INTERNATIONAL CIVIL AVIATION ORGANIZATION

MIDDLE EAST OFFICE

REPORT OF THE EIGHTH MEETING OF MIDANPIRG RVSM TASK FORCE (MID RVSM TF/8)

(Abu Dhabi, 25 28 May 2003)

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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* Available only on ICAO website

PART I - HISTORY OF THE MEETING

1. PLACE AND DURATION

1.1 The Eighth Meeting of MIDANPIRG Reduced Vertical Separation Minimum Task Force (RVSM TF/8), hosted by the UAE, was held at the conference room of the Hilton Hotel, Abu Dhabi, United Arab Emirates (UAE), 25 28 May 2003.

2. OPENING

2.1 The meeting was 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 Jamhoor extended the warmest welcome to all participants from four continents on behalf of the Unit
successful Task Force meeting. He pointed out that two and a half years have elapsed since the region embarked on the planning process for the safe implementation of RVSM and we have just six months left until implementation. He indicated that although many important tasks have been completed, there were still many outstanding issues to be addressed prior to implementation and the ball is now mainly in the hands of States.

2.2 It was emphasized that the GO/NO-GO decision is only 3 months away, and the primary objective of this meeting was to give an accurate picture of outstanding issues that must be resolved in order to reach a GO-decision in August. He highlighted the need for this Task Force meeting to come up with clear indications on what ***has been done*** and what ***must be done*** by the time it will meet in late August. Mr. Khalifa emphasized the need all stakeholders and States concerned to spare no efforts in ensuring that all requirements are met, in accordance with the MID Region implementation time-lines, for ensuring the safe implementation of RVSM on 27 November 2003.

2.3 Mr. Sabri Said Al-Busaidy, of Oman, Chairman of the Task Force also welcomed the delegates and thanked the GCAA of UAE for hosting the Task Force meeting. He also urged the parties concerned to expedite action so that all outstanding tasks be completed in a timely manner.

2.4 Mr. Dhiraj Ramdoyal, Regional Officer, Air Traffic Management from the ICAO Middle East Office extended the greetings of Mr A. Zerhouni, the Regional Director and Mr. M. Khonji, the Deputy Director of the ICAO Middle East Office to the participants and thanked the UAE for their sustained cooperation and support.

3. ATTENDANCE

3.1 The meeting was attended by a total of 61 participants from 12 States (Bahrain, Egypt, I.R. Iran, Jordan, Kuwait, Lebanon, Oman, Saudi Arabia, Sudan, Syria, United Arab Emirates and Yemen) and one Organization (IATA). The list of participants is at **Appendix D** to the report.

4. OFFICERS AND SECRETARIAT

4.1 The meeting was Chaired by Mr. Sabri Said Al-Busaidy of Oman. Mr. Dhiraj 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. Mohammed Abdullah Zainal of Bahrain (ATC/WG) and Mr. Ibrahim Negm of Egypt *(OPS/AIR/WG).

**Note:- In consultation with the Chairman of the Task Force, it was agreed that, as it has already completed all tasks which were assigned to it, there was no requirement for the OPS/AIR/WG to convene for the time being.*

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 ensuing Task Force meetings.

2) Safety and airspace monitoring aspects (SAM/WG)

3) ATC operations aspects (ATC/WG)

4) programme management issues

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

DRAFT CONCLUSION 8/1: NATIONAL SAFETY PLAN
DRAFT CONCLUSION 8/2: FUNCTIONAL HAZARD ASSESSMENT
DRAFT CONCLUSION 8/3: CREATION OF NON-EXCLUSION AREAS WITHIN RVSM AIRSPACE
DRAFT CONCLUSION 8/4: COORDINATION PROBLEMS OVER THE RED SEA AREA

MID RVSM TF/8
Report on Agenda Item 1

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 ENSUING RVSM TASK FORCE MEETINGS.

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 ensuing RVSM Task Force meetings. It noted the subsequent follow-up action(s) which have been taken and other outstanding issues on which prompt action have to be taken. An updated list of conclusions/ decisions and a summary of the status of implementation 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/8
Appendix 1A to the Report on Agenda Item 1

CONCLUSION/DECISION	STATUS	REMARKS
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 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 Agency (MECMA), will be established and staffed by - 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.	On-going	

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. b) MECMA shall ensure that further processing and evaluation of this data within its Terms of Reference and identify or develop methodologies for assessing risk associated with traffic and conditions prevailing within the MID Region.	On-going	

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.	On-going	
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.	On-going	
~~**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.~~	~~On-going~~	*This conclusion has been deleted. The creation of non-exclusion areas within RVSM airspace is no longer authorized in the MID Region. RVSM TF/8 Conclusion 8/3 refers.*

CONCLUSION/DECISION	STATUS	REMARKS
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.*	On-going	

CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 7/17: TRAINING OF ALL PERSONNEL INVOLVED WITH THE IMPLEMENTATION OF RVSM IN THE MID REGION That, 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; Seminars/Workshops be organized in the Region for training of air traffic services personnel in the RVSM field; States be invited to approach training institutions for the development of a training module in the RVSM field representative of the MID Region. States having difficulties in implementing RVSM implementation programme, may either individually or ingroup explore the possibility of seeking outside expertise	On-going	
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.	On-going	Confirmation from States required

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.	On-going	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.	On-going	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.	On-going	States should indicate status of implementation

CONCLUSION/DECISION	STATUS	REMARKS
Status of Conclusions/Decisions emanating from the RVSM TF-5 Meeting (Abu Dhabi, 02 05 June 2002)		
~~**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:~~ ~~Introduction of two separated RNP routes:~~ ~~connecting TURAIF to BANIAS (for eastbound traffic), and~~ ~~connecting CHEKKA to TONTU (for westbound traffic).~~ ~~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.~~ ~~*progress is required by 28 November 2002 in order to implement RVSM in the northern part of the Arabian Peninsula in November 2003.*~~	~~On-going~~ ~~Completed.~~	~~Informal meeting held between the states concerned and awaiting results of consultations with Cyprus for harmonization with the European RVSM interface area.. Being closely monitored.~~ ~~NOTAM issued by Saudi Arabia~~
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.	On-going	Most States have replied that they endorse the Manual. Further review being carried out by Eurocontrol.

CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 5/3: MID RVSM TRAINING GUIDELINES That, the MID Region States take into account the training guidelines as indicated at Appendix 3-C, when developing their training programme for the implementation of RVSM; the CNS/ATM Human Resources Planning and Training Task Force take into account the requirements identified in the training guidelines - aining and simulation center capabilities in the MID Region.	On-going	
CONCLUSION 5/4- REGIONAL RVSM INFORMATION CAMPAIGN That MID region States, notify their aircraft operators that RVSM will be implemented in the MID region on the AIRAC date of 27 November 2003; and request the operators to obtain required regulatory approval to operate in the RVSM airspace.	On-going	

CONCLUSION/DECISION	STATUS	REMARKS
Status of Conclusions/Decisions emanating from the RVSM TF-6 Meeting (Abu Dhabi14 -17 October 2002)		
CONCLUSION 6/1: 2ND TRAFFIC SAMPLE a) States should provide MECMA a complete record of flights above FL255 during the period of **26 December 2002 to 23 January 2003**. The flight data should be in the specified format and forwarded to MECMA on a weekly basis. b) The traffic data for the last week (17 23 January) should reach MECMA by 30 January 2003.	On-going	
CONCLUSION 6/2: NATIONAL SAFETY PLANS That: a) Development of national safety plans is required to assure safe implementation of RVSM; b) the Middle East RVSM Task Force adopt the model national safety plan at **Appendix H** to the report for implementation of RVSM as guideline to States; c) States produce a preliminary version of the State Safety Plan in January 2003 for approval by the CAA or Ministry of Transport, and d) States provides MECMA with an up-to-date version of the State Safety Plan in April 2003, prior to the eighth meeting of the MID RVSM Task Force.	On-going	Safety plan already developed by Yemen

CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 6/3: IMPLEMENTATION OF THE DUAL ROUTES That: a) the precondition for the assessment associated with the safe implementation of RVSM is the establishment of the permanent route structure on a uni-directional basis; b) the implementation be completed by 26 December 2002 and remains in place until the implementation of RVSM	Action taken	Although not in accordance with the MID Plan, alternative arrangements have been made

CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 6/4: ROUTE STRUCTURE-MEDITERRANEAN INTERFACE That: a) ICAO Regional Office will initiate procedures for the amendment of the Plan for the creation of a route from point FANOS to point VESAR (limit Nicosia/Ankara FIR boundary) and the segment of UN318 from point DOREN (limit Nicosia/Ankara FIR boundary) to point BALMA (34 29.9N 035 03.0E-limit Nicosia/Beirut FIR boundary) for the channeling of traffic from Eastern Mediterranean to the MID Region. b) States concerned are urged to consider the proposal for the creation of the direct segment of the routes from Turaif to VESAR and TONTU to DOREN; c) Syria is also invited to consider other options, including the implementation of the direct route segment from points FESAL to NIKAS; and d) States concerned consider the implementation of the segment of P/UP559 within the Amman and Damascus FIRs. **(See Appendix E)**	ongoing	To be discussed within the framework of EMAC meetings
CONCLUSION 6/5: COORDINATION PROBLEMS OVER THE RED SEA AREA That a meeting be organized under the aegis of ICAO with a view to explore ways and means of finding a durable solution to the coordination problems in the Red Sea area.	On-going	Coordinating with IATA for the convening of the meeting

CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 6/6: ENDORSEMENT OF THE DRAFT RVSM MANUAL FOR REGIONAL APPLICATION That: a) States of the MID region review the Draft ATC Manual for RVSM in the MID region, which has been prepared by the RVSM Task Force and send their comments to the ICAO MID Regional Office as soon as possible, preferably prior to 31 January 2003; b) States are invited to endorse the provisions of the Manual for regional application (See Appendix J to the Report).	On-going	To be presented to MIDANPIRG/8 for endorsement *(April2003- tentative date)*
CONCLUSION 6/7: DRAFT OPERATIONS/AIRWORTHINESS APPROVAL MANUAL FOR MID REGION That, the MID Region States and IATA be invited to examine the Draft Operational/Airworthiness Approval Manual for the MID region as indicated report, and to send their comments to the ICAO MID Office, as soon as possible, preferably prior to 31st January 2003.	On-going	

CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 6/8: DEVELOPMENT OF NATIONAL OPERATIONAL AND AIRWORTHINESS APPROVAL DOCUMENTS That, States in the MID Region, while developing their National Operational and Airworthiness Approval documents, are invited to inspire from the Draft Operations/Airworthiness Approval Manual for RVSM in the MID Region.	On-going	Inputs from States awaited
Status of Conclusions/Decisions emanating from the RVSM TF-7 Meeting (Abu Dhabi 23 -26 February 2003)		
CONCLUSION 7/1: FIRS NOT INCLUDED IN THE PLANNING PROCESS That, due to lack of data needed for the readiness assessment and safety assessment, the airspace of Baghdad, Kabul and Tel Aviv FIRs will be not be included in the safety and monitoring programme associated with implementation of RVSM in the MID Region on 27 November 2003.		

CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 7/2: OPERATOR READINESS That: a) the Middle East regional RVSM readiness is being gauged as the ratio of approved flights to the total number of reported flights within the airspace planned for RVSM implementation, where a flight is being defined as a unique flight multiplied by the number of FIRs in which this flight was reported to have operated above FL255 at some portion of its journey. b) the MID readiness was 84.7% as calculated on the traffic samples available by 09 February. c) the required readiness in the Middle East Region is 90%. d) States are urged to complete the traffic sampling and forward the data to MECMA without further delay.	On-going	

CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 7/3: ESTABLISHMENT OF A DIRECT ROUTE BETWEEN POINTS BEIRUT AND DAMASCUS FIRS That: a) the Secretariat initiates procedures for the creation of a direct route (extension of UL620) from BALMA (3428.9N 03503.0E) to intercept UN318 at point RALPO, 13 NM North of ASSEL (3325.2N 03734.0E) via MALOULA (3351.2N 03632.0E; b) awaiting the inclusion of the new route in the MID plan, domestic designator J222 will be assigned to the proposed new route.	Actioned as J222	Need for amendment of the Plan. Some flight level restrictions within Damascus FIR
CONCLUSION 7/4: DUAL ROUTES EASTERN MEDITERRANEAN-MID That action on the implementation of RVSM TF/6 Conclusion 6/4 a), b), and d) concerning the establishment of direct dual routes between the MID Region and the Eastern Mediterranean be discussed within the framework of Europe-Middle East Coordination Bureau on Air Traffic Management (EMAC) meetings.	On-going	
CONCLUSION 7/5: FINALIZATION OF THE ATC MANUAL That, States and other user organizations concerned provide their comments on the draft ATC Manual to the ICAO MID Regional Office as soon as possible, prior to 31 March 2003, with a view to finalize the document for endorsement by MIDANPIRG/8 meeting.	Action completed	

CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 7/6: ELABORATION OF OPERATIONAL LETTERS OF AGREEMENT That: a) States prepare and coordinate with adjacent Centres/FIRs draft letters of agreement for the handling of traffic in RVSM and Non-RVSM environments; b) A copy of the proposed draft be brought to the RVSM TF/8 meeting in May 2003 with a view to share experiences with adjacent Centres/States; c) the Model at **Appendix 3B** be used in the preparation of the LOAs; and d) the procedures should preferably be based on a route-by-route basis and also include flight planning and communications failure procedures.	On-going (refer to appendix 4A of report of TF/8 Meeting	
CONCLUSION 7/7: RVSM IMPLEMENTATION CHANGE-OVER TIME IN THE MID REGION That: a) the most appropriate change-over time for the implementation of RVSM in the MID Region be at 0200UTC on 27 November 2003; b) the proposal be discussed and agreed upon, within the framework of joint coordination meetings with the Asia region.	On-going	

CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 7/8: FINALIZATION OF THE MID RVSM OPS/AIR APPROVAL MANUAL That, MID Region States and concerned airspace users provide their comments on the Draft MID RVSM OPS/AIR Approval Manual to the ICAO MID Regional Office as soon as possible, preferably, prior to 31st March 2003 in order to finalize the document for endorsement by MIDANPIRG /8 meeting.	Action completed	

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MID RVSM TF/8
Report on Agenda Item 2

REPORT ON AGENDA ITEM 2: SAM/WG TERMS OF REFERENCE

2.1 The working group reviewed its terms of reference as set out in **Appendix 2A.**

MECMA Duties and Responsibilities

2.1 The duties and responsibilities of the MECMA were reviewed. The working 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. and responsibilities, including those related to RNP, are as stated in **Appendix 2B.**

Readiness Assessment

2.3 The meeting reviewed a profile of operators and aircraft types operating in the Middle East (MID) Region. The analysis was based on traffic samples received from Bahrain, Egypt, Iran, Jordan, Lebanon, Oman, Saudi Arabia, Syria, UAE and Yemen.

2.3.1 The readiness Assessment was presented under separate cover attached to this report. This assessment was structured with a view to being updateable as additional information concerning operator readiness becomes available.

2.3.2 Traffic data from Kuwait was received during the meeting. It appears that the initial report which was sent earlier never reached MECMA.

2.3.3 In early May 2003, 12 States were asked to provide update approvals registry, or forward no-change statements. By 27 May eight States, Bahrain, Iran, Jordan, Kuwait, Lebanon, Oman, Syria and Yemen, had responded, and Table 2-1 below sets out the registry status as of 27 May 2003:

MID State	Initial Info Received	Update	Acft. on Register	RVSM Approved	%
Bahrain	21 May 03	None	7	3	42.86
Egypt	23 Sep 02	21 Apr 03	87	77	89%
Iran	18 Oct 02	26 May 03	69	27	39%
Iraq	Nil	---			
Jordan	06 Jul 02	25 May 03	19	17	89%
Kuwait	24 Jul 02	27 May 03	25	25	100%
Lebanon	27 Jun 02	25 May 03	12	9	75%
Libya	Nil	---	19	1	5%
Oman	13 Aug 02	26 May 03	38	34	89%

MID State	Initial Info Received	Update	Acft. on Register	RVSM Approved	%
Pakistan	22 Mar 03	None	45	20	44%
Qatar	07 Jul 02	None	28	26	93%
Saudi Arabia	26 Feb 03	None	209	144	69%
Sudan	Nil	---	7	3	43%
Syria	25 Jul 02	25 May 03	24	16	67%
UAE	15 May 02	06 May 03	74	66	89%
Yemen	10 Mar 03	None	9	9	100%

Table 2-1. Summary of approvals.

It should be noted that since received information must go through a cross-referencing process, the three right-hand columns with numbers of airframes and percentages do not necessarily reflect the current situation.

2.3.4 MID States were reminded of the requirement to provide the necessary data for approvals to MECMA on a monthly basis. Contact details are as follows:

MECMA	Telephone:	00971 2 4054 230
P.O. Box 666,	Fax:	00971 2 4054 316
Abu Dhabi,	E-mail:	traffic@mecma.com
United Arab Emirates.	Website:	www.mecma.com

2.3.5 The meeting agreed that if the 90% readiness is not achieved by 27 August 2003, alternative means of achieving an adequate level of readiness might be explored.

National Safety Plans

2.4 MECMA is, *inter alia*, tasked with conducting safety assessments as an aid for the Middle East RVSM Task Force for decision making in preparation for RVSM implementation on 27 November 2003. To this end, it is vital that MECMA has sufficient

the Task Force at its 6th meeting in November 2002, this was to be accomplished by each State providing MECMA with an up-to-date version of the State Safety Plan in April 2003, prior to the 8th
producing national adequate safety plans, MECMA had presented a model National Safety Plan at TF/6, based on the one produced by Eurocontrol. Additionally, MECMA presented the UAE national safety plan at TF/7 in February 2003 and provided hard and soft copies to all States.

2.4.1 The objective of the Safety Plan is to set out those national activities that are required to support safe implementation of RVSM. The plan also addresses safety red for the implementation of RVSM is described in some detail.

- The role of the activity in support of the safe implementation and operation of RVSM.
- The standards to be applied to the conduct of the activity.
- The additional supporting activities that will provide confidence that the identified National activities will lead to the successful implementation of RVSM.

2.4.2 The objective of providing this level of information is to provide early assurance that the State has identified the requirements associated with safe implementation of RVSM; delegated authority and assigned responsibility to the staff members concerned with the programme and allocated the necessary resources. Furthermore, regulatory and safety management issues need to be addressed and documented.

