INTERNATIONAL CIVIL AVIATION ORGANIZATION

RVSM/RNAV/RNP TF/11 MEETING REPORT

(NAIROBI 30 NOVEMBER, 2006 – DECEMBER 1, 2006)

Prepared by the APIRG RVSM/RNAV/RNP TASK FORCE

The RVSM/RNAV/RNP Task Force is a Task Force of the AFI Planning and Implementation Regional Group (APIRG).

Its Reports are therefore submitted to APIRG through the ATS/AIS/SAR Sub-Group for review and action.

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Appendices :

PART I - HISTORY OF THE MEETING

1. Introduction

1.1 The Eleventh meeting of the RVSM/RNAV/RNP Task Force (RVSM/RNAV/RNP/TF/11) was convened pursuant to AFI/7 RAN Meeting Recommendations 5/7, 5/17 and APIRG/13 Decision 13/58 by the International Civil Aviation Organization in Nairobi from **30 November, 2006 to December 1, 2006**.

1.2 The reduced vertical separation minima Task Force 11 meeting was opened by Mr. Geoffrey Moshabesha, Regional Director, ICAO ESAF Office, Nairobi. The Regional Director appreciated the Task Force's consistency in carrying out the work assigned to it by APIRG in taking crucial decisions in pursuance to the tasks in the Strategy/Action Plan. He highlighted some important elements of the Task Force's activities and urged the States to continue the appreciable commitment in the process of RVSM implementation in tge AFI airspace. He thanked the RVSM Task Force Project Management Team (PMT), for the guidance to the Task Force in order to promote the AFI RVSM implementation programme. He urged the Meeting to continue unabatedly in pursuing the AFI RVSM programme to meet the Target Level of Safety required for the implementation of RVSM in the Region. Furthermore he urged the participants to be frank in their discussions so that realistic conclusions can be reached.

2. Officers and Secretariat

2.1 Mr. Apolo KHARUGA, Regional Officer, Air Traffic Management from the ICAO ESAF Office, Nairobi, was the Secretary/Moderator of the meeting. He was assisted by Mr. Konan BROU, Regional Officer, Air Traffic Management, ICAO ESAF; Mr. Ibrahim Usman AUYO, Regional Officer ATM, WACAF Office, Dakar; Mr. Drazen Gardilcic Technical Officer, ATM HQ and Mr. Kevin EWELS, Manager of the AFI RVSM Monitoring Agency (ARMA).

3. Attendance

3.1 The meeting was attended by 91 (Ninety One) participants from 26 (Twenty Six) States and 4 (Four) International Organizations namely; ASECNA, IATA, IFALPA and IFATCA. The list of participants is at **Appendix A** to this report.

4. Working Language

4.1 The meeting was conducted in the English language.

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5. AGENDA

5.1 The following Agenda was adopted :

Agenda Item 1

Review and follow-up of the conclusions of the Tenth Meeting of APIRG RVSM/RNAV/RNP Task Force (RVSM TF/10) and the Second RVSM Stakeholders meeting .

Agenda Item 2

Review of major activities of the RVSM Task Force

2.1 ARMA Report.
2.2 AFI RVSM State Readiness Survey.
2.3 Status of ATS Letters of Agreement/Procedure (LOA/LOP).
2.4 Status of PISC.
2.5 Status of National Safety Plans (NSPs).
2.6 Status of amendment proposal to Doc.7030. Status of Amendment to the Regional Supplementary Procedures – Doc.7030/4 African Indian Ocean (AFI) Region (Serial. No. ESAF-S 06/3 – AFI RAC/1)

Agenda Item 3

3.1 CRA progress.
3.2 Safety Assessment Issues.

Agenda Item 4

Review and update the RVSM Strategy/Action Plan.

Agenda Item 5

Any Other Business.

