INTERNATIONAL CIVIL AVIATION ORGANIZATION

MIDDLE EAST OFFICE

REPORT OF THE SEVENTH MEETING OF
MIDANPIRG RVSM TASK FORCE
(MID RVSM TF/7)

(*Abu Dhabi, 23 26 February 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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* Produced as separate documents
** Available only on ICAO website

PART I - HISTORY OF THE MEETING

1. PLACE AND DURATION

1.1 The Seventh Meeting of MIDANPIRG Reduced Vertical Separation Minimum Task Force (RVSM TF/7), hosted by the UAE, was held at the conference room of the Hilton Hotel, Abu Dhabi, United Arab Emirates (UAE), 23 26 February 2003.

2. OPENING

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

wished them all a successful Task Force meeting. He 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. He also urged the Task Force to expedite outstanding issues so as to assist States in a timely manner, in the implementation process.

2.2 Mr. Mohamed R. M. Khonji, the Deputy Regional Director of the ICAO Middle East Office, Cairo, welcomed the delegates to the meeting and thanked the GCAA of UAE for hosting this Task Force Meeting and for the excellent spirit of cooperation and support which has always prevailed between the UAE and the ICAO MID Regional Office. He also thanked other States and organizations from outside the region which are dedicating their efforts in assisting the MID Region at this critical phase of the implementation process; in particular, Mr. Joe Sultana, from Eurocontrol.

3. ATTENDANCE

3.1 The meeting was attended by a total of 55 participants from 12 States (Bahrain, Egypt, I.R. Iran, Jordan, Kuwait, Lebanon, Oman, Pakistan, Saudi Arabia, Syria, United Arab Emirates and United States of America) and two Organizations (Eurocontrol & IATA). The list of participants is at **Appendix E** 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). The meeting was also supported by Mr. Mohamed R. M. Khonji, Deputy Regional Director, ICAO Middle East Office.

5. LANGUAGE

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

MID RVSM TF/7
History of the Meeting

6. AGENDA

6.1 The following Agenda was adopted:

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

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

3) ATC operations aspects (ATC/WG)

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

5) Any other business

7. CONCLUSIONS AND DECISIONS - DEFINITION

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

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

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

8. LIST OF CONCLUSIONS AND DECISIONS

DRAFT CONCLUSION 7/1: FIRS NOT INCLUDED IN THE PLANNING PROCESS
DRAFT CONCLUSION 7/2: OPERATOR READINESS
DRAFT CONCLUSION 7/3: ESTABLISHMENT OF A DIRECT ROUTE BETWEEN POINTS BEIRUT AND DAMASCUS FIRS
DRAFT CONCLUSION 7/4: DUAL ROUTES EASTERN MEDITERRANEAN-MID
DRAFT CONCLUSION 7/5: FINALIZATION OF THE ATC MANUAL
DRAFT CONCLUSION 7/6: ELABORATION OF OPERATIONAL LETTERS OF AGREEMENT
DRAFT CONCLUSION 7/7: RVSM IMPLEMENTATION CHANGE-OVER TIME IN THE MID REGION
DRAFT CONCLUSION 7/8: FINALIZATION OF THE MID RVSM OPS/AIR APPROVAL MANUAL

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 FIFTH MEETING OF THE RVSM TASK FORCE.

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

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

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 7/9: ESTABLISHMENT OF A REGIONAL SAFETY AND MONITORING AGENCY That: a) the task of monitoring safety in conjunction with implementation of RVSM in the Middle East Regions be assigned to a Central Monitoring Agency; b) the monitoring agency, referred to as the Middle East Central Monitoring Agency (MECMA), will be established and staffed by the - GCAA) based at the Head Office in Abu Dhabi; and c) the Terms of Reference of the MECMA is at Appendix 5C to the report on Agenda Item 5	action taken	
CONCLUSION 7/10: SAFETY ANALYSIS That, the safety analysis required for RVSM implementation in the Middle East Region be carried out by MECMA under the auspices of the UAE General Civil Aviation Authority initially based on information from, or in cooperation with one or more suitably qualified regional organizations.	ongoing	
CONCLUSION 7/11: REPORTING OF DATA FOR CARRYING OUT SAFETY ASSESSMENT	ongoing	

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	STATUS	REMARKS
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.		
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	ongoing	

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	STATUS	REMARKS
b) MECMA will update the table in the light of data and experience gained in other Regions.		
CONCLUSION 7/13: CIVIL/MILITARY COORDINATION That, in order to ensure the safe and coordinated implementation of RVSM in the MID Region, States should ensure that the Military Authorities are fully involved in the planning and implementation process and give due regard to LIM MID (COM/MET/RAC) RAN Meeting 1996, Recommendations 2/9 to 2/14.	ongoing	
CONCLUSION 7/14: CREATION OF NON EXCLUSION AREAS WITHIN RVSM AIRSPACE That, with a view to facilitate the integration of earlier generation aircraft not approved for RVSM operations, intending to operate on domestic networks within RVSM airspace, non exclusion areas be created in order to accommodate these operations.	ongoing	
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	ongoing	

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	STATUS	REMARKS
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.*		
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	ongoing	
CONCLUSION 7/18: GUIDANCE MATERIAL FOR AIRWORTHINESS AND OPERATIONAL APPROVAL That, States in the MID Region adopt the guidance material contained in	ongoing	Confirmation from States required

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

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	STATUS	REMARKS
Status of Conclusions/Decisions emanating from the RVSM TF-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.

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 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 - 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	
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.	ongoing	

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	STATUS	REMARKS
b) The traffic data for the last week (17 23 January) should reach MECMA by 30 January 2003.		
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.	ongoing	Safety plan already developed by Yemen
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;	Action taken	Although not in accordance with the MID Plan, alternative arrangements have been made

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	STATUS	REMARKS
b) the implementation be completed by 26 December 2002 and remains in place until the implementation of RVSM		
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

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	STATUS	REMARKS
CONCLUSION 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.	ongoing	Coordinating with IATA for the convening of the meeting
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).	ongoing	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	ongoing	

STATUS OF CONCLUSIONS AND DECISIONS RELATING TO THE IMPLEMENTATION OF RVSM IN THE MID REGION AS ENDORSED BY MIDANPIRG/7 MEETING (CAIRO, 21 -25 January 2002)		
CONCLUSION/DECISION	STATUS	REMARKS
Office, as soon as possible, preferably prior to 31st January 2003.		
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.	ongoing	Inputs from States awaited

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MID RVSM TF/7
Appendix 1B to the Report on Agenda Item 1

RVSM PROGRAMME MANAGERS

STATE & NAME	TITLE/CONTACT DETAILS
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REPORT ON AGENDA ITEM 2: SAFETY AND AIRSPACE MONITORING ASPECTS (SAM/WG)

2.1 The Work Group reviewed its terms of reference and noted in particular, the requirement to:

on of the Target Level

*Note:- **Appendix 2A** to the report on Agenda Item 2.*

2.1.1 Additionally the normal working arrangements, whereby the Task Force Chairman, Work Group Rapporteurs and the ICAO Secretariat to the widest possible extent undertake co-ordination with other working group and with the Task Force as a whole, were noted.

2.2 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

including those related to RNP, are as stated in **Appendix 2B** to the report on Agenda Item 2.

2.2.1

Middle East Central Monitoring Agency (MECMA)

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Abu Dhabi

United Arab Emirates

Telephone:	+971 2 405 4339	or	+971 2 405 4230
Fax:	+971 2 405 4316		*(new number)*
Email:	traffic@mecma.com		(*for forwarding of traffic samples*)
Website:	www.mecma.com		

2.2.2 MECMA has expanded its website www.mecma.com, presenting the background and terms of reference of MECMA. Furthermore, forms for reporting of traffic data, coordination failures, calculation of flying time in the FL290/FL410 level band and large height deviations have been updated. Links to ARINC and CSSI websites have also been established to facilitate access to GMU monitoring services.

2.3 Readiness Review

2.3.1 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, UAE and Yemen. The review was based on *actual* approvals data as distinct from the assessment presented at TF/3 in August 2001, where the preliminary readiness assessment was based on airframe *potential* for RVSM approval.

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

2.3.2 Another difference from preliminary readiness assessment was that the final readiness assessment was based on FIR-flights as distinct from unique flights, the difference being that a flight was counted once for each FIR in which it, at some portion of the flight was recorded as operating above FL255. The task force decided to use this methodology to obtain a more authentic measure of operational impact of RVSM status.

2.3.3 The meeting recalled that MID RVSM Task Force has set the minimum for approved flights to 90% as criterion for RVSM readiness.

2.3.4 The period for the traffic sampling was decided in MID RVSM TF/6 Conclusion 6/1 and the guidelines for the sample were specified in the TF/6 Report on Agenda Item 3 paragraph 3.4.6 and the form in Appendix 3C. Table 2-1 presents the format. The form is also posted on the MECMA website (mecma.com), from where it can be downloaded.

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

Table 2-1. Form for Traffic Sample

2.3.5 The following section presents the results of processing the traffic sample obtained from several Flight Information Regions (FIRs) in the MID region. These results are presented in terms of summaries of operators, fleet composition, flight level utilization and origin-destination combinations in MID Region, as obtained from the sample.

2.3.6 Nine States Bahrain, Egypt, Iran, Jordan, Lebanon, Oman, Saudi Arabia, United Arab Emirates (UAE) and Yemen - provided the traffic data in the sample. Only data received by 09 February 2003 had been included in the readiness review. Table 2-2 contains a summary of the traffic data used in this analysis. The detailed daily flight break-up per FIR and totals is shown in **Appendix 2C** to the report on Agenda Item 2**.**

FIR	From	To	Records	Remarks
LLLL			0	No data
HECC	26/12/02	23/01/03	8,684	
OAKX			0	No data
OBBB	26/12/02	23/01/03	3,497	Partial sample
OEJD	26/12/02	23/01/03	4,198	Partial sample
OIIX	26/12/02	23/01/03	13,430	
OJAC	26/12/02	23/01/03	4,378	
OKAC			0	No data
OLBB	26/12/02	23/01/03	2,315	
OMAE	26/12/02	23/01/03	12,569	
OOMM	26/12/02	23/01/03	13,313	
ORBS			0	No data
OSTT			0	Data late
OYSC	26/12/02	23/01/03	1,592	
Total			63,976	

Table 2-2. Summary of data contributed to this analysis

2.3.7 **Partial traffic samples had been delivered by two FIRs:**

Bahrain — Only 25% of the actual traffic was included in the original sample due to a data processing error. Additional data was handed over to MECMA during the Task Force meeting, but not included in the assessment because of time required for verification and processing.

Jeddah — Only traffic for the dual unidirectional route structure was included in the original sample due to a misinterpretation of the requirements. The remaining data for international flights was handed over to MECMA during the Task Force meeting, but not included in the assessment because of time required for verification and processing. Data for domestic flights will be provided by mid-March.

Kuwait — No data had been provided in time for processing. However, the Kuwaiti delegation agreed to provide the required sample.

Kabul — No data was provided. Also, Afghanistan had not participated in any part of the Middle East RVSM planning process. Although officially accredited to the MID Region, Afghanistan has actually been participating in the Asia/Pacific planning process.

Baghdad — No data was provided. Also, Iraq had not participated in any part of the Middle East RVSM planning process.

Tel Aviv — No data was provided. Also, Israel had not participated in any part of the Middle East RVSM planning process.

2.3.8 As a result of complete lack of data of any kind from Baghdad, Kabul and Tel Aviv FIRs, MECMA informed the meeting that it is not in a position to draw conclusion related to readiness for RVSM implementation nor will it be possible to carry out the necessary safety assessment for these FIRs. The Task Force noted the situation and reached the following conclusion:

DRAFT 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.

2.3.9 Only traffic at FL255 and above was to be included in the data. However, as some records had blank fields for entry- or exit levels, and all flights contained in the traffic samples were included in this analysis regardless of flight level, some regional aircraft types that normally do not operate in RVSM airspace as well as the commercial aircraft types capable of high altitude operations were included in the analysis. The sample days are represented in Figure 2-1.

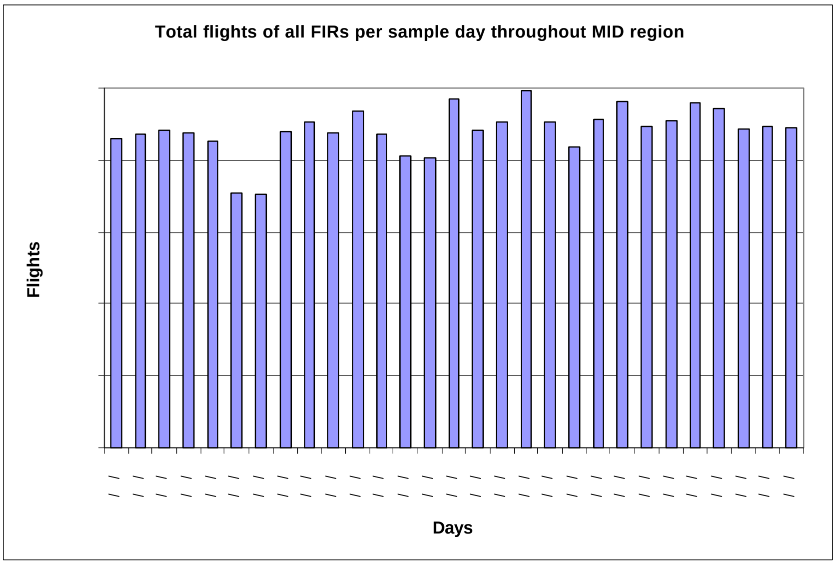


Figure 2-1. Plot of Daily Flight Activity Contributions to MID Region Traffic Sample

2.3.10 Figure 2-2 shows the top 20 commercial operators, in terms of total operations, as observed in the traffic sample. These operators account for over 55 percent of the operations observed in the sample. The top six, representing over 30 percent of total operations in the data sample, are Emirates, Gulf Air, Saudi Arabian Airlines, Qatar Airways, Iran Air and Kuwait Airways**.**

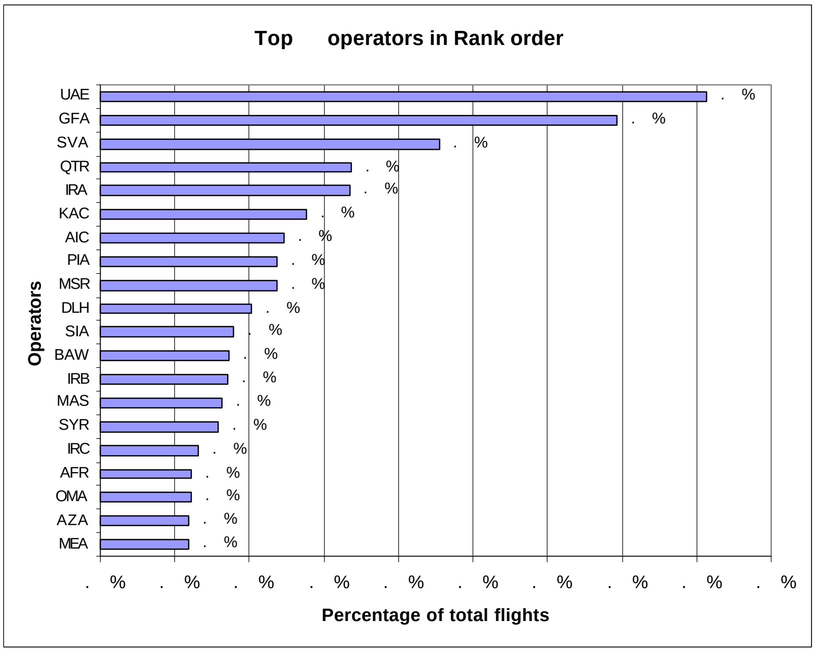


Figure 2-2. Top 20 MID Region Operators in Rank Order

2.3.11 To standardize the presentation of results, the aircraft types observed in the various FIR samples were combined into aircraft groups. The aircraft type group definitions are shown in Table 2-3. Aircraft types not listed in the table were included in the analysis using the designator obtained during the sample.

Aircraft Type Group	**Aircraft Types**
A300	A306, A30B
A320	A320, A319, A321
A330	A332, A333
A340	A342, A343
B727	B721, B722
B73A	B731, B732
B73B	B733, B734, B735, B736, B737, B738, B739
B74A	B741, B742
B74B	B743, B744, B74S, B74F
B757	B752, B753
B767	B762, B763

TABLE 2-3. AIRCRAFT TYPE GROUPS USED IN ANALYSIS OF TRAFFIC SAMPLE

2.3.12 The distribution of the top 20 Aircraft Types/Groups representing over 92 percent of total operations is shown in Figure 2-3. The top five aircraft types/groups, representing roughly 47 percent of the operations in the FIR samples, as defined in Table 2-3, are: A330, A320, B747 (B743, B744, B74S, B74F), B777 and B767. Details of operations by aircraft type as observed in the sample up to 99% are shown in **Appendix 2D** to the report on Agenda Item 2.

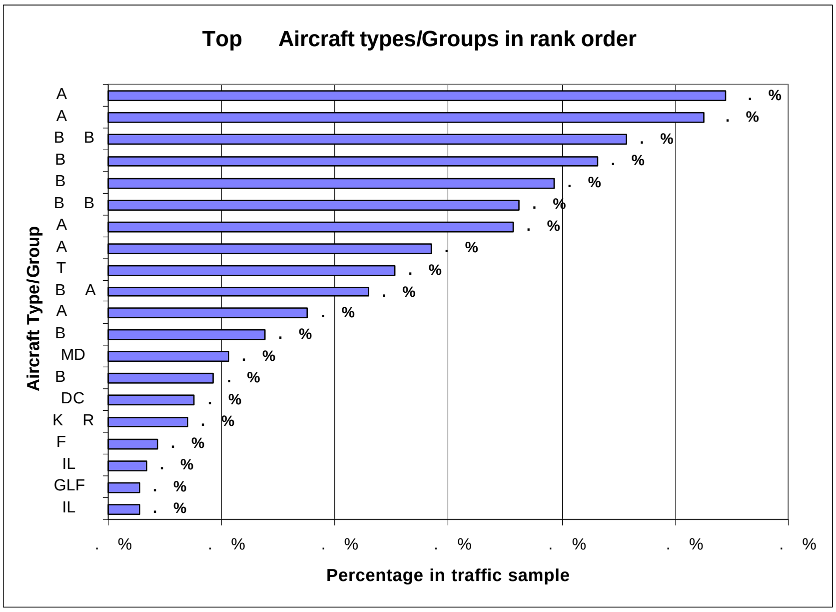


FIGURE 2-3. TOP 20 MID REGION AIRCRAFT TYPES/GROUPS IN RANK ORDER

2.3.13 Figure 2-4 shows the flight level utilization for those flights with flight level data above 255. Data that did not have any flight level information or flight levels less than 260 are not included in this calculation.

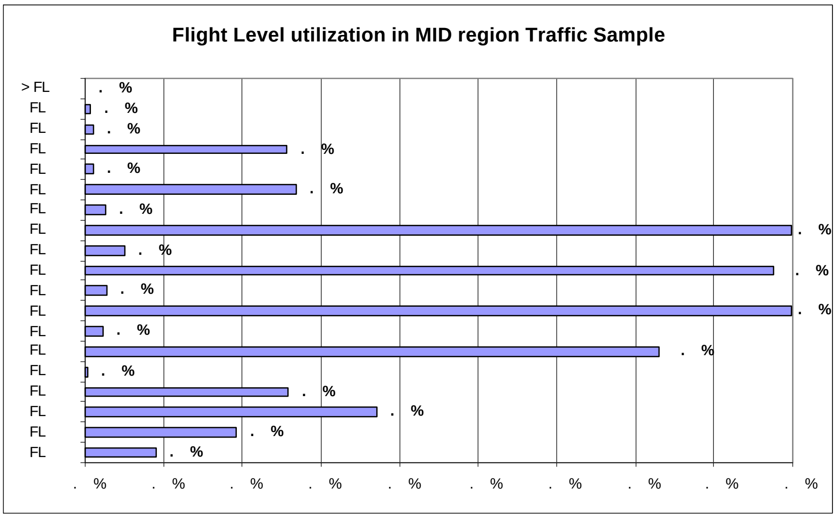


FIGURE 2-4. FLIGHT LEVEL UTILIZATION IN MID REGION DATA SAMPLE

2.3.14 Origin-destination combinations are surveyed to gain an impression of the economical and operational impact of non-RVSM status. The number of origin-destination combinations in the data sample is very large. Figure 2-5 shows the top 20 origin-destination combinations, which represents over 10 percent of total operations in the sample. It should be noted that while the ranking of origin-destination pairs is likely to change significantly with inclusion of additional traffic data, the long-haul fleets are predominantly RVSM approved and no major shift in the overall picture is expected.

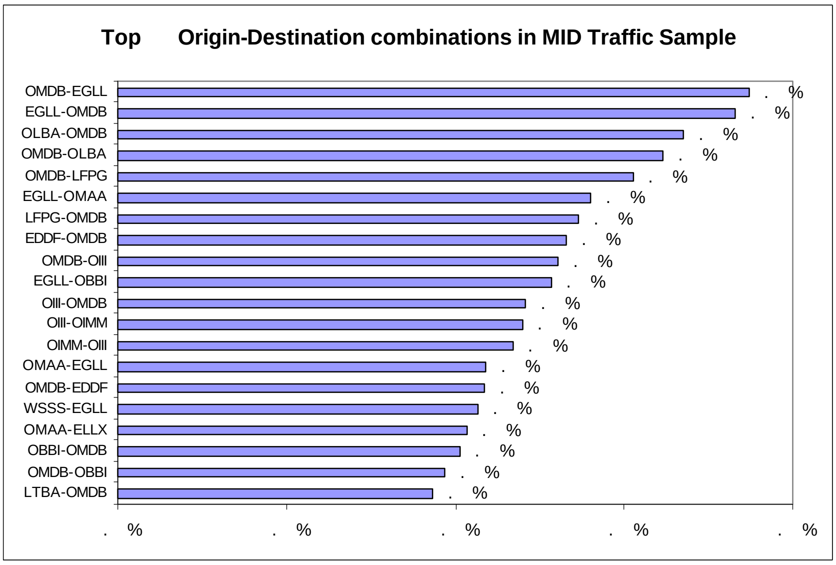


FIGURE 2-5. TOP 20 ORIGIN-DESTINATIONS IN THE MID REGION TRAFFIC SAMPLE

2.3.15 The top 60 State-State origin-destination combinations, as defined by the first two characters of an ICAO airport designator, are presented in Table 2-4. When organized by State of origin and State of destination, the entries in Table 2-4 account for roughly 43 percent of the total traffic operations in the sample

State ICAO designators	State Name	State Name	Count	Percentage	Cumulative Percentage
OI-OI	Iran	Iran	4391	6.86%	6.86%
EG-OM	United Kingdom	United Arab Emirates	1164	1.82%	8.68%
OM-EG	United Arab Emirates	United Kingdom	1133	1.77%	10.45%
OM-ED	United Arab Emirates	Germany	817	1.28%	11.73%
ED-OM	Germany	United Arab Emirates	761	1.19%	12.92%
OP-OM	Pakistan	United Arab Emirates	699	1.09%	14.01%
OP-OE	Pakistan	Saudi Arabia	664	1.04%	15.05%
OM-OP	United Arab Emirates	Pakistan	647	1.01%	16.06%
OL-OM	Lebanon	United Arab Emirates	629	0.98%	17.05%
OE-OP	Saudi Arabia	Pakistan	620	0.97%	18.02%
OM-OL	United Arab Emirates	Lebanon	581	0.91%	18.92%
OM-OI	United Arab Emirates	Iran	547	0.86%	19.78%
HE-LI	Egypt	Italy	505	0.79%	20.57%
OM-LF	United Arab Emirates	France	503	0.79%	21.35%

State ICAO designators	State Name	State Name	Count	Percentage	Cumulative Percentage
OI-OM	Iran	United Arab Emirates	499	0.78%	22.14%
EG-OB	United Kingdom	Bahrain	494	0.77%	22.91%
LF-OM	France	United Arab Emirates	485	0.76%	23.67%
OM-OB	United Arab Emirates	Bahrain	458	0.72%	24.38%
OB-OM	Bahrain	United Arab Emirates	446	0.70%	25.08%
LI-HE	Italy	Egypt	441	0.69%	25.77%
OE-OM	Saudi Arabia	United Arab Emirates	399	0.62%	26.39%
OM-OE	United Arab Emirates	Saudi Arabia	381	0.60%	26.99%
ED-HE	Germany	Egypt	357	0.56%	27.55%
HE-ED	Egypt	Germany	339	0.53%	28.08%
EH-OM	Netherlands	United Arab Emirates	330	0.52%	28.59%
VA-OM	India	United Arab Emirates	324	0.51%	29.10%
HE-HE	Egypt	Egypt	324	0.51%	29.60%
OM-EL	United Arab Emirates	Luxemburg	319	0.50%	30.10%
OS-OM	Syria	United Arab Emirates	317	0.50%	30.60%
OM-OS	United Arab Emirates	Syria	310	0.48%	31.08%
VO-OM	India	United Arab Emirates	308	0.48%	31.56%
OM-VO	United Arab Emirates	India	305	0.48%	32.04%
VT-OM	Thailand	United Arab Emirates	302	0.47%	32.51%
OE-VA	Saudi Arabia	India	302	0.47%	32.99%
OM-OK	United Arab Emirates	Kuwait	289	0.45%	33.44%
LT-OE	Turkey	Saudi Arabia	282	0.44%	33.88%
OM-EH	United Arab Emirates	Netherlands	279	0.44%	34.31%
OB-EG	Bahrain	United Kingdom	276	0.43%	34.75%
LI-OM	Italy	United Arab Emirates	276	0.43%	35.18%
WI-OE	Indonesia	Saudi Arabia	276	0.43%	35.61%
WS-EG	Singapore	United Kingdom	274	0.43%	36.04%
OA-OM	Afghanistan	United Arab Emirates	271	0.42%	36.46%
LI-VR	Italy	VR	266	0.42%	36.88%
LT-OM	Turkey	United Arab Emirates	258	0.40%	37.28%
OL-OE	Lebanon	Saudi Arabia	257	0.40%	37.68%
HE-OM	Egypt	United Arab Emirates	252	0.39%	38.08%
OK-OM	Kuwait	United Arab Emirates	248	0.39%	38.46%
OM-VA	United Arab Emirates	India	246	0.38%	38.85%
OE-LT	Saudi Arabia	Turkey	240	0.38%	39.22%
OE-OL	Saudi Arabia	Lebanon	236	0.37%	39.59%
LI-VA	Italy	India	234	0.37%	39.96%
OM-HE	United Arab Emirates	Egypt	232	0.36%	40.32%
OM-LI	United Arab Emirates	Italy	219	0.34%	40.66%
VA-OE	India	Saudi Arabia	217	0.34%	41.00%
TA-OT		Qatar	210	0.33%	41.33%

State ICAO designators	State Name	State Name	Count	Percentage	Cumulative Percentage
WS-ED	Singapore	Germany	210	0.33%	41.66%
LS-OM	Switzerland	United Arab Emirates	210	0.33%	41.99%
OE-WI	Saudi Arabia	Indonesia	208	0.33%	42.31%
VA-EG	India	United Kingdom	208	0.33%	42.64%
OM-LT	United Arab Emirates	Turkey	207	0.32%	42.96%

TABLE 2-4. TOP 60 STATE-STATE COMBINATIONS

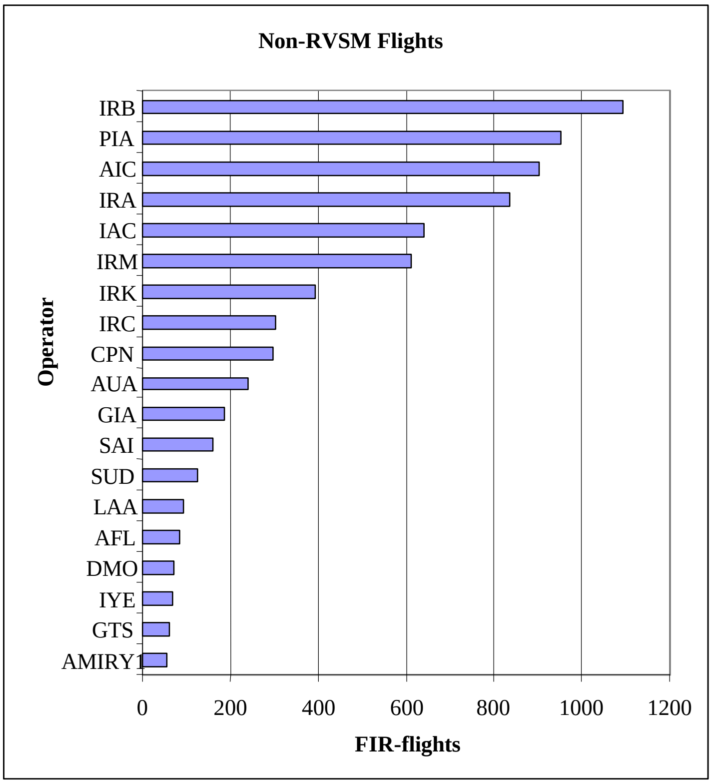
2.3.16 In order to assess the current readiness of the target MID airspace for RVSM, State RVSM approvals contained in the MECMA Approvals Database were assembled. The Database contains all State RVSM approvals reported to either MECMA or Eurocontrol. The approvals were compared to the operator/aircraft-type combinations in order to assess the readiness of the airspace for RVSM. **Appendix 2E** to the report on Agenda Item 2 shows the results of the comparison of State approvals and MASPS-complaint aircraft. As will be observed, the overall result is that 84.7 % of the FIR-flights were RVSM-approved. The Table in **Appendix 2F** to the report on Agenda Item 2 provides a summary of those FIR-flights (15.3 %) that were not RVSM-approved. The table is sorted in descending order both vertically and horizontally, presenting the highest values in the top-left corner of the sheet, the objective being to identify the shortfall in readiness and quantify the problem, which is that another 3,000 of the flights contained in the sample would need to be RVSM-approved to meet the 90% readiness criterion.

*Note: The tables in **Appendices 2E** and **2F** to the report on Agenda item 2 contain minor anomalies due to lack of up-to-date data.*

2.3.17 The meeting noted that, at this in the process, focus must be on those operators / types that are not RVSM approved and top-20 extracts from **Appendix 2F** to the report on Agenda Item 2 for both operators and types are shown in Table 2-5, below. Graphical presentations are presented in Figures 2-6 and 2-7.

Operator	Totals
IRB	
PIA	
AIC	
IRA	
IAC	
IRM	
IRK	
IRC	
CPN	
AUA	
GIA	
SAI	
SUD	
LAA	
AFL	
DMO	
IYE	
GTS	
AMIRY	
SVA	

TABLE 2-5. TOP 20 NON-RVSM OPERATORS


Non-RVSM Flights
Operator
IRB
PIA
AIC
IRA
IAC
IRM
IRK
IRC
CPN
AUA
GIA
SAI
SUD
LAA
AFL
DMO
IYE
GTS
AMIRY1
0
200
400
600
800
1000
1200
FIR-flights

Type	Totals
T	
A B	
A	
A	
B	
F	
B	
B	
B	
B	
IL	
A	
B	
IL	
YK	
IL	
B	
L	
B	
B	

TABLE 2-6. TOP 20 NON-RVSM TYPES

Note 1: The three Airbus types A300, A310 and A320, which all belong to type-groups 1-3, account for more than the 3,000 flights needed to reach the 90% target.

Note 2: The top-three non-RVSM operators IRB, PIA and AIC account for 2,944 flights; sufficient to reach the 90% target.

2.3.18 Iranian operators had encountered a problem related to GMU-monitoring of 12 aircrafts. Service providers had presented a requirement to have the monitoring conducted in the area near the Turkish border and this would be both costly and inconvenient to the concerned operators, who do not normally operate in this area.

2.3.19 During the meeting IATA established contact with CSSI, who confirmed their ability and interest in carrying out the required monitoring for the concerned operators. MECMA confirmed its requirement for all GMU data from the monitored flights, including geographical data (Lat/Long) as well as the voyage reports giving information about on-track segments and navigation systems (GPS, INS, VOR/DME or DME/DME) used by the aircraft.

2.3.20 PIA had contacted both IATA and MECMA to establish contact to approved monitoring providers. The move was welcomed and the requested information provided to PIA to accelerate the RVSM approval process.

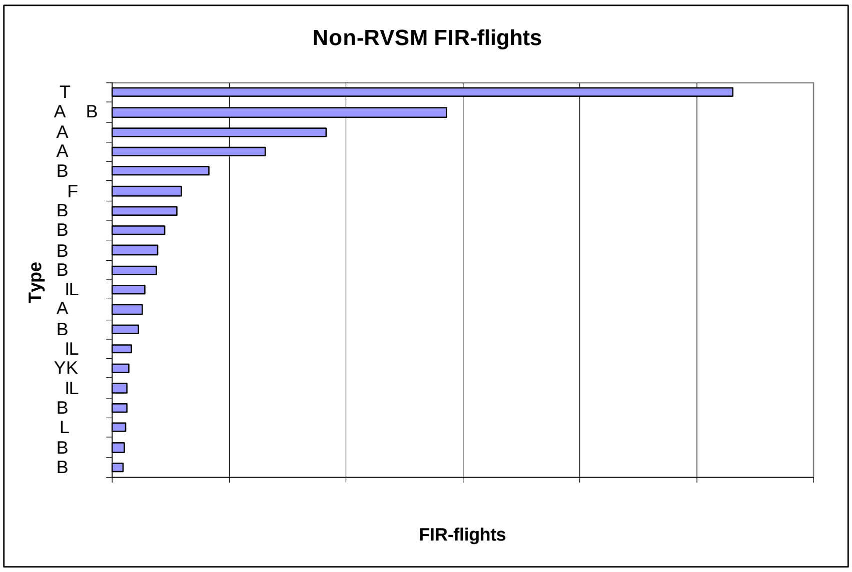


FIGURE 2-7. TOP 20 NON-RVSM TYPES IN THE TRAFFIC SAMPLE

2.3.21 The meeting noted that flights with the three Airbus types, A300, A310 and A320, make up approximately 5% of the total number of FIR-flights and RVSM approval of these airframes therefore has the potential of meeting the current shortfall in readiness.

2.3.22 Based on the foregoing the meeting is endorsed the following conclusion:

DRAFT 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.

2.3.23 The meeting noted that the RVSM safety assessment must include collision risk modelling (CRM) for the airspace in accordance with the guidance provided in ICAO Doc 9574, Appendix A, to ensure that the target level of safety (TLS) will be met and MECMA has developed software for calculation of the horizontal risk factors i.e. N_x and $P_y(0)$ which will be applied on the traffic samples supplied by the provider States. However, no specific guidance material is available from ICAO or other RMAs for estimation of the probability of vertical overlap, $P_z(1000)$. Two methodologies have been adopted in the RGCSP (now SASP) analysis to model observed height-keeping errors. However, the detailed material developed is not currently available in the public domain.

2.3.24 In accordance with its tasking, MECMA had liaised with other Regional Monitoring Agencies (RMAs) and in this context attended a coordination meeting for RMAs in Montreal in November 2002. One of MECM
calculation of $P_z(1000)$. Such calculation routines are complex and require specialised software.

2.3.25 With the objective of assisting the Middle East Region in safe and timely implementation of RVSM, Eurocontrol offered to provide MECMA a copy of its software for estimation of $P_z(1000)$ without charge. This generous offer was accepted with gratitude and the meeting expressed its deep appreciation of the invaluable assistance given by Eurocontrol to the MID RVSM Task Force over a wide range, as it was recognised that without such support, the MID implementation process could not have progressed with the necessary pace.

2.3.26 Software licensing terms were agreed between Eurocontrol and MECMA and an agreement was prepared for signature in the near future.

2.3.27 The meeting reviewed Conclusion 6/2 stating, inter alia:

- Development of national safety plans is required to assure safe implementation of RVSM; and
- States provide 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.

2.3.28 The objective of the example Safety Plan is to set out those national activities that are required to support safe implementation of RVSM. The plan also addresses safety requirements

2.3.29 The national safety plan is a dynamic document that will need to be produced in several stages with increasing depth of detail. Each of the national activities required for the implementation of RVSM needs to be 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.

2.3.30 To produce an adequate safety assessment, it is important that MECMA has sufficient
accomplished
only if each State provides MECMA with an up-to-date version of the State Safety Plan in April 2003,

national adequate safety plans, MECMA had produced an example plan based upon the one produced by Eurocontrol for use by the 41 States that implemented RVSM in January 2002.

2.3.31 The United Arab Emirates presented Issue 0.2 of its National Safety Plan, which had been completed in early February. The objective of the presentation was to facilitate other State in their task of producing own safety plans and a soft copy of the UAE safety plan was provided to each State for reference.

2.3.32 The experience gained through the introduction of RVSM has shown that the concept of a Regional Monitoring Agency (RMA) is essential to help to ensure safety within a region. It has a significant role to play in all aspects of the monitoring process and one of its functions is to establish a database of aircraft approved by their respective State authorities for operations at RVSM levels in the region for which the RMA has responsibility. This information is of vital importance if the height-keeping performance data collected by the height monitoring systems is to be effectively utilised in the risk assessment

2.3.33 Another objective of the database is to permit accurate readiness assessments to be produced in support of the implementation programme.

2.3.34 To avoid duplication by States in registering approvals with RMAs, the concept of a cognisant RMA for the processing of approval data has been established by ICAO. Under this concept, all States are associated with a particular RMA for the processing of RVSM approvals. The States for whom MECMA is the cognisant RMA for RVSM approvals are listed below:

Bahrain

Egypt

Iran

Iraq

Jordan

Kuwait

Lebanon

Libya

Oman

Pakistan

Qatar

Saudi Arabia

Sudan

Syria

United Arab Emirates

Yemen

Note: The meeting noted that although Libya, Pakistan and Sudan are not in the MID Region Air Navigation Plan, they are accredited to the Middle East Region, but have been assigned to MECMA for practical reasons.

2.3.35 Aircraft operating in MID airspace can be categorised into two classes:

- Aircraft that operate solely within MID airspace.
- Aircraft that operate both within M

2.3.36 It is the responsibility of MECMA to gather State approvals for the former category of aircraft from authorities issuing those approvals. This requires that MECMA establish communication with each such authority and provide a precise description of the approvals information required. Details have been provided in Task Force reports and are posted on the MECMA website (mecma.com) along with the pertinent forms with a brief description of their use for provision of information on aircraft RVSM approval status. For ease of reference, all relevant information is reproduced in **Appendix 2G** to the report on Agenda Item 2.

Note:- Where possible, MECMA collects State approvals information for the latter category of aircraft those operating outside the targeted RVSM airspace from other RMAs. This collection is facilitated by maintaining a database in a common electronic format.

2.3.37 In May 2002, MECMA requested information from all the Middle East States concerning approvals of operators and aircraft registered in the respective States and nine States responded with the requested data. Since the third quarter of 2002, only one State had provided updated information and three States had provided no information at all. Table 2-7 contains the status of approvals for the Middle East Region according to the RVSM approvals database.

MID State	Initial Info Received	Update	Acft. on Register	RVSM Approved	%
Afghanistan	No	---	1	0	0.00
Bahrain	No	---	7	3	42.86
Qatar	07/07/02	None	28	25	89.29
Egypt	23/09/02	None	89	75	84.27
Iran	18/10/02	---	82	25	30.49
Iraq	No	---			
Jordan	06/07/02	None	30	22	73.33
Kuwait	24/07/02	None	25	25	100.00
Lebanon	27/06/02	None	24	9	37.50
Oman	13/08/02	None	36	35	97.22
Saudi Arabia	No	---	180	142	78.89
Syria	25/07/02	None	24	15	62.50
Uae	15/05/02	15/02/03	66	61	92.42
Yemen	No	---	8	7	87.50

Table 2-7. Summary of approvals.

2.3.38 In order to facilitate the process of transferring data between State databases and the MECMA database, it is important that individual States establish their own RVSM approvals databases in the same format as the MECMA database and that States send approvals in this format, preferably by email.

2.3.39 States should send updated database information as soon as it becomes available. However, the minimum requirement is for RVSM approvals, correct as of the last working day of the month, to be with MECMA by the 10th of the following month. This is only applicable to any additions to the State approvals database during the preceding month. Any withdrawals of approval must be notified immediately. It should be noted that an approval is not transferable and that if an aircraft is sold or leased, re-approval from the State of Registry is required.

2.4 Assigned altitude Deviations (AAD)

2.4.1 Reporting of assigned altitude deviations (AAD) was introduced with effect from 01 July 2001 and the reports, including nil-reports, are summarized in Table 2-8, below:

Month/FIR	OBBB	HECC	OEJD	OJAC	OKAC	OLBB	OOMM	OMAE	Total
Jul-01								Nil	
Aug-01	Nil	Nil						Nil	
Sep-01		Nil					Nil	Nil	
Oct-01	Nil	Nil					Nil	Nil	
Nov-01	Nil	Nil	14		Nil		Nil	Nil	
Dec-01	Nil	Nil			Nil		Nil	Nil	
Jan-02		Nil	2	5	Nil		Nil	Nil	
Feb-02	Nil	Nil	2	1	Nil		Nil	Nil	
Mar-02	Nil	Nil	2		Nil		Nil	Nil	
Apr-02	Nil	Nil	Nil			Nil	Nil	Nil	
May-02	Nil		Nil		Nil	Nil	Nil	Nil	
Jun-02	Nil	Nil	10		Nil	Nil	Nil	Nil	
Jul-02	Nil	Nil	9		Nil	Nil	Nil	Nil	
Aug-02	Nil	1	4		Nil	Nil	Nil	Nil	
Sep-02	Nil	Nil	Nil		Nil	Nil		Nil	
Oct-02	Nil	Nil	Nil		Nil	Nil	Nil	Nil	
Nov-02	Nil	Nil	4		Nil	Nil	Nil	Nil	
Dec-02		Nil			Nil	Nil	Nil	Nil	
Nil Reports	15	15	4	0	13	9	16	18	90
AADs	0	1	52	6	0	0	0	0	59

Table 2-8. Summary of AAD Reporting

2.4.2 The summary of AADs considered valid and their duration is as follows:

DEVIATION	DURATION
600 FT	**120 SECONDS**
500 FT	**100 SECONDS**

Table 2-9. MID AADs

2.4.3 Flying time in the level band FL290-FL410 is set out in Table 2-10, below. As reporting is incomplete for a number of FIRs, flying time is only credited for those months, for which reporting, including nil-reporting, has been received by MECMA.

FIR	Hours	Remarks
OMAE	48,183	
HECC	106,191	
OBBB		Only movements reported
OEJD		Nil info
OJAC	17,670	
OKAC		Only movements reported
OLBB	3,749	Since Apr 02
OOMM	81,525	
Total	257,318	

Table 2-10. Flying Time FL290-FL410

2.4.4 The total proportion of time spent 300 ft or more away from the assigned levels is summarized in Table 2-11, below:

Deviation	Time	Proportion
ft	secs.	. E-
ft	secs.	. E-
Total flying time		, hours

Table 2-11. AAD Proportions

2.4.5 The Task Force noted the results of AAD reporting so far and decided to base its further safety assessment work on the tabulated results

2.4.6 MECMA presented preliminary calculations of horizontal risk factors in part of the ATS route structure. The results were based on the traffic samples supplied for the period 26 December 2002 23 January 2003.

2.4.7 The following is a brief summary of the results and it should be noted that MECMA has concentrated its efforts on points/areas of highest probable risk, while less critical areas will be evaluated at a later stage.

Amman:	Introduction of the new dual unidirectional route structure (UN318 and UR219) had produced the desired results. Passing frequency at TRF, previously in excess of 4, had decreased to 0.54, while all other points had even lower occupancies.
Bahrain:	No calculations carried out due to incomplete traffic sample.
Beirut:	Passing frequencies at BALMA and LEBOR are well within the limit of 1.25 set for the MID Region.
Cairo:	The general situation is promising, and only RASDA appears to have too high traffic density for bi-directional traffic. The situation was discussed with Egyptian delegates and MECMA will be providing a proposed solution. Crossing calculations are planned for CVO, but are not expected to reveal high risk.
Emirates:	ENADA remained a problem and Muscat and Emirates FIRs had agreed to split the traffic into two unidirectional flows. The new system will take effect on 17 April.
Jeddah:	No calculations carried out due to incomplete traffic sample.
Muscat:	Establishment of multiple routes to the crossing points between Bombay and Muscat FIRs has resulted in a significant reduction in lateral overlap probability. RASKI, being the point with the highest traffic density is well within limits, while transfer points further south have less traffic. The problem at ENADA needed a quick solution, which will be implemented with effect from April. ETUKO will not exceed limits on the Muscat side, where the traffic divides into three flows, while it is likely that problems will surface on the Bahrain side. Passing frequencies are well within the limit of 1.25 set for the MID Region.
Tehran:	The problems on the FIR boundary to the Emirates FIR had been resolved with introduction of the unidirectional route structure in November 2002. Transition to RVSM levels between TBZ and DASIS had necessitated separate calculations for the crossing points to/from Ankara FIR. However, application of RVSM criteria indicates that the present system will be safe in an RVSM environment.

SAFETY & AIRSPACE MONITORING WORK GROUP (SAM/WG)

TERMS OF REFERENCE

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.

