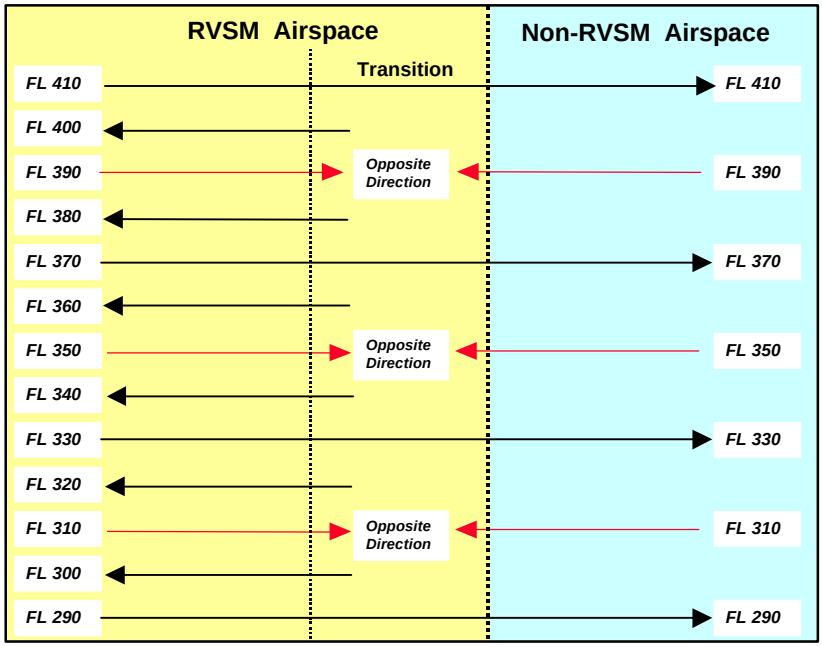


Figure 14: Scenario where non-RVSM airspace is adjacent to, and east[1] of, RVSM airspace.

[1] or south, where predominate traffic flows prescribe the use of flight levels, with regard to direction of flight, on a north/south basis.

COMPULSORY REPORTING POINTS

7.2.4 One means used to determine that two-way communication between an aircraft and ATC has failed is the aircraft's failure to report its position over a compulsory reporting point.

7.2.5

ability to detect air-ground communication failures on a timely basis, taking into account ATC separation and co-ordination requirements. Paragraphs 7.2.6, 7.2.7 and 7.2.8 contain options with regards to the placement of compulsory reporting points in the context of RVSM implementation, for consideration.

7.2.6 There is a requirement to establish RVSM entry/exit points at or near the boundaries **between the MID RVSM Airspace and adjacent non-RVSM airspace** for all ATS routes which cross the lateral limits of the MID RVSM Airspace. The designation of these points as compulsory reporting points could enhance ATC's ability to detect air-ground communication failures.

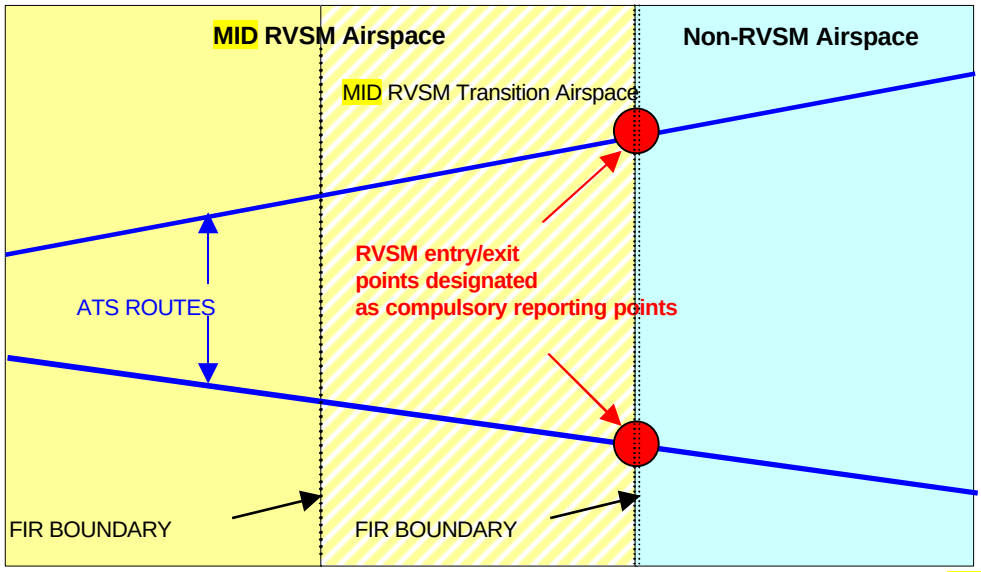


Figure 15: Compulsory reporting points on ATS routes at the boundary between MID RVSM Airspace and adjacent non-RVSM Airspace.

7.2.7 Where non-RVSM airspace is located adjacent to, and east of, the MID RVSM Airspace, the establishment of compulsory reporting points at or near the boundaries **between the MID RVSM Airspace and the MID RVSM Transition Airspace** for all ATS routes which cross such boundaries could also enhance ATC's ability to detect air-ground communication failures.

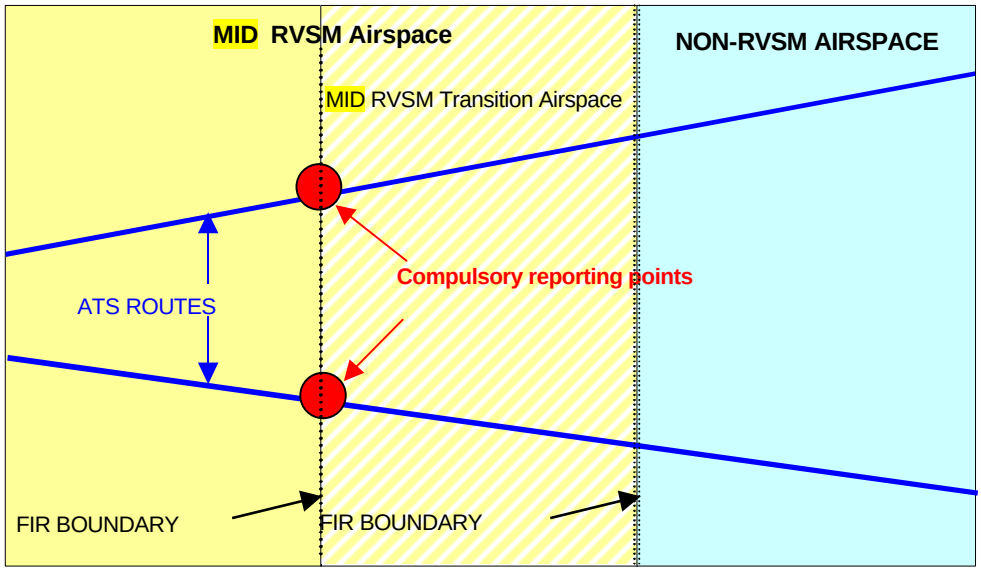


Figure 16: Compulsory reporting points on ATS routes at the boundary between MID RVSM Airspace and MID RVSM Transition Airspace.

7.2.8 Additionally, where non-RVSM airspace is located adjacent to, and east of, the MID RVSM Airspace, the establishment of compulsory reporting points **within the adjacent non-RVSM airspace** for all ATS routes which cross the lateral limits of the MID RVSM Airspace could further enhance ATC's ability to detect air-ground communication failures.

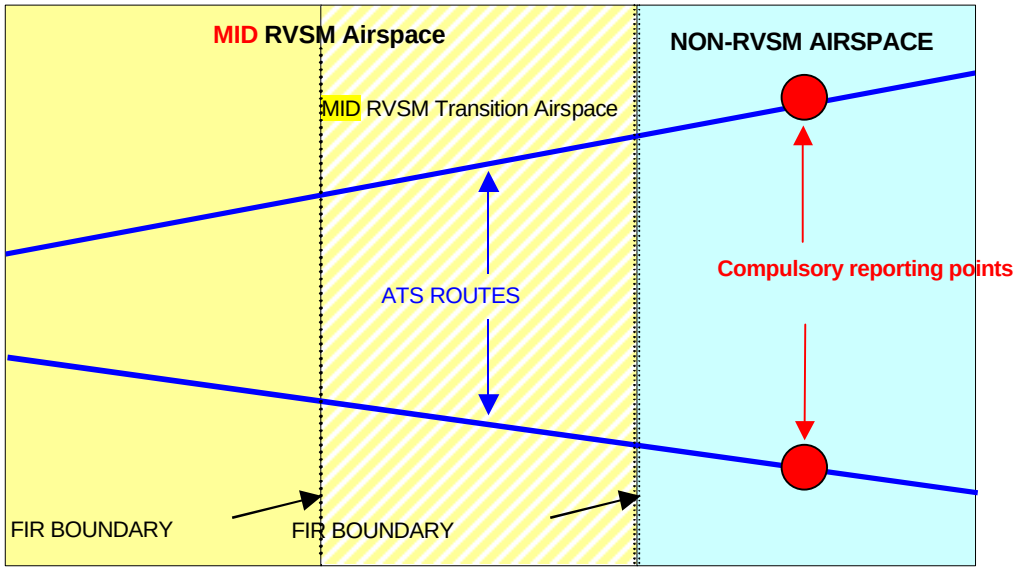


Figure 17: Compulsory reporting points within adjacent non-RVSM airspace on ATS routes which cross the lateral limits of the MID RVSM Airspace.

7.2.9 With regards to the establishment and location of compulsory reporting points, the proposed amendment to the ICAO Regional Supplementary Procedures for MID Region pertaining to air-ground communication failure procedures, and specifically the proposed should be taken into account (page 7-8, paragraph 5.3.1 b) refers).

LATERALLY-SPACED, UNI-DIRECTIONAL ATS ROUTES

7.2.10 The use of laterally-spaced, uni-directional ATS routes as a means of strategically separating opposite-direction traffic operating to/from the MID RVSM Airspace is addressed in Section 9. In the context of air-ground communication failure procedures, laterally-spaced, uni-directional ATS routes between MID RVSM Transition Airspace and adjacent non-RVSM airspace could help mitigate the differences between cruising levels appropriate for direction of flight within the MID RVSM Airspace versus the cruising levels applicable within adjacent non-RVSM airspace (paragraph 7.2.3 refers).

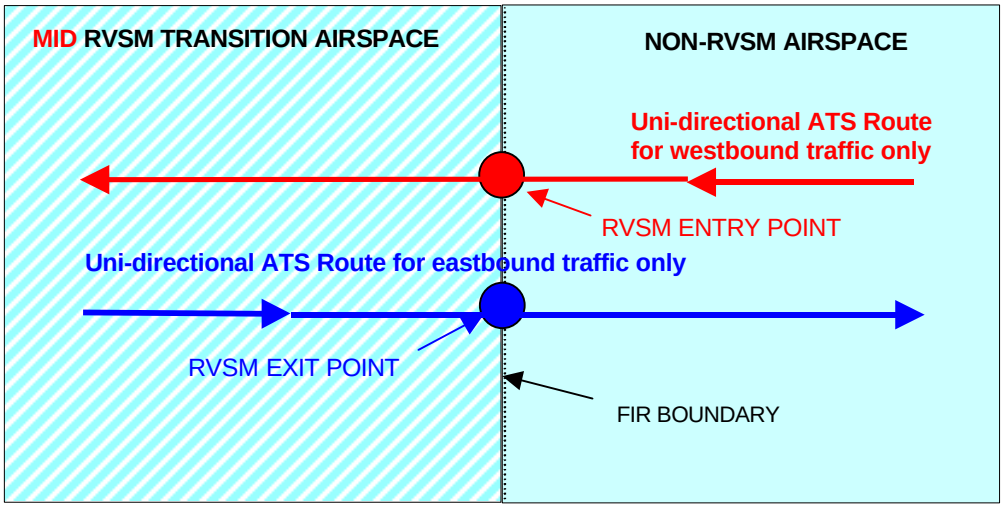


Figure 18: Laterally-spaced, uni-directional ATS routes between MID RVSM Transition Airspace and adjacent non-RVSM airspace.

Flight Level Allocation Schemes (FLAS)

7.2.11 The strategic use of Flight Level Allocation Schemes is addressed in Section 9. FLAS could also be used in the context of air-ground communication failure procedures. For example, where non-RVSM airspace is located adjacent to, and east of, the MID RVSM Airspace, FLAS could be used to establish the distance/time from the boundary of non-RVSM airspace at which the use of flight levels 310, 350, and 390 as eastbound cruising levels would be discontinued.