List of Conclusions and Decisions:

Number	Title
Conclusion 11/1:	**Safety assessment data and incident reporting** **That:** a) States pursue stringent incident reporting measures and take appropriate remedial actions as required by the CRA report in order to contribute to a positive total TLS; and b) States intensify their efforts in reducing the incident rates to support positive CRA results;
Conclusion 11/2:	**Target date for AFI RVSM Implementation** **That:** a) The actual date/time of implementation of RVSM will be determined taking into account: i) The completion of the activities in the AFI RVSM Strategy/Action Plan; ii) The development of an acceptable PISC which includes an acceptable CRA and its subsequent approval by the ANC; iii) The approval by ICAO ANC of AFI RVSM Regional SUPP's (Doc.7030/4) relating to RVSM; and **b)** The target date for implementation of RVSM in the AFI Region will be determined by the Task Force, after the second CRA, which is to be undertaken, and the completion of the other outstanding elements of the PISC.
Conclusion 11/3:	**Civil/Military Coordination/Seminars** **That:** a) in order to ensure the safe and coordinated implementation of RVSM in the AFI Region, ICAO and States ensure that the military aviation authorities are fully involved in the planning and the implementation process; and b) seminars and workshops be conducted on civil military coordination.
Conclusion 11/4:	**Reporting of data for monitoring and/or carrying out safety assessment** **That:** a) All States institute the procedures for reporting of data, incidents and conditions necessary for performing the collision risk calculations prerequisite for RVSM implementation to the AFI Regional Monitoring Agency (ARMA). The data will include, but not necessarily be limited to: (i) Height deviations of 300 ft or more; (ii) Total number of IFR movements for each month;

Number	Title
	(iii) The average time per movement spent in the level band FL 290 to FL 410; (iv) ATC coordination failures; (v) Turbulence; (vi) Traffic data; and b) GPS Monitoring Unit (GMU) is being used for height monitoring where appropriate in the AFI Region, which will be coordinated by the ARMA; and **c)** ARMA compile a list of non contributing States, regarding traffic flow data, and submit to Task Force meetings as appropriate for consideration and remedial action; and d) States continue to provide the required safety assessment data to ARMA on a monthly basis using Forms 1, 2, 3 and Form 4; and e) That ICAO urge Tunisia and Morocco to provide ICAO and ARMA with the required safety assessment data on a monthly basis using ARMA forms 1, 2, 3 and 4;
Conclusion 11/5:	**Implementation of RVSM in the AFI Region** **That:** a) All RVSM implementation preparation works (safety, assessment, training) be done taking into consideration the FL 290 and FL 410 inclusive, being the AFI RVSM airspace; and b) Implementation of RVSM in the AFI Region be harmonized and coordinated within the AFI Region as well as with the adjacent Regions.
Conclusion 11/6:	**Training of all personnel involved with the implementation of RVSM in the AFI Region** **That:** a) On site training courses be conducted to expedite the training process; b) In order to ensure uniformity in the training, States shall use the AFI RVSM training material; c) Seminars continue to be organized in the Region for training all personnel involved in the implementation of RVSM; d) States having difficulties in implementing RVSM implementation training may either individually or in group explore the possibility of seeking outside expertise; e) States provide refresher training to Controllers and ensure that proficiency checks for ATCOs are done; and f) IFALPA provide to the PMT revised comprehensive Pilot Training RVSM Guidance material for provision to AFI States for dissemination to operators.