MID RVSM TF/7
Appendix 2C to the Report on Agenda Item 2

Details of Traffic Samples Collected in Middle East Region Where the RVSM Is Provisionally Planned for Application

Date	HECC	OBBB	OEJD	OIIX	OJAC	OLBB	OMAE	OOMM	OYSC	All FIRs Total
26/12/02	471	101	118	446	89	59	390	414	66	2154
27/12/02	410	109	142	444	95	65	444	413	57	2179
28/12/02	443	120	98	449	167	79	396	403	49	2204
29/12/02	391	128	124	450	108	79	430	420	59	2189
30/12/02	367	103	108	570	142	76	420	275	71	2132
31/12/02	222	93	117	432	101	60	360	341	48	1774
01/01/03	199	96	99	415	76	51	398	381	48	1763
02/01/03	369	116	136	455	136	77	437	407	66	2199
03/01/03	367	126	145	466	163	87	444	407	61	2266
04/01/03	380	142	159	410	145	108	412	402	30	2188
05/01/03	449	115	158	476	156	83	432	440	30	2339
06/01/03	304	88	161	472	145	72	440	461	37	2180
07/01/03	223	117	153	429	148	66	421	443	31	2031
08/01/03	165	108	149	468	148	63	445	450	23	2019
09/01/03	391	118	151	497	144	76	467	527	51	2422
10/01/03	237	133	192	434	183	64	434	503	31	2211
11/01/03	331	144	185	374	192	74	399	483	82	2264
12/01/03	331	159	178	455	208	81	465	548	60	2485
13/01/03	275	116	158	468	168	74	432	499	71	2261
14/01/03	271	108	72	455	156	75	431	471	58	2097
15/01/03	239	134	148	457	175	83	489	506	54	2285
16/01/03	331	134	165	481	161	94	442	520	76	2404
17/01/03	265	128	147	453	177	79	429	495	61	2234
18/01/03	284	137	138	458	170	109	438	481	55	2270
19/01/03	258	134	166	500	176	101	469	536	52	2392
20/01/03	274	119	152	526	156	96	449	519	70	2361
21/01/03	214	108	143	506	154	95	429	502	62	2213
22/01/03	175	129	169	480	166	88	452	516	58	2233
23/01/03	48	134	167	504	173	101	475	550	75	2227
G. Total	8684	3497	4198	13430	4378	2315	12569	13313	1592	63976

Aircraft Type/Group Distribution for the MID Region Traffic Sample (Up to 99% of Aircraft Type/Groups Shown)

Aircraft Type	Count	Percentage	Cumulative Percentage
A330	6968	10.89%	10.89%
A320	6728	10.52%	21.41%
B74B	5851	9.15%	30.56%
B777	5527	8.64%	39.20%
B767	5029	7.86%	47.06%
B73B	4625	7.23%	54.29%
A300	4564	7.13%	61.42%
A310	3646	5.70%	67.12%
T154	3230	5.05%	72.17%
B74A	2933	4.58%	76.76%
A340	2241	3.50%	80.26%
B727	1766	2.76%	83.02%
MD11	1352	2.11%	85.13%
B757	1180	1.84%	86.98%
DC10	967	1.51%	88.49%
K35R	897	1.40%	89.89%
F100	550	0.86%	90.75%
IL86	434	0.68%	91.43%
GLF4	356	0.56%	91.99%
IL76	348	0.54%	92.53%
YK42	348	0.54%	93.07%
C17	317	0.50%	93.57%
F28	315	0.49%	94.06%
B707	278	0.43%	94.50%
C5	254	0.40%	94.89%
MD90	238	0.37%	95.27%
IL62	189	0.30%	95.56%
MD83	163	0.25%	95.82%
B73A	160	0.25%	96.07%
CL60	158	0.25%	96.31%
L101	141	0.22%	96.53%
DC93	139	0.22%	96.75%
C130	129	0.20%	96.95%
H25B	102	0.16%	97.11%
C135	93	0.15%	97.26%
AN12	89	0.14%	97.40%
F900	84	0.13%	97.53%
GLF5	82	0.13%	97.66%
FA20	76	0.12%	97.77%
GLF2	70	0.11%	97.88%

Aircraft Type	Count	Percentage	Cumulative Percentage
GLF3	70	0.11%	97.99%
T134	69	0.11%	98.10%
A124	65	0.10%	98.20%
T204	65	0.10%	98.30%
VC10	65	0.10%	98.41%
DC86	64	0.10%	98.51%
F2TH	59	0.09%	98.60%
FA50	58	0.09%	98.69%
GLEX	53	0.08%	98.77%
IL18	53	0.08%	98.85%
BA11	50	0.08%	98.93%
P3	43	0.07%	99.00%

RVSM Approved FIR-Flights

Appendix 2E to the Report on Agenda Item 2

RVSM	Type	A332	A320	B772	B744	B763	A310	A306	B742	A343	B738	MD11	B773	B722	B743	B752	A321	F100	B734	DC10	B737	B733	B741	IL86	B74S	A333	A342
Operator	Totals	6498	5287	4424	4227	3749	3252	2269	2246	1884	1199	1018	1011	998	955	915	585	550	529	508	498	429	392	362	328	315	302
UAE	5063	3425		790			166						682														
GFA	4439	1077	1440			1443				479																	
SVA	2453			884	176			175				102			398								392		3		
QTR	2208	299	1006					903																			
KAC	1769		271	149	32		390	554	14	317																	
MSR	1408		379	175				309							28		183										99
IRA	1308						416	100	70									550							150		
SIA	1138			259	640								239														
AFR	1124	61	58	265	41				622	76												1					
BAW	1108			832	276																						
RJA	1081		181				819																				81
DLH	1069		2		277		5	1	293	355							1										113
MAS	1042			734	218				69																	21	
SYR	964		381											428											155		
MEA	740		420				75	19									226										
AZA	732		113			486			50			26					25										
THY	722						221			76	390								12								
AIC	677				469				128						80												
ALK	666	377								289																	
KLM	630				32	344					60	117			76							1					
CLX	590				590																						
IYE	587						308				279																
BBC	570						214													356							
CAL	551				388				91	72																	
IRC	545													545													
ETH	512					212										231											
PIA	512						121		139						252												
CPA	485			113	19				273	34			34													12	
EVA	386											386															

RVSM Approved FIR-Flights

Appendix 2E to the Report on Agenda Item 2

RVSM	Type	A332	A320	B772	B744	B763	A310	A306	B742	A343	B738	MD11	B773	B722	B743	B752	A321	F100	B734	DC10	B737	B733	B741	IL86	B74S	A333	A342
Operator	Totals	6498	5287	4424	4227	3749	3252	2269	2246	1884	1199	1018	1011	998	955	915	585	550	529	508	498	429	392	362	328	315	302
CRX	377	373										4															
SQC	372				372																						
NWA	310				310																						
FDX	298						176					122															
EEZ	286	144	142																								
GIA	271				101				120																	50	
LTU	269	201	17			2										27	2									20	
THA	242				32			78					56		1											75	
IRM	236						75																				
MPH	220					1			166			53															
UPS	215					215																					
AEL	213			213																							
VKG	213	110	22																							81	
OAL	204							9		19									172			4					
KQA	202					136															66						
FIN	199															199											
SEY	183					146															37						
MYT	180	162				18																					
QFA	176				176																						
TAS	176		176																								
CFG	174					1										51											
CYP	166		51				5																				
BPA	163					73													90								
MON	162	118														44											
JAT	162																			2		160					
HVN	160					160																					
VLE	160	6	128														26										
SHK	130		130																								
AUA	128	12	53							2							41										5

RVSM Approved FIR-Flights

Appendix 2E to the Report on Agenda Item 2

RVSM	Type	A332	A320	B772	B744	B763	A310	A306	B742	A343	B738	MD11	B773	B722	B743	B752	A321	F100	B734	DC10	B737	B733	B741	IL86	B74S	A333	A342
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BHP	122					44										78											
TRA	122										36					80					6						
EDW	120	61	59																								
MAH	120																		38			16					
AEW	119					65													20			34					
AMM	117		1			91										25											
WOA	117											67								50							
ROT	115																				71	44					
BER	111										111																
BLX	110					102					8																
CSA	106						85												21								
TRJ	104																							104			
TAR	96		86					5																			
DAH	94					15	11				63			2													
RAM	93				16	33					1					24					18						
DSR	92																			92							
AEF	86		38														48										
MAU	86									55																	
AMV	84						23																				
HDA	84														84												
LAA	80							80																			
NVR	78	57									21																
ELY	77			10					12		8					7											
WEA	77										37								40								
CRL	76	14													35				27								
SWR	76		1									75															
HLF	73						15				58																
KZW	71						1			38	3															29	
MKA	71								48																		

RVSM Approved FIR-Flights

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RVSM	Type	A332	A320	B772	B744	B763	A310	A306	B742	A343	B738	MD11	B773	B722	B743	B752	A321	F100	B734	DC10	B737	B733	B741	IL86	B74S	A333	A342
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CCA	69																										
ADH	68																		42			26					
AFL	68						68																				
DAL	66											66															
LAJ	63		30														33										
PVV	62																							53			
SDM	62																										
BAL	58					36										22											
LDA	54					3					19								14		18						
A6SUL	53					53																					
AZI	53																				53						
AHY	52															52											
SBI	51																							41			
PAL	50									23																27	
VSO	50																							50			
KAL	48				48																						
KJC	48																							24			
TUA	48																					45					
TCW	47		47																								
BAH	46													16													
SVR	45																							20			
JMC	44															44											
GTI	41				6				34						1												
A6AIN	37																				37						
A6SIR	36																				36						
FRT	36																										
LIB	36									33																	
LXO	36																										
AIS	35					35																					

RVSM Approved FIR-Flights
Appendix 2E to the Report on Agenda Item 2

RVSM	Type	A332	A320	B772	B744	B763	A310	A306	B742	A343	B738	MD11	B773	B722	B743	B752	A321	F100	B734	DC10	B737	B733	B741	IL86	B74S	A333	A342
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HMS	35																										
A6DAS	34																				34						
CKS	34								34																		
ESL	34																							31			
TSO	34																				11						
LOT	33					9																24					
ABD	32								32																		
DAN	32																				32						
PAC	31								31																		
VPBFW	31																										
TVL	27																		27								
UZB	27					10	7									10											
XLA	27										27																
KAZ	26																										
UKM	26																										
ERG	25																										
FFR	25																					25					
PLK	25																							25			
SLR	25					1					18								6								
VDA	25																										
ADB	24																										
EUH	24										24																
HZSJP3	24																										
A6LIW	23																				23						
AHC	23																										
ENK	23																										
VPBYA	22																				22						
IBE	21		15							6																	
A6SHZ	20							20																			

RVSM Approved FIR-Flights

Appendix 2E to the Report on Agenda Item 2

RVSM	Type	A332	A320	B772	B744	B763	A310	A306	B742	A343	B738	MD11	B773	B722	B743	B752	A321	F100	B734	DC10	B737	B733	B741	IL86	B74S	A333	A342
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A6ZSN	20																								20		
MWA	20						20																				
NOS	20										20																
SAZ	20																										
SHJ	20																										
BRU	19																										
HBIVV	18																										
AUI	17																					13					
EUS	17																							10			
EXH	17																										
ORB	17																										
AMB	16																										
CFC	16						16																				
HZKSDC	16																										
VPCEC	16																				16						
CCE	15																										
HZKSRC	15																										
IRQ	15																										
ELL	14																										
HZAFA2	14																										
SUD	14							14																			
5BDBE	13																										
A6EAJ	13																										
AZS	13																										
PGT	13																		13								
SEU	13		13																								
VPBOA	13																										
VPCBB	13										13																
ECA	12		12																								

RVSM Approved FIR-Flights

Appendix 2E to the Report on Agenda Item 2

RVSM	Type	A332	A320	B772	B744	B763	A310	A306	B742	A343	B738	MD11	B773	B722	B743	B752	A321	F100	B734	DC10	B737	B733	B741	IL86	B74S	A333	A342
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GAF	12						12																				
HBIIZ	12																										
HLN	12															12											
HZDG2	12																										
MVD	12																										
SHE	12																										
TCRMK	12																										
DADBL	11																					11					
LDI	11					11																					
SLL	11																					10					
A6KAH	10																										
AMC	10																					10					
AZQ	10																										
EAF	10								10																		
HZKAA	10																										
INJ	10																										
P4AVJ	10																										
SUM	10																										
TSY	10																										
VIR	10									10																	
DBR	9															9											
HBINJ	9																										
HZHR2	9																										
VIM	9																										
A6YAS	8				8																						
ADR	8		8																								
CBI	8																										
HHI	8																				8						
IFA	8																										

RVSM Approved FIR-Flights

Appendix 2E to the Report on Agenda Item 2

RVSM	Type	A332	A320	B772	B744	B763	A310	A306	B742	A343	B738	MD11	B773	B722	B743	B752	A321	F100	B734	DC10	B737	B733	B741	IL86	B74S	A333	A342
Operator	Totals	6498	5287	4424	4227	3749	3252	2269	2246	1884	1199	1018	1011	998	955	915	585	550	529	508	498	429	392	362	328	315	302
IMOVE	8																										
KAO	8																										
LTP	8																										
MMD	8																										
NJE	8																										
OHY	8		4					2																			
CJE	7																										
COE	7																										
GGEDI	7																										
LGL	7																		7								
P4AVM	7																										
SVW	7																										
TCDGC	7																										
3BAGC	6																										
AEE	6																										
AKY	6																										
BRA	6																				6						
EIA	6								6																		
P4ALM	6																										
POT	6																										
QAJ	6																										
RMF	6																										
TCATA	6																										
BUC	5																										
CFHRD	5																										
CHD	5																										
GMA	5																										
HBIFQ	5																										
HZMIS	5																										

RVSM Approved FIR-Flights

Appendix 2E to the Report on Agenda Item 2

RVSM	Type	A332	A320	B772	B744	B763	A310	A306	B742	A343	B738	MD11	B773	B722	B743	B752	A321	F100	B734	DC10	B737	B733	B741	IL86	B74S	A333	A342
Operator	Totals	6498	5287	4424	4227	3749	3252	2269	2246	1884	1199	1018	1011	998	955	915	585	550	529	508	498	429	392	362	328	315	302
UKN	5																										
VAZ	5																										
VPBCC	5																										
A6SMS	4																										
AFI	4													2						2							
AYZ	4																							4			
HBVNO	4																										
HZ124	4																										4
HZAB1	4																										
HZHR3	4													4													
HZSAB2	4																										
HZTAA	4																				4						
HZWBT3	4					4																					
ISS	4																										
JOL	4																										
JTV	4																										
LEA	4																										
LIL	4																										
NGA	4								4																		
TCMKA	4																										
TMN	4																										
TWJ	4																										
AHR	3																										
AOC	3																										
BES	3																										
EWG	3		3																								
GCO	3																			3							
HZFYZ	3																										
HZOFC4	3																										

RVSM Approved FIR-Flights

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RVSM	Type	A332	A320	B772	B744	B763	A310	A306	B742	A343	B738	MD11	B773	B722	B743	B752	A321	F100	B734	DC10	B737	B733	B741	IL86	B74S	A333	A342
Operator	Totals	6498	5287	4424	4227	3749	3252	2269	2246	1884	1199	1018	1011	998	955	915	585	550	529	508	498	429	392	362	328	315	302
KZK	3						3																				
LLM	3																										
OAE	3																			3							
OJF	3																										
OMS	3																										
TCNEO	3																										
3BXLA	2																										
BBG	2																					2					
BVR	2																										
C6TTB	2																					2					
INX	2										2																
KHO	2																										
MMM	2																										
MMZ	2																										
TSC	2																										
A6EJA	1	1																									
AME	1																										
AUL	1																										
AWC	1																					1					
FPG	1																										
HCY	1										1																
HZAB3	1													1													
UKW	1																										

RVSM Approved FIR-Flights

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RVSM	Type	B762	A30B	T154	MD90	B735	A319	GLF4	B753	IL62	CL60	MD83	IL76	GLF5	F2TH	A124	GLF3	T204	F900	MD82	YK42	B732	H25B	GLF2	LJ55	GLEX	LJ60	DC86	FA50	B721	T134	E135	L29B
Operator	Totals	298	250	245	238	211	167	133	122	109	103	86	62	60	58	55	55	53	42	37	32	31	31	28	28	24	24	19	14	13	13	11	10
UAE	5063																																
GFA	4439																																
SVA	2453				212			41									34		9					27									
QTR	2208																																
KAC	1769													42																			
MSR	1408		65			170																											
IRA	1308																					22											
SIA	1138																																
AFR	1124																																
BAW	1108																																
RJA	1081																																
DLH	1069		1				21																										
MAS	1042																																
SYR	964																																
MEA	740																																
AZA	732																			32													
THY	722					23																											
AIC	677																																
ALK	666																																
KLM	630																																
CLX	590																																
IYE	587																																
BBC	570																																
CAL	551																																
IRC	545																																
ETH	512	69																															
PIA	512																																
CPA	485																																
EVA	386																																

RVSM Approved FIR-Flights

Appendix 2E to the Report on Agenda Item 2

RVSM	Type	B762	A30B	T154	MD90	B735	A319	GLF4	B753	IL62	CL60	MD83	IL76	GLF5	F2TH	A124	GLF3	T204	F900	MD82	YK42	B732	H25B	GLF2	LJ55	GLEX	LJ60	DC86	FA50	B721	T134	E135	L29B
Operator	Totals	298	250	245	238	211	167	133	122	109	103	86	62	60	58	55	55	53	42	37	32	31	31	28	28	24	24	19	14	13	13	11	10
CRX	377																																
SQC	372																																
NWA	310																																
FDX	298																																
EEZ	286																																
GIA	271																																
LTU	269																																
THA	242																																
IRM	236		161																														
MPH	220																																
UPS	215																																
AEL	213																																
VKG	213																																
OAL	204																																
KQA	202																																
FIN	199																																
SEY	183																																
MYT	180																																
QFA	176																																
TAS	176																																
CFG	174								122																								
CYP	166						110																										
BPA	163																																
MON	162																																
JAT	162																																
HVN	160																																
VLE	160																																
SHK	130																																
AUA	128										15																						

RVSM Approved FIR-Flights

Appendix 2E to the Report on Agenda Item 2

RVSM	Type	B762	A30B	T154	MD90	B735	A319	GLF4	B753	IL62	CL60	MD83	IL76	GLF5	F2TH	A124	GLF3	T204	F900	MD82	YK42	B732	H25B	GLF2	LJ55	GLEX	LJ60	DC86	FA50	B721	T134	E135	L29B
Operator	Totals	298	250	245	238	211	167	133	122	109	103	86	62	60	58	55	55	53	42	37	32	31	31	28	28	24	24	19	14	13	13	11	10
BHP	122																																
TRA	122																																
EDW	120																																
MAH	120	66																															
AEW	119																																
AMM	117																																
WOA	117																																
ROT	115																																
BER	111																																
BLX	110																																
CSA	106																																
TRJ	104																																
TAR	96						5																										
DAH	94																																
RAM	93																							1									
DSR	92																																
AEF	86																																
MAU	86	31																															
AMV	84		11		26							24																					
HDA	84																																
LAA	80																																
NVR	78																																
ELY	77	40																															
WEA	77																																
CRL	76																																
SWR	76																																
HLF	73																																
KZW	71																																
MKA	71																											19					

RVSM Approved FIR-Flights

Appendix 2E to the Report on Agenda Item 2

RVSM	Type	B762	A30B	T154	MD90	B735	A319	GLF4	B753	IL62	CL60	MD83	IL76	GLF5	F2TH	A124	GLF3	T204	F900	MD82	YK42	B732	H25B	GLF2	LJ55	GLEX	LJ60	DC86	FA50	B721	T134	E135	L29B
Operator	Totals	298	250	245	238	211	167	133	122	109	103	86	62	60	58	55	55	53	42	37	32	31	31	28	28	24	24	19	14	13	13	11	10
CCA	69	69																															
ADH	68																																
AFL	68																																
DAL	66																																
LAJ	63																																
PVV	62			9																													
SDM	62			31						31																							
BAL	58																																
LDA	54																																
A6SUL	53																																
AZI	53																																
AHY	52																																
SBI	51																	10															
PAL	50																																
VSO	50																																
KAL	48																																
KJC	48			8														16															
TUA	48																																
TCW	47																																
BAH	46							30																									
SVR	45			25																													
JMC	44																																
GTI	41																																
A6AIN	37																																
A6SIR	36																																
FRT	36			1						34																							
LIB	36											3																					
LXO	36											36																					
AIS	35																																

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Appendix 2E to the Report on Agenda Item 2

RVSM	Type	B762	A30B	T154	MD90	B735	A319	GLF4	B753	IL62	CL60	MD83	IL76	GLF5	F2TH	A124	GLF3	T204	F900	MD82	YK42	B732	H25B	GLF2	LJ55	GLEX	LJ60	DC86	FA50	B721	T134	E135	L29B
Operator	Totals	298	250	245	238	211	167	133	122	109	103	86	62	60	58	55	55	53	42	37	32	31	31	28	28	24	24	19	14	13	13	11	10
HMS	35			35																													
A6DAS	34																																
CKS	34																																
ESL	34									3																							
TSO	34	23																															
LOT	33																																
ABD	32																																
DAN	32																																
PAC	31																																
VPBFW	31							31																									
TVL	27																																
UZB	27																																
XLA	27																																
KAZ	26			26																													
UKM	26																				26												
ERG	25			12						13																							
FFR	25																																
PLK	25																																
SLR	25																																
VDA	25															25																	
ADB	24															24																	
EUH	24																																
HZSJP3	24										24																						
A6LIW	23																																
AHC	23												23																				
ENK	23			23																													
VPBYA	22																																
IBE	21																																
A6SHZ	20																																

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Appendix 2E to the Report on Agenda Item 2

RVSM	Type	B762	A30B	T154	MD90	B735	A319	GLF4	B753	IL62	CL60	MD83	IL76	GLF5	F2TH	A124	GLF3	T204	F900	MD82	YK42	B732	H25B	GLF2	LJ55	GLEX	LJ60	DC86	FA50	B721	T134	E135	L29B
Operator	Totals	298	250	245	238	211	167	133	122	109	103	86	62	60	58	55	55	53	42	37	32	31	31	28	28	24	24	19	14	13	13	11	10
A6ZSN	20																																
MWA	20																																
NOS	20																																
SAZ	20										20																						
SHJ	20						20																										
BRU	19			17																											2		
HBIVV	18										18																						
AUI	17					4																											
EUS	17			7																													
EXH	17													6																		11	
ORB	17			17																													
AMB	16																								16								
CFC	16																																
HZKSDC	16														16																		
VPCEC	16																																
CCE	15																	15															
HZKSRC	15																						15										
IRQ	15												15																				
ELL	14					14																											
HZAFA2	14										14																						
SUD	14																																
5BDBE	13																													13			
A6EAJ	13																										13						
AZS	13												13																				
PGT	13																																
SEU	13																																
VPBOA	13										13																						
VPCBB	13																																
ECA	12																																

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Appendix 2E to the Report on Agenda Item 2

RVSM	Type	B762	A30B	T154	MD90	B735	A319	GLF4	B753	IL62	CL60	MD83	IL76	GLF5	F2TH	A124	GLF3	T204	F900	MD82	YK42	B732	H25B	GLF2	LJ55	GLEX	LJ60	DC86	FA50	B721	T134	E135	L29B
Operator	Totals	298	250	245	238	211	167	133	122	109	103	86	62	60	58	55	55	53	42	37	32	31	31	28	28	24	24	19	14	13	13	11	10
GAF	12																																
HBIIZ	12													12																			
HLN	12																																
HZDG2	12																12																
MVD	12																	12															
SHE	12							12																									
TCRMK	12														12																		
DADBL	11																																
LDI	11																																
SLL	11			1																													
A6KAH	10																																10
AMC	10																																
AZQ	10												10																				
EAF	10																																
HZKAA	10							10																									
INJ	10														8																		
P4AVJ	10										10																						
SUM	10									10																							
TSY	10		10																														
VIR	10																																
DBR	9																																
HBINJ	9																									9							
HZHR2	9																9																
VIM	9			9																													
A6YAS	8																																
ADR	8																																
CBI	8																												8				
HHI	8																																
IFA	8																																

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Appendix 2E to the Report on Agenda Item 2

RVSM	Type	B762	A30B	T154	MD90	B735	A319	GLF4	B753	IL62	CL60	MD83	IL76	GLF5	F2TH	A124	GLF3	T204	F900	MD82	YK42	B732	H25B	GLF2	LJ55	GLEX	LJ60	DC86	FA50	B721	T134	E135	L29B
Operator	Totals	298	250	245	238	211	167	133	122	109	103	86	62	60	58	55	55	53	42	37	32	31	31	28	28	24	24	19	14	13	13	11	10
IMOVE	8																									8							
KAO	8									8																							
LTP	8			8																													
MMD	8														8																		
NJE	8																						8										
OHY	8		2																														
CJE	7						7																										
COE	7																		7														
GGEDI	7														7																		
LGL	7																																
P4AVM	7																										7						
SVW	7																		5										2				
TCDGC	7														7																		
3BAGC	6											6																					
AEE	6																								6								
AKY	6																				6												
BRA	6																																
EIA	6																																
P4ALM	6																																
POT	6															6																	
QAJ	6																								6								
RMF	6																									6							
TCATA	6							6																									
BUC	5			5																													
CFHRD	5																						5										
CHD	5									5																							
GMA	5							3																									
HBIFQ	5																		5														
HZMIS	5																					5											

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RVSM	Type	B762	A30B	T154	MD90	B735	A319	GLF4	B753	IL62	CL60	MD83	IL76	GLF5	F2TH	A124	GLF3	T204	F900	MD82	YK42	B732	H25B	GLF2	LJ55	GLEX	LJ60	DC86	FA50	B721	T134	E135	L29B
Operator	Totals	298	250	245	238	211	167	133	122	109	103	86	62	60	58	55	55	53	42	37	32	31	31	28	28	24	24	19	14	13	13	11	10
UKN	5									5																							
VAZ	5			3																											2		
VPBCC	5																																
A6SMS	4																										4						
AFI	4																																
AYZ	4																																
HBVNO	4																																
HZ124	4																																
HZAB1	4																																
HZHR3	4																																
HZSAB2	4																		4														
HZTAA	4																																
HZWBT3	4																																
ISS	4											2								2													
JOL	4																														4		
JTV	4										4																						
LEA	4																		4														
LIL	4																					4											
NGA	4																																
TCMKA	4																																
TMN	4			4																													
TWJ	4						4																										
AHR	3																			3													
AOC	3																						3										
BES	3																		2										1				
EWG	3																																
GCO	3																																
HZFYZ	3																																
HZOFC4	3																		3														

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Appendix 2E to the Report on Agenda Item 2

RVSM	Type	B762	A30B	T154	MD90	B735	A319	GLF4	B753	IL62	CL60	MD83	IL76	GLF5	F2TH	A124	GLF3	T204	F900	MD82	YK42	B732	H25B	GLF2	LJ55	GLEX	LJ60	DC86	FA50	B721	T134	E135	L29B
Operator	Totals	298	250	245	238	211	167	133	122	109	103	86	62	60	58	55	55	53	42	37	32	31	31	28	28	24	24	19	14	13	13	11	10
KZK	3																																
LLM	3																														3		
OAE	3																																
OJF	3																												3				
OMS	3			3																													
TCNEO	3																																
3BXLA	2																		2														
BBG	2																																
BVR	2																																
C6TTB	2																																
INX	2																																
KHO	2																																
MMM	2																														2		
MMZ	2																																
TSC	2																																
A6EJA	1																																
AME	1																		1														
AUL	1			1																													
AWC	1																																
FPG	1																									1							
HCY	1																																
HZAB3	1																																
UKW	1												1																				

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RVSM	Type	C56X	L101	LJ35	CRJ2	C25A	C550	DC85	B712	B736	BE40	C560	C750	DC95	H25C	AN12
Operator	Totals	9	8	8	5	4	4	4	3	3	3	2	2	2	2	1
UAE	5063															
GFA	4439															
SVA	2453															
QTR	2208															
KAC	1769															
MSR	1408															
IRA	1308															
SIA	1138															
AFR	1124															
BAW	1108															
RJA	1081															
DLH	1069															
MAS	1042															
SYR	964															
MEA	740															
AZA	732															
THY	722															
AIC	677															
ALK	666															
KLM	630															
CLX	590															
IYE	587															
BBC	570															
CAL	551															
IRC	545															
ETH	512															
PIA	512															
CPA	485															
EVA	386															

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RVSM	Type	C56X	L101	LJ35	CRJ2	C25A	C550	DC85	B712	B736	BE40	C560	C750	DC95	H25C	AN12
Operator	Totals	9	8	8	5	4	4	4	3	3	3	2	2	2	2	1
CRX	377															
SQC	372															
NWA	310															
FDX	298															
EEZ	286															
GIA	271															
LTU	269															
THA	242															
IRM	236															
MPH	220															
UPS	215															
AEL	213															
VKG	213															
OAL	204															
KQA	202															
FIN	199															
SEY	183															
MYT	180															
QFA	176															
TAS	176															
CFG	174															
CYP	166															
BPA	163															
MON	162															
JAT	162															
HVN	160															
VLE	160															
SHK	130															
AUA	128															

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RVSM	Type	C56X	L101	LJ35	CRJ2	C25A	C550	DC85	B712	B736	BE40	C560	C750	DC95	H25C	AN12
Operator	Totals	9	8	8	5	4	4	4	3	3	3	2	2	2	2	1
BHP	122															
TRA	122															
EDW	120															
MAH	120															
AEW	119															
AMM	117															
WOA	117															
ROT	115															
BER	111															
BLX	110															
CSA	106															
TRJ	104															
TAR	96															
DAH	94									3						
RAM	93															
DSR	92															
AEF	86															
MAU	86															
AMV	84															
HDA	84															
LAA	80															
NVR	78															
ELY	77															
WEA	77															
CRL	76															
SWR	76															
HLF	73															
KZW	71															
MKA	71							4								

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RVSM	Type	C56X	L101	LJ35	CRJ2	C25A	C550	DC85	B712	B736	BE40	C560	C750	DC95	H25C	AN12
Operator	Totals	9	8	8	5	4	4	4	3	3	3	2	2	2	2	1
CCA	69															
ADH	68															
AFL	68															
DAL	66															
LAJ	63															
PVV	62															
SDM	62															
BAL	58															
LDA	54															
A6SUL	53															
AZI	53															
AHY	52															
SBI	51															
PAL	50															
VSO	50															
KAL	48															
KJC	48															
TUA	48								3							
TCW	47															
BAH	46															
SVR	45															
JMC	44															
GTI	41															
A6AIN	37															
A6SIR	36															
FRT	36															1
LIB	36															
LXO	36															
AIS	35															

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RVSM	Type	C56X	L101	LJ35	CRJ2	C25A	C550	DC85	B712	B736	BE40	C560	C750	DC95	H25C	AN12
Operator	Totals	9	8	8	5	4	4	4	3	3	3	2	2	2	2	1
HMS	35															
A6DAS	34															
CKS	34															
ESL	34															
TSO	34															
LOT	33															
ABD	32															
DAN	32															
PAC	31															
VPBFW	31															
TVL	27															
UZB	27															
XLA	27															
KAZ	26															
UKM	26															
ERG	25															
FFR	25															
PLK	25															
SLR	25															
VDA	25															
ADB	24															
EUH	24															
HZSJP3	24															
A6LIW	23															
AHC	23															
ENK	23															
VPBYA	22															
IBE	21															
A6SHZ	20															

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RVSM	Type	C56X	L101	LJ35	CRJ2	C25A	C550	DC85	B712	B736	BE40	C560	C750	DC95	H25C	AN12
Operator	Totals	9	8	8	5	4	4	4	3	3	3	2	2	2	2	1
A6ZSN	20															
MWA	20															
NOS	20															
SAZ	20															
SHJ	20															
BRU	19															
HBIVV	18															
AUI	17															
EUS	17															
EXH	17															
ORB	17															
AMB	16															
CFC	16															
HZKSDC	16															
VPCEC	16															
CCE	15															
HZKSRC	15															
IRQ	15															
ELL	14															
HZAFA2	14															
SUD	14															
5BDBE	13															
A6EAJ	13															
AZS	13															
PGT	13															
SEU	13															
VPBOA	13															
VPCBB	13															
ECA	12															

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RVSM	Type	C56X	L101	LJ35	CRJ2	C25A	C550	DC85	B712	B736	BE40	C560	C750	DC95	H25C	AN12
Operator	Totals	9	8	8	5	4	4	4	3	3	3	2	2	2	2	1
GAF	12															
HBIIZ	12															
HLN	12															
HZDG2	12															
MVD	12															
SHE	12															
TCRMK	12															
DADBL	11															
LDI	11															
SLL	11															
A6KAH	10															
AMC	10															
AZQ	10															
EAF	10															
HZKAA	10															
INJ	10											2				
P4AVJ	10															
SUM	10															
TSY	10															
VIR	10															
DBR	9															
HBINJ	9															
HZHR2	9															
VIM	9															
A6YAS	8															
ADR	8															
CBI	8															
HHI	8															
IFA	8			8												

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RVSM	Type	C56X	L101	LJ35	CRJ2	C25A	C550	DC85	B712	B736	BE40	C560	C750	DC95	H25C	AN12
Operator	Totals	9	8	8	5	4	4	4	3	3	3	2	2	2	2	1
IMOVE	8															
KAO	8															
LTP	8															
MMD	8															
NJE	8															
OHY	8															
CJE	7															
COE	7															
GGEDI	7															
LGL	7															
P4AVM	7															
SVW	7															
TCDGC	7															
3BAGC	6															
AEE	6															
AKY	6															
BRA	6															
EIA	6															
P4ALM	6	6														
POT	6															
QAJ	6															
RMF	6															
TCATA	6															
BUC	5															
CFHRD	5															
CHD	5															
GMA	5														2	
HBIFQ	5															
HZMIS	5															

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RVSM	Type	C56X	L101	LJ35	CRJ2	C25A	C550	DC85	B712	B736	BE40	C560	C750	DC95	H25C	AN12
Operator	Totals	9	8	8	5	4	4	4	3	3	3	2	2	2	2	1
UKN	5															
VAZ	5															
VPBCC	5				5											
A6SMS	4															
AFI	4															
AYZ	4															
HBVNO	4					4										
HZ124	4															
HZAB1	4		4													
HZHR3	4															
HZSAB2	4															
HZTAA	4															
HZWBT3	4															
ISS	4															
JOL	4															
JTV	4															
LEA	4															
LIL	4															
NGA	4															
TCMKA	4						4									
TMN	4															
TWJ	4															
AHR	3															
AOC	3															
BES	3															
EWG	3															
GCO	3															
HZFYZ	3	3														
HZOFC4	3															

RVSM Approved FIR-Flights

Appendix 2E to the Report on Agenda Item 2

RVSM	Type	C56X	L101	LJ35	CRJ2	C25A	C550	DC85	B712	B736	BE40	C560	C750	DC95	H25C	AN12
Operator	Totals	9	8	8	5	4	4	4	3	3	3	2	2	2	2	1
KZK	3															
LLM	3															
OAE	3															
OJF	3															
OMS	3															
TCNEO	3										3					
3BXLA	2															
BBG	2															
BVR	2												2			
C6TTB	2															
INX	2															
KHO	2													2		
MMM	2															
MMZ	2		2													
TSC	2		2													
A6EJA	1															
AME	1															
AUL	1															
AWC	1															
FPG	1															
HCY	1															
HZAB3	1															
UKW	1															

Non-RVSM Approved FIR-Flights

Appendix 2F to the Report on Agenda Item 2

Non-RVSM	Type	T154	A30B	A310	A320	B722	F28	B733	B763	B703	B738	IL76	A306	B737	IL62	YK42	IL86	B752	L101	B772	B732	B744	B74S	GLF2	DC93	T134	B742	FA20	H25B	A319	CL60	DC86	L29B	DC95
Operator	Totals	2655	1433	915	658	413	296	277	222	197	191	143	128	114	80	69	68	66	57	55	45	36	3	34	32	30	27	26	23	22	21	15	15	13
IRB	1092	1092																																
PIA	951		705					246																										
AIC	901			830									71																					
IRA	835	18	548			269																												
IAC	641			3	585								53																					
IRM	610	452	158																															
IRK	391	385										2																						
IRC	301						287																					14						
CPN	297	281								2						14																		
AUA	239								18		168									53														
GIA	184								184																									
SAI	159	159																																
SUD	125		10			27				6		7		28				33			11													
LAA	93			31		16	8			30														3										
AFL	84	28															56																	
DMO	71														71																			
IYE	68					64						4																						
GTS	60											60																						
AMIRY1	55			34																										21				
SVA	53			6	2				2					2					29				3											
DAH	52							4						33																				
TMA	46			3						43																								
IRZ	44									44																								
DNV	42	42																																
UKM	42							23																	3									13
RJA	40							1		33																					4			
SYR	38											30														7		1						
CFG	36				35																	1												
ORB	34	34																																

Non-RVSM Approved FIR-Flights

Appendix 2F to the Report on Agenda Item 2

Non-RVSM	Type	T154	A30B	A310	A320	B722	F28	B733	B763	B703	B738	IL76	A306	B737	IL62	YK42	IL86	B752	L101	B772	B732	B744	B74S	GLF2	DC93	T134	B742	FA20	H25B	A319	CL60	DC86	L29B	DC95
Operator	Totals	2655	1433	915	658	413	296	277	222	197	191	143	128	114	80	69	68	66	57	55	45	36	3	34	32	30	27	26	23	22	21	15	15	13
AZZ	33									32							1																	
RNA	33																	33																
KZK	32	26																			6													
KGL	30	24																								6								
AFI	29																								29									
UKR	27	27																																
DUB5	26																										26							
KMP	26																		26															
UDC	26															26																		
AZA	24													2								22												
BAH	24																							24										
AHY	21					21																												
CEF	21	21																																
PLK	21	21																																
UZB	20											2			9		9																	
NVR	18				5									8						1														
A9CBXB	17																														17			
AMIRY2	17				17																													
MSR	17			7																														
VPBOY	16																												16					
AMV	15																				15													
UDN	15															15																		
BBG	14							2																										
BER	14													14																				
DUB6	14										14																							
A6CPC	13																																13	
CCA	13								13																									
THY	13				2				3																		1							
ATN	12																															12		

Non-RVSM Approved FIR-Flights

Appendix 2F to the Report on Agenda Item 2

Non-RVSM	Type	T154	A30B	A310	A320	B722	F28	B733	B763	B703	B738	IL76	A306	B737	IL62	YK42	IL86	B752	L101	B772	B732	B744	B74S	GLF2	DC93	T134	B742	FA20	H25B	A319	CL60	DC86	L29B	DC95
Operator	Totals	2655	1433	915	658	413	296	277	222	197	191	143	128	114	80	69	68	66	57	55	45	36	3	34	32	30	27	26	23	22	21	15	15	13
MEA	12		12																															
VRE	12											12																						
AMIRY4	11																													1				
EPIPA	11																											11						
HDA	11																					11												
KGA	11	11																																
AEW	10																				10													
DUB4	10																																	
EIHCD	10					10																												
GZP	10															6																		
BTC	9	9																																
ILV	9											9																						
A4OBN	8										8																							
ALK	8				8																													
HZMS5	8																																	
CMK	7	3																								4								
ETH	7													7																				
MVD	7	7																																
TAR	7													7																				
TJK	7	5																								2								
VPBGT	7																							7										
VPCJN	7																																	
ABG	6											6																						
BLX	6													6																				
GEG	6																									5								
NOS	6													6																				
RME	6	4																								2								
RMV	6					1																												
AME	5																																	

Non-RVSM Approved FIR-Flights

Appendix 2F to the Report on Agenda Item 2

Non-RVSM	Type	T154	A30B	A310	A320	B722	F28	B733	B763	B703	B738	IL76	A306	B737	IL62	YK42	IL86	B752	L101	B772	B732	B744	B74S	GLF2	DC93	T134	B742	FA20	H25B	A319	CL60	DC86	L29B	DC95
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AMIRY3	5																																	
HZBL2	5																												5					
NGA	5									3									2															
AHC	4																																	
BRZ	4	3														1																		
EAF	4																																	
ENK	4															4																		
JAT	4					4																												
SDM	4																									4								
TRT	4									4																								
VID	4											4																						
AZQ	3																															3		
BBC	3																					1												
CFC	3																																	
DOB	3											3																						
MPH	3				1									1						1														
TRA	3												3																					
UKS	3											1																						
MON	2																					1												
7OADC	2																												2					
BHP	2			1													1																	
BIE	2				1																1													
CAL	2								2																									
KHO	2																																	
LIB	2																				2													
MWA	2				2																													
SHK	2																																	
TCSSS	2																																2	
URN	2	2																																

Non-RVSM Approved FIR-Flights

Appendix 2F to the Report on Agenda Item 2

Non-RVSM	Type	T154	A30B	A310	A320	B722	F28	B733	B763	B703	B738	IL76	A306	B737	IL62	YK42	IL86	B752	L101	B772	B732	B744	B74S	GLF2	DC93	T134	B742	FA20	H25B	A319	CL60	DC86	L29B	DC95
Operator	Totals	2655	1433	915	658	413	296	277	222	197	191	143	128	114	80	69	68	66	57	55	45	36	3	34	32	30	27	26	23	22	21	15	15	13
VLE	2										1						1																	
AGN	1							1																										
AZS	1																																	
CCE	1	1																																
CLX	1												1																					
CYP	1																																	
ELL	1																																	
ESL	1											1																						
NFA	1																																	
OMAN3	1																																	
SUM	1											1																						
TCIYC	1					1																												
TUA	1															1																		
TUL	1															1																		
UKW	1															1																		
UMK	1											1																						
VKG	1						1																											

Non-RVSM Approved FIR-Flights

Appendix 2F to the Report on Agenda Item 2

Non-RVSM	Type	MD83	A332	A342	GLF4	A343	C130	GLF5	A333	AN12	B721	DH8C	T204	AN72	B734	B762	BA11	DC10	F50	RJ1H	B736	DC90	LJ35	AT45	MD11	P3	AT42	B739	FA50	MD93	YK40
Operator	Totals	13	12	11	11	10	8	8	7	7	7	7	5	4	4	4	4	4	4	4	3	3	3	2	2	2	1	1	1	1	1
IRB	1092																														
PIA	951																														
AIC	901																														
IRA	835																														
IAC	641																														
IRM	610																														
IRK	391																		4												
IRC	301																														
CPN	297																														
AUA	239																														
GIA	184																														
SAI	159																														
SUD	125																	3													
LAA	93		5																												
AFL	84																														
DMO	71																														
IYE	68																														
GTS	60																														
AMIRY1	55																														
SVA	53		2	1			2								1								2						1		
DAH	52					4			7						1						3										
TMA	46																														
IRZ	44																														
DNV	42																														
UKM	42																					3									
RJA	40											2																			
SYR	38																														
CFG	36																														
ORB	34																														

Non-RVSM Approved FIR-Flights

Appendix 2F to the Report on Agenda Item 2

Non-RVSM	Type	MD83	A332	A342	GLF4	A343	C130	GLF5	A333	AN12	B721	DH8C	T204	AN72	B734	B762	BA11	DC10	F50	RJ1H	B736	DC90	LJ35	AT45	MD11	P3	AT42	B739	FA50	MD93	YK40
Operator	Totals	13	12	11	11	10	8	8	7	7	7	7	5	4	4	4	4	4	4	4	3	3	3	2	2	2	1	1	1	1	1
AZZ	33																														
RNA	33																														
KZK	32																														
KGL	30																														
AFI	29																														
UKR	27																														
DUB5	26																														
KMP	26																														
UDC	26																														
AZA	24																														
BAH	24																														
AHY	21																														
CEF	21																														
PLK	21																														
UZB	20																														
NVR	18															4															
A9CBXB	17																														
AMIRY2	17																														
MSR	17											5	3											2							
VPBOY	16																														
AMV	15																														
UDN	15																														
BBG	14	11																							1						
BER	14																														
DUB6	14																														
A6CPC	13																														
CCA	13																														
THY	13	2																		4							1				
ATN	12																														

Non-RVSM Approved FIR-Flights

Appendix 2F to the Report on Agenda Item 2

Non-RVSM	Type	MD83	A332	A342	GLF4	A343	C130	GLF5	A333	AN12	B721	DH8C	T204	AN72	B734	B762	BA11	DC10	F50	RJ1H	B736	DC90	LJ35	AT45	MD11	P3	AT42	B739	FA50	MD93	YK40
Operator	Totals	13	12	11	11	10	8	8	7	7	7	7	5	4	4	4	4	4	4	4	3	3	3	2	2	2	1	1	1	1	1
MEA	12																														
VRE	12																														
AMIRY4	11			10																											
EPIPA	11																														
HDA	11																														
KGA	11																														
AEW	10																														
DUB4	10				10																										
EIHCD	10																														
GZP	10													4																	
BTC	9																														
ILV	9																														
A4OBN	8																														
ALK	8																														
HZMS5	8							8																							
CMK	7																														
ETH	7																														
MVD	7																														
TAR	7																														
TJK	7																														
VPBGT	7																														
VPCJN	7										7																				
ABG	6																														
BLX	6																														
GEG	6																														1
NOS	6																														
RME	6																														
RMV	6														1		4														
AME	5						3																			2					

Non-RVSM Approved FIR-Flights

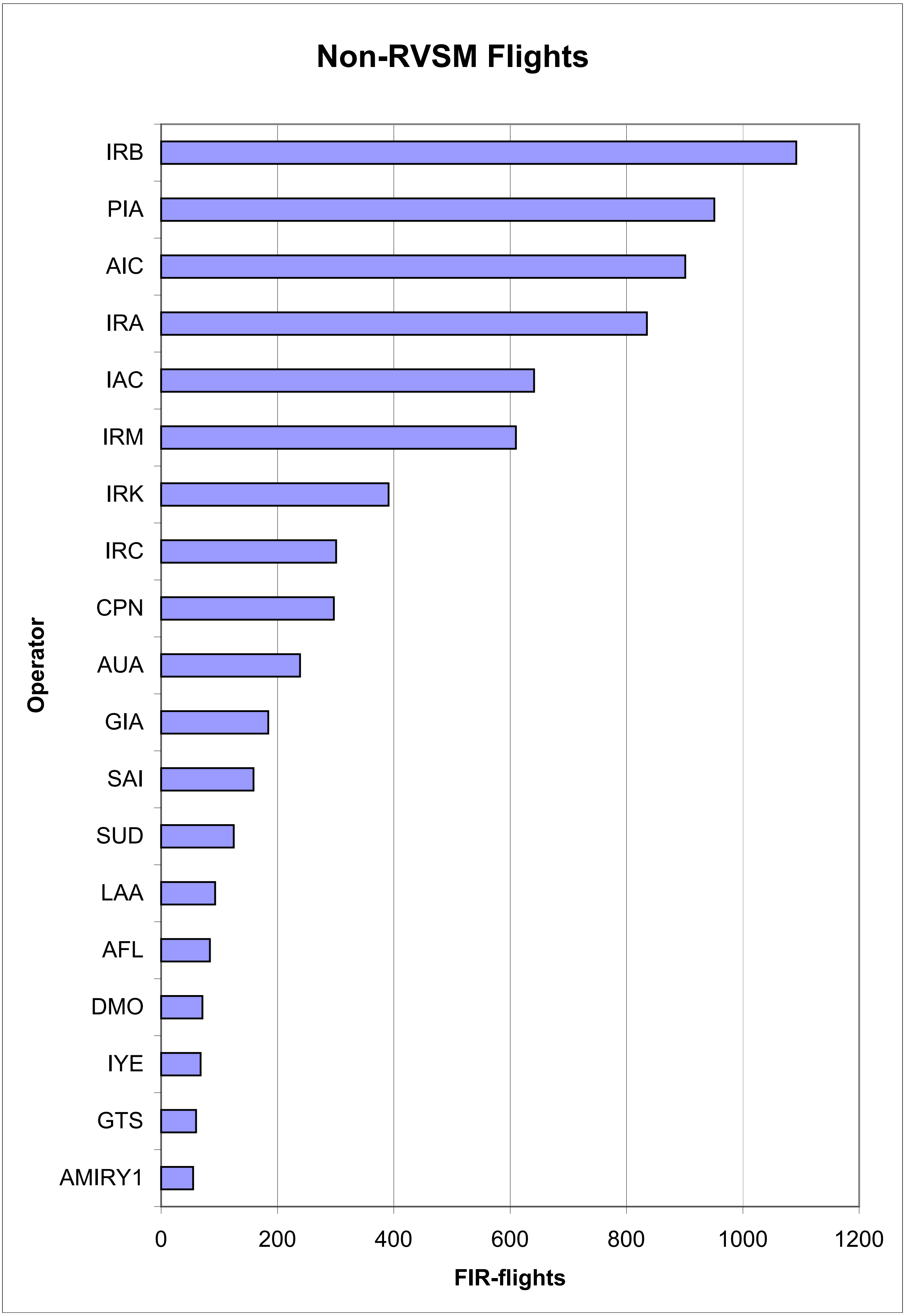
Appendix 2F to the Report on Agenda Item 2

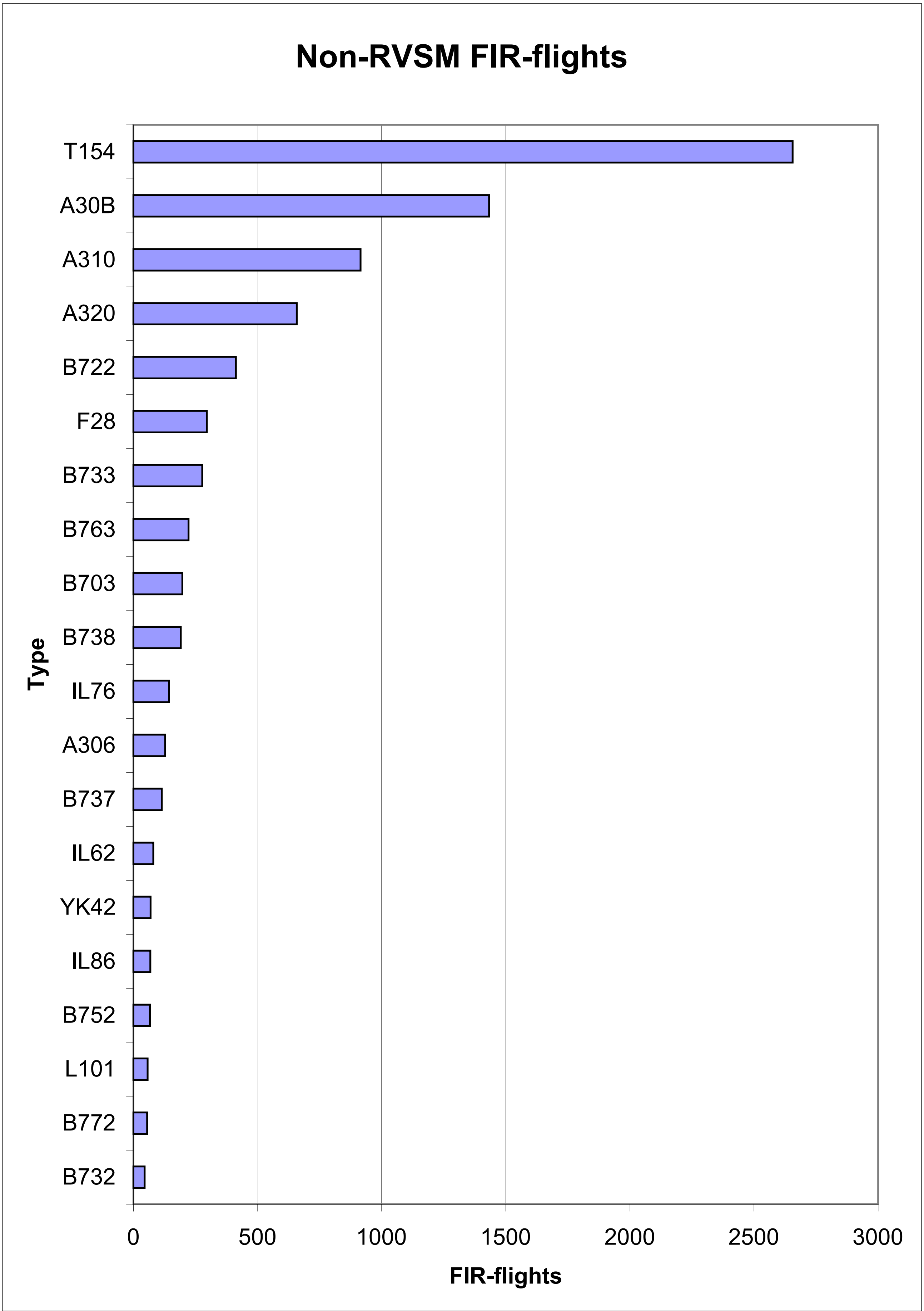
Non-RVSM	Type	MD83	A332	A342	GLF4	A343	C130	GLF5	A333	AN12	B721	DH8C	T204	AN72	B734	B762	BA11	DC10	F50	RJ1H	B736	DC90	LJ35	AT45	MD11	P3	AT42	B739	FA50	MD93	YK40
Operator	Totals	13	12	11	11	10	8	8	7	7	7	7	5	4	4	4	4	4	4	4	3	3	3	2	2	2	1	1	1	1	1
AMIRY3	5					5																									
HZBL2	5																														
NGA	5																														
AHC	4									4																					
BRZ	4																														
EAF	4		4																												
ENK	4																														
JAT	4																														
SDM	4																														
TRT	4																														
VID	4																														
AZQ	3																														
BBC	3					1																			1						
CFC	3						3																								
DOB	3																														
MPH	3																														
TRA	3																														
UKS	3									2																					
MON	2																											1			
7OADC	2																														
BHP	2																														
BIE	2																														
CAL	2																														
KHO	2																	1												1	
LIB	2																														
MWA	2																														
SHK	2												2																		
TCSSS	2																														
URN	2																														

Non-RVSM Approved FIR-Flights

Appendix 2F to the Report on Agenda Item 2

Non-RVSM	Type	MD83	A332	A342	GLF4	A343	C130	GLF5	A333	AN12	B721	DH8C	T204	AN72	B734	B762	BA11	DC10	F50	RJ1H	B736	DC90	LJ35	AT45	MD11	P3	AT42	B739	FA50	MD93	YK40
Operator	Totals	13	12	11	11	10	8	8	7	7	7	7	5	4	4	4	4	4	4	4	3	3	3	2	2	2	1	1	1	1	1
VLE	2																														
AGN	1																														
AZS	1									1																					
CCE	1																														
CLX	1																														
CYP	1														1																
ELL	1		1																												
ESL	1																														
NFA	1																						1								
OMAN3	1				1																										
SUM	1																														
TCIYC	1																														
TUA	1																														
TUL	1																														
UKW	1																														
UMK	1																														
VKG	1																														


Non-RVSM Flights
Operator
IRB
PIA
AIC
IRA
IAC
IRM
IRK
IRC
CPN
AUA
GIA
SAI
SUD
LAA
AFL
DMO
IYE
GTS
AMIRY1
0
200
400
600
800
1000
1200
FIR-flights


Non-RVSM FIR-flights
T154
A30B
A310
A320
B722
F28
B733
B763
B703
B738
IL76
A306
B737
IL62
YK42
IL86
B752
L101
B772
B732
Type
0
500
1000
1500
2000
2500
3000
FIR-flights

Fields of Aircraft State RVSM Approvals Database

a) State of Registry. Enter the single or dual letter ICAO identifier as contained in ICAO Doc 7910/103 (March 2002). In the case of their being more than one identifier designated for the State, use the letter identifier that appears first.

b) -letter ICAO identifier as contained in ICAO Doc 8585/121 (July 2002). If none, place an X in this field and write the name of the operator/owner in the Remarks field.

c) Aircraft type. Enter the ICAO designator as contained in ICAO Doc 8643/30 (November 2002), e.g. for Airbus A320-211, enter A320; for Boeing B747-438 enter B744.

d) Aircraft Series - Enter Series of A320-211 enter 211; for Boeing B747-438, enter 400 or 438.

e) Manufacturers Serial Number.

f) Year of Manufacture. In YYYY format e.g. 1996.

g) -XYZ write A6XYZ.

h) Registration Date. In format DD/MM/YY. Example: for 14 October 2002, write 14/10/02.

i) Mode S Address. Enter ICAO allocated Aircraft Mode S (6 character, hexadecimal) address code.

j) Operations Approval Issue Date. In format DD/MM/YY.

k) Operations Withdrawal Date. In format DD/MM/YY.

l) Reason For Withdrawal.

m) RVSM Approval - Enter yes or no.

n) RVSM Approval Issued Date. In format DD/MM/YY.

o) RVSM Expiry Date. In format DD/MM/YY.

p) Compliance method. On what basis the aircraft is made RVSM compliant. Enter the following:

    I. TC for Type Certificate.
    II. STC for Supplementary Type Certificate.
    III. SB for Service Bulletin with Reference Number.
    IV. SL for Service Letter with Reference Number.
    V. MOD for Modification.

q) Remarks.