- Aircraft and operators need approvals for RVSM. The regulations, processes and responsibilities need to be identified.
- ATS staff need to be trained in preparation for RVSM operations.
- ATS equipment needs to be upgraded to accommodate RVSM operations. Modifications must be specified and contracts made and managed to ensure integrity in the modification process.
- Changes to ATS procedures must be identified. Some changes will be associated with equipment changes, while others will be designed to cater for equipment characteristics or rooted in airspace changes.
- Airspace design needs to reviewed and changes identified. Such redesign may involve restructuring of the ATS route system, while others may be associated with re-sectorisation.
- Switchover to RVSM must be planned in detail and provisions made for both a safe transition to RVSM as well as reversion to CVSM, if necessary.
- Operational monitoring of RVSM, hereunder approvals and assigned altitude deviations.
- The Eurocontrol countdown plan will be added to the guidance material.

2.4.3 Table 2-2, below, sets out the response received by MECMA as of 27 May 2003 for National Safety Plans.

MID State	**Initial Plan Received**	**Remark**
Bahrain	May 03	
Egypt	Apr 03	
Iran	May 03	Draft
Jordan	May 03	Draft
Kuwait	May 03	
Lebanon	May 03	

MID State	Initial Plan Received	Remark
Oman	May 03	
Saudi Arabia	May 03	Draft
Syria	May 03	
UAE	Feb 03	
Yemen	Jan 03	

Table 2-2. National Safety Plans.

2.4.4 The national safety plan documents that a number of safety issues have been addressed and is essential in satisfying the ICAO safety requirements for implementation of RVSM. Therefore, it is a matter of crucial importance to the MID RVSM programme that States, that have not already done so, provide copies of their national safety plans to the ICAO MID Office and to MECMA no later than 30 June 2003.

2.4.5 MECMA had obtained the assistance of Integra consult, who had been involved in the safety aspects of European RVSM implementation, to assist in further processing of the national safety plans to ensure robustness. This was scheduled as follows:

2.4.6 As progress on development of national safety plans is a matter of prime importance in ensuring adequate levels of safety in conjunction with implementation of RVSM, it was agreed that this requirement will be added to the Evaluation Form Checklist (item 1.4) for accurate monitoring of progress.

a) Based on the Model National Safety Plan and the responses received from States by 26 May 2003, Integra will carry out audits of the specific safety plans and return to MECMA.

b) MECMA will forward the audit reports to States by 20 June 2003 for review of input and queries.

c) States are requested to respond to audit reports by 01 August 2003.

d) At days 1 and 2 of RVSM TF/9 (24-25 August 2003), national safety plans will be discussed with States on an individual basis, following which a consolidated presentation of this aspect of the RVSM safety efforts will be made to the Task Force in support of its Go/No-Go decision.

DRAFT CONCLUSION 8/1 NATIONAL SAFETY PLANS

a) Available national safety plans will be audited and returned to States by 20 June 2003 for review of input and queries.

b) States are requested to respond to audit reports by 01 August 2003.

c) In order to complete the necessary regional planning, States that have not already done so, provide copies of their national safety plans to the ICAO MID Office and to MECMA no later than 30 June 2003.

d) National safety plans will be discussed with States on an individual basis at RVSM TF/9, following which a consolidated presentation of this aspect of the RVSM safety efforts will be made to the Task Force in support of its Go/No-Go decision.

Functional Hazard Assessment

2.5 A Functional Hazard Assessment (FHA) is required in conjunction with the national safety plans. Integra Consult presented the concept of functional hazard assessment and discussed a few selected examples of the European FHA, which had kindly been provided by Eurocontrol.

2.6 A key part of the management of safety is that the safety risks associated with unsuited regulations equipment, procedures or airspace design are identified and, as appropriate, shown to be acceptably low. Middle East States will review the hazards and risks that will have been identified by the European FHA with the objective of identifying those aspects where the local circumstances are different from those assumed within the Eurocontrol FHA. Any additional activities, required as a result of this review, will be listed as actions in future update to the respective national safety plans.

2.6.1 The European FHA consisted of three parts:

Switch-over phase

RVSM transition airspace

Mature RVSM operations

The meeting found that the European FHA in principle was relevant to Middle East airspace and agreed to utilise it as basis for national application.

2.6.2 The European FHA is reproduced as **Appendix 2C** to this report.

DRAFT CONCLUSION 8/2 FUNCTIONAL HAZARD ASSESSMENT

That, the European Functional Hazard Assessment (FHA) should be used by States as part of their safety management in conjunction with RVSM implementation. This FHA should be adapted as required to suit State-specific conditions.

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.

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;

d) 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.

Hazardlog for "Transition" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
1. Scenario 1													
1.1	Non-RVSM aircraft adjusted to CVSM FL too early	Human error	1. Increased ATCO workload. 2. Increasing controlling requirement.	Increased workload	4	Remote	4, as increased ATCO workload but no direct impact on safety. Remote - as it will happen between once per day to once per year!	Proper simulation which results in recommendation of when to perform level change. Local instructions for performing level changes for non-RVSM approved aircraft.	4	Remote	Risk will remain the same, however, the probability will decrease, but stays within the same level band.	ATCO may revise clearance (re-clearence: vertical or horizontal)	
1.2	Non-RVSM aircraft given RVSM separation in transition airspace (application of 2 VSM in same airspace)	1. Pilot pressure - pilots pressured by operators to ask for most optimum FL 2. Human error.	Increased workload	1. Increased workload. 2. Vertical deviation is more than 50% of the vertical separation minimum	3	Extremely Remote	3, as vertical deviation is more than 50% of the vertical separation minimum but ATCO or Flight Crew in control of the situation. Planner and Executive controller always working together.	ATCO will have visual RVSM indication on his/her display/flight progress strip. Local instructions.	3	Extremely Remote	Risk will remain the same.	STCA - Depending on the parameter of the STCA, the STCA should give a warning if non-RVSM aircraft is applied less than 2000ft VSM.	Experience from Shannon indicates that this is unlikely to create a problem. (to be checked by the RVSM Programme group)
1.3	Non-RVSM aircraft crossing a number of FLs.												Hazard not specifically related to RVSM. Normal ATCO task.
1.4	New ATCO with no CVSM experience												Covered by the assumptions. It is assumed that training adequately will cover transition issues.

Hazardlog for "Transition" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
1.5	Inability to provide longitudinal separation for RVSM approved aircraft entering CVSM. (congestion)	1. Improper flow control. 2. Flying from RVSM airspace into non-RVSM airspace.	1. Increased workload (enroute holding/vectoring) 2. Increased co-ordination 3. Forced level changes	1. Increased workload 2. Fuel shortage due to forced level change.	4	Probable	4, due to increased workload.	Flow management will be imposed at Eurocontrol level and locally (if not part of CFMU area).	4	Remote	Probability depends on flow control. Proper flow control does not exist today in these areas and must be developed by RVSM Programme group before implementation of RVSM.	Normal contingency fuel is sufficient to cover the fuel shortage consequence. Airspace modifications and changes to LoAs to apply optimal longitudinal spacing.	RVSM will increase probability of bunching effect.
1.6	Unnecessary change of flight levels.												Not a specific hazard related to RVSM.
1.7	RVSM aircraft degrades to Non-RVSM Status	Equipment failure	1. Increased workload for pilots and ATCO. 2. ATCO must decide if aircraft may continue within RVSM, with 2000 ft VSM. ATCO must co-ordinate with adjacent sector/centre. 3. Aircraft may be decended into non-RVSM airspace and co-ordination with lower sector/centre.	Increased workload	4	Extremely Remote	RVSM awareness programme to pilots and ATCOs. 4, due to increased ATCO workload, as the aircraft shall not be applied with 2000 ft VSM.	No mitigation exists.	4	Extremely Remote			Inflight contingency. Covered in the switchover FHA (Hazard no 2.3).

Hazardlog for "Transition" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
1.8	Two aircraft on same level - opposite direction.	1. COM failure and pilots fails to follow FPL 2. The pilot fails to execute clearance 3. ATCO fails to clear aircraft to correct CVSM level.	1. Increased workload. 2. Increased co-ordination.	1. Potential loss of separation (100% loss of vertical separation) 2. Travelling opposite direction - less than 10 min apart.	3	Extremely Remote	3, as ATCO or pilot is able to control and recover from the situation.	Tactical solutions if volume of traffic permits (Offset procedures). Freezing FL310, FL350 and FL390 for a specific distance within the transition areas. Unidirectional routes (Standard Routing Scheme).	4	Extremely Remote	Probability will be reduced - but not sufficiently to reduce to "Extremely improbable". Severity reduced to 4, as mitigation means preventing the aircraft getting closer than 10 min. - same level and opposite direction - to each other.	The STCA should give the ATCO an indication, if the two aircraft get too close to each other. Usage of Avoiding action.	
1.9	Aircraft exiting at a non-existing CVSM level	1. COM failure and pilots fails to follow FPL 2. The pilot fails to execute clearance 3. ATCO fails to clear aircraft to correct CVSM level.	1. Increased workload. 2. Increased co-ordination	1. Vertical deviation is more than 50% of the vertical separation minimum. 2. Increased workload.	3	Extremely Remote	3, as ATCO or pilot is able to control and recover from the situation.	RVSM awareness training courses. System (flight progress strip or OLDI) should reflect RFL. Pilot training should focus on RVSM/non-RVSM airspace. Improved co-ordination between states.	3	Extremely Remote	The probability has not changed significantly	Use of STCA.	Hazard illustrated in scenario 1C.
1.10	Length of buffer area is too short (FL310, FL350 and FL390 frozen)		Increased workload	Possibility of head on - potential loss of vertical separation (greater than 50%)	3	Probable	3, as ATCO or pilot is able to control and recover from the situation.	Increased buffer areas based on simulation or calculation. Common recommendation to the states. Unidirectional routes (Standard Routing Scheme).	5		If the mitigation is followed, the hazard will no longer be significant. - The hazard will no longer exist.		Hazard should not exist one year after introduction of RVSM
1.11	Length of buffer area is too long (FL310, FL350 and FL390 frozen)												For information only - not considered to be a hazard.
1.12	Blockage of R/T.												Hazard not specifically related to RVSM.

Hazardlog for "Transition" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
1.13	Aircraft unable to reach requested FL due to performance limitations.	performance limitations	Increased workload	Increased workload	5	Probable	Not a safety issue	Aircraft operator/pilot should make sure the accuracy of the flight plan - to match the actual performance of the flight.	5	Extremely Improbable	If the FPL will be correct, this hazard will no longer exist. (mitigation will remove the hazard)!		Hazard not specific related to RVSM airspace. Hazard is however related to RVSM in that matter that the aircraft must be able to reach its RFL as filed in FPL, in case of communication failure.
2. Scenario 2													
2.1	Pilot makes conversion error	Human error	1. Increased workload 2. Increased communication	Loss of separation - potential head on.	0				0				This hazard is not specific to RVSM. Nothing will change with the introduction of RVSM.
2.2	ATCO fails to perform conversion to metric CIS system.	Human error	Does not perform level change into CIS metric system.	Loss of separation - potential head on.	3	Probable	3, as vertical deviation is more than 50% of the vertical separation minimum but the ATCO is able to control the situation.	Flight Level Allocation Schemes (FLAS). Frozen RVSM levels FL310, FL350 and FL390). Dual uni-directional routes. System functionality.	0		Introduction of unidirectional route will remove the hazard.		
2.3	Application of RVSM flight levels and CIS metric levels in same airspace		Increased workload	Increased workload	5	Probable	The increased workload will have no impact on safety.	If required FL310, 350, 390 may be frozen in the transition airspace. The problems will then be the same as today.	5	Probable			Human error by ATCO covered elsewhere.
3. Scenario 3													
3.1	Non-RVSM aircraft cleared above RVSM airspace and must descend												Hazard not specifically related to RVSM.
3.2	Pilot not executing proper clearance.	1. ATCO not giving proper clearance 2. Pilot not executing clearance		1. Potential loss of separation (100% loss of vertical separation) 2. Travelling opposite direction - less than 10 min apart									Cause of hazard 1.8.

Hazardlog for "Transition" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
3.3	Status of aircraft												Covered by hazard 1.7
3.4	Early release of aircraft and the application of RVSM levels.		No operational consequences.	No safety consequences.			No safety cons.						Legal implications of applying RVSM in non-RVSM airspace. Must be detailed in LoAs.
3.5	Late handover of aircraft from non-RVSM airspace.	1. ATCO error 2. Pilot error	1. Increased workload. 2. Increased co-ordination.	Increased workload	4	Remote	Letter of Agreement should ensure proper handover procedures.	Pilots awareness programme on RVSM. Obligation of pilots to report at compulsary (RVSM entry) reporting points. Controllers should prompt pilots to report at compulsary reporting points.	4	Remote	Not sufficient change in probability to change to "Extremely remote".	Tactical re-adjustment	
3.6	Congestion at FL280 and below		Increased workload	Increased workload	4	Remote	Class 4 due to increased workload. This hazard depends on the operators, if they upgrade their aircraft to become RVSM approved aircraft. A prerequisite of the go decision will be a sufficient number of RVSM approved aircraft. Through simulations it will be identified whether the sectorisation must be changed.	Flow control used to prevent congestion.	4	Remote		Tactical replanning.	
4. Scenario 4													
4.1	Pilot makes conversion error												This hazard is not specific to RVSM. Nothing will change with the introduction of RVSM.

Hazardlog for "Transition" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
4.2	New RVSM levels not in pilot's conversion tables.												Not a hazard as it is against the assumptions. However, the operators must deal with this issue before switchover. This only applies to those aircraft not having a feet altimeter.
5. Misc.													
M.1	Inability to receive FPL information	1 System failure. 2. Operator fails to send to the correct addresses.	1. Increased workload for FDPS operators. 2. Increased workload for ATCOs.	Increased ATCO workload (co-ordination, R/T etc.)									States outside the IFPZ have been asked to conduct an assessment to investigate the impact of missing FPLs. The introduction of RVSM will have no impact on the current problem.
M.2	Inaccuracy of FPL received by automated FDPS.												Not a hazard as the automated FDPS should reject any FPLs not compliant with the requirements.
M.3	Changing the routine of the checking process due to inaccuracy of FPL ("W" on flight plans, Exit/Entry level, Exit/Entry points)		Increased workload										Hazard not specifically related to RVSM. The checking routine should be in place, according to the assumptions (1 year after RVSM implementation)
M.4	Reduced separation due to unclear holding procedures.												This hazard were raised in FHA - switchover. It was then decided that this hazard should be covered by FHA transition. The holding procedures should be clearly described in the local instructions if applicable.

Hazardlog for "Mature Airspace" FHA-log

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
1. AIR Related Hazards													
1.1	Aircraft with MTOW < 15.000kg or <30 pax might not be carrying TCAS 7.00	The carriage of TCAS 7.00 is not a mandatory requirement	Increased number of TA and RA to be expected.	1. Increased ATCO workload when aircraft are following RA. 2. Increased workload on aircrew.	4	Probable	4, as the hazards will increase the ATCO workload.	RVSM Programme is monitoring the number of aircraft within this category. If more than 10% (ref. ACAS study) of the aircraft population is falling into this category, the RVSM programme will then consider the operational acceptability of the problem. Furthermore the RVSM Programme is conducting its own analysis into the number of aircraft fitted with ver. 6.04 operating in RVSM airspace. (Estimates 5-6 %).	4	Remote	The mitigation has reduced the probability.		The AO should seriously consider the operarional implications of operating aircraft fitted with ver. 6.04A inside RVSM airspace.
1.2	Nuisance TAs and RAs.	Too high climb/descend rate	TA and RA will be issued.	1. Increased ATCO workload when aircraft are following RA. 2. Increased workload on aircrew.	4	Probable	4, as both ATCOs and aircrew will have increased workload	ACAS awareness programme and ICAO initiative adressing the problem of high climb/descend rates.	4	Probable	The RVSM programme recognises the problem and an awareness programme is on the way to reduce the risk. (Training of ATCO and Pilot). However, the mitigation will not change the probability.	Not to exceed maximum climb/descend rates could be introduced a certain number of feet's before level off altitude.	
1.3	System error - altitude deviation	Malfunction of the height keeping system	1. Pilots observe and report height keeping errors. 2. ATCOs observe and report altitude deviation. 3. Aircraft RVSM approval status is downgraded.	Potential loss of separation.	3	Extremely Remote	3, as vertical deviation is less than 50% of the vertical separation minimum and without pilots or ATCOs being fully able to control the situation.	RVSM certifcation procedures in place. (certification of RVSM aircraft).	3	Extremely Remote	The mitigation will reduce the probability, but will remain within the band - Extremely Remote.	Continuing height monitoring programme, even after implementation of RVSM.	
1.4	ATCO and pilots will not use correct phraseology especially in connection with negative RVSM.	Due to its repetitiveness	Vital information may not be made known to all relevant concerned with the flight.	Potential loss of prescribed separation. This only becomes a hazard if the ATCO reduce the required VSM.	0		Hazard does not exist today and it is then not possible to assign a risk before RVSM mitigation.	Strips, screen and R/T indicate the status of the negative RVSM status of an aircraft.	5	Probable	5, as no direct safety consequences. However, if the ATCO applies a wrong VSM, this is covered in hazard 2.5.	None	This hazard does only apply to State aircraft in the core area. However it might relate to an aircraft with degraded RVSM status.
1.5	The pilots will miss the visual perspective of other traffic from the flight deck.	Lack of outside references	None	None	5	Probable	5, as no safety consequences is related to the hazard.		5	Probable	There are no identified means of mitigating this risk in RVSM.		

Hazardlog for "Mature Airspace" FHA-log

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
1.6	The pilot will miss the visual perspective of other traffic from the flight deck and will deviate from cleared level/track.	Lack of outside references	Aircraft will leave its cleared level/route.	1. Increased ATCO workload. 2. Increased aircrew workload 3. Possible loss of prescribed separation	3	Extremely Remote	3, as vertical deviation is less than 50% of the vertical separation minimum but ATCO is not able to control the situation.	None	3	Extremely Remote	There are no identified means of mitigating this risk in RVSM.		
1.7	Aircraft operators expect pilots to cruise at optimum FL (economic FL)	Pressure on pilots from AO	Increase of R/T	No safety consequences	5	Probable	No safety consequences.	None	5	Probable	There are no identified means of mitigating this risk in RVSM.	None	
1.8	Pilot is deviating from clearance.	1 Human Error 2 Misreading of clearance 3. Incorrect level input to FMS 4. Callsign confusion	Deviation from assigned level (Level bust).	1. Increased ATCO workload (increased R/T and co-ordination). 2. Possible loss of prescribed separation.	3	Remote	The crosscheck between pilots has failed. The ATCO will react once the level bust has occured. The ATCO will monitor the climb/descend rate of the aircraft. It is probable that a level bust can happen between once a day and once per year. The worst case consideration is that another aircraft is in the vicinity.	None	3	Remote	There are no identified means of mitigating this risk in RVSM.	May have to use avoiding action and emergency separation. STCA safety net to ATCO TCAS safety net to aircrew.	The described scenario is comparable with today's situation below FL290. In addition it can be assumed that there are more level changes below FL290 and therefore today's situation below FL290 can give more rise to this specific hazard.
1.9	Aircraft unexpectedly encounters turbulence that affects RVSM operations	1. CB activity 2. Clear Air Turbulence 3. Mountain waves	1. Aircrew may have difficulty by keeping assigned level. 2. Aircrew may request level changes and re-routing. 3. RVSM operations might have to be suspended. 4. Possible sector overload.	1. Increased ATCO workload. 2. Increased aircrew workload. 3. Potential loss of separation.	3	Extremely Remote	Vertical deviation is more than 50% of the vertical separation minimum but pilots are able to recover from the situation.	It might be required to temporary suspend a level band within the RVSM area or the whole RVSM airspace. ATFM must regulate future traffic. The ACC might have to perform a Re-sectorisation and increase sector manning. Issue SIGMET.	3	Extremely Remote	Procedures in place today to regulate the traffic will also be applicable in RVSM. Proposed DOC 7030 is dealing with this issue.	Keep traffic below or above area in question.	