Number	Title
Conclusion 11/7:	**Guidance material for Airworthiness and Operational Approval** That, ICAO urge States which have not done so, to include in their national legislation and regulations the Airworthiness and Operational Approval process for aircraft and operators intending to operate within the RVSM airspace based on provisions of ICAO Annex 6 Part 1 Chapter 15 paragraph 15.2.3 and the guidance material contained in JAA Temporary Guidance Leaflet (TGL) N°6.
Conclusion 11/8:	**RVSM enforcement in national legislation** That States which have not done so, take the appropriate measures in order: a) to publish as a matter of urgency, an AIC informing the users of their intention to implement RVSM; b) to include the necessary provisions in their national legislation.
Conclusion 11/9:	**Funding of the RVSM implementation programme** That, National Governments, Regulatory bodies, operators, service providers and other stakeholders provide budgetary allocations for acquisitions and other activities necessary for ensuring that all the requirements are met in a timely manner in order to safely implement RVSM in the AFI Region.
Conclusion 11/10:	**Monitoring of Height Deviations** **That:** a) States which have radar at the ACC to conduct monitoring of aircraft height deviations, Assigned Altitude Deviations (AAD) in the AFI RVSM airspace; and b) The data collected in a) above be forwarded to ARMA for action.
Conclusion 11/11:	**Publication of AFI RVSM Safety Policy** That States expedite the publication of AIC on AFI RVSM Safety Policy using the sample at **Appendix B**.
Conclusion 11/12:	**Completion and signing of National Safety Plans** **That:** a) ICAO send a letter to ASECNA member States urging them to expedite the signing of their respective National Safety Plans and send to ARPO the signed copies as soon as possible but not later than **28 February 2007;** and b) ICAO urge the States of South Africa, Swaziland, La Reunion (France) and Mozambique to complete and sign their National Safety Plans (NSPs) and send them to ARPO as soon as possible but not later than **28 February 2007**.

Number	Title
Conclusion 11/13:	**State RVSM Readiness Assessment** **That:** a) ICAO urge, the States which have not completed their State RVSM readiness assessment to do so and forward to ARPO, as soon as possible however not later than **28 February 2007** using the questionnaire at **Appendix C**; and b) ICAO as far as possible, quality assure data supplied by States for accuracy.
Conclusion 11/14:	**Pre-Implementation Safety Case (PISC)** That, after the submission of the PISC to the RVSM project management team by ALTRAN Technologies Consultants by **31 December 2006** the AFI RVSM Task Force will determine the date of submission of PISC to the ANC.
Conclusion 11/15:	**AFI RVSM Core Airspace** **That:** a) for Req_{core}_12 (refer AFI FHA report at the ICAO website: www.icao.int/ESAF/RVSM) "Air/Ground Communication system shall be designed to ensure a total coverage of the RVSM Airspace with a minimum MTBF (Mean Time Between Failure) of two months for a given FIR"; and b) for Req_{core}_88 (refer to FHA report at the ICAO website: www.icao.int/ESAF/RVSM) "Aircraft shall be equipped with ACAS II version 7".
Conclusion 11/16:	**AFI RVSM Switch-Over Period** **That:**: a) for $_{swit}\_24$ (refer AFI FHA report at the ICAO website: www.icao.int/ESAF/RVSM) "Use of Eastbound RVSM FL (FL310, FL350 and FL390) shall be suspended for a period of Two (2) hours after the Time Zero (To)"; and b) for $_{swit}\_40$ (refer AFI FHA report at theICAO website: www.icao.int/ESAF/RVSM). "Traffic density shall be limited during switch-over period as appropriate"; and c) A Trigger NOTAM shall be published Two (2) weeks before Time Zero (To) notifying the implementation of RVSM and relevant procedures to be applied; and d) for $_{swit}\_25$ (refer AFI FHA report at the ICAO website: www.icao.int/ESAF/RVSM) "A NOTAM shall be published to suspend FL310, FL350 and FL390 for RVSM operations after ToS during a period of Two hours"; and