Note: Soft copy of Excel template is available on www.mecma.com.

Fields of Operators RVSM Approvals Database

a) -letter ICAO identifier as contained in ICAO Doc 8585/121 (July 2002).
If none, place an X in this field.

b) Name of Operator. Full name of the operator

c) State of the operator. Enter the single letter ICAO identifier as contained in ICAO Doc 7910/103 (March 2002). In the case of their being more than one identifier designated for the State, use the letter identifier that appears first.

d) Address. Address to contact operator.

e) Telephone. Telephone Number of the operator.

f) Fax. Fax Number of the operator.

g) E-mail. E-mail address of the operator.

h) AFTN. AFTN address of the operator.

i) Sita. Sita address of the operator.

j) Telex. Telex Number of the operator.

k) Contact. Name of the contact person.

Note: Soft copy of Excel template is available on www.mecma.com.

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

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

Agenda Item 1: Airspace organization

i) Congestion Problem,

ii) Dual routes Eastern Mediterranean-MID,

iii) Coordination problems- Red Sea area.

Agenda Item 2: Review Implementation Issues.

i) draft ATC manual,

ii) training guidelines,

iii) identification of transition areas,

iv) transition procedures,

v) Letters of agreement,

vi) interface meetings.

Agenda Item 3: Review of Evaluation Forms.

Agenda Item 4: Updating RVSM TF Task List.

Agenda Item 5: Other Issues.

3.2 Airspace organization

Congestion problems

3.2.1 The work Group was apprised of the implementation by Syria, on 26 December 2002, of the interface route UR219, at variance with the Plan, which now proceeds from ARAAM *(which replaces FESAL)* to NIKAS, instead of proceeding to point BANIAS via UL619. It was however noted that the implementation of this route segment in a unidirectional track, would nevertheless, enable the establishment of safety case for ensuring the safe implementation of RVSM on 27 November 2003.

3.2.2 The Group raised concerns over the flight level restrictions being imposed within Amman FIR and requested that the procedures be reviewed and aircraft be allowed to operate, as far as possible, at their preferred economic flight levels. Clarifications were also given regarding the use of radar within RVSM airspace. It was pointed out that although radar is not a pre-requisite for the implementation of RVSM, it is however an important tool for ATC, in particular, in some difficult environments.

3.2.3 The Group was also informed of the agreement reached by Jordan, Lebanon and Syria for the implementation of a shorter route (UL620) between BALMA (3428.9N 03503.0E) MALOULA (3351.2N 03632.0E) then to intercept route UN318 at point RALPO, 13 NM North of

ASSEL (3325.2N 03734.0E). While awaiting the amendment to the MID Plan for the inclusion of this route, it was agreed that domestic designator J222 would be assigned to the portion of the route from BALMA to RALPO and it would be implemented as soon as possible.

Dual routes Eastern Mediterranean-MID

3.2.4 The Work Group noted that action on the implementation of RVSM TF/6 Conclusion 6/4 a), b), and d) have still not been taken and the Secretariat was requested to discuss the issue within the framework of Europe-Middle East Coordination Bureau on Air Traffic Management (EMAC) meetings.

Coordination problems- Red Sea area

3.2.5 The Group raised concern over the coordination problems in the Red Sea area and requested the Secretariat to expedite action pursuant to RVSM TF/6 Conclusion 6/5 for the convening of a meeting under the aegis of ICAO, to explore ways and means of finding a durable solution to the problem. It was indicated that informal meeting involving all parties concerned would be held as soon as possible and IATA was also requested to assist in the process.

3.3 Review Implementation Issues

3.3.1 The Group was informed that the draft ATC manual would be presented to MIDANPIRG/8 meeting for endorsement, then to States for regional application. The offer by Eurocontrol to carry out a final review of the Document was appreciated.

Training guidelines

3.3.2 The Work Group was of the view that the training guidelines developed by the Task Force were mature enough to be used by States. It was thus agreed that States would use these guidelines for the development of their own training requirements for ensuring the safe implementation of RVSM in the region.

Identification of transition areas

3.3.3 It was clarified that the requirement for the creation of transition areas between RVSM and non-RVSM airspace should, in principle, be based on a route by route basis and there was no need for the establishment of transition areas following the entire delineation of adjacent FIR boundaries/regions.

Transition procedures

3.3.4 The Work group agreed that transition procedures, based on a route-by-route basis, should be developed by each State, taking into account the guidance provided in the Draft ATC Manual and be included in the Letters of Agreement (LOA).

Letters of agreement (LOA)

3.3.5 The Group agreed that draft letters of agreement should be developed, as soon as possible, comprising of procedures to be used for the handling of traffic between adjacent FIRs and should also include procedures to be followed in the event of communications failures and flight planning. The group noted with appreciation the model LOA proposed by Saudi Arabia and was of the view that it could be used by States in the preparation of their own LOAs. The Group was also given a copy of the existing LOA between Tehran and Ankara FIRs, which include procedures for the handling of RVSM traffic within the transition area, which has been established.

Interface meetings

3.3.6 The Group was apprised of the outcome of the first joint coordination meeting which was organized 19-20 October 2002 with the Asia Region and noted that the next meeting will be held in Bangkok from 9 11 June 2003. It was noted that at an informal meeting which was held in Paris, from 19 20 December 2002 involving Eurocontrol and the Secretariat from both the ICAO Middle East and Paris Offices, a draft proposal for the amendment of the EUR and MID/ASIA Parts of the Regional Supplementary Procedures were developed and would be finalized at the second interface meeting with the Asia region in June 2003. It was noted that the informal coordination meeting with the EUR region would be organized in August this year.

3.3.7 Based on the following the work group developed the following draft conclusions/decisions:

DRAFT 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.

DRAFT 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.

DRAFT 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.

DRAFT 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.

3.4 Review of Evaluation Forms

3.4.1 The meeting accordingly reviewed the inputs received from States and it was noted that many States have so far not provided the required data. The meeting requested the Secretariat to update the evaluation forms for further review by the RVSM TF/8 meeting in May 2003. The evaluation forms are at **Appendix C** to the Report..

3.5 Updating RVSM TF Task List

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

Other Issues

3.6 RVSM implementation Change-over time

3.6.1 The group was of the view that change-over time for the implementation of RVSM on 27 November 2003 be made at a time with low traffic volume due to the need to assign new cruising levels to a number of flights and the resulting coordination workload. A traffic analysis conducted by MECMA indicates that 0200 UTC on 27 November 2003 would be the most appropriate time for the MID Region. It was however agreed that this proposal be discussed at the next joint coordination meeting with the Asia region to be held in June 2003. The Group accordingly framed the following Draft Conclusion:

DRAFT 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.

3.7 RVSM Implementation Master Plan

3.7.1 The meeting noted that Saudi Arabia has already developed an RVSM Implementation Master Plan and it was agreed that States may inspire from the plan to develop their own plans.

3.8 Draft proposal for the amendment to the Regional supplementary Procedures (Doc 7030/4)

3.8.1 The Group agreed that, for reference purposes, some relevant materials developed by the Task Force (AICs, AIP Supplements, proposals
be included as an Appendix to the report **(**See **Appendix D** to the Report **-** *Draft AIC).*

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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DRAFT

LETTER OF AGREEMENT

BETWEEN

KHARTOUM AREA CONTROL CENTER AND JEDDAH AREA CONTROL CENTER

GOVERNMENT OF SUDAN KINGDOM OF SAUDI ARABIA

1. **PREAMBLE:**

1.1 The authorized representatives of the Presidency of Civil Aviation, Kingdom of Saudi Arabia and the Civil Aviation Authority of the Government of Sudan agree that the procedures contained in this document shall remain in force from the effective date specified in Para, 2 below until either amended or cancelled.

1.2 This letter of Agreement supercedes and cancels all previous Letters of Agreement between the KHARTOUM ACC and the JEDDAH ACC and their revisions.

2. **EFFECTIVE DATE**:

This Letter of Agreement shall become effective on 27 November 2003 at 0001 UTC.

3. **OBJECTIVE:**

The objective of this Letter of Agreement is to specify coordination procedures between JEDDAH ACC/FIC and KHARTOUM ACC/FIC.

4. **SCOPE:**

4.1 These procedures are supplementary to the ICAO Standards and Recommended Practices (SARPS) contained in ICAO Annexes 2 & 11 and in the ICAO Air Traffic Management, DOC 4444, ATM/501 and ICAO Regional Supplementary Procedures in DOC. 7030/4.

4.1 They detail the conditions under which the responsibility for the provision of Air Traffic Services shall be transferred between the ATS Units mentioned in Para.,3 above.

4.2 This letter of Agreement also formalizes the delegation of responsibility from JEDDAH ACC to KHARTOUM ACC and vice-versa for the provision of Air Traffic Services within those portions of airspace which lie between their FIR boundaries and the agreed transfer of control points as defined in Para.,13. The establishment of these transfer of control points is based on operational considerations only and does not therefore contribute to, neither can it be revoked for, any other purpose beyond this context.

5. DEVIATIONS & AMENDMENTS:

5.1 Deviation from the procedures specified in this Letter of Agreement shall only be permitted in exceptional cases and not without prior coordination, on a case-by-case basis.

5.2 Any deviation from these provisions, that arises due to an emergency or is applied to ensure the safety of air traffic, shall immediately be notified to the other ATS Unit and shall be terminated as soon as the circumstances that warranted the deviation cease to exist.

5.3 Temporary deviations from the procedures contained in this agreement may be permitted following appropriate coordination between the JEDDAH ACC and the KHARTOUM ACC Duty Supervisors.

5.4 Permanent amendments to or cancellation of all or any part of this agreement shall be effected in writing (exchange of letters, AFTN or Telex messages) by the appropriate Approval Authorities.

5.5 In the interest of preserving the normal safe and expeditious flow of air traffic between and within the two AOR's, all information regarding any operational irregularity which violates a part of this Letter of Agreement shall be investigated and information exchanged between the respective Facility Managers.

6. AREAS OF RESPONSIBILITY :

JEDDAH ACC AREA OF RESPONSIBILITY (AOR):

6.1 The Air Traffic Services Area of Responsibility (AOR) for the JEDDAH ACC is that airspace, from the surface of the earth to unlimited, that lies within the JEDDAH FIR, as described in the Saudi Arabian AIP.

6.2 **KHARTOUM ACC AREA OF RESPONSIBILITY (AOR):**

The Air Traffic Services Area of Responsibility (AOR) for the KHARTOUM ACC is that airspace, from the surface to unlimited, that lies within the KHARTOUM FIR as described in the Sudanese AIP..:

7. COMMON CONTROL BOUNDARY (CCB) :

7.1 The CCB between the KHARTOUM ACC AOR and the JEDDAH ACC AOR is the line connecting the following 2 geographic points.

a) 20deg, 00min, 00sec, NORTH * 038deg, 30min, 00sec, EAST
b) 22deg, 00min, 00sec, NORTH * 038deg, 00min, 00sec, EAST

8. APPROVED ROUTINGS:

8.1 The JEDDAH ACC and the KHARTOUM ACC shall ensure that flights under their respective control fly along and in accordance with the following list of airways and unless coordinated otherwise, all aircraft are to be established on the radial forming the centerline of the airway prior to transfer of control taking place.

AIRWAY	SEGMENT	DIRECTION
B 407/H49 :	JDW-DUNGU-MAHDI	: Southwest bound Traffic
G 660 :	BOGUM-NABTA-LUBAP-JDW	: Northeast bound Traffic.

9. JEDDAH FIR RVSM TRANSITION AREA AIRSPACE

9.1 The Transition Area for transition from Reduced Vertical Separation Minimum (RVSM) airspace into Non-RVSM airspace, and vice versa, within the JEDDAH FIR is as follows:

9.2 The JEDDAH FIR RVSM Transition Area adjacent to the KHARTOUM FIR Non-RVSM airspace is that airspace between FL 290 and FL 410 inclusive, contained within the confines of the following Airways:

G 660 : Between JDW VORTAC and NABTA

B 407 : Between JDW VORTAC and DUNGU

9.3 The following are the EXIT and ENTRY Points between the JEDDAH FIR RVSM Transition Area airspace and the KHARTOUM FIR :

FIR	ENTRY POINT	EXIT POINT	AIRWAY	DIRECTION
KHARTOUM FIR	NABTA	**************	G 660	INBOUND
KHARTOUM FIR	***************	DUNGU	B 407/H49	OUTBOUND

9.4 PROCEDURES FOR CONTROLLING RVSM COMPLIANT AND NON-RVSMCOMPLIANT AICRAFT

9.4.1 JEDDAH ACC shall ensure that:

a) Both RVSM Compliant aircraft and Non-RVSM Compliant aircraft entering the JEDDAH FIR RVSM Airspace from KHARTOUM FIR Non-RVSM airspace are to be accommodated within the JEDDAH RVSM Transition Area airspace;

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

c) Aircraft are established at cruising levels appropriate for the JEDDAH FIR RVSM Airspace or KHARTOUM FIR Non-RVSM airspace, as applicable, and that the appropriate vertical separation minimum is achieved before the aircraft passes the EXIT Point of the RVSM Transition Area into the KHARTOUM FIR.; and

d) Non-RVSM Compliant civil aircraft operating from KHARTOUM FIR Non-RVSM airspace into the JEDDAH FIR RVSM Airspace are to be established at a cruising level outside the vertical dimensions of the JEDDAH FIR RVSM Airspace before the aircraft passes the ENTRY Point of the RVSM Transition Area into the JEDDAH FIR.

e) The cruising levels appropriate to direction of flight for RVSM Compliant and Non-RVSM Compliant aircraft conform to those listed in ICAO Annex 2, Appendix 3, (a) & (b).

9.4.2 The cruising levels appropriate to direction of flight between the KHARTOUM FIR Non-RVSM airspace and JEDDAH FIR RVSM airspace is shown in Figure 1 below.

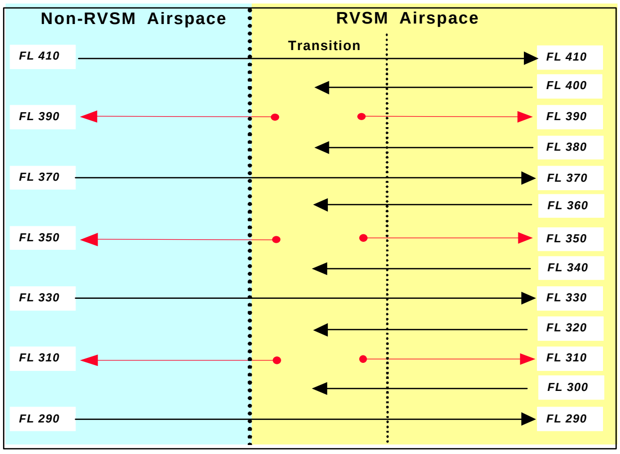


Figure 1.

9.4.3 It is important to note that in the above Figure, the **"Opposing Directions"** cruising levels are FL 310, FL 350 and FL390.

9.5 ATC PROCEDURES FOR RVSM COMPLIANT AIRCRAFT AND NON-RVSM COMPLIANT AIRCRAFT TRANSITING FROM THE JEDDAH FIR RVSM AIRSPACE INTO THE KHARTOUM FIR NON-RVSM AIRSPACE AND VICE VERSA.

9.5.1 RVSM Compliant aircraft and Non-RVSM Compliant aircraft entering the JEDDAH FIR RVSM Airspace from the KHARTOUM FIR Non-RVSM airspace shall be established at a flight level in accordance with the ICAO Tables of Cruising Levels, as published in ICAO. Annex 2, Appendix 3, (a).

9.5.2 Any changes for RVSM Compliant aircraft from Non-RVSM cruising levels to RVSM cruising levels shall be initiated by JEDDAH ACC after the aircraft enters the RVSM Transition Area (See Figure 2).

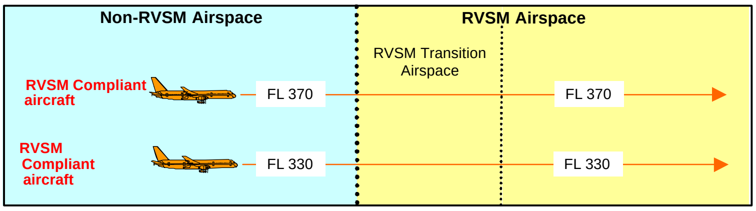


Figure 2.

9.5.3 RVSM Compliant aircraft entering the KHARTOUM FIR Non-RVSM airspace from the JEDDAH RVSM Transition Area shall be established with the applicable vertical separation minimum by JED ACC before the aircraft passes the Transition Area EXIT Point into the KHARTOUM FIR Non-RVSM airspace. Such aircraft shall be established at a flight level in accordance with the ICAO Tables of Cruising Levels, as published in ICAO Annex 2, Appendix 3 (b). (See Figure 3).

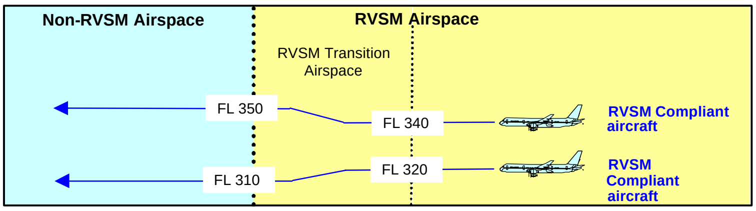


Figure 3.

9.5.4 Non-RVSM Compliant aircraft operating from a departure aerodrome to a destination aerodrome which are both outside of the lateral limits of the JEDDAH FIR RVSM airspace, with a portion of the route within the lateral limits of the JEDDAH FIR RVSM airspace, shall be cleared to FL 280 or below or at FL 430 or above by KHARTOUM ACC and any such flight level changes shall be achieved before the aircraft passes the ENTRY Point to the JED RVSM Transition Area airspace. (See Figure 4).

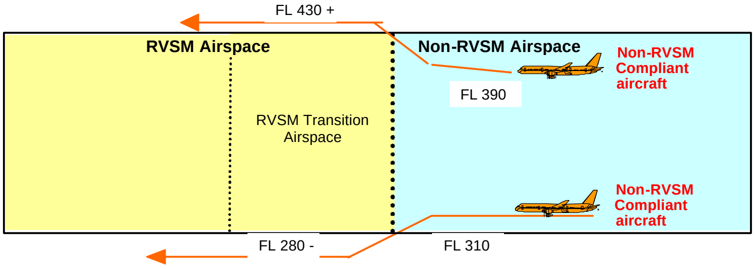


Figure 4.

9.5.5 Non-RVSM Compliant aircraft operating from a departure aerodrome outside of the lateral limits of the JEDDAH FIR RVSM airspace with a destination aerodrome within the lateral limits of the JEDDAH FIR RVSM airspace shall be cleared to a flight level at or below FL 280 by the KHARTOUM ACC and the Non-Compliant RVSM aircraft must be at or below FL 280 before reaching the ENTRY point to the JED RVSM Transition Area. (See Figure 5)

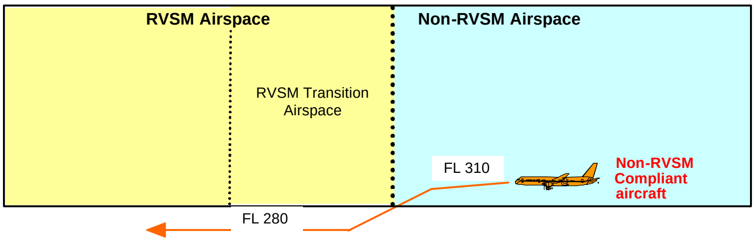


Figure 5.

9.5.6 Non-RVSM Compliant aircraft operating from a departure aerodrome within the lateral limits of the JEDDAH FIR RVSM airspace to a destination aerodrome in the KHARTOUM FIR Non-RVSM airspace shall be cleared by JEDDAH ACC to a flight level at or below FL 280; and, **if the KHARTOUM ACC approves**, may be cleared to FL 290 or above by the JEDDAH ACC provided any such flight level changes shall be achieved within the JEDDAH RVSM Transition Area and before the aircraft passes the Transition Area EXIT point into the KHARTOUM FIR Non-RVSM airspace. (See Figure 6)

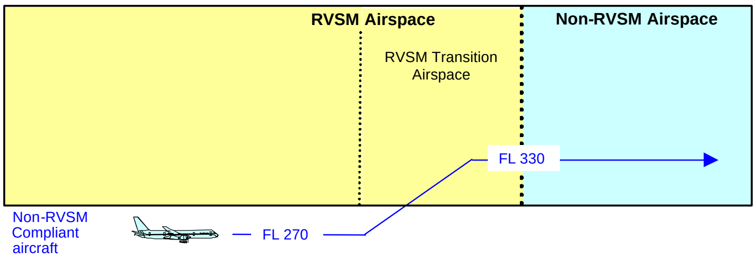


Figure 6.

9.6 PROCEDURES FOR SUSPENSION OF RVSM

9.6.1 JEDDAH ACC will consider suspending RVSM procedures within affected areas of the JEDDAH FIR RVSM airspace when there are pilot reports of greater than moderate turbulence. Within areas where RVSM procedures are suspended, the vertical separation minimum between all aircraft will be at least 2,000 ft.

10. MOVEMENT AND CONTROL MESSAGES:

10.1 FLIGHT PLANS:

Filed Flight Plan (FPL) messages shall be sent via the AFTN for all flights originating within one FIR and entering the other, not less than 60 minutes before the estimated time of the aircraft over the Common Control Boundary (CCB).

10.2 DEPARTURES:

Departure (DEP) messages shall be sent via the AFTN for all flights mentioned in Para., 10.1.2 above, as soon as practicable after the aircraft is airborne.

10.3 **ESTIMATES:**

Estimate (EST) messages shall be sent, using the appropriate "Voice Circuit" (Land Line or HF Radio), for all flights crossing the Common Control Boundary, in sufficient time to permit receipt by the Accepting ATS Unit not more than one hour nor less than 30 minutes before the estimated time for the aircraft to be over the transfer of control point specified in Para., 13, below.

10.4 **REVISIONS:**

10.4.1 "Revisions" and other "Coordination" (CDN) messages shall normally be sent, using the appropriate "Voice Circuit" (Land Line or HF radio), as soon as practicable whenever 3 minutes or more from the estimated time that was originally passed or when a change of the cleared level and/or crossing condition is planned.

10.4.2 The Transferring ATS Unit shall send "Revision" and other "Coordination" messages to the Accepting ATS Unit at least 20 minutes prior to the aircraft's estimated time over the transfer of control point.

10.4.3 In case of non-availability of the ATS "Voice Circuit" between the ATS Units concerned, the Transferring ATS Unit shall send the relevant flight data to the Accepting ATS Unit via the AFTN.

10.4.4 "Estimates", "Revisions" and other "Coordination" messages when sent via the AFTN, require an "acknowledgement" from the Acceptance ATS Unit in the form of an "Acceptance" (ACP) message, to be sent to the Transferring ATS Unit.

10.4.5 After coordination of the transfer of control conditions, the resulting ATC clearance shall not be changed by the Transferring ATS Unit unless prior agreement has been effected between the ATS Units concerned.

10.4.6 In case of flights departing from aerodromes where, due to their proximity to the Common Control Boundary (CCB), application of the procedures set out in Para., 10.1.4 above would not be possible after departure, coordination between the Transferring ATS Unit and the Accepting ATS Unit shall be effected prior to the issuance of the ATC clearance to the aircraft concerned. (See ICAO DOC 4444, ATM/501, Chapter X, Para., 10.4.2.2.1.)

11. COMMUNICATIONS FAILURE BETWEEN ATS UNITS:

11.1 For those exceptional cases where there is a complete failure of communications between JEDDAH ACC and KHARTOUM ACC, the Transferring ATS Unit shall act as follows:

a) Attempt to relay Flight Data Messages through all available agencies to the Accepting ATS Unit; if unable, then

b) Clear the concerned aircraft to a "Clearance Limit" within its airspace; and

c) Inform the aircraft of the absence of coordination between the two ATS units; and

d) Instruct the aircraft to establish contact with the Accepting ATS Unit (VHF/UHF or HF) and provide it with relevant flight data; and

e) Request the aircraft to advise the Transferring ATS Unit when the Accepting ATS Unit has issued it a clearance to proceed.

11.2 Aircraft departing from the OEJN Airport on B 407, shall be cleared short to DUNGU at FL 180 and to reach DUNGU maintaining FL 180.

11.3 Aircraft , southwest bound over the JDW VORTAC on B407 shall be cleared short to DUNGU at FL 280 or above, appropriate to its direction of flight. {See ICAO Annex 2, Appendix 3 (b).]

11.4 RVSM Compliant aircraft from the KHARTOUM FIR, on G 660, shall be cleared short to NABTA and to reach NABTA maintaining a flight level appropriate to its direction of flight, at FL 290 or above, [See ICAO Annex 2, Appendix 3, (a)].

11.5 Non-RVSM Compliant aircraft from the KHARTOUM FIR, on G 660, shall be cleared short to NABTA and to reach NABTA maintaining a flight level appropriate to its direction of flight at FL 270 or below. [See ICAO Annex 2, Appendix 3, (b)].

11.6 All aircraft shall be instructed to request further clearance directly from the Accepting ATS Unit and then obtain clearance from the Transferring ATS Unit to to proceed in accordance with the clearance received from the Accepting ATS Unit.

12. TRANSFER OF COMMUNICATIONS:

12.1 Aircraft shall be instructed to establish communications with the Accepting ATS Unit over the transfer of control point. Transfer of communications does not constitute transfer of control; Para., 13.4 refers.

12.2 Whenever the Accepting ATS Unit is unable to establish contact with an aircraft within five minutes after its estimated time over the transfer of control point, it shall inform the Transferring ATS Unit so that appropriate measures may be taken.

12.3 With reference to the ICAO DOC 4444, ATM/501, Chapter X, Para., 10.4.2.4.4, the Accepting ATS Unit need not, as a matter of routine, notify the Transferring ATS Unit that radio communication has been established with an aircraft being transferred.

12.4 Whenever an aircraft is unable to maintain radio contact with the ATS Unit responsible for the provision of Air Traffic Services in the airspace in which it is operating, other ATS Units shall, if possible, assume relay functions between them.

12.5 Primary frequency assignment for transfer of communications is as follows:

ATS ROUTE	ATS UNIT CALL SIGN	FREQUENCY
B 407 (Landing PSD)	KHARTOUM CONTROL	118.1 MHZ or 11300 KHZ
B 407 (Over-flying PSD)	KHARTOUM CONTROL	124.7 MHZ or 11300 KHZ or 13288 KHZ or 5517 KHZ
G 660 (Via NABTA)	JEDDAH CONTROL	119.1 MHZ or 124.0 MHZ

13. TRANSFER OF CONTROL:

13.1 Control of traffic shall be transferred to the Accepting ATS unit at the following significant points:.

ATS ROUTE	TRANSFER OF CONTROL POINT
a) B 407	DUNGU
b) G 660	NABTA
c) OTHERS	Crossing the CCB

13.2 If transfer of control is required at points other than those specified in Para., 13.1 above, they shall be coordinated individually for each flight.

13.3 The Accepting ATS Unit shall assume control of an aircraft as soon as it has reported passing the appropriate transfer of control point. There is no requirement for additional transfer of control or acceptance messages unless requested by the Transferring ATS Unit..

13.4 Control of traffic communicating with the Accepting ATS Unit shall not be assumed prior to aircraft passing the transfer of control point, unless specifically agreed to by the Transferring ATS Unit.

14. FLIGHT LEVELS:

14.1 Aircraft on ATS routes shall be assigned flight levels as follows:

ATS ROUTE	FROM	TO	FLIGHT LEVELS
G 660	JEDDAH AOR	KHARTOUM AOR	[As per ICAO Annex 2,
G 407	KHARTOUM AOR	JEDDAH AOR	Appendix C, (a) & (b).]

15. SEPARATION:

15.1 Aircraft at the same level shall be longitudinally separated with a minimum of 10 minutes, constant or increasing, except as stated in Para., 11.1 above.

15.2 When the succeeding aircraft is faster than the preceding aircraft, the Transferring ATS Unit shall notify the Accepting ATS Unit and request its approval for the transfer of control. The Accepting ATS Unit shall have the right to determine the transfer of control conditions.

16. CLEARANCE LIMIT:

The clearance limit shall normally be the destination aerodrome. However, if the necessary coordination cannot be effected in good time , e.g. due to communications failure between ATS units, the clearance limit shall be the transfer of control point and the aircraft shall be instructed to request onward clearance from the Accepting ATS Unit before proceeding beyond that point. (Please refer to Para., 11 above.)

17. WEATHER INFORMATION:

ATS units shall keep each other informed of SIGMET information and of weather conditions at destination aerodromes within their respective AOR whenever such conditions may fall below airport operating minima and consequently may result in diversion or holding for weather improvement.

18. OTHER INFORMATION EXCHANGE:

18.1 Each party to this agreement shall advise the other:

a) Of all pertinent details concerning any existing emergency flight which may enter the other's AOR.

b) When any airport closure/restriction is implemented that may affect the other ATC unit.

c) When weather conditions, at destination aerodromes within their respective AOR may fall below pilot or aircraft operating minima and result in diversion action or holding for weather improvement.

d) When the radar facility of either ATS Unit is out of service, and non-radar procedures are required.

19. FLOW CONTROL:

Should it become necessary for a unit to impose flow control restrictions within its AOR, the Accepting ATS Unit shall advise the other as to the number of aircraft per hour, or the distance in trail between aircraft either in minutes or in miles, that it can accept, along with any additional restrictions that might need to be applied. The Accepting ATS Unit shall notify the other as soon as any of these flow control restrictions are no longer required.

20. AUTHORIZED SIGNATORIES:

For PCA, Saudi Arabia	For CAA, Sudan
________________________	______________________
Mohammed O. Alawi Director, Air Traffic Services.	....

Annex A.

ABBREVIATIONS AND DEFINITIONS

ABBREVIATIONS:

ACAS	Airborne collision avoidance system
ACC	Area Control Center
ACP	Acceptance Message
AFTN	Aeronautical Fixed Telecommunication Network
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
ALR	Alerting Message
AOR	Area of Responsibility
APP	Approach Control Unit
APREQ	Approval Request Message
ARR	Arrival Message
ATM	Air Traffic Management
ATSU	Air Traffic Services Unit
AWY	Airway
CCB	Common Control Boundary
CDN	Coordination Message
CHG	Modification Message
CIDIN	Common ICAO Data Interchange Network
CNL	Cancellation Message
CNS	Communications, Navigation and Surveillance
CPDLC	Controller-Pilot Data Link Communications
CPL	Current Flight Plan Message
CTA	Control Area
CTP	Control Transfer Point
DEP	Departure Message
DEST	Destination Aerodrome
DLA	Delay Message
DPS	Data Processing System
EAT	Expected Approach Time
EST	Estimate Message
ETO	Estimated Time Over Significant Point
FIR	Flight Information Region
FPL	Filed Flight Plan Message
FREQ	Frequency
HF	High Frequency (3 to 30 MHz)
ICAO	International Civil Aviation Organization
JDW	Jeddah VORTAC
KHZ	Kilohertz
KSA	Kingdom of Saudi Arabia
KT	Knots
MCC	Mission Control Centre
MHZ	Megahertz
MIL	Military

MIN	Minutes
MNM	Minimum
MNPS	Minimum Navigation Performance Specification
MOA	Military Operating Area
NOTAM	Notice To Airmen
PSD	Port Sudan
PCA	Presidency of Civil Aviation
RCC	Rescue Coordination Centre
RDL	Radial
REP	Reporting Point
RNAV	Area Navigation
RNP	Required Navigation Performance
RPL	Repetitive Flight Plan
RSC	Rescue Sub-Centre
RVSM	Reduced Vertical Separation Minimum
SAR	Search And Rescue
SARPS	Standards And Recommended Practices
SARSAT	Search And Rescue Satellite aided Tracking
SIGMET	Significant Meteorological Information
SPL	Supplementary Flight Plan Message
SRR	Search and Rescue Region
SSR	Secondary Surveillance Radar
SUPPS	Regional Supplementary Procedures
TACAN	Tactical Air Navigation Aid
TFR	Transfer of Control
TMA	Terminal Control Area
TCU	Terminal Control Unit
TURB	Turbulence
UFN	Until Further Notice
UHF	Ultra High Frequency (300 to 3000 MHZ)
UNL	Unlimited
U/S	Unserviceable
UTC	Coordinated Universal Time
VHF	Very High Frequency (30 to 300 MHZ)
VORTAC	VOR and TACAN

DEFINITIONS :

ATS Accepting Unit/Controller. Air Traffic Control Unit/Controller next to take control of an aircraft.
ATS Transferring Unit/Controller. Air Traffic Control Unit/Controller in the process of transferring the responsibility for providing air traffic control service to an aircraft to the next air traffic control unit/controller along the route of flight.
Aeronautical Information Publication (AIP). A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation.
Airborne collision avoidance system (ACAS). An aircraft system based on Secondary Surveillance Radar (SSR) transponder signals which operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponders.
Aircraft proximity. A situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised. An aircraft proximity is classified as follows:

Risk of collision. The risk classification of an aircraft proximity in which serious risk of collision has existed.

No risk of collision. The risk classification of an aircraft proximity in which no risk of collision has existed.

Risk not determined. The risk classification of an aircraft proximity in which insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination.

Air traffic control clearance. Authorization for an aircraft to proceed under conditions specified by an air traffic control unit.
Air traffic services unit. A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.
Airway. A control area or portion thereof established in the form of a corridor.
Alerting service. A service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.
Appropriate ATS authority. The relevant authority designated by the State responsible for providing air traffic services in the airspace concerned.
Area control centre. A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Area control service. Air traffic control service for aircraft in control areas.
Area navigation (RNAV). A method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these.
Area navigation route. An ATS route established for the use of aircraft capable of employing area navigation.
ATS route. A specified route designed for channeling the flow of traffic as necessary for the provision of air traffic services.
Note 1 The term ATS route is used to mean variously, airway, advisory route, controlled or uncontrolled route, arrival or departure route, etc.

Note 2 An ATS route is defined by route specifications which include an ATS route designator, the track to or from significant points (waypoints), distance between significant points, reporting requirements and, as determined by the appropriate ATS authority, the lowest safe altitude.

Clearance limit. The point to which an aircraft is granted an air traffic control clearance.
Code (SSR). The number assigned to a particular multiple pulse reply signal transmitted by a transponder in Mode A or Mode C.
DME distance. The line of sight distance (slant range) from the source of a DME signal to the receiving antenna.
Filed flight plan. The flight plan as filed with an ATS unit by the pilot or his designated representative, without any subsequent changes.
Note When the word _______ is used as a suffix to this term, it denotes the content and format of the filed flight plan data sent from one unit to another.

Flight level. A surface of constant atmospheric pressure which is related to a specific pressure datum, 1013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.
Note 1 A pressure type altimeter calibrated in accordance with the Standard Atmosphere:
(a) when set to QNH altimeter setting, will indicate altitude.
(b) when set to OFE altimeter setting, will indicate height above the OFE reference datum.
(c) when set to 1013.2 hectopascals (hPa) will indicate flight levels.
Note 2 The terms _____ and _______ used in Note 1 above, indicate altimetric, not geometric, values.
Flight plan. Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft.
Flow control. Measures designed to adjust the flow of traffic into a given airspace, along a given route or bound for a given aerodrome, so as to ensure the most effective utilization of the airspace.
Level. A generic term relating to the vertical position of an aircraft in flight and meaning variously, height, altitude or flight level.
Level change. In the application of longitudinal separation, level change is that portion of the climb or descent of one aircraft during which no vertical separation exists with respect to another aircraft.
Mode (SSR). The conventional identifier related to specific functions of the interrogation signals transmitted by an SSR interrogator. There are 4 modes specified in Annex 10: A, C, S and intermode.
Non-radar Separation.* See "Procedural separation". Definition is interchangeable.
NOTAM. A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.
Primary surveillance radar (PSR). A surveillance radar system which uses reflected radio signals.
Procedural separation.* The separation used when aircraft position information is derived from sources other than radar.
PSR blip. The visual indication, in non-symbolic form, on a radar display of the position of an aircraft obtained by primary radar.
provision of air traffic control service.
Reduced Vertical Separation Minimum Transition Area. The Jeddah FIR RVSM Transition Area is that airspace between FL 290 and FL 410 inclusive, contained within the confines of the following Airways:

B 407 : Between JDW VORTAC and DUNGU
G 660 : Between JDW VORTAC and NABTA
G 650 : Between JDW VORTAC and RASKA
R 775 : Between JDW VORTAC and APDOS
B 413 : Between KOBAS and RIBOK

Reporting point. A specified geographical location in relation to which the position of an aircraft can be reported.

Required navigation performance (RNP). A statement of the navigation performance necessary for operation within a defined airspace.

Note: Navigation performance and requirements are defined for a particular RNP type and/or application.

Rescue coordination centre. A centre established within an assigned SAR area to promote efficient organization of SAR.

Rescue unit. A unit composed of trained personnel and provided with equipment suitable for the expeditious conduct of SAR.

RNP type. A containment value expressed as a distance in nautical miles from the intended position within which flights would be for at least 95 percent of the total flying time.

Secondary surveillance radar (SSR). A surveillance radar system which uses transmitters/receivers (interrogators) and transponders.

SIGMET. Information issued by an meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of aircraft operations.

Significant point. A specified geographical location used in defining an ATS route or the flight path of an aircraft and for other navigation and ATS purposes.

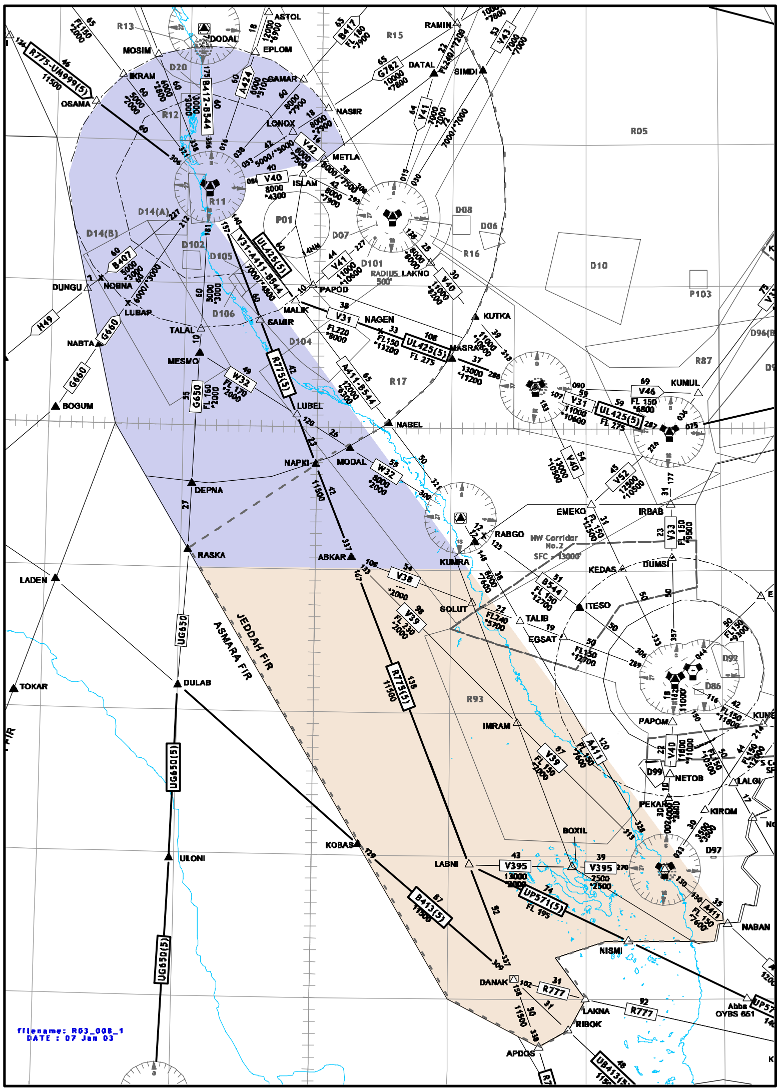
SSR response. The visual indication, in non-symbolic form, on a radar display, of a response from an SSR transponder in reply to an interrogation.

Terminal control area. A control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes.

Transfer of control point. A defined point located along the flight path of an aircraft, at which the responsibility for providing air traffic control service to the aircraft is transferred from one control unit or position to the next.

ANNEX B

RVSM TRANSITION AREA MAP



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

4.1 The OPS/AIR Work Group held its meeting in accordance with its Terms of Reference and Work Programme as set by MIDANPIRG at **Appendix 4A** to the report on Agenda Item 4.

4.2 The Work Group was attended by Operations and Airworthiness experts from the following States of the MID Region: Bahrain, Egypt, Iran, Kuwait, Lebanon, Saudi Arabia and Syria. IATA also attended as an observer.

4.3 **Draft MID RVSM OPS/AIR Approval Manual**

4.3.1 The Work Group gave priority to review and update the Draft MID RVSM OPS/AIR Manual Version 1.0 dated 17/10/2002 and its associated forms in order to be presented for endorsement by MIDANPIRG/8 meeting in April 2003. The Work Group completed this task and produced MID RVSM OPS/AIR Approval Manual Version 1.1 dated 26/02/2003 at **Appendix G** to the report.

4.3.2 Accordingly the following Draft Conclusion was developed:

DRAFT 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.

4.4 **OPS/AIR Work Programme (Task List)**

4.4.1 The Work Group reviewed and updated that part of the MID RVSM Task Force Work Programme (Task List) related to OPS/AIR/WG. The updated Task List is at **Appendix B** to the report.

The Work Group noticed that most of the MID States have amended existing legislations in accordance with MIDANPIRG/7 Conclusion 7/19 for the inclusion of provisions for the implementation of RVSM. However, it was noted that several MID States had not yet done so. The meeting therefore urged all concerned MID States to expedite action pursuant to all MIDANPIRG/7 Conclusion 7/19 so to provide a copy of the legislation to ICAO MID Regional Office as soon as possible and prior to next RVSM TF/8 meeting 25 28 May 2003.

4.5 **Use of GMU/HMU**

4.5.1 The Work Group was informed of the monitoring requirements of some operators in MID

purposes. To this affect, the Work Group was informed that contacts have been established between IATA and service providers over the issue and it has been agreed that as indicated under Paragraph 2.1.4 and 2.3.19 of the report on agenda itme 2, appropriate assistance would be given to the concerned States.

4.6. **MECMA Website**

4.6.1 The Work Group wished to bring to the attention of the MID Region Operators through their States to check the MECMA website: www.mecma.com for more information regarding MID RVSM implementation.

4.7 **Other Issues**

4.7.1 The Work Group encourages co-operation and co-ordination between States to achieve the Milestone Plan for implementation at the target date of 27 November 2003.

AIRCRAFT OPERATIONS & AIRWORTHINESS WORK GROUP (OPS/AIR/WG)

TERMS OF REFERENCE

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

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

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

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

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

To review monitoring data prior to implementation and after implementation.

REPORT ON AGENDA ITEM 5 : ANY OTHER BUSINESS

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

MID RVSM TASK FORCE TENTATIVE FUTURE SCHEDULE OF MEETINGS

Date	**Meeting**	**Venue**
YEAR 2003		
25 28 May	MID RVSM TF/8	Abu Dhabi
9-11 June	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

TERMS OF REFERENCE FOR THE MID RVSM TASK FORCE

1. Develop a comprehensive implementation plan for RVSM in the MID Region, taking into account the requirements of the *Manual on Implementation of a 300 M (1000 ft) Vertical Separation Minimum between FL 290 and FL 410 Inclusive (Doc 9574)*, and the requirements of users*.*

2. Identify any areas within the MID Region where it may not be feasible to introduce RVSM in the initial implementation.

3. Determine the extent to which a cost-benefit analysis is required prior to implementation of RVSM.

4. Coordinate with the bodies responsible for the implementation of RVSM in adjacent Regions in order to harmonize implementation plans.

5. Develop guidance material for RVSM operations in the MID Region, taking into account existing guidance material which has been developed by other regions.