Hazardlog for "Mature Airspace" FHA-log

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
1.10	Pre-planned suspension of RVSM due to turbulence	Turbulence	1. Lack of RVSM levels. 2. Possible sector overload. 3. Aircrew may have difficulty by keeping assigned level. 4. Aircrew may request level changes and/or rerouting.	1. Increased controller workload. 2. Increased workload in the cockpit.	0		Hazard does not exist today and it is then not possible to assign a risk before RVSM mitigation.	ATFM must regulate traffic. The ACC might have to perform a Re-sectorisation and increase sector manning. AO flight plan outside area.	5	Extremely Remote	Procedures in place today to regulate the traffic will also be applicable in RVSM. Proposed DOC 7030 is dealing with this issue. 5, as no direct safety	Keep traffic below or above in area in question.	Areas outside the suspended area faces increased workload, as they have to perform transition tasks.
1.11	Sudden deviation from cleared FL and/or route.	Vorticies from preceding aircraft 1000 ft above	1. Aircraft deviate unintentionally from cleared level/route. 2. More severe for small aircraft behind heavier traffic. 3. When flying in trail, usually there will be a VSM of 2000 ft.	1. Increase of workload for the flight crew. 2. Potential loss of separation.	4	Remote	4, as vertical deviation is less than 50% of the vertical separation minimum but pilot is able to fully recover from the situation.	RVSM Programme has undertaken an independent wake vortex study, which concludes that RVSM is not exptected to increase the probability of a hazardous encounter with wake vortex, but pilots and air traffic should be informed that nuisance encounters would increase.	4	Remote	There are no identified means of mitigating this risk in RVSM.	None	Possibility to increase longitudinal separation if two aircraft are trailing.
1.12	Aircraft may operate closer to flight envelope limitations.	The most economic FL is closer to the operating ceiling of the aircraft.	1. Aircraft reactions are slower. 2. In case of steep turns the aircraft might loose alititude.	Potential loss of separation.	4	Extremely Remote	4, as vertical deviation is less than 50% of the vertical separation minimum with the aircrew able to control and recover from the situation.	None	4	Extremely Remote	There are no identified means of mitigating this risk in RVSM.	None	
1.13	Aircrew has to downgrade to Non-RVSM approved status.	1. Equipment failure 2. Weather	1. The aircraft should leave the RVSM airspace. 2. A 2000 ft VSM is required between other aircraft while inside the RVSM airspace.	1. Increased workload in cockpit. 2. Increased ATCO workload.	4	Extremely Remote	4, due to increased workload.	Establish RVSM separation and take aircraft below RVSM airspace when appropriate.	4	Extremely Remote	The mitigation does not reduce risk. Despite the aircraft might be able to hold altitude within +/- 300 ft, mitigation measures has to be taken.	None	
1.14	Change of approval status of aircraft during flight - downgraded. Pilot will not be able to control level.	Equipment failure.	1. The aircraft should leave the RVSM airspace. 2. Possible deviation from CFL before failure discovered (reaction time).	1. Increased workload in cockpit. 2. Increased ATCO workload. 3. Potential loss of separation.	2	Extremely Improbable	2, as vertical deviation is more than 50% of the vertical separation minimum and the aircrew is not able to control the situation.	None	2	Extremely Improbable	There are no identified means of mitigating this risk in RVSM.	Clear the airspace around the aircraft in question. Supply the pilot with relevant traffic infomation.	

Hazardlog for "Mature Airspace" FHA-log

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
1.15	Air RX/TX underserviceable.	Aircraft RX/TX unserviceable	1. Ground/air is unable to exchange information/clearances. 2. Aircraft will try to establish contact with other ATC units; if no contact the aircraft will squark 7600. 3. Aircraft will follow lost communication procedures	1. Increased ATCO workload. 2. Increased pilot workload 3. Potential loss of separation.	3	Remote	3, as vertical deviation is less than 50% of the vertical separation minimum but with the crew being able to control the situation.	Follow lost communication procedures. ATC shall apply CVSM separation towards aircraft experiencing com-failure.	4	Remote	The severity has been reduced as the separation standard will be increased.	None	
1.16	Non-RVSM approved aircraft flying above FL410 and performs emergency descent. (Ground-contingency)				2	Extremely Remote			2	Extremely Remote			Inflight contingency - Hazard not specifically related to RVSM.
2. Ground Related Hazards													
2.1	Co-ordinated acceptance of aircraft with degraded RVSM status within RVSM airspace.	1. Denial could result in a diversion or emergency 2. Denial could create more work.	ATCO will have to apply two (2) Vertical Separation Minima standards.	Slight increase in ATCO workload.	4	Extremely Remote	4, due to increase of workload.	Specific co-ordination procedures to be established.	4	Extremely Remote	The mitigation means will not be able to reduce the risk.	None	
2.2	"W" is indicated in the flight plan or the pilot claims a/c for RVSM approved despite this is not the case.	1. Late change of aircraft/crew on a particular route 2. Pilot not aware of rules/approval status of aircraft 3. AO not aware of rules/typing error.	1. ATCO/pilot will act according to the information they have received/know of. 2. Potentially the aircraft might deviate from assigned level and may/may not activate TA or RA on other aircraft.	1. Possible loss of separation. 2. Technically this is not a loss of separation, as the ATCO has applied correct separation standards, according to the information available. 3. Slight increase of ATCO workload.	0		Hazard does not exist today and it is then not possible to assign a risk before RVSM mitigation.	RVSM awareness programme (Information packages) to Aircraft operators and pilots. In case of RVS approval status of aircraft, a change message must be submitted.	4	Remote	4, due to the slight increase of ATCO workload.		When the situation is being discovered, follow up investigations should be made. If deemed appropriate sanctions should be applied.
2.3	Flight departing from airports within IFPZ with a RFL within RVSM airspace, but is missing RVSM approval status on FPL	1. IFPS fails to reject FPL 2. AO not aware of rules/typing error	ATCO shall assign cruising level below RVSM airspace.	Slight increase in ATCO workload.	0		Hazard does not exist today and it is then not possible to assign a risk before RVSM mitigation.	IFPS shall reject FPL with no W but RFL within RVSM airspace.	4	Extremely Remote	4, as increase of workload for ATCO.	None	

Hazardlog for "Mature Airspace" FHA-log

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
2.4	Flight plan totally missing	1. Original OAT flight that wants to continue GAT 2. Originally flight planned via another ACC 3. Change of flight rules from VFR to IFR 4. FPL distribution error	ATCO has to obtain necessary flight data, including information about RVSM approval status and assure that the ATC system is being updated as prescribed.	Increase ATCO workload.	4	Remote	4, due to increase in workload.	Though FPL is missing estmiates/ACT will still be exchanged.	4	Remote	The mitigation will not reduce the risk.	None	
2.5	Potential loss of separation due to wrong application of separation standard for OAT and GAT.	RVSM exemption rules for STATE aircraft	ATCO has to apply different separation standards within the same airspace.	1. Increased ATCO workload. 2. Potential loss of separation.	4	Probable	4, as vertical deviation is less than 50% of the vertical separation minimum and the pilot is in full control of the situation.	Radar display requirements to clearly indicate RVSM status. (FPL item 18 information) Strip content requirement to clearly indicate RVSM status. Special R/T procedures. Special co-ordination procedures.	4	Remote	The mitigation will reduce the probability of the hazard to occur.	Deny Non-RVSM approved aircraft to RVSM airspace.	
2.6	STCA functionality not able to discriminate between RVSM approved aircraft and non-RVSM approved aircraft.	System functionality not adapted to RVSM.	In case of loss of prescribed separation a very late STCA alert will be generated.	1. Reduction in overall safety. 2. Potential loss of separation.	4	Probable	4, as vertical deviation is less than 50% of the vertical separation minimum and ATCO in control of the situation.	STCA systems adopted to RVSM.	4	Extremely Remote	The mitigation will reduce the probability of the hazard to occur.	None	It was assumed that the STCA parameter has been set to 1000 ft.
2.7	RVSM status of aircraft operating immediately above and below RVSM airspace not known to ATCO.	1. DFL between sectors/ACCs chosen to be FL295 or FL420 2. Display defiencies. Which again could be based on lack of adequeate system functionality	Increased co-ordination burden if the ATCO knows the system deficiencies.	1. Possible Increase of controller workload. 2. Possible loss of prescribed separation standards.	4	Probable	4, as vertical deviation is less than 50% of the vertical separation minimum and ATCOs are able to control and recover from the situation.	ATC systems adapted to display Non-RVSM approved aircraft a defined number of levels below RVSM airspace.	4	Extremely Remote	This mitigation will only have the effect if RVSM sectors encompass FL290. If sectors are split at FL295 specific co-ordination procedures will have to be developed.	None	DFL should not be possible at FL295.
2.8	Missing IFPS checks of FPLs coming from states inside RVSM.	1. Manual acceptance of wrong FPL 2. IFPS is not performing the required checks of FPL	1. Wrong FPLs not rejected. 2. ACC not provided with correct FPL 3. Extra co-ordination burden when estimates/ACTs are exchanged.	Increased ATCO workload.	4	Probable	4, due to increase workload.	IFPS systems adapted to RVSM	4	Extremely Remote	Mitigation will reduce the probability of the hazard.	None	

Hazardlog for "Mature Airspace" FHA-log

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
2.9	The need for manual insertion of changes or missing RVSM approval status	1. Lack of FPL information 2. Aircraft downgrading/upgrading RVSM approval status	The ATCO has to inform the system of changed/missing information if system support is to be available.	Increased ATCO workload.	0		Hazard does not exist today and it is then not possible to assign a risk before RVSM mitigation.	The design, philosophy and access to the input functionality will be an important factor. ATC will allow for manual update of RVSM status information.	4	Remote	4, due to the increased workload.	None	
2.10	ATC systems are not able to exchange OLDI messages containing data about RVSM approval status	Lack of required system adaptation.	Need for manual exchange of information between ACCs.	Increased ATCO workload.	4	Probable	4, due to the increased workload.	ATC systems adapted to include RVSM approved status.	4	Remote	The mitigation reduces the probability of the hazard to occur.	None	
2.11	ATC systems are not able to exchange data about RVSM approval status.	Lack of required system adaptation.	Need for manual exchange of information between sectors.	Increased ATCO workload.	4	Probable	4, due to the increased workload.	ATC systems adapted to include RVSM approved status.	4	Remote	The mitigation reduces the probability of the hazard to occur.	None	
2.12	Different co-ordination requerements with different MIL agencies within the ACC.												Hazard not specifically related to RVSM.
2.13	RVSM status has to be transmitted manually to succeeding units, if information is missing in flight plan.	1. It is not possible to update systems 2. AO is not adhering to prescribed procedures	Transmit RVSM status of aircraft to succeeding unit. (co-ordination)	1. Increased ATCO workload. 2. Vital information may not be made known to all relevant concerning with the flight.	0		Hazard does not exist today and it is then not possible to assign a risk before RVSM mitigation.	IFPS should check and reject any FPLs with a RFL within RVSM airpsace, but no RVSM approval status.	4	Remote	4, due to the increased workload.	None	
2.14	ATCOs and pilots will not use correct phraseology in connection with negative RVSM approval status												Hazard has been covered by hazard 1.4.
2.15	Increased number of crossing levels.	During climb out/descent will have to cross more FLs.	1. The number of aircraft that has to be taken into consideration for separation might increase. 2. De-confliction during climb our/descent might be accomplished faster.	1. Possible increase in controller workload. 2. (Possible decrease in controller workload)??	5	Probable	No safety consequences.	None	5	Probable	There are no identified means of mitigating this risk in RVSM.	None	Can be an advantage. With more flight levels available, it is possible to use vertical separation as tactical solutions.

Hazardlog for "Mature Airspace" FHA-log

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
2.16	Controller applies a wrong separation standard												Hazard has been covered by hazard 2.5.
2.17	ATCO issued incorrect clearance.	1. ATCO not aware of status of airspace. 2. ATCO not aware of separation rules for RVSM airspace 3. ATCO not aware of RVSM status of involved aircraft 4. Human error	An incorrect clearance is issued to a pilot.	1. Increased ATCO workload. 2. Potential loss of separation.	4	Probable	4, as vertical deviation is less than 50% of the vertical separation minimum and ATCOs able to recover from situation.	Training of ATCOs Marking of Non-RVSM approved aircraft on radar and strips. Specific phraseology. Specific co-ordination procedures for non-RVSM approved aircraft.	4	Remote		Avioding actions Use STCA/MTCD as safety net.	
2.18	Operational error from ATCO. (Callsign confusion)												This is a cause to hazard covered by 1.8.
2.19	Pre-planned suspension of RVSM due to turbulence												Hazard has been covered by hazard 1.10.
2.20	Aircraft unexpectedly encounters turbulence that affects RVSM operations.												Hazard has been covered by hazard 1.9.
2.21	Definition of vertical dimensions of TRAs may differ from State to State												
2.22	Contingency situation - single aircraft non RVSM compliant will not trigger STCA												Hazard has been covered by hazard 2.6.
2.23	STCA not reacting correctly when RVSM is temporary suspended and increased VSM is introduced.												This is not a hazard in itself. Operational contingency.
2.24	Aircraft degrades its RVSM status.												Hazard has been covered by hazard 1.13.

Hazardlog for "Mature Airspace" FHA-log

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
2.25	Ground TX/RX unserviceable.												Hazard is not specifically related to RVSM.
2.26	Non-RVSM approved aircraft flying above FL410 and performs emergency descent (air contingency).												Hazard has been covered by hazard 1.16.
2.27	Computer failures.	Technical failure	ATC will have to work on back-up systems. The operational consequences in relation to RVSM will highly depend on the functionality available.	1. Increased ATCO workload. 2. Potential loss of separation.	2	Remote	2, as vertical deviation is more than 50% of the vertical separation minimum and the ATCO not able to control the situation.	Back-up computers of ATC systems adapted to RVSM operations. AFTM measures.	5	Remote	The RVSM Programme measures has reduced the severity.		.

Hazardlog from "Switchover" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
1. Scenario 1													
1.1	Aircraft fuel shortage due to ATC enforced level change at switchover	Aircraft having to change altitude unexpectantly (pilot/operator unaware of implementation of RVSM)	Aircraft diversion. ATCO has to change tactical plans	1. Diversion and possible fuel starvation to aircraft. 2. ATCO has to change tactical plans	3	Remote	From ATCO perspective class 4, due to increased workload. From pilot's perspective class 4, due to contingency measures available.	Flight plan checks. An AIC will be circulated re flight plan issues regarding level changes at switchover. Any flight plan not informing RVSM status will be rejected by IFPS. Operator, ATCO and Pilot awareness programme	3	Extremely Remote	Probability reduced due to awareness and training.	No contingency required, normal ATC and airline operation sufficient	
1.2	Incorrect and unsafe commands issued by ATCO due to the inability of ATCO to adjust to RVSM procedures	1. Lack of effective training 2. Lack of experience 3. Regression to CVSM procedures	Inability of ATCO to adjust to RVSM procedures	Incorrect and unsafe commands issued by ATCO (worst case assumed to result in aircraft using FL in wrong direction)	2	Remote	Vertical deviation is more than 50% of the vertical separation minimum, without ATCO being able to control or recover from the situation. Avoiding action may be needed	Training as part of the National Safety Plan. Simulations are being conducted. Before switchover, the ATCO shall obtain the individual RVSM status of the aircraft under his/her control.	2	Extremely Improbable	Probability reduced due to awareness and training.	It will be necessary to use safety nets of TCAS on the airside and STCA on the ground side, together with avoidance actions.	
1.3	Incorrect and unsafe commands issued by ATCO due to high ATCO workload due to simultaneous implementation of new ATC procedures/new ATS systems	Simultaneous implementaton of new ATC procedures and new ATS	High ATCO/aircrew workload	Incorrect and unsafe commands issued by ATCO (worst case assumed to result in aircraft using FL in wrong direction)	2	Extremely Improbable	Vertical deviation is more than 50% of the vertical separation minimum, without ATCO being able to control or recover from the situation. Avoiding action may be needed	Part of the plan is that route structure/sectorisation will be frozen by October 2001. New ATS systems should be in place by 24 Jan. 2002, however, if this is not possible, an acceptable contingency plan must be in place. CFMU will have a capacity policy in place.	2	Extremely Improbable		RVSM programme group shall monitor the process of implementation of new ATS system	A number of States will be affacted by implementing bew ATS systems, including new ATC procedures.
1.4	Incorrect and unsafe commands issued by ATCO due to misuse of flight level allocation scheme	Lack of effective training	Inability of ATCO to adjust to RVSM procedures	Incorrect and unsafe commands issued by ATCO (worst case assumed to result in aircraft using FL in wrong direction)	2	Remote	Vertical deviation is more than 50% of the vertical separation minimum, without ATCO being able to control or recover from the situation. Avoiding action may be needed	Training as part of the National Safety Plan. Simulations are being conducted. Handover process between two centres	3	Extremely Remote	Vertical deviation is more than 50% of the vertical separation minimum. Severity reduced as independent centre will be able to verify. ATCO able to control the situation	It will be necessary to use safety nets of TCAS on the airside and STCA on the ground side, together with avoidance actions.	