Number	Title
	e) for swit_35 (refer AFI FHA report at the ICAO website: www.icao.int/ESAF/RVSM) "Transit of non-RVSM civil aircraft shall be suspended for a period of Two hours after Time Zero (To)" and; f) for swit_36 (refer AFI FHA report at the ICAO website: www.icao.int/ESAF/RVSM) "Operation above FL410 shall be suspended for non-RVSM aircraft for a period of Two (2) hours after Time Zero (To)".
Conclusion 11/17:	**Airworthiness Certification for RVSM Operation.** That States having difficulties with the implementation of operational airworthiness certification on the RVSM implementation seek assistance from other States having this expertise;
Conclusion 11/18:	**AFI RVSM Implementation – Cost recovery** That IATA airlines continue to financially support the RVSM implementation effort in order to improve safety and economy of Air Traffic in AFI Region and keep the Task Force informed accordingly.
Conclusion 11/19:	**RVSM Optimal Switch Over Time** That States complete their national Switch-Over Plans using the specimen at **Appendix D** as soon as possible but not later than **28 February 2007**.
Conclusion 11/20:	**ATS Letters of Procedure/Agreement** That the template ATS Letter of Procedure/Agreement at **Appendix E** be used by States to update their current letter of Procedure/Agreement to incorporate RVSM procedures as soon as possible, but not later than 3 months before the RVSM implementation date.
Conclusion11/21:	**Amendment to the Regional Supplementary Procedures – Doc 7030/4** That the revised proposed amendments to the Regional Supplementary Procedures-Doc 7030/4 at **Appendix F** be processed by the secretariat in accordance with the established practice.
Conclusion 11/22:	**AFI RVSM Strategy/Action Plan** That the updated AFI RVSM Strategy/Action Plan at **Appendix G** be circulated to States for action.
Conclusion 11/23:	**Annex 10 - State Aircraft Addresses** That States establish and maintain their Mode S registers for inclusion in the ARMA Forms at **Appendix H** relevant to RVSM operations.

Number	Title
Conclusion 11/24:	**AFI RVSM ATC OPS Manual** That the sample AFI RVSM ATC OPS Manual at **Appendix I** be circulated to States to assist them to update their procedures where appropriate.
Conclusion 11/25:	**AFI RVSM Safety Assessment** That the AFI RVSM safety assessment process remains as documented in the AFI RVSM Safety policy.
Conclusion 11/26:	**Publication of AIC on GMU Height Monitoring** That ICAO request States to publish the AIC on GMU Height Monitoring at **Appendix J**.
Conclusion 11/27:	**Funding of ARMA** That the requirement to share the cost of maintaining the ARMA, for the benefit of the Region, will need to be addressed in the foreseeable future in line with the global approach.
Conclusion 11/28:	**Non Receipt of Flight Plans** **That:** a) ICAO undertake a survey relating to missing flight plans to understand the extent of the problem and identify the causes and propose remedial action and; b) the Project Management Team decide on the methodology to conduct such a survey.
Decision 11/1:	**Aircraft/Operators readiness survey** That, the results of ICAO/ARMA surveys be updated and presented at the RVSM TF meetings for consideration.
Decision 11/2:	**Rate of climb procedure for inclusion in amendment to Doc. 7030/4** That the Secretary carry out the appropriate enquiries at ICAO Headquarters to verify the necessity to include the following text in the AFI Doc 7030/4 revision related to RVSM **"Vertical rate of climb should be reduced to less than 1000 feet per minute in the last 1000 feet before reaching assigned flight level"**

Number	Title
Decision 11/3 :	**Alternative approach for the achievement of the TLS** That the TF noted the proposed alternative approach for the achievement of the TLS and that certain elements of this proposal would be considered by the PMT in conjunction with the result of the PISC, incorporating the second CRA and subsequently report it to TF 12.

PART II: REPORT ON AGENDA ITEMS

Report on Agenda Item 1

1. Review and follow-up of action of conclusions of the Tenth meeting of RVSM/RNAV/RNP Task Force (RVSM TF/10)and the Second RVSM Stakeholders meeting

1.1 Under this Agenda Item the meeting reviewed and noted the action taken on the conclusions of the tenth meeting of the RVSM/RNAV/RNP Task Force. It reinstated conclusions which were still in force and proposed the action to be taken before the next Task Force meeting planned for 23 -24 April 2007. The revised conclusions appear in Part 1 of this report.