6. Address any other matters, as appropriate, which are relevant to the implementation of RVSM.

MID RVSM TASK FORCE - WORK PROGRAMME

ID	DESCRIPTION	START	FINISH	RESOURCES	
	Working Methods and Resources				
1	Agree on structure of TF to enable efficient handling of specialist technical tasks		5-Oct-00	RVSM TF - Completed	
2	Identify resources for performing specialist technical tasks	5-Oct-00	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	31-Mar-03	SAM/WG	
11	Develop detailed program for safety analysis	6-Mar-02	ON-GOING	SAM/WG	
12	Establish requirements for pre and post-implementation monitoring	TBD	6-Mar-02	SAM/WG - 4th qtr. 03 for post implementation monitoring	completed
13	Undertake initial safety analysis	TBD	4th qtr.-02	SAM/WG-Completed	
14	Carry out pre-implementation safety analysis	TBD	27-Aug-03	SAM/WG	
15	Carry out pre-implementation readiness assessmsent	TBD	31-Mar-03	SAM/WG	
16	Carry out post-implementation safety analysis during verification phase	TBD	Mid.-04	SAM/WG	
17	Review of mathematical and statistical techniques to assure their appropriateness for MID RVSM	11-Apr-01	Jan-03	SAM/WG- 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	
	ATC Operational Issues				
22	Dertermine the limits of RVSM airspace (geographic and vertical)	10-Apr-01	6-Mar-02	ATC/WG - Completed	

MID RVSM TASK FORCE - WORK PROGRAMME

ID	DESCRIPTION	START	FINISH	RESOURCES	
23	Develop ATC operational policy & procedures for normal RVSM operations	14 Oct. 02	31-Mar-03	ATC/WG-ON-GOING ACTIVITY	
24	Identify transition areas and transition procedures	26-Aug-01	28-May-03	ATC/WG-Egypt,Iran, Saudi Arabia,Oman to prepare draft	
25	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	
26	Develop ATC procedures for non-approved State acft to transit RVSM airspace	10-Apr-01	5-Jun-02	ATC/WG-Completed	
27	Develop procedures for handling non-compliant civil aircraft (inc ferry & maintenance)	10-Apr-01	5-Jun-02	ATC/WG-Completed	
28	Develop procedures for suspension of RVSM	10-Apr-01	5-Jun-02	ATC/WG- Completed	
29	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-Outside expertise may be sought	
30	Develop ATC regional training guidance material	TBD	28-May-03	ATC/WG- draft-completed	
31	Harmonization of ATC regional guidance material	5-Jun-02	31-Mar-03	Bahrain to coordinate inputs/Secretariat to follow-up	
32	Identify issues to be adressed in Letters of Agreement	10-Apr-01	23 Feb. 03	*ATC/WG- Saudi- Arabia draft*	
33	Evaluate the need for chart amendments related to RVSM	11-Apr-01	28-May-03	Secretarist to prepare draft	
34	States to conduct local RVSM training for air traffic controllers	27-Mar-03	26-Nov-03	States- On-going activity	
	OPS/AIR Issues				
35	States to examine existing legislation and regulations to identify any changes required for RVSM	5-Oct-00	28-May-03	OPS/AIR/WG	
36	Develop and promulgate information on the operational approval process	1-Apr-01	29-Aug-01	OPS/AIR/WG - Completed	
37	Develop procedures for aircraft found to be non-compliant through monitoring	11-Apr-01	26- Feb. 03	OPS/AIR/WG - Completed	
38	Develop regional guidance on pilot, maintenance personnel and dispatcher training	11-Apr-01	26-Feb-03	OPS/AIR/WG - Completed	
39	Examine issues related to the use of ACAS in RVSM airspace	11-Apr-01	29-Aug-01	OPS/AIR/WG - Completed	
	Joint Tasks				
40	Review preliminary readiness assessment	1-Apr-01	29-Aug-01	RVSM TF - Completed- 90% target achieved	
41	Set target proportion of RVSM approved flights for full RVSM implementation	1-Apr-01	23 Feb. 03	RVSM TF - Completed	
42	Set target AIRAC implementation date(AIP Supplement to be published)	7-Apr-01	2-Oct-03	RVSM TF -Completed *(15th May 03)*	
43	Prepare/maintain regional status report detailing RVSM implementation plans	1-Apr-01	28-May-03	RVSM TF - *Secretariat to prepare draft*	
44	Identify major milestone and targe dates	9-Apr-01	28-May-03	RVSM TF - Secretariat to prepare chart.	
45	Develop a regional RVSM informational campaign	7-Apr-01	28-May-03	RVSM TF *-Bahrain, Lebanon and Saudi Arabia to assist*	
46	Develop regional RVSM Guidance Material	1-Apr-01	28-May-03	RVSM TF- Version 1.2 completed- Final review by MIDANPIRG/8	

MID RVSM TASK FORCE - WORK PROGRAMME

ID	DESCRIPTION	START	FINISH	RESOURCES	
47	Review weather and contingency procedures for applicability under RVSM	10-Apr-01	26-Feb-03	Draft completed(Secretariat will harmonize with other Regions)	
48	Develop model AICs and NOTAMs	9-Apr-01	29-Aug-01	Draft Completed(AIC already Issued)	
49	Evaluate preliminary readiness and safety assessments	20-Jan-01	5-Jun-02	404000000.4	
50	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	
51	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	
52	Develop Doc 7030 amendment	10-Apr-01	27-Aug-03	RVSM TF- Draft prepared. Being harmonized with other Regions	
53	Review aircraft altitude-keeping performance and operational errors	1-Jul-01	25-May-03	RVSM TF	
54	Develop monitoring and evaluation program for the verification phase	TBD	5-Jun-02	RVSM TF-Completed	
55	Evaluate final readiness assessment	TBD	27-Aug-03	RVSM TF	
56	Evaluate final safety analysis	30-Jan-03	27-Aug-03	RVSM TF(2nd quarter 2003)	
57	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.003

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	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:	✓	-	
	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	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: BAHRAIN

Appendix 3B

FIR(s): BAHRAIN

Rev.003

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	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	✓	-	
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
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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: BAHRAIN

Appendix 3B

FIR(s): BAHRAIN

Rev.003

EVALUATION DATE(s):

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

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
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 3B

FIR(s): BAHRAIN

Rev.003

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	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	✓	-	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	-	No	Being provided

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: BAHRAIN

Appendix 3B

FIR(s): BAHRAIN

Rev.003

EVALUATION DATE(s):

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

	approval documentation			
3.9	Did you nominate your State RVSM Programme Manager	✓	-	
3.10	Certification	-	-	

OTHER GENERAL REQUIRMENTS

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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: EGYPT

Appendix C

FIR(s): CAIRO

Rev.003

EVALUATION DATE(s):15 September 2002

01/06/2002	X	01/09/2002	X	26/02/2003	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:	✓	-	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)

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: EGYPT

Appendix C

FIR(s): CAIRO

Rev.003

EVALUATION DATE(s):15 September 2002

01/06/2002	X	01/09/2002	X	26/02/2003	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	✓	-	
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. LOAs signed with Athens and Nicosia ACCs
2.3	Have training requirements been assessed	✓	--	
2.4	Issue of AIC	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: EGYPT

Appendix C

FIR(s): CAIRO

Rev.003

EVALUATION DATE(s):15 September 2002

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

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
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.003

EVALUATION DATE(s):15 September 2002

01/06/2002	X	01/09/2002	X	26/02/2003	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	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	✓	-	RVSM data monitoring will be automatically interchanged among

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: EGYPT

Appendix C

FIR(s): CAIRO

Rev.003

EVALUATION DATE(s):15 September 2002

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

	approval documentation			regional monitoring agencies
3.9	Did you nominate your State RVSM Programme Manager	✓	-	Mr. Mahmoud Elshanabary
3.10	Certification	✓	-	

OTHER GENERAL REQUIRMENTS

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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: I.R.IRAN

Appendix C

FIR(s): TEHRAN

Rev.003

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X		26/02/2003	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:	✓	-	*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	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: I.R.IRAN

Appendix C

FIR(s): TEHRAN

Rev.003

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X		26/02/2003	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	✓	-	
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
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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: I.R.IRAN

Appendix C

FIR(s): TEHRAN

Rev.003

EVALUATION DATE(s):

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

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.	✓	-	Eventually Sector 1 will have to operate in 2 Sectors
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

Rev.003

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X		26/02/2003	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		NO	Under development
3.2	Aircraft and Operators approval/guidance	✓	-	
3.3	Procedures for non-compliant aircraft		No	Under development
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers	✓	-	
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval	✓	-	20 aircraft approved. 25%
3.6	How many national operators have full RVSM approval	✓	-	2 Operators (IRAN AIRLINES and MAHAN AIRLINES
3.7	What is the percentage ratio of aircraft fleet	✓	-	40% *(28 aircrafts)*
3.8	Did you provide MECMA with RVSM	✓	-	Provided in advance

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: I.R.IRAN

Appendix C

FIR(s): TEHRAN

Rev.003

EVALUATION DATE(s):

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

	approval documentation			
3.9	Did you nominate your State RVSM Programme Manager	✓	-	
3.10	Certification	✓	-	

OTHER GENERAL REQUIRMENTS

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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: JORDAN

Appendix C

FIR(s): AMMAN

Rev.003

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	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:	✓	-	
	Assigned Altitude Deviation (AAD) forms	✓	-	
	-Total IFR movements per month	✓	-	
	-Average time spent per movement at assigned levels between FL290 and FL410	✓	-	
	-ATC/ATC Coordination failures	-	No	
1.2	Whether any turbulence data reports have been received and sent to MECMA	-	No	
1.3	Whether traffic data has been sent	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: JORDAN

Appendix C

FIR(s): AMMAN

Rev.003

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	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	✓	-	*(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	
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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: JORDAN

Appendix C

FIR(s): AMMAN

Rev.003

EVALUATION DATE(s):

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

2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.	✓	-	
2.8	Conduct of local training for air traffic controllers	✓	-	
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	
2.10	Is there any need for changes to FDPS?	✓	-	
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	
2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	-	No	
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	-	No	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: JORDAN

Appendix C

FIR(s): AMMAN

Rev.003

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003	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	✓		Regulatory Guidance :JCA
3.3	Procedures for non-compliant aircraft	✓		Procedures shall be coordinated with ATC controlling airspace
3.4	Development of RVSM Training Curriculum for flight crew members and dispatchers	-	No	Operator procedure
3.5	What is the percentage ratio of the national aircraft that received RVSM airworthiness approval	-	No	19 out of 27 aircraft are approved
3.6	How many national operators have full RVSM approval	-	No	2 operators (Royal Jordanian and Royal Squadron)
3.7	What is the percentage ratio of aircraft fleet	-	No	Royal Jordanian 10 out of 16 aircraft
3.8	Did you provide MECMA with RVSM	-	No	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: JORDAN

Appendix C

FIR(s): AMMAN

Rev.003

EVALUATION DATE(s):

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

	approval documentation			
3.9	Did you nominate your State RVSM Programme Manager	✓		
3.10	Certification	✓		Operations specifications and/or letter of authorization

OTHER GENERAL REQUIRMENTS

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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: KUWAIT

Appendix C

FIR(s): KUWAIT

Rev.003

EVALUATION DATE(s):

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

SAFETY AND AIRSPACE MONITORING ASPECTS

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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: KUWAIT

Appendix C

FIR(s): KUWAIT

Rev.003

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003		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	✓	-	
2.2	Documentations/procedures Have contingency plans been made in case equipment upgrade not received on time Have letters of agreement been signed with adjacent centres for provision of services in an RVSM environment	-	No	
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of AIC	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: KUWAIT

Appendix C

FIR(s): KUWAIT

Rev.003

EVALUATION DATE(s):

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

2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.	✓	-	
2.8	Conduct of local training for air traffic controllers	-	No	Under preparation
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	
2.10	Is there any need for changes to FDPS?	-	No	Not applicable
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	
2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	-	No	Not applicable
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	-	No	Not applicable

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: KUWAIT

Appendix C

FIR(s): KUWAIT

Rev.003

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	26/02/2003		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	✓	-	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	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: KUWAIT

Appendix C

FIR(s): KUWAIT

Rev.003

EVALUATION DATE(s):

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

	approval documentation			
3.9	Did you nominate your State RVSM Programme Manager	✓	-	
3.10	Certification	✓	-	

OTHER GENERAL REQUIRMENTS

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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: LEBANON

Appendix C

FIR(s): BEIRUT

Rev.003

EVALUATION DATE(s):01 MAR2003

01/06/2002	X	01/09/2002	X	01/12/2002	x	01/03/2003	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:	✓	-	
	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	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: LEBANON

Appendix C

FIR(s): BEIRUT

Rev.003

EVALUATION DATE(s):01 MAR2003

01/06/2002	X	01/09/2002	X	01/12/2002	x	01/03/2003	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		-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	(Signed with Nicosia. Not yet signed with adjacent MID States
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of AIC	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: LEBANON

Appendix C

FIR(s): BEIRUT

Rev.003

EVALUATION DATE(s):01 MAR2003

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

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	✓	-	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.003

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 fleet	-	-	**100%**
3.8	Did you provide MECMA with RVSM	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: LEBANON

Appendix C

FIR(s): BEIRUT

Rev.003

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			

	approval documentation			
3.9	Did you nominate your State RVSM Programme Manager	✓	-	
3.10	Certification	✓	-	

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.003

EVALUATION DATE(s):

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

SAFETY AND AIRSPACE MONITORING ASPECTS

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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: OMAN

Appendix C

FIR(s): MUSCAT

Rev.003

EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	01/12/2002		01/03/2003		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	✓	-	
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	*(still being evaluated)*
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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: OMAN

Appendix C

FIR(s): MUSCAT

Rev.003

EVALUATION DATE(s):

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

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	✓	-	Awareness phase has started
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	Part of the FDPS upgrade
2.10	Is there any need for changes to FDPS?	✓	-	
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	
2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	✓	-	
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: OMAN

Appendix C

FIR(s): MUSCAT

Rev.003

EVALUATION DATE(s):

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

AIRCRAFT OPERATIONS AND AIRWORTHINESS ASPECTS

	REQUIREMENTS	ACTION TAKEN		REMARKS
		YES	NO	
3.1	National Regulations for RVSM Implementation			*3.1 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			
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			

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: OMAN

Appendix C

FIR(s): MUSCAT

Rev.003

EVALUATION DATE(s):

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

3.8	Did you provide MECMA with RVSM approval documentation			
3.9	Did you nominate your State RVSM Programme Manager	✓		
3.10	Certification			

OTHER GENERAL REQUIRMENTS

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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SAUDI ARABIA

Appendix C

FIR(s): JEDDAH

Rev.003

EVALUATION DATE(s):

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

SAFETY AND AIRSPACE MONITORING ASPECTS

REQUIREMENTS		ACTION TAKEN		REMARKS
		YES	NO	
1.1	-To verify whether the following reports are regularly being sent to MECMA:	✓	-	
	Assigned Altitude Deviation (AAD) forms	✓	-	
	-Total IFR movements per month	✓	-	
	-Average time spent per movement at assigned levels between FL290 and FL410	✓	-	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	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SAUDI ARABIA

Appendix C

FIR(s): JEDDAH

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EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X		26/02/2003		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	✓	-	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 No	
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of aic	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	Not applicable now
2.6	Trigger NOTAM to be issued in October 2003 for confirming implementation of RVSM	-	No	Not applicable now

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SAUDI ARABIA

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2.7	Evaluation of the need to carry out simulations to assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.	-	No	Not yet ready
2.8	Conduct of local training for air traffic controllers	-	No	Not yet ready
2.9	Have you considered the need for changes to flight strips? (Non-RVSM, State aircraft etc..)	✓	-	Part of the FDPS upgrade
2.10	Is there any need for changes to FDPS?	✓	-	
2.11	Is there any need to changes in radar display systems? (*where applicable)*	✓	-	
2.12	Have you considered the need for changes to Short Term Conflict Alerts(STCAs)? (*where applicable*)	✓	-	
2.13	Have you considered any need for changes to Medium Term Conflict Detection (MTCD) Systems? (*where applicable)*	-	No	
2.14	Have you considered any need for changes to On-Line Data Interchange (OLDI)? (*where applicable)*	-	No	In progress

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SAUDI ARABIA

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EVALUATION DATE(s):

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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			

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SAUDI ARABIA

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3.8	Did you provide MECMA with RVSM approval documentation			
3.9	Did you nominate your State RVSM Programme Manager	✓		
3.10	Certification			

OTHER GENERAL REQUIRMENTS

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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SYRIA

Appendix C

FIR(s): DAMASCUS

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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	***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	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SYRIA

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EVALUATION DATE(s): Rev.003

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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
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of AICc	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)		No	under preparation
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	✓	-	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SYRIA

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	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
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

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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	✓	-	
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	-	No	

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

STATE: SYRIA

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	approval documentation			
3.9	Did you nominate your State RVSM Programme Manager	✓	-	
3.10	Certification	✓	-	

OTHER GENERAL REQUIRMENTS

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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIREMENTS

STATE: UNITED ARAB EMIRATES

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EVALUATION DATE(s):

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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		

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIREMENTS

STATE: UNITED ARAB EMIRATES

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EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	01/12/2002	X	26/02/2003	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
2.3	Have training requirements been assessed	YES		
2.4	Issue of AIC	YES		
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

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIREMENTS

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EVALUATION DATE(s):

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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		
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	*No need for change*
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

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EVALUATION DATE(s):

01/06/2002	X	01/09/2002	X	01/12/2002	X	26/02/2003	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	92.42%	-	92.42% (61 OUT OF 66 Jet 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	YES		

EVALUATION FORM CHECKLIST
MID RVSM IMPLEMENTATION MILESTONES/REQUIREMENTS

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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	26/02/2003	X	01/06/2003		01/09/2003			

	approval documentation			
3.9	Did you nominate your State RVSM Programme Manager	YES		
3.10	Certification	YES		Incorporated in the safety plan

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

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EVALUATION DATE(s):

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

EVALUATION FORM CHECKLIST
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EVALUATION DATE(s):

01/06/2002	X	01/09/2002		01/12/2002		01/03/2003	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	-	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	
2.3	Have training requirements been assessed	✓	-	
2.4	Issue of AIC	✓	-	
2.5	Issue of AIP Supplement (15 May 2003)	-	No	
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	-	No	According to plan by end May 03

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	assess ATC workload and consideration of possible requirements for airspace/route and/or sector reorganization.			
2.8	Conduct of local training for air traffic controllers	-	No	Initial training, April 2003
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

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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	60%	-	
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	✓	-	

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MID RVSM IMPLEMENTATION MILESTONES/REQUIRMENTS

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	approval documentation			
3.9	Did you nominate your State RVSM Programme Manager	✓	-	
3.10	Certification	✓	-	

OTHER GENERAL REQUIRMENTS

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

DRAFT AERONAUTICAL INFORMATION CIRCULAR (AIC)

IMPLEMENTATION OF REDUCED VERTICAL SEPARATION MINIMA

Effective date: 27 November 2003.
Type: Permanent.
This AIC serves as Notice of Intent to implement RVSM in the
2003.

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

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

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

follow-up NOTAMS.

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

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

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

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

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

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

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

<u>CAA (</u>

MID RVSM TF/7
Appendix E to the Report

INTERNATIONAL CIVIL AVIATION ORGANIZATION

SEVENTH MEETING OF THE MIDDLE EAST RVSM TASK FORCE

(Abu Dhabi, 23-26 February 2003)

LIST OF PARTICIPANTS

14 April 2003

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United Arab Emirates

Safety Plan For the Implementation of RVSM

DOCUMENT APPROVAL

The following table identifies all management Authorities that have successively approved the present issue of this document.

AUTHORITY	**NAME AND SIGNATURE**	**DATE**
RVSM Programme Manager	Riis Johansen	
Director Flight Safety	Ahmed Al Haddabi	
Chief ATC Officer	Arne Elmquist	
Senior Operational Training Officer	Shaun Kincaid	
Approval Authority		

DOCUMENT CHANGE RECORD

Edition	Date	Reason for Change	Sections/pages affected
0.1	Dec 2002	First Draft	All
0.2	Feb 2003	Update for inclusion of States' safety preparedness in RVSM safety case	All
1.0	April 2003	Final Issue of safety plan prior to Go Ahead Decision	To Be Done

TABLE OF CONTENTS

Attachments:

1 INTRODUCTION

1.1 Objective of Safety Plan

The objective of this Safety Plan for United Arab Emirates is to set out those national activities that are required to support the RVSM safety analysis. The GCAA has not determined any high level requirements additional to those specified in ICAO Annexes 2 and 11 and associated Documents.

Each of the National activities required for the implementation of RVSM by United Arab Emirates is described in some detail. The descriptions address:

- The role of the activity in support of the safe implementation and operation of RVSM in United Arab Emirates,
- 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 within United Arab Emirates. These supporting activities include:
  - Those that help achieve quality,
  - Those that help manage identified risks.

The purpose in showing this level of information is to provide early assurance that United Arab Emirates has addressed its safety responsibilities and developed a plan to achieve the safe implementation of RVSM.

This safety plan has also been produced to help those within United Arab Emirates who have responsibility for the provision and regulation of the State's en-route Air Traffic Services, i.e. the GCAA's directorate of Air Navigation Services. It helps them understand the safety aspects of the State's RVSM activities and shows how the National Programme Manager is managing these aspects.

1.2 Approach

The Example Safety Plan provided by MECMA has been used as a template for the United Arab Emirates' RVSM Safety Plan. This national safety plan is divided into sections that consider the national activities for RVSM as follows:

Chapter 2. Aircraft and Operator Approvals for RVSM

Chapter 3. ATS Training for RVSM

Chapter 4. Changes to ATS Equipment

Chapter 5. Changes to ATS Procedures

Chapter 6. Changes to Airspace Design

Chapter 7. Switchover to RVSM

Chapter 8. Operational Monitoring of RVSM

Within each chapter the plan:

1. Describes those activities that are necessary to provide an appropriate ATS following the implementation of RVSM in the MID region,
2. Identifies the appropriate responsible Authorities, together with a description as to how these Authorities discharge their responsibilities,
3. Describes the detailed activities and checks that underpin the achievement of quality of the activities described in item 1, above,
4. Shows how the hazard and risk information that will be produced by MECMA's RVSM Programme will be addressed as appropriate by the State.

1.3 Organisation

The organisation for the RVSM safety plan and associated activities is as follows.

- The Director General of the CAA, H.E. Mohammed Ghanim Al Ghaith, is the designated State Authority and is responsible for the provision of an appropriate Air Traffic Service within the State. In approving the plan the Director General is confirming that he is satisfied that responsibility for the safe implementation of RVSM has been properly delegated; that the staff delegated have been duly authorised to act on his behalf; and that they are competent to act on his behalf.
- The UAE RVSM Programme Manager, Mr. Riis Johansen, has responsibility for the National RVSM programme. He approves the safety plan and is responsible for obtaining the further approvals that are described below. In approving the plan the RVSM Programme Manager is confirming that in his view the plan is acceptable, and accurately describes the activities that are required to show that the safety requirements will be achieved.
- The Director Flight Safety, Mr. Ahmed Al Haddabi, has responsibility for the issue and enforcement of airworthiness and flight operational regulations within the United Arab Emirates. He issues RVSM approvals of aircraft and operators and publishes advisory material and carries out general awareness programmes as required to facilitate the approval process. In approving the plan the Director Flight Safety is confirming that, from a flight operational and airworthiness perspective, the plan is acceptable and accurately describes the activities that are required to show that the safety requirements will be achieved.
- The Chief ATC Officer (CATCO), Mr. Arne Elmquist, is responsible for the Area Control Centre's ATS operations. In approving the plan, the CATCO is confirming that from a safety perspective all necessary actions have been or will be undertaken by the Emirates ACC to ensure that RVSM can be safely implemented and operated within United Arab Emirates.
- The Senior Operational Training Officer (SOTO), Mr. Shaun Kincaid, is responsible for the training activities carried out for controllers and assistants in the Area Control Centre's ATS operations. Furthermore, he is responsible for the periodic competency checking as well as progress checks for operational and pre-operational staff. In approving the plan, the SOTO is confirming that from the training and QA perspectives all necessary actions have been or will be undertaken by the Emirates ACC to ensure that RVSM can be safely implemented and operated within United Arab Emirates.

In addition to the above, specific approvals for individual activities are also required. These are indicated in the relevant chapters of this safety plan (see sections 2.4, 3.4 through to 8.4).

The above organisation applies during the pre-implementation phase of RVSM. There are activities (in particular safety monitoring activities) that take place post-implementation. The responsibility for post-implementation safety activities rests with responsible staff in Flight Safety and Air Navigation Services. The post-implementation activities are not contained in this safety plan.

2 AIRCRAFT AND OPERATOR APPROVALS

2.1 Introduction

This chapter is concerned with aircraft and operator approvals that are needed for aircraft to be permitted to fly within the Middle East RVSM Region. It describes the approvals programme within the United Arab Emirates.

2.2 Safety Requirement

The safety requirement is to show that all UAE operators are aware of the RVSM implementation and has obtained RVSM approval for themselves and their aircraft as appropriate. Both the aircraft and the operator require approval if they are to operate in RVSM airspace. It is the responsibility of the GCAA to describe its regulatory activities that will lead to documentary proof of the Authority’s diligence with respect to these approvals.

2.3 Standards Applied

The United Arab Emirates issued Civil Aviation Advisory Publication No. 5 (CAAP 5) on 01 September 1998, setting out the process and requirements of approval of civil aircraft and operators for RVSM operations.

CAAP 5 was revised in late 2002 and a Second Edition issued with effect from 01 January 2003.

CAAP 5 is based on the United States’ FAA interim guidance 91-RVSM.

A copy of CAAP 5 is included in the Safety Plan as Attachment 2-A.

2.4 Planned Aircraft and Operator Approvals Activities

An approvals programme was developed in 1998 to support the implementation of RVSM in the European and Far East regions.

The details of the programme are found in [please fill in details]

The programme subdivides into two main activities:

1. **Awareness Activities**
   Operators and Authorities for State aircraft have already been informed about RVSM approval and monitoring requirements through:

   - AICs

     Notice of intent of implementing RVSM in UAE airspace between FL290 and FL410 was first given by AIC Number 07 of 2001, issued on 29 November 2001.

     UAE AIC Number 04 of 2002 was issued on 17 December 2002, reiterating notice of intent.

Copies of AICs 07/01 and 04/02 are included in the Safety Plan as Attachment 2-B.

- All present UAE Aircraft Operating Agencies have been directly informed about requirements related to RVSM operations and prospective operators will be provided with the necessary information as part of the Authority's Direct approach to operators likely to need RVSM approvals.

2. **Approval Activities**
   These are described in 2.5 below.

2.5 Approval Activities

There are two areas for which United Arab Emirates has an established approval / regulatory process:

1. **Approval of Operators**

   UAE Operators that wish to operate within the RVSM Airspace, must apply to the GCAA to obtain operational approval (in line CAAP 5)

   The following UAE operators have aircraft capable of operating above FL285:

Operator	Designator	Approved
Emirates	UAE	Yes
Amiri Flight	AUH	Yes
Dubai Airwing	DUB	Yes
Execujet Middle East	-	Yes
Flying Dolphin	FDN	No
Fujairah Private Flight	-	Yes
Global Jet Ltd.	-	No
Hawk Executive Jet	-	Yes
Sharjah Ruler's Flight	SHJ	Yes

   The responsible officer for giving such approvals is the Director flight Safety, Mr Ahmed Al Haddabi. His approval is based on CAAP 5.

2. **Certification and Approval of Aircraft**

   Operators (or owners) of aircraft registered within United Arab Emirates, or operated by organisations based in United Arab Emirates, must apply to the GCAA for certification and approval in line with CAAP 5.

3. **Procedures**

   The GCAA's Directorate of Flight Safety Services (DFSS) has established a set of procedures to be followed in conjunction with approval of operators and aircraft for RVSM operations. These procedures are set out in Chapter 9 of the DFSS Procedures Manual.

   A copy of Chapter 9 is included in the Safety Plan as Attachment 2-B.

Type	OPR Approved	No. of aircraft	A/W Approved
A310	Yes	1	1
A332	Yes	24	24
B772	Yes	9	9
B773	Yes	9	9
A306	Yes	1	1
B737	Yes	4	4
B744	Yes	1	1
B74S	Yes	1	1
B767	Yes	1	1
B737	Yes	1	1
B738	Yes	1	1
B742	Yes	1	1
B74S	Yes	2	2
GLF4	Yes	1	1
LJ60	Yes	1	1
B703	No	1	0
B732	No	3	0
LJ60	Yes	1	1
L29B	No	1	0
L29B	Yes	1	1
A319	Yes	1	1
		66	61

The responsible officer for granting approvals of operators and airframes is the Director flight Safety, Mr Ahmed Al Haddabi. His approval is based on CAAP 5.

The Rulers' offices in the respective Emirates own and operate VIP aircraft. These aircraft are on the United Arab Emirates' register of civil aircraft and are operated in accordance with ICAO Annexes 6 and 8. Personnel associated with these operations are licensed in conformance with ICAO Annex 1. Details of approvals are contained in sub-paragraphs 1 and 2, above.

Except for fighter aircraft, the United Arab Emirates' military does not own or operate aircraft operating above FL285.

2.6 Achievement of Quality of Approval Activities

It is important to ensure that the approval activities are effective and lead to RVSM approved aircraft that are capable of meeting the more stringent height keeping requirements within the MID RVSM airspace and air crew that are familiar with RVSM rules and procedures. There are several elements that provide confidence in this capability. These elements are:

1 Monitoring of Aircraft Technical Height Keeping Performance

Eurocontrol has established a Height Monitoring Infrastructure consisting of three Height Monitoring Units (HMUs) that already has, and until further will continue to, provide monitoring of a substantial proportion of the aircraft fleet operating within the MID RVSM region. Additionally, a number of operators have had their fleets monitored by approved providers of GPS Monitoring Unit (GMU) services. Aircraft that are not within the specified standards are reported to the appropriate State Authorities that approved the aircraft for RVSM operations. Furthermore, they will be reported to MECMA. The Operator of the non-compliant aircraft will also be contacted. The General Civil Aviation Authority will follow up all such reports with the Operators concerned. This review will take place within the normal framework of aircraft certification and operator licensing.

2 Monitoring Operational Errors

MECMA has an established and ongoing programme of operational error data collection and assessment. Information is obtained from ACCs and States on operational altitude deviations of 300 ft or greater. MECMA will use the data as part of the RVSM Safety Analysis. MECMA is continuously monitoring data for trends or clusters of events associated with a specific operator or region of airspace and is notifying States, both directly and through the Middle East RVSM Task Force.

In addition to the above, the directorate of Flight Safety monitors and reviews aircraft airworthiness and operator licenses both on a regular basis and in response to identified concerns or trends. This on-going monitoring process is underpinned by a limitation of two years on approvals, thereby establishing periodicity in the oversight programme.

3 ATS TRAINING

3.1 Introduction

This chapter is concerned with the Emirates ACC's operational ATS training activities that are needed to ensure that operational staff is familiar with RVSM procedures. The training programme that has been established is described. Additionally, further details are provided to show how this training programme supports and underpins the safe implementation of RVSM.

The training syllabus and associated material is based on that developed by Eurocontrol for the RVSM implementation in 41 States in Europe and North Africa in January 2002.

3.2 Safety Requirement

The safety requirement associated with the ATS training is to show that all relevant staff have been appropriately trained in RVSM procedures and are competent to operate within an RVSM environment.

3.3 Standards Applied

There are no international standards for training of ATS staff in provision of services in an RVSM environment. The training material supplied by Eurocontrol has been used as reference guidance for the development of United Arab Emirates' training material.

However, internal standards for ATS training are being applied to RVSM training. They are summarised as follows:

The objectives of each course are defined, based on:

a) International (ICAO) standards and recommended practices (SARPs).

   Relevant SARPs are mainly contained in Annexes 2 and 11.

   SARPs are afforded UAE regulatory status *vide* Part VIII, Chapter 1, paragraph 2.3 of the Civil Aviation Regulations.

b) International (ICAO) procedures

   Relevant Procedures are mainly contained in PANS-ATM, Doc 4444.

   Procedures are afforded UAE regulatory status *vide* Part VIII, Chapter 1, paragraph 2.3 of the Civil Aviation Regulations.

c) International best practice

   This is based on an on-going process whereby practices improving safety and/or regularity at busy units with well-established reputations are being applied in the GCAA training programme.

   It is on the basis of "international best practice" that Eurocontrol training material is being used in the UAE training programme.

   It should be noted that the European syllabus was designed to cover the full range of situations encountered by its States. As this syllabus is wider in scope than that required for the Emirates ACC, the syllabus and material are subsets of those developed by Eurocontrol.

3.4 Planned ATS Training Activities for RVSM

An ATS training programme has been developed to support the implementation of RVSM. Details of the programme are set out below and show that it is the intent to train all controllers licensed in the Emirates ACC prior to RVSM Implementation on 27 November 2003. Furthermore all ATC Assistants and Communications Operators will be trained in RVSM aspects of flight data processing. The programme subdivides into four main activities:

1. Establishing Training Roles and Responsibilities

   Staff have been identified to lead, prepare and deliver RVSM training to ACC Staff. Titles, names and training roles are provided in summary form in the table below:

<table>
<tr><th>Staff Position</th><th>Name</th><th>RVSM Training Role</th></tr>
<tr><td>Senior Operational Training Officer</td><td>S. B. Kincaid</td><td>Training Manager</td></tr>
<tr><td>Dep. Senior Operational Training Officer</td><td>K. Ali Jaber</td><td>Deputy Training Manager</td></tr>
<tr><td>ATSI</td><td>L. Wepener</td><td rowspan="3">Development and presentation of classroom and simulator training</td></tr>
<tr><td>ATSI</td><td>C. Richardson</td></tr>
<tr><td>ATSI</td><td>M. Dolbey</td></tr>
<tr><td>Air Traffic Control Supervisor</td><td>M. Hayes</td><td rowspan="4">Simulator Instruction and simulator room co-ordination</td></tr>
<tr><td>ATCO</td><td>M. Blignaut</td></tr>
<tr><td>ATCO</td><td>C. Knox</td></tr>
<tr><td>ATCO</td><td>T. Foulsham</td></tr>
<tr><td>Chief Air Traffic Control Assistant</td><td>V. P. Abraham</td><td rowspan="3">Instructor assistance in ATCA classroom training and ATCA simulator instruction</td></tr>
<tr><td>Flight Data Supervisor</td><td>R. Sainudeen</td></tr>
<tr><td>Computer Systems Administrator</td><td>A. Fonseca</td></tr>
<tr><td>Pseudo Pilot</td><td>A. Allen</td><td rowspan="4">Simulator operation</td></tr>
<tr><td>Pseudo Pilot</td><td>A. Hanif</td></tr>
<tr><td>ATCA</td><td>P. Nair</td></tr>
<tr><td>ATCA</td><td>S. Al Hosani</td></tr>
</table>

2. Development of Training Material

   The training material supplied by Eurocontrol will be used as the basis for the State training material. This will be supplemented by locally developed material. All the designated trainers will become familiar with the material.

3. Development of Training Programme

   A programme of courses has been established at the Emirates ACC in close co-operation with the Chief ATC Officer.

   Course Portfolio:

   Course: **R1 C**: RVSM Training Course for ATCOs.

   All controllers who have operational responsibilities in the ACC will receive the R1 C course.

   Syllabus and timetable for the R1 C course is provided as Attachment 3-A.

   R1 A: RVSM Training Course for ATCAs.

   All ATC Assistants who have operational responsibilities in the ACC will receive the R1 A course.

   Syllabus and timetable for the R1 A course is provided as Attachment 3-B. [TBD]

   R1 O: RVSM Training Course for Com. Centre Operators.

   All Communications Operators and ATC Cadets who have operational responsibilities in the Communications Centre will receive the R1 O course.

   Syllabus and timetable for the R1 O course is provided as Attachment 3-C. [TBD]

4. Implementing the Training Programme in Emirates ACC

   Courses will be run at the ACC as tabulated below:

Training Courses

	R1 C	R1 A	R1 O
Total Students	48	36	10
Students per course	4	3	1
No. of courses	12	12	10
Days per course	2	2	1
Total course days	24	24	10
Training duration (weeks)	6	6	6

Follow-up and refresher training will be provided as tabulated below:

Refresher Courses

	R1 C	R1 A	R1 O
Total Students	48	36	10
Students per course	4	3	1
No. of courses	12	12	10
Days per course	1	1	0.5
Total course days	12	12	5
Training duration (weeks)	3	3	3

5. Schedule of Training Activities

01 March – 26 March 2003	Initial Training Preparation
29 March – 30 April 2003	Course Design, Training Manual and Lecture Preparation
03 May – 14 May 2003	Simulator Exercise Design
02 August – 27 August 2003	Simulator Exercise Preparation
30 August – 17 September 2003	Course Consolidation and Simulator Dry Runs
20 September – 29 October 2003	Training Courses
	(RC 1, RA 1, RO 1)
01 November – 19 November 2003	Refresher Courses
	(RC 1, RA 1, RO 1)
22 November – 26 November 2003	Contingency Period
(27 November 2003	Implementation)

A timetable of courses has been developed and is provided as Attachment D.

A record of course completion is provided as Attachment E.

3.5 Approval of Activities Associated with the RVSM Training Programme

There are two aspects of these training activities for which United Arab Emirates has established an approval process. These two aspects are:

1. Approval of the Training Material

   All ATS training material is subject to strict control and changes must be approved prior to first use. The RVSM training material is subject to this process. The responsible officer for the approval of the training material is the Director of Air Navigation Services, Mr Riis Johansen. His approval is based on his mandate as regulatory authority officer in charge of, *inter alia*, ATS.

2. Acceptance of Controller Competence in RVSM Operations

   The change to RVSM does not require changes to the controller's ATC license (or certificate of competence). However, the Directorate of Air Navigation Services *does* accept the responsibility to ensure that controllers are capable of RVSM operations. To discharge this responsibility, the Director of Air Navigation Services approves the RVSM training programme for his unit. Approval of the programme represents a commitment from the ACC to ensure that all appropriate staff receive RVSM training and that this training makes full use of the approved training material.

3.6 Achievement of Quality of RVSM Training Activities

It is essential to ensure that the ATS training in RVSM operations is effective and understood by controllers. There are several elements that provide confidence in this effectiveness. These elements are:

a) The training material will be developed by the ANS Operational Training department, which has extensive experience in equipment-, airspace- and procedure-specific training of controllers and assistants to perform their operational duties in the Emirates ACC.

b) The training material will be reviewed by the Chief- and Senior ATC Officers who both have extensive experience in the Emirates and major European ACCs. They have, furthermore, many years of experience in ATS training in a multitude of environments.

c) Subsequently, the training material will be submitted to the Director ANS for regulatory approval. The DANS is UAE RVSM Programme Manager, head of MECMA and chairing the Safety and Airspace Monitoring workgroup of the RVSM Task Force. Through these responsibilities, as well as his position as chief regulatory officer for ANS, he is thoroughly familiar with the training requirements.

1. Use of the Eurocontrol Material as Guidance

   The Eurocontrol material has been developed by the Institute of Air Navigation Services (IANS) and has been subject to extensive review within the RVSM Programme. This material forms the core of the training material developed for the State RVSM training programme.

2. Experienced Trainers Used

   The responsibility for the development and delivery of the training rests with the personnel listed in paragraph 3.4. They are experienced training instructors and are licensed as On-the-Job Training (OJT) Instructors.

3. <u>Training Material is Subject to Review</u>

   Operational and management staff at the ACC will review the material prior to first use. The review comments will be documented and the material will be amended as appropriate.

4. <u>Timely Training Programme</u>

   The ATS provider recognizes its responsibility for the competence of controllers in operating within the MID RVSM region. It will therefore ensure that:

   - The training programme allows controllers sufficient time from their operational duties to attend one of the courses,
   - That accurate course attendance records are kept (including time spent on training simulators), and
   - Controllers are encouraged to seek clarification, and further training if necessary, on those aspects they did not fully understand.
   - Controllers and assistants will be tested on their theoretical understanding of RVSM operational aspects pertaining to UAE airspace. This testing will be carried out on the Computer-Based Examination facility associated with the ACC.
   - Controllers and assistants will be evaluated on their practical application of RVSM procedures, hereunder contingency procedures, during the simulator phase of their training programme. This evaluation will be documented and retained on the individual training files.

5. <u>Training Programme is Interactive</u>

   Specifically interaction will be encouraged through informal course feedback. This will be fed back to the trainers and developers and used to further refine the course. Secondly the material will be presented in an interactive manner and interaction with attendees will be encouraged. Areas of difficulty in assimilating/understanding the material will be sought from attendees and will be addressed on an individual or group basis through further explanation and training if necessary.

6. <u>Refresher Briefings will be Provided as Necessary</u>

   RVSM training may, through operational and staffing constraints, be provided to a controller up to seven weeks in advance of RVSM implementation. In such circumstances in the weeks prior to implementation, refresher briefings will be provided, so that what was learnt on the course is refreshed in the mind.

4 ATS EQUIPMENT

4.1 Introduction

This chapter is concerned with those changes to ATS equipment that are needed for RVSM Operations. The chapter describes the programme of activities that has been established to make the required changes to ATS equipment. Additionally further details are provided to show that these changes will be completed successfully and will underpin the safe implementation of RVSM.

4.2 Safety Requirement

The safety requirement is to show that the changes to the ATS equipment have been made successfully and approved for operational use.

4.3 Standards Applied

Based upon the European ATC manual, the Middle East RVSM Task Force has developed an ATC manual that is consistent with ICAO Document 7030/4 and provides further information. This latter document provides the basis for the changes to ATS equipment that are required for the MID RVSM Region.

4.4 Planned ATS Equipment Changes

United Arab Emirates has developed a programme for changes to ATS equipment to support the implementation of RVSM. The details of the programme are found in Attachment X.

This detailed programme shows that the ATS equipment requirements are being addressed in two stages:

4.4.1 Watchkeeper operations

The Watchkeeper system is uncomplicated in design and offers few advanced features. It contains no functionality limitations precluding RVSM operations.

Correspondingly, it has none of the features providing visual indications to the controller of infringements of separation minima, such as STCA, MTCD or track label annotations to signify RVSM approval status of individual flights.

Parsing of flight plans at the time of reception for RVSM approval status (W in Field 10) is outside the scope of the European RVSM ATM Manual. This pre-flight check is performed by the Eurocontrol Initial Flight Plan System (IFPS), which is based in Brussels. A related issue, R (RNAV capability indicator), has successfully been handled by flight data staff for more than one year, and it is intended that this procedure will be extended to the RVSM capability indicator.

Watchkeeper operations will extend at least one year after implementation of RVSM in the Middle East Region.

4.4.2 Eurocat 2000 operations

The Eurocat 2000 (Alpha Plus) system was contracted for in February 1997 – well before plans for RVSM were mooted in the Middle East Region and the standard product did not include RVSM functionality.

RVSM functionality was subsequently included in the Eurocat 2000 project as a variation order. The functionality is specified in ECR-350, which was originally developed in conformance with ATM Manual for European customers of the Eurocat 2000 product.

ECR-350 includes the following functionalities:

- Parsing of Field 10 for W to indicate RVSM capability. If not present, a “W” will be displayed in red in Line 0 of the track label for aircraft operating above a set level (FL270). Furthermore, the STCA and MTCD functionalities have been modified to apply the applicable vertical separation minimum in evaluation of conflict status.
- Parsing of Field 10 for R to indicate RNAV capability. If not present, an “R” will be displayed in red in Line 0 of the track label.
- Parsing of Field 10 for Y to indicate 8.33 kHz capability. If not present, a “Y” will be displayed in red in Line 0 of the track label. This functionality is not currently required in UAE airspace and will be disabled by setting the floor for this requirement to FL999

Parsing of flight plans at the time of reception for RVSM approval status (W in Field 10) is not addressed by ECR-350 for the reason mentioned under Watchkeeper operations.

As distinct from the Watchkeeper environment, the flight data staff will not handle correctly formatted flight plans, and the current procedure will not be applicable for Eurocat 2000 operations. However, an evaluation of the operational aspects has led to the conclusion that pre-flight checking of flight plans will not be required in the UAE as the emirates FIR is not expected to be adjacent to CVSM airspace.

4.5 Approval of Activities

There are two aspects of these ATS equipment changes for which the United Arab Emirates has established an approval process. These two aspects are:

1. <u>Configuration Changes to Existing ATS Equipment</u>

   All changes to ATS equipment are subject to configuration control. Changes require approval from ANS prior to online implementation in the ACC.

   The change process is managed through a configuration control committee consisting of:

   - Director ANS, Mr Riis Johansen (Chairman)
   - Chief ATS Officer, Mr Arne Elmquist (Ops member)
   - Chief Engineer, Mr Martin le Roux (Engineering member)
   - System Adaptation Officer, Mr Deon van Zyl

Procedures for the change process are set out in an instruction issued by the Director ANS.

2. Acceptance of Modified ATS Equipment for Operational Use at the ACC

   Operational and functional requirements for equipment for operational use at the ACC are subject to approval by the Director of ANS, Mr Riis Johansen.

   The functional baseline for the RVSM functionality in the Alpha Plus / Eurocat 2000 product has been accepted as integral part of the design review, completed in 2001.

   Testing and acceptance of equipment for operational use at the ACC is subject to approval by the Director of ANS, Mr Riis Johansen.

   Testing of RVSM functionality of the Eurocat 2000 product has not yet commenced and this equipment will be introduced after RVSM implementation.

4.6 The Achievement of Quality in the Changes to the ATS Equipment

It is important to ensure that the changes are successful, in that they fully implement the agreed requirements and are fully compatible with the systems and practises at the ACC. There are several elements that provide confidence in the successful change to the ATS equipment:

1. Functional Requirements have been Established

   Functional Requirements for the RVSM functionality of the Eurocat 2000 system have been defined by the GCAA and the delivered changes will be judged against these requirements. These functional requirements were an integral part of the specification agreed with Thales ATM.

2. There are Appropriate Software Development Processes

   Thales ATM has software development processes that it is applying to the software modifications required for RVSM. These are internal contractor procedures.

3. The Developed Software will be Tested

   The developed software will go through a series of tests and user trials prior to acceptance. Each of the identified functional requirements will be formally tested against agreed acceptance criteria.

4. The Human Machine Interface will be Evaluated

   Controllers, as part of the RVSM training, will evaluate the Human-Machine Interface (HMI). Feedback will be sought from those attending courses on the usability and clarity of the HMI.

4.7 The Management of Risk Associated with the Changes to ATS Equipment

A key part of the management of safety is that the safety risks associated with poor or inadequate ATS equipment are identified and, as appropriate, shown to be acceptably low.

Further risk analysis will be carried out in conjunction with implementation of the safety management system on 27 November 2003 as required by ICAO Annex 11, Chapter 2, paragraph 2.26.

Any additional activities, required as a result of this review, will be listed as actions in future updates to this safety plan.

5 ATS PROCEDURES

5.1 Introduction

This chapter is concerned with those changes that are required to ATS Procedures by the implementation of RVSM in the MID Region. This chapter describes the activities that have been established to develop and implement new ATS procedures within each ACC. Additionally; further details are provided to show how these activities underpin the safe implementation of RVSM.

5.2 Safety Requirement

The safety requirement is to show that the changes to the ATS procedures have been approved for use. Assurance is required to show that the new procedures are appropriate, that they do not cause excessive controller and aircrew workloads, and have been co-ordinated with other agencies.

5.3 Standards Applied

ICAO Doc 7030/4 provides the regional supplementary procedures. The Middle East RVSM Task Force has developed an ATC manual that is consistent with ICAO Document 7030/4 and provides further amplification of its implementation in the MID Region.

5.4 Planned Activities for the Development of ATS Procedures for RVSM

A programme of activities has been established to develop and co-ordinate the changes to the ATS procedures. The details of the programme are found in United Arab Emirates RVSM Master Plan. The programme subdivides into the following main activities:

1. Co-ordination with Military Authorities

   Only military aircraft are exempt from RVSM within the Middle East Region, while other State aircraft, e.g. VIP flights, adhere to normal RVSM requirements. Currently, military aircraft in the United Arab Emirates have no restriction on operating between flight levels FL290 and FL410 and, as implementation of RVSM potentially imposes additional requirements on both Military and Civil Authorities; an assessment of military aircraft capable of operating above FL285 has been carried out:
   - The UAE military has, except for fighter/reconnaissance aircraft, no aircraft with that capability.
   - Of other military aircraft operating inside of or overflying the Emirates FIR, the majority are from the armed forces of the USA and the UK. A survey of flight plans from these military agencies has shown that they already flight plan in accordance with RVSM procedures in place in the European Region.

2. Co-ordination with Adjacent ACCs

   The changes to procedures required for RVSM at the Emirates ACC will need to be co-ordinated with adjacent ACCs. At present the Emirates ACC has LoAs with three adjacent centres - Tehran, Muscat and Bahrain ACCs. An audit of these

LoAs has confirmed that they already are written in order to accommodate RVSM without changes. The LoAs make reference to ICAO Doc 7030 that, in its revised form, will reflect the regional air navigation agreement regarding implementation of RVSM. In the LoAs, the appropriate levels are referred to by the terms “even” and “odd” to denote levels applicable to tracks 180º - 360º and 001º - 179º, respectively. Consequently, such provisions will remain valid under RVSM operations.