Hazardlog from "Switchover" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
1.5	Incorrect and unsafe command issued by ATCO due to impossibility to revert back to CVSM	1. Total system failure 2. OLDI fails	1. Increase capacity reduction. 2. Work manually - perform manual co-ordination. 3. Saturation of R/T.	Must revert to contingency procedures	4	Extremely Remote	Class 4 - increased workload of ATCO/air crew. The probability takes into account that the system has been formally accepted.	Contingency plans are in place. The ATS-Systems are formally accepted. RVSM is suggesting additional manning (software and hardware engineers) to be in duty at time of switchover.	4	Extremely Remote	Mitigation will not affect the severity classification.		
1.6	Incorrect and unsafe commands issued by ATCO due to sector manning (insuffcient manning level)	Rostering			0				0				It was decided not to classify this hazard as it was considered to be incredible that any ATC centre will have insufficient staff on duty on day of switchover.
1.7	Potential loss of separation due to ATC inadvertently clearing an aircraft to overfly RVSM airspace and subsequently having to descend the aircraft through RVSM airspace.		The ATCO must apply 2000 ft. VSM when the aircraft is descending through RVSM airspace.	No safety consequences									The hazard considers an aircraft which is cleared above RVSM airspace, but is to land within RVSM airspace. The aircraft shall then be descended through the RVSM airspace. As there are no safety consequences the hazard has not been classified.
1.8	Potential loss of separation due to communication failure	No credible cause due to implementation of RVSM.	Increased workload to ATCO.		0				0				Hazard is not specifically related to RVSM.
1.9	Increased workload due to congestion below FL290	Implementation of RVSM and quantity on NON-RVSM aircraft.	1. Increased workload for the ATCO. 2. Increasing transition period.	Increased ATCO workload	4	Extremely Remote	Class 4 due to increased workload	RVSM will be implemented at low peak hour. (Traffic flow analysis being carried out by RVSM programme Group)	4	Extremely Remote			
1.10	Potential loss of separation due to crossing various flight levels	Division Flight Level boundary	The ATCO must apply 2000 ft. VSM between any other aircraft within the RVSM airspace.	No safety consequences.	0				0				As there are no safety consequences the hazard has not been classified.
1.11	Potential loss of separation due to failure of co-ordination with lower level	Physical communication failure	1. Aircraft remains in RVSM airspace. 2. ATCO must follow the procedure/LoAs establihshed with lower sector.	1. Increased ATCO workload 2. Increased co-ordination with adjacent sector/centre	4	Extremely Improbable	Increased ATCO workload.	None required	4	Extremely Improbable		Setting of DFL	This hazard is related to sectors where the DFL (Division Flight Level) is above FL280.

Hazardlog from "Switchover" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
1.12	Potential loss of separation due to reduced possibility to get aircraft to climb/descend due to traffic density	Weather conditions	1. Aircraft remains in RVSM airspace. 2. ATCO must follow the procedure/LoAs establihshed with lower sector.	1. Increased ATCO workload 2. Increased co-ordination with adjacent sector/centre	4	Extremely Improbable	Extremely improbable due to time of day RVSM will be implemented.	There are no identified means of mitigating this risk in RVSM.	4	Extremely Improbable		ATFM regulations	
1.13	Potential loss of separation due to rerouting/diverting	1. Inflight contingency 2. Weather	1. Increased workload for both the ATCO/aircrew. 2. ATCO must apply 2000 ft. VSM between any other aircraft within the RVSM airspace.	Increased ATCO workload	4	Extremely Remote	Increased ATCO workload.	RVSM Awareness Programme for Operators/Pilots/ATCOs.	4	Extremely Remote			
1.14	Potential loss of separation due to unclear holding procedures												Hazard not specifically related to RVSM.
1.15	Potential loss of separation due to unclear level change												Hazard not considered to be credible.
1.16	Potential loss of separation due to aircraft remaining at level (refuses to change level).	1. Pilot unprepared - Lack of awareness 2. Weather conditions.	1. Increased workload - applying 2000 ft separation. 2. Increased co-ordination.	Increased ATCO workload	4	Extremely Remote	Increased ATCO workload.	RVSM Awareness Programme for Operators/Pilots/ATCOs.	4	Extremely Remote			
1.17	Loss of separation due to ATC system not detecting RVSM status	ATS not detecting RVSM status.	ATCO applying 1000 ft. VSM where the correct VSM is 2000 ft.	Vertical deviation is more than 50% of the vertical separation minimum.	2	Extremely Remote	2, as the loss of separation will be greater than 50% and the ATCO will not be able to control the situation.		2	Extremely Improbable	The probability will reduce by ATCO verbally checking the RVSM status of aircraft.		Hazard is not specifically related to RVSM switchover and has been covered in the mature RVSM operation FHA.
1.18	Potential loss of separation due to wrong RVSM status indication on flight plan	Human error on filing flight plan.	The controller is applying 1000 ft. VSM where the correct VSM is 2000 ft.	Vertical deviation is more than 50% of the vertical separation minimum	2	Probable	ATCO cannot control the situation.	Verbal confirmation of RVSM status before time of switchover. Normal R/T procedures, which will confirm NON-RVSM approved status.	2	Extremely Improbable	The probability will reduce by the ATCO verbally checking the RVSM status of aircraft.		

2. Scenario 2

Hazardlog from "Switchover" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
2.1	Potential loss of separation due to incorrect use of flight level allocation scheme	Lack of awareness/wrong application of procedures.	Increased workload.	Potential loss of horizontal separation	2	Extremely Improbable	ATCOs are properly trained. This could only happen at boundaries (inter-sector). Vertical deviation is more than 50% of the vertical separation minimum and ATCO is not being able to control the situation.	LoAs shall address issue related to FL310, FL350 and FL390 (address additional controls and/or use of those flight levels). RVSM Programme group provides guidance on LoAs.	3	Extremely Improbable	Mitigation will reduce severity as ATCO is now in control of the situation.		Having two aircraft at two different sectors (different R/T frequency) - both being cleared to same FL (opposite direction).
2.2	Incorrect RVSM status indicated on FPL	Human error	Increased workload to ATCO in co-ordination (manual co-ordination, e.g. manual handover)	Increased ATCO workload	4	Remote	IFPS will check flight plans and reject if incorrect. RVSM Awareness Programme to operators and pilots.	There are no identified means of mitigating this risk in RVSM.	4	Remote			
2.3	RVSM aircraft degrades RVSM status	Aircraft equipment failure	1. Increased workload for pilots and ATCO. 2. ATCO must decide if aircraft may continue within RVSM, with 2000 ft VSM. ATCO must co-ordinate with adjacent sector/centre. 3. Aircraft may be descended into non-RVSM airspace and co-ordination with lower sector/centre.	Increased ATCO workload	4	Extremely Remote	There are no identified means of mitigating this risk in RVSM.	No mitigation.	4	Extremely Remote			Normal inflight contingency
2.4	Equipment error causing change of level (unintended deviation from level)	Undetected equipment error.											Hazard not specfically related to RVSM switchover and has been covered in mature RVSM operation FHA.
2.5	Severe turbulence/Weather												Hazard not specfically related RVSM switchover and has been covered in related to mature RVSM operation FHA.

Hazardlog from "Switchover" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
2.6	ATS failure	Technical failure	1. Increased capacity reduction. 2. Work manuallly - perform manual co-ordination. 3. Saturation of R/T.	Must revert to contingency procedures	4	Extremely Remote	4, as the hazard will lead to an increase of workload for ATCO and aircrew. The probability takes into account that the system has been formally accepted.	Contingency plans are in place. The ATC system shall be formally accepted. RVSM is suggesting additional manning (software and hardware engineers) to be on duty at time of switchover.	4	Extremely Remote	Mitigation will not affect the severity classification.		
2.7	Communication failure	No credible cause due to implementation of RVSM											Hazard not specfically related to RVSM switchover and has been covered in related to mature RVSM operation FHA.
2.8	Overshoot/Undershoot level (Incorrect level off)												Hazard not specfically related to RVSM switchover and has been covered in related to mature RVSM operation FHA.
2.9	Simulataneously implementation of new ATC procedures/new ATS systems		High ATCO/aircrew workload	Incorrect and unsafe commands	2	Extremely Improbable	Vertical deviation is less than 50% of the vertical separation minimum without the controller being able to control or recover from the situation - avoiding actions may be needed.	Part of the plan is that route structure/sectorisation will be frozen by October 2001. ATS systems should be in place by 24 Jan. 2002, however if this is not possible, an acceptable contingency plan may be in place. CFMU will have a capacity policy in place.					Covered at hazard 1.3.
3. Scenario 3													
3.1	Increased workload due to increased R/T with non-RVSM aircraft	Lack of RVSM awareness	1. Increased workload 2. Increased co-ordination	Increased workload	5	Probable	Severity class 5 due to low traffic density.	RVSM awareness programmes for pilots, operators, ATC staff. Flight plan checking - Aircraft planning for an RVSM level - being Non-RVSM approved, will be rejected with a warning stating that they request a FL within RVSM airspace.	5	Probable	Increasing RT will be probable in RVSM transition areas.		Long discussion between ATCOs and pilots of Non-RVSM aircraft, asking climb FL 290 or above.
3.2	Fuel Shortage	Aircraft departing outside IFPS - Planning RVSM level.	1. Diversion. 2. Increased workload. 3. Increased co-ordination.	Increased workload	4	Extremely Remote	RVSM awareness programme	There are no identified means of mitigating this risk in RVSM.	4	Extremely Remote			Aircraft departing outside IFPS and flight plan is not rejected. The aircraft has planned to fly within RVSM level, however Non-RVSM approved

Hazardlog from "Switchover" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
4. Scenario 4													
4.1	Pilot files FPL with incorrect RFL in accordance with FLAS (eastbound/westbound level)		Flight plan rejected										The situaiton is not specifically related to RVSM switchover - has been covered in FHA concerning RVSM Transition. Normal RVSM transition procedures shall make sure that aircraft will be on correct level. IFPS must agree when to start checking FPLs.
4.2	ATCO assigns wrong FL in accordance with FLAS (eastbound/westbound)	Lack of awareness/wrong application of procedures.	Increased workload	Potential loss of horizontal separation.	2	Extremely Improbable	ATCOs are properly trained. This could only happen at boundaries (inter-sector). Vertical deviation is more than 50% of the vertical separation minimum and ATCO will not be able to control the situation.	LoAs shall address issue related to FL310, FL350 and FL390 (address additional controls and/or use of those flight levels). RVSM Programme group provides guidance on LoAs.	3	Extremely Improbable	Mitigation will reduce the severity as the ATCO is now in control of the situation.		
5. Scenario 5													
5.1	Unsafe and incorrect commands from ATCO during high traffic density	1. Weather 2. Issue of wrong clearance 3. Non-RVSM flight over FL410 4. Shift change 5. Presence of exempted STATE aircraft (causing higher workload) 6. Human error 7. Aircraft equipment failure	Increased workload.	1. Initial increased workload in adapting to RVSM environment. 2. Potential loss of vertical separation. 3. Potential loss of horizontal separation.	3	Remote	CFMU capacity policy will be able to restrict traffic flow during the morning peak. Vertical deviation is more than 50% of the vertical separation minimum, however, with ATCOs being able to control the situation. It is assumed that approx. 60 instances per year currently happen during shift changes.	Further reduction of traffic flow. Refresher training of ATCOs - last minute briefing. Establishment of uni-directional route structure. Longer handover period/additional staff	3	Extremely Remote	Assumption that the traffic flow has been reduced - decided by the States individually.		Worst case assumption that shift change will happen at High peak.

Hazardlog from "Switchover" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
5.2	Increased R/T traffic	More level change	1. Increased workload. 2. Increased co-ordination.	Increased workload	4	Remote	4, due to increased workload.	Further reduction of traffic flow. Last minute briefing on RVSM R/T procedures.	4	Extremely Remote	Mitigation has not changed probability.		
5.3	High workload	Morning traffic peak.											Not considered to be a hazard - workload increase part of normal ATC operations.
5.4	Single aircraft RT Failure before t0	Equipment failure	1. Increased workload 2. Increased co-ordination	Increased workload	5	Extremely Remote	Inflight contingency	Established ICAO process	5	Extremely Remote			
5.5	Increased traffic below FL290	1. Flow regulation FL290 and above. 2. Quantity of non-RVSM aircraft	1. Increase workload 2. Increase co-ordination 3. Traffic congestion below FL290.		5	Remote	No safety consequences	RVSM Programme Group to investigate distrubution of traffic below RVSM airspace.	5	Remote	No mitigation exists today.		
5.6	ATC system failure												Hazard more related to mature RVSM operation.
5.7	IFPS and CFMU failure												Hazard not specifically related to RVSM
5.8	Congestion at entry and exit points		Increased workload. Radar clutter. Label overlap.										The Hazard is not specific related to FHA switchover - thas been covered at transition FHA.
5.9	Pilots visual perspective (unaccustomed to flying RVSM)	Implementation of reduced separation.	1. Increase of RT. 2. Pilots taking unnecessary avoiding action. 3. Increase of ATCO workload. 4. Increase of co-ordination (ATCO).	1. Potential loss of separation. 2. Increase of workload due to co-ordination.	3	Remote	Vertical deviation is more than 50% of the vertical separation minimum but pilot is in control of the situation	Training of pilots and ATCOs.	3	Extremely Remote	Probability reduced due to awareness and training.		
5.10	Inadequate procedures (ATC manual and LoAs)		Increased workload	Potential loss of separation (less than 50%)	4	Probable	ATC is in control of the situation	Contingency co-ordination measures. Flow management measures. Simulation has taken place (for some sectors).	4	Remote	Mitigation reduces the probability.		Has been covered at FHA1.

6. Scenario 6

Hazardlog from "Switchover" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
6.1	Potential loss of separation due to ATCO applying wrong separation standard	ATCO applying wrong separation standard (human error).	Increased workload and avoidance action from ATCO	1. Vertical deviation is more than 50% of the vertical separation minimum 2. Increased workload.	2	Extremely Improbable	ATCO unaware and cannot recover the situation. Flight plan indicating non-RVSM, normal R/T procedures will be applied.	ATCO shall confirm RVSM status of all aircraft under his/her control prior to T0	2	Extremely Improbable	Mitigation does not reduce the severity, but reduces the probability		Controller treats the State aircraft as being RVSM approved, while the status is non-RVSM
6.2	Increased workload due to non-RVSM approved state aircraft	1. Different crossings 2. Applying two separation standards	1. Increased workload in co-ordination and applying two separate VSM. 2. Capacity constraints for other aircraft	Increased workload	5	Probable	Increased workload, however no safety consenquences due to low traffic density. 'Probable' as some of the 40 states will have State aircraft flying during switchover.	RVSM awareness programme is also directed towards State aircraft (military)	5	Probable			
6.3	Increased workload for vertical adjacent centres/sectors.		Increased co-ordination to provide correct separation standard										Hazard not specifically related to RVSM switchover and has been covered in the mature RVSM operation FHA.
6.4	FPL does not state that the aircraft is a STATE aircraft	Human error	1. Aircraft will be treated as a non STATE, non-RVSM approved aircraft and asked to descend below RVSM airspace. 2. Increased workload and co-ordination.	Increased workload.	5	Extremely Remote	The increase of workload does not impact safety.	RVSM Awareness programme is also directed at States aircraft (military).	5	Extremely Remote			
6.5	The FPL indicates that the STATE aircraft is RVSM approved, however, being non-RVSM approved	ATS does not detect RVSM status	ATCO applies 1000 ft. VSM where the correct VSM is 2000 ft.	Vertical deviation is more than 50% of the vertical separation minimum	2	Probable	The ATS system has been properly accepted.	Verbal confirmation of RVSM status before time of switchover. Hard-checking performed by CFMU.	2	Extremely Improbable	The probability will reduce by ATCO verbally checking the RVSM status of aircraft.		The hazard is not specifically related to RVSM switchover and has been covered in the mature RVSM operation FHA.
6.6	Inability to restrict number of STATE aircraft in RVSM airspace												Hazard is not specifically related to RVSM switchover.

Hazardlog from "Switchover" FHA-session

Risk#/-title		Causes	Operational Consequences	Safety Consequences	Pre RVSM mitigation Sev./prob.		Pre RVSM mitigation Rationale	RVSM mitigation means	Post RVSM mitigation Sev./prob.		Post RVSM mitigation Severity Remarks	Contingency	Comments
6.7	Failure to identify formation flights	1. ATCO error 2. Incorrect FPL	Increased workload	Vertical deviation is more than 50% of the vertical separation minimum	2	Extremely Improbable	ATCO has no control of situation	Flight plan is checked. Current R/T procedures - ATCO shall confirm the RVSM status of all aircraft under his/her control prior to T0.	3	Extremely Improbable	ATCO will be able to control the situation, as they now are informed of the formation flight.		

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 addressed the following issues:

i) non-compliant aircraft operations within RVSM airspace;
ii) weather deviation procedures;
iii) co-ordination problems over the Red Sea area; and
iv) other related issues

3.2 Non-compliant aircraft operations within RVSM airspace

3.2.1 The meeting noted the concerns of States regarding the operation of non-compliant aircraft within RVSM airspace. It was pointed out that this mixed environment is risky and will also result in an increase in the workload of air traffic controllers. Furthermore, experiences from other regions indicate that except for State aircraft and some operations carried out under specific conditions, non-RVSM compliant aircraft should normally, not be authorized to operate within RVSM airspace.

3.2.2 The meeting recalled that at the RVSM-TF/5 meeting it was agreed that the following non-RVSM compliant aircraft may be authorized to operate within RVSM airspace ***under specific conditions and after special coordination:***

a) it is being delivered to the State of Registry or Operator;
b) it 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;
c) it is transporting a spare engine mounted under the wing; or
d) it is being utilized for mercy or humanitarian purposes.

3.2.3 Although non-compliant RVSM State/military aircraft can operate within RVSM airspace, It was suggested that States may wish to consider the elaboration of specific procedures for accommodating State/military operations as follows:

i) the provision for temporary airspace reservations;
ii) the provision for block altitudes;
iii) the provision for special routes to be used by military aircraft; and
iv) the provision for special routes applicable aircraft to which 2000 ft VSM would be applicable.

3.2.4 The meeting was of the view that the elaboration of specific procedures for accommodating State/military aircraft operations within RVSM airspace, is left to individual States. However, it was agreed that the creation of non- exclusion areas, as endorsed under MIDANPIRG/7 Conclusion 7/14, to accommodate non-compliant aircraft *(except State aircraft and aircraft operating under specific conditions)* within RVSM airspace should **not** be authorized.

3.2.5 Based on the foregoing, the meeting formulated the following draft conclusion:

Draft Conclusion 8/3 - Creation of Non-Exclusion Areas Within RVSM Airspace

That, taking into account inherent problems associated with both RVSM and non-RVSM compliant aircraft operations within RVSM airspace, the requirement for the creation of non-exclusion areas as authorized under MIDANPIRG/7 Conclusion 7/14 be discontinued.

3.3 Weather deviation procedures

3.3.1 The meeting considered procedures applicable during severe turbulence including the need/consideration for the suspension of RVSM operations. Concerns were raised on action(s) to be initiated by air traffic controllers in such circumstances. It was clarified that weather deviation procedures in RVSM airspace will be promulgated in the Regional Supplementary Procedures, Doc 7030 and it was not possible to cater for all conditions likely to arise.