Report on Agenda Item 2

2. Review of the major activities of the RVSM Task Force

2.1 The meeting was presented with several working papers relating to AFI RVSM covering the following:

2.2 AFI RVSM State Readiness Survey

2.2.1 The meeting recalled that in order for the consultants for RVSM to complete the pre-implementation safety case (PISC) in a timely manner there were certain elements which needed to be in place namely, the ALTRAN Consultant-Functional Hazard Analysis, the Collision Risk Assessment and the National Safety Plans, in order to prepare the PISC. Other elements of concern were the publication of AIC, the revised Letters of Procedure/Agreement (LOPs/LOAs), the publication of AFI Safety Policy on RVSM the development and approval of the National Safety Plans.

2.2.2 The meeting noted in particular the previous State readiness survey and decided there was need to conduct another survey before the implementation of RVSM.

ARMA Safety and Consolidated Readiness Assessment Report

2.2.3 The meeting was apprised on the current status of various elements relating to safety assessment and readiness survey namely; Functional Hazard Assessment, Collision Risk Assessment, National Safety Plans, the Pre-Implementation Safety Case, consolidated readiness assessment, large height deviations, GMU Height monitoring program and monthly FIR Traffic and associated returns to ARMA. The meeting endorsed the ARMA assessment that:

a) a sufficiently high proportion of operations, within the proposed RVSM band, will be conducted by approved operators and aircraft when RVSM is introduced.
b) the continued timely and accurate submission of all ARMA data forms by all FIRs remains essential to the success of RVSM implementation in AFI.

c) The PISC process and contributory documentation are at an advanced stage of development and the second CRA is receiving the appropriate priority.

2.2.4 The meeting called for States to:

a) continue collection of ARMA traffic data by all FIR's with the timely and accurate submission thereof to the ARMA in view of the second CRA and;
b) finalize the NPS's and obtain the required signatures.

Amendment to Doc.7030

2.2.5 The meeting noted that the PISC called for the amendment to Doc.7030 to include material on RVSM. In this regard, the Secretariat was requested to finalize the amendment proposal in accordance with the established practice. The meeting requested the Secretariat to determine whether it was appropriate to include the procedure on rate of climb in the amended Doc.7030. In view of the discussions it was decided:

Decision 11/2 - Rate of climb procedure for inclusion in Amendment to Doc. 7030/4

That the Secretary carry out the appropriate enquiries at ICAO Headquarters to verify the necessity to include the following text in the AFI Doc 7030/4 revision related to RVSM

"Vertical rate of climb should be reduced to less than 1000 feet per minute in the last 1000 feet before reaching assigned flight level".

2.2.6 In view of the decisions on Agenda Item 2, the following conclusions and decisions were formulated.

Conclusion 11/1: Safety assessment data and incident reporting

That:

a) **States pursue stringent incident reporting measures and take appropriate remedial actions as required by the CRA report in order to contribute to a positive total TLS; and**
b) **States intensify their efforts in reducing the incident rates to support positive CRA results;**

Conclusion 11/2: Target date for AFI RVSM Implementation

That:

a) **The actual date/time of implementation of RVSM will be determined taking into account:**

i) The completion of the activities in the AFI RVSM Strategy/Action Plan;
ii) The development of an acceptable PISC which includes an acceptable CRA and its subsequent approval by the ANC;
iii) The approval by ICAO ANC of AFI RVSM Regional SUPP's (Doc.7030/4) relating to RVSM; and

b) The target date for implementation of RVSM in the AFI Region will be determined by the Task Force, after the second CRA, which is to be undertaken, and the completion of the other outstanding elements of the PISC.

Conclusion 11/3: Civil/Military Coordination/Seminars

That:

a) in order to ensure the safe and coordinated implementation of RVSM in the AFI Region, ICAO and States ensure that the military aviation authorities are fully involved in the planning and the implementation process; and
b) seminars and workshops be conducted on civil military coordination.