Route changes necessary for implementation of RVSM have already been introduced, and no sectorisation changes will be made within the Emirates FIR. Adjacent FIRs have not indicated any need for re-sectorisation of airspace adjacent to the Emirates FIR. Hence, no changes related to routes or sectorisation are envisaged.

Instances where specific levels above FL285 are mentioned are reviewed below:

- LoA with Bahrain ACC:

  The table in paragraph 2.2 states inter alia: “Only FL220 and FL280(+) available for MITEX traffic”.

  MITEX has now been replaced by ULOVO as transfer point OBBB/OEJD on UR219 and the wording should be updated to reflect this.

  Application of the RVSM table in Annex 2 will give Emirates ACC the following levels above FL285: 300, 320, 340, 360, 380 and 400 (six levels) instead of the present three even CVSM levels.

- LoA with Muscat ACC:

  No references to levels above FL285 are made. No changes required.

- LoA with Tehran ACC:

  Paragraph 4.2: “Traffic overflying Emirates FIR: Only FL330 - FL350 available… “

  This wording was consciously used during revision of the LoA in 2002. Under RVSM, FL330 and FL350 will be available eastbound, while FL340 will be available westbound.

  Paragraph 4.4: “…cruising levels shall be assigned according to the table of cruising levels in ICAO Annex 2, Appendix 3“.

  This wording was chosen during revision of the LoA in 2002 to accentuate continued validity of the LoA under RVSM operations.

3. <u>Changes to Unit Operations Manual</u>

The Emirates ACC will need to change its Unit Operations Manual (LATSI) to include the changes as a result of RVSM. This is the responsibility of ACC management. The following items will be addressed:

- The Communications Centre will be tasked with checking for inclusion of W in field 10 of FPL.
- Strip marking for non-RVSM aircraft with flight planned level above FL250
- Procedure for non-RVSM aircraft in RVSM airspace

- Restoring from RVSM to CVSM
- Restoring from CVSM to RVSM
- Handling of aircraft declaring non-RVSM compliance

[Specific references to the LATSI – with paragraph numbers – to be inserted]

National Programme activities recognise the links between the changes to airspace, which have preceded the changes to procedures, and the development of RVSM ATC training which can only be fully completed when the new procedures are available.

5.5 Approval of Activities Associated with the Changes to ATS Procedures

There are two aspects of these changes to procedure activities for which *United Arab Emirates* has established an approval process. These two aspects are:

1. Approval of the Unit Operations Manual

Any change to an ACC Operations Manual (LATSI) is subject to strict control. All changes must be approved prior to use. The responsible officer is the Chief ATC Officer (CATCO), Mr Arne Elmquist who will approve the changes to the LATSI for use. His approval is based on work description and duties as a CATCO at Emirates ACC.

2. The Acceptance of Amended Agreements (LoAs) between ACCs

Changes to LoAs are approved (signed) by executives of the government organisations responsible for the provision of air traffic services in the respective States. This authority is devolved as follows:

Bahrain / Emirates:

The overall LoA is signed by the Director Generals of the respective Authorities. This document contains provisions of a permanent nature.

Specifications subject to periodic change and updating are contained in five appendices to the LoA. Within the framework of the main LoA, the Directors of Air Navigation Services are authorised to undertake the technical / operational deliberations related to such updates and to sign on behalf of the respective Authorities.

Changes are not required for implementation of RVSM.

Muscat / Emirates:

The overall LoA is signed by the Undersecretary and the Director General, respectively. This document contains provisions of a permanent nature.

Specifications subject to periodic change and updating are contained in five appendices to the LoA. Within the framework of the main LoA, the Directors of Air Navigation Services are authorised to undertake the technical / operational deliberations related to such updates and to sign on behalf of the respective Authorities.

Changes are not required for implementation of RVSM.

Tehran / Emirates:

The LoA is structured a single document, containing all necessary provision for the operational cooperation between the respective ACCs. The LoA is signed by the Deputy in Operation and the Director General, respectively.

The LoA was updated in 2002, with effective date 28 November, and was designed to encompass all changes necessary for implementation of RVSM.

5.6 Achievement of Quality of Changes to ATS Procedures

It is important to ensure that the changes to ATS procedures are appropriate and have been conducted in a professional manner. There are several elements that provide confidence in this. They are:

1. Use of the ICAO and Middle East Material

   ICAO Documents 7030/4, 9574 and the Middle East ATC manual for RVSM have been subject to extensive review and development. They provide a definitive basis for these changes.

2. Operational Staff Review of Changes

   The Chief ATC Officer and Senior ATC Officer at the ACC (both operationally current) have reviewed the LATSI. The review comments will be documented and where appropriate the manual will be modified.

3. The Changes to LoAs Follow a Strict Control Process

   All LoAs within United Arab Emirates are subject to extensive review. Within United Arab Emirates this includes the Director of ANS as well as ACC operational staff, principally the CATCO, SATCO and SOTO.

4. The Changes to the Procedures and Airspace Design Have Been / Will Be Simulated

   The Emirates ACC has a radar simulation facility capable of full-scale simulation of two sectors with a third position utilised as a feeder sector. This is adequate as only the North and South sectors have airspace extending above FL265, while the East and West sectors only handle arriving and departing flights to/from airports in the Northern Emirates.

   The changes to airspace design, introduced in November 2002, were subject to evaluation in conjunction with preparations for and execution of conversion training.

   Final evaluation of RVSM procedures will be made after simulation scheduled in conjunction with preparations for conversion training during August and September 2003.

5.7 The Management of Risk Associated with Changes to ATS Procedures

A request will be forwarded to MECMA (prior to RVSM implementation date) to obtain information about any likely non-compliant operator or aircraft. This list will be provided to the operational staff in the Emirates ACC and it will serve the purpose of giving awareness to the staff. A “check RVSM status” will be marked on the FPS in order to highlight this suspicion to the ATCO/ATCA.

When receiving estimates for transiting aircraft, the previous ACC will be asked to confirm the RVSM status of the aircraft. For departing traffic from UAE airports requesting clearance into RVSM airspace, this same strip marking will apply in order for the ATCO to be reminded of the possibility of non-compliance and get confirmation from PIC about the RVSM status before clearing an operator/aircraft into RVSM airspace.

Appropriate action will be taken against offenders.

A procedure for tracking of co-ordination failures is already established in order to be able to find areas where improvement is needed and change of procedures might be required. The Hazard Analysis with reference to co-ordination failures are in accordance with MID RVSM TF4 – WP/11.

Further risk analysis will be carried out in conjunction with implementation of the safety management system on 27 November 2003 as required by ICAO Annex 11, Chapter 2, paragraph 2.26.

6 AIRSPACE DESIGN

6.1 Introduction

This chapter is concerned with those airspace design activities that are needed to ensure that RVSM operations are safe and effective. Additionally, details are provided to show how these airspace changes support safe implementation of RVSM.

6.2 Safety Requirement

The safety requirement associated with the changes to airspace design is to show that the changes are appropriate and are consistent with the safe operation of RVSM in the Middle East Region.

6.3 Standards Applied

The general principles for the ATM planning processes set out in the Middle East Basic Air Navigation Plan (Basic ANP), Part V and FASID, Part V, Attachment A, *Working Principles for the Construction of Air Routes*, have been used as the basis for the planning process.

Whilst it is best practice to simulate such changes to show both the impact on traffic flows and controller workload, there are no applicable standards for evaluating proposed changes.

6.4 Planned Changes to Airspace Design

A programme of changes to airspace design has been developed and implemented to support the implementation of RVSM.

There are several changes to the design of airspace that have been carried out to support the effective implementation of RVSM. These include:

- Changes to entry, reporting and exit points to minimise possible congestion at these points:

  Arriving traffic from Tehran FIR has been routed via position ORSAR on a re-aligned G666. This measure separates the descending traffic from overflying traffic, which will route via SIR. Furthermore, ORSAR will only have eastbound traffic.

  Restricting traffic on the SHJ – PAPAR track (P574) to westbound only.

  Establishing an eastbound-only track via SIR (L223) for traffic from/via Tehran FIR, overflying the Emirates FIR.

  Overflying traffic from Muscat FIR via GISMO has been segregated from arriving traffic, thereby reducing traffic density significantly whilst facilitating descent.

  Position ENADA on R219 is now only used for overflying traffic, thereby traffic density significantly.

- Some modifications to allow more direct routings.

Introduction of G666 has reduced the distance for traffic from Europe by some 40 NM.

- A419 (DARAX) has bee transferred to the East Sector north of ATBOR.

The re-alignments listed above were agreed with Iranian and Omani civil aviation authorities and are reflected in the LoA change process described in section 5.3 above.

A survey of the ATS route system is provided in Attachment 6 – A/

6.5 Approval of Changes to Airspace Design

There are two aspects of these airspace design activities for which United Arab Emirates accepts responsibility and has established an approval process. They are:

1. Approval of the Changes

All airspace design issues must be approved prior to first use. The responsible officer is Riis Johansen, Director Air Navigation Services (DANS) whose terms of reference includes planning and implementation of airways, routes for arrival and departure and holding areas etc.

He has approved and issued the changes in a series of instructions to Air Traffic Control, Aeronautical Information Services, Operational Training and the Watchkeeper equipment Adaptation Officer. These instructions contained detailed descriptions of the new route structures and were issued during the period July – September 2002.

Following implementation, minor adjustments to the boundaries between the North / East / South sectors were made in January 2003 to clarify the distribution of responsibilities in the ATBOR area.

A diagram with standard transit routings was published on 23 January 2003 by AIRAC AIP Amendment No. 59 (effective 20 March) to facilitate flight planning.

2. Changes Included in the LoAs as Necessary

This approval process is described above in section 5.5.

6.6 Achievement of Quality of Changes to Airspace Design

The GCAA has adopted a number of measures to ensure that the changes to airspace design would be effective. There are several elements that provide confidence in this effectiveness. These elements are:

1. Changes to Airspace Received Extensive Review

The proposed airspace design changes were extensively review by management staff within the ACC. The review comments were fed back to DANS for incorporation in the design process.

The Chief of AIS and the Operational training departments made separate and individually independent entry of all geographical data in the respective systems to ensure integrity of data and coherent application of procedures.

2. <u>Use of Simulations</u>

   Simulations were performed as part of the training preparations for the “TERGIS” (Tehran-GISRA) project. These preparations were carried out August – September 2002 with the objective of validating the airspace structure as well as the exercises for the conversion training programme. The studies show that the airspace design changes are effective within simulations of the operational concept of CVSM Operations in a uni-directional route system using a single-alternate flight level orientation system.

   Based on the operational concept, the absence of horizontal sector divisions in the band FL290-FL410 and that flight level allocation schemes are not used, a high level of confidence in the system’s validity under RVSM operations has been gained.

   Validation of the system in a RVSM environment will take place during preparation for RVSM conversion training. These preparations will take place from April to September 2003.

6.7 The Management of Risk Associated with Airspace Design Changes

A key part of the management of safety is that the safety risks associated with poor or inadequate changes to airspace design are identified and as appropriate shown to be acceptably low. Within the UAE RVSM Programme there is an on-going process of identifying hazards and introducing measures to mitigate associated risks to an acceptable level.

7 RVSM SWITCHOVER

7.1 Introduction

This chapter describes those activities that show that the operational impact of switchover to RVSM has been addressed and that contingency plans exist Additionally further details are provided to show how this changeover activity supports the safe implementation of RVSM. Switchover is the operational process of managing the actual conversion of ATS from a 2000-ft separation (CVSM) environment to a 1000-ft (RVSM) environment. It covers the changes in the few hours before switchover on 27 November 2003 and the first few hours after the switchover. This switchover is the key operational aspect of the countdown to the implementation of RVSM.

7.2 Safety Requirement

The safety requirement is to show that the special procedures for the switchover to RVSM have been approved for use. Assurance should be provided to show that procedures and reversionary modes of operation are in place.

7.3 Standards Applied

United Arab Emirates will use the Eurocontrol RVSM countdown plan as the basis for its own countdown plan.

7.4 Planned Switchover Activities

Activities need to be planned to enable the safe and effective switchover to RVSM. The plan assumes that the planned countdown activities will identify the optimum way to handle the switch from CVSM to RVSM. United Arab Emirates planning activity focuses on the establishing information and special procedures for the Emirates ACC and establishing suitable arrangements and staffing for the switchover period.

Equipment failure of varying scales of seriousness is always a possible problem for the ACC and the relevant contingency plans to cover such emergencies are already in place. Switchover is a period of heightened risk. While no system modifications will be carried out in conjunction with the switchover, some new procedures are introduced for the first time.

Traffic levels will have been considered by the ACC and additional staffing will be provided for the switchover period and the days immediately after to ensure ready availability of Planning controllers for the North and South sectors to support controllers during their first exposure to RVSM procedures.

Flow restrictions are not planned by the Emirates ACC, but may be implemented on a tactical basis in accordance with existing procedures to address restrictions in downstream FIRs.

The emphasis throughout is on the implementation of RVSM; while 2000ft VSM may be put in place as an emergency measure after the implementation of RVSM, this does not imply reversion to non-RVSM airspace. During any period when RVSM has been suspended, a vertical separation minimum of 2000 feet shall be applied between aircraft operating within EUR RVSM airspace regardless of their approval status. It should be noted that all RVSM cruising levels (290, 300,320, 320 etc.) remain assignable by ATC, in accordance with ICAO Annex2, Appendix 3.a - Table of Cruising levels:

The conditions, under which such an option would be considered, such as severe weather, will be analysed as much as practicable in advance of the RVSM implementation date.

The sequence of events at switchover will be:

- Warning of Change;
- Implementation of Changeover;
- Verification of Aircraft approval status;
- Level changes where appropriate

There is likely to be air traffic being handled at the time of switchover. A switchover scenario will be included in the simulation undertaken as part of the training preparations. Traffic levels based on live samples from midnight until 03:00 UTC are very low and controllers are not expected to have difficulty in transferring aircraft to their new levels.

Specific switchover training will not be given to controllers. Instead, instructional staff from the training Department will be assigned to operational duties from one hour prior to switchover until the Regional switchover is reported to be completed. The staff members will staff the planning positions on the North and South sectors and assist the Supervisor in the required coordination with adjacent ACCs, specific to the switchover as well as liaison with the MECMA Response Cell.

A repeated broadcast of the change will be made to aircraft in flight 15 minutes before switchover. The RVSM approval status of each aircraft under control will be established at switchover so that a comparison can be made with flight plan information, and the radar display of their status. The existing phraseology as provided in the RVSM Flight Crew Information Notice and the RVSM ATC Manual Edition 2, Paragraph 5.7 - Phraseology, provides sufficient guidance for the verification of RVSM status. Particular attention will be given to Military Flights because some aircraft may not be RVSM approved. Through the conversion training, controllers will be aware of the two different vertical separation minima used in those circumstances.

Special attention will be given to the allocation of Flight Levels 310, 350 and 390 for the period following switchover. There is potential conflict with traffic at Opposite Direction Levels (ODL) in the core area during the transition phase. In UAE airspace and at the FIR boundaries, this problem is largely overcome through implementation of uni-directional routes on the busy stretches.

However, UAE controllers will delay the allocation of FL310, FL350, and FL390 (RVSM odd levels) to southbound/eastbound traffic, for a period of 20 minutes after switchover, to reduce the possibility of conflict with northbound/westbound traffic, which has not yet been cleared to even RVSM levels by the previous sector. This will be co-ordinated with the adjacent Centres, as appropriate

7.5 Approval of Switchover Plans

The General Civil Aviation Authority accepts responsibility for the switchover and has established an approval process. This is:

1. Approval of the Special Procedures Developed for the Emirates ACC
   These special ATS procedures (to cover switchover) will require approval prior to use just like any other ATS procedure. The responsible officer is the Director ANS, Mr Riis Johansen. He will approve the material for use. His approval is based on his job description.

Achievement of Quality of Switchover

It is important to ensure that the planning for switchover is effective. There are several elements that provide confidence in this effectiveness. These elements are:

1. Use of the Eurocontrol Countdown Material as a Reference Standard

   The Eurocontrol material on the countdown process is being developed and the switchover aspects are an identified key part of the countdown process. This Eurocontrol material has been subject to extensive review.

2. Senior Staff in the ACC Will Review Switchover Procedures

   Operational and management staff at the ACC will review the material. The review comments will be documented in memoranda to the Director ANS and the material will be amended as appropriate.

7.7 The Management of Risk Associated with the Switchover to RVSM

A key part of the management of safety is that the safety risks associated with the switchover are identified and as appropriate shown to be acceptably low. Within the Eurocontrol RVSM Programme there was a commitment to perform a Functional Hazard Assessment (FHA), identifying hazards and assessing the risk associated with such hazards. The purpose of the review is to identify 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 updates to this safety plan.

8 RVSM OPERATIONAL SAFETY MONITORING AND REVIEW

8.1 Introduction

This chapter describes those activities that are concerned with the post-implementation monitoring of the safety performance of RVSM operations by United Arab Emirates.

8.2 Safety Requirement

The safety requirement is to provide appropriate monitoring of the operational safety performance of the ATS in the application of RVSM.

8.3 Standards Applied

There are no appropriate global standards. However, safety monitoring will be introduced in conjunction with implementation of the safety management system on 27 November 2003 as required by ICAO Annex 11, Chapter 2, paragraph 2.26.

8.4 Monitoring Activities

The post-implementation monitoring arrangements are not yet determined. This determination is part of the establishment of post-implementation arrangements. In United Arab Emirates this will be considered as one aspect of the development of national countdown arrangements.

There are two key activities:

1. <u>Safety Monitoring of State ATS Performance in MID RVSM Region</u>

   These arrangements will be a specific aspect of the normal monitoring of safety performance by the State. The GCAA is developing a data recording and analysis system to capture operational incidents, deviations from normal, system faults and provide an assessment the safety performance implied by such occurrences.

2. <u>Operational Error Reporting</u>

   The General Civil Aviation Authority commits to providing operational error data reported by controllers in its ACCs. The State already supplies this information as part of its contribution to the MECMA Pre-Implementation Safety Case. The data supplied is used, together with data from the other RVSM states, to assess the likely risk of collision in MID RVSM region. In addition the GCAA will assess this data provided by its own ACC and act on the evidence as appropriate.

8.5 Approvals

The approval process for the establishment of such monitoring arrangements is not yet determined.

8.6 Achievement of Quality

The General Civil Aviation Authority will develop monitoring arrangements that achieve the safety requirement to monitor operational performance. However, as the arrangements have not yet been determined, it is not possible to say anything at present as to the aspects of these arrangements that give confidence in the achievement of quality.

8.7 Management of Risk

These monitoring arrangements will help manage operational risks. They do not introduce additional risks.

- End -

<u>Emirates Area Control Centre</u>
<u>ATC Training Section</u>

COURSE: R1 C

<u>Syllabus</u>

<u>Part I</u>

Lecture 1 - Introduction

a) General

- Background and History
- Implementation
  - Schedule
  - Procedures

b) Training

- Course Structure
  - Syllabus
  - Timetable

c) Assessment

- Course Certification
  - Theory
  - Practical

d) Definitions

e) Abbreviations

f) Airspace

- Mid Region

g) Table of Cruising Levels

Lecture 2 - Procedures (Aircraft and Operators)

a) Approval requirements for aircraft and operators

Lecture 3 - Procedures (ATC)

a) General

b) LOAs

c) Check of W

d) Suspension of RVSM

Lecture 4 - Contingency Procedures

a) General

Lecture 5 - Systems

a) Watchkeeper

b) AFCoS

<u>Part II</u>

Practical Simulator Exercises *(As per simulator timetable)*

<u>Part III</u>

Assessment
Practical
Theory Exam

<u>Part IV</u>

Course summary

Course Timetable

Ad-Hoc	R1 C			Day 1
TIME	SUBJECT	PERSON	ATCOs	EQUIPMENT NEEDED
0730	Lecture 1	ATSI	4	Laptop & Projector
0815	Lecture 2	ATSI	4	Laptop & Projector
0900	Break			
0915	Lecture 3	ATSI	4	Laptop & Projector
1000	Lecture 4	ATSI	4	Laptop & Projector
1045	Break			
1100	Lecture 5	ATSI	4	Laptop & Projector
1145	Simulator Briefing	ATSI	4	Simulator
1215	Break			
1230	Simulator Exercise 1	ATSI	4	Simulator
1400	Summary		4	

Ad-Hoc	R1 C			Day 2
TIME	SUBJECT	PERSON	ATCOs	EQUIPMENT NEEDED
0730	Exam	ATSI	4	Classroom
0830	Simulator Exercise 2	ATSI	4	Simulator
1030	Simulator Exercise 3	ATSI	4	Simulator
1230	Simulator Exercise 4	ATSI	4	Simulator
1400	Individual Debriefs	ATSI	4	

R1 C Course Record

RC1 Course 1	
20-21 September	
Names	
A	
B	
C	
D	

RC1 Course 2	
22-23 September	
Names	
A	
B	
C	
D	

RC1 Course 3	
27-28 September	
Names	
A	
B	
C	
D	

RC1 Course 5	
4-5 October	
Names	
A	
B	
C	
D	

RC1 Course 6	
6-7 October	
Names	
A	
B	
C	
D	

RC1 Course 7	
11-12 October	
Names	
A	
B	
C	
D	

RC1 Course 9	
18-19 October	
Names	
A	
B	
C	
D	

RC1 Course 10	
20-21 October	
Names	
A	
B	
C	
D	

RC1 Course 11	
25-26 October	
Names	
A	
B	
C	
D	

Changes to ATC Operating Procedures

The following changes to Unit Operations Manual (LATSI) are planned to address the requirements for RVSM operations:

Chapter	Para.	Headline	Item
III	3.8.6	Division of task	Com centre to check for inclusion of W in field 10 of FPL
III	Appendix	Strip marking	Strip marking for non-RVSM aircraft with flight planned level above FL250
III	3.14.1	RVSM procedures	Procedure for non-RVSM aircraft in RVSM airspace
III	3.14.2	RVSM procedures	Restoring from RVSM to CVSM
III	3.14.3	RVSM procedures	Restoring from CVSM to RVSM
III	3.14.4	RVSM procedures	Handling of aircraft declaring non-RVSM compliance

The respective changes above (except for strip-marking) will reflect text in ATC Manual for RVSM in MID Region

Survey of ATS Route Structure

A survey of the UAE ATS Route structure has been carried out with the objective of evaluating readiness for RVSM operations.

In the following, principal characteristics are listed for each route along with a conclusion regarding safety aspects and suitability for RVSM operations.

Specifics for each route have been extracted from the UAE AIP and are reproduced as Attachment 6-C along with a table of standard routings for transiting traffic and a chart (ENR 6-1) showing the overall route structure.

A791 / R219 TUGOS

Direction:	Eastbound (Inbound) only
Levels available:	All odd levels available
	Bahrain will gain 3 levels
Transfer criteria:	Radar / Radar – 10 NM – silent transfer
Sectorisation:	Bahrain East / UAE North – all levels
Remarks:	Traffic released at AMOLI
Conclusion:	Ready for RVSM

R784 ORSAR

Direction:	Bi-directional
Levels available:	Only FL330 – FL350
	Tehran ACC will have FL330 and FL350 for eastbound traffic, thereby gaining 1 level
	Emirates will have FL340 available for westbound traffic instead of FL350.
Transfer criteria:	Radar / Radar – 40 NM – silent transfer
Sectorisation:	Tehran 4 / UAE North – all levels
Remarks:	Very low traffic volume
Conclusion:	Ready for RVSM

G666 ORSAR

Direction:	Eastbound (Inbound) only
Levels available:	Only FL210 – FL270
Conclusion:	No impact on RVSM

L223 SIR

Direction:	Eastbound (Inbound) only
Levels available:	All odd levels available
	Tehran ACC will gain 3 levels
Transfer criteria:	Radar / Radar – 40 NM – silent transfer
Sectorisation:	Tehran 4 / UAE North – all levels
Remarks:	Low traffic volume (7 flights per day)
Conclusion:	Ready for RVSM

P574 PAPAR

Direction:	Westbound (Outbound) only
Levels available:	All even levels available Emirates ACC will gain 3 levels
Transfer criteria:	Radar / Radar – 40 NM – silent transfer
Sectorisation:	UAE North / Tehran 4 – all levels
Remarks:	High traffic volume (95 flights per day)
Conclusion:	Ready for RVSM

A419 DARAX

Direction:	Bi-directional
Levels available:	All
Transfer criteria:	10 minutes – procedural on Tehran side
Sectorisation:	Tehran 5 / UAE North – FL270(+) Tehran 5 / UAE East – FL260(-) Each side will gain 3 levels
Remarks:	Low traffic volume
Conclusion:	Ready for RVSM

A791 LALDO

Direction:	Bi-directional above FL265
Levels available:	All
Transfer criteria:	10 minutes eastbound due to Tehran restrictions. 10 NM westbound – silent transfer
Sectorisation:	Muscat North / UAE North – FL270(+) Muscat North / UAE East – FL260(-) Each side will gain 3 levels
Remarks:	Low traffic volume above FL265
Conclusion:	Ready for RVSM

A777 TONVO

Direction:	Eastbound (Outbound) only
Levels available:	Only FL250(-)
Conclusion:	No impact on RVSM
Remarks:	See P307 - TONVO

P307 TONVO New - wef 17 Apr 03

Direction:	Eastbound (Outbound) only
Levels available:	Only FL210(+)
Transfer criteria:	10 NM – silent transfer.
Sectorisation:	UAE North / Muscat North – FL270(+) UAE East / Muscat North – FL260(-)
Remarks:	Replaces R219 - ENADA See separate safety analysis

Conclusion:	Ready for RVSM

R219 / N571 ENADA

Direction:	Bi-directional above FL265
Levels available:	All
Transfer criteria:	Radar / Radar – 10 NM – silent transfer
Sectorisation:	Muscat North / UAE North – FL270(+)
	Muscat North / UAE East – FL260(-)
	Each side will gain 3 levels
Remarks:	Medium traffic volume above FL265 (82 flights per day).
	Diverging traffic pattern on UAE side

Distribution of Westbound traffic:

Exit point	Flights
BALUS	878
TOSNA	329
PAPAR	183
ORSAR	20

Traffic to BALUS and TOSNA constitute 1207 of 1410 flights – or 86% - thereby favouring an alignment south of the eastbound track.

Distribution of eastbound traffic:

Entry point	Flights
TUGOS	596
SISOK	209
SIR	78
ORSAR	29
DARAX	1

All traffic is routing via SHJ, thereby being positioned for any track originating from this point.

To be replaced by dual one-way system

See P307 - TONVO

Conclusion:	Not ready for RVSM

N571 ENADA

Levels available:	Only FL260(+)
Conclusion:	Not ready for RVSM
Remark:	To be replaced by dual one-way system
	See N571 – MENSA, below

N571 MENSA New - wef 17 Apr 03

Levels available:	Only FL200(+)
Conclusion:	Ready for RVSM
Remark:	Part of dual one-way system
	See separate safety analysis

B540 PASOV

Direction:	Westbound (Inbound) only
Levels available:	Only FL260(-)
Conclusion:	No impact on RVSM

P574 SOLUD

Direction:	Westbound only
Levels available:	FL260(+)
Transfer criteria:	Radar / Radar – 10 NM – silent transfer
Sectorisation:	Muscat North / UAE North – FL280(+) Muscat North / UAE East – FL260(-) Muscat will gain 3 levels
Remarks:	Low traffic volume (15 flights per day).
Conclusion:	Ready for RVSM

M762 TAPRA

Direction:	Westbound (Inbound) only
Levels available:	Only FL260(-)
Conclusion:	No impact on RVSM

L223 TARDI

Direction:	Eastbound (Outbound) only
Levels available:	All odd levels available Emirates ACC will gain 3 levels
Transfer criteria:	Radar / Radar – 10 NM – silent transfer
Sectorisation:	UAE North / Muscat Central – FL270(+) UAE East / Muscat Central – FL260(-)
Remarks:	Low traffic volume (7 flights per day) above FL265.
Conclusion:	Ready for RVSM

R401 MUSAP

Direction:	Northbound (Inbound) only
Levels available:	All even levels available for overflights Muscat ACC will gain 3 levels
Transfer criteria:	Radar / Radar – 10 NM – silent transfer
Sectorisation:	Muscat Central / UAE North – FL270(+) Muscat Central / UAE East – FL260(-)
Remarks:	Very low traffic volume (less than 1 flight per day) above FL265.
Conclusion:	Ready for RVSM

P899 ITRAX

Direction:	Westbound only
Levels available:	All even levels
Transfer criteria:	Radar / Radar – 10 NM – silent transfer

Sectorisation:	Muscat Central / UAE South – All levels Muscat will gain 3 levels
Remarks:	Medium traffic volume (40 flights per day).
Conclusion:	Ready for RVSM

B457 LABRI

Direction:	Eastbound (Outbound) only
Levels available:	All odd levels available Emirates ACC will gain 3 levels
Transfer criteria:	Radar / Radar – 10 NM – silent transfer
Sectorisation:	UAE South / Muscat Central – All levels
Remarks:	Medium traffic volume (75 flights per day).
Conclusion:	Ready for RVSM

N563 SODEX

Direction:	Westbound only
Levels available:	All even levels
Transfer criteria:	Radar / Radar – 10 NM – silent transfer
Sectorisation:	Muscat Central / UAE South – All levels Muscat will gain 3 levels
Remarks:	Low traffic volume (20 flights per day).
Conclusion:	Ready for RVSM

T199 SODEX

Direction:	Bi-directional
Levels available:	All levels
Transfer criteria:	Radar / Radar – 10 NM – silent transfer
Sectorisation:	Muscat Central / UAE South – All levels Muscat will gain 3 levels Muscat will gain 3 levels
Remarks:	Low traffic volume (2 flights per day).
Conclusion:	Ready for RVSM

M628 LUDID

Direction:	Eastbound (Outbound) only
Levels available:	All odd levels above FL265 Emirates ACC will gain 3 levels
Transfer criteria:	Radar / Radar – 10 NM – silent transfer
Sectorisation:	UAE South / Muscat Central – All levels
Remarks:	Very low traffic volume (>1 flight per day).
Conclusion:	Ready for RVSM

M628 ALPEK

Direction:	Bi-directional
Levels available:	All levels above FL265
	Bahrain ACC will gain 3 levels
	Emirates ACC will gain 3 levels
Transfer criteria:	Radar / Procedural – 10 minutes
Sectorisation:	UAE South / Bahrain East – All levels
Remarks:	Very low traffic volume (>1 flight per day).
Conclusion:	Ready for RVSM

B415 BUNDU

Direction:	Bi-directional
Levels available:	All levels available
	Bahrain ACC will gain 3 levels
	Emirates ACC will gain 3 levels
Transfer criteria:	Radar / Radar – 10 NM – silent transfer
Sectorisation:	UAE South / Bahrain East FL230(+) – not used
	UAE South / Doha APP FL220(+)
Remarks:	Presently, only for traffic to/from Qatar
Conclusion:	Ready for RVSM

A415 TOSNA

Direction:	Westbound (outbound) only
Levels available:	All levels available
	Emirates ACC will gain 3 levels (not used)
Transfer criteria:	Radar / Radar – 10 NM – silent transfer
Sectorisation:	UAE South / Bahrain East FL230(+) – not used
	UAE South / Doha APP FL220(+)
Remarks:	Presently, only for traffic to/from Qatar
Conclusion:	Ready for RVSM

L305 SISOK

Direction:	Eastbound (Inbound) only
Levels available:	Only FL210(-)
Conclusion:	No impact on RVSM

B457 SISOK

Direction:	Eastbound (Inbound) only
Levels available:	All odd levels available
	Bahrain will gain 3 levels
Transfer criteria:	Radar / Radar – 10 NM – silent transfer
Sectorisation:	Bahrain East / UAE North – all levels
Remarks:	Traffic released abeam Halul Island
Conclusion:	Ready for RVSM

G462 BALUS

Direction:	Westbound (Outbound) only
Levels available:	All even levels available For ULOVO traffic, only FL280(+) available Emirates will gain 3 levels
Transfer criteria:	Radar / Radar – 10 NM – silent transfer For ULOVO traffic: 10 Minutes
Sectorisation:	UAE South / Bahrain East – all levels
Remarks:	Most important capacity increase for ULOVO traffic. High traffic volume (>150 flights per day)
Conclusion:	Ready for RVSM

- Changes to entry, reporting and exit points have been made to minimise possible congestion at the following points:

  Arriving traffic from Tehran FIR has been routed via position ORSAR on a re-aligned G666. This measure separates the descending traffic from overflying traffic, which will route via SIR. Furthermore, ORSAR will only have eastbound traffic.

  Overflying traffic from Muscat FIR via GISMO has been segregated from arriving traffic, thereby reducing traffic density significantly whilst facilitating descent.

  Position ENADA and R219 east of SHJ will be withdrawn on 17 April 2003 and replaced by a dual uni-directional route system, thereby reducing traffic density significantly and eliminating the opposite traffic configuration.

- Some modifications to allow more direct routings.

  Introduction of G666 has reduced the distance for traffic from Europe by some 40 NM.

- A419 (DARAX) has bee transferred to the East Sector north of ATBOR.

The re-alignments listed above were agreed with Iranian and Omani civil aviation authorities and are reflected in the LoA change process described in section 5.3 above.

The changes related to ENADA were published by NOTAM on 19 February 2003 and will take effect on 17 April. Associated changes to the Emirates / Muscat LoA are planned for settlement in early March.

Change Analysis – ENADA

1. Need for Change

Calculation of passing frequency as part of the safety assessment required for RVSM implementation revealed a passing frequency of 2.11 at ENADA – against the regionally set limit of 1.25. While averaging with other points is permitted and ENADA may be considered as an intersection – albeit with small angles, other considerations support the desire for change.

From a general ATM safety perspective, bi-directional traffic should be avoided, except on routes with low traffic volumes.

2. Description of Current System

ENADA has been one of the main transfer points between Emirates and Muscat ACCs since the inception of Emirates FIR in 1986.

UAE side:

Eastbound traffic is fed to ENADA via R219, which is bi-directional east of SHJ.

Westbound traffic is routed via N571 and R219.

Note: See AIP Chart ENR 6-1, dated 29 Nov 02.

Daily traffic volumes (Jan 03):

ENADA	R219	N571
Eastbound	35	-
Westbound	7	41

Since 2001, ENADA has only been used for traffic overflying the Emirates FIR, while departures are routed via TONVO, some 3 NM north of R219, and arrivals are routed via the GISRA area south of ENADA.

Communication: VHF

Navigation: RNP 5

Surveillance: Covered by MSSR

Levels: FL260(+)

Attitude: Level flight at transfer

FLOS: Standard – single, alternate

FLAS: Nil

Separation:	Minimum in Emirates ACC is 5 NM Transfer minimum to Muscat ACC is 10 NM Silent transfer
Safety:	No AIRPROX reported within last 12 months.

3. Description of Proposed System

Withdraw ENADA and route eastbound overflights via SHJ - TONVO (as for departures). Designate this segment P307.

Re-align N571 via new transfer point MENSA at position N 24º57’50” E056º32’49”, thence via AVAMI to ATBOR. MENSA is 2.6 NM southwest of ENADA.

The split will give 6.3 NM lateral separation between P307 and N571.

Accept (transiting) traffic in N571 FL200(+)

Communication:	VHF		
Navigation:	RNP 5		
Surveillance:	Covered by MSSR		
Levels at TONVO:	P307	FL210(+)	→
	A777	FL250(-)	↑→
Levels at MENSA:	N571	FL200(+)	←
FLOS:	Standard – single, alternate		
FLAS:	Nil		
Separation:	Transfer minimum to Muscat ACC 10 NM Silent transfer Conditional level restriction at PASOV (see below)		

Draft NOTAMs and map are attached.

4. Safety Assessment Method

Collision risk modelling (CRM) as per ICAO Doc 9574 and Doc 9689.

RNP monitoring data will be used in determination of distribution and Actual Navigation Performance.

Qualitative evaluation of operational risk aspects of route structure.

5. Risk Evaluation

Technical Evaluation (CRM)

Lateral overlap probability between P307 and N571 at TONVO is 2.5×10^{-5}.

Lateral overlap probability between P307 and B540 at MENSA is 1.15×10^{-5}.

Probability of N571 traffic straying into GISRA at MENSA is 2.5×10^{-2} (ANP 2.3).

Operational Evaluation

A significant safety improvement will be gained by eliminating the reciprocal configuration at ENADA.

Re-locating overflights below FL260 from PASOV-KUPMA to MENSA eliminates the conflicts between low overflights – of which there are few.

The rule of keeping a lateral distance from GISRA will need to be modified. Suggested solution:

> Insert a rule that Muscat ACC must transfer PASOV traffic below N571 traffic if less than 20 NM longitudinal separation exists.

Operational changeover will be facilitated by eliminating the bi-directional configuration at ENADA.

Risk associated with coordination failures will be reduced.

6. Safety Criteria Satisfied?

With the conditional PASOV level restriction, safety criteria are satisfied.

DRAFT

OPERATIONS/AIRWORTHINESS APPROVAL MANUAL

FOR

REDUCED VERTICAL SEPARATION MINIMUM (RVSM)

IN THE MID REGION

Edition: 1.1
Edition Date : 26/02/2003

MANUAL CHANGE RECORD

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

EDITION	**DATE**	**REASON FOR CHANGE**	**SECTIONS PAGES AFFECTED**

AMENDMENT SUMMARY

Note: This manual 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

LIST OF EFFECTIVE PAGES

Page No	Rev.No	Date	Page No	Rev.No	Date	Page No	Rev.No	Date

TABLE OF CONTENTS

1. PURPOSE

This manual provides a Minimum Aircraft Systems Performance Specification (MASPS) for altimetry to support the use of a 300m (1,000 ft) vertical separation above FL 290. It establishes an acceptable means, but not the only means, that can be used in the approval of aircraft and operators to conduct flights in airspace or on routes where Reduced Vertical Separation Minimum (RVSM) is applied. The manual contains guidance on airworthiness, continued airworthiness, and operational practices and procedures for RVSM airspace. RVSM airspace is any airspace or route between FL 290 and FL 410 inclusive where aircraft are separated vertically by 300m (1,000 ft).

2. RELATED REGULATIONS

National regulations relating to the granting of an approval for flight in RVSM airspace, testing and inspection of altimeter systems, and maintenance procedures.

3. REFERENCES:

EUROCONTROL Manual on Operational ATC Aspects in European RVSM airspace .

FAA Document 91 RVSM Interim Guidance Material on the approval of Operators/Aircraft for RVSM Operations.

ICAO Document 7030/4 (EUR), Regional Supplementary Procedures.

ICAO Document 9572, RGCSP, Seventh Meeting, Montreal 30 October - 20 November 1990.

ICAO Document 9574, Manual on the Implementation of a 300m (1,000 ft) Vertical Separation Minimum Between FL 290 - FL 410 Inclusive.

JAA Document Temporary Guidance Leaflet (TGL) No.6 ; Guidance Material on the approval of aircraft and operators for flight in airspace above flight level 290 where a 300m (1,000 FT) vertical separation minimum is applied.

4. BACKGROUND:

In 1982 the International Civil Aviation Organization (ICAO) initiated a series of worldwide studies to assess the feasibility of a reduction of the vertical separation minimum (VSM) above FL 290 from 2000ft to 1000ft. The principal benefits, which the implementation of the VSM were expected to provide, were a theoretical doubling of the airspace capacity between FL 290 and FL 410, and the opportunity for aircraft to operate at or closer to their optimum flight levels, with resulting fuel economy and time savings.

Studies and data collections were conducted to determine the height deviations >300ft as well as to define corrective measures. As a result it was concluded that a 1000ft VSM between FL 290 and FL 410 was technically feasible without imposing unreasonably demanding technical or operational requirements.

The ICAO Air Navigation Commission (ANC) endorsed these findings in 1990. North Atlantic (NAT) was identified as the region best suited to the best application of the new minimum, because of the better than average height keeping accuracy shown by NAT Minimum Navigation Performance Specification (NAT MNPS) approved aircraft, together with the predominantly one-way traffic flow in the NAT region. The trials were successful and resulted in RVSM being adopted in 1997.

This concept has been introduced into designated European airspace since 24 January 2002 and to be introduced in the Middle East designated airspace (MID) and the western part of Asia Pacific designated airspace in 27 November 2003.

5. DEFINITIONS AND ABBREVIATIONS

Aircraft Group A group of aircraft that are of nominally identical design and build with respect to all details that could influence the accuracy of height keeping performance.

Altimetry System Error (ASE) The difference between the pressure altitude displayed to the flight crew when referenced to the International Standard Atmosphere ground pressure setting (1013.2 hPa /29.92 in.Hg) and free stream pressure altitude.

Assigned Altitude Deviation (AAD) The difference between the transmitted Mode C altitude and the assigned altitude/ flight level.

Automatic Altitude Control System Any system that is designed to automatically control the aircraft to a referenced pressure altitude.

Avionics Error (AVE) The error in the processes of converting the sensed pressure into an electrical output, of applying any static source error correction (SSEC) as appropriate, and of displaying the corresponding altitude.

Basic RVSM Envelope The range of Mach numbers and gross weights within the altitude ranges FL 290 to FL 410 (or maximum attainable altitude) where an aircraft can reasonably expect to operate most frequently.

Full RVSM Envelope The entire range of operational Mach numbers, W/δ, and altitude values over which the aircraft can be operated within RVSM airspace.

General Air Traffic (GAT) Flights conducted in accordance with the rules and provisions of ICAO.

Height keeping Capability Aircraft height keeping performance that can be expected under nominal environmental operating conditions, with proper aircraft operating practices and maintenance.

Height keeping Performance The observed performance of an aircraft with respect to adherence to a flight level.

Non-Group Aircraft An aircraft for which the operator applies for approval on the characteristics of the unique airframe rather than on a group basis.

Operational Air Traffic (OAT) Flights which do not comply with the provisions stated for 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 registered.

Residual Static Source Error The amount by which static source error (SSE) remains under-corrected or overcorrected after the application of SSEC.

State Aircraft Aircraft used in military, customs and police services shall be deemed to be State aircraft

Static Source Error The difference between the pressure sensed by the static system at the static port and the undisturbed ambient pressure.

Static Source Error Correction (SSEC) A correction for static source error.

Total Vertical Error (TVE) Vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level).

W/δ Aircraft weight, W, divided by the atmospheric pressure ratio, δ.

Abbreviation	Meaning
δ	Atmospheric Pressure Ratio
AAD	Assigned Altitude Deviation
ADC	Air Data Computer
AOA	Angle of Attack
AOC	Air Operator's Certificate
ASE	Altimetry System Error
ATS	Air Traffic Service
GAT	General Air Traffic
Hp	Pressure Altitude
hPa	Hecto-Pascals
in.Hg	Inches of Mercury
M	Mach number
MASPS	Minimum Aircraft System Performance Specification
MECMA	Middle East Central Monitoring Agency
MEL	Minimum Equipment List
MIDANPIRG	Middle East Air Navigation Planning and Implementation Regional Group
MMEL	Master Minimum Equipment List
Mmo	Maximum Operating Limit Mach
MNPS	Minimum Navigation Performance Specification
NAT	North Atlantic
NOTAM	Notice to Airmen
OAT	Operational Air Traffic
OTS	Organised Track Structure
QFE	Atmospheric pressure at aerodrome elevation (or at runway threshold)
QNH	Altimeter sub-scale setting to obtain elevation when on ground
RTF	Radio Telephony
SB	Service Bulletin
SL	Service Letter
SSE	Static Source Error
SSEC	Static Source Error Correction
STC	Supplemental Type Certificate
TC	Type Certificate
TVE	Total Vertical Error
VMO	Maximum Operating Limit Velocity
W	Weight

6. THE APPROVAL PROCESS

6.1 General

Airspace where RVSM is applied should be considered special qualification airspace. The specific aircraft type or types that the operator intends to use will need to be approved by the responsible authority before the operator conducts flight in RVSM airspace. In addition, where operations in specified airspace require approval in accordance with an ICAO Regional Navigation Agreement, an operational approval will be needed. This manual provides guidance for the approval of specific aircraft type or types, and for operational approval.

6.2 Approval of Aircraft

6.2.1 Each aircraft type that an operator intends to use in RVSM airspace should have received RVSM airworthiness approval from the responsible authority, in accordance with paragraph 9, prior to approval being granted for RVSM operations, including the approval of continued airworthiness programmes. Paragraph 9 provides guidance for the approval of newly built aircraft and for aircraft that have already entered service. Paragraph 10 contains guidance on the continued airworthiness (maintenance and repair) programmes for all RVSM operations.

6.2.2 It is accepted that aircraft which have been approved in compliance with JAA Information Leaflet No. 23, TGL No. 6 or FAA Interim Guidelines 91-RVSM satisfy the airworthiness criteria of this manual.

Note: Operators are advised to check existing approvals and the Aircraft Flight Manual for redundant regional constraints.

6.3 Operational Approval

For certain airspace, as defined by ICAO Regional Navigation Agreements, operators are required to hold State approval to operate in that airspace, which may or may not include RVSM. Paragraph 11 contains guidance on operational procedures that an operator may need to adopt for such airspace where RVSM is applied including advice on the operational material that may need to be submitted for review by the responsible authority.

7. RVSM PERFORMANCE

7.1 General

The objectives set out by the RGCSP have been translated into airworthiness standards by assessment of the characteristics of altimetry system error (ASE) and automatic altitude control.

7.2 RVSM Flight Envelopes

For the purposes of RVSM approval, the aircraft flight envelope may be considered as two parts; the Basic RVSM flight planning envelope and the Full RVSM flight envelope (referred to as the Basic envelope and the Full envelope respectively), as defined in paragraph 5 and explained in 9.4. For the Full envelope, a larger ASE is allowed.

7.3 Altimetry System Error

7.3.1 To evaluate a system against the ASE performance statements established by RGCSP (see Appendix 5, paragraph 2), it is necessary to quantify the mean and three standard deviation values for ASE, expressed as ASE_{mean} and ASE_{3SD}. To do this, it is necessary to take into account the different ways in which variations in ASE can arise. The factors that affect ASE are:

(a) Unit to unit variability of avionics equipment.

(b) Effect of environmental operating conditions on avionics equipment.

(c) Airframe to airframe variability of static source error.

(d) Effect of flight operating conditions on static source error.

7.3.2 Assessment of ASE, whether based on measured or predicted data will need to consider sub-paragraphs (a) to (d) of 7.3.1. The effect of item (d) as a variable can be eliminated by evaluating ASE at the most adverse flight condition in an RVSM flight envelope.

7.3.3 The criteria to be met for the Basic envelope are:

(a) At the point in the envelope where the mean ASE reaches its largest absolute value that value should not exceed 25 m (80 ft);

(b) At the point in the envelope where absolute mean ASE plus three standard deviations of ASE reaches its largest absolute value, the absolute value should not exceed 60 m (200 ft).

7.3.4 The criteria to be met for the Full envelope are:

(a) At the worst point in the Full envelope where the mean ASE reaches its largest absolute value, the absolute value should not exceed 37 m (120 ft).

(b) At the point in the Full envelope where the mean ASE plus three standard deviations of ASE reaches its largest absolute value, the absolute value should not exceed 75 m (245 ft).

(c) If necessary, for the purpose of achieving RVSM approval for a group of aircraft (see 9.3), an operating limitation may be established to restrict aircraft from conducting RVSM operations in parts of the Full envelope where the absolute value of mean ASE exceeds 37 m (120 ft) and/or the absolute value of mean ASE plus three standard deviations of ASE exceed 75 m (245 ft). When such a limitation is established, it should be identified in the data submitted to support the approval application, and documented in appropriate aircraft operating manuals. However, visual or aural warning/indication associated with such a limitation need not be provided in the aircraft.

7.3.5 Aircraft types for which an application for a Type Certificate is made after 1 January 1997, should meet the criteria established for the Basic envelope in the Full RVSM envelope.

7.3.6 The standard for aircraft submitted for approval as non-group aircraft, as defined in sub-paragraph 9.3.2, is as follows:

(a) For all conditions in the Basic envelope:

- | Residual static source error + worst case avionics | ≤ 50 m (160 ft)

(b) For all conditions in the Full envelope:

- | Residual static source error + worst case avionics | ≤ 60 m (200 ft)

Note: Worst case avionics means that a combination of tolerance values, specified by the aircraft constructor for the altimetry fit into the aircraft, which gives the largest combined absolute value for residual SSE plus avionics errors.

7.4 Altitude Keeping

ft)
about the selected altitude, when the aircraft is operated in straight and level flight under non-turbulent non-gust conditions.

Note: Automatic altitude control systems with flight management system/ performance ft) under non-turbulent, non-gust conditions, installed in aircraft types for which an application for Type Certificate was made prior to January 1, 1997, need not be replaced or modified.