3.4 Co-ordination problems over the Red Sea Area

3.4.1 The meeting noted with appreciation the efforts expended by both Egypt, IATA and ICAO to find a durable solution to the problem caused by un-coordinated flights operating over the Red Sea area. The meeting recalled that the Sixth meeting of the RVSM Task Force, under conclusion 6/5 requested that a meeting be organized under the aegis of ICAO to address the issue.

navigation. It urged all parties concerned to explore ways and means of finding a durable solution to this long outstanding problem.

3.4.2 It was noted that Egypt, took the initiative of discussing the issue within the framework of a bilateral coordination meeting with Israel which was held in Cairo, on 19 20 May 2003. To this effect, it was agreed that one of the interim solutions could be the reservation of blocked flight levels to accommodate these flights. The allocation of FL300 for northbound flights and FL310 for southbound flights were being proposed. This proposal was thoroughly discussed by the Task Force meeting and it was agreed that both Saudi Arabia and Yemen will consider the above options and will keep ICAO apprised of their decision. Furthermore, it was agreed that an informal meeting involving only Egypt, Saudi Arabia, Sudan, Yemen and IATA be organized under the aegis of ICAO, as soon as possible and preferable before the end of August 2003, with a view to agree on the procedures to be applicable to the un-coordinated flights.

3.4.3 Furthermore, with immediate effect, the following temporary measures will become applicable:

i) The first FIR having information on the estimates of the coordinated flights, will immediately pass on the traffic information to the adjacent FIRs concerned.

ii) With a view to ensure that other aircraft in the vicinity are kept aware of their position/track and flight level, IATA will request all un-coordinated flights, to follow either the Traffic Information Broadcast by Aircraft and related operating procedures (TIBA) or the IATA In-flight Broadcast Procedures (IFBP).

3.4.4 Based on the foregoing the meeting formulated the following draft conclusion:

Draft Conclusion 8/4 - Coordination Problems Over the Red Sea Area

That:

a) States concerned consider the proposal by Egypt for the allocation of reserved flight levels to un-coordinated flights operating over the Red Sea and keep ICAO informed of their decision;

b) as a matter of urgency, a meeting be organized under the aegis of ICAO, involving Egypt, Saudi Arabia, Sudan, Yemen and IATA with a view to agree on the procedures to be applicable to un-coordinated flights operating over the red sea;

Note: It was agreed that the meeting be organized before the end of August 2003 and will involve high level decision makers from the appropriate Civil Aviation Authorities concerned.

c) With immediate effect, the following procedures will become applicable:

i) the first FIR having information on the estimates of the un-coordinated flights, will immediately pass on traffic information to the adjacent FIRs concerned;

ii) with a view to ensure that other aircraft in the vicinity are kept aware of their position/track and flight level, IATA will request all un-coordinated flight operations over the Red Sea, to follow either the *Traffic Information Broadcast by Aircraft and related operating procedures (TIBA) or the IATA In-flight Broadcast Procedures (IFBP).
**Cf. Attachment C to Annex 11*

3.5 Other related issues

Interface meeting

3.5.1 The meeting was informed that the interface meeting with Asia Region had to be postponed to a later date and the interface meeting with EUR Region is tentatively planned for August 2003.

Special Implementation Project

3.5.2 The meeting was informed of the approval by the ICAO Council of a Special Implementation Project (SIP) for Lebanon, Jordan, Syria and Yemen. The objective of the SIP is to assess the status of preparedness of the States for ensuring the safe implementation of RVSM on 27 November 2003, to identify any shortcomings/deficiencies regarding equipment, training, procedures

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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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REPORT ON AGENDA ITEM 4 : PROGRAMME MANAGEMENT ISSUES

4.1 Under this agenda item the meeting considered the following issues:

i) elaboration of letters of agreement;
ii) review of the Task List; and
iii) update of the evaluation forms;

4.2 Elaboration of letters of agreement

4.2.1 The meeting accordingly reviewed existing letters of agreement between the different elaboration of procedures within transition areas. An update on the status of letters of agreement 2003 is at **Appendix 4A** to the Report on Agenda Item 4).

4.3 Review of the Task List

4.3.1 The meeting reviewed the checklist and identified urgent tasks which should be carried out prior to the GO/ No GO decision on 27 August 2003. The updated Task List is indicated at **Appendix B** to the report.

4.4 Update of the evaluation form

4.4.1 The meeting accordingly reviewed and updated the evaluation form checklist which is indicated at **Appendix C** to the report.

MID RVSM TF/8
Appendix 4A to the Report on Agenda Item 4

STATUS OF LETTERS OF AGREEMENT (LOAs)						
States	**ACCs concerned**	**Adjacent ACCs**	**Status of LOAs**			
			Draft	**Final**	**Signed**	**Remarks**
Bahrain	Bahrain	Emirates			X	No change
		Jeddah	X			
		Kuwait	X			
		Tehran		*X		Minor changes required
		Muscat	*X			Major changes required-*draft end June
Egypt	Cairo	Amman			X	
		Athens			X	
		Jeddah	*X			*Draft to be ready within 2 weeks
		*Khartoum			X	
		Nicosia			X	
		Tel Aviv		*X		*To be finalized
		Tripoli	X			ICAO to assist
Iran	Tehran	Ankara			X	
		*Ashgabat				
		*Baghdad				
		Bahrain		*X		*Minor changes required- in September 2003
		*Baku				
		Emirates			X	No Change
		*Kabul				
		Karachi		*X		*Minor changes required-September 2003
		Muscat		*X		*Minor changes required-September 2003

STATUS OF LETTERS OF AGREEMENT (LOAs)						
States	**ACCs concerned**	**Adjacent ACCs**	**Status of LOAs**			
			Draft	**Final**	**Signed**	**Remarks**
		*Turkmenbashi				
Jordan	Amman	Baghdad				
		Cairo			X	
		Damascus	X			
		Jeddah	X			
		Tel Aviv				
Kuwait	Kuwait	*Baghdad				Awaiting future developments
		Bahrain	X			
		Tehran	X			
		Jeddah	X			
Lebanon	Beirut	Damascus			X	
		Nicosia		*X		*Slight adjustments required
Oman	Muscat	Emirates			X	
		Bahrain	X			Major changes required-October 2003
		Bombay				Still pending
		Karachi				Draft to be developed
		Tehran		X		Minor changes required
Saudi Arabia	Jeddah	Amman	X			
		*Asmara	X			
		*Baghdad	X			
		Bahrain	X			
		Cairo	X			
		Kuwait	X			
		*Khartoum			X	

STATUS OF LETTERS OF AGREEMENT (LOAs)						
States	**ACCs concerned**	**Adjacent ACCs**	**Status of LOAs**			
			Draft	**Final**	**Signed**	**Remarks**
			X			
Syria	Damascus	Amman		*X		*Not yet signed
		Ankara		X		
		*Baghdad	X			
		Beirut	X			
		Nicosia			X	
United Arab Emirates	Emirates	Bahrain			X	No Change
		Muscat			X	No Change
		Tehran			X	No Change
Yemen		Addis Ababa				Not yet
		*Asmara				Not yet
		Djibouti	X			FL 240 and below
		Jeddah	X			
		*Mogadishu	X			Not yet
		Muscat				
* Non RVSM						

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 2003		
July (*date to be determined)*	2nd JCM-RVSM ASIA/MID	Bangkok
August *(date to be determined)*	1st JCM-RVSM EUR/MID	Paris
24 27 August	MID RVSM TF/9	Abu Dhabi
19 22 October	MID RVSM TF/10	Abu Dhabi
YEAR 2004		
01-03 March	MID RVSM TF/11*	Abu Dhabi
22 -24 November	MID RVSM TF/12**	Abu Dhabi

*Preliminary post-implementation safety review
**Post-implementation safety review

5.2 U.A.E. Entry VISA requirements

5.2.1 With a view to facilitate issuance of entry VISA to the UAE, the meeting was informed that all participants should leave a scanned copy of their National Passports with the administration. Furthermore, they should confirm their participation by email to Mr..Angelo Fernanes (angelo.fernandes@gcaa-uae.gov.ae) at least three weeks before any meeting This would enable the timely processing of the papers.

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
(Task List)

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	23 Feb. 03	RVSM TF -Completed
3	Investigate methods of funding any outside assistance required	5-Oct-00	23.Feb.03	RVSM TF- Completed
	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	1-May-03	SAM/WG- Completed
11	Develop detailed program for safety analysis	6-Mar-02	20-Jjune-03	SAM/WG- Resheduled
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	1 Jan.-03	27-Aug-03	SAM/WG- To be based on executive summary
14-A	Carry out pre-implementation safety analysis	1-Jan-03	22-Oct.-03	SAM/WG- To be based on final report
15	Carry out pre-implementation readiness assessmsent	TBD	31-Mar-03	SAM/WG- Completed
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- Completed
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	ON-GOING	SAM/WG
21	Monitor progress with operator approvals	11-Apr-01	ONGOING	SAM/WG. Some operators not ready and/or facing problems.Data from approval Registry not bering sent. IATA to assist.
22	Review of National Safety plans	28-May-03	20-Jun-03	SAM/WG

MID RVSM TASK FORCE - WORK PROGRAMME
(Task List)

ID	DESCRIPTION	START	FINISH	RESOURCES
22-A	Reply to querries on National Safety Plans	20-Jun-03	1-Aug.-03	SAM/WG
22-C	Final Review of National Safety plans	24-Aug.-03	27-Aug.-03	SAM/WG
	ATC Operational Issues			
23	Dertermine the limits of RVSM airspace (geographic and vertical)	10-Apr-01	6-Mar-02	ATC/WG - Completed
24	Develop ATC operational policy & procedures for normal RVSM operations	14 Oct. 02	28-May-03	ATC/WG- Completed
25	Identify transition areas and transition procedures	26-Aug-01	27-Aug.-03	ATC/WG-On-going activity
26	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
27	Develop ATC procedures for non-approved State acft to transit RVSM airspace	10-Apr-01	5-Jun-02	ATC/WG-Completed
28	Develop procedures for handling non-compliant civil aircraft (inc ferry & maintenance)	10-Apr-01	5-Jun-02	ATC/WG-Completed
29	Develop procedures for suspension of RVSM	10-Apr-01	5-Jun-02	ATC/WG- Completed
30	Evaluate the need for simulations to assess ATC workload and possible need for airspace/air route/Sector changes	2-Jun-02	30-Apr-03	ATC/WG-Guidelines required. Secretariat to look for available CD's
31	Develop ATC regional training guidance material	TBD	28-May-03	ATC/WG- Completed
32	Harmonization of ATC regional guidance material	5-Jun-02	31-Mar-03	ATC/WG- Completed
33	Identify issues to be adressed in Letters of Agreement	10-Apr-01	28-May-03	ATC/WG- Completed
34	Evaluate the need for chart amendments related to RVSM	11-Apr-01	28-May-03	Secretarist to prepare draft
35	States to conduct local RVSM training for air traffic controllers	27-Mar-03	26-Nov-03	States- On-going activity
	OPS/AIR Issues			
36	States to examine existing legislation and regulations to identify any changes required for RVSM	5-Oct-00	27-Aug-03	OPS/AIR/WG -Awaiting confirmation from States
37	Develop and promulgate information on the operational approval process	1-Apr-01	29-Aug-01	OPS/AIR/WG - Completed
38	Develop procedures for aircraft found to be non-compliant through monitoring	11-Apr-01	26- Feb. 03	OPS/AIR/WG - Completed
39	Develop regional guidance on pilot, maintenance personnel and dispatcher training	11-Apr-01	26-Feb-03	OPS/AIR/WG - Completed
40	Examine issues related to the use of ACAS in RVSM airspace	11-Apr-01	29-Aug-01	OPS/AIR/WG - Completed
	Joint Tasks			
41	Review preliminary readiness assessment	1-Apr-01	29-Aug-01	RVSM TF - Completed- 90% target achieved
42	Set target proportion of RVSM approved flights for full RVSM implementation	1-Apr-01	23 Feb. 03	RVSM TF - Completed
43	Set target AIRAC implementation date(AIP Supplement to be published)	7-Apr-01	2-Oct-03	RVSM TF -Completed *(15th May 03)*
44	Prepare/maintain regional status report detailing RVSM implementation plans	1-Apr-01	28-May-03	RVSM TF - *Secretariat to prepare draft*

MID RVSM TASK FORCE - WORK PROGRAMME
(Task List)

ID	DESCRIPTION	START	FINISH	RESOURCES
45	Identify major milestone and targe dates	9-Apr-01	28-May-03	RVSM TF - Secretariat to prepare chart.
46	Develop a regional RVSM informational campaign	7-Apr-01	27-Aug-03	RVSM TF -*Bahrain, Lebanon,Saudi Arabia, UAE and IATA offered to assist*
47	Develop regional RVSM Guidance Material	1-Apr-01	28-May-03	RVSM TF- Version 2.1 completed- Endorsement by MIDANPIRG/8
48	Review weather and contingency procedures for applicability under RVSM	10-Apr-01	26-Feb-03	Draft completed-Secretariat to develop amendment to Regional Supps.
49	Develop model AICs and NOTAMs	9-Apr-01	29-Aug-01	Draft Completed(AIC already Issued)
50	Evaluate preliminary readiness and safety assessments	20-Jan-01	5-Jun-02	
51	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
52	Evaluate the need for tactical offset procedures to mitigate the effects of turbulence and TCAS alerts	10-Apr-01	26-Feb-03	RVSM TF- Completed
53	Develop Doc 7030 amendment	10-Apr-01	27-Aug-03	RVSM TF- Draft prepared. Being harmonized with other Regions
54	Review aircraft altitude-keeping performance and operational errors	1-Jul-01	25-May-03	RVSM TF-Completed
55	Develop monitoring and evaluation program for the verification phase	TBD	5-Jun-02	RVSM TF-Completed
56	Evaluate final readiness assessment	TBD	27-Aug-03	RVSM TF
57	Evaluate final safety analysis	30-Jan-03	27-Aug-03	RVSM TF-Analysis to be based on executive summary. Second update in Oct. 2003
58	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

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003	X	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	✓	-	
1.4	National Safety Plan provided to MECMA	✓	-	
	Feedback to MECMA on audit reports (Due by 01/08/2003	-	No	Not due yet
	Final Review (due by 25/08/2003, at TF/9)	-	No	Not due yet

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: BAHRAIN

Appendix C

FIR(s): BAHRAIN

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003		01/09/2003					

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	Not applicable now *Refer to Appendix 4A
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. 1st Week of June.
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.	✓	-	Initial evaluation has started

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: BAHRAIN

Appendix C

FIR(s): BAHRAIN

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003		01/09/2003					

2.8	Conduct of local training for air traffic controllers	✓	-	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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: BAHRAIN

Appendix C

FIR(s): BAHRAIN

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003		01/09/2003					

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	✓	-	100 %
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	-	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: BAHRAIN

Appendix C

FIR(s): BAHRAIN

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003		01/09/2003					

OTHER GENERAL REQUIRMENTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
FUNDING/BUDGETARY ALLOTMENT	✓	-	
TRAINING	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: EGYPT

Appendix C

FIR(s): CAIRO

Rev.004

EVALUATION DATE(s):15 September 2002

01/06/2002	X	01/09/2002	X	26/02/2003		28/05/2003	X	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:	✓	-	All reports forwarded 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	✓	-	Forwarded to MECMA from July 2001 December 2001`
1.3	Whether traffic data has been sent	✓	-	Forwarded to MECMA (26/12/2002-last update)
1.4	National Safety Plan provided to MECMA	✓	-	
	Feedback to MECMA on audit reports (due by 01/08/2003)	-	No	Not due yet
	Final Review (Due by 25/08/2003)	-	No	Not due yet

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: EGYPT

Appendix C

FIR(s): CAIRO

Rev.004

EVALUATION DATE(s):15 September 2002

01/06/2002	X	01/09/2002	X	26/02/2003		28/05/2003	X	01/09/2003					

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 States. Refer to Appendix 4A for update
2.3	Have training requirements been assessed	✓	--	
2.4	Issue of AIC	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	*✓	-	*Early June
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.	✓	-	To be carried out shortly

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: EGYPT

Appendix C

FIR(s): CAIRO

Rev.004

EVALUATION DATE(s):15 September 2002

01/06/2002	X	01/09/2002	X	26/02/2003		28/05/2003	X	01/09/2003					

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)*	✓	-	*To be updated within 2 months*

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: EGYPT

Appendix C

FIR(s): CAIRO

Rev.004

EVALUATION DATE(s):15 September 2002

01/06/2002	X	01/09/2002	X	26/02/2003		28/05/2003	X	01/09/2003					

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	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: EGYPT

Appendix C

FIR(s): CAIRO

Rev.004

EVALUATION DATE(s):15 September 2002

01/06/2002	X	01/09/2002	X	26/02/2003		28/05/2003	X	01/09/2003					

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

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X		26/02/2003	X	28/05/2003	X	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:	✓	-	*Had some problems in sending data to MECMA. Now sorted out.*
	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	✓	-	
1.4	National Safety Plan provided to MECMA	✓	-	
	Feedback to MECMA on audit reports (due by 01/08/2003)	-	No	Not due yet
	Final review (Due by 25/08/2003)	-	No	Not due yet

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: I.R.IRAN

Appendix C

FIR(s): TEHRAN

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X		26/02/2003	X	28/05/2003	X	01/09/2003					

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 Ankara ACC only. Tyo prepare draft for TF/8 Meeting. Refer to Appendix 4A for update
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	-	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	✓	-	Eventually Sector 1 will have to operate in 2 Sectors

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	X		26/02/2003	X	28/05/2003	X	01/09/2003					

	sector reorganization.			
2.8	Conduct of local training for air traffic controllers	✓	-	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. *In consultation with manufacturer.*
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)*	✓	-	

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	X		26/02/2003	X	28/05/2003	X	01/09/2003					

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS

	REQUIREMENTS	ACTION TAKEN		REMARKS
		YES	NO	
3.1	National Regulations for RVSM Implementation	✓	-	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	✓	-	42% *(37 aircrafs)*
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	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: I.R.IRAN

Appendix C

FIR(s): TEHRAN

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X		26/02/2003	X	28/05/2003	X		01/09/2003							

OTHER GENERAL REQUIRMENTS			
REQUIREMENTS	**ACTION TAKEN**		**REMARKS**
	YES	NO	
FUNDING/BUDGETARY ALLOTMENT	-	No-	
TRAINING	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: JORDAN

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FIR(s): AMMAN

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003	X	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	-	No	
	-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	✓	-	
1.4	National Safety Plan provided to MECMA	✓	-	
	Feedback to MECMA on audit report (due by 01/08/2003)	-	No	Not due yet
	Final review (due by 25/08/2003)	-	No	Not due yet

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: JORDAN

Appendix C

FIR(s): AMMAN

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003	X	01/09/2003					

ATC OPERATIONS ASPECTS

	REQUIRMENTS	ACTION TAKEN		REMARKS
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	✓	-	*(Order placed already)*
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	* Refer to Appendix 4A for update
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.	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: JORDAN