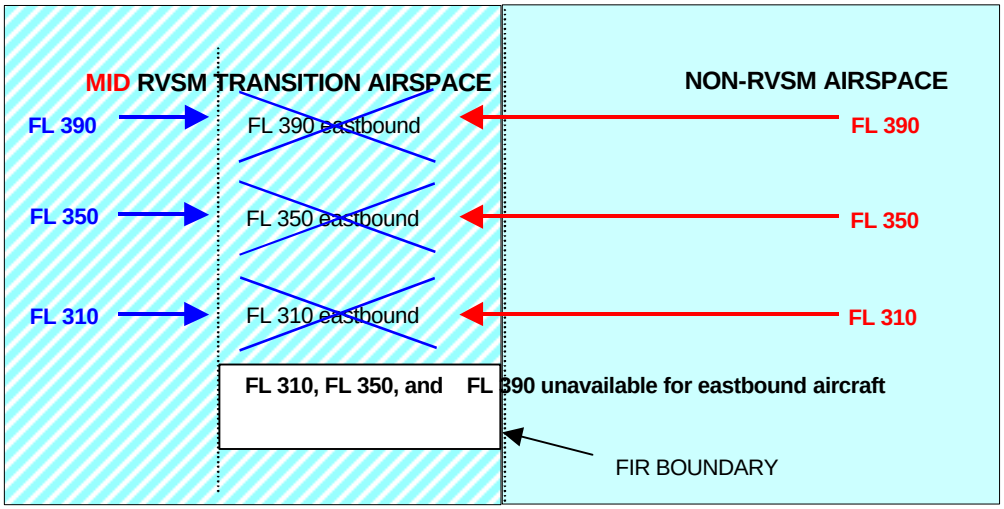


Figure 19: FLAS depicting FL 310, FL 350, and FL 390 discontinued for eastbound aircraft within a portion of the MID RVSM Transition Airspace.

DRAFT

PROPOSAL FOR AMENDMENT OF THE

REGIONAL SUPPLEMENTARY PROCEDURES (DOC 7030/4)

(Serial No.: MID/ASIA-S -)

a) Regional Supplementary Procedures:

Doc 7030/4 MID/ASIA Regional Supplementary Procedures Part 1 RAC as amended by Amendment 202 dated 30 November 2001.

b) Proposed amendment:

1) Delete Sections 5.1 and 5.2 in their entirety.

2) Add the following provisions for Air-Ground Communication Failure

"5.0 Action In The Event Of Air-Ground Communication Failure
(A2 - 3.6.5.2)

5.1 As soon as it is known that two-way communication has failed, ATC shall maintain separation between the aircraft having the communication failure and other aircraft based on the assumption that the aircraft will operate in accordance with 5.2 or 5.3.

5.2 Visual Meteorological Conditions (VMC)

5.2.1 Except as provided for in 5.3.1, a controlled flight experiencing communication failure in VMC shall:

a) set transponder to Code 7600;

b) continue to fly in VMC;

c) land at the nearest suitable aerodrome;

d) report its arrival time by the most expeditious means to the appropriate ATS unit.

5.3 Instrument Meteorological Conditions (IMC)

5.3.1 A controlled IFR flight experiencing communication failure in IMC, or where it does not appear feasible to continue in accordance with 5.2, shall:

a) set transponder to Code 7600; and

b) maintain for a period of 7 minutes the last assigned speed and level or the minimum flight altitude, if the minimum flight altitude is higher than the last assigned level.

The period of 7 minutes commences:

i) if the aircraft is operating on a route without compulsory reporting points or has been instructed to omit position reports:

1) at the time the last assigned level or minimum flight altitude is reached, or

2) at the time the aircraft sets transponder to Code 7600,

whichever is later; or

ii) if the aircraft is operating on a route with compulsory reporting points and has not been instructed to omit position reports:

1) at the time the last assigned level or minimum flight altitude is reached, or

2) at the previously reported pilot estimate for the compulsory reporting point, or

3) at the time the aircraft fails to report its position over a compulsory reporting point,

whichever is later;

Note: The period of 7 minutes is to allow the necessary air traffic control and co-ordination measures.

c) thereafter adjust level and speed in accordance with the filed flight plan;

Note: As regards changes to levels and speed, the Filed Flight Plan, which is the flight plan as filed with an ATS unit by the pilot or a designated representative, without any subsequent changes will be used.

d) if being radar vectored or proceeding offset according to RNAV without a specified limit, proceed in the most direct manner possible to rejoin the current flight plan route no later than the next significant point, taking into consideration the applicable minimum flight altitude;

Note: As regards the route to be flown or the time to begin descent to the arrival aerodrome, the Current Flight Plan, which is the flight plan, including changes, if any, brought about by subsequent clearances, will be used.

e) proceed according to the current flight plan route to the appropriate designated navigation aid serving the destination aerodrome and, when required to ensure compliance with 5.3.1 f), hold over this aid until commencement of descent;

f) commence descent from the navigation aid specified in 5.3.1.e) at, or as close as possible to, the expected approach time last received and acknowledged; or, if no expected approach time has been received and acknowledged, at, or as close as possible to, the estimated time of arrival resulting from the current flight plan;

g) complete a normal instrument approach procedure as specified for the designated navigation aid; and

h) land, if possible, within thirty minutes after the estimated time of arrival specified in 5.3.1 f) or the last acknowledged expected approach time, whichever is later.

Note: Pilots are reminded that the aircraft may not be in an area of secondary surveillance radar coverage."

8.0 ATS SYSTEMS SUPPORT

8.1 General

8.1.1 Given the requirement for ATC to accommodate non-RVSM approved State aircraft as GAT within the MID RVSM Airspace, it is essential that ATC be systematically aware as to the RVSM approval status of all aircraft operating within the MID RVSM Airspace, as well as outside of and in close proximity to the EUR RVSM Airspace. The ATS systems adaptations described in this section have been developed to support this safety critical operational requirement.

8.1.2

status as being that of a State aircraft, where such an aircraft is requesting operation within the MID RVSM Airspace and has not indicated that it is RVSM approved.

8.1.3 The requirement for ATC to selectively apply two vertical separation minima within the MID RVSM Airspace, as a result of the requirements to accommodate non-RVSM approved State aircraft within the MID RVSM Airspace, and non-RVSM approved civil aircraft within MID RVSM Airspace where RVSM transition tasks are carried out, renders flight-planning requirements for the MID Region RVSM Airspace safety critical.

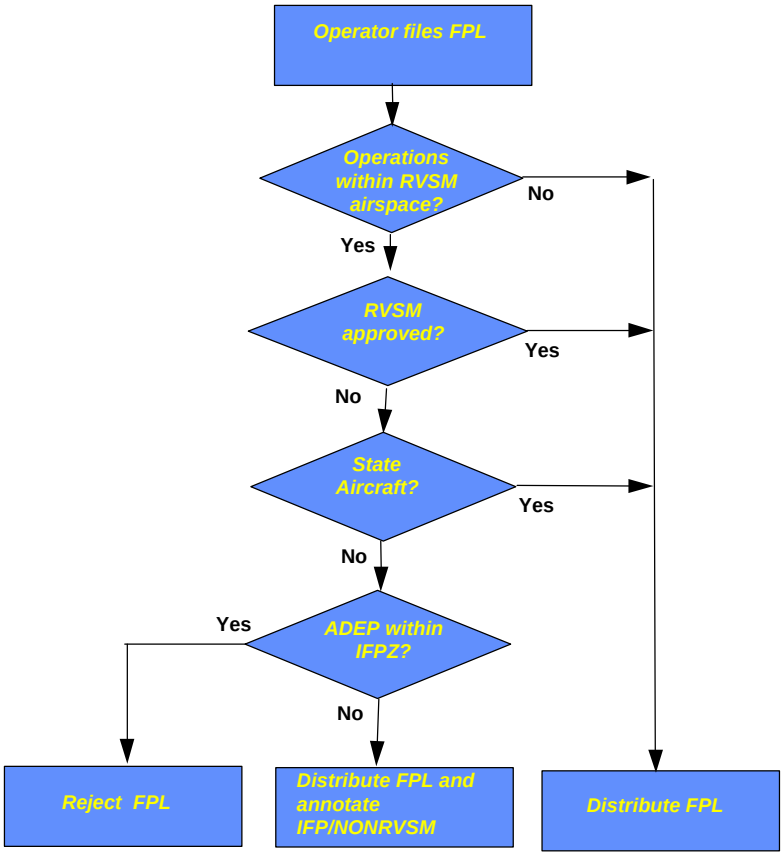
8.1.4 The ATS systems adaptations will be applied as a function of the RVSM-related flight plan information filed.

8.2 Flight Data Processing Systems (FDPS)

8.2.1 In order to ensure the application of 300 m (1 000 ft) vertical separation minimum between RVSM approved aircraft only, it is important that ACCs/UACs receive the support of IFPS for the purpose of:

- rejecting flight plans filed with an ADEP within the IFPS Zone (IFPZ), which do not qualify for operation within the MID RVSM Airspace on the basis of the information filed; and
- annotating flight plans filed with an ADEP outside the IFPS Zone (IFPZ), which do not qualify for operation within the MID RVSM Airspace on the basis of the information filed; and
- ensuring the timely and accurate distribution of the relevant RVSM associated flight plan information.

8.2.2 IFPS will reject or distribute flight plans submitted by operators on the basis of the following decision scheme:



8.2.3 In support of these requirements, IFPS will distribute all relevant flight plan information, including the RVSM approval status (ICAO Flight Plan Item 10 or Item Q of the RPL), filed in accordance with the flight planning requirements contained in Section 5.1, to the Flight Data Processing Systems of appropriate ACCs/UACs.

8.2.4 Controllers, having received an estimate message for which no flight plan was available, shall be aware as to the likelihood of no flight plan being available in adjacent ACCs/UACs. As a consequence, the sending controller shall use a verbal co-ordination as a means of ensuring that the receiving controller is aware -RVSM approval status.

8.2.5 In support of flight plans filed in the air (AFILs), all ATC Flight Plan Proposals (AFP) forwarded to IFPS should include the relevant ICAO Flight Plan Item 8, 10 and 18 information to the extent possible. ATC Flight Plans (APL) or ATC Flight Plan Change Messages (ACH) distributed by IFPS on the basis of AFPs for which no relevant RVSM information was forwarded (Item 10) shall contain the indicator: **IFP/RVSMUNKNOWN** ated, controllers shall ensure that the relevant RVSM approval information is forwarded to the adjacent control sectors concerned.

8.2.6 States situated within the IFPZ, extracting their own RPLs, shall ensure that the flight plan (FPL) created by their local FDPS is in conformance with the requirements pertaining to the filing of RPLs in regards to RVSM within IFPS.

8.2.7 Controllers are reminded that for flight plans filed with an ADEP located outside the IFPS Zone, IFPS cannot reject the flight plan. Consequently, such FPLs generated by IFPS, which would have been rejected on the basis of the RVSM **IFP/NONRVSM**

8.2.8 FDPSs **shall** be able to process and make available for display all flight levels within the MID RVSM Airspace.

8.3 Radar Display Systems

8.3.1 The operational requirements regarding radar display systems are applicable to those radar display systems of ACCs/UACs whose areas of responsibility include MID RVSM Airspace.

8.3.2 Furthermore they shall apply, at a minimum, to the radar position symbols and/or radar labels associated with GAT.

8.3.3 The operational requirements associated with radar display systems are essential to ATC being able to maintain a continuous, systematic and unambiguous level of awareness as to the RVSM approval status of all aircraft under its responsibility.

8.3.4 In a radar environment, the radar position symbols and/or radar labels associated with aircraft operating within the MID RVSM Airspace **shall** provide a clear indication of the current non-RVSM approval status.

Note 1: Non-RVSM approved aircraft operating within the MID RVSM Airspace could include State aircraft operating as GAT and/or civil aircraft operating within MID RVSM Airspace where RVSM transition tasks are carried out.

Note 2: The RVSM approval status of an aircraft, as reflected in the current flight plan, may be downgraded from RVSM approved to non-RVSM approved, based on information received directly from the pilot. Only for those circumstances associated with equipment-related contingency events may an aircraft's RVSM approval status be upgraded.

8.3.5 Where radar is used as the primary tool for applying separation, the radar position symbols and/or radar labels **should** provide a clear indication of the current non-RVSM approval status of aircraft operating within such level bands above and below the MID RVSM Airspace, as defined by the local ATS authority.

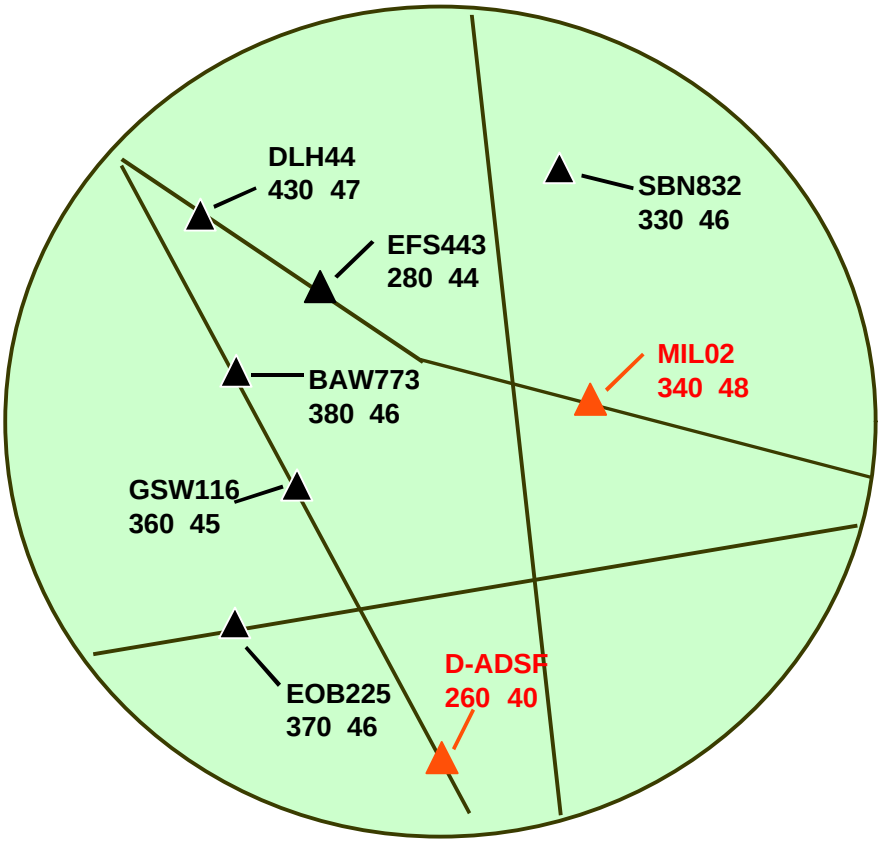
Note: The vertical extent of the level bands will have been determined locally as a function of specific local operational requirements in terms of sectorisation, etc.