8. AIRCRAFT SYSTEMS

8.1 Equipment for RVSM Operations

The minimum equipment fit is:

8.1.1 Two independent altitude measurement systems. Each system will need to be composed of the following elements:

(a) Cross-coupled static source/system, with ice protection if located in areas subject to ice accretion;

(b) Equipment for measuring static pressure sensed by the static source, converting it to pressure altitude and displaying the pressure altitude to the flight crew:

(c) Equipment for providing a digitally encoded signal corresponding to the displayed pressure altitude, for automatic altitude reporting purposes;

(d) Static source error correction (SSEC), if needed to meet the performance criteria of sub-paragraphs 7.3.3, 7.3.4 or 7.3.6, as appropriate; and

(e) Signals referenced to a pilot selected altitude for automatic control and alerting. These signals will need to be derived from an altitude measurement system meeting the criteria of this manual, and, in all cases, enabling the criteria of sub-paragraphs 8.2.6 and 8.3 to be met.

8.1.2 One secondary surveillance radar transponder with an altitude reporting system that can be connected to the altitude measurement system in use for altitude keeping.

8.1.3 An altitude alerting system.

8.1.4 An automatic altitude control system.

8.2. Altimetry

8.2.1 *System Composition* the altimetry system of an aircraft comprises all those elements involved in the process of sampling free stream static pressure and converting it to a pressure altitude output. The elements of the altimetry system fall into two main groups:

(a) Airframe plus static sources.

(b) Avionics equipment and/or instruments.

8.2.2 *Altimetry System Outputs* The following altimetry system outputs are significant for RVSM operations:

(a) Pressure altitude (Baro-corrected) for display.

(b) Pressure altitude reporting data.

(c) Pressure altitude or pressure altitude deviation for an automatic altitude control device.

8.2.3 *Altimetry System Accuracy* The total system accuracy will need to satisfy the criteria of sub-paragraphs 7.3.3, 7.3.4 or 7.3.6 as appropriate.

8.2.4 *Static Source Error Correction* If the design and characteristics of the aircraft and its altimetry system are such that the criteria of sub-paragraphs 7.3.3, 7.3.4 or 7.3.6 are not satisfied by the location
and geometry of the static sources alone, then suitable SSEC will need to be applied automatically within the avionics equipment of the altimetry system. The design aim for static source error correction, whether applied by aerodynamic/ geometric means or within the avionics equipment, should be to produce a minimum residual static source error, but in all cases it should lead to compliance with the criteria of sub-paragraphs 7.3.3, 7.3.4 or 7.3.6, as appropriate.

8.2.5 *Altitude Reporting Capability* The aircraft altimetry system will need to provide an output to the aircraft transponder as required by applicable operating regulations.

8.2.6 *Altitude Control Output*

(a) The altimetry system will need to provide a signal that can be used by an automatic altitude control system to control the aircraft to a selected altitude. The signal may be used either directly, or combined with other sensor signals. If SSEC is necessary to satisfy the criteria of sub-paragraph 7.3.3, 7.3.4 or 7.3.6, then an equivalent SSEC may be applied to the altitude control signal. The signal may be an altitude deviation signal, relative to the selected altitude, or a suitable absolute altitude signal.

(b) Whatever the system architecture and SSEC system, the difference between the signal output to the altitude control system and the altitude displayed to the flight crew will need to be kept to the minimum.

8.2.7 *Altimetry System Integrity* The RVSM approval process will need to verify that the predicted rate of occurrence of undetected failure of the altimetry system does not exceed 1×10^{-5} per flight hour. All failures and failure combinations whose occurrence would not be evident from cross cockpit checks, and which would lead to altitude measurement /display errors outside the specified limits, need to be assessed against this value. Other failures or failure combinations need not be considered.

8.3 Altitude Alerting

The altitude deviation warning system will need to signal an alert when the altitude displayed to the flight crew deviates from selected altitude by more than a nominal value. For aircraft for which an application for a Type Certificate or major modification is made before 1 January 1997, the
ft). For aircraft for which an
application for a Type Certificate is made on or after 1 January 1997, the value will need to be not

ft). The overall equipment tolerance in implementing these nominal values
ft).

8.4 Automatic Altitude Control System

8.4.1 As a minimum, a single automatic altitude control system with an altitude keeping performance complying with sub-paragraph 7.4, will need to be installed.

8.4.2 Where an altitude select/acquire function is provided, the altitude select/acquire control
ft) exists between the
value selected by, and displayed to, the flight crew, and the corresponding output to the control system.

8.5 System Limitations

8.5.1 The Aircraft Flight Manual should include a statement of compliance against this manual (or equivalent guidance material) quoting the applicable Service Bulletin or build standard of the aircraft. In addition the following statement should be included:-

Operational Approva

8.5.2 Non-compliant aspects of the installed systems and any other limitations will need to be identified in the approved Aircraft Flight Manual amendment or supplement, and in the applicable and approved Operations Manual.

For example:-

Non -compliant altimeter systems, e.g. standby altimeter;
Non-Compliant modes of the automatic pilot, e.g. altitude hold, vnav, altitude select;
Weight Limit;
Mach Limit;
Altitude Limit.

9. AIRWORTHINESS APPROVAL

9.1 General

9.1.1 Obtaining RVSM airworthiness approval is a two step process which may involve more than one authority.

9.1.2 For the first step:

- in the case of a newly built aircraft, the aircraft constructor develops and submits to the responsible authority of the state of manufacture, the performance and analytical data that supports RVSM airworthiness approval of a defined build standard. The data will be supplemented with maintenance and repair manuals giving associated continued airworthiness instructions. Compliance with RVSM criteria will be stated in the Aircraft Flight Manual including reference to the applicable build standard, related conditions and limitations. Approval by the responsible authority, and, where applicable, validation of that approval by other authorities, indicates acceptance of newly built aircraft, conforming to that type and build standard, as complying with the RVSM airworthiness criteria.

- in the case of an aircraft already in service, the aircraft constructor (or an approved design organisation), submits to the responsible authority, either in the state of manufacture or the state in which the aircraft is registered, the performance and analytical data that supports RVSM airworthiness approval of a defined build standard. The data will be supplemented with a Service Bulletin, or its equivalent, that identifies the work to be done to achieve the build standard, continued airworthiness instructions, and an amendment to the Aircraft Flight Manual stating related conditions and limitations. Approval by the responsible authority, and, where applicable, validation of that approval by other authorities, indicates acceptance of that aircraft type and build standard as complying with the RVSM airworthiness criteria.

9.1.3 The combination of performance and analytical data, Service Bulletin(s) or equivalent, continued airworthiness instructions, and the approved amendment or supplement to the Aircraft Flight Manual is known as the RVSM approval data package.

9.1.4 For the second step, an aircraft operator may apply to the responsible authority of the state in which the aircraft is registered, for airworthiness approval of specific aircraft. The application will need to be supported by evidence confirming that the specific aircraft has been inspected and, where necessary, modified in accordance with applicable Service Bulletins, and is of a type and build standard that meets the RVSM airworthiness criteria. The operator will need to confirm also that the continued airworthiness instructions are available and that the approved Aircraft Flight Manual amendment or supplement (see paragraph 8.5) has been incorporated. Approval by the authority indicates that the aircraft is eligible for RVSM operations. The authority will notify the designated monitoring cell accordingly.

For RVSM airspace for which an operational approval is prescribed, airworthiness approval alone does not authorise flight in that airspace.

9.2 Contents of the RVSM Approval Data Package

As a minimum, the data package will need to consist of the following items:

(a) A statement of the aircraft group or non-group aircraft and applicable build standard to which the data package applies.

(b) A definition of the applicable flight envelope(s).

(c) Data showing compliance with the performance criteria of paragraphs 7 and 8.

(d) The procedures to be used to ensure that all aircraft submitted for airworthiness approval comply with RVSM criteria. These procedures will include the references of applicable Service Bulletins and the applicable approved Aircraft Flight Manual amendment or supplement.

(e) The maintenance instructions that ensure continued airworthiness for RVSM approval.

The above items are explained further in the following sub-paragraphs.

9.3 Aircraft Groupings

9.3.1 For aircraft to be considered as members of a group for the purposes of RVSM approval, the following conditions should be satisfied:

(a) Aircraft should have been constructed to a nominally identical design and be approved on the same Type Certificate (TC), TC amendment, or Supplemental TC, as applicable.

Note: For derivative aircraft it may be possible to use the data from the parent configuration to minimise the amount of additional data required to show compliance. The extent of additional data required will depend on the nature of the differences between the parent aircraft and the derivative aircraft.

(b) The static system of each aircraft should be nominally identical. The SSE corrections should be the same for all aircraft of the group.

(c) The avionics units installed on each aircraft to meet the minimum RVSM equipment criteria of sub-paragraph 8.1 should comply with the manufacturer's same specification and have the same part number.

Note: Aircraft that have avionic units that are of a different manufacturer or part number may be considered part of the group, if it can be demonstrated that this standard of avionic equipment provides equivalent system performance.

9.3.2 If an airframe does not meet the conditions of sub-paragraphs 9.3.1(a) to (c) to qualify as a member of a group, or is presented as an individual airframe for approval, then it will need to be considered as a non-group aircraft for the purposes of RVSM approval.

9.4 Flight Envelopes

The RVSM operational flight envelope, as defined in paragraph 5, is the Mach number, W/δ, and altitude ranges over which an aircraft can be operated in cruising flight within the RVSM airspace. Appendix 1 gives an explanation of W/δ. The RVSM operational flight envelope for any aircraft may be divided into two parts as explained below:

9.4.1 *Full RVSM Flight Envelope* The Full envelope will comprise the entire range of operational Mach number, W/δ, and altitude values over which the aircraft can be operated within RVSM airspace. Table 1 establishes the parameters to be considered.

TABLE 1 - FULL RVSM ENVELOPE BOUNDARIES

	Lower Boun ary is defined by	**Upper Bounc ary is defined by**
Level		The lower of: st; buffet; other aircraft flight limitations
Mach or Speed	The lower of :	The lower of: $_{MO}/V_{MO}$ buffet; other aircraft flight limitations
Gross Weight	west gross weight compatible with operations in RVSM airspace	with operations in RVSM airspace

9.4.2 *Basic RVSM Flight Planning Envelope* The boundaries for the Basic envelope are the same as those for the Full envelope except for the upper Mach boundary.

9.4.3 For the Basic envelope, the upper Mach boundary may be limited to a range of airspeeds over which the aircraft group can reasonably be expected to operate most frequently. This boundary should be declared for each aircraft group by the aircraft constructor or the approved design organisation. The boundary may be equal to the upper Mach/airspeed boundary defined for the Full envelope or a lower value. This lower value should not be less than the Long Range Cruise Mach Number plus 0.04 Mach, unless limited by available cruise thrust, buffet, or other flight limitations.

9.5 Performance Data

The data package should contain data sufficient to show compliance with the accuracy criteria set by paragraph 7.

9.5.1 *General* ASE will generally vary with flight condition. The data package should provide coverage of the RVSM envelope sufficient to define the largest errors in the Basic and Full envelopes. In the case of group aircraft approval, the worst flight condition may be different for each of the criterion of sub-paragraph 7.3.3 and 7.3.4. Each should be evaluated.

9.5.2 Where precision flight calibrations are used to quantify or verify altimetry system performance they may be accomplished by any of the following methods. Flight calibrations should be performed only when appropriate ground checks have been completed. Uncertainties in application of the method will need to be assessed and taken into account in the data package.

(a) Precision tracking radar in conjunction with pressure calibration of atmosphere at test altitude.

(b) Trailing cone.

(c) Pacer aircraft.

(d) Any other method acceptable to the responsible authority.

Note: When using pacer aircraft, the pacer aircraft will need to be calibrated directly to a known standard. It is not acceptable to calibrate a pacer aircraft by another pacer aircraft.

9.5.3 *Altimetry System Error Budget* It is implicit in the intent of sub-paragraph 7.3, for group aircraft approvals and for non-group approvals, that a trade-off may be made between the various error sources which contribute to ASE. This manual does not specify separate limits for the various error sources that contribute to the mean and variable components of ASE as long as the overall ASE accuracy criteria of sub-paragraph 7.3 are met. For example, in the case of an aircraft group approval, the smaller the mean of the group and the more stringent the avionics standard, the larger the available allowance for SSE variations. In all cases, the trade-off adopted should be presented in the data package in the form of an error budget that includes all significant error sources. This is discussed in more detail in the following sections. Altimetry system error sources are discussed in Appendix 2.

9.5.4 *Avionic Equipment* should be identified by function and part number. A demonstration will need to show that the avionic equipment can meet the criteria established by the error budget when the equipment is operated in the environmental conditions expected to be met during RVSM operations.

9.5.5 *Groups of Aircraft* Where approval is sought for an aircraft group, the associated data package will need to show that the criteria of sub-paragraph 7.3.3 and 7.3.4 are met. Because of the statistical nature of these criteria, the content of the data package may vary considerably from group to group.

(a) The mean and airframe-to-airframe variability of ASE should be established, based on precision flight test calibration of a number of aircraft. Where analytical methods are available, it may be possible to enhance the flight test data base and to track subsequent changes in the mean and variability based on geometric inspections and bench test, or any other method acceptable to the responsible authority. In the case of derivative aircraft it may be possible to use data from the parent as part of the data base. This may be applicable to a fuselage stretch where the only difference in mean ASE between groups could be reliably accounted for by analytical means.

(b) An assessment of the aircraft-to-aircraft variability of each error source should be made. The error assessment may take various forms as appropriate to the nature and magnitude of the source and the type of data available. For example, for some error sources (especially small ones), it may be acceptable to use specification values to represent three standard deviations. For other error sources (especially larger ones) a more comprehensive assessment may be required. This is especially true for airframe error sources where specification values of ASE contribution may not have been previously established.

(c) In many cases, one or more of the major ASE error sources will be aerodynamic in nature, such as variations in the airframe surface contour in the vicinity of the static pressure source. If evaluation of these errors is based on geometric measurements, substantiation should be provided that the methodology used is adequate to ensure compliance. An example of the type of data that could be used to provide this substantiation is provided in Appendix 3, figure 3-2.

(d) An error budget should be established to ensure that the criteria of sub-paragraphs 7.3.3 and 7.3.4 are met. As noted in 9.5.1, the worst condition experienced in flight may differ for each criterion and therefore the component error values may also differ.

(e) In showing compliance with the overall criteria, the component error sources should be combined appropriately. In most cases this will involve the algebraic summation of the mean components of the errors, Root-Sum-Square (RSS) combination of the variable components of the errors, and summation of the RSS value with the absolute value of the overall mean. Care should be taken that only variable component error sources that are independent of each other are combined by RSS.

(f) The methodology described above for group approval is statistical. This is the result of the statistical nature of the risk analysis and the resulting statements of Appendix 5 sub-paragraphs 5(a) and 5(b). In the context of a statistical method, the statements of Appendix 5, sub-paragraph 5(c) need further explanation. This item states that 'each individual aircraft in the group shall be built to have an ASE ft)'. This statement has not been taken to mean that every airframe should be calibrated with a trailing cone or equivalent to ft). Such an interpretation would be unduly onerous considering that the risk analysis allows for a small proportion of aircraft to exceed 60m (200 ft). However, it is accepted that if any aircraft is ft) then it should receive corrective action.

9.5.6 *Non-group Aircraft* When an aircraft is submitted for approval as a non-group aircraft, as explained in sub-paragraph 9.3.2, the data should be sufficient to show that the criteria of sub-paragraph 7.3.6 are met. The data package should specify how the ASE budget has been allocated between residual SSE and avionics error. The operator and responsible authority should agree on what data is needed to satisfy approval criteria. The following data should be established:

(a) Precision flight test calibration of the aircraft to establish its ASE or SSE over the RVSM envelope. Flight calibration should be performed at points in the flight envelope(s) as agreed by the responsible authority. One of the methods listed in sub-paragraphs 9.5.2 (a) to (d) should be used.

(b) Calibration of the avionics used in the flight test as required to establish residual SSE. The number of test points should be agreed by the responsible authority. Since the purpose of the flight test is to determine the residual SSE, specially calibrated altimetry equipment may be used.

(c) Specifications for the installed altimetry avionics equipment, identifying the largest allowable errors.

Using the foregoing, compliance with the criteria of sub-paragraph 7.3.6 should be demonstrated. If, subsequent to aircraft approval for RVSM operation, avionic units that are of a different manufacturer or part number are fitted, it should be demonstrated that the standard of avionic equipment provides equivalent altimetry system performance.

9.6 Compliance Procedures

The data package will need to define the procedures, inspections and tests, and the limits that will be used to ensure that all aircraft approved against the data package 'conform to type'; that is all future approvals, whether of new build or in-service aircraft, meet the budget allowances developed according to sub-paragraph 9.5.3. The budget allowances will be established by the data package and include a methodology that allows for tracking the mean and standard deviation for new build aircraft. Limits will need to be defined for each potential source of error. A discussion of error sources is provided in Appendix 2. Examples of procedures are presented in Appendix 3. Where an operating limitation has been applied, the package should contain the data and information necessary to document and establish that limitation.

9.7 Continued Airworthiness

9.7.1 The following items should be reviewed and updated as applicable to RVSM:

(a) The Structural Repair Manual with special attention to the areas around each static source, angle of attack sensors, and doors if their rigging can affect airflow around the previously mentioned sensors.

(b) The Master Minimum Equipment List (MMEL).

9.7.2 The data package should include details of any special procedures that are not covered in sub-paragraph 9.7.1, but may be needed to ensure continued compliance with RVSM approval criteria. Examples follow:

(a) For non-group aircraft, where airworthiness approval has been based on flight test, the continuing integrity and accuracy of the altimetry system will need to be demonstrated by ground and flight tests of the aircraft and its altimetry system at periods to be agreed with the responsible authority. However, alleviation of the flight test requirement may be given if it can be demonstrated that the relationship between any subsequent airframe/system degradation and its effects on altimetry system accuracy is understood and that it can be compensated or corrected.

(b) In-flight defect reporting procedures should be defined to aid identification of altimetry system error sources. Such procedures could cover acceptable differences between primary and alternate static sources, and others as appropriate.

(c) For groups of aircraft where approval is based on geometric inspection, there may be a need for periodic re-inspection, and the interval required should be specified.

9.8 Post Approval Modification

Any variation/modification from the initial installation that affects RVSM approval should be referred to the aircraft constructor or approved design organisation, and accepted by the responsible authority.

10. CONTINUED AIRWORTHINESS (MAINTENANCE PROCEDURES)

10.1 General

(a) The integrity of the design features necessary to ensure that altimetry systems continue to meet RVSM approval criteria should be verified by scheduled tests and inspections in conjunction with an approved maintenance programme. The operator should review its maintenance procedures and address all aspects of continued airworthiness that may be relevant.

(b) Adequate maintenance facilities will need to be available to enable compliance with the RVSM maintenance procedures.

10.2 Maintenance Programmes

Each operator requesting RVSM operational approval should establish RVSM maintenance and inspection practices acceptable to, and as required by, the responsible authority, that include any required maintenance specified in the data package (sub-paragraph 9.2). Operators of aircraft subject to maintenance programme approval will need to incorporate these practices in their maintenance programme.

10.3 Maintenance Documents

The following items should be reviewed, as appropriate:

(a) Maintenance Manuals.

(b) Structural Repair Manuals.

(c) Standard Practices Manuals.

(d) Illustrated Parts Catalogues.

(e) Maintenance Schedule.

(f) MMEL

10.4 Maintenance Practices

If the operator is subject to an approved maintenance programme, that programme should include, for each aircraft type, the maintenance practices stated in the applicable aircraft and component manufacturers' maintenance manuals. In addition, for all aircraft, including those not subject to an approved maintenance programme, attention should be given to the following items:

(a) All RVSM equipment should be maintained in accordance with the component manufacturers' maintenance instructions and the performance criteria of the RVSM approval data package.

(b) Any modification or design change which in any way affects the initial RVSM approval, should be subject to a design review acceptable to the responsible authority.

(c) Any repairs, not covered by approved maintenance documents, that may affect the integrity of the continuing RVSM approval, e.g. those affecting the alignment of pitot/static probes, repairs to dents or deformation around static plates, should be subject to a design review acceptable to the responsible authority.

(d) Built-in Test Equipment (BITE) testing should not be used for system calibration unless it is shown to be acceptable by the aircraft constructor or an approved design organisation, and with the agreement of the responsible authority.

(e) An appropriate system leak check (or visual inspection where permitted) should be accomplished following reconnection of a quick-disconnect static line.

(f) Airframe and static systems should be maintained in accordance with the aircraft constructor's inspection standards and procedures.

(g) To ensure the proper maintenance of airframe geometry for proper surface contours and the mitigation of altimetry system error, surface measurements or skin waviness checks will need to be made, as specified by the aircraft constructor, to ensure adherence to RVSM tolerances. These checks should be performed following repairs, or alterations having an effect on airframe surface and airflow.

(h) The maintenance and inspection programme for the autopilot will need to ensure continued accuracy and integrity of the automatic altitude control system to meet the height keeping standards for RVSM operations. This requirement will typically be satisfied with equipment inspections and serviceability checks.

(i) Whenever the performance of installed equipment has been demonstrated to be satisfactory for RVSM approval, the associated maintenance practices should be verified to be consistent with continued RVSM approval. Examples of equipment to be considered are:

(i) Altitude alerting.

(ii) Automatic altitude control system.

(iii) Secondary surveillance radar altitude reporting equipment.

(iv) Altimetry systems.

10.4.1 *Action for Non-compliant Aircraft* Those aircraft positively identified as exhibiting height keeping performance errors that require investigation, as discussed in sub-paragraph 11.7, should not be operated in RVSM airspace until the following actions have been taken:

(a) The failure or malfunction is confirmed and isolated; and,

(b) Corrective action is taken as necessary to comply with sub-paragraph 9.5.5 (f) and verified to support RVSM approval.

10.4.2 *Maintenance Training* New training may be necessary to support RVSM approval. Areas that may need to be highlighted for initial and recurrent training of relevant personnel are:

(a) Aircraft geometric inspection techniques.

(b) Test equipment calibration and use of that equipment.

(c) Any special instructions or procedures introduced for RVSM approval.

10.4.3 *Test Equipment*

(a) The test equipment should have the capability to demonstrate continuing compliance with all the parameters established in the data package for RVSM approval or as approved by the responsible authority.

(b) Test equipment should be calibrated at periodic intervals as agreed by the responsible authority using reference standards whose calibration is certified as being traceable to national standards acceptable to that authority. The approved maintenance programme should include an effective quality control programme with attention to the following:

(i) Definition of required test equipment accuracy.

(ii) Regular calibrations of test equipment traceable to a master standard. Determination of the calibration interval should be a function of the stability of the test equipment. The calibration interval should be established using historical data so that degradation is small in relation to the required accuracy.

(iii) Regular audits of calibration facilities both in-house and outside.

(iv) Adherence to approved maintenance practices.

(v) Procedures for controlling operator errors and unusual environmental conditions which may affect calibration accuracy.

11. OPERATIONAL APPROVAL

11.1 Purpose and Organization

Paragraph 6 of this manual gives an overview of the RVSM approval processes. For airspace where operational approval is required, this paragraph describes steps to be followed and gives detailed guidance on the required operational practices and procedures. Appendices 4 and 5 are related to this paragraph and contain essential information for operational programmes.

11.2 RVSM Operations

Approval will be required for each aircraft group and each aircraft to be used for RVSM operations. Approval will be required for each operator and the responsible authority will need to be satisfied that

(a) each aircraft holds airworthiness approval according to paragraph 9;
(b) each operator has continued airworthiness programmes (maintenance procedures) according to paragraph 10;
(c) where necessary, operating procedures unique to the airspace have been incorporated in operations manuals including any limitations identified in paragraph 8.5.
(d) high levels of aircraft height keeping performance can be maintained.

11.3 Content of Operator RVSM Application

The following material should be made available to the responsible authority, in sufficient time to permit evaluation, before the intended start of RVSM operations.

(a) *Airworthiness Documents* Documentation that shows that the aircraft has RVSM airworthiness approval. This should include an Approved Flight Manual amendment or supplement.

(b) *Description of Aircraft Equipment* A description of the aircraft appropriate to operations in an RVSM environment.

(c) *Training Programmes and Operating Practices and Procedures* Holders of Air Operators Certificates (AOC) may need to submit training syllabi for initial, and where appropriate, recurrent training programmes together with other appropriate material to the responsible authority. The material will need to show that the operating practices, procedures and training items, related to RVSM operations in airspace that requires State operational approval, are incorporated. Non-AOC operators will need to comply with local procedures to satisfy the responsible authority that their knowledge of RVSM operating practices and procedures is equivalent to that set for AOC Holders, sufficient to permit them to conduct RVSM operations. Guidance on the content of training programmes and operating practices and procedures is given in Appendix 4. In broad terms, this covers flight planning, pre-flight procedures, aircraft procedures before RVSM airspace entry, in-flight procedures, and flight crew training procedures. The procedures used within airspace of the EUR region and the procedures unique to the North Atlantic Airspace for which specific State operational approval is required are stated in Doc 7030/4.

(d) *Operations Manuals and Checklists* The appropriate manuals and checklists should be revised to include information/guidance on standard operating procedures as detailed in Appendix 4. Manuals should include a statement of the airspeeds, altitudes and weights considered in RVSM aircraft approval; including identification of any operating limitations or conditions established for that aircraft group. Manuals and checklists may need to be submitted for review by the authority as part of the application process.

(e) *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.

(f) *Minimum Equipment List* Where applicable, a minimum equipment list (MEL), adapted from the master minimum equipment list (MMEL) and relevant operational regulations, should include items pertinent to operating in RVSM airspace.

(g) *Maintenance* When application is made for operational approval, the operator should establish a maintenance programme acceptable to the responsible authority, as detailed in paragraph 10.

(h) *Plan for Participation in Verification/Monitoring Programmes* The operator should establish a plan acceptable to the responsible authority, for participation in any applicable verification/ monitoring programme (See 11.6). This plan will need to include, as a minimum, a check on a sample of the operator's fleet by an independent height monitoring system.

11.4 Demonstration Flight(s)

The content of the RVSM application may be sufficient to verify the aircraft performance and procedures. 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 relevant procedures are applied effectively. If the performance is satisfactory, operation in RVSM airspace may be permitted.

11.5 Form of Approval Documents

(a) *Holders of an Air Operator's Certificate* Approval to operate in designated RVSM airspace areas will be granted by an Approval issued by the responsible authority in accordance with their national regulations where operational approval is required by an ICAO Regional Agreement. Each aircraft group for which the operator is granted approval will be listed in the Approval.

(b) *Non AOC Holders* These operators will be issued with an Approval as required by their national regulations. These approvals will be valid for a period specified in national regulations which may require renewal.

Note: Subject to compliance with applicable criteria, an RVSM Approval combining the airworthiness approval of sub-paragraph 9.1.4 and the operational approval of paragraph 11.2 may be available from some authorities.

11.6 Height Monitoring

The introduction of 300 m (1,000 ft) RVSM separation is conditional upon the principal consideration that the risk of collision as a consequence of a loss of vertical separation, from any cause, is less than the agreed target level of safety. Accordingly, height monitoring is carried out using a system comprised of fixed ground-based Height Monitoring Units (HMU) and a GPS-based monitoring system comprising portable GPS Monitoring Units (GMU), GPS reference stations, post-flight processing facilities and logistic support. Air Operators are required to have a number of their aircraft height monitored within six months of receiving RVSM approval. Information on the location of Height Monitoring Units can be found in ICAO Document 7030/4 Regional Supplementary Procedures (for appropriate region)

11.7 Airspace Monitoring

For airspace where a numerical Target Level of Safety is prescribed, monitoring of aircraft height keeping performance in the airspace by an independent height monitoring system is necessary to verify that the prescribed level of safety is being achieved. However, an independent monitoring check of an aircraft is not a prerequisite for the grant of an RVSM approval.

11.8 Suspension, Revocation and Reinstatement of RVSM Approval

The incidence of height keeping errors that can be tolerated in an RVSM environment is small. It is expected of each operator to take immediate action to rectify the conditions that 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 repeat occurrences. The need for follow up reports will be determined by the responsible authority. Occurrences that should be reported and investigated are errors of:

(a) TVE equal to or greater t ft),

(b) ft), and

(c) ft).

11.8.1 *Height keeping Errors* Height keeping errors fall into two broad categories:

- errors caused by malfunction of aircraft equipment; and
- operational errors.

11.8.2 An operator that consistently experiences errors in either category will have approval for RVSM operations suspended or revoked. If a problem is identified which is related to one specific aircraft type, then RVSM approval may be suspended or revoked for that specific type within that operator's fleet.

Note: The tolerable level of collision risk in the airspace would be exceeded if an operator consistently experienced errors.

11.8.3 *Operators Actions* The operator should make an effective, timely response to each height keeping error. The responsible authority may consider suspending or revoking RVSM approval if the operator's responses to height keeping errors are not effective or timely. The responsible authority will consider the operator's past performance record in determining the action to be taken.

11.8.4 *Reinstatement of Approval The* operator will need to satisfy the responsible authority that the causes of height keeping errors are understood and have been eliminated and that the operator's RVSM programmes and procedures are effective. At its discretion and to restore confidence, the authority may require an independent height monitoring check of affected aircraft to be performed.

12. AVAILABILITY OF DOCUMENTS

12.1 Copies of EUROCONTROL documents may be requested from EUROCONTROL Documentation Centre, GS4, Rue de la Fusee, 96, B-1130 Brussels, Belgium: (Fax: 32 2 729 9109), and on the internet at < http://www.eur-rvsm.com >.

12.2 Copies of FAA documents might be obtained from Superintendent of Documents, Government Printing Office, Washington DC 20402-9325, USA.

12.3 Copies of ARINC documents may be obtained from Aeronautical radio Inc., 2551 Riva Road, Annapolis, Maryland 24101-7465, USA.

12.4 Copies of RTCA documents may be obtained from RTCA Inc.,1140 Connecticut Avenue, N.W., Suite1020, Washington, DC 20036-4001, USA,. (Tel: 1 202 833 9339).

12.5 Information for obtaining ICAO and JAA documents should be requested from the applican national authority. (Information for obtaining the North Atlantic MNPS Airspace Operational Manual may be found in UK CAA AIC 149/1998).

APPENDIX 1 - EXPLANATION OF W/δ

1 Sub-paragraph 9.4 describes the range of flight conditions over which conformity with the ASE criteria should be shown. The description includes reference to the parameter W/δ. The following discussion is provided for the benefit of readers who may not be familiar with the use of this parameter.

2 It would be difficult to show all of the gross weight, altitude, and speed conditions which constitute the RVSM envelope(s) on a single plot. This is because most of the speed boundaries of the envelopes are a function of both altitude and gross weight. As a result, a separate chart of altitude versus Mach would be required for each aircraft gross weight. Aircraft performance engineers commonly use the following technique to solve this problem.

3 For most jet transports the required flight envelope can be collapsed to a single chart with good approximation, by the use of the parameter W/δ (weight divided by atmospheric pressure ratio). This fact is due to the relationship between W/δ and the fundamental aerodynamic variables M and lift coefficient as shown below.

$W/\delta = 1481.4 C_L M^2 S_{Ref}$, where:

δ = ambient pressure at flight altitude divided by sea level standard pressure of 1013.25 hPa

W/δ = Weight over Atmospheric Pressure Ratio
C_L = Lift Coefficient
M = Mach Number
S_{REF} = Reference Wing Area

4 As a result, the RVSM flight envelope(s) may be collapsed into one chart by simply plotting W/δ, rather than altitude, versus Mach Number. Since δ is a fixed value for a given altitude, weight can be obtained for a given condition by simply multiplying the W/δ value by δ.

5 Over the RVSM altitude range, it is a good approximation to assume that position error is uniquely related to Mach Number and W/δ for a given aircraft.

APPENDIX 2 - ALTIMETRY SYSTEM ERROR COMPONENTS

1. INTRODUCTION

Sub-paragraph 9.5.3 states that an error budget should be established and presented in the approval data package. The error budget is discussed in some detail in subsequent paragraphs for group and non-group aircraft. The purpose of this appendix is to provide guidance to help ensure that all the potential error sources are identified and included in the error budget for each particular model.

2. OBJECTIVE OF ASE BUDGET

2.1 The purpose of the ASE budget is to demonstrate that the allocation of tolerances amongst the various parts of the altimetry system is, for the particular data package, consistent with the overall statistical ASE criteria. These individual tolerances within the ASE budget also form the basis of the procedures, defined in the airworthiness approval data package, which will be used to demonstrate that aircraft satisfy the RVSM criteria.

2.2 It is necessary to ensure that the budget takes account of all contributory components of ASE.

2.3 For group approval it is necessary to ensure either that the budget assesses the combined effect of the component errors in a way that is statistically realistic, or that the worst case specification values are used.

3. ALTIMETRY SYSTEM ERROR

3.1 Breakdown

Figure 2-1 shows the breakdown of total ASE into its main components, with each error block representing the error associated with one of the functions needed to generate a display of pressure altitude. This breakdown encompasses all altimetry system errors that can occur, although different system architectures may combine the components in slightly different ways.

(a) The 'Actual Altitude' is the pressure altitude corresponding to the undisturbed ambient pressure.

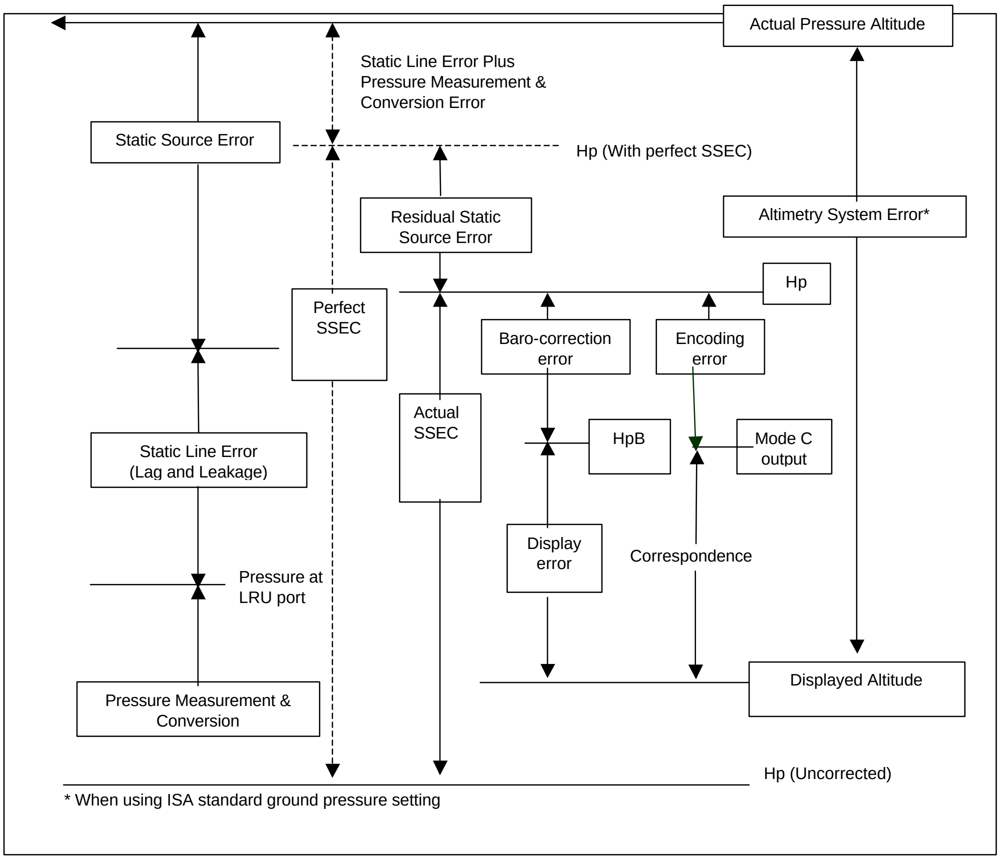
(b) 'Static Source Error' is the difference between the undisturbed ambient pressure and the pressure within the static port, at the input end of the static pressure line.

(c) 'Static Line Error' is any difference in pressure along the length of the line.

(d) 'Pressure Measurement and Conversion Error' is the error associated with the processes of sensing the pneumatic input seen by the avionics, and converting the resulting pressure signal into altitude. As drawn, Figure 2-1 represents a self-sensing altimeter system in which the pressure measurement and altitude conversion functions would not normally be separable. In an air data computer system the two functions would be separate, and SSEC would probably then be applied before pressure altitude (Hp) was calculated.

(e) 'Perfect SSEC' would be that correction that compensated exactly for the SSE actually present at any time. If such a correction could be applied, then the resulting value of Hp calculated by the system would differ from the actual altitude only by the static line error plus the pressure measurement and conversion error. In general this cannot be achieved, so although the 'Actual SSEC' can be expected to reduce the effect of SSE, it will do so imperfectly.

FIGURE 2-1 ALTIMETRY SYSTEM ERRORS



(f) 'Residual Static Source Error' is applicable only in systems applying an avionic SSEC. It is the difference between the SSE and the correction actually applied. The corrected value of Hp will therefore differ from actual pressure altitude by the sum of static line error, pressure measurement and conversion error, and residual SSE.

(g) Between Hp and displayed altitude occur the baro-correction error and the display error. Figure 2-1 represents their sequence for a self-sensing altimeter system. Air data computer systems can implement baro-correction in a number of ways that would modify slightly this part of the block diagram, but the errors would still be associated with either the baro-correction function or the display function. The only exception is that those systems that can be switched to operate the display directly from the Hp signal can eliminate baro-correction error where standard ground pressure setting is used, as in RVSM operations.

3.2 Components

The altimetry system errors presented in Figure 2-1 and described in 3.1 are discussed below in greater detail.

3.2.1 *Static Source Error* The component parts of SSE are presented in Table 2-1, with the factors that control their magnitude.

(a) The reference SSE is the best estimate of actual SSE, for a single aircraft or an aircraft group, obtained from flight calibration measurements. It is variable with operating condition characteristically reducing to a family of W/δ curves that are functions of Mach. It includes the effect of any aerodynamic compensation that may have been incorporated in the design. Once determined, the reference SSE is fixed for the single aircraft or group, although it may be revised when considering subsequent data.

(b) The test techniques used to derive the reference SSE will have some measurement of uncertainty associated with them, even though known instrumentation errors will normally be eliminated from the data. For trailing-cone measurements the uncertainty arises from limitations on pressure measurement accuracy, calibration of the trailing-cone installation, and variability in installations where more than one are used. Once the reference SSE has been determined, the actual measurement error is fixed, but as it is unknown it can only be handled within the ASE budget as an estimated uncertainty.

(c) The airframe variability and probe/port variability components arise from differences between the individual airframe and probe/port, and the example(s) of airframe and probe port used to derive the reference SSE.

3.2.2 *Residual Static Source Error*

(a) The components and factors are presented in Table 2-1. Residual SSE is made up of those error components which make actual SSE different from the reference value, components 2, 3, and 4 from Table 2-1, plus the amount by which the actual SSEC differs from the value that would correct the reference value exactly, components 2(a), (b) and (c) from Table 2-2.

(b) There will generally be a difference between the SSEC that would exactly compensate the reference SSE, and the SSEC that the avionics is designed to apply. This arises from practical avionics design limitations. The resulting error component 2(a) will therefore be fixed, for a particular flight condition, for the single aircraft or group. Additional variable errors 2(b) and 2(c) arise from those factors that cause a particular set of avionics to apply an actual SSEC that differs from its design value.

(c) The relationship between perfect SSEC, reference SSEC, design SSEC and actual SSEC is illustrated in Figure 2-2, for the case where static line errors and pressure measurements and conversion errors are taken as zero.

(d) Factors that create variability of SSE relative to the reference characteristic should be accounted for twice. First, as noted for the SSE itself in Table 2-2, and secondly for its effect on the corruption of SSEC as in factor 2(a)(i) of Table 2-2. Similarly the static pressure measurement error should be accounted for in two separate ways. The main effect will be by way of the 'pressure measurement and conversion' component, but a secondary effect will be by way of factor 2(a)(ii) of Table 2-2.

TABLE 2-1 STATIC SOURCE ERROR
(Cause: Aerodynamic Disturbance to Free-Stream Conditions)

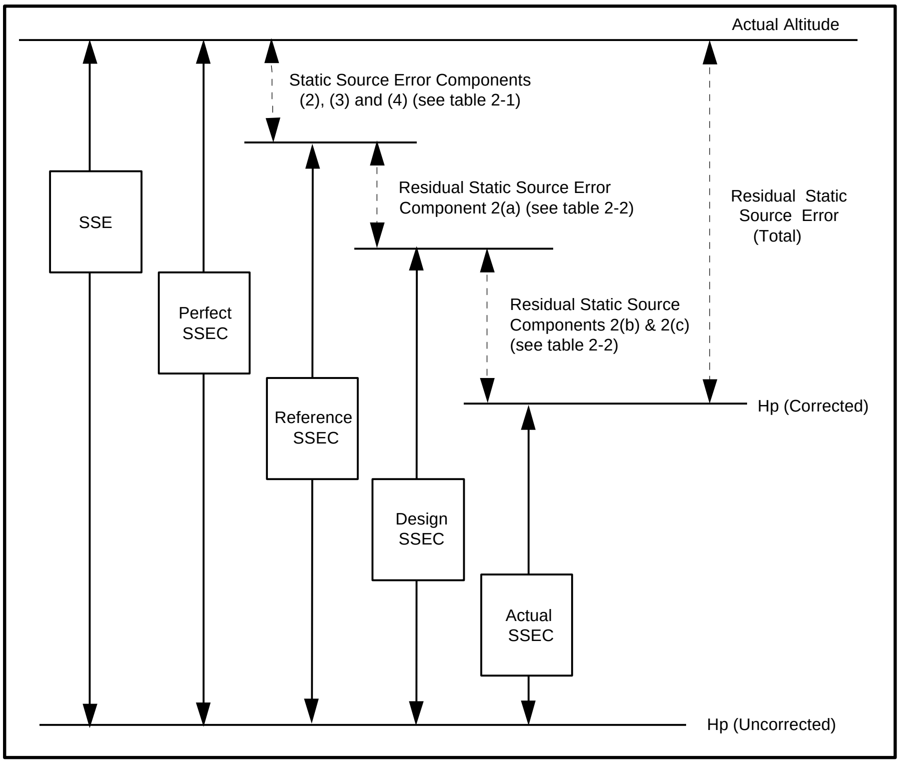
Factors	Error Components
Airframe Effects Operating Condition (Speed, altitude, angle of attack, sideslip) Geometry: Size and shape of airframe; Location of static sources; Variations of surface contour near the sources; Variations in fit of nearby doors, skin panels or other items.	1) Reference SSE values from flight calibration measurements. 2) Uncertainty of flight calibration measurements.
Probe/Port Effects Operating Condition (Speed, altitude, angle of attack, sideslip) Geometry: Shape of probe/port; Manufacturing variations; Installation variations.	3) Airframe to airframe variability. 4) Probe/port to probe/port variability.

TABLE 2-2 RESIDUAL STATIC SOURCE ERROR: (AIRCRAFT WITH AVIONIC SSEC)
(Cause: Difference between the SSEC actually applied and the actual SSE)

Factors	Error Components
(1) As for Static Source Error PLUS (2) Source of input data for SSEC function (a) Where SSEC is a function of Mach: (i) P_S sensing: difference in SSEC from reference SSE. (ii) P_S measurement: pressure transduction error. (iii) P_T errors: mainly pressure transduction error. (b) Where SSEC is a function of angle of attack: (i) geometric effects on alpha: -sensor tolerances; -installation tolerances; -local surface variations. (ii) measurement error: -angle transducer accuracy. (3) Implementation of SSEC function (a) Calculation of SSEC from input data;	1) Error Components (*2*), (*3*), and (*4*) from table 2-1 PLUS 2(a) Approximation in fitting design SSEC to flight calibration reference SSE. 2(b) Effect of production variability (sensors and avionics) on achieving design SSEC. 2(c) Effect of operating environment (sensors and avionics) on achieving design SSEC.

(b) Combination of SSEC with uncorrected height.	

FIGURE 2-2 SSE/SSEC RELATIONSHIPS FOR ASE WHERE STATIC LINE, PRESSURE MEASUREMENT AND CONVERSION ERRORS ARE ZERO



3.2.3 *Static Line Error* Static line errors arise from leaks and pneumatic lags. In level cruise these can be made negligible for a system that is correctly designed and correctly installed.

3.2.4 *Pressure Measurement and Conversion Error*

(a) The functional elements are static pressure sensing, which may be mechanical, electromechanical or solid-state, and the conversion of pressure signal to pressure altitude.

(b) The error components are:

(i) calibration uncertainty;

(ii) nominal design performance;

(iii) unit to unit manufacturing variations; and

(iv) effect of operating environment.

(c) The equipment specification is normally taken to cover the combined effect of the error components. If the value of pressure measurements and conversion error used in the error budget is the worst case specification value, then it is not necessary to assess the above components separately. However, calibration uncertainty, nominal design performance and effect of operating environment can all contribute to bias errors within the equipment tolerance. Therefore if it is desired to take statistical account of the likely spread of errors within the tolerance band, then it will be necessary to assess their likely interaction for the particular hardware design under consideration.

(d) It is particularly important to ensure that the specified environmental performance is adequate for the intended application.

3.2.5 *Baro-Setting Error* This is the difference between the value displayed and the value applied within the system. For RVSM operation the value displayed should always be the International Standard Atmosphere ground pressure, but setting mistakes, although part of TVE, are not components of ASE.

(a) The components of Baro-Setting Error are:

(i) resolution of setting knob/display;

(ii) sensing of displayed value; and

(iii) application of sensed value.

(b) The applicability of these factors and the way that they combine depend on the particular system architecture.

(c) For systems in which the display is remote from the pressure measurement function there may be elements of the sensing and/or application or sensed value error components which arise from the need to transmit and receive the setting between the two locations.

3.2.6 *Display Error* The cause is imperfect conversion from altitude signal to display.

The components are:

(a) conversion of display input signal;

(b) graticule/format accuracy, and

(c) readability.

3.2.7 In self-sensing altimeters the first of these would normally be separate from the pressure measurement and conversion error.

APPENDIX 3 - ESTABLISHING AND MONITORING STATIC SOURCE ERRORS

1. INTRODUCTION

The data package is discussed in sub-paragraph 9.2. It is stated, in sub-paragraph 9.5.5 (c) that the methodology used to establish the static source error should be substantiated. It is further stated in sub-paragraph 9.6 that procedures be established to ensure conformity of newly manufactured aeroplanes. There may be many ways of satisfying these objectives; two examples are discussed below.

2. EXAMPLE 1

2.1 One process for showing compliance with RVSM criteria is shown in Figure 3-1. Figure 3-1 illustrates those flight test calibrations and geometric inspections will be performed on a given number of aircraft. The flight calibrations and inspections will continue until a correlation between the two is established. Geometric tolerances and SSEC will be established to satisfy RVSM criteria. For aircraft being manufactured, every Nth aircraft will be inspected in detail and every Mth aircraft will be flight test calibrated, where 'N' and 'M' are determined by the aircraft constructor and agreed to by the responsible authority. The data generated by 'N' inspections and 'M' flight calibrations can be used to track the mean and three standard deviation values to ensure continued compliance of the model with the criteria of paragraph 7. As additional data are acquired, they should be reviewed to determine if it is appropriate to change the values of N and M as indicated by the quality of the results obtained.

2.2 There are various ways in which the flight test and inspection data might be used to establish the correlation. The example shown in Figure 3-2 is a process in which each of the error sources for several aeroplanes is evaluated based on bench tests, inspections and analysis. Correlation between these evaluations and the actual flight test results would be used to substantiate the method.

2.3 The method illustrated in Figures 3-1 and 3-2 is appropriate for new models since it does not rely on any pre-existing data base for the group.

3. EXAMPLE 2

3.1 Figure 3-3 illustrates that flight test calibrations should be performed on a given number of aircraft and consistency rules for air data information between all concerned systems verified. Geometric tolerances and SSEC should be established to satisfy the criteria. A correlation should be established between the design tolerances and the consistency rules. For aircraft being manufactured, air data information for all aircraft should be checked for consistency in cruise conditions and every Month aircraft should be calibrated, where M is determined by the manufacturer and agreed to by the responsible authority. The data generated by the M flight calibrations should be used to track the mean and three standard deviation values to ensure continued compliance of the group with the criteria of paragraph 7.