Conclusion 11/4: Reporting of data for monitoring and/or carrying out safety assessment

That:

a) All States institute the procedures for reporting of data, incidents and conditions necessary for performing the collision risk calculations prerequisite for RVSM implementation to the AFI Regional Monitoring Agency (ARMA). The data will include, but not necessarily be limited to:
   (i) Height deviations of 300 ft or more;
   (ii) Total number of IFR movements for each month;
   (iii) The average time per movement spent in the level band FL 290 to FL 410;
   (iv) ATC coordination failures;
   (v) Turbulence;
   (vi) Traffic data; and
b) GPS Monitoring Unit (GMU) is being used for height monitoring where appropriate in the AFI Region, which will be coordinated by the ARMA; and
c) ARMA compile a list of non contributing States, regarding traffic flow data, and submit to Task Force meetings as appropriate for consideration and remedial action; and
d) States continue to provide the required safety assessment data to ARMA on a monthly basis using Forms 1, 2, 3 and Form 4; and
e) That ICAO urge Tunisia and Morocco to provide ICAO and ARMA with the required safety assessment data on a monthly basis using ARMA forms 1, 2, 3 and 4;

Conclusion 11/5: Implementation of RVSM in the AFI Region

That:

a) **All RVSM implementation preparation works (safety, assessment, training) be done taking into consideration the FL 290 and FL 410 inclusive, being the AFI RVSM airspace; and**
b) **Implementation of RVSM in the AFI Region be harmonized and coordinated within the AFI Region as well as with the adjacent Regions.**

Conclusion 11/6: Training of all personnel involved with the implementation of RVSM in the AFI Region

That:

a) **On site training courses be conducted to expedite the training process;**
b) **In order to ensure uniformity in the training, States shall use the AFI RVSM training material;**
c) **Seminars continue to be organized in the Region for training all personnel involved in the implementation of RVSM;**
d) **States having difficulties in implementing RVSM implementation training may either individually or in group explore the possibility of seeking outside expertise;**
e) **States provide refresher training to Controllers and ensure that proficiency checks for ATCOs are done; and**
f) **IFALPA provide to the PMT revised comprehensive Pilot Training RVSM Guidance material for provision to AFI States for dissemination to operators.**

Conclusion 11/7:Guidance material for Airworthiness and Operational Approval

That, ICAO urge States which have not done so, to include in their national legislation and regulations the Airworthiness and Operational Approval process for aircraft and operators intending to operate within the RVSM airspace based on provisions of ICAO Annex 6 Part 1 Chapter 15 paragraph 15.2.3 and the guidance material contained in JAA Temporary Guidance Leaflet (TGL) N°6.

Conclusion 11/8: RVSM enforcement in national legislation

That States which have not done so, take the appropriate measures in order:

a) **to publish as a matter of urgency, an AIC informing the users of their intention to implement RVSM;**
b) **to include the necessary provisions in their national legislation.**

Conclusion 11/9: Funding of the RVSM implementation programme

That, National Governments, Regulatory bodies, operators, service providers and other stakeholders provide budgetary allocations for acquisitions and other activities necessary for ensuring that all the requirements are met in a timely manner in order to safely implement RVSM in the AFI Region.

Conclusion 11/10: Monitoring of Height Deviations

That:

a) **States which have radar at the ACC to conduct monitoring of aircraft height deviations, Assigned Altitude Deviations (AAD) in the AFI RVSM airspace; and**
b) **The data collected in a) above be forwarded to ARMA for action.**

Conclusion 11/11: Publication of AFI RVSM Safety Policy

That States expedite the publication of AIC on AFI RVSM Safety Policy using the sample at Appendix B.

Conclusion 11/12: Completion and signing of National Safety Plans

That:

a) **ICAO send a letter to ASECNA member States urging them to expedite the signing of their respective National Safety Plans and send to ARPO the signed copies as soon as possible but not later than 28 February 2007; and**
b) **ICAO urge the States of South Africa, Swaziland, La Reunion (France) and Mozambique to complete and sign their National Safety Plans (NSPs) and send them to ARPO as soon as possible but not later than 28 February 2007.**

Conclusion 11/13: State RVSM Readiness Assessment

That:

a) **ICAO urge, the States which have not completed their State RVSM readiness assessment to do so and forward to ARPO, as soon as possible however not later than 28 February 2007 using the questionnaire at Appendix C; and**
b) **ICAO as far as possible, quality assure data supplied by States for accuracy.**

Conclusion 11/14: Pre-Implementation Safety Case (PISC)

That, after the submission of the PISC to the RVSM project management team by ALTRAN Technologies Consultants by 31 December 2006 the AFI RVSM Task Force will determine the date of submission of PISC to the ANC.