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FIR(s): AMMAN

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003	X	01/09/2003					

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)*	-	No	
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	-	No	Not applicable now

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: JORDAN

Appendix C

FIR(s): AMMAN

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003	X	01/09/2003					

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		No	To 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	17 out of 64
3.6	How many national operators have full RVSM approval	✓	-	2 operators (Royal Jordanian and Royal Squadron)
3.7	What is the percentage ratio of aircraft fleet	✓	-	(Royal Jordanian 14 out of 14)-100% Royal squadron: 3 out of 6 (50 %)
3.8	Did you provide MECMA with RVSM approval documentation	✓	-	
3.9	Did you nominate your State RVSM Programme Manager	✓		
3.10	Certification	✓		Operations specifications and/or letter of authorization

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: JORDAN

Appendix C

FIR(s): AMMAN

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003	X	01/09/2003					

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

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003		28/05/2003	X	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	✓	-	
1.4	National Safety Plan provided to MECMA	✓	-	
	Feedback to MECMA on audit report (due by 01/08/2003)	-	No	Not due yet
	Final review (Due by 25/08/2003)	-	No	Not due yet

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: KUWAIT

Appendix C

FIR(s): KUWAIT

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003		28/05/2003	X	01/09/2003					

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	Refer to appendix 4A for update
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	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: KUWAIT

Appendix C

FIR(s): KUWAIT

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003		28/05/2003	X	01/09/2003					

	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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: KUWAIT

Appendix C

FIR(s): KUWAIT

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003		28/05/2003	X	01/09/2003					

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	✓	-	100%
3.6	How many national operators have full RVSM approval	✓	-	*(Only 1 Operator)*
3.7	What is the percentage ratio of aircraft fleet	✓	-	100%
3.8	Did you provide MECMA with RVSM approval documentation	✓	-	
3.9	Did you nominate your State RVSM Programme Manager	✓	-	
3.10	Certification	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: KUWAIT

Appendix C

FIR(s): KUWAIT

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003		28/05/2003	X	01/09/2003					

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.004

EVALUATION DATE(s):01 MAR2003

01/06/2002	X	01/09/2002	X	01/12/2002	x	01/03/2003	x	28/05/2003	x	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 coordination failures
1.2	Whether any turbulence data reports have been received and sent to MECMA	✓	-	NIL
1.3	Whether traffic data has been sent	✓	-	
1.4	National Safety Plan provided to MECMA	✓	-	
	Feedback to MECMA on audit report (Due by 01/08/2003)	-	No	Not due yet
	Final review (due by 25/08/2003)	-	No	Not due yet

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: LEBANON

Appendix C

FIR(s): BEIRUT

Rev.004

EVALUATION DATE(s):01 MAR2003

01/06/2002	X	01/09/2002	X	01/12/2002	x	01/03/2003	X	28/05/2003	X	01/09/2003			

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	On-going
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	Refer to Appendix 4A for update
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.	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: LEBANON

Appendix C

FIR(s): BEIRUT

Rev.004

EVALUATION DATE(s):01 MAR2003

01/06/2002	X	01/09/2002	X	01/12/2002	x	01/03/2003	X	28/05/2003	X	01/09/2003			

2.8	Conduct of local training for air traffic controllers	✓	-	THEORERICAL TRAINING 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)*	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: LEBANON

Appendix C

FIR(s): BEIRUT

Rev.004

EVALUATION DATE(s):01 MAR 2003

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

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	-	-	**73%**
3.6	How many national operators have full RVSM approval	-	-	**1**
3.7	What is the percentage ratio of aircraft actu fleet	-	-	**100%**
3.8	Did you provide MECMA with RVSM approval documentation	✓	-	
3.9	Did you nominate your State RVSM Programme Manager	✓	-	
3.10	Certification	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: LEBANON

Appendix C

FIR(s): BEIRUT

Rev.004

EVALUATION DATE(s):01 MAR 2003

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

OTHER GENERAL REQUIRMENTS

2.

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES		
FUNDING/BUDGETARY ALLOTMENT	✓		
TRAINING	✓		

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: OMAN

Appendix C

FIR(s): MUSCAT

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	01/12/2002	X	01/03/2003	X	28/05/2003	X	01/09/2003			

SAFETY AND AIRSPACE MONITORING ASPECTS

	REQUIREMENTS	ACTION TAKEN YES	ACTION TAKEN NO	REMARKS
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 reports received)*
1.3	Whether traffic data has been sent	✓	-	
1.4	National Safety Plan provided to MECMA	✓	-	
	Feedback to MECMA on audit report (due by 01/08/2003)	-	No	Not due yet
	Final review (Due by 25/08/2003)	-	No	Not due yet

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: OMAN

Appendix C

FIR(s): MUSCAT

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	01/12/2002	X	01/03/2003	X	28/05/2003	X	01/09/2003				

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	Confirmation received that equipment will be upgraded before implementation of RVSM refer to Appendix 4A for update
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	-	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.	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: OMAN

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FIR(s): MUSCAT

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EVALUATION DATE(s):

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2.8	Conduct of local training for air traffic controllers	✓	-	Awareness phase has started Theoretical training completed
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)*	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: OMAN

Appendix C

FIR(s): MUSCAT

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	01/12/2002	X	01/03/2003	X	28/05/2003	X	01/09/2003			

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS

	REQUIREMENTS	ACTION TAKEN YES	ACTION TAKEN NO	REMARKS
3.1	National Regulations for RVSM Implementation	✓	-	*3.1 to 3.10: Update not available. To be updated at next TF/8 meeting.*
3.2	Aircraft and Operators approval/guidance	✓	-	
3.3	Procedures for non-compliant aircraft	-	No	Investigating the issue
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers	✓	-	Included in JAA leaflet G
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval	✓	-	90%
3.6	How many national operators have full RVSM approval	✓	-	2
3.7	What is the percentage ratio of aircraft fleet	✓	-	100% during approval process all RVSM approved aircraft are monitored.
3.8	Did you provide MECMA with RVSM approval documentation		-	
3.9	Did you nominate your State RVSM Programme Manager	✓		

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: OMAN

Appendix C

FIR(s): MUSCAT

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EVALUATION DATE(s):

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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.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X		26/02/2003	X	28/05/2003	X	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	✓	-	Final data would be available shortly. *(In progress)*
	-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	✓	-	
1.4	National Safety Plan provided to MECMA	✓	-	
	Feedback to MECMA on audit report (due by 01/08/2003)	-	No	Not due yet
	Final review (Due by 25/08/2003)	-	No	Not due yet

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SAUDI ARABIA

Appendix C

FIR(s): JEDDAH

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X		26/02/2003	X	28/05/2003	X	01/09/2003						

ATC OPERATIONS ASPECTS

	REQUIRMENTS	ACTION TAKEN		REMARKS
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	✓	-	Order already placed
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 -	Refer to appendix 4A for update
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	-	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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SAUDI ARABIA

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FIR(s): JEDDAH

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EVALUATION DATE(s):

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2.8	Conduct of local training for air traffic controllers	✓	-	Initiated (introductory part)
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	Not applicable

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SAUDI ARABIA

Appendix C

FIR(s): JEDDAH

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X		26/02/2003	X	28/05/2003	X	01/09/2003					

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS

	REQUIREMENTS	ACTION TAKEN		REMARKS
		YES	NO	
3.1	National Regulations for RVSM Implementation			In progress. Updated data to be available by TF/8 Meeting
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	✓		

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SAUDI ARABIA

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FIR(s): JEDDAH

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EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X		26/02/2003	X	28/05/2003	X	01/09/2003					

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

EVALUATION DATE(s): Rev.004

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003	X	01/09/2003					

SAFETY AND AIRSPACE MONITORING ASPECTS

	REQUIREMENTS	ACTION TAKEN YES	ACTION TAKEN NO	REMARKS
1.1	-To verify whether the following reports are regularly being sent to MECMA:	-	No	***RADAR DATA NOT AVAILABLE NOW***
	Assigned Altitude Deviation (AAD) forms	-	No	No reports received from Pilots
	-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	No reports received from Pilots
1.3	Whether traffic data has been sent	✓	-	
1.4	National Safety Plan provided to MECMA	✓	-	
	Feedback to MECMA on audit report (due by 01/08/2003)		No	Not due yet
	Final review 9due by 25/08/2003)		No	Not due yet

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SYRIA

Appendix C

FIR(s): DAMASCUS

EVALUATION DATE(s): Rev.004

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003	X	01/09/2003					

ATC OPERATIONS ASPECTS

	REQUIRMENTS	ACTION TAKEN		REMARKS
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	✓	-	Radar equipment upgrade due end of 2003
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	With Cyprus and Turkey, not yet completed. Refer to Appendix 4A for update
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of AICc	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	*✓	-	1st week of June
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM		No	under preparation
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	✓	-	procedural environment

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SYRIA

Appendix C

FIR(s): DAMASCUS

EVALUATION DATE(s): Rev.004

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003	X	01/09/2003					

2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	-	No	Not installed/procedural
2.10	Is there any need for changes to FDPS?	-	No	Not installed
2.11	Is there any need to changes in radar display systems? (*where applicable)*	-	No	Not installed
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	-	No	
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	Do not exist

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SYRIA

Appendix C

FIR(s): DAMASCUS

EVALUATION DATE(s): Rev.004

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003	X	01/09/2003					

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	-	No	
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval	90%	-	13 out of 14
3.6	How many national operators have full RVSM approval	-	Nil	
3.7	What is the percentage ratio of aircraft fleet	95%	-	
3.8	Did you provide MECMA with RVSM approval documentation	-	No	
3.9	Did you nominate your State RVSM Programme Manager	✓	-	
3.10	Certification	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SYRIA

Appendix C

FIR(s): DAMASCUS

EVALUATION DATE(s): Rev.004

01/06/2002	X	01/09/2002	X	26/02/2003	X	28/05/2003	X	01/09/2003					

OTHER GENERAL REQUIRMENTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
FUNDING/BUDGETARY ALLOTMENT	✓	-	
TRAINING	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIREMENTS

STATE: UNITED ARAB EMIRATES

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FIR(s): EMIRATES

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EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	01/12/2002	X	28/05/2003	X	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:	YES		
	Assigned Altitude Deviation (AAD) forms	YES		
	-Total IFR movements per month	YES		
	-Average time spent per movement at assigned levels between FL290 and FL410	YES		
	-ATC/ATC Coordination failures	YES		
1.2	Whether any turbulence data reports have been received and sent to MECMA	YES		*(No reports received)*
1.3	Whether traffic data has been sent	YES		
1.4	National Safety Plan provided to MECMA	YES		
	Feedback to MECMA on audit report (Due by 01/08/2003)	-	No	Not due yet
	Final Review due 25 Aug. 2003 at TF/9 Meeting	-	No	Not due yet

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIREMENTS

STATE: UNITED ARAB EMIRATES

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FIR(s): EMIRATES

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EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	01/12/2002	X	28/05/2003	X	01/06/2003		01/09/2003			

ATC OPERATIONS ASPECTS

	REQUIRMENTS	ACTION TAKEN		REMARKS
		YES	NO	
2.1	Have appropriate orders been made for purchase of equipment upgrade for ATC systems	YES		Installation after 27.11.03
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	YES	N/A	Safety Plan made Existent LOAs provide for an RVSM environment See appendix 4A for update
2.3	Have training requirements been assessed	YES		
2.4	Issue of AIC	YES		
2.5	Issue of AIP Supplement (15 May 2003)	YES	-	AIP Supplement 03/03 issued on 27 May 2003
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.	YES		

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIREMENTS

STATE: UNITED ARAB EMIRATES

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EVALUATION DATE(s):

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2.8	Conduct of local training for air traffic controllers	-	No	Awareness phase has started-Oct/Nov/03 Training scheduled for October & November 2003
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	YES	-	Included in updated procedures for strip marking
2.10	Is there any need for changes to FDPS?		NO	*Existing FDPS sufficient. Installation of new ATC equipment upgrade will include PDPF upgrade*
2.11	Is there any need to changes in radar display systems? (*where applicable)*		NO	*No need for change*
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)		-	Not applicable
2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*		-	Not applicable
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*		-	Not applicable

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIREMENTS

STATE: UNITED ARAB EMIRATES

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FIR(s): EMIRATES

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EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	01/12/2002	X	28/05/2003	X	01/06/2003		01/09/2003			

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS

	REQUIREMENTS	ACTION TAKEN		REMARKS
		YES	NO	
3.1	National Regulations for RVSM Implementation	YES		
3.2	Aircraft and Operators approval/guidance	YES		
3.3	Procedures for non-compliant aircraft	YES		
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers	YES		
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval	89%	-	66 out of 74 Aircraft
3.6	How many national operators have full RVSM approval	7		
3.7	What is the percentage ratio of aircraft fleet	93%		
3.8	Did you provide MECMA with RVSM approval documentation	YES		
3.9	Did you nominate your State RVSM Programme Manager	YES		
3.10	Certification	YES		Incorporated in the safety plan

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIREMENTS

STATE: UNITED ARAB EMIRATES

Appendix C

FIR(s): EMIRATES

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EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	01/12/2002	X	28/05/2003	X	01/06/2003		01/09/2003			

OTHER GENERAL REQUIRMENTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
FUNDING/BUDGETARY ALLOTMENT	YES	-	
TRAINING	YES	-	Material available planning in progress Scheduled for Oct/Nov. 03

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: YEMEN

Appendix C

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003	X	28/05/2003	X		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 deviations observed or reported
	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	✓		
1.4	National Safety Plan provided to MECMA	✓	-	
	Feedback to MECMA on audit report (Due by 01/08/2003)	-	No	Not due yet
	Final review (Due by 25/08/2003)	-	No	Not due yet

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: YEMEN

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EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003	X	28/05/2003	X		01/09/2003				

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	
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	Refer to Appendix 4A for update
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	-	No	
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	According to plan by end May 03
2.8	Conduct of local training for air traffic controllers	✓	-	Initial training, April 2003

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: YEMEN

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EVALUATION DATE(s):

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2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	Flight strips being prepared manually at present
2.10	Is there any need for changes to FDPS?	-	No	
2.11	Is there any need to changes in radar display systems? (*where applicable)*	-	-	Not applicable
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	-	-	Not applicable
2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	-	-	Not applicable
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	-	-	Not applicable

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: YEMEN

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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	-*	-	March 2003
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	90%	-	
3.6	How many national operators have full RVSM approval	-	-	1
3.7	What is the percentage ratio of aircraft fleet	-	-	To be notified in due course
3.8	Did you provide MECMA with RVSM approval documentation	✓	-	
3.9	Did you nominate your State RVSM Programme Manager	✓	-	
3.10	Certification	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: YEMEN

Appendix C

Rev.004

EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003	X	28/05/2003	X	01/09/2003		

OTHER GENERAL REQUIRMENTS

REQUIREMENTS	ACTION TAKEN		REMARKS
	YES	NO	
FUNDING/BUDGETARY ALLOTMENT	✓		INFORMATION TO BE PROVIDED AT A LATER STAGE
TRAINING	✓		

MID RVSM TF/8
Appendix D to the Report

INTERNATIONAL CIVIL AVIATION ORGANIZATION

EIGHTH MEETING OF THE MIDDLE EAST RVSM TASK FORCE

(Abu Dhabi, 25-28 May 2003)

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15 June 2003

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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	**:**	**2.1**
Edition Date	**:**	**28/05/2003**

This draft Document has been 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.

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2.1	28/05/2003	RVSM Non-exclusion areas no longer applicable	

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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 an RVSM Airspace, from a non-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 an RVSM Airspace, into a non-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.

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. 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**.

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

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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

[1] 3rd Continental RVSM Real-Time Simulation, S08, (Conclusions)

airspace structure including, for example, resectorisation and/or the introduction of additional sectors.

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.

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) - 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.

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/ASIA Regions

- 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:

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.

Bahrain
Egypt
Iran
Israel
Jordan
Kuwait
Lebanon
Oman
Qatar
Saudi Arabia
Syria
UAE
Yemen

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:

Cruising Levels Appropriate to Direction of Flight - MID Region (FL 280 TO FL 430)

Track* from 180 degrees to 359 degrees**	Track* from 000 degrees to 179 degrees**
← FL 430	*(non-RVSM level)*
	FL 410 →
← FL 400	
	FL 390 →
← FL 380	
	FL 370 →
← FL 360	
	FL 350 →
← FL 340	
	FL 330 →
← FL 320	
	FL 310 →
← FL 300	
	FL 290 →
← FL 280	*(non-RVSM level)*

* 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.

Note: With a view to have consistency of terms used in other adjacent regions, the use of the terms **GAT** and **OAT** will be interpreted as follows:

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.

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 For the purpose of providing a clear indication to ATC that where non-RVSM

RVSM Airspace, in addition to military operations, operators of customs or police

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.

5.1.2 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.

5.1.3 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 te RVSM approval status

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 290 or above shall ins in Item 18 of the ICAO Flight Plan.

5.1.5.1 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 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 RVSM Airspace, and the requested flight level for that portion of the route commencing immediately after the RVSM exit point.
- *Note: there are no requirements for the inclusion of entry/exit points between two adjacent RVSM areas with similar rules of procedure (eg. MID and EUR*

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 for traffic transiting to/from RVSM and non-RVSM areas, 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 an RVSM Airspace to a

destination aerodrome within the lateral limits of an RVSM Airspace shall include the following in Item 15 of the ICAO Flight Plan:

a) the entry point at the lateral limit of an 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 an 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 an RVSM Airspace to a **destination aerodrome outside** of the lateral limits of an 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 an RVSM Airspace; and

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

~~*Note: With a view to facilitate the integration of earlier generation aircraft, not approved for RVSM operations, and intending to operate on domestic flights within RVSM airspace, non exclusion areas will be established with a view to accommodate these operations.*~~

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 an RVSM Airspace, with a portion of the route within the lateral limits of an RVSM Airspace, shall include the following in Item 15 of the ICAO Flight Plan:

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

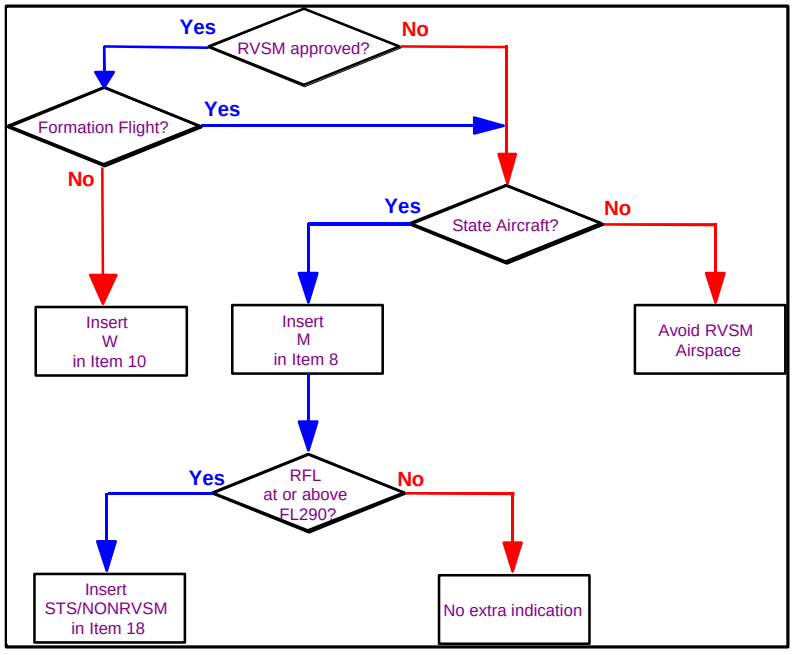


Figure 3: Overview of RVSM Flight Planning Requirements for Operators.