8.3.6 The means by which the distinguishing feature is applied to the radar position symbols and/or radar labels of the aircraft concerned **shall** be automatic.

Note: It is understood that, during the initial period of RVSM implementation, for certain radar display systems, it may be required to accomplish the application of this distinguishing feature manually, provided clear and validated procedures are in place to ensure that this safety critical information is available to the relevant radar control positions.

8.3.7 The possibility for the manual manipulation of the radar position symbols and/or radar labels of aircraft **shall** be available.

Note: The manual manipulation will be used as a means of updating the radar position symbols and/or radar labels of aircraft experiencing in-flight equipment-related contingencies which result in the loss of RVSM approval status.



Radar Position Symbols and Radar Labels, red colour:	***non-RVSM approved***
Radar Position Symbols and Radar Labels, black colour:	***RVSM approved***

Figure 20: Example of Radar Display which uses colour to distinguish radar labels of non-RVSM approved aircraft.

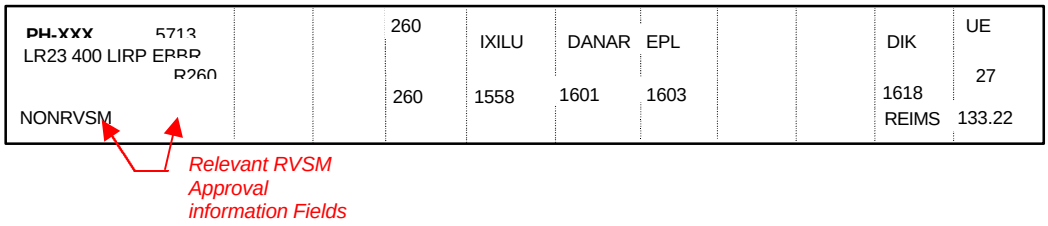
8.4 Flight Strips (Paper or Electronic)

8.4.1 These operational requirements are applicable to the flight progress strips generated within ACCs/UACs whose areas of responsibility include MID RVSM Airspace.

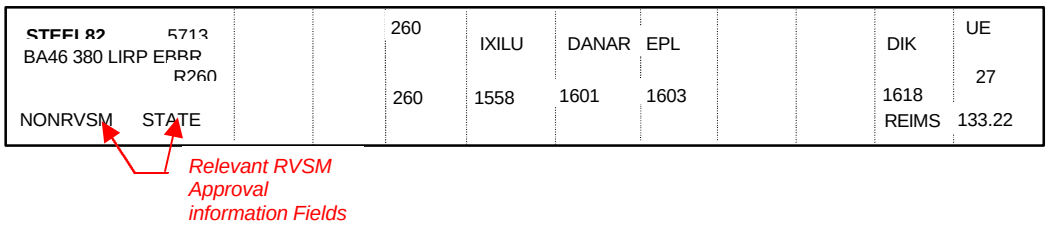
Note: If there are no paper or electronic strips, these requirements shall be applied

8.4.2 Local FDPS shall indicate on all flight strips (paper, electronic or, in the absence of either, extended label) for non-RVSM approved aircraft the information filed by operators in respect of both their RVSM approval status and their status as that of a State aircraft (if applicable).

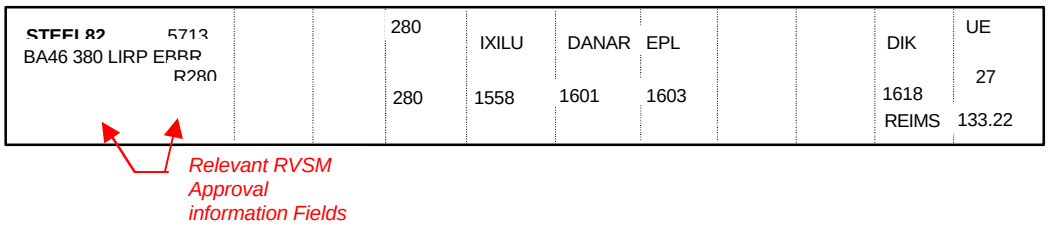
8.4.3 Information regarding a State or civil -RVSM approval status **shall** be displayed on the flight strip. (Message example: **NONRVSM**).



8.4.4 Where applicable, the indication that a non-RVSM approved aircraft is a State aircraft **shall** be displayed on the flight strip. (Message example: **STATE AIRCRAFT**)



8.4.5 For all RVSM approved aircraft, no indication is required:



8.4.6 ACCs/UACs should also consider the adoption of additional visual cues that could support the requirement of remaining continually aware of the RVSM approval status of all aircraft within its area of responsibility. Such methods might include assigning a dedicated colour to strip holders for such flights where paper flight strips are used or to assigning a dedicated colour to the electronic strips associated with such aircraft.

8.5 On-Line Data Interchange (OLDI)

8.5.1 OLDI **should** include the current RVSM approval status of an aircraft, as well as

applicable.

8.5.2 OLDI **should** support the systematic transfer of information related to requests for MID RVSM Airspace, in Item 18 of the ICAO Flight Plan (Item 18 message: **STS/NONRVSM**).

8.5.2.1 Since the automated OLDI message replaces the verbal estimate message, information regarding the request for special handling (STS/NONRVSM), as indicated by Item 18, should be transmitted to emulate the information which would

8.5.3 The support of OLDI in the forwarding of RVSM-related information will be beneficial:

- as confirmation of the data filed in the flight plan, as it is safety critical;
- where degradation of capability has occurred for a particular aircraft;
- where, for whatever reason, the accepting unit does not have the flight plan.

8.5.4 In consideration of the significant operational impact associated with the accommodation of non-RVSM approved State aircraft within the MID RVSM Airspace, where automated co-ordination dialogue facilities are in use, such aircraft could be the subject of a referral to the controller in the receiving unit for his/her explicit acceptance, and as such, co-ordination procedures to this effect could be agreed and included in Inter-Centre Letters of Agreement.

8.6 ATS Systems Overview

8.6.1 The following matrix provides an overview of the automated systems adaptations required to support the application of RVSM:

Red non-italics: mandatory ***Blue italics: highly desirable***		Flight Strip (Electronic, Paper or Extended Label[1]), indicate:	OLDI Message (Item 22)	Radar Position Symbols and/or Radar Labels
RVSM approved aircraft	All Levels	no requirements		
Non-RVSM approved State aircraft (operating as GAT)	FL 430 and above	• non-RVSM approval status (e.g.: **NONRVSM)** • Indicate state aircraft status (e.g.: **STATE A/C)**	*transmit:* • ***STS/NONRVSM*** • ***current RVSM approval and***	*apply distinguishing feature[2]*
	FL 290 - 410	• non-RVSM approval status (e.g.: **NONRVSM)** • Indicate state aircraft status (e.g.: **STATE A/C)**	*transmit:* • ***STS/NONRVSM*** • ***current RVSM approval and***	apply distinguishing feature
	FL 280 and below	• non-RVSM approval status (e.g.: **NONRVSM)** • Indicate state aircraft status (e.g.: **STATE A/C)**	*transmit:* • ***current RVSM approval and***	*apply distinguishing feature[2]*
All formation flights of State aircraft[3] (operating as GAT)	FL 430 and above	• non-RVSM approval status (e.g.: **NONRVSM)** • Indicate state aircraft status (e.g.: **STATE A/C)**	*transmit:* • ***STS/NONRVSM*** • ***current RVSM approval and***	*apply distinguishing feature[2]*
	FL 290 - 410	• non-RVSM approval status (e.g.: **NONRVSM)** • Indicate state aircraft status (e.g.: **STATE A/C)**	*transmit:* • ***STS/NONRVSM*** • ***current RVSM approval and***	apply distinguishing feature
	FL 280 and below	• non-RVSM approval status (e.g.: **NONRVSM)** • Indicate state aircraft status (e.g.: **STATE A/C)**	*transmit:* • ***current RVSM approval and***	*apply distinguishing feature[2]*
Non-RVSM approved civil aircraft	FL 430 and above	• non-RVSM approval status (e.g.: **NONRVSM)**	*transmit:* • ***current RVSM approval status***	*apply distinguishing feature[2]*
	FL 290 - 410 (in airspace where RVSM transition tasks are carried out)	• non-RVSM approval status (e.g.: **NONRVSM)**	*transmit:* • ***current RVSM approval status***	apply distinguishing feature
	FL 280 and below	• non-RVSM approval status (e.g.: **NONRVSM)**	*transmit:* • ***current RVSM approval status***	*apply distinguishing feature[2]*

Note [1]: This information may be included in an extended label if no paper or electronic strips exist.

Note [2]: To be applied between level bands above and/or below MID RVSM Airspace according to individual ACC/UAC specified vertical limits, as defined by the local ATS authority.

*Note [3]: Only formation flights of **State** aircraft shall be accommodated within the MID RVSM Airspace.*

8.7 Short Term Conflict Alert (STCA), and Medium Term Conflict Detection (MTCD)

Short Term Conflict Alert (STCA)

8.7.1 STCA systems of ACCs/UACs applying RVSM **should** be able to selectively assess the applicable vertical separation minimum of either 300 m (1 000 ft) or 600 m (2 000 ft), as determined by the current RVSM approval or non-approval status of the aircraft concerned, operating in the level band between FL 290 to FL 410 inclusive.

8.7.2 Where the STCA system of an ACC/UAC applying RVSM does not meet the requirements of paragraph 8.7.1, it **shall** be able to assess a vertical separation minimum of 300 m (1 000 ft) up to and including FL 410.

8.7.2.1 The serious disruptions to those operational environments applying RVSM, caused by STCA systems generating alerts based on an assessment of a vertical separation minimum of 600 m (2 000 ft) in the flight level band 290 to 410 inclusive, would be too numerous to be sustainable.

8.7.2.2 ACCs/UACs will be aware, for those STCA systems not adapted to meet the requirement described in paragraph 8.7.1, that alerts for those encounters involving at least one non-RVSM approved aircraft, operating between FL 290 to FL 410 inclusive, would be based on a vertical separation minimum which would not be applicable to the encounter in question. Nevertheless, in keeping with the concept of STCA as a safety net, alerts would however be generated as a function of a VSM assessment sufficient to assist in the prevention of collision.

Medium Term Conflict Detection (MTCD)

8.7.3 Medium Term Conflict Detection systems of ACCs/UACs applying RVSM **shall** be able to assess the selective application of a vertical separation minimum of either 300 m (1 000 ft) or 600 m (2 000 ft), as determined by the current RVSM approval or non-approval status of the aircraft concerned operating in the level band between FL 290 to FL 410 inclusive.

8.7.4 Individual ACCs/UACs should undertake early planning to ensure that the necessary software adaptations are accomplished within the defined timeframes for the initial implementation of MID RVSM. Implementation of MID RVSM prior to the completion of the necessary adaptations to STCA/MTCD systems would result in nuisance alerts being generated to an extent that severe operational disruptions could result.

9.0 AIR TRAFFIC MANAGEMENT CONSIDERATIONS

9.1 General

9.1.1 The introduction of RVSM will require that individual ACCs/UACs undertake a critical evaluation of operating practices so as to identify areas where adjustments and/or changes are required.

9.1.2 Individual ACCs/UACs may wish to take the opportunity to maximise the operational benefits to be gained from the introduction of RVSM by undertaking an extensive critical operational analysis.

9.2 Optimisation of the ATS Route Network

9.2.1 It is expected that the optimisation of the existing ATS route network will be realised through a combination of Flight Level Allocation Schemes, sectorisation, and, to a lesser extent, changes to the ATS route network itself. In general, it is expected that following the implementation of RVSM there will be a vertical re-distribution of traffic with more aircraft reaching their optimum flight levels. This vertical re-distribution of traffic may require changes to ATC sector boundaries in order to balance controller workload.

9.2.2 On bi-directional ATS routes, climbing and descending aircraft will cross more cruising levels in an RVSM environment than in a non-RVSM environment. Therefore, consideration should be given to the potential benefit of expanding the use of uni-directional ATS routes. Local needs (e.g. availability of airspace, ATC sectorisation, crossing points) will dictate whether or not this is practicable, but on those ATS route segments where the majority of the traffic is in the evolutionary stages of flight, the creation of laterally-spaced, uni-directional ATS routes to facilitate climb/descent to/from cruising levels could reduce controller workload.

9.2.3 The introduction of MID RVSM will permit an optimisation of any existing Flight Level Allocation Schemes (FLAS) through the designation of new flight levels for specified ATS route segments. Strategic de-confliction at major crossing points will be facilitated through the availability of the additional cruising levels. FLAS could also be considered where RVSM airspace is adjacent to non-RVSM airspace, and particularly where the adjacent non-RVSM airspace is located to the east of the MID RVSM Airspace.

9.3 ATC Sectorisation

9.3.1 The implementation of MID RVSM may require an analysis of the optimal levels to be used for delineating the vertical limits of control sectors within ACCs/UACs. Operational experts should evaluate the requirement to re-define such vertical limits as a function of adaptations to FLAS, or predicted changes in the vertical profiles of major traffic flows expected from the implementation of RVSM.

9.3.2 In addition to the requirement to provide a vertical separation minimum of 300 m (1 000 ft) between RVSM approved aircraft operating within the MID RVSM Airspace, States shall ensure that the vertical limits of control sectors within ACCs/UACs also facilitate the requirement to provide a vertical separation minimum of 600 m (2 000 ft) between:

a. non-RVSM approved State aircraft and any other aircraft operating within the MID RVSM Airspace;

b. all formation flights of State aircraft and any other aircraft operating within the MID RVSM Airspace;

c. non-RVSM approved civil aircraft and any other aircraft operating within the MID RVSM Airspace where RVSM transition tasks are carried out.

9.3.3 Consideration should be given to the impact on ATC co-ordination workload resulting from the requirement to provide a 600 m (2 000 ft) vertical separation minimum, as described in paragraph 9.3.2, for such aircraft operating at levels immediately above or below vertical sector boundaries within the MID RVSM Airspace. Vertically adjacent sectors will require continuous awareness, through co-ordination, of the presence of traffic operating at flight levels immediately above or below a vertical sector boundary, in order to facilitate the provision of the required vertical separation minimum. As an example, consideration could be given to adjusting the lower limit of a sector from FL 300 to FL 285 with the implementation of RVSM, so as to reduce ATC co-ordination requirements for aircraft that require a 600 m (2 000 ft) vertical separation minimum within the MID RVSM Airspace. Alternatively, ACCs/UACs may wish to consider the designation of FL 275 as a suitable division flight level between

two sectors. Such designation would make available, to the sector responsible for

-

equipment-related in-flight contingency.

9.3.4 The implementation of MID RVSM will render those cruising levels in the flight level band between FL 290 and FL 410 inclusive, which were vertical limits of sectors prior to RVSM implementation, as assignable cruising levels. As a consequence, ACCs/UACs will be required to designate vertical sector limits based on 500 ft intervals situated between two assignable cruising levels.

e.g.: Prior to RVSM implementation, upper limit of sector: FL 300
After RVSM implementation, upper limit of sector: FL 295

9.3.5 Areas of Common Interest (ACIs) described in Inter-Centre Letters of Agreement must be amended to reflect any changes to sector boundaries, where applicable.

9.4 Air Traffic Management Options for MID RVSM Transition Airspace

9.4.1 States on the periphery of the MID RVSM Airspace are faced with additional ATC tasks, as compared to States within the MID RVSM Airspace whose area of responsibility does not include RVSM transition airspace. States responsible for MID RVSM Transition Airspace may wish to evaluate the potential increase in controller workload on busy bi-directional ATS routes which cross the RVSM/non-RVSM boundary.

9.4.2 Controllers will need to adjust the cruising levels for aircraft operating from the MID RVSM Airspace to adjacent non-RVSM airspace and vice-versa, due to the differences between the cruising levels applicable within the MID RVSM Airspace to those which are applicable within the adjacent non-RVSM airspace. Furthermore, where non-RVSM airspace is located adjacent to, and east of, the MID RVSM Airspace, the fact that FL 310, FL 350 and FL 390 are westbound cruising levels within non-RVSM airspace and eastbound cruising levels within the MID RVSM Airspace is an important safety consideration.

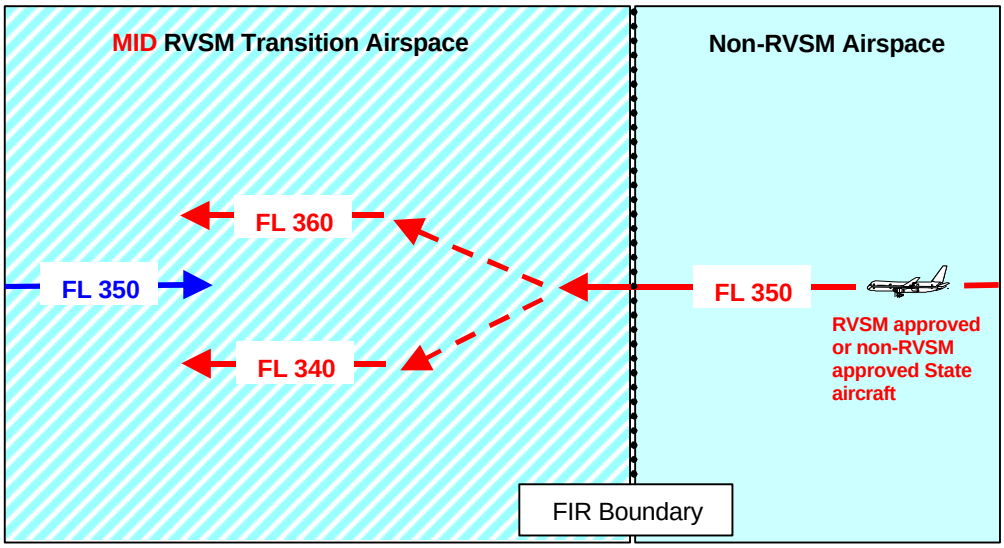


Figure 21: Traffic operating from adjacent non-RVSM airspace at FL 350 westbound is established at FL 340 or FL 360 within MID RVSM Transition Airspace.

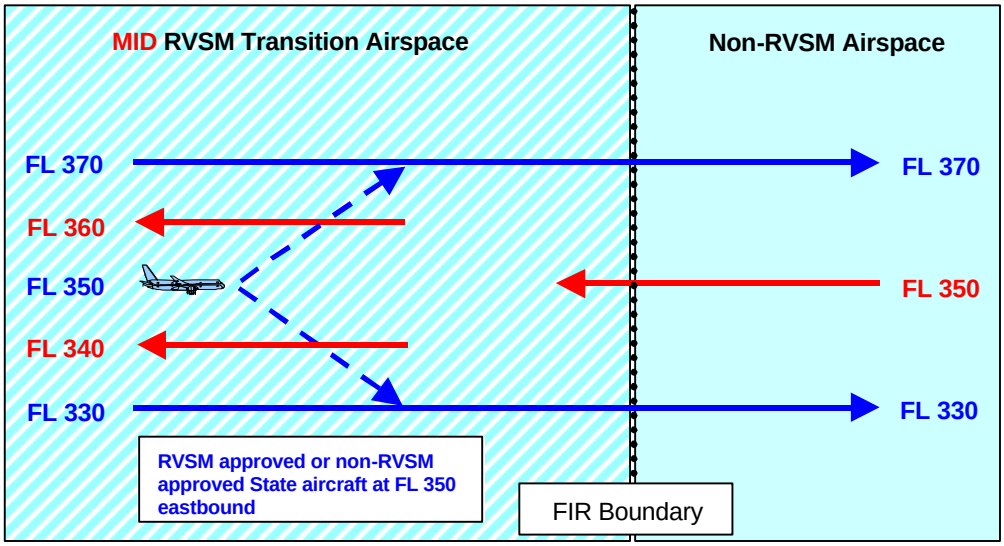


Figure 22: Traffic within the EUR RVSM Transition Airspace at FL 350 eastbound is established at FL 330 or FL 370 prior to the boundary with adjacent non-RVSM Airspace.

9.4.3 ACCs/UACs which perform RVSM transition tasks should consider the following options:

1. laterally-spaced, uni-directional ATS routes; and
2. flight level allocation scheme(s).

Laterally- Spaced, Uni-directional ATS Routes

9.4.4 States whose area of responsibility includes MID RVSM Transition Airspace may wish to consider the establishment of laterally-spaced, uni-directional ATS routes to facilitate the transition of traffic operating from the MID RVSM Airspace to adjacent non-RVSM airspace and vice-versa, if traffic levels and/or the complexity of RVSM transition tasks warrant it. This could be achieved either cross-border after co-ordination with adjacent non-RVSM States, or within the FIR of an individual State. Illustrations of laterally-spaced, uni-directional ATS routes are as follows:

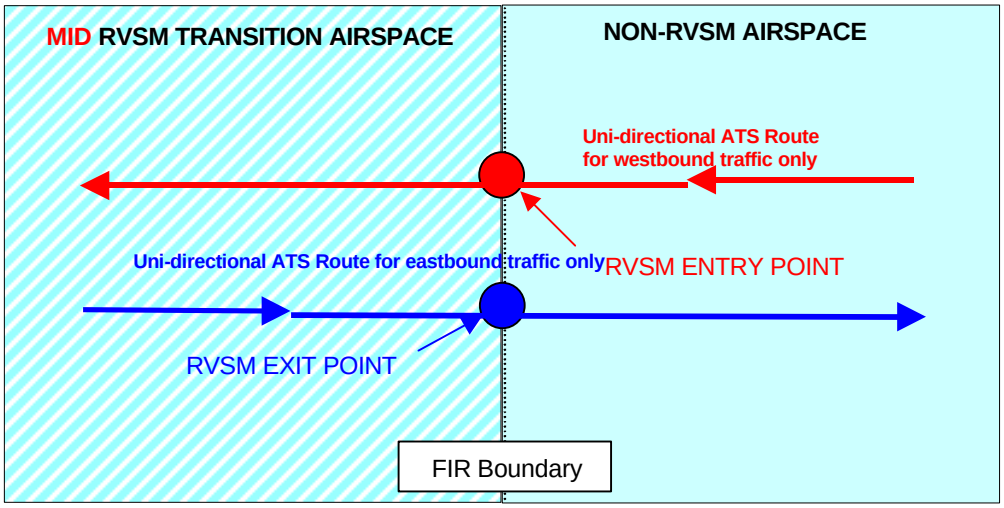


Figure 23: Laterally-spaced, uni-directional ATS routes between MID RVSM Transition Airspace and adjacent non-RVSM airspace.

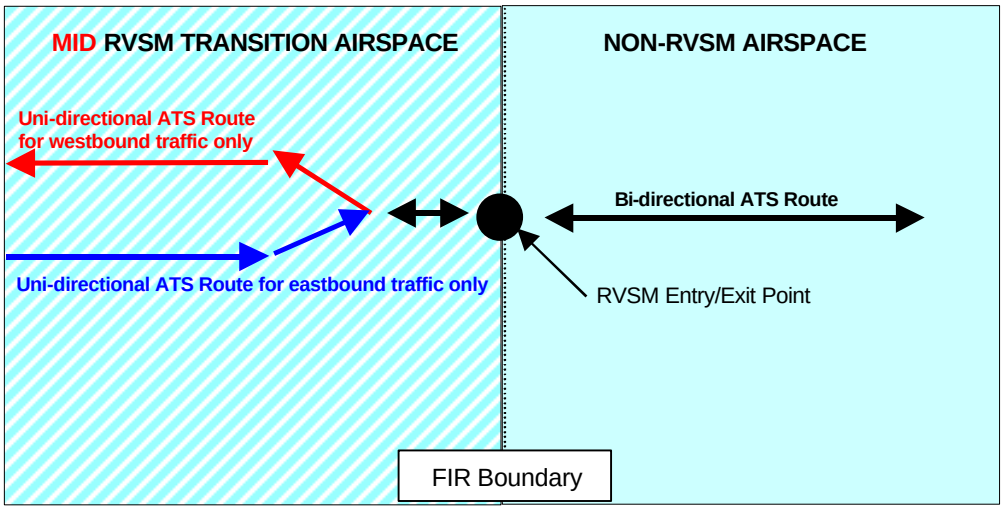


Figure 24: Laterally-spaced, uni-directional ATS routes within EUR RVSM Transition Airspace.

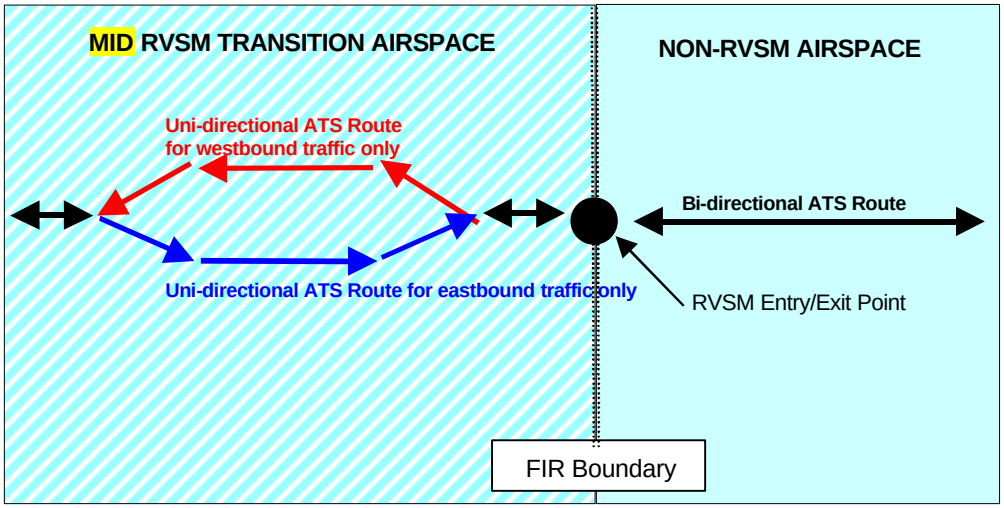


Figure 25: Laterally-spaced, uni-directional route section on a bi-directional ATS route within MID RVSM Transition Airspace.