Conclusion 11/15: AFI RVSM Core Airspace

That:

a) **for Req_{core}_12 (refer AFI FHA report at the ICAO website: www.icao.int/ESAF/RVSM) "Air/Ground Communication system shall be designed to ensure a total coverage of the RVSM Airspace with a minimum MTBF (Mean Time Between Failure) of two months for a given FIR"; and**
b) **for Req_{core}_88 (refer to FHA report at theICAO website: www.icao.int/ESAF/RVSM) "Aircraft shall be equipped with ACAS II version 7".**

Conclusion 11/16:AFI RVSM Switch-Over Period

That:

a) **for $_{swit}\_24$ (refer AFI FHA report at the ICAO website: www.icao.int/ESAF/RVSM) "Use of Eastbound RVSM FL (FL310, FL350 and FL390) shall be suspended for a period of Two (2) hours after the Time Zero (To)"; and**
b) **for $_{swit}\_40$ (refer AFI FHA report at theICAO website: www.icao.int/ESAF/RVSM). "Traffic density shall be limited during switch-over period as appropriate"; and**
c) **A Trigger NOTAM shall be published Two (2) weeks before Time Zero (To) notifying the implementation of RVSM and relevant procedures to be applied; and**
d) **for $_{swit}\_25$ (refer AFI FHA report at the ICAO website: www.icao.int/ESAF/RVSM) "A NOTAM shall be published to suspend FL310, FL350 and FL390 for RVSM operations after ToS during a period of Two hours"; and**
e) **for $_{swit}\_35$ (refer AFI FHA report at the ICAO website: www.icao.int/ESAF/RVSM) "Transit of non-RVSM civil aircraft shall be suspended for a period of Two hours after Time Zero (To)" and;**
f) **for $_{swit}\_36$ (refer AFI FHA report at the ICAO website: www.icao.int/ESAF/RVSM) "Operation above FL410 shall be suspended for non-RVSM aircraft for a period of Two (2) hours after Time Zero (To)".**

Conclusion 11/17: Airworthiness Certification for RVSM Operation.

That States having difficulties with the implementation of operational airworthiness certification on the RVSM implementation seek assistance from other States having this expertise;

Conclusion 11/18: AFI RVSM Implementation – Cost recovery

That IATA airlines continue to financially support the RVSM implementation effort in order to improve safety and economy of Air Traffic in AFI Region and keep the Task Force informed accordingly.

Conclusion 11/19: RVSM Optimal Switch Over Time

That States complete their national Switch-Over Plans using the specimen at Appendix D as soon as possible but not later than 28 February 2007.

Conclusion 11/20: ATS Letters of Procedure/Agreement

That the template ATS Letter of Procedure/Agreement at Appendix E be used by States to update their current letter of Procedure/Agreement to incorporate RVSM procedures as soon as possible, but not later than 3 months before the RVSM implementation date.

Conclusion11/21: Amendment to the Regional Supplementary Procedures – Doc 7030/4

That the revised proposed amendments to the Regional Supplementary Procedures-Doc 7030/4 at Appendix F be processed by the secretariat in accordance with the established practice.

Conclusion 11/23: Annex 10 - State Aircraft Addresses

That States establish and maintain their Mode S registers for inclusion in the ARMA Forms at Appendix H relevant to RVSM operations.

Conclusion 11/24: AFI RVSM ATC OPS Manual

That the sample AFI RVSM ATC OPS Manual at Appendix I be circulated to States to assist them to update their procedures where appropriate.

Conclusion 11/25: AFI RVSM Safety Assessment

That the AFI RVSM safety assessment process remains as documented in the AFI RVSM Safety policy.

Conclusion