FIGURE 3-1 PROCESS FOR SHOWING INITIAL AND CONTINUED COMPLIANCE OF AIRFRAME STATIC PRESSURE SYSTEMS

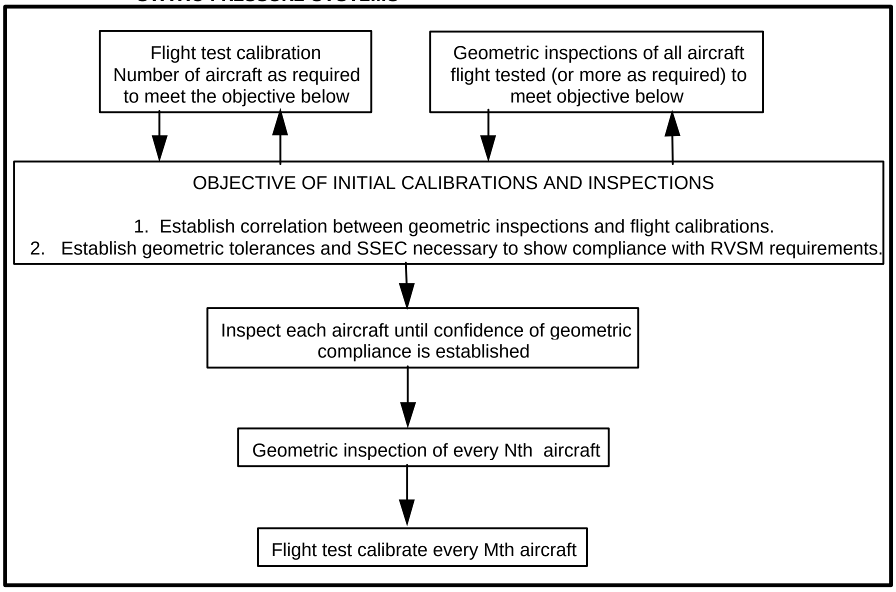


FIGURE 3-2 COMPLIANCE DEMONSTRATION GROUND - TO FLIGHT TEST CORRELATION PROCESS EXAMPLE

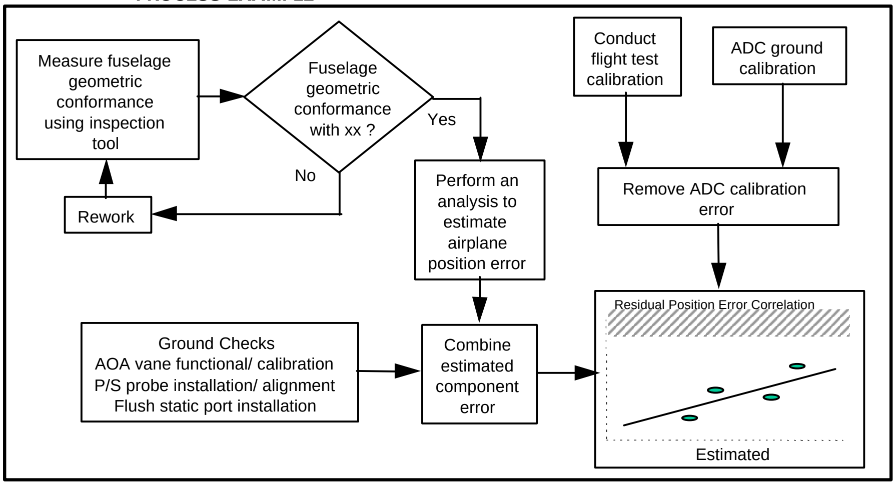
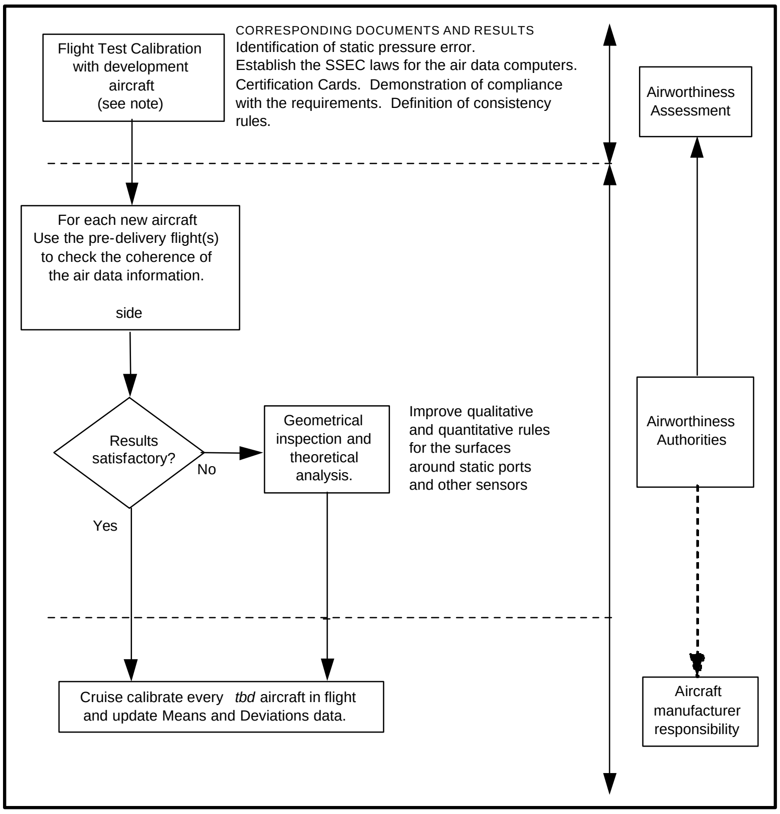


FIGURE 3-3 PROCESS FOR SHOWING INITIAL AND CONTINUED COMPLIANCE OF AIRFRAME STATIC PRESSURE SYSTEMS FOR NEW MODEL AIRCRAFT.



Note : The flight test installation chosen to get the calibration data will need to have an accuracy compatible with the level of performance to be demonstrated and an analysis of this accuracy will need to be provided. Any possible degradation of this accuracy will need to be monitored and corrected during the flight test period.

APPENDIX 4 TRAINING PROGRAMMES AND OPERATING PRACTICES AND PROCEDURES

1. INTRODUCTION

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 of this appendix 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 document is written 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

During flight planning the flight crew should pay particular attention to conditions that may affect operation in RVSM airspace.

These include, but may not be limited to:

(a) verifying that the airframe is approved for RVSM operations;

(b) reported and forecast weather on the route of flight;

(c) minimum equipment requirements pertaining to height keeping and alerting systems; and

(d) any airframe or operating restriction related to RVSM approval.

3. PRE-FLIGHT PROCEDURES AT THE AIRCRAFT FOR EACH FLIGHT

The following actions should be accomplished during the pre-flight procedure:

(a) 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;

(b) 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 maintenance staff);

(c) 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 (75ft).

(d) 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

The following equipment should be operating normally at entry into RVSM airspace:

(a) Two primary altitude measurement systems.

(b) One automatic altitude-control system.

(c) 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.

(d) 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:

(a) 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.

(b) 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;

(c) 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;

(d) 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.

(e) 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.

(f) Ensure that the altitude-alerting system is operative;

(g) At intervals of approximately one hour, cross-checks between the primary m ft). Failure to meet this condition will require that the altimetry system be reported as defective and notified to ATC;

(i) The usual scan of flight deck instruments should suffice for altimeter cross-checking on most flights.

(ii) Before entering RVSM airspace, the initial altimeter cross check of primary and standby altimeters should be recorded

Note: Some systems may make use of automatic altimeter comparators.

(h) 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.

(i) If the pilot is advised in real time that the aircraft has been identified by a height- ft) and/or an ASE ft) 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.

(j) If the pilot is notified by ATC of an assigned altitude deviation m ft) then the pilot should take action to return to cleared flight level as quickly as possible.

<u>5.2 Contingency procedures after entering RVSM airspace are:</u>

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 a plan of action appropriate to the airspace concerned.

Note: Refer to ICAO Regional Supplementary Procedures Doc.7030/4.

5.2.2 Examples of equipment failures which should be notified to ATC are:

(a) failure of all automatic altitude-control systems aboard the aircraft;

(b) loss of redundancy of altimetry systems;

(c) loss of thrust on an engine necessitating descent; or

(d) 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 cleared flight level, the pilot should follow any established regional 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:

(a) Primary and standby altimeter readings.

(b) Altitude selector setting.

(c) Subscale setting on altimeter.

(d) Autopilot used to control the aeroplane and any differences when an alternative autopilot system was selected.

(e) Differences in altimeter readings, if alternate static ports selected.

(f) Use of air data computer selector for fault diagnosis procedure.

(g) 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:

(a) knowledge and understanding of standard ATC phraseology used in each area of operations;

(b) importance of crew members cross checking to ensure that ATC clearances are promptly and correctly complied with;

(c) 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.

(d) 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

(e) characteristics of aircraft altitude capture systems which may lead to overshoots;

(f) relationship between the aircraft's altimetry, automatic altitude control and transponder systems in normal and abnormal conditions;

(g) any airframe operating restrictions, if required for the specific aircraft group, related to RVSM airworthiness approval.

8. **SPECIFIC REGIONAL OPERATIONAL PROCEDURES**

8.1 The areas of applicability by Flight Information Region (FIR) of RVSM airspace in identified ICAO regions is contained in the relevant sections of ICAO Document 7030/4. In addition these sections contain operational and contingency procedures unique to the regional airspace concerned, specific flight planning requirements, and the approval requirements for aircraft in the designated region.

8.2 For the North Atlantic Minimum Navigation Performance Specification (MNPS) airspace, where RVSM have been in operation since 1997, further guidance (principally for State Approval Agencies) is contained in ICAO Document NAT 001 T13/5NB.5 with comprehensive operational guidance (aimed specifically at aircraft operators) in the North Atlantic MNPS Airspace Operational Manual.

8.3 Comprehensive guidance on operational matters for European RVSM Airspace is contained in relevant State Aeronautical Publications.

8.4 During the life of this document, it is expected that additional ICAO regions or parts of regions may introduce RVSM into their airspace. The area of applicability and associated procedures will be published in Document 7030/4 where reference will be made to additional material as necessary.

APPENDIX 5 - REVIEW OF ICAO DOCUMENT 9574 - HEIGHT KEEPING PARAMETERS

1. ICAO Document 9574 Manual on the implementation of a 300m (1,000 ft) Vertical Separation Minimum Between FL 290-FL 410 Inclusive, covers the overall analysis of factors for achieving an acceptable level of safety in a given airspace system. The major factors are passing frequency, lateral navigation accuracy, and vertical overlap probability. Vertical overlap probability is a consequence of errors in adhering accurately to the assigned flight level, and this is the only factor covered in this document.

2. In ICAO Doc. 9574, Section 2.3.1, the vertical overlap probability requirement is restated as the aggregate of height keeping errors of individual aircraft that must lie within the total vertical error (TVE) distribution, expressed as the simultaneous satisfaction of the following four criteria:

(a) " the proportion of height keeping errors beyond 90 m (300 ft) in magnitude must be less than 2.0×10^{-3};

(b) the proportion of height keeping errors beyond 150 m (500 ft) in magnitude must be less than 3.5×10^{-6};

(c) the proportion of height keeping errors beyond 200 m (650 ft) in magnitude must be less than 1.6×10^{-7}; and

(d) the proportion of height keeping errors between 290 m (950 ft) and 320 m (1,050 ft) in magnitude must be less than 1.7×10^{-8}. "

3. The following characteristics presented in ICAO Doc. 9574 were developed in accordance with the conclusions of ICAO Doc. 9536. They are applicable statistically to individual groups of nominally identical aircraft operating in the airspace. These characteristics describe the performance that the groups need to be capable of achieving in service, exclusive of human factors errors and extreme environmental influences, if the airspace system TVE criteria are to be satisfied. The following characteristics are the basis for development of this document:

(a) 'The mean altimetry system error (ASE) of the group ft); and

(b) The sum of the absolute value of the mean ASE for the group and three standard deviations of ASE within the group shall not exceed 75 m (245 ft); and

(c) Errors in altitude keeping shall be symmetric about a mean of 0 m (0 ft) and shall have a standard deviation not greater than 13 m (43 ft) and should be such that the error frequency decreases with increasing error magnitude at a rate which is at least exponential.'

4. ICAO Doc. 9574 recognises that specialist study groups would develop the detailed specifications, to ensure that the TVE objectives can be met over the full operational envelope in RVSM airspace for each aircraft group. In determining the breakdown of tolerances between the elements of the system it was considered necessary to set system tolerances at levels that recognise that the overall objectives must be met operationally by aircraft and equipment subject to normal production variability, including that of the airframe static source error, and normal in-service degradation. It was also recognised that it would be necessary to develop specifications and procedures covering the means for ensuring that in-service degradation is controlled at an acceptable level.

5. On the basis of studies reported in ICAO Doc. 9536, Volume 2, ICAO Doc. 9574 recommended that the required margin between operational performance and design capability

should be achieved by ensuring that the performance criteria are developed to fulfil the following, where the narrower tolerance in sub-paragraph 5 (b) is specifically intended to allow for some degradation with increasing age:

(a) 'the mean uncorrected residual position error (static source error) of the group shall ft); and

(b) the sum of the absolute value of the mean ASE for the group and three standard deviations of ASE within the group, shall not exceed 60 m (200 ft); and

(c) each individual aircraft in the group shall be built to have ASE contained within ft); and

(d) an automatic altitude control system shall be required and will be capable of ft) about selected altitude when operated in the altitude hold mode in straight and level flight under non-turbulent, non-gust conditions.'

6. These standards provide the basis for the separate performance aspects of airframe, altimetry, altimetry equipment and automatic altitude control system. It is important to recognise that the limits are based on studies (Doc. 9536, Volume 2), which show that ASE tends to follow a normal distribution about a characteristic mean value for the aircraft group and that the in-service performances of the separate groups aggregate together to give an overall performance spread which is distributed about the population mean TVE that is nominally zero. Consequently, controls should be provided which will preclude the possibility that individual aircraft approvals could create clusters operating with a mean significantly beyond 25 m (80 ft) in magnitude, such as could arise where elements of the altimetry system generate bias errors additional to the mean corrected static source error.

APPENDIX 6 Forms

APPENDIX 6-1 RVSM AIRWORTHINESS AND OPERATIONAL APPROVALS FLOW CHART

1) Submit application and data to support RVSM A/W Approval (i.e. TC, STC, SB, etc.)

2) Data Acceptable to CAA?

3) CAA GRANTS A/W APPROVAL

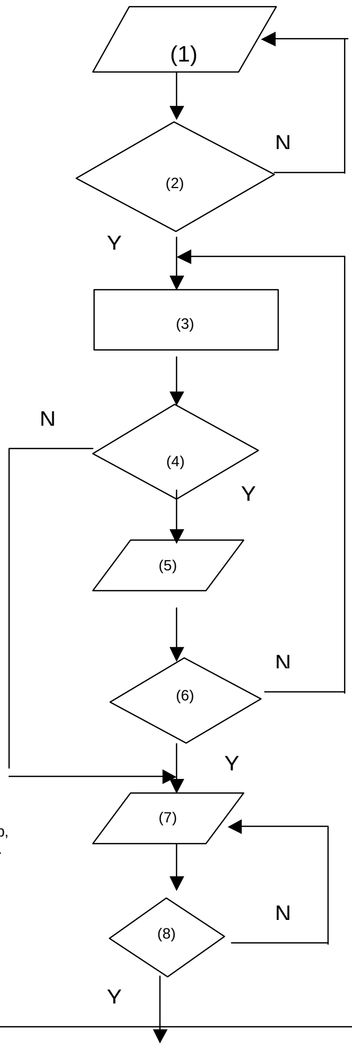
4) MONITOR, if required?

5) GMU OR HMU DATA

6) DATA is acceptable?

7) Submit application and data to support RVSM OperationalApproval (Training Certificate/Prog. Ops Manual, AFM Supp, MEL, Maint. and Structural Repair Proc. (Continued A/W), Monitoring, etc.)

8) Data Acceptable to CAA?



9) CAA Grants RVSM OPS. APPROVAL	(9)

APPENDIX 6-2 NOTIFICATION TO MIDDLE EAST CENTRAL MONITORING AGENCY (MECMA)

NOTES TO AID COMPLETION OF FORMS F1, F2, F3 and F4

central registry of State RVSM approvals of operators and aircraft using the airspace where the MID Provider States will apply RVSM. In conjunction with this activity, MECMA will work closely with other Regional Monitoring Agencies (RMAs) in development of the means for collecting information about such approvals.

2.1 Middle East States should maintain a database of all national RVSM airworthiness and operational approvals granted for MID RVSM operations. Airworthiness approvals granted for the Middle East Region should be sent to MECMA as aircraft are approved for RVSM operations. The State database of operational approvals may be sent to the MECMA on a regular basis. In order for the MECMA to make use of operational approval information from other regions and assess monitoring completion, the State must register with the MECMA by submitting relevant information about point of contact. MECMA will review the approvals from other regional agencies for that State and assess the completion of monitoring goals.

2.2 In order to facilitate the process of transferring data between State databases and the MECMA database, it is recommended that individual States establish their own RVSM approvals databases in the same format as the MECMA database and that States send approvals via MS Excel file preferably e-mailed as an attachment.

e as stated in paragraph 3.2.

2.2.2 If a State does not have access to the Internet, the information can be dispatched to the MECMA by airmail, Fax, or courier service.

2.2.3 States should send updated database information as soon as it becomes available. However, it may not be practical to pass information every time a new approval is granted and the minimum requirement is for RVSM approvals, correct as of the last working day of the month, to be with the MIDANPIRG by the 10th of the following month. This is only applicable to any additions to the State approvals database during the preceding month. Any withdrawals of approval must be notified to the MIDANPIRG immediately. It should be noted that an approval is not transferable and that if an aircraft is sold or leased, re-approval from the State of Registry will need to be sought.

2.2.4 The State RVSM Airworthiness and Operational Approvals database will contain the following fields (Provide all information that is available):

a) State of Registry. Enter the single or dual letter ICAO identifier as contained in ICAO Doc 7910/103 (March 2002). In the case of their being more than one identifier designated for the State, use the letter identifier that appears first.

b) 3-letter ICAO identifier as contained in ICAO

operator/owner in the Remarks field.

c) Aircraft type. Enter the ICAO designator as contained in ICAO Doc 8643/30 (November 2002), e.g. for Airbus A320-211, enter A320; for Boeing B747-438 enter B744.

d) Aircraft Series -
e.g., for Airbus A320-211 enter 211; for Boeing B747-438, enter 400 or 438.

e) Manufacturer Serial Number.

f) Year of Manufacture. In YYYY format e.g. 1996.

g) -XYZ write A6XYZ.

h) Registration Date. In format DD/MM/YY. Example: for 14 October 2002, write 14/10/02.

i) Mode S Address. Enter ICAO allocated Aircraft Mode S (6 character, hexadecimal) address code.

j) RVSM Operational Approval Issue Date. In format DD/MM/YY.

k) RVSM Operational Approval Expiry Date in format DD/MM/YY.

l) RVSM Operational Approval Withdrawal Date. In format DD/MM/YY.

m) Reason For Withdrawal.

n) RVSM Airworthiness Approval - Enter yes or no.

o) RVSM Airworthiness Approval Issued Date. In format DD/MM/YY.

p) RVSM Airworthiness Approval Expiry Date. In format DD/MM/YY.

q) Compliance method. On what basis the aircraft is made RVSM compliant. Enter the following:

    I. TC (Type Certificate).
    II. STC (Supplemental Type Certificate).
    III. SB (Service Bulletin with Reference Number).
    IV. SL (Service Letter with Reference Number).
    V. MOD (Modification).

r) Remarks.

2.2.5 The State RVSM Approved Operators database will contain the following fields (Provide all information that is available):

a) -letter ICAO identifier as contained in ICAO Doc 8585/121 (July 2002). For general aviation

b) Name of Operator. Full name of the operator

c) State of Operator. Enter the single letter ICAO identifier as contained in ICAO Doc 7910/103 (March 2002). In the case of their being more than one identifier designated for the State, use the letter identifier that appears first.

d) Address. Address to contact operator.

e) Telephone. Telephone Number of the operator.

f) Fax. Fax Number of the operator.

g) E-mail. E-mail address of the operator.

h) AFTN. AFTN address of the operator.

i) Sita. Sita address of the operator.

j) Telex. Telex Number of the operator.

k) Contact. Name of the contact person.

2.3 States are reminded that the integrity of the database depends on regular and timely updates and that access to RVSM airspace may be denied in the absence of up-to-date information.

2.4 Any aircraft wishing to fly in MID RVSM airspace must be approved and indicate that approval in field 10 of the ICAO flight plan by entering the aircraft not matching this criteria are to be challenged by air traffic controllers in the FIRs that have introduced RVSM. This is most likely to be done to crews who show signs of

uncertainty of the procedures. Any crew not able to confirm that they possess approval to operate will be directed to descend clear of MID RVSM airspace. The ATS Provider State should then notify the MECMA, who will then write to the State of Registry concerning the aircraft under investigation. The burden is put onto the State to ensure that the operator is made aware of the implications of non-compliance and to take necessary enforcement action to ensure that the incident is not repeated.

3.1 MID States are reminded of the requirement to provide the necessary data for approvals to MECMA in a regular and timely manner.

3.2 Contact details are as follows:

MECMA	**Telephone:**	**00971 2 4054230**
P.O. Box 666,	**Fax:**	**00971 2 4054316**
Abu Dhabi,	**E-mail:**	**traffic@mecma.com**
United Arab Emirates.	**Website:**	**www.mecma.com-**

APPENDIX 6-3 APPLICATION FOR RVSM AIRWORTHINESS AND OPERATIONAL APPROVAL

APPLICATION FOR RVSM AIRWORTHINESS AND OPERATIONAL APPROVAL

NAME OF OPERATOR AND ADDRESS**:**							
NAME OF OWNER:				AIRCRAFT REGISTRATION NO:			
CERTIFICATE OF AIRWORTHINESS:		ISSUANCE DATE:		EXPIRY DATE:			
AIRCRAFT MANUFACTURER/MODEL/SERIES/SERIAL NO.: ____________ ____________ ____________ ____________							
AIRCRAFT MODE S ADDRESS (HEXADECIMAL) ______ ______ ______ ______ ______ ___							
VERIFICATION OF DATA THAT SUPPORTS RVSM AIRWORTHINESS APPROVAL (ENCLOSED): TC DS # __________; STC ISSUANCE DATE: ____________________ WHERE APPLICABLE, VALIDATION OF APPROVAL BY LOCAL CAA: Y A							
RVSM TRAINING: (Training Certificates/ Company Training Program Enclosed)	Flight Crew Y N		Dispatchers Y N		Maintenance Y N		
RVSM RELATED SECTIONS/DOCUMENTS ENCLOSED:	Operations Manual Y N		AFM Supplement Y N		Minimum Equipment List Y N		Maintenance & Structural Repair Procedures (Continued A/W) Y N

RVSM EQUIPMENT	No. of Systems	Manufacturer	Part No.	Model
ADC				
AUTO PILOT				
ALT. ALERTER				

Operations or Agent for Service: Name: Signature:	Title: Telephone: Fax Number:	Date

FOR CAA USE ONLY

AIRWORTHINESS APPROVAL **NAME:**		**OPERATIONS** **OPERATIONAL APPROVAL** **NAME:**	
Signature	**Date**	**Signature**	**Date**

Notes: (1) Submit application 30 days prior to operation in the RVSM airspace.
(2) *Operations/Airworthiness Approval Manual for RVSM in the Mid Region* Requirements.
(3) Operators must show that they have completed the monitoring requirements for the area of operations or provide a plan for participation in the verification/monitoring program.

APPENDIX 6-4 LETTER OF AUTHORIZATION (LOA) FOR GLOBAL RVSM

LETTER OF AUTHORIZATION (LOA) FOR GLOBAL RVSM

This letter constitutes Airworthiness and Operational Approvals for the aircraft to operate in **Global Reduced Vertical Separation Minimum (RVSM)** airspace by the authorized operator specified below.

Aircraft Manufacturer: ________________ Registration Number : _________________ Colour:__________________

Model Number : _______________________ Serial Number: _______________________

Name of Owner: ____
Authorized Operator: ____
Address: ____
Aircraft Base of Operation: ____
City: ________________________ Country: ____________________________

ible for Crew Operations or Agent for Service:
Name: _______________________________________ Signature: _____________________________
Telephone Number: _____________________________ FaxNumber: _____________________________

APPROVED RVSM EQUIPMENT

RVSM EQUIPMENT	NO. OF SYSTEMS	MANUFACTURER	PART NO.	MODEL
ADC				
AUTO PILOT				
ALT. ALERTER				

Authorization Number: ____________________________
Aircraft Conditions/Limitations (if applicable): ____

Date of Issuance: ____________________ Expiry Date: ___________________________

This authorization is subject to the conditions that all operations conducted in RVSM airspace are in accordance with CAA Regulation:_____________ and the flight rules contained in International Civil Aviation Organization (ICAO) Annex 2.

ew Operations or Agent for Service must accept responsibility for complying with the stated regulations by signing this document. This document is considered invalid until signed. If the person signing this document relinquishes responsibility, changes mailing address, or the aircraft changes ownership or base operation, this letter becomes invalid and the signee should immediately notify the issuing CAA

prior to expiration date if no changes have been made. If any changes have been made, application for a new LOA must be made in the same manner as that required for the initial LOA. (This document must be returned to the CAA upon sale/or deregistration of the aircraft).

FOR CAA USE ONLY

CAA STAMP

SIGNATURE: ____________________________
CAA Official

Name: ________________________________

Title: ________________________________

Note: This is an example of Airworthiness and Operational Approvals for Non AOC Holders (FAR Part 91 Operators). These operators should be issued a letter of authorization (LOA) based on national regulations when the approval process has been completed.
For AOC Holders (For example FAR Parts 121, 125, 135 Operators), approval to operate in RVSM airspace should be granted through the issuance of an Operations Specifications. Each aircraft type group for which the operator is granted authority should be listed in Operations Specifications.

APPENDIX 6-5 WITHDRAWAL OF RVSM OPERATIONAL APPROVAL

1. When a State of Registry/State of Operator has cause to withdraw the RVSM Operational Approval of an operator/aircraft for operations within RVSM airspace, details as requested below must be submitted to the Middle East Central Monitoring Agency (MECMA) by the most expedient method.

2. *Before providing information as requested below, reference should be made to the accompanying notes*. (PLEASE USE BLOCK CAPITALS).

STATE OF REGISTRY: | | |

NAME OF OPERATOR: | | | | |

STATE OF OPERATOR: | | |

AIRCRAFT TYPE: | | | | |

AIRCRAFT/SERIES: | | | | | | |

MANUFACTURER SERIAL NO: | | | | | | |

REGISTRATION NUMBER: | | | | | | | |

MODE S ADDRESS (HEXA DECIMAL): | | | | | | |

DATE OF WITHDRAWAL OF RVSM OPERATIONAL APPROVAL:

| | | | | | |

REASON FOR WITHDRAWAL OF RVSM OPERATIONAL APPROVAL:
____
____
____
____

REMARKS:

FILE REF:

APPENDIX 6-6 RECORD OF RVSM AIRWORTHINESS AND OPERATIONAL APPROVALS

1-When a State of Registry/State of Operator approves or amends either the RVSM Airworthiness Approval or RVSM Operational Approval of an operator/aircraft for operations in RVSM airspace, details of that approval must be recorded and sent to Middle East Central Monitoring Agency (MECMA) as soon as practicable but not later than the 10th day of the month following the month that the approval was issued.

2-Before providing information as requested below, reference should be made to the accompanying notes. (PLEASE USE BLOCK CAPITALS).

State of Registry: | | |

Operator Code: | | | |

Aircraft Type: | | | | |

Aircraft Series: | | | | | | |

Manufacturer Serial Number: | | | | | | |

Year of Manufacture: | | | | |

Registration Number: | | | | | | | |

Registration Date: | | | | | | | | |

Mode S Address (Hexa Decimal): | | | | | | |

RVSM Operational Approval Issue Date: | | | | | | | | |

RVSM Operational Expiry Date: | | | | | | | | |

RVSM Operational Withdrawal Date: | | | | | | | | |

Reason for Withdrawal: ______________________________
____

RVSM Airworthiness Approval: YES _____ NO _____

RVSM Airworthiness Approval Issued Date:

RVSM Airworthiness Approval Expiry Date:

Compliance Method:

TC	STC	SB	SL	MOD

REMARKS: ______________________________

APPENDIX 6-7 RECORD OF RVSM APPROVED OPERATORS

Before providing information as requested below, reference should be made to the accompanying notes. (PLEASE USE BLOCK CAPITALS).

OPERATOR CODE: | | |

NAME OF OPERATOR: ______________________

STATE OF OPERATOR: | |

ADDRESS: ______________________

TELEPHONE: ______________________

FAX: ______________________

E-MAIL: ______________________

AFTN: ______________________

SITA: ______________________

TELEX: ______________________

CONTACT: ______________________

APPENDIX 6-8 WITHDRAWAL OF RVSM OPERATIONAL APPROVAL

1. When a State of Registry/State of Operator has cause to withdraw the RVSM Operational Approval of an operator/aircraft for operations within RVSM airspace, details as requested below must be submitted to the Middle East Central Monitoring Agency (MECMA) by the most expedient method.

2. *Before providing information as requested below, reference should be made to the accompanying notes*. (PLEASE USE BLOCK CAPITALS).

STATE OF REGISTRY:

NAME OF OPERATOR:

STATE OF OPERATOR:

AIRCRAFT TYPE:

AIRCRAFT/SERIES:

MANUFACTURER SERIAL NO:

REGISTRATION NUMBER:

MODE S ADDRESS (HEXA DECIMAL):

DATE OF WITHDRAWAL OF RVSM OPERATIONAL APPROVAL:

REASON FOR WITHDRAWAL OF RVSM OPERATIONAL APPROVAL:

REMARKS:

FILE REF:

APPENDIX 6-9 POINT OF CONTACT DETAILS/CHANGE OF POINT OF CONTACT

1. DETAILS FOR MATTERS RELATING TO RVSM APPROVALS

This form should be completed and forwarded on the first reply to Middle East Central Monitoring Agency (MECMA) or when there is a change to any of the details requested on the form. (PLEASE USE BLOCK CAPITALS).

STATE OF REGISTRY

STATE OF REGISTRY 2 LETTER ICAO IDENTIFIER

CAA ADDRESS

NAME OF CONTACT PERSON

SURNAME FIRST NAME

TITLE/POSITION

TELEPHONE NUMBER FAX NUMBER

EMAIL

Initial Reply*/Change of Details*
**Delete as appropriate*

APPENDIX 6-10

RVSM OPERATIONS TURBULENCE REPORT FORM

SECTION A

<table>
<tr><td>Date of Occurrence</td><td colspan="2">Time (UTC)

*DAY/NIGHT</td><td colspan="3">Operator</td><td>Flight Number</td></tr>
<tr><td colspan="3">Aircraft Type & Series</td><td>Registration</td><td colspan="3">Aircraft Weight (KG)</td></tr>
<tr><td>Origin & Destination</td><td colspan="2">Position in LAT & LONG</td><td colspan="4">Cleared Track Co-ordinates</td></tr>
<tr><td>Flight Level</td><td colspan="2">Speed/Mach Number</td><td colspan="2">Flight Phase:
*CRUISE/CLIMB/DESCENT</td><td colspan="2">Were you turning?
*YES/NO</td></tr>
<tr><td colspan="2">Did you apply a track offset?
*YES/NO</td><td colspan="3">Size of Track Offset?
Nautical Miles</td><td colspan="2">Was ATC informed?
*YES/NO</td></tr>
<tr><td>MET Conditions*
IMC
VMC</td><td colspan="3">Actual Weather:
Wind Visibility Cloud Temperature
/ km / °C</td><td colspan="3">Degree of Turbulence
*LIGHT/MODERATE/SEVERE</td></tr>
<tr><td colspan="7">Other significant weather?</td></tr>
</table>

1.1 SECTION B

1. What made you suspect Wake Vortex as the cause of the disturbance? ______

   ______

   ______

   ______

2. Did you experience vertical acceleration? *YES/NO
   If YES please describe briefly ______

3. What was the change in altitude? (please estimate angle)
   Pitch ______° Roll ______° Yaw ______°

4. What was the change in height if any? *INCREASE/DECREASE

(* Circle the appropriate reply only)

Continued Appendix 7-4, Figure 1

5. Was there buffeting? *YES/NO
6. Was there stick shake? *YES/NO
7. Was the Autopilot engaged? *YES/NO
8. Was the Autothrottle engaged? *YES/NO
9. What control action was taken?

   Please describe briefly ____

   ____

   ____

10. Could you see the aircraft suspected of causing the wake vortex? *YES/NO
11. Did you contact the aircraft suspected of causing the vortex? *YES/NO
12. Was the aircraft suspected of causing the vortex detected by TCAS? *YES/NO

    If YES to any of questions 10 to 12, what type of aircraft was it? ______________

    and where was it relative to your position? ______________________

    (Estimated separation distance) ______________________

    Were you aware of the preceding aircraft before the incident? *YES/NO

OTHER INFORMATION

13. Have you any other comments which you think may be useful? ______________

    ____

    ____

    ____

    ____

Signed ______________________________ DATE ______________

Name (BLOCK CAPITALS) ______________________________

(* Circle the appropriate reply only)

When complete, please send this form to:

Copy to:

1.2	**MECMA** **LOCAL CAA**	**Telephone:**	**00971 2 4054230**
1.3	**P.O. Box 666,**	**Fax:**	**00971 2 4054316**
1.4	**Abu Dhabi,**	**E-mail:**	**traffic@mecma.com**
1.5	**United Arab Emirates.**	**Website:**	**www.mecma.com-**

Appendix 6-11 Navigation Error Investigation Form

Part 1

1.5.1 Instructions for Completion

1.6 General

Ensure that Part 1 of this form has been completed to the maximum extent possible.

Attach ATC flight plan.

For Errors 5 8 NM

No further investigation is required therefore, only Part 1 needs to be completed.

Attach Part 1 and flight plan to monthly report to Central Monitoring Agency.

For Errors in Excess of 8 NM

Attach the completed Part 1 and (blank) Parts 2- Gross and forward to Aviation Standards and Safety Department at this address:

Aviation Standards and Safety Department
Attention: [investigating officer]
[address 1]
[address 2]
[address 3]

Aviation Standards and Safety Department will conduct investigation and return all parts to ATS.

Attach Parts 1-5 and flight plan to monthly report to Central Monitoring Agency.

PART I - To be completed by ATS Supervisor (and aircraft owner/operator if needed)	
Name of ATC Unit:	
Date/Time (UTC):	
2. DETAILS OF AIRCRAFT	
1. Aircraft callsign:	
2. Aircraft registration:	
3. Name of Owner/Operator:	
4. Type of Aircraft:	
5. Point of Departure:	
6. Destination:	
7. Route Segment:	
8. Cleared Track:	
9. Position where error was observed:	
10. Extent of deviation (NM)	
11. Flight Level/Altitude:	

Action taken by ATC:
Other Comments:

Note: Information for items 2 and 3 of Part 1 is not mandatory, as it may not be available in the flight plan

GROSS NAVIGATION ERROR INVESTIGATION FORMS

PART 2 Details of Aircraft, Navigation and Communications Equipment Fitted
(to be completed by aircraft owner/operator)

Navigation Systems

3. LRNS	Number of Systems (0, 1, 2 etc)	3.1 Make	Model
3.2 INS			
IRS			
GNSS			
FMS			
4. OTHER (Please specify)			

Which navigation system was coupled to the autopilot at the time of observation of the error?	
Which NAV MODE was selected at the time of observation of the error?	4.1.1 Yes / No
Aircraft registration and model/series	
Was the aircraft operating according to the RNP requirements?	4.1.2 Yes / No

Communication Equipment

4.2 HF			
VHF			
SATCOM			
CPDLC			

Part 3 Detailed description of incident **(To be completed by owner/operator use separate sheet if necessary)**
Please give your assessment of the actual track flown by the aircraft and the cause of the deviation:
Corrective action proposed:

PART 4 - To be completed by the owner/operator, <u>only in the event of partial or total navigation equipment failure</u>.

5. NAV SYSTEM TYPE	**5.1 INS**	**IRS/FMS**	**5.2 Other** **(Please specify)**
Indicate the number of units of each type that failed			
Indicate position at which the failure(s) occurred			
Give an estimate of the duration of the equipment failure(s)			
At what time was ATC advised of the failure(s)			

PART 5 - TO BE COMPLETED BY INVESTIGATING AGENCY		
6. HAVE ALL HE REQUIRED DATA BEEN SUPPLIED		
Is further investigation warranted?	Yes	No
Will this incident be the subject of a separate report?	Yes	No
General comments:		
Classification: (please delete non-applicable options) A B C D E F G H I		
6.1 CLASSIFICATION OF GROSS NAVIGATION ERRORS		

Class	Cause
A	Aircraft not approved to the RNP Type for the airspace
B	ATC System loop error
C	Waypoint insertion error, due to correct entry of incorrect position or incorrect entry of correct position
D	Other navigation errors, including equipment failure notified to ATC in time for action
E	Other navigation errors, including equipment failure notified to ATC too late for action
F	Other navigation errors, including equipment failure of which notification was not received by ATC
G	Mode select error
H	Weather deviation (other than approved)
I	Other (please specify)

APPENDIX 6-12

RVSM OPERATIONS ALTITUDE DEVIATION REPORT FORM

MESSAGE FORMAT FOR A REPORT TO THE MIDDLE EAST CENTRAL MONITORING AGENCY (MECMA) **OF AN ALTITUDE DEVIATION OF 300 FT OR MORE, INCLUDING THOSE DUE TO TCAS, TURBULENCE AND CONTINGENCY EVENTS**

1. REPORTING AGENCY
2. DATE AND TIME
3. LOCATION OF DEVIATION
4. FLIGHT IDENTIFICATION AND TYPE
5. FLIGHT LEVEL ASSIGNED
6. OBSERVED/REPORTED[1] FINAL FLIGHT LEVEL[2] [1]
7. DURATION AT FLIGHT LEVEL
8. CAUSE OF DEVIATION
9. OTHER TRAFFIC
10. CREW COMMENTS, IF ANY, WHEN NOTIFIED
11. REMARKS[3]

---

1. State one of the two choices.
2. In the case of turbulence, state extent of deviation from cleared flight level.
3. In the event of contingency action, indicate whether prior clearance was given and if contingency procedures were followed.

When complete, please send this form to:

Copy to:

6.2	**MECMA**	**Telephone:**	**00971 2 4054230**	**LOCAL CAA**
6.3	**P.O. Box 666,**	**Fax:**	**00971 2 4054316**	
6.4	**Abu Dhabi,**	**E-mail:**	**traffic@mecma.com**	
6.5	**United Arab Emirates.**	**Website:**	**www.mecma.com**	

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	:	2.0
Edition Date	:	26/02/2003

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.

DOCUMENT STATUS AND TYPE

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

DOCUMENT APPROVAL

DOCUMENT CHANGE RECORD

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

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
1.0	05/06/-02	Working Draft Document	ALL
1.2	17/10/02	Draft	ALL
2.0	26/02/03	Final Draft	Para 5.6.5 8.3.4 Note 11 and 2

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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

---Intentionally Left Blank---

CHECKLIST OF PAGES

Page	Dated	Page	Dated	Page	Dated	Page	Dated
iv		5-6		7-4		A-1	
v		5-7		7-5		B-1	
vi		5-8		7-6		C-1	
vii		5-9		7-7		D-1	
viii		5-10		7-8		D-2	
ix		5-11		7-9		D-3	
x		5-12		8-1		E-1	
xi		5-13		8-2		E-2	
xii		5-14		8-3		E-3	
xiii		5-15		8-4		E-4	
xiv		5-16		8-5		E-5	
1-1		5-17		8-6		F-1	
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2-4		5-28		9-3		G-5	
2-5		5-29		9-4		G-6	
3-1		5-30		9-5		G-7	
3-2		5-31		9-6		G-8	
4-1		5-32		9-7		G-9	
5-1		5-33		9-8		G-10	
5-2		6-1		9-9		G-11	
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LIST OF ABBREVIATIONS

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

Throughout this document the u

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

.

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) - on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum -step approach within four distinct phases :

<u>Phase 1:</u> 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.

<u>Phase 2:</u> 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.

<u>Phase 3 :</u> 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 to operate within the MID 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 - lette
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

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

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

5.1.5.1

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.

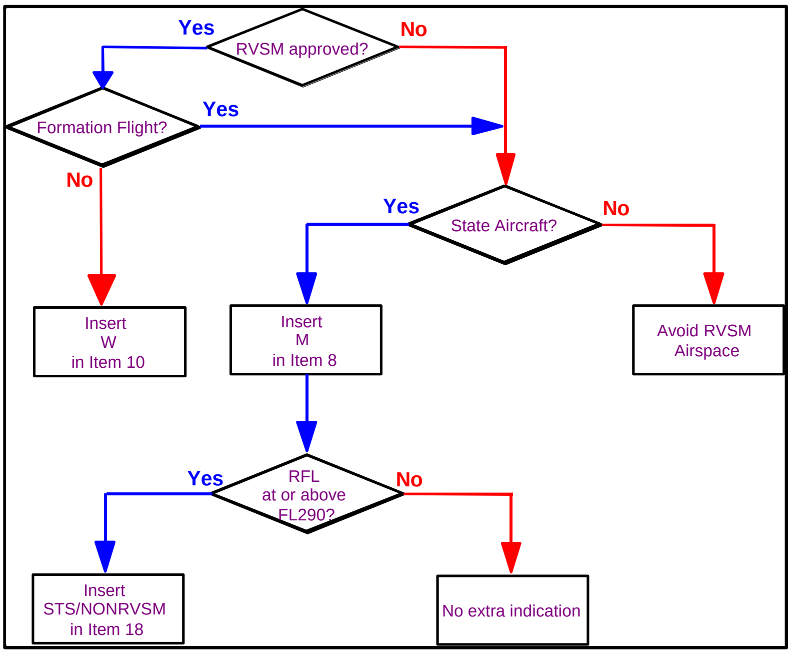


Figure 3: Overview of RVSM Flight Planning Requirements for Operators.

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 -

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.

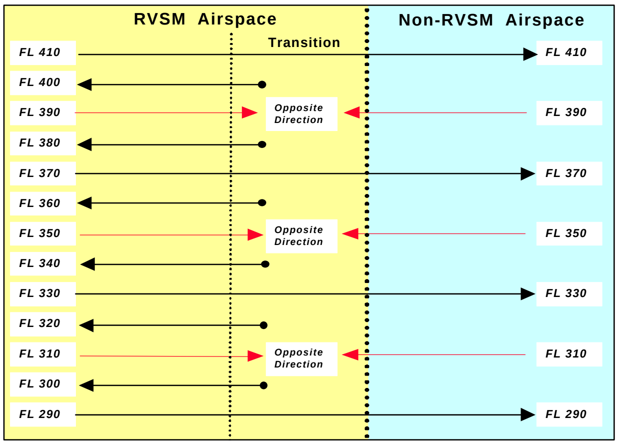


Figure 4: Scenario where non-RVSM airspace is located adjacent to, and east[1] of, RVSM airspace.

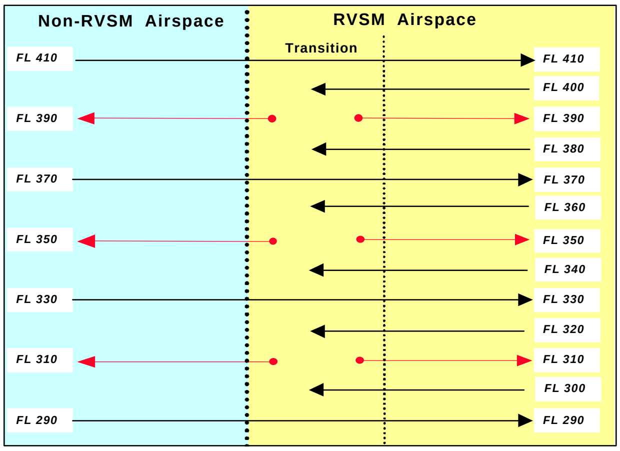


Figure 5: Scenario where non-RVSM airspace is located adjacent to, and west[2] of, RVSM airspace.

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

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

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

RVSM Approved Aircraft and Non-RVSM Approved State Aircraft

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

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

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

c) the Inter-Centre Letter of Agreement.

5.5.4 Any changes from non-RVSM cruising levels to RVSM cruising levels shall be initiated by the first ACC/UAC providing air traffic control service to the aircraft within 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.

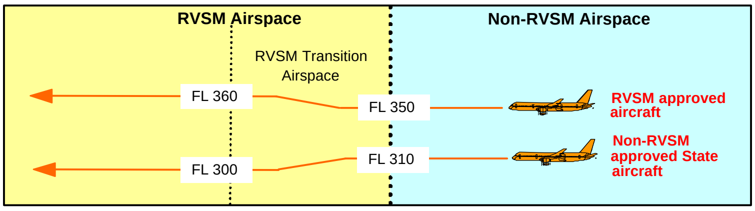


Figure 6: Transition of RVSM approved aircraft and non-RVSM approved State aircraft from non-RVSM airspace to RVSM airspace, where non-RVSM airspace is <u>east</u> of the RVSM airspace.

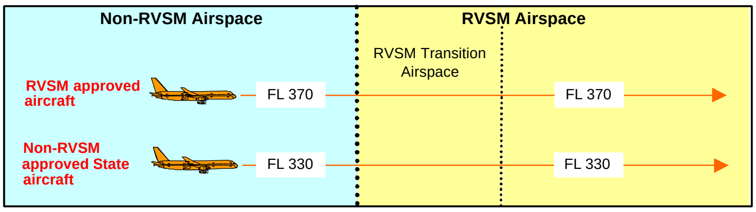


Figure 7: Transition of RVSM approved aircraft and non-RVSM approved State aircraft from non-RVSM airspace to RVSM airspace, where non-RVSM airspace is <u>west</u> of the RVSM airspace.

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.

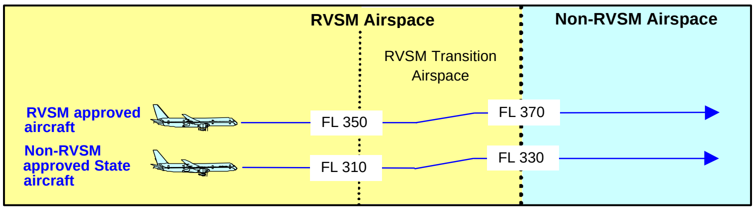


Figure 8: Transition of RVSM approved aircraft and non-RVSM approved State aircraft from RVSM airspace to non-RVSM airspace, where non-RVSM airspace is <u>east</u> of the RVSM airspace.

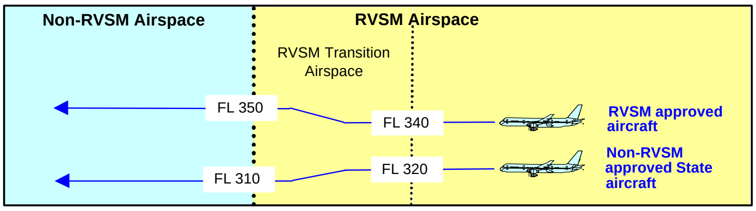


Figure 9: Transition of RVSM approved aircraft and non-RVSM approved State aircraft from RVSM airspace to non-RVSM airspace, where non-RVSM airspace is <u>west</u> of the RVSM airspace.

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.

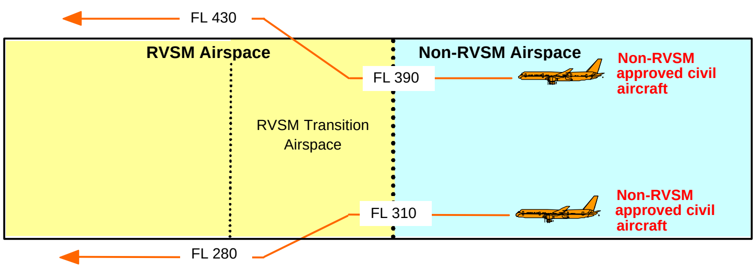


Figure 10: Transition of non-RVSM approved <u>civil</u> aircraft from non-RVSM airspace to RVSM airspace, with departure and destination aerodromes outside of the laterals limits of the RVSM airspace.

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.

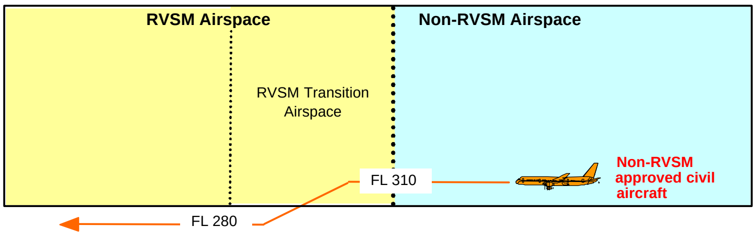


Figure 11: Transition of non-RVSM approved civil aircraft from non-RVSM airspace to RVSM airspace, with a departure aerodrome outside of the lateral limits of the RVSM airspace and a destination aerodrome within the lateral limits of the RVSM airspace.

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.

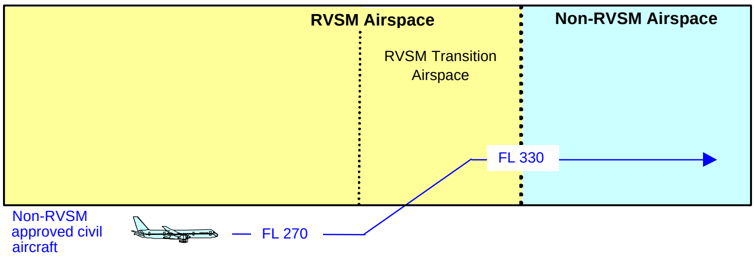


Figure 12: Transition of non-RVSM approved civil aircraft from RVSM airspace to non-RVSM airspace, with a departure aerodrome within the lateral limits of RVSM airspace and a destination aerodrome outside of the lateral limits of the RVSM airspace.