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 information, to enable controllers to be systematically aware of the aircr - 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.

5.2.1.3 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 an RVSM Airspace, could be cleared to a flight level **above** an RVSM Airspace, i.e. FL 430.

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.

5.3 Vertical Separation Minima (MID RVSM AREA)

5.3.1 The applicable vertical separation minimum between RVSM approved aircraft operating within an 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 an 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 an 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 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 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 organization 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.

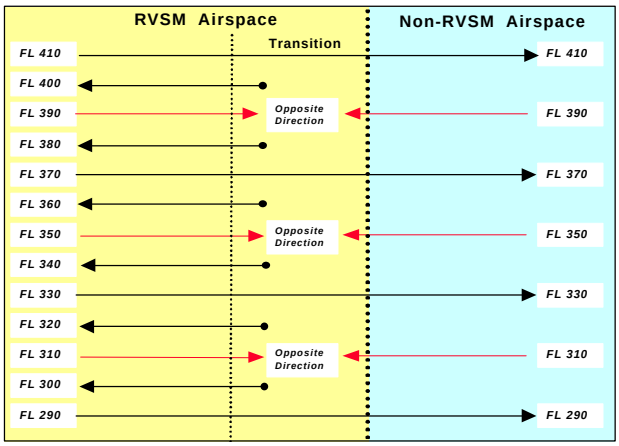


Figure 4: Scenario where non-RVSM airspace is located adjacent to, and east of, RVSM airspace.

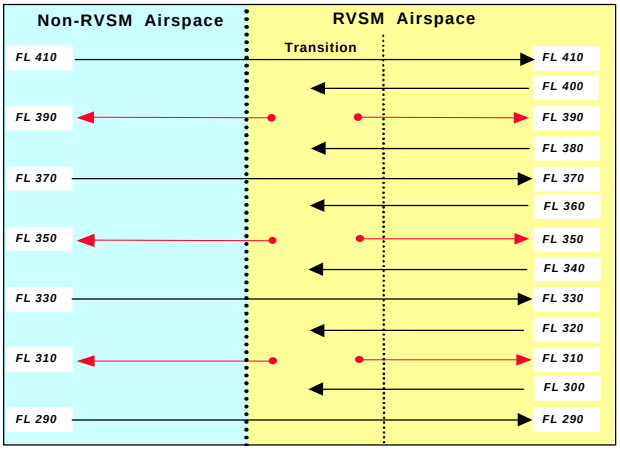


Figure 5: Scenario where non-RVSM airspace is located adjacent to, and west of, RVSM airspace.

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 an 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.

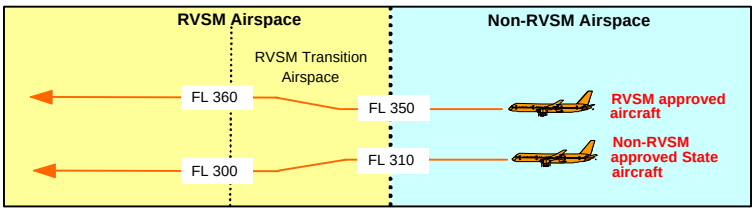


Figure 6: Transition of RVSM approved aircraft and non-RVSM approved State aircraft from non-RVSM airspace to RVSM airspace, where non-RVSM airspace is east of the RVSM airspace.

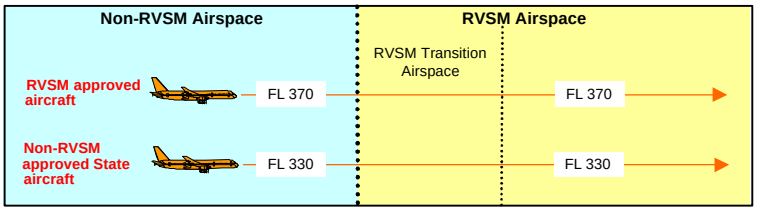


Figure 7: Transition of RVSM approved aircraft and non-RVSM approved State aircraft from non-RVSM airspace to RVSM airspace, where non-RVSM airspace is west of the RVSM airspace.

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 3b): and/or

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

c) the Inter-Centre Letter of Agreement.

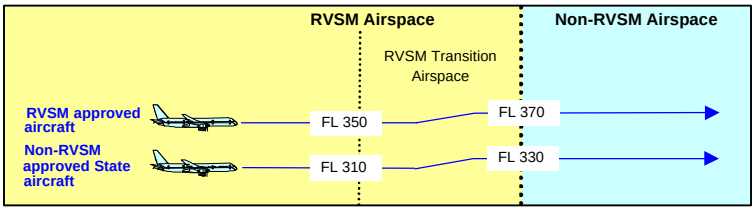


Figure 8: Transition of RVSM approved aircraft and non-RVSM approved State aircraft from RVSM airspace to non-RVSM airspace, where non-RVSM airspace is east of the RVSM airspace.

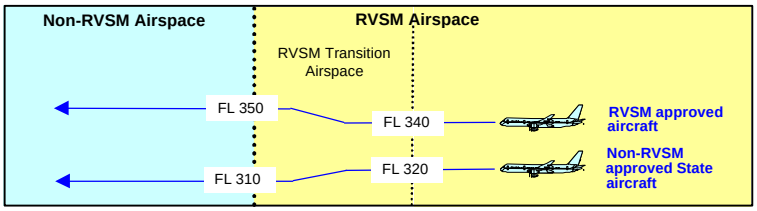


Figure 9: Transition of RVSM approved aircraft and non-RVSM approved State aircraft from RVSM airspace to non-RVSM airspace, where non-RVSM airspace is west of the RVSM airspace.

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.

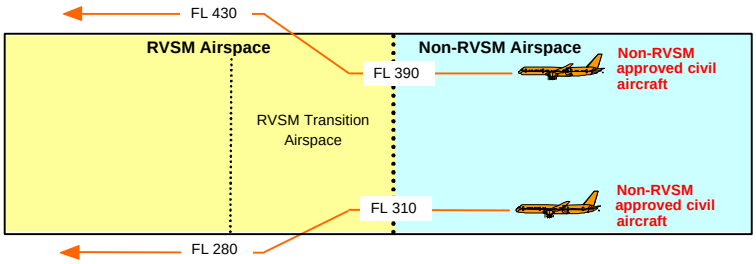


Figure 10: Transition of non-RVSM approved civil aircraft from non-RVSM airspace to RVSM airspace, with departure and destination aerodromes outside of the laterals limits of the RVSM airspace.

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.

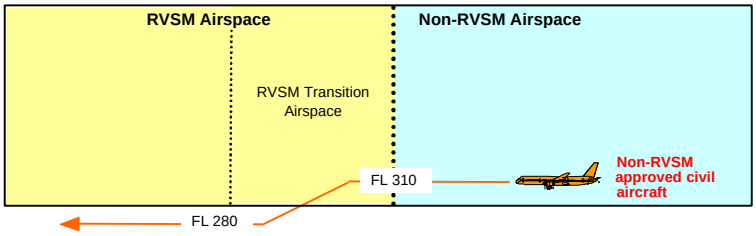


Figure 11: Transition of non-RVSM approved civil aircraft from non-RVSM airspace to RVSM airspace, with a departure aerodrome outside of the lateral limits of the RVSM airspace and a destination aerodrome within the lateral limits of the RVSM airspace.

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.

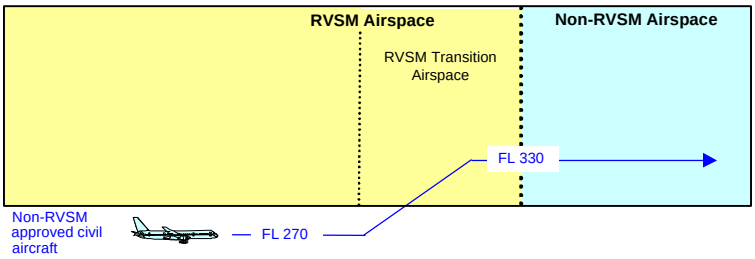


Figure 12: Transition of non-RVSM approved civil aircraft from RVSM airspace to non-RVSM airspace, with a departure aerodrome within the lateral limits of RVSM airspace and a destination aerodrome outside of the lateral limits of the RVSM airspace.

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 an 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 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 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)

Note: Additional information on equipment list that must be operating prior to entering RVSM airspace is indicated in the OPS/Air Manual

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 90 m (300 ft) or more, the controller shall inform the pilot accordingly and the pilot

5.6.6.1 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 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 label and/or radar position symbol, for 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

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 an RVSM Airspace need not be cleared out of RVSM airspace. If the pilot has informed ATC that

cleared flight level, the establishment of an appropriate horizontal separation minimum, or an increased vertical separation minimum may be accomplished within the 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.

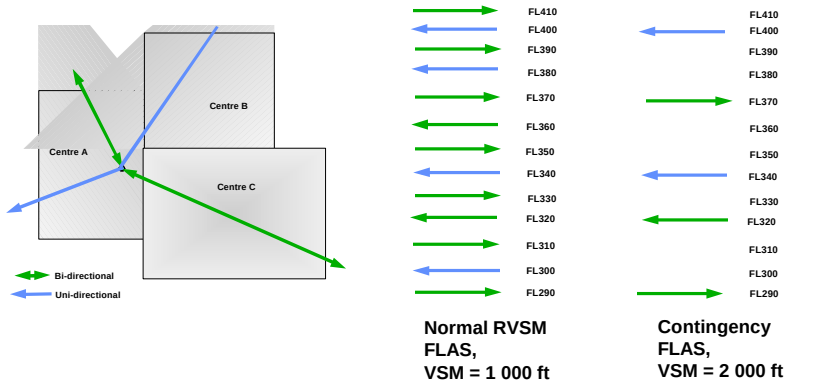
Severe Turbulence Forecast

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.



The application of the contingency FLAS, when required, is facilitated by virtue of the fact that the

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 Centre B is
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 MID 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.	**UNABL E RVSM DUE TURBU ENCE***
degraded below the MASP S 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 ontact on all frequencies within the lateral limits of the MID RVSM Airspace until such time as the p roblem ceases to exist, or the aircraft has exited M D RVSM Airspace)*	**UNABL E RVSM DUE EQUIPM IENT***
For a pilot to report the ab lity to resume operations within the MID RVSM airsp ace after an equipment or weather-related contingenc y.	**READY TO RESUME RVSM***
For a controller to conf m that an aircraft has regained its RVSM approv l status, or to confirm that the pilot is ready to resume RVSM operations.	**REPOR T 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.	**NEGAT /E RVSM** *or* **NEGAT /E RVSM STATE** **AIRCRA FT [***as applicable***]**
To verbally supplement estimate messages of non-RVSM approved aircraft.	**NEGAT /E RVSM** *or* **NEGAT /E RVSM STATE** **AIRCRA FT [***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].	**UNABL RVSM DUE** **TURBU ENCE [***or* **EQUIPMENT,** *as appli able***]**

5.8 Inter-Centre Co-ordination

Flight Plans

Note: Detailed procedures for the handling/ verification of flight plans for traffic origination within and outside of the MID Region are further elaborated under Para.8.2.

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 an 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 Furthermore, 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.

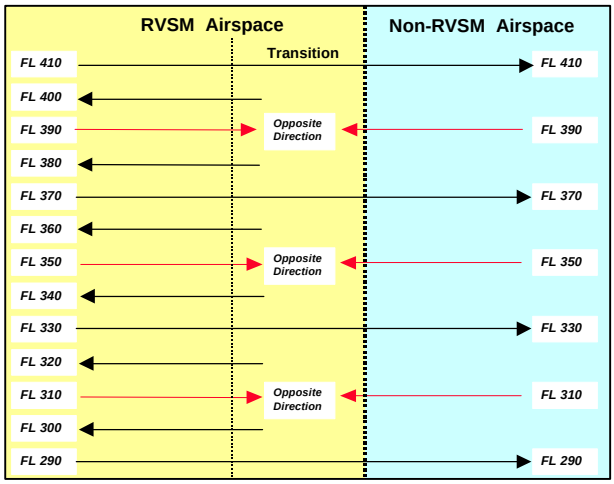


Figure 14: Scenario where non-RVSM airspace is adjacent to, and east[1] of, RVSM airspace.

[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.

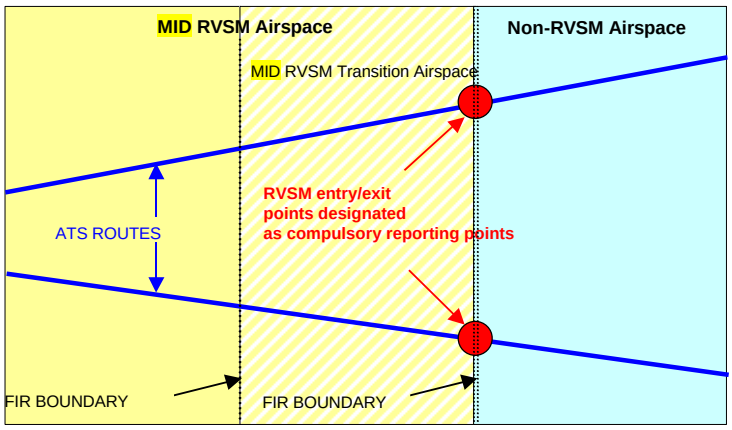


Figure 15: Compulsory reporting points on ATS routes at the boundary between MID RVSM Airspace and adjacent non-RVSM Airspace.

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.

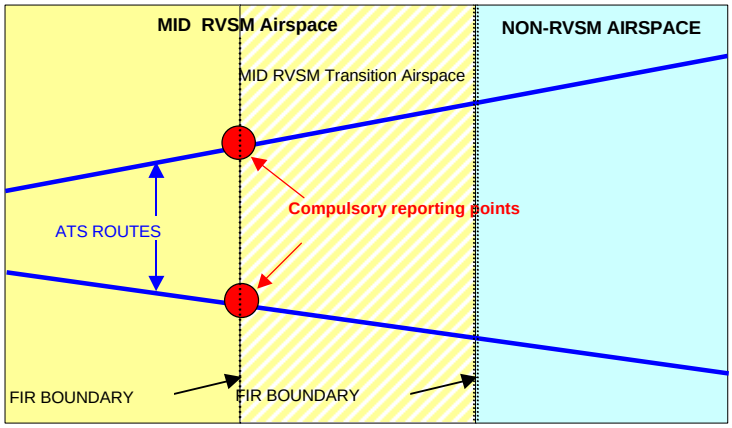


Figure 16: Compulsory reporting points on ATS routes at the boundary between MID RVSM Airspace and MID RVSM Transition Airspace.

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.

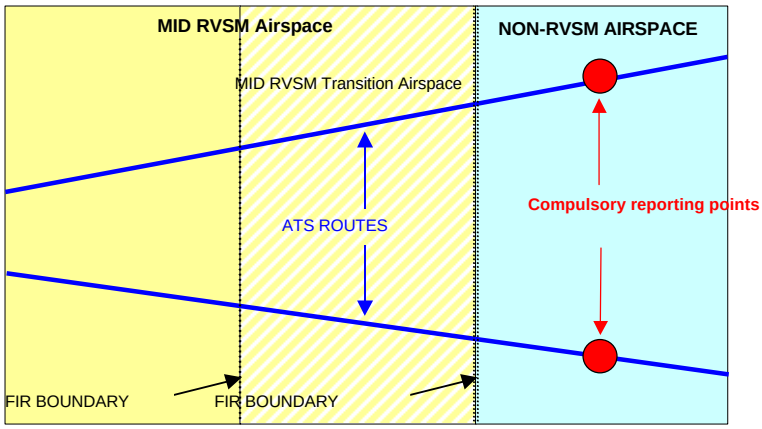


Figure 17: Compulsory reporting points within adjacent non-RVSM airspace on ATS routes which cross the lateral limits of the MID RVSM Airspace.

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). Although, radio communication failure (RCF) procedures in the MID region will be aligned with procedures applicable in the European RVSM airspace, when operating in the oceanic

maintain the last assigned speed and level or minimum flight altitude for a period of 20 minutes instead of 7 minutes.

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).

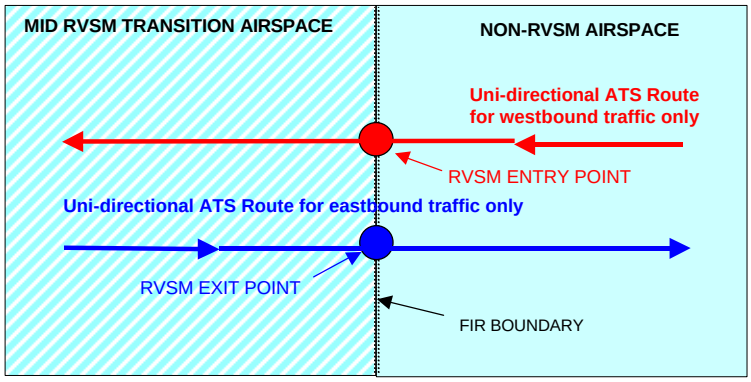


Figure 18: Laterally-spaced, uni-directional ATS routes between MID RVSM Transition Airspace and adjacent non-RVSM airspace.

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.

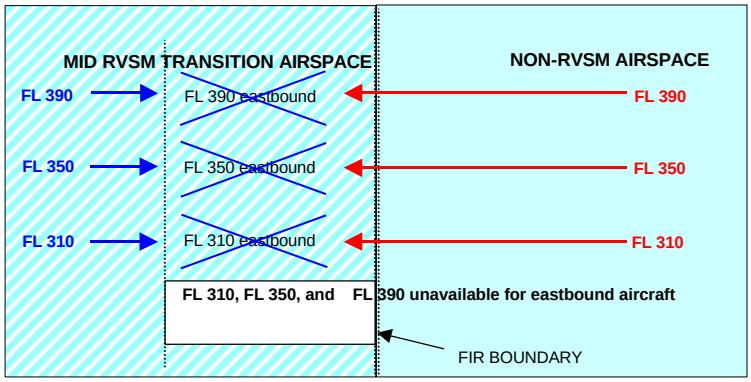


Figure 19: FLAS depicting FL 310, FL 350, and FL 390 discontinued for eastbound aircraft within a portion of the MID RVSM Transition Airspace.