Flight Level Allocation Schemes (FLAS)

9.4.5 Where an alternative and/or a supplement to the laterally-spaced, uni-directional ATS route network option may be required, consideration should be given to the application of a Flight Level Allocation Scheme. A FLAS is a scheme whereby specific flight levels are applied to specific segments within the ATS route network. By organizing the use and non-use of flight levels on specific route segments, potential traffic conflicts can be avoided.

9.4.6 The implementation of RVSM makes it necessary for ACCs/UACs to review, and, if necessary, revise existing FLAS, taking into account the additional cruising levels available. Additionally, ACCs/UACs responsible for MID RVSM Transition Airspace which is adjacent to non-RVSM airspace should consider the differences in cruising levels appropriate to direction of flight between RVSM airspace and non-RVSM airspace. ACCs/UACs should also determine whether there is a requirement to develop and implement any new FLAS.

9.4.7 It is recommended that where it is appropriate to do so, strategic solutions should be developed as to when to discontinue the use of FL 310, FL 350, and FL 390 as eastbound cruising levels. Both opposite direction and crossing traffic scenarios at these flight levels should be taken into account. Any such strategic solutions agreed to should be contained in Inter-Centre Letters of Agreement, and/or Flight Level Allocation Schemes, as appropriate.

Illustrations of FL 310, FL 350, and FL 390 discontinued as eastbound cruising levels are as follows:

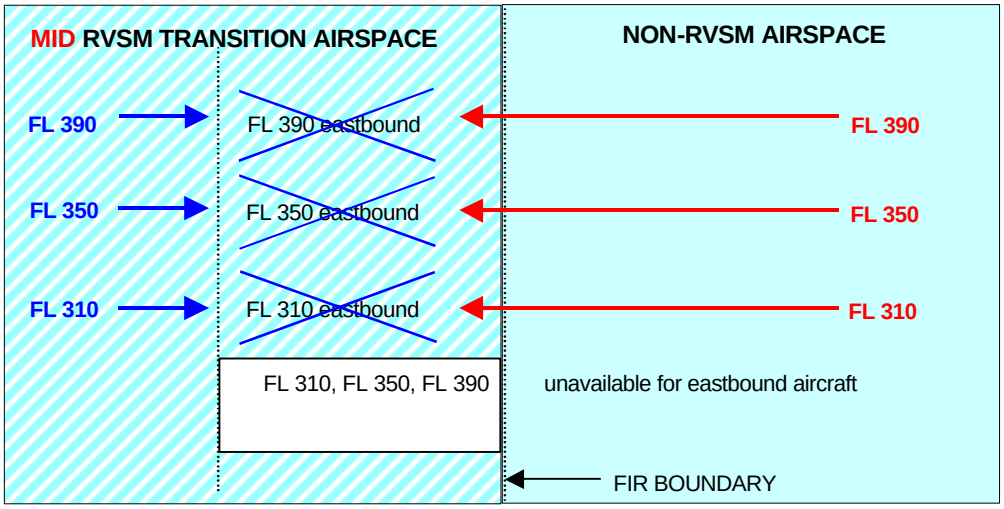


Figure 26: FLAS depicting FL 310, FL 350, and FL 390 discontinued for eastbound aircraft within a portion of the MID RVSM Transition Airspace.

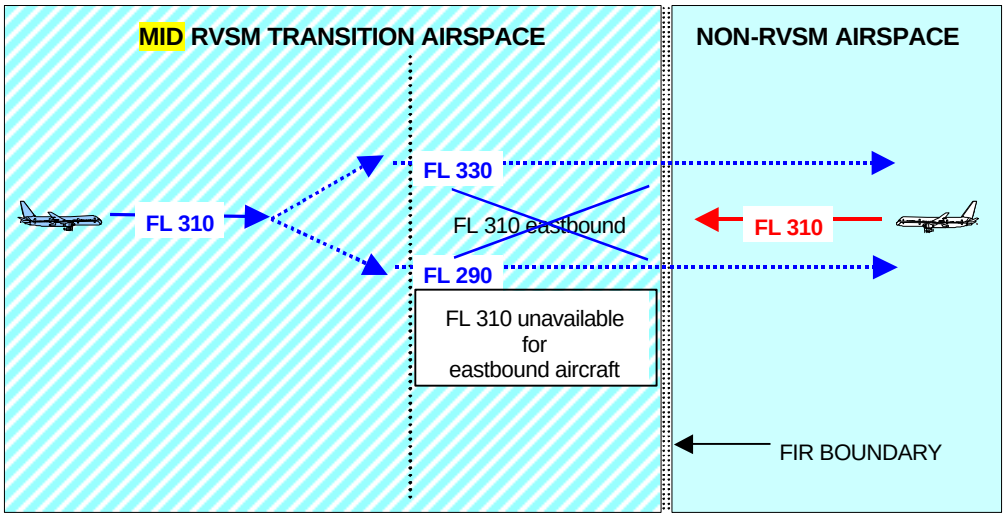


Figure 27: Opposite direction aircraft at FL 310. FLAS discontinues FL 310 for eastbound aircraft within a portion of the MID RVSM Transition Airspace.

9.5 Inter-Centre Letters of Agreement

9.5.1 Prior to the implementation of MID RVSM, ACCs/UACs should review their existing Inter-Centre Letters of Agreement for the purpose of updating the content to encompass RVSM-related changes, as appropriate.

9.5.2 ACCs/UACs should consider the inclus - Centre Letters of Agreement. A contingency FLAS could be applied during periods of meteorological conditions requiring a suspension in the use of 300 m (1 000 ft) vertical separation minimum within MID RVSM Airspace. In this way, co-ordination of levels appropriate to the transfer of traffic requiring a minimum of 600 m (2 000 ft) vertical separation minimum from adjacent ACCs/UACs can be facilitated.

9.5.3 Additionally, ACCs/UACs should consider whether there is a requirement to increase the pre-notification time parameter(s) for the passing of estimate messages involving non-RVSM approved aircraft intending to operate within the MID RVSM Airspace, as a means of facilitating planning for the integration of such traffic in accordance with a 600 m (2 000 ft) vertical separation minimum.

9.5.4 ACCs/UACs should also consider the inclusion of precise co-ordination procedures related to RVSM in their Inter-Centre Letters of Agreement with adjacent ACCs/UACs which do not receive flight plan information from IFPS, so as to ensure that the RVSM approval status of each aircraft is accurately communicated.

10.0 AIRBORNE COLLISION AVOIDANCE SYSTEMS (ACAS)

10.1 The provisions of the ICAO Regional Supplementary Procedures, Doc 7030/4 (MID/ASIA

mandates the carriage and operation of ACAS II in the MID Region as from 1 July 2001 by all aircraft that meet the following criteria:

- All civil fixed-wing turbine-engined aircraft having a maximum take-off mass exceeding 15000 kg or maximum approved passenger seating configuration of more than 30.

Note: Except when operating wholly within an FIR for which the State responsible has notified in its AIP or by NOTAM that these provisions do not apply.

10.2 However, in order to permit resolution of practical implementation issues involving supply, installation and certification of ACAS II equipment, aircraft may be granted special exemptions from compliance with the ACAS II requirement within the transition period, under specific conditions until 1 January 2003.

10.3 It is relevant to note that TCAS II, Version 6.04A (or earlier), is **not** ICAO ACAS II SARPs compliant, and, as such, will require upgrading to TCAS II, Version 7.

10.4 TCAS II, Version 6.04A (or earlier) models, which generate Traffic Advisories (TAs) and Resolution Advisories (RAs) were designed for an operating environment where a minimum vertical separation of 600 m (2 000 ft) is applied above FL 290. Analysis of TCAS II, Version 6.04A (or earlier) performance has revealed that, in an RVSM environment, it would generate a high number of nuisance Traffic Advisories (TAs) and Resolution Advisories (RAs).

10.5 TCAS II, Version 7, includes modifications intended to address operational issues, including its compatibility for operations within RVSM Airspace. Comprehensive work is underway to confirm TCAS II, Version 7 performance in the MID RVSM Airspace. Initial analysis indicates that the modifications introduced are effective, and it is considered important that TCAS II, Version 7 should be in widespread use before RVSM is implemented in the MID Region.

10.6 Controllers should be aware that, notwithstanding the MID ACAS provisions referred to in paragraph 10.1, a small population of aircraft will continue to operate within the MID RVSM Airspace while operating either TCAS II, Version 6.04A (or earlier), or no ACAS, by virtue of the fact that they are not included in the criteria for mandatory carriage and operation, i.e. *civil, fixed-wing turbine aircraft of more than 15000 kg or maximum passenger load of more than 30*. *Safety studies initiated by EUROCONTROL are currently underway to define the operational impact such aircraft will have on the EUR RVSM Airspace.*

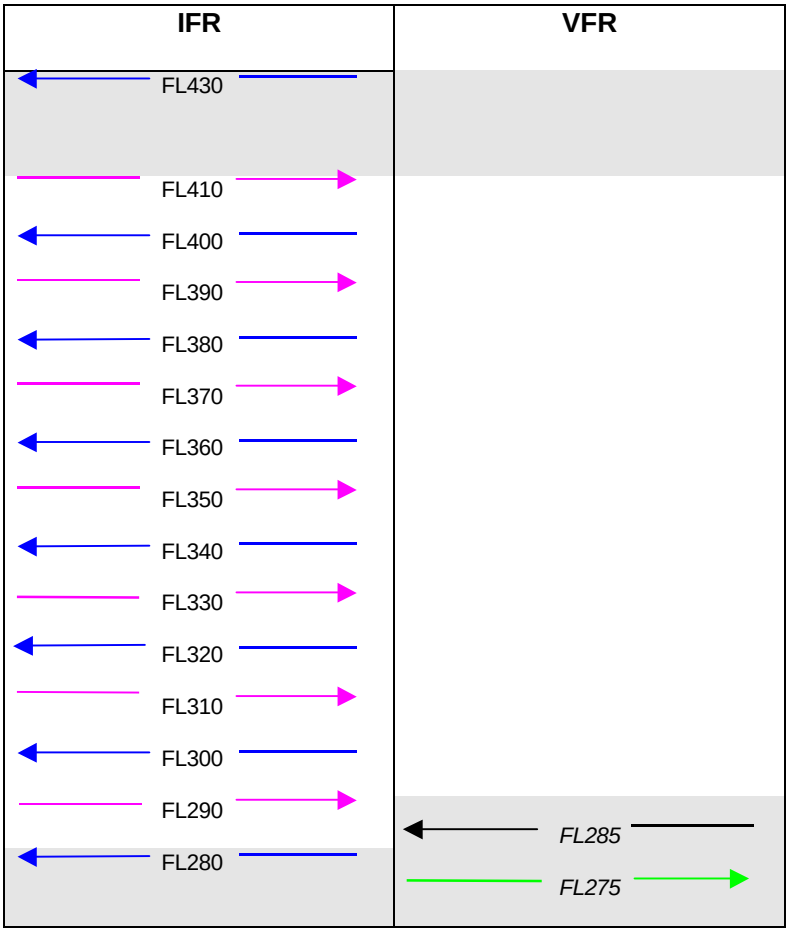
10.7 The implementation of MID RVSM is being undertaken with due regard for the operational performance of ACAS II. The mandatory carriage and operation of ICAO Standards And Recommended Practices (SARPs) compliant ACAS II in MID Region, as specified in paragraph 10.1, precedes the implementation of MID RVSM.

---***END***---

Appendix A

RVSM Table of Cruising Levels

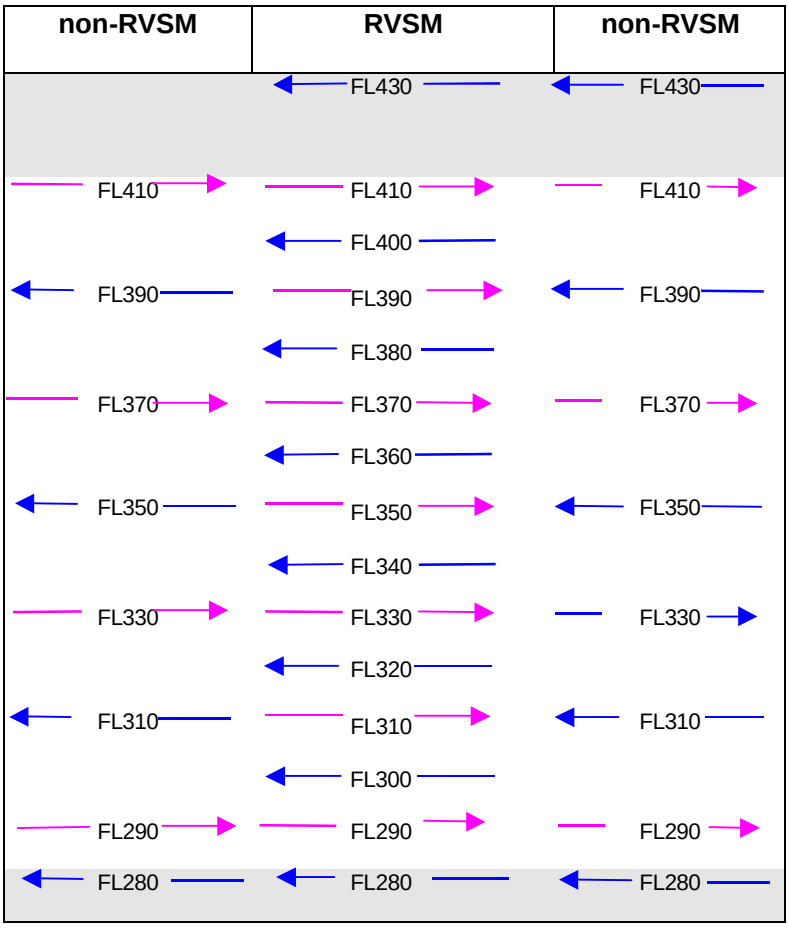
(Reference: ICAO Annex 2, Appendix 3, Paragraph a))



Note: The provisions of ICAO Annex 2 preclude VFR flight above FL 290. Accordingly, attention is drawn to the absence of VFR cruising levels above FL410, where the VSM reverts to 2 000 ft.

Appendix B

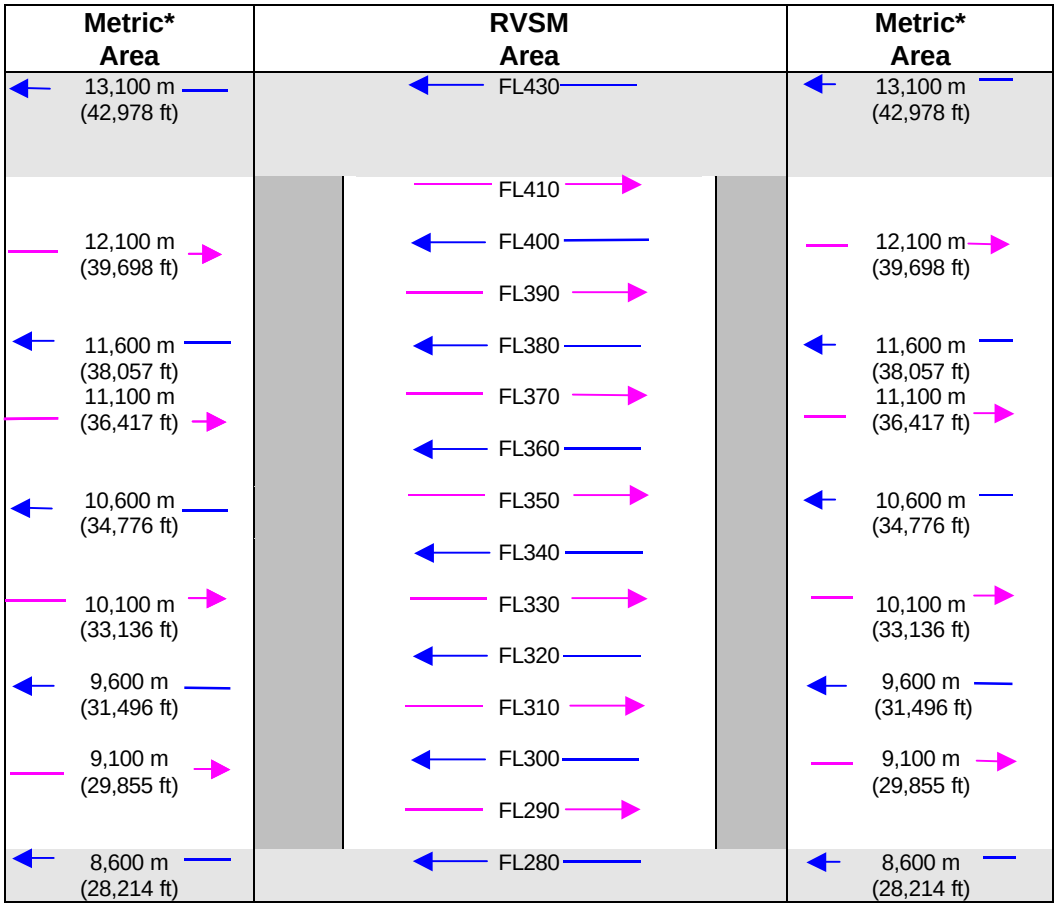
RVSM/non-RVSM Transition



conflict to be resolved during transition

Appendix C

Feet - Metric Transition



* system of metric cruising levels as applied, for instance, in the Russian Federation

Airspace where Transition Tasks are carried out

Appendix D

Guidance Material

on the Implementation of a 300m (1000ft) Vertical Separation Minimum in the European RVSM

: Airworthiness

It is intended as a means of providing background material of sufficient detail to allow operational ATC personnel to gain an appreciation of the subject. The contents of this appendix, therefore should not be considered as authoritative.

AIRWORTHINESS

Introduction

This material has been prepared in conjunction with the Joint Airworthiness Authority (JAA) and it provides an overview of the development, and content, of JAA Temporary Guidance Leaflet (TGL) No.6. which is the authoritative document on all issues relating to the European MASPS and on the approval of aircraft and operators for flight in designated RVSM airspace.

Background

1 The initial MASPS, for the height keeping accuracy necessary for RVSM operations, was established by the ICAO RGCSP. It was further refined by the NAT SPG by means of a group of technical specialists from State authorities, aircraft and avionics manufacturers, and airline and pilot associations. This group developed material which was then published by the Federal Aviation Administration (FAA) as FAA Document 91 - RVSM : Interim Guidance for Approval of Operators/Aircraft for RVSM Operations, and by the JAA as Information Leaflet No. 23 (I.L.No. 23). These documents detailed the airworthiness, continuing airworthiness, and operations programmes necessary to approve operators and aircraft for RVSM operations in the NAT RVSM airspace.

2 JAA TGL No.6

2.1 JAA TGL No.6 was published in mid 1998. It extends the area of applicability of the requirements of I.L. No. 23, to any region in which RVSM operations are introduced. Regional differences (e.g. ATC Procedures) are addressed in separate Annexes to the main body of TGL No.6, which will ultimately be re-issued as a JAA Acceptable Means of Compliance (AMC) with Joint Aviation Requirements (JAR Ops 1 Subpart L). The requirements detailed in the main body of TGL No.6 are unchanged from those set out in IL No. 23. which were developed in accordance with the conclusions of the RGCSP/6 Meeting (Doc 9536).

TGL No.6 provides detailed guidance on :

- the process for the approval of Aircraft and Operators, for RVSM operations.
- RVSM performance requirements
- Aircraft System requirements
- Airworthiness Approval
- Continued Airworthiness (Maintenance Requirements)
- Operational Approval (ATC and Flight Crew) aspects.

together with the following Appendices :

Appendix 1 - Explanation of W/δ
Appendix 2 - Altimetry System Error (ASE) Components
Appendix 3 - Establishing and Monitoring Static Source Errors
Appendix 4 - Training Programmes and Operating Practices and Procedures
Appendix 5 - Review of ICAO Doc.9574 - Height Keeping Errors
Appendix 6 - Specific Procedures [ATC] for European RVSM Airspace
Appendix 7 - Specific Procedures for the North Atlantic Airspace

TGL No.6 Para 8 details the following minimum equipment fit for aircraft seeking airworthiness approval for RVSM operations :

a) Two independent altitude measurement systems. Each system will need to be composed of the following elements:

- Cross-coupled static source/system, provided with ice protection if located in areas subject to ice accretion;

- Equipment for measuring static pressure sensed by the static source, converting it to pressure altitude and displaying the pressure altitude to the flight crew:

- Equipment for providing a digitally coded signal corresponding to the displayed pressure altitude, for automatic altitude reporting purposes;

- Static source error correction (SSEC), if needed to meet the performance criteria.

- Signals referenced to a pilot selected altitude for automatic control and alerting. These signals should be derived from an altitude measurement system meeting the criteria of this document [TGL No. 6], and, in all cases, enabling the criteria relating to Altitude Control Output and Altitude Alerting to be met.

b) One Secondary Surveillance Radar (SSR) transponder with an altitude reporting system that can be connected to the altitude measurement system in use for altitude for height keeping.

c) An altitude alerting system

d) An automatic altitude control system.

Appendix E

Following is an extract of the relevant section (Part 4), State Approval of Aircraft for RVSM Operations, Guidance Material on the Implementation of a 300m (1000ft) Ve

It is intended as a means of providing background material, of sufficient detail, to allow operational ATC personnel to gain an appreciation of the subject. The contents of this appendix, therefore should not be considered as authoritative.

STATE APPROVAL OF AIRCRAFT FOR RVSM OPERATIONS

1 The State Approval Process

1.1. With effect from the agreed date of the implementation of RVSM in European airspace, Operators intending to conduct flights within the notified RVSM airspace shall require an RVSM Approval either from the State in which the aircraft is registered, or from the State in which the Operator is based. Whilst the primary responsibility for gaining the necessary approval must rest with the aircraft operator, State aviation authorities will be expected to initiate such procedures as necessary to publicise the requirement for, and the means of obtaining, such approvals. In addition, State aviation authorities should maintain regular checks and records of the approvals which they have granted, and ensure that the relevant data is passed to the designated central data base.

2 RVSM Approvals. An RVSM approval will encompass the following elements:

2.1 Airworthiness Requirements (including continuous airworthiness)

2.1.1 The European RVSM Airworthiness requirements are detailed in the JAA TGL No 6. Para. 9. This provides guidance for the approval of newly built aircraft and for aircraft that have already in service. Aircraft may be granted an airworthiness approval against these requirements, or those of equivalent State documentation.

2.1.2 State Airworthiness authorities should also confirm that aircraft altimetry and height-keeping equipment will be maintained in accordance with approved procedures and servicing schedules as detailed in TGL No 6 Para 10.

2.1.3 Whilst meeting the airworthiness requirements of an RVSM approval is, by itself, not sufficient to authorise flight in RVSM airspace, it will qualify the aircraft to enter the Airspace User Preparation & Performance Verification Phase (P1) of the monitoring programme. It is important therefore that the appropriate State Authority should advise the designated monitoring cell accordingly.

2.2 Operational Requirements

2.2.1 To meet the operational requirements of an RVSM approval, the operator will need to satisfy the appropriate authority that that they have instituted flight crew procedures for operations in the European RVSM airspace.

3. Content of Operator RVSM Application

3.1

No.6 Para 11.3, and summarised below. The application should be submitted in sufficient time to permit evaluation before the intended start of RVSM operations and should include :

- Airworthiness Documents - to show that the aircraft holds an RVSM airworthiness approval

- Description of Aircraft Equipment - appropriate to RVSM operations

- Training Programmes and Operating Practices and Procedures - holders of Air Operators Certificates (AOC) should submit training syllabi and other appropriate material to the responsible authority to show that the operating practices, procedures and training items related to RVSM operations are incorporated in initial, and where appropriate, recurrent training programmes. Other operators will need to comply with local procedures to satisfy the responsible authority that their knowledge of RVSM operating procedures and practices is equivalent to that set for AOC Holders, sufficient

to hold approval to conduct RVSM operations. Guidance on the content of Flight Crew training programmes and operating practices and procedures is given in Section 5 of this document. This material is identical to Appendix 4 of TGL No.6. The European RVSM ATC Procedures which are set out in Section 6 of this document are copied in Appendix 6 to TGL No.6.

- Operations Manuals and Checklists - the appropriate manuals and checklists should be revised to include information/guidance on standard operating procedures for RVSM operations.

- Past Performance - relevant operating history, where available, should be included in the application. The applicant should show that changes needed in training, operating or maintenance practices to improve poor height keeping performance, have been made.

- Minimum Equipment List (MEL) - where applicable, an MEL, adapted from the Master Minimum Equipment List (MMEL) and relevant operational regulations, should include items pertinent to operating in RVSM airspace.

- Maintenance - when application is made for operational approval, the operator should establish a maintenance programme acceptable to the responsible authority.

- Plan for participation in the Performance Verification/Monitoring Programmes - this plan will need to include, as a minimum, a check on a sample of the operators fleet by an independent height monitoring system.

3 The application of the RVSM approval process and the monitoring programmes may be sufficient to verify the height keeping performance of an aircraft. However, the final step of the approval process may require a demonstration flight. The responsible authority may appoint an inspector for a flight in RVSM airspace to verify that all procedures are applied effectively. If the performance is satisfactory, the operator will be eligible for RVSM approval.

4 Issue of RVSM Approval.

- For AOC Holders - approvals will be issued by the appropriate authority in accordance with Joint Airworthiness Requirements (JAR OPS 1). Each aircraft group for which the operator is granted approval will be listed in the Approval.

- For Non AOC Holders - these operators will be issued with an Approval as required by national regulations or with JAR OPS 2 when this is published. These approvals will be valid for a period specified in National Regulations, typically 2 years, and may require renewal.

5 Suspension or Revocation of Approval for RVSM Operations.

5.1 The incidence of height keeping errors that can be tolerated in an RVSM environment is small. Thus Operators will be expected to take immediate action to rectify the conditions which cause an error. The operator should report an occurrence involving poor height keeping to the responsible authority within 72 hours. The report should include an initial analysis of causal factors and measures taken to prevent any reoccurrence. The need for follow up reports will be determined by the responsible authority.

5.2 Occurrences that should be reported and investigated are height keeping errors which display a :

- TVE equal to or greater than 300 ft (90m)
- ASE equal to or greater than 245 ft (75m)
- AAD equal to or greater than 300 ft (90m)

5.3 An Operator that consistently experiences height keeping errors, whether they are due to technical or operational causes, will have approval for RVSM operations revoked. If a problem is related to one specific aircraft type, then RVSM operational approval may be

notification of an height keeping error is not timely or effective, then the relevant authority may consider suspending or revoking RVSM approval.

6 Provision for the monitoring of aircraft:

6.1 A programme to monitor or verify aircraft height-keeping performance is considered a necessary element of European RVSM implementation. Verification and monitoring

programmes have the basic objective of observing and evaluating the height-keeping performance of MASPS equipped aircraft to :

a) confirm the efficacy of the RVSM MASPS
b) monitor the effectiveness of the approval process.
c) confirm that required safety levels will be achieved when RVSM is implemented.

7 Data base of State approvals

7.1 State aviation authorities will be expected to maintain a State Data Base (SDB) of all approvals which they have granted for operations in RVSM airspace. The details of the compilation and formatting of the data and the system operating parameters are under development. Ideally, the SDBs will provide data to one or more Central Data Bases (CDBs), including the NAT Central Monitoring Agency (CMA). This would facilitate the tactical monitoring of the approval status of those aircraft which have flight planned to operate in RVSM airspace, should such monitoring be considered necessary.

Appendix F

Follo Guidance Material on the Implementation of a 300m (1000ft) Vertical Separation Minimum in the *Flight Crew Training Programmes and Operating Practices and Procedures*

It is intended as a means of providing background material of sufficient detail to allow operational ATC personnel to gain an appreciation of the subject. The contents of this appendix, therefore should not be considered as authoritative.

FLIGHT CREW TRAINING PROGRAMMES AND OPERATING PRACTICES AND PROCEDURES

1. Introduction

1.1 Flight crews will need to have an awareness of the criteria for operating in RVSM airspace and be trained accordingly. The items detailed in paragraphs 2 to 6 should be standardised and incorporated into training programmes and operating practices and procedures. Certain items may already be adequately standardised in existing procedures. New technology may also remove the need for certain actions required of the flight crew. If this is so, then the intent of this guidance can be considered to be met.

Note: *This guidance material has been developed for all users of RVSM airspace, and as such is designed to present all required actions. It is recognised that some material may not be necessary for larger public transport operators.*

2. Flight Planning

2.1 During flight planning the flight crew should pay particular attention to conditions that may affect operation in RVSM airspace.

2.1.1 These include, but may not be limited to:

- verifying that the airframe is approved for RVSM operations;
- reported and forecast weather on the route of flight;
- minimum equipment requirements pertaining to height keeping and alerting systems; and
- any airframe or operating restriction related to RVSM approval.

3. Pre-flight procedures at the aircraft for each flight

3.1 The following actions should be accomplished during the pre-flight procedure:

- review technical logs and forms to determine the condition of equipment required for flight in the RVSM airspace. Ensure that maintenance action has been taken to correct defects to required equipment;
- during the external inspection of aircraft, particular attention should be paid to the condition of static sources and the condition of the fuselage skin near each static source and any other component that affects altimetry system accuracy. This check may be accomplished by a qualified and authorised person other than the pilot (e.g. a flight engineer or ground engineer);
- before takeoff, the aircraft altimeters should be set to the QNH of the airfield and should display a known altitude, within the limits specified in the aircraft operating manuals. The two primary altimeters should also agree within limits specified by the aircraft operating manual. An alternative procedure using QFE may also be used. Any required functioning checks of altitude indicating systems should be performed.
- Note. *The maximum value for these checks cited in operating manuals should not exceed 23m (75 ft).*
- before take-off, equipment required for flight in RVSM airspace should be operative, and any indications of malfunction should be resolved.

4. Procedures prior to RVSM airspace entry

4.1 The following equipment should be operating normally at entry into RVSM airspace:

- Two primary altitude measurement systems.
- One automatic altitude-control system.
- One altitude-alerting device.

Note: *Dual equipment requirements for altitude-control systems will be established by regional agreement after an evaluation of criteria such as mean time between*

failures, length of flight segments and availability of direct pilot-controller communications and radar surveillance.

- Operating Transponder. An operating transponder may not be required for entry into all designated RVSM airspace. The operator should determine the requirement for an operational transponder in each RVSM area where operations are intended. The operator should also determine the transponder requirements for transition areas next to RVSM airspace.

  Note: *Should any of the required equipment fail prior to the aircraft entering RVSM airspace, the pilot should request a new clearance to avoid entering this airspace;*

5 In-Flight Procedures

5.1 The following practices should be incorporated into flight crew training and procedures:

- Flight crews will need to comply with any aircraft operating restrictions, if required for the specific aircraft group, e.g. limits on indicated Mach number, given in the RVSM airworthiness approval.

- Emphasis should be placed on promptly setting the sub-scale on all primary and standby altimeters to 1013.2 (hPa) /29.92 in. Hg when passing the transition altitude, and rechecking for proper altimeter setting when reaching the initial cleared flight level;

- In level cruise it is essential that the aircraft is flown at the cleared flight level. This requires that particular care is taken to ensure that ATC clearances are fully understood and followed. The aircraft should not intentionally depart from cleared flight level without a positive clearance from ATC unless the crew are conducting contingency or emergency manoeuvres;

- When changing levels, the aircraft should not be allowed to overshoot or undershoot the cleared flight level by more than 45 m (150 ft);

Note: *It is recommended that the level off be accomplished using the altitude capture feature of the automatic altitude-control system, if installed.*

- An automatic altitude-control system should be operative and engaged during level cruise, except when circumstances such as the need to re-trim the aircraft or turbulence require disengagement. In any event, adherence to cruise altitude should be done by reference to one of the two primary altimeters. Following loss of the automatic height keeping function, any consequential restrictions will need to be observed.

- Ensure that the altitude-alerting system is operative;

- At intervals of approximately one hour, cross-checks between the primary m).

  Failure to meet this condition will require that the altimetry system be reported as defective and notified to ATC;

  the usual scan of flight deck instruments should suffice for altimeter cross-checking on most flights.

- In normal operations, the altimetry system being used to control the aircraft should be selected for the input to the altitude reporting transponder transmitting information to ATC.

- If the pilot is advised in real time that the aircraft has been identified by a height-monitoring system as exhibiting a TVE greater than m) and/or an ASE m) then the pilot should follow established regional procedures to protect the safe operation of the aircraft. This assumes that the monitoring system will identify the TVE or ASE within the set limits for accuracy.

- If the pilot is notified by ATC of an assigned altitude deviation of 300 ft (90 m) or more then the pilot should take action to return to cleared flight level as quickly as possible.

5.2 Contingency procedures after entering RVSM airspace are:

5.2.1 The pilot should notify ATC of contingencies (equipment failures, weather) which affect the ability to maintain the cleared flight level, and co-ordinate an appropriate plan of action.

5.2.2 Examples of equipment failures which should lead to notification to ATC:

- failure of all automatic altitude-control systems aboard the aircraft;
- loss of redundancy of altimetry systems,
- loss of thrust on an engine necessitating descent; or
- any other equipment failure affecting the ability to maintain cleared flight level

5.2.3 The pilot should notify ATC when encountering greater than moderate turbulence.

5.2.4 If unable to notify ATC and obtain an ATC clearance prior to deviating from the assigned cleared flight level, the pilot should follow the established contingency procedures and obtain ATC clearance as soon as possible.

6. Post Flight

6.1 In making technical log entries against malfunctions in height keeping systems, the pilot should provide sufficient detail to enable maintenance to effectively troubleshoot and repair the system. The pilot should detail the actual defect and the crew action taken to try to isolate and rectify the fault.

6.2 The following information should be recorded when appropriate:

- Primary and standby altimeter readings.
- Altitude selector setting.
- Sub-scale setting on altimeter.

- Auto-pilot used to control the aeroplane and any differences when an alternative auto-pilot system was selected.

- Differences in altimeter readings, if alternate static ports selected.

- Use of air data computer selector for fault diagnosis procedure.

- The transponder selected to provide altitude information to ATC and any difference noted when an alternative transponder was selected.

7 Special Emphasis Items: Flight Crew Training

7.1 The following items should also be included in flight crew training programmes:

- knowledge and understanding of standard ATC phraseology used in each area of operations;

- importance of crew members cross checking to ensure that ATC clearances are promptly and correctly complied with;

- use and limitations in terms of accuracy of standby altimeters in contingencies. Where applicable, the pilot should review the application of static source error correction/ position error correction through the use of correction cards;

  Note: Such correction data will need to be readily available on the flight deck.

- problems of visual perception of other aircraft at 300m (1,000 ft) planned separation during darkness, when encountering local phenomena such as northern lights, for opposite and same direction traffic, and during turns; and

- characteristics of aircraft altitude capture systems which may lead to overshoots.

- relationship between the aircraft's altimetry, automatic altitude control and transponder systems in normal and abnormal conditions.

- any airframe operating restrictions, if required for the specific aircraft group, related to RVSM airworthiness approval.

Appendix G

Guidance Material on the Implementation of a 300m (1000ft) Vertical Separation Minimum in the *System Performance Monitoring*

It is intended as a means of providing background material of sufficient detail to allow operational ATC personnel to gain an appreciation of the subject. The contents of this appendix, therefore should not be considered as authoritative.

SYSTEM PERFORMANCE MONITORING

1 Introduction

1.1 This Part provides guidance on the monitoring of operations in European RVSM airspace. The objectives of the monitoring programme are to ensure that the level of collision risk does not exceed the TLS and to assess the compliance of aircraft with the global height keeping performance specification (paragraph 2.2 refers). This information will be taken into account by decision makers in judging whether overall safety goals applicable to the European RVSM airspace are being achieved.

1.2 The overall criterion for safety in the European RVSM area is that the TLS of 5×10^{-9} fatal accidents per flight hour (representing the risk due solely to the loss of vertical separation from any cause) is not exceeded. The agreed method of assessing actual collision risk is by the use of a variant of the Reich collision risk model (CRM) suitable to the area.

1.3 The height-keeping errors which will contribute to collision risk in the European RVSM area can be divided into two categories; technical errors and operational errors. Technical errors, i.e. Altimetry System Errors (ASE) are caused by inaccuracies in the height-keeping equipment of aircraft, whereas, operational errors, i.e. Assigned Altitude Deviation (AAD), are caused by mistakes, by ATC or Flight Crew, which result in aircraft being flown at incorrect flight levels. ASE and AAD are the main constituents of Total

Vertical Error (TVE). As aircraft operations in the European area are, for the larger part, conducted under tactical radar control together with some procedural separation, the frequency of occurrence, size and duration of operational errors can be greatly reduced. Nevertheless, operational errors can, and do, occur and may make a significant contribution to the overall collision risk. The TLS has been chosen to take account of the risk from both technical errors and operational errors.

1.4 In order to ensure that the TLS is not being exceeded, it is necessary to monitor both the occurrence of vertical errors and the CRM parameter values on a continuing basis. Many of the parameter values used in the CRM are based on a planning horizon of approximately 10 years and require periodic monitoring.

1.5 The CRM parameters fall into two groups from the stand-point of monitoring requirements. The first group consists of two important parameters which are critical for safety assessment, in the sense that the actual risk in the airspace changes in proportion to changes in their values. The first of these parameters is an estimate of the proportion of flight time spent by aircraft, nominally separated by 1 000 ft, in vertical overlap. This parameter is a function of the height-keeping performance of the overall aircraft population. It is termed the "vertical overlap probability" and denoted by the term

overlap events per aircraft flight hour.

1.6 The second group of CRM parameters is less demanding either because the CRM is relatively insensitive to their values, or because they are not expected to change substantially over the planning horizon of this document. They should be re-assessed periodically to ensure that their values reflect the current European RVSM airspace system.

1.7 It must be emphasised that the monitoring requirements, in particular the measurement of TVE, have been established at a stringent level appropriate to the first application of RVSM in a complex, high density continental airspace. As a result of initial work done in the NAT, and the additional data and operational experience which will be gained in Europe, it may be possible in the future to relax some of the monitoring requirements in the European area and in other regions where the RVSM is introduced as a part of the global implementation process.

1.8 All of the measures which combine to constitute, or to verify, the height-keeping performance of an aircraft play a part in the concept of monitoring which is expected to make a significant contribution to risk reduction. The measures include:

- the requirement for aircraft to carry and use the equipment defined in the MASPS;
- the initial installation procedures, tests and, where necessary, flight checks of aircraft altimetry equipment;
- the compliance with State airworthiness approval procedures;
- the compliance with continued airworthiness requirements;
- the adherence to ATC procedures; and
- the completion of in-flight operating drills by crews.

1.9 All of the foregoing measures are addressed in the relevant parts of this guidance material. However, these measures do not give a direct indication that the overall criterion for safety is met. This can be achieved only through independent system performance monitoring.

2 The Collision Risk Model

2.1 The risk of a mid-air collision due to a loss of vertical separation, from any cause, will be estimated using a CRM which is currently being adapted to meet the specific requirements of European airspace. The model brings together factors of the operational system, through probabilistic and deterministic elements, to produce an estimate of the long-term average system risk of aircraft collision.

2.2 The TLS for the European RVSM airspace, of 5 $x10^{-9}$ fatal accidents per flight hour, embodies the collision risk due to the loss of vertical separation from all causes. This represents the upper limit for the value of N_{az} which results when the collision risk equation is evaluated. That is, the N_{az} can not be larger than the TLS.

3 Monitoring the Parameters of the CRM specification

In order to ensure that the collision risk with European RVSM operations does not exceed the TLS, the parameters of the CRM must be monitored and assessed on a continuing basis.

3.1 MONITORING OF PZ(1 000)

3.1.1 Monitoring of height keeping performance in the European RVSM airspace

3.1.1.1 The agreed TLS of 5×10^{-9} fatal accidents per flight hour requires that an assessment of total system vertical overlap probability (Pz(1000)) be performed. This requires that the duration of all large errors in the vertical plane be reported and assessed. Thus, in addition to errors detected through the height monitoring system, all operational errors which occur in European RVSM airspace and which result in aircraft flying at or close to a flight level other than the one to which they were assigned, or were assigned to in error, must be reported.

3.1.1.2 The contribution of operational errors to the overall risk is not yet known but could be high in the European area. However, because the majority of aircraft in the region are controlled tactically using radar surveillance, it is anticipated that controller intervention will limit or reduce the size and duration of operational errors. Nonetheless, it is vital that reports of all operational errors should be sent by provider States to the designated monitoring agency.

3.1.1.3 System risk is directly proportional to the amount of total flight time spent by aircraft at an incorrect flight level. The estimates of such times will be one of the key elements to be used in determining whether or not the system is in compliance with the TLS, using appropriate mathematical and statistical methods.

3.1.1.4 Data sources for estimating time spent by aircraft at incorrect flight levels will include reports to the designated monitoring agency by ATC authorities and airlines, as well as the results of special data gathering exercises using HMUs and other suitable systems.

3.1.2 Monitoring of Compliance with the Global System Performance Specification

3.1.2.1 In addition to the requirement that total system performance meets the overall TLS, the monitoring process will be used to ensure that the fleet of aircraft flying in the European RVSM airspace meets the global system performance specification from which the RVSM MASPS was derived (paragraph 2.2.3 above also refers).

3.1.2.2 Because the global system performance specification, and in particular the Pz(1000) of 1.7×10^{-8}, was used to derive aircraft height keeping performance specifications, only errors resulting from incorrectly operating equipment are included in this aspect of the monitoring programme.

3.1.2.3 An assessment of TVE is critical to an assessment of Pz(1 000). As a result, the accuracy with which TVE can be measured is an important concern. TVE can be measured by comparing the geometric height of an aircraft, as measured by an HMU, or any other suitable system, to the geometric height of its assigned flight level. The accuracy of the measurement should be such that the mean error is 0 ft and the SD of the error does not exceed 50 ft.

3.1.2.4 These measured TVE data are fundamental to the monitoring process. Large amounts of such TVE data are needed to draw inference from the monitoring process with a high level of confidence.

3.1.2.5 Given a measured TVE and a simultaneous difference between automatically reported Mode C altitude and assigned flight level (i.e. the AAD), it is possible to estimate the aircraft's ASE, i.e., the difference between its TVE and AAD. Thus it is important to obtain as much measured TVE data as possible, in order to calculate typical ASE values for airframes and for aircraft types, before and during initial applications of the RVSM, to determine whether these ASE values are constant and repeatable. If this can

Mode C (or Mode S or ADS) altitude.

3.2 MONITORING AIRCRAFT PASSING EVENTS INVOLVING PLAN OVERLAP

3.2.1 In addition to an upper bound for Pz(1000), the original form of the global system performance specification provided upper bounds for aircraft passing frequency and the probability of lateral overlap. These values were derived for opposite direction traffic.

3.2.2 However, because the majority of traffic in European RVSM airspace will fly on crossing routes and because a growing proportion of traffic is expected to be flying direct routes in the future, the global system performance specification has been reformulated in terms of passing events involving plan overlap.

3.2.3 The aircraft passing frequency involving plan overlap in the European area will be assessed on a monthly basis by the designated monitoring agency using traffic data supplied by the ATC authorities. It is anticipated that the level of this parameter may be close to that used to derive the aircraft height-keeping performance in the global system performance specification.

3.3 MONITORING OTHER CRM PARAMETERS

3.3.1 The remaining CRM parameters are average aircraft speed, relative speed between aircraft, and the average length, width and height of the aircraft operating in the European airspace. As stated previously, the risk of a mid-air collision is either relatively insensitive to these parameter values, or the values are not expected to change substantially over the planning horizon of this document. Intensive monitoring of the values of these parameters should not be necessary. The designated monitoring agency should be aware of the relative importance of these parameters in the overall process of ensuring that system safety is maintained, and should assess their likely values, on a periodic basis, using whatever means are deemed appropriate.

4 Assessment of the safety of European RVSM operations

4.1 The airspace parameters which are derived from the monitoring procedures outlined above allow the collision risk, in the vertical plane, in the airspace system to be assessed against the TLS. The height-keeping performance of aircraft can also be assessed and compared to the requirements of the global height-keeping performance specification outlined in paragraph 2.2.2 above.

4.2 Prior to implementation of RVSM in the European area, mathematical and statistical techniques will be used to provide detailed information on the forecast performance of the system in terms of collision risk and aircraft height-keeping performance. After implementation of RVSM the monitoring of the CRM parameters and the assessment of

the system performance will continue so that any adverse trends may be quickly identified and corrected.

4.3 During the performance verification programme, and after implementation of RVSM, periodic reports will be issued to provide an analysis of the information obtained from routine monitoring procedures (HMU and GMU), mandatory occurrence reports, air-miss data, near mid-air collision reports or any other similar source of information on aircraft height-keeping performance. The appropriate European body should take action as necessary to ensure that the level of collision risk is maintained below the TLS.

5 Responsibilities of the designated monitoring agency

5.1 The designated monitoring agency will be responsible for the efficient and effective performance of the above monitoring tasks. To this end it will be necessary to :

- ensure the availability of all data required for the monitoring system,
- ensure the availability of monitoring system output,
- process the monitoring system output,
- take follow-up action after the detection of large height deviations,
- perform safety assessment.
- make recommendations to improve height keeping performance.
- issue periodic reports

6 Objectives of the Height Monitoring System

6.1 In order to recommend a monitoring system, it was necessary first to define overall monitoring targets. Following a review of information and data collected in the vertical studies programme and the monitoring activities in the NAT Region, it was assumed that ASE for individual airframes would be stable for a period of two years. Two important objectives of the Performance Verification programme (P1) were therefore to establish the ASE performance of the airframes which will operate the European RVSM airspace and to confirm the assumptions concerning the stability of ASE.

6.2 On the basis of the above assumption, it was possible to establish the objectives of the monitoring programme and to consider how these objectives could be met. Firstly, the ultimate objective was to carry out a complete census of airframes. The monitoring

system should therefore be designed to be capable, in principle, of performing such a census over a period of one year. Because a complete census may prove to be an impractical target during the performance verification programme, the minimum targets, listed below, were agreed. These should enable the monitoring cell to collect sufficient information on the height keeping performance of aircraft operating in the European Region:

6.2.1 Monitoring Targets

6.2.1.1 Monitoring targets for the Performance Verification programme for those aircraft considered to be members of an Aircraft Group.[1]

6.2.1.1.1 A minimum target of 60%* of the airworthiness approved airframes of each aircraft group from each operator is required in order to generate sufficient monitoring data to confirm whether a particular group is compliant with the MASPS.

* Note :Alternatively, this percentage may be reduced (to a minimum of 10% or 2 aircraft whichever is greater) if it can be shown, based on the ASE results, that a sufficient number of aircraft of the same group have been sampled to satisfy the requirement that the aircraft group meets the MASPS with a high level of confidence.

6.2.1.1.2 The method to determine whether a group[1] is compliant with the MASPS, and the organisational aspects of the application of that method, will have to be defined, taking into account the need for a strong coherence with NAT practices.

6.2.1.1.3 Any airworthiness approved group aircraft failing individual requirements (i.e. the absolute value of ASE > 245ft) would be deemed non-compliant. In making this decision allowance would have to be made for the measurement error of the height monitoring system.

6.2.1.2 Monitoring targets for the Performance Verification programme for aircraft which do not qualify as members of an aircraft group[2.]

6.2.1.2.1All airworthiness approved aircraft need to be monitored on an individual basis unless flight test evidence can be provided to show that each airframe is compliant with ASE targets.

6.2.1.2.2Any airworthiness approved aircraft failing individual requirements (i.e., the absolute value of ASE > 200ft) would be deemed non-compliant. In making this decision allowance would have to be made for the measurement error of the height monitoring system.

6.2.1.3 Use of NAT experience - After consideration of the data and experience gained in the monitoring of the NAT RVSM operations, the following principles were adopted for the European Region : :

- the European RVSM monitoring programme will not be part of the European RVSM approval process for airframes. The monitoring output will only be used to determine the go-ahead for the introduction of RVSM (P2.6).
- the number of aircraft of a particular operator which were monitored in the NAT programme should be taken into account in determining how many aircraft of that operator should be monitored in the European monitoring programme;
- in general, any operator-group pairings, or non-group aircraft, already satisfying the monitoring requirements through participation in the NAT RVSM programme would not require any further monitoring; and
- the NAT monitoring programme, will satisfy the European RVSM monitoring requirements with that same rule.

6.2.1.4 Conclusion of Performance Verification programme - Subject to a satisfactory collision risk assessment and other operational considerations, the introduction of RVSM could be made provided that 90% of the flights in the area of interest would be made by operator-aircraft group pairings or non-group aircraft that have satisfied the monitoring requirements during the verification programme.

Notes :

(1) Group aircraft are those of nominally identical design and build with respect to all details that could influence the accuracy of height keeping performance. A detailed explanation is given in JAA TGL No.6 Para 9.3.1.

(2) Non group aircraft are those aircraft not falling under the definition of group aircraft.

6.3 These targets are considered to be the minimum necessary to ensure that a representative sample of MASPS approved aircraft will be obtained. The data obtained from a monitoring programme that meets these targets will be sufficient to provide:

- further evidence of the stability of ASE;
- guidance on the efficacy of the MASPS and on the effectiveness of altimetry system modifications; and
- confidence that the TLS will be met.

6.4 It is important to note that these minimum targets have been agreed on the assumption that the observed aircraft height keeping performance would meet the global requirements and consequently that the collision risk due to technical errors would be less than the technical aspect of the TLS. If the observed performance proved to be significantly worse than the global height keeping requirements, then the minimum sampling requirements might have to be increased to determine both the cause of the errors and whether or not the regional TLS would be threatened.

7 Description of the Height Monitoring System

1 Currently there are two accepted methods of measuring aircraft height keeping performance. These are :

- Height Monitoring Unit (HMU). This is a fixed ground based system which employs a network of a Master and 4 Slave Stations to receive aircraft SSR Mode A/C signals to establish the three dimensional position of the aircraft. The geometric height of the aircraft is measured to an accuracy of 50 ft (1 Standard Deviation (SD)). This is compared, in near real time, with meteorological input data on the geometric height of the assigned Flight (Pressure) Level to obtain a measurement of the Total Vertical Error

(TVE) of the target aircraft. The aircraft SSR Mode C data is also recorded to determine the extent of any Assigned Altitude Deviation (AAD) and for subsequent aircraft identification, when the SSR Mode S response is not available.

- approximately 45 x 40 x 30 cm^3) which contains a GPS receiver, a device for recording and storing the GPS three dimensional position data, and two separate GPS receiver

  is positioned on board the candidate aircraft and, being battery powered, functions independently of the aircraft systems. Following the flight the recorded GPS data are sent back to a central site where, using differential post processing, aircraft geometric height is determined. A network of not more than 25 GMUs will make up the GPS Monitoring System (GMS).

2 It is intended that the European Height Monitoring System should be a hybrid system of HMUs and GMUs which makes optimum use of the advantages offered by each. Thus the strategic and inflexible characteristics of the HMUs, which can provide a large and predictable rate of collection of high quality data at relatively high installation and low maintenance/ongoing operating costs, can be blended with the tactical flexibility of the GMU which permits the targeting of specific aircraft at a low initial purchase price, but with relatively high operating costs in both manpower and logistics. The resultant system will be capable of acquiring a representative sample of the height keeping performance of the aircraft population by operator, type or airframe. or if required, a complete census of RVSM approved aircraft.

3 Over a period of time the HMUs will provide repeat samples of the height keeping performance of individual aircraft. These data will establish the typical ASE range for a variety of aircraft types and will be the basis of the studies to determine whether the assumptions regarding the stability and repeatability of ASE are valid.

4 Those aircraft which normally operate on routes which do not pass within the effective range of one of HMUs will be candidates for monitoring by the GMS. The GMS can also be used to obtain repeat measurements of airframes and aircraft types which have been shown to be poor performers.

4 A combination of HMUs and a GMS is expected to provide the most efficient means of achieving the verification and monitoring objectives. Furthermore, because of the complementary nature of the systems, both elements (HMU/GMS) are equally critical to the composition of the hybrid system.

5 It is currently planned that the height monitoring system for the European RVSM airspace will consist of four HMUs, of which one (Strumble, United Kingdom) also belongs to the NAT height monitoring system. The other three HMUs with an extended coverage area, will be placed near Nattenheim (Germany), Geneva (Switzerland) and Linz or Sollenau (Austria). The GMS will consist of not more than 25 GMUs, together with GPS reference stations, post-flight processing facilities and adequate logistic support.

Appendix H

List of Contacts

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