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 shall be requested to check the pressure setting a

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

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

ity to maintain the

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.

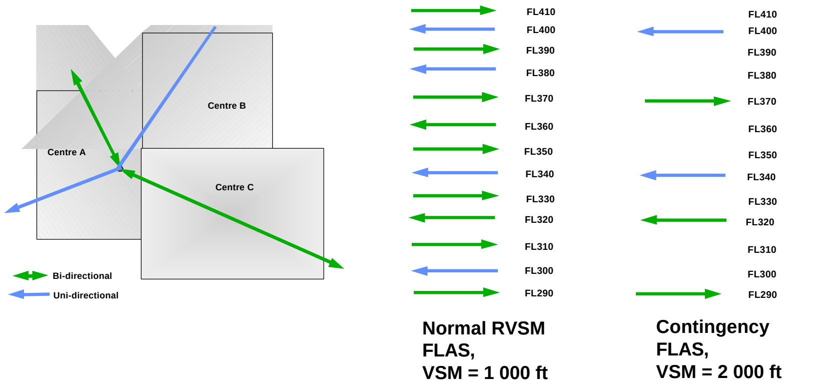
Severe Turbulence Forecast

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 ty to establish aircraft at levels appropriate for Centre A 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.	**UNABLE RVSM DUE TURBULENCE***
degraded below the MASPS required for flight within the MID RVSM Airspace. *(The phrase is to be used to convey both the initial indication of the non-MASPS compliance, and henceforth, on initial contact on all frequencies within the lateral limits of the MID RVSM Airspace until such time as the problem ceases to exist, or the aircraft has exited MID RVSM Airspace)*	**UNABLE RVSM DUE EQUIPMENT***
For a pilot to report the ability to resume operations within the MID RVSM airspace after an equipment or weather-related contingency.	**READY TO RESUME RVSM***
For a controller to confirm that an aircraft has regained its RVSM approval status, or to confirm that the pilot is ready to resume RVSM operations.	**REPORT ABLE TO RESUME RVSM**

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

Pilot RTF:	(*callsign*) **REQUEST FL 320, NEGATIVE RVSM**
Controller RTF:	(*callsign*) **CLIMB TO FL 320**
Pilot RTF:	(*callsign*) **CLIMB TO FL 320, NEGATIVE RVSM**

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

Pilot RTF:	(*callsign*) **REQUEST FL 430, NEGATIVE RVSM**
Controller RTF:	(*callsign*) **CLIMB TO FL 430**
Pilot RTF:	(*callsign*) **CLIMB TO FL 430, NEGATIVE RVSM**

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

Pilot RTF:	(*callsign*) **REQUEST FL 380, NEGATIVE RVSM**
Controller RTF:	(*callsign*) **CLIMB TO FL 380**
Pilot RTF:	(*callsign*) **CLIMB TO FL 380, NEGATIVE RVSM**

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

Pilot RTF:	(*callsign*) **REQUEST FL 320, NEGATIVE RVSM**
Controller RTF:	(*callsign*) **UNABLE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN FL 280**

5.7.2 Co-ordination between ATS Units

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

5.8 Inter-Centre Co-ordination

Flight Plans

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 all 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.

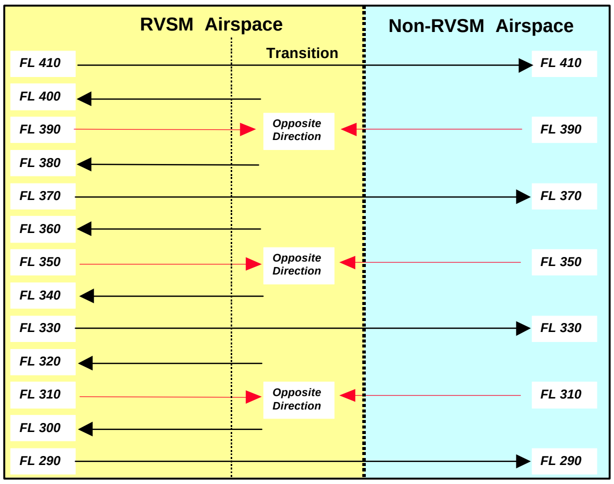


Figure 14: Scenario where non-RVSM airspace is adjacent to, and east[1] of, RVSM airspace.

[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.

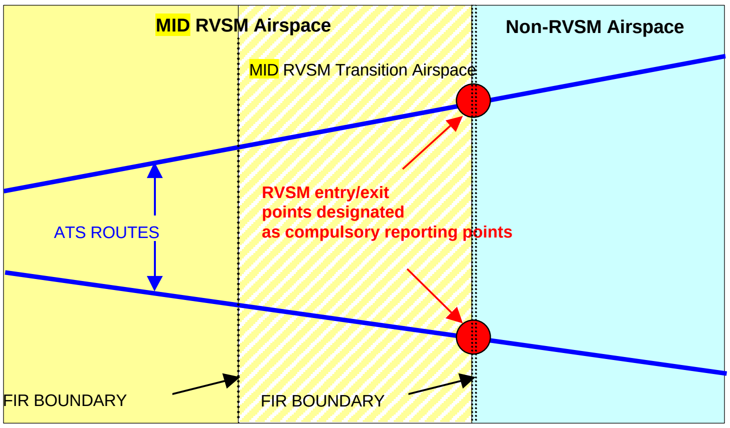


Figure 15: Compulsory reporting points on ATS routes at the boundary between MID RVSM Airspace and adjacent non-RVSM Airspace.

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.

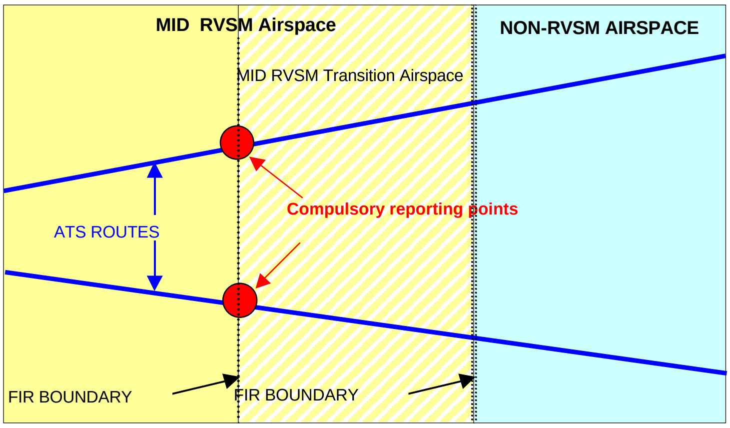


Figure 16: Compulsory reporting points on ATS routes at the boundary between MID RVSM Airspace and MID RVSM Transition Airspace.

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.

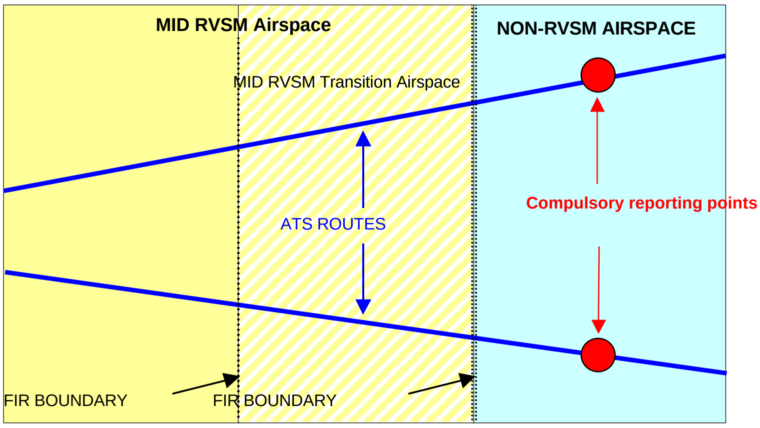


Figure 17: Compulsory reporting points within adjacent non-RVSM airspace on ATS routes which cross the lateral limits of the MID RVSM Airspace.

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 in 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.

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).

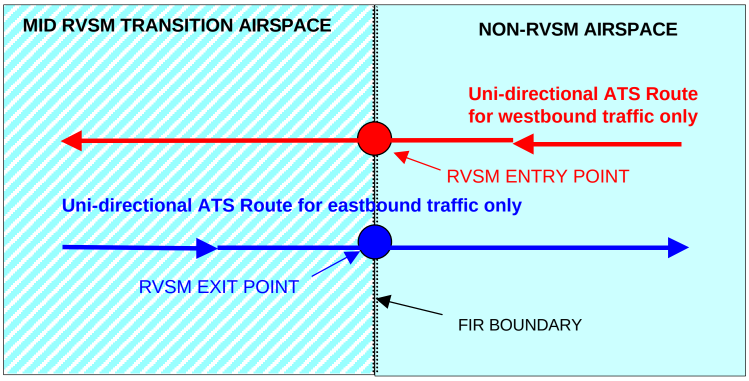


Figure 18: Laterally-spaced, uni-directional ATS routes between MID RVSM Transition Airspace and adjacent non-RVSM airspace.

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.

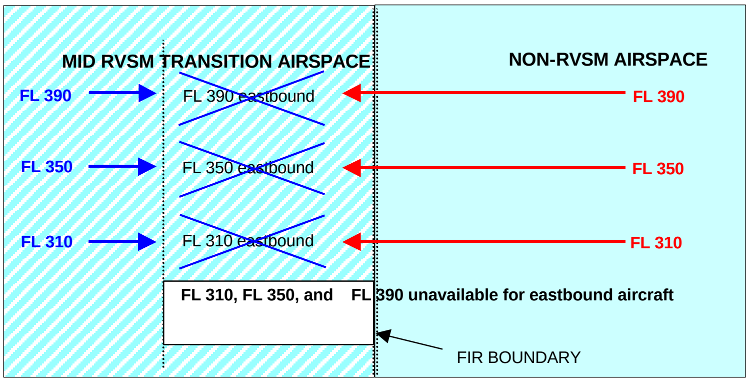


Figure 19: FLAS depicting FL 310, FL 350, and FL 390 discontinued for eastbound aircraft within a portion of the MID RVSM Transition Airspace.

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 Also significant is the operational requirement for
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.

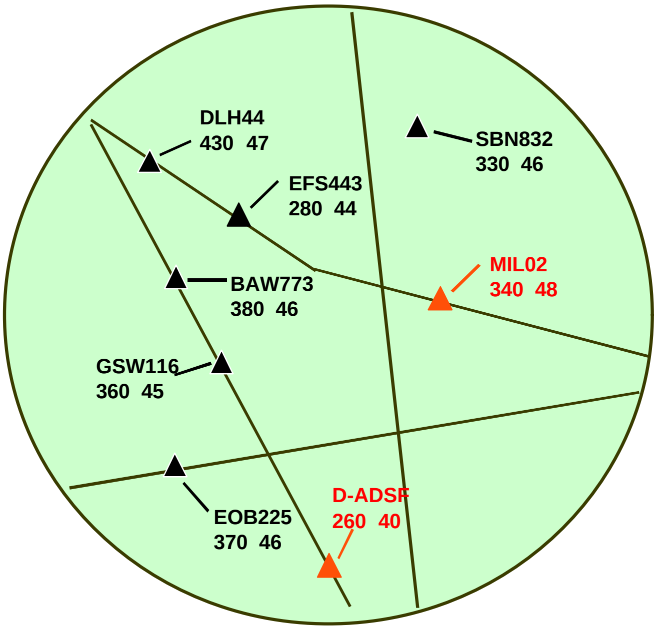
Note: The vertical extent of the level bands will have been determined locally as a function of specific local operational requirements in terms of sectorisation, etc.

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.

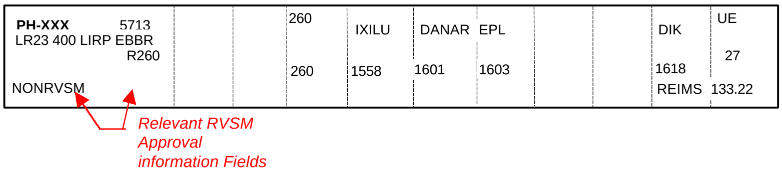
8.4 Flight Strips (Paper or Electronic)

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.

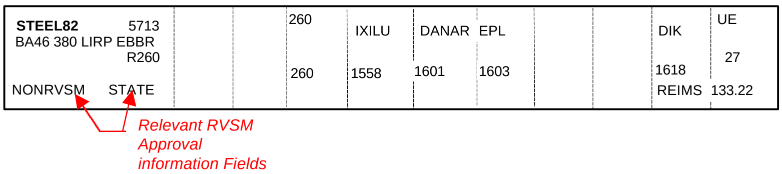
Note: If there are no paper or electronic strips, these requirements shall be applied

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).

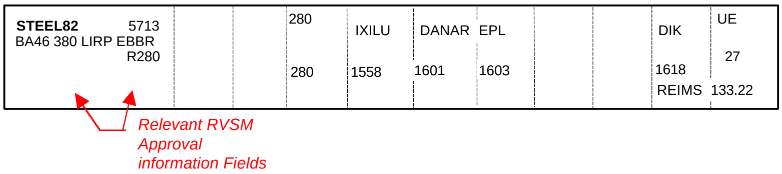
8.4.3 -RVSM approval status **shall** be displayed on the flight strip. (Message example: **NONRVSM**).



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.

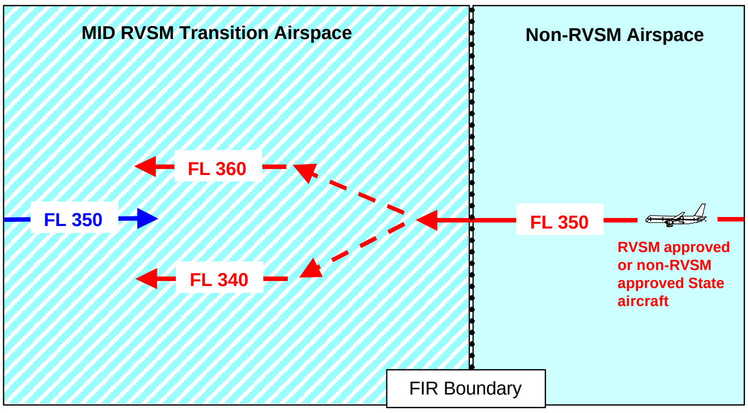


Figure 21: Traffic operating from adjacent non-RVSM airspace at FL 350 westbound is established at FL 340 or FL 360 within MID RVSM Transition Airspace.

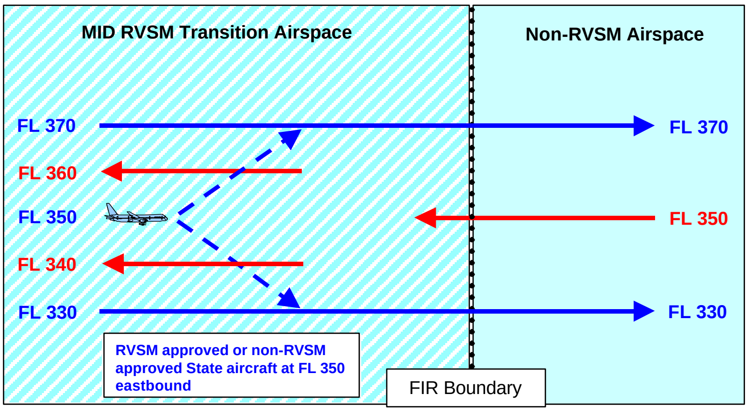


Figure 22: Traffic within the EUR RVSM Transition Airspace at FL 350 eastbound is established at FL 330 or FL 370 prior to the boundary with adjacent non-RVSM Airspace.

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:

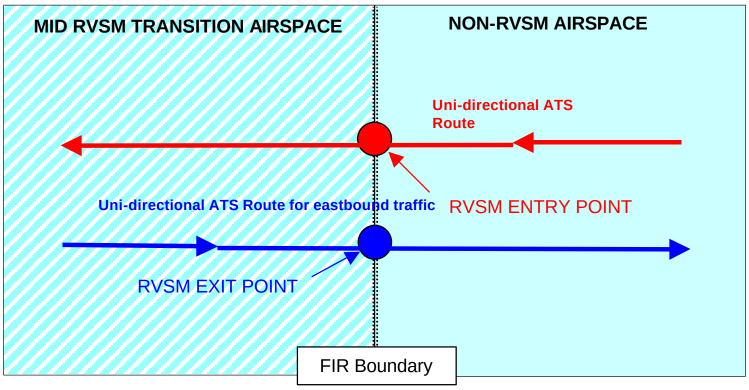


Figure 23: Laterally-spaced, uni-directional ATS routes between MID RVSM Transition Airspace and adjacent non-RVSM airspace.

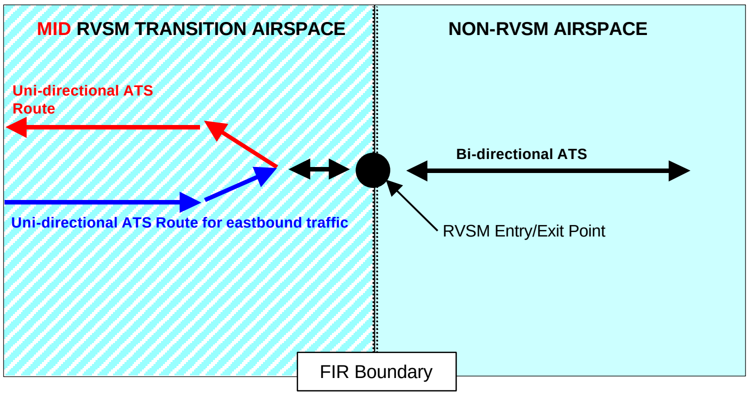


Figure 24: Laterally-spaced, uni-directional ATS routes within MID RVSM Transition Airspace.

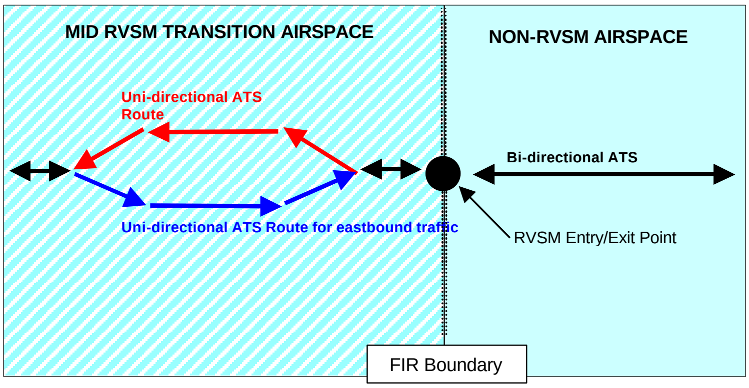


Figure 25: Laterally-spaced, uni-directional route section on a bi-directional ATS route within MID RVSM Transition Airspace.

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:

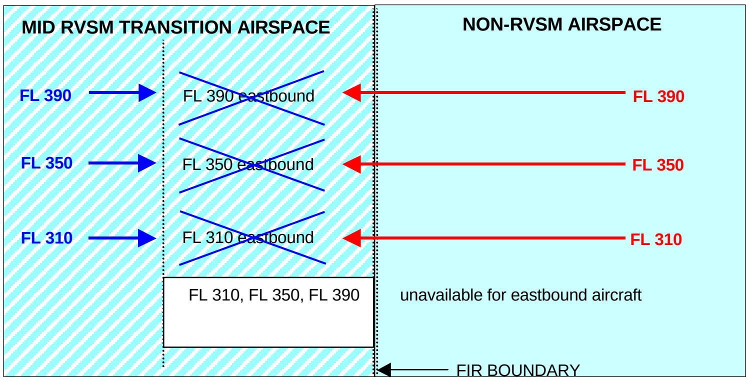


Figure 26: FLAS depicting FL 310, FL 350, and FL 390 discontinued for eastbound aircraft within a portion of the MID RVSM Transition Airspace.

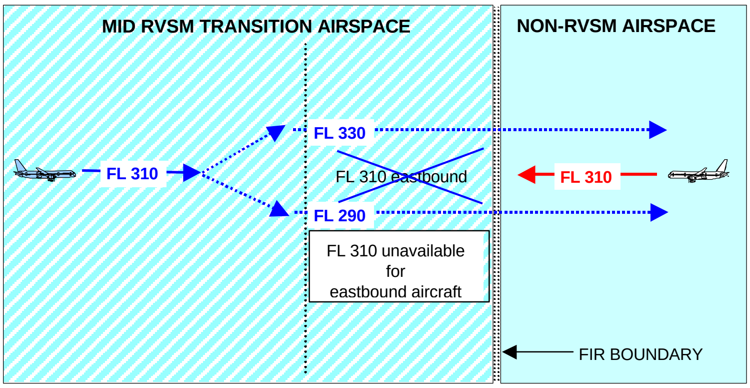


Figure 27: Opposite direction aircraft at FL 310. FLAS discontinues FL 310 for eastbound aircraft within a portion of the MID RVSM Transition Airspace.

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

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))

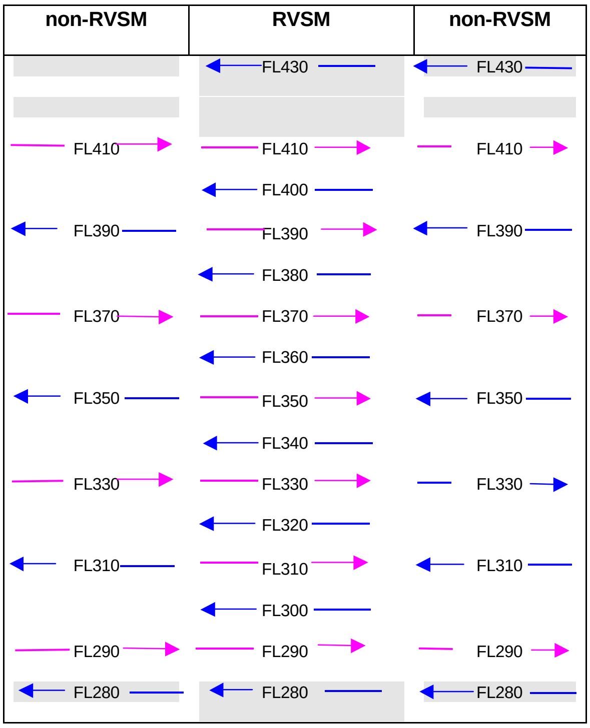
IFR	VFR
FL430	
FL410	
FL400	
FL390	
FL380	
FL370	
FL360	
FL350	
FL340	
FL330	
FL320	
FL310	
FL300	
FL290	
	FL285
FL280	*FL275*

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

Metric* Area	RVSM Area	Metric* Area
← 13,100 m (42,978 ft)	← FL430	← 13,100 m (42,978 ft)
	FL410 →	
12,100 m (39,698 ft) →	← FL400	12,100 m (39,698 ft) →
	FL390 →	
← 11,600 m (38,057 ft)	← FL380	← 11,600 m (38,057 ft)
11,100 m (36,417 ft) →	FL370 →	11,100 m (36,417 ft) →
	← FL360	
← 10,600 m (34,776 ft)	FL350 →	← 10,600 m (34,776 ft)
	← FL340	
10,100 m (33,136 ft) →	FL330 →	10,100 m (33,136 ft) →
	← FL320	
← 9,600 m (31,496 ft)	FL310 →	← 9,600 m (31,496 ft)
9,100 m (29,855 ft) →	← FL300	9,100 m (29,855 ft) →
	FL290 →	
← 8,600 m (28,214 ft)	← FL280	← 8,600 m (28,214 ft)

* system of metric cruising levels as applied, for instance, in the Russian Federation

Airspace where Transition Tasks are carried out

Appendix D

Following is an extract 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 (1000ft) Vertical Separation Minimum in the European R

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 The required content of an Ope
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

Following is an extract of the relevant section 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-
  m) and/or
  an ASE greater than
  m) then the pilot should follow established regional procedures to protect the safe operation of the aircraft. This assumes that the monitoring system will identify the TVE or ASE within the set limits for accuracy.

- If the pilot is notified by ATC of an assigned altitude deviation of 300 ft (90 m) or more then the pilot should take action to return to cleared flight level as quickly as possible.

5.2 Contingency procedures after entering RVSM airspace are:

5.2.1 The pilot should notify ATC of contingencies (equipment failures, weather) which affect the ability to maintain the cleared flight level, and co-ordinate an appropriate plan of action.

5.2.2 Examples of equipment failures which should lead to notification to ATC:

- failure of all automatic altitude-control systems aboard the aircraft;
- loss of redundancy of altimetry systems,
- loss of thrust on an engine necessitating descent; or
- any other equipment failure affecting the ability to maintain cleared flight level

5.2.3 The pilot should notify ATC when encountering greater than moderate turbulence.

5.2.4 If unable to notify ATC and obtain an ATC clearance prior to deviating from the assigned cleared flight level, the pilot should follow the established contingency procedures and obtain ATC clearance as soon as possible.

6. Post Flight

6.1 In making technical log entries against malfunctions in height keeping systems, the pilot should provide sufficient detail to enable maintenance to effectively troubleshoot and repair the system. The pilot should detail the actual defect and the crew action taken to try to isolate and rectify the fault.

6.2 The following information should be recorded when appropriate:

- Primary and standby altimeter readings.
- Altitude selector setting.
- Sub-scale setting on altimeter.
- Auto-pilot used to control the aeroplane and any differences when an alternative auto-pilot system was selected.
- Differences in altimeter readings, if alternate static ports selected.
- Use of air data computer selector for fault diagnosis procedure.
- The transponder selected to provide altitude information to ATC and any difference noted when an alternative transponder was selected.

7 Special Emphasis Items: Flight Crew Training

7.1 The following items should also be included in flight crew training programmes:

- knowledge and understanding of standard ATC phraseology used in each area of operations;
- importance of crew members cross checking to ensure that ATC clearances are promptly and correctly complied with;
- use and limitations in terms of accuracy of standby altimeters in contingencies. Where applicable, the pilot should review the application of static source error correction/ position error correction through the use of correction cards;

  Note: Such correction data will need to be readily available on the flight deck.

- problems of visual perception of other aircraft at 300m (1,000 ft) planned separation during darkness, when encountering local phenomena such as northern lights, for opposite and same direction traffic, and during turns; and

- characteristics of aircraft altitude capture systems which may lead to overshoots.

- relationship between the aircraft's altimetry, automatic altitude control and transponder systems in normal and abnormal conditions.

- any airframe operating restrictions, if required for the specific aircraft group, related to RVSM airworthiness approval.

Appendix G

Guidance Material on the Implementation of a 300m (1000ft) Vertical Separation Minimum in the *System Performance Monitoring*

It is intended as a means of providing background material of sufficient detail to allow operational ATC personnel to gain an appreciation of the subject. The contents of this appendix, therefore should not be considered as authoritative.

SYSTEM PERFORMANCE MONITORING

1 Introduction

1.1 This Part provides guidance on the monitoring of operations in European RVSM airspace. The objectives of the monitoring programme are to ensure that the level of collision risk does not exceed the TLS and to assess the compliance of aircraft with the global height keeping performance specification (paragraph 2.2 refers). This information will be taken into account by decision makers in judging whether overall safety goals applicable to the European RVSM airspace are being achieved.

1.2 The overall criterion for safety in the European RVSM area is that the TLS of 5×10^{-9} fatal accidents per flight hour (representing the risk due solely to the loss of vertical separation from any cause) is not exceeded. The agreed method of assessing actual collision risk is by the use of a variant of the Reich collision risk model (CRM) suitable to the area.

1.3 The height-keeping errors which will contribute to collision risk in the European RVSM area can be divided into two categories; technical errors and operational errors. Technical errors, i.e. Altimetry System Errors (ASE) are caused by inaccuracies in the height-keeping equipment of aircraft, whereas, operational errors, i.e. Assigned Altitude Deviation (AAD), are caused by mistakes, by ATC or Flight Crew, which result in aircraft being flown at incorrect flight levels. ASE and AAD are the main constituents of Total Vertical Error (TVE). As aircraft operations in the European area are, for the larger part, conducted under tactical radar control together with some procedural separation, the frequency of occurrence, size and duration of operational errors can be greatly reduced. Nevertheless, operational errors can, and do, occur and may make a significant contribution to the overall collision risk. The TLS has been chosen to take account of the risk from both technical errors and operational errors.

1.4 In order to ensure that the TLS is not being exceeded, it is necessary to monitor both the occurrence of vertical errors and the CRM parameter values on a continuing basis. Many of the parameter values used in the CRM are based on a planning horizon of approximately 10 years and require periodic monitoring.

1.5 The CRM parameters fall into two groups from the stand-point of monitoring requirements. The first group consists of two important parameters which are critical for safety assessment, in the sense that the actual risk in the airspace changes in proportion to changes in their values. The first of these parameters is an estimate of the proportion of flight time spent by aircraft, nominally separated by 1 000 ft, in vertical overlap. This parameter is a function of the height-keeping performance of the overall aircraft population. It is termed the "vertical overlap probability" and denoted by the term

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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-END-

KINGDOM OF SAUDI ARABIA

MINISTRY OF DEFENCE AND AVIATION

PRESIDENCY OF CIVIL AVIATION

AIR TRAFFIC SERVICES

K.S.A RVSM

MASTER PLAN

Version:

Date :

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GLOSSARY

AAD	Assigned Altitude Deviation
ACC	Area Control Center
ACG	EATCHIP ATM/CNS Consultancy Group
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
AIRAC	Aeronautical Information Regulation And Control
APDSG	ATM Procedures Development Sub Group
ASE	Altimetry System Error
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATM	Air Traffic Management
ATS	Air Traffic Service
CMA	Central Monitoring Agency
DGATS	Director General Air Traffic Services
EANPG	ICAO European Air Navigation Planning Group
EATCHIP	European ATC Harmonization and Integration Programme
ECAC	European Civil Aviation Conference
EUR RAN	ICAO European Regional Air Navigation Meeting
FDPS	Flight Data Processing System
FLAS	Flight Level Allocation Scheme
FTE	Flight Technical Error
GAT	General Air Traffic
GMU	GPS Monitoring Unit
HMU	Height Monitoring Unit
ICAO	International Civil Aviation Organization
IFPS	Integrated Initial Flight Plan Processing System
JAA	Joint Aviation Authority
MASPS	Minimum Aircraft System Performance Specification
MECMA	Middle East Central Monitoring Agency
MNPS	Minimum Navigation Performance Standard
NAT	North Atlantic Region
OAT	Operational Air Traffic
PCA	Presidency of Civil Aviation
PMB	Programme Management Board
PMM	
PSO	Programme Support Office
RDPS	Radar Data Processor System
RGCSP	ICAO Review of the General Concept of Separation Panel
RNP	Required Navigation Performance
RUSC	
RVSM	Reduced Vertical Separation Minimum
SSEC	Static Source Error Correction
TCAS	Traffic Alert and Collision Avoidance System
TGL	Temporary Guidance Leaflet

TLS	**Target Level of Safety**
TVE	**Total Vertical Error**
VSM	**Vertical Separation Minimum**

1. EXECUTIVE SUMMARY

1.1 On 27 November 2003, the MID Region will implement a Reduced Vertical Separation Minimum (RVSM) in airspace throughout the MID Region. The MID RVSM airspace will be in complete conformance with the RVSM standard already implemented within the European and Asia Pacific Regions. Once the MID RVSM airspace is in place, International Flights will be able to fly unrestricted between the European Region and the Asia Pacific Region.

1.2 The use of RVSM airspace permits aircraft to utilize an additional six Flight Levels between FL 290 and FL 410 inclusive. This will result with a moreefficient use of airspace, a reduction of in-flight delays, a reduction of fuel costs for the users.

1.3 The K.S.A. RVSM Master Plan is part of the MID RVSM Programme and describes how the required K.S.A. activities are organized and managed by the Presidency of Civil Aviation (PCA) of Saudi Arabia.

1.4 The scope of this document includes a description of the work to be done in K.S.A. by a number of participants in accordance with the K.S.A. RVSM Master Schedule.

1.5 This document addresses implementation activities from now up to the implementation date of 27 November 2003.

2. PURPOSE OF THE K.S.A. RVSM MASTER PLAN

2.1 The purpose of the K.S.A Master Plan is to provide a reference and framework to define how the implementation of RVSM airspace in the Jeddah FIR will coincide with the implementation of RVSM airspace in the other member States in the MID Region.

3. BACKGROUND

3.1 In the late 1970s, faced with rising fuel costs and growing demands for a more efficient use of the available airspace, the International Civil Aviation Organization (ICAO), in the 1980s, initiated a comprehensive programme of studies to examine the feasibility of reducing the standard 2000 ft of vertical separation minimum used between aircraft flying between FL 290 (29,000ft) and FL 410 (41,000ft) to be the same as the standard 1000 ft vertical separation minimum that is used between aircraft flying at FL 290 and below. These studies were conducted in Canada, Europe, Japan and the United States.

3.2 The studies demonstrated that the global reduction of vertical separation from 2000ft to1000ft between FL 290 and FL 410 inclusive, was safe, feasible, cost-beneficial and would not impose too great a change to the existing aircraft height determining equipments. The studies also showed that the North Atlantic Region (NAT) airspace, known as the Minimum Navigation Performance Specification (MNPS) airspace, was an ideal environment for the introduction of this Reduced Vertical Separation Minimum (RVSM) because of the similar types of aircraft flying in this airspace and the unidirectional flow of this air traffic.

3.3 Planning for RVSM in the NAT Region commenced in 1990. A trial first stage of the Operational Evaluation Phase, using the 1000ft RVSM , at and between FL 330 (33,000ft) and FL 370 (37,000ft), began on 27 March 97. A second trial stage, extending RVSM to between FL310 (31,000ft) and FL 390 (39,000ft) inclusive was started in October 1998.

3.4 plementation of RVSM reached into the airspace of the States lying within the western boundary of the Europea Region, it was determined that the introduction of RVSM in the European airspace would provide similar benefits to aircraft flying within the European Region. However, from the outset it was clear that the complex nature of the European air route network, its wide variety of aircraft types, high traffic density and the high percentage of aircraft climbing and descending, is a more demanding environment than that of the NAT Region. Therefore, the introduction of RVSM in European airspace would need to have its own assessment of the feasibility and safety concerns of implementing RVSM into European airspace and to give special attention to whether or not the traditional levels of safety would be compromised.

3.5 European States and EUROCONTROL were involved in the initial RVSM studies with the ICAO Review of the General Concept of Separation Panel (RGCSP). Since the EUR RAN agreement in 1994, EUROCONTROL has continued to investigate the feasibility and safety of implementing RVSM in European airspace, taking into account the experience of the implementation in the NAT Region. At EANPG/37, it was agreed that EUROCONTROL would be requested to develop proposals for the amendment of appropriate ICAO Documents with the aim of developing a Regional Air Navigation Plan for the implementation of RVSM in the EUR Region.

3.6 To-date, the principle RVSM activities, including co-ordination with State RVSM activities, have been performed in the EATCHIP Airspace and Navigation Domain of EUROCONTROL. These activities as well as those proposed within the European RVSM Master Plan are being undertake

3.7 On 24 January 2002, at 00:01 UTC, EUROCONTROL implemented RVSM throughout European airspace.

3.8 Similar feasibility/safety studies were carried out in the ASIA/PAC Region and RVSM is to be implemented in the ASIA/PAC Region in three stages, Pacific, 5/OCT/00, South China Sea, 21/ FEB/02 and Asia-Europe, South of the Himalayas, 27/NOV/03.

4. MAIN TOPICS

4.1 Aircraft Requirements

4.1.1 For operations in RVSM airspace, flights are required to be RVSM Compliant. State aircraft are exempted from this requirement, although military authorities are encouraged to make their transport fleet compatible with RVSM requirements. To obtain RVSM Compliance, aircraft require modifications in accordance with FAA STCs. Service Bulletins, produced by aircraft manufacturers etc., FAA Interim Guidance 91-RVSM and JAA Temporary Guidance Leaflet No.6 (TGL 6) provide MASPS, guidance on airworthiness, operational practices, procedures and requirements for RVSM airspace that can be used as a basis for the compliance process. These RVSM requirements are reflected in the ICAO Regional Supplementary Procedures Document - Doc 7030.

4.1.2 PCA, Department of Aviation Standards and Safety has issued Notification, AW/02/827, dated 31 AUG 2002 regarding the implementation of Reduced Vertical Separation Minimum (RVSM) in the Jeddah FIR, effective 27 November 2003.

4.2 ATC Systems

4.2.1 In order to accommodate and support the provision of ATC in an RVSM environment, ATC systems will need modification. The modifications are related to the need for the controller to distinguish between RVSM Compliant aircraft and Non-RVSM Compliant aircraft, and to accommodate the extra RVSM Flight Levels, possible re-sectorisation, etc. ATC training simulators will need similar modifications.

4.2.2 K.S.A. Flight Data Processing Systems (FDPS) will need to be updated to permit the processing of flight plans in a manner appropriate to flights conducted within RVSM airspace. The FDPS produced Flight Strips (Paper
-RVSM
filed by

are required.

4.2.3 The Position Symbols and/or Data Blocks displayed on ATC Radar System

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this indication be changeable by the controller if the status of an aircraft

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4.3 Airspace and ATC Procedures

4.3.1 PCA, Air Traffic Services Directorate has issued an Aeronautical Information Circular, NR 05/01, dated 06 DEC 2001, entitled Implementation of Reduced Vertical Separation Minima (RVSM) in Jeddah FIR. This AIC serves as a Notice of Intent to implement RVSM in the Jeddah FIR, effective 27 November 2003.

4.3.2 With the advent of RVSM in K.S.A. airspace (Jeddah FIR), there will be an additional six Flight Levels for use by Air Traffic Controllers. This will require that the ACC Sectors and the airway route network be reviewed and revised where appropriate.

4.3.3 Since the Jeddah FIR shares its Western boundary with the Khartoum FIR and the Asmara FIR (Both Non-RVSM airspaces) an appropriate RVSM Transition Area will need to be identified and the necessary ATC procedures for handling aircraft transiting to/from RVSM airspace and Non-RVSM airspace will need to developed and published in the K.S.A. AIP. These ATC procedures will conform to those RVSM procedures contained in the

Document, DOC 7030.

4.3.4 Letters of Agreement (LOA) will need to be amended to reflect the changes resulting from the implementation of RVSM airspace in the Jeddah FIR.

4.3.5 Appropriate training of air traffic controllers with realistic simulator practice sessions that will familiarize them with the application of the new RVSM procedures and understanding of the actions they must take when confronted with pilots initiating possible contingency actions associated with flights in RVSM airspace.

4.4 RVSM Operational Safety Monitoring and Review

4.4.1 The safety requirement is for PCA to provide appropriate monitoring of the operational safety performance of the Air Traffic Controllers in their application of RVSM and to provide a method of collecting operational error data reported by Air Traffic Controllers in the Jeddah FIR in the same way that it was provided by the K.S.A. RVSM Program Manager to MECMA during the safety evaluations conducted during Pre-Implementation phase RVSM.

4.4.2 This Post-Implementation RVSM error data along with similar error data from the other FIRs in the MID Region will be used to asses the likely risk of collision in RVSM airspace throughout the MID Region.. In addition PCA can assess this error data provided by the Jeddah ACC and act on the evidence, as appropriate.

5. SCOPE OF K.S.A. MASTER PLAN

5.1 The KSA RVSM Master Plan is the basis for the implementation of RVSM airspace in the Jeddah FIR in accordance with the common time scale as determined by the MID RVSM Task Force.

5.2 The K.S.A. RVSM Master Plan addresses the following activities:

- Regulation / Legislation Issues
- RVSM Approval
- ATC Procedures and Airspace Preparation
- ATS Systems (RDPS/FDPS) Modifications
- Simulation Exercises
- Controller Training for RVSM
- Aeronautical Publications
- Safety Assessment

6. REFERENCE MATERIAL

DOCUMENT NAME	REFERENCE	VERSION
K.S.A Safety Plan for the Implementation of RVSM	RVSM TF/6 Appendix H	DRAFT
ICAO Manual on RVSM	ICAO Doc. 9574	1.0
JAA Temporary Guidance Leaflet Number 6	TGL 6	July 1, 1998
ATC Manual for Reduced Vertical Separation Minimum (RVSM) in MID Region	RVSM TF/6 Appendix J	DRAFT
ICAO Guidance Material for the Implementation and use of RVSM in European Airspace	Endorsed by EANPG/40	January 1999
ICAO SUPPS DOC 7030/4 MID/ASIA	Amendment 204	20 Feb 02
FAA Interim Guidance Material on the Approval of Operators/Aircraft for RVSM Operations.	91-RVSM	Change 1 06/30/99

7. IMPLEMENTATION SCHEDULE

ATS DIRECTORATE	END DATE
PREPARATION OF AIRSPACE:	
Complete National Airspace Structure and Sectorization Changes.	15/MAY/03
ATS SYSTEMS MODIFICATION:	
Approve and install system modifications to Radar System & FDPS	31/MAY/03
TRAINING SIMULATOR MODIFICATIONS:	
Approve and install Training Simulator modifications.	TBD
Prepare and complete RVSM Training Scenarios	TBD
ATC PROCEDURES:	
Adapt/Integrate RVSM ATC Procedures in ATS Manual of Operations.	TBD
LETTERS OF AGREEMENT:	
Complete Amendments to all Letters of Agreement	01/SEP/03
Integrate Amendments to LOAs into ATS Manual of Operations	01/OCT/03
AIP AMENDMENT:	
Prepare and complete appropriate amendment for K.S.A. AIP	15/MAY/03
CONTROLLER TRAINING FOR RVSM:	
Finalize Air Traffic Controller Training Plan	27/MAR/03
Complete Air Traffic Controller Training	26/NOV/03

AVIATION STANDARDS AND SAFETY DEPARTMENT	END DATE
RVSM COMPLIANT REQUIREMENTS:	
Notify Aircraft Operators of RVSM Requirements.	TBD
Establish Aircraft Certification Programme.	TBD
Identify Crew Training Requirements.	TBD
Develop Amendments to ASSD Operations Manual	TBD

MILITARY AUTHORITIES	END DATE
IMPACT OF RVSM ON THE MILITARY	
Assessment of RVSM on military flight operations	TBD
MILITARY AIRCRAFT MODIFICATIONS	
Military to modify Transport Aircraft to be RVSM Compliant	TBD
FLIGHT CREW TRAINING	
Provide Flight Crews with training to fly in RVSM Airspace	TBD

8. MID RVSM TASK FORCE

8.1 At the MIDANPIRG/6 meeting of 10/14 September 2000, the MID RVSM Task Force was created to develop and oversee a MID RVSM Programme to implement an RVSM standard, similar to the RVSM standard used by EUROCONTROL, within the MID Region airspace.

8.2 The MID RVSM Task Force had its 1st meeting in Cairo on 3-5/OCT/00 and at their 4th meeting, held in Abu Dhabi on 03/06 March 2002, the MID RVSM Task Force announced that MIDAMPIRG/7 had endorsed 27 /NOV/03 as the implementation date for RVSM in the MID Region.

8.3 The MID Region has 13 States participating on the MID RVSM Task Force. Each member State is required to produce and follow a RVSM Master Plan that will ensure a harmonious implementation of RVSM airspace between member States on 27/ NOV/03.

8.4 The MID RVSM Task Force is structured in the following manner:

National Program	
	Bahrain
	Egypt
	Iran
	Iraq
	Israel
	Jordan
	Kuwait
	Lebanon
	Oman
	Saudi Arabia
	Syria
	United Arab Emirates
	Yemen
Participating Organizations:	IATA
	JEPPSON
	ICAO

RVSM PROGRAMME MANAGERS

STATE & NAME	TITLE & CONTACT DETAILS
AFGHANISTAN	
Did not participate	
BAHRAIN	
Mr. Mohammed Zainal	Head Standards Licensing & Developments Civil Aviation Affairs P.O. Box 586 Manama, Bahrain Fax : (973) 321 029 Tel : (973) 321 028 Mobile : (973) 967 6707 E-Mail : zainalmohammed@hotmail.com
Alternate: Mr. Saleem M. Hassan Ali	Head Aeronautical & Airspace Planning Bahrain International Airport P.O. Box 586 Manama, Bahrain. Fax : (973) 321 992 Tel : (973) 321 180 Mobile : (973) 960 8860 SITA : BAHAPYF E-Mail : saleemmh@bahrain.gov.bh
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IRAN	
Mr. Asadollah Rastegarfar	Chief of Training Department Menrebad Airport Iran Civil Aviation Tehran, Iran. Fax : (982-1) 452-7194 Tel : (982-1) 452 8010 E-Mail : csuaco-2@chapar.net

STATE & NAME	TITLE & CONTACT DETAILS
IRAQ	
Did not participate.	
ISRAEL	
Did not Participate	
JORDAN	
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LEBANON	
Mr. Khaled Chamieh	Chief of Aeronautical Information Services Directorate General of Civil Aviation Air Navigation Department Beirut International Airport Beirut, Lebanon. Fax : (961-1) 629 023 Tel : (961-1) 629 026 Mobile : (961-1) 383 7833 SITA : OLBBZQZX E-Mail : AIS@beirutairport.gov.lb
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UNITED ARAB EMIRATES	
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YEMEN	
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10.0 ACTION ITEMS FOR THE IMPLEMENTATION OF RVSM

ACTION ITEM	RESPONSIBLE PARTY	START DATE	END DATE	REMARKS
AERONAUTICAL INFORMATION CIRCULAR				
Implementation of RVSM in Jeddah FIR on 27/NOV/03	DIR / ATS	*****	*****	AIC : NR 05/01-06/DEC/01
AIRWORTHINESS NOTIFICATION				
Implementation of RVSM in Jeddah FIR on 27/NOV/03	ASSD	*****	*****	AW : AW/02/827-31/AUG/02
CERTIFICATION OF AIRCRAFT AND CREWS				
Upgrade Saudia Aircraft to be RVSM Compliant	Saudia Airlines		TBD	Coordination is on-going
Upgrade GAT Aircraft to be RVSM Compliant	Aircraft Owners		TBD	Coordination is on-going
Upgrade Military Aircraft to be RVSM Compliant	R S AF		TBD	Coordination is on-going
AIRSPACE ISSUES RELATED TO RVSM				
Determine the changes needed in the Air Route Network	DIR / ATS	25/JAN/03	15/MAY/03	15/MAY/03 is AIRAC Date
Determine the changes needed to the ACC Sectorization	DIR / ATS	25/JAN/03	15/MAY/03	
Determine the Transition Airspace Areas	DIR / ATS	25/JAN/03	15/MAY/03	
ATC PROCEDURES RELATED TO RVSM				
General Procedures	DIR / ATS	On-Going	13/AUG/03	Coordinated with Task Force
Procedures for Non-Compliant RVSM / State Aircraft	DIR / ATS	On-Going	13/AUG/03	Coordinated with Task Force
Flight Planning Procedures	DIR / ATS	On-Going	13/AUG/03	Coordinated with Task Force
Inter-ACC Coordination Procedures	DIR / ATS	On-Going	13/AUG/03	Coordinated with Task Force
Contingency Procedures	DIR / ATS	On-Going	13/AUG/03	Coordinated with Task Force
Transition Airspace Procedures	DIR / ATS	On-Going	13/AUG/03	Coordinated with Task Force
Phraseologies for RVSM operations	DIR / ATS	On-Going	13/AUG/03	Coordinated with Task Force

ACTION ITEM	RESPONSIBLE PARTY	START DATE	END DATE	REMARKS
ATC SYSTEMS MODIFICATIONS				
Determine needed modifications to Radar Display	DIR / ATS	22/FEB/03	31/MAY/03	
Determine needed modifications to Flight Plan Processor	DIR / ATS	22/FEB/03	31/MAY/03	
Determine needed modifications to ATC Training Simulator	DIR / ATS	TBD	TBD	Coordination On-going
Submit Systems change requests to Airway Engineering	DIR / ATS	******	******	Has Been Completed
Establish Systems Change Schedule	DIR / ATS	******	******	Has Been Completed
Implement Systems Changes	DIR / ATS	22/FEB/03	31/MAY/03	
Evaluate and Accept Systems Changes	DIR / ATS	31/MAY/03	TBD	
AIR TRAFFIC CONTROLLER TRAINING PLAN				
Theoretical Training in Class Room	DIR / ATS	27/MAR/03	26/NOV/03	
Practical Training on Simulator	DIR / ATS	27/MAR/03	26/NOV/03	
Qualification Exercises in Simulator	DIR / ATS	27/MAR/03	26/NOV/03	
AERONAUTICAL INFORMATION PUBLICATION				
Publish RVSM Amendment to K.S.A. AIP	DIR / ATS	20/FEB/03	15/MAY/03	15/MAY/03 is AIRAC Date
IMPLEMENTATION OF RVSM IN JEFDDAH FIR				
Issue appropriate NOTAM to activate RVSM in Jeddah FIR	DIR / ATS	TBD	TBD	