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

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.

FIRs.

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 1:-The period of 7 minutes is to allow the necessary air traffic control and co-ordination measures.

Note 2:-
instrument meteorological conditions (IMC), aircraft will maintain the last assigned speed and level or minimum flight altitude for a period of 20 minutes instead of 7 minutes.

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 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) and Procedures

Flights originating within the MID Region

8.2.1 In order to ensure the safe application of 300 m (1 000 ft) vertical separation minimum between RVSM approved aircraft only, it is important that ACCs/UACs verify the correctness of the information contained in all items of the flight plan for the purpose of:

- rejecting flight plans filed, which do not qualify for operation within the MID RVSM Airspace on the basis of the information filed;
- annotating flight plans and, in consultation with the operator, amending as necessary the data, for flights 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.

Flights originating outside the MID Region

8.2.2 For flights originating outside the MID Region intending to over-fly or land within the Region, the ACCs/UACs concerned shall ensure that the relevant RVSM flight plan information (data provided under item 8, 10, 15 and 18) has been properly filed.

8.2.3 In support of these requirements, the appropriate agency or AIS unit 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.

Note: In addition to the procedures contained in the Procedures for Air Navigation, Doc4444, ATM/501, regarding the use of repetitive flight plans, (Chapter 16.4-Implementation of RPL procedures), the receiving unit/,agency, or AIS Office, as appropriate, shall, as soon as an RPL is received, verify the correctness of the data.

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 States within the MID Region, 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.

8.2.6 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. If in some States, by specific exemption, some domestic non-RVSM approved flights have access to RVSM airspace, then flight planning strips and radar display systems must equally provide a clear indication of their non-RVSM approval status.

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.

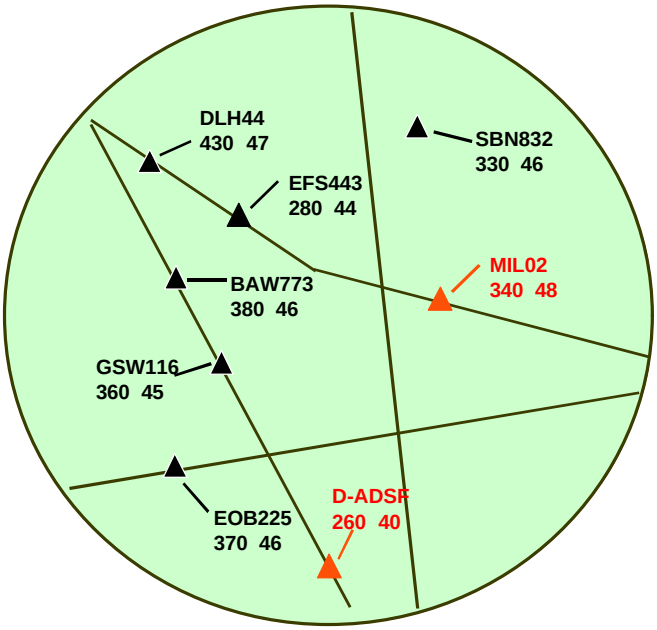
Note: The vertical extent of the level bands will have been determined locally as a function of specific local operational requirements in terms of sectorisation, etc.

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.

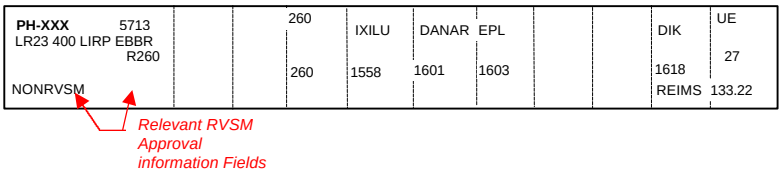
8.4 Flight Strips (Paper or Electronic)

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.

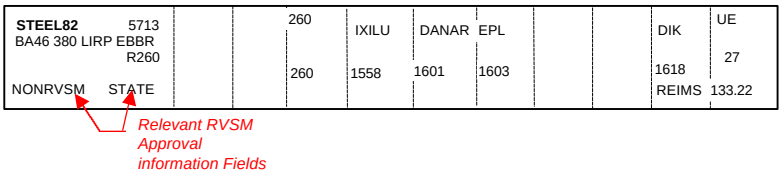
Note: If there are no paper or electronic strips, these requirements shall be applied

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).

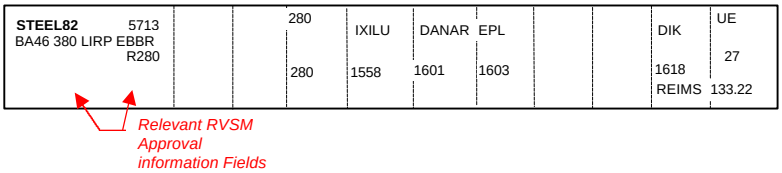
8.4.3 -RVSM approval status **shall** be displayed on the flight strip. (Message example: **NONRVSM**).



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)

Note: Although recognising that OLDI is not the ICAO recommended protocol to be used for the transfer of data, MIDANPIRG has endorsed the use of OLDI as an interim measure pending the use/availability of AIDC.

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

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

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 (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 optimization 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

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experiencing an 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.

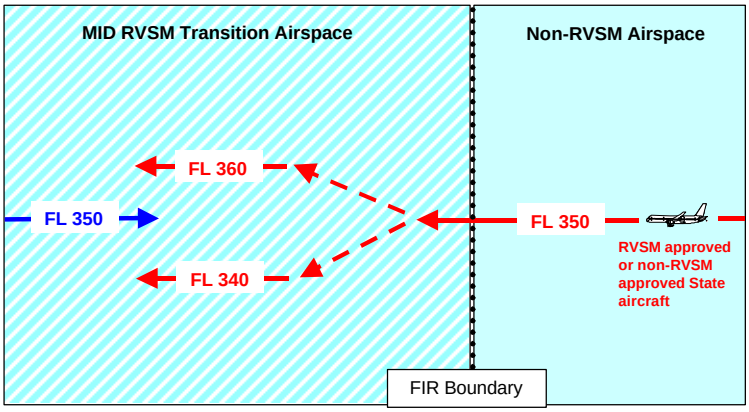


Figure 21: Traffic operating from adjacent non-RVSM airspace at FL 350 westbound is established at FL 340 or FL 360 within MID RVSM Transition Airspace.

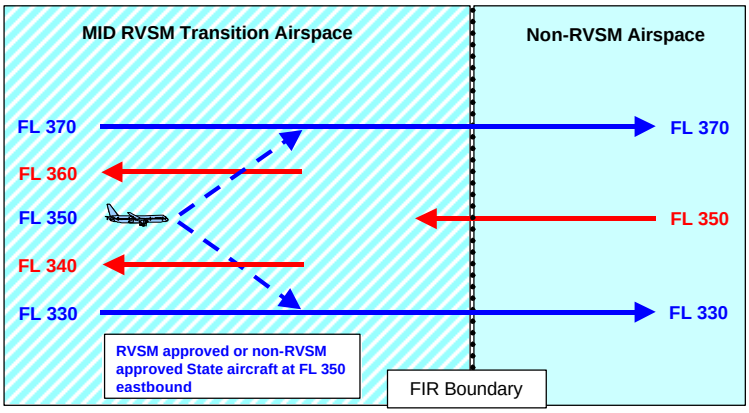


Figure 22: Traffic within the EUR RVSM Transition Airspace at FL 350 eastbound is established at FL 330 or FL 370 prior to the boundary with adjacent non-RVSM Airspace.

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:

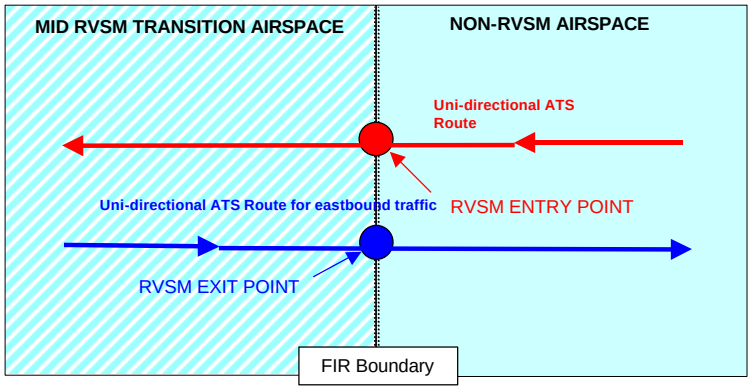


Figure 23: Laterally-spaced, uni-directional ATS routes between MID RVSM Transition Airspace and adjacent non-RVSM airspace.

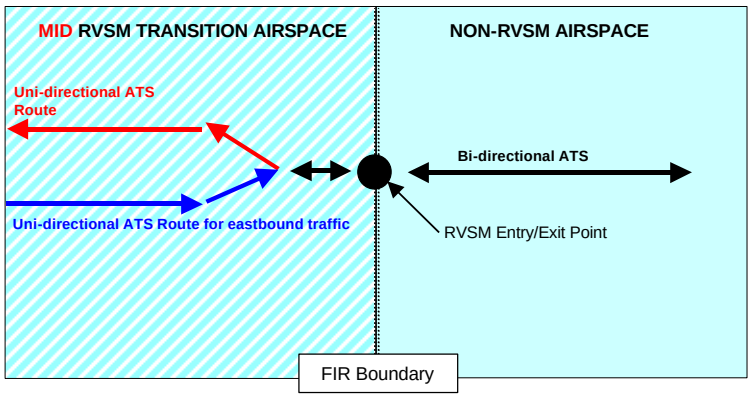


Figure 24: Laterally-spaced, uni-directional ATS routes within MID RVSM Transition Airspace.

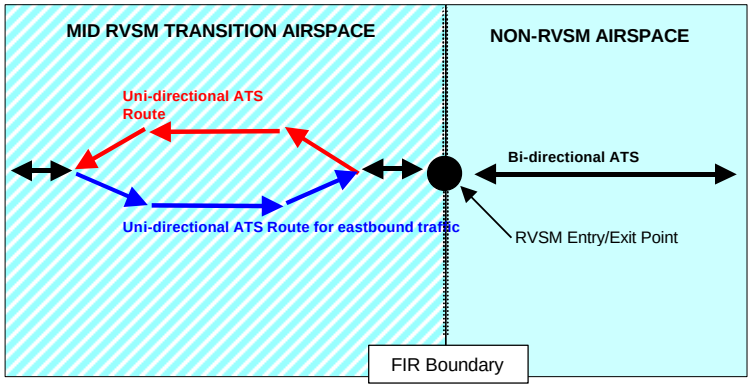


Figure 25: Laterally-spaced, uni-directional route section on a bi-directional ATS route within MID RVSM Transition Airspace.

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:

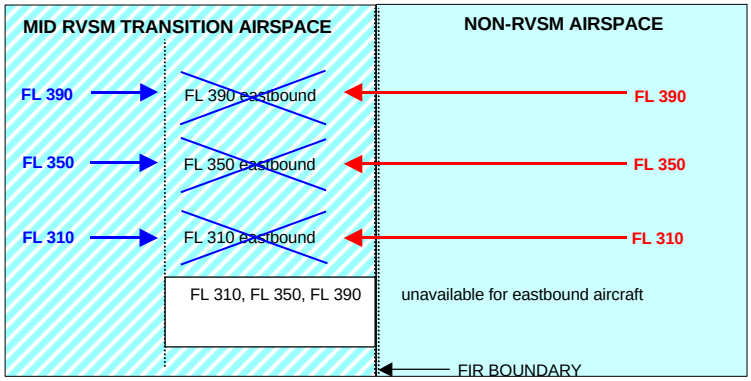


Figure 26: FLAS depicting FL 310, FL 350, and FL 390 discontinued for eastbound aircraft within a portion of the MID RVSM Transition Airspace.

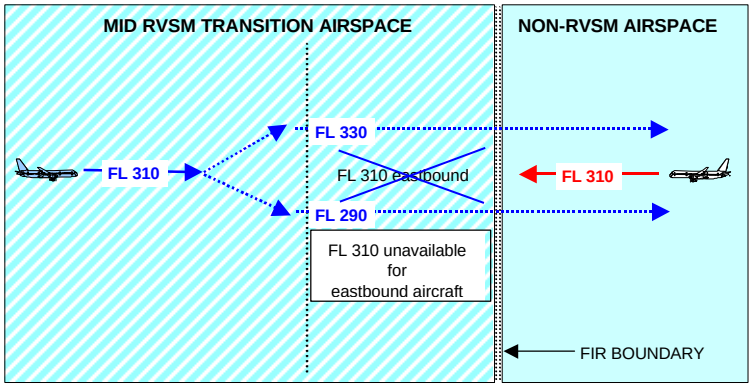


Figure 27: Opposite direction aircraft at FL 310. FLAS discontinues FL 310 for eastbound aircraft within a portion of the MID RVSM Transition Airspace.

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 -

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

ration 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.*

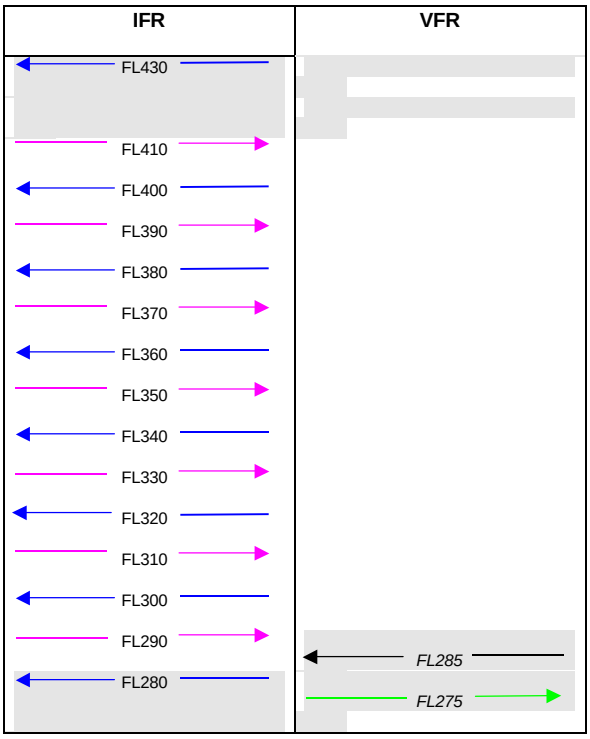
10.7 The implementation of MID RVSM is being undertaken with due regard for the operational performance of ACAS II. The mandatory carriage and operation of ICAO Standards And Recommended Practices (SARPs) compliant ACAS II in MID Region, as specified in paragraph 10.1, precedes the implementation of MID RVSM.

---***END***---

Appendix A

RVSM Table of Cruising Levels

(Reference: ICAO Annex 2, Appendix 3, Paragraph a))

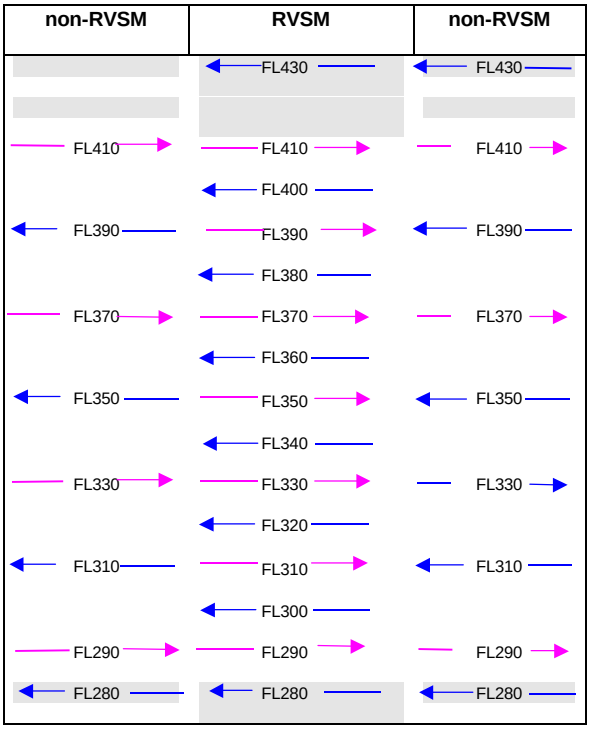


Note 1: The provisions of ICAO Annex 2 preclude VFR flight above FL 290. Accordingly, attention is drawn to the absence of VFR cruising levels above FL410, where the VSM reverts to 2 000 ft.

Note 2: Lower minima for VFR flights have been adopted in the MID Region and are indicated in the respective AIPs.

Appendix B

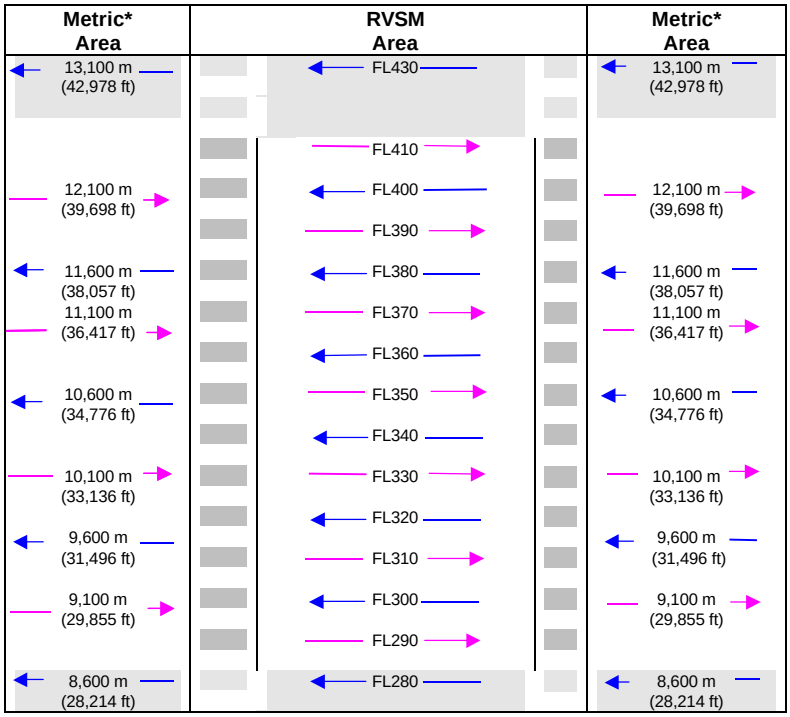
RVSM/non-RVSM Transition



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

: 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

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

a 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

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 m) and/or 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

Following is an extract of the relevant section (Parts 7) of the ICAO Docu 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

aircraft

plan 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 x 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

the 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.]

6.2.1.2.1 All 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.

6.2.1.2.2 Any 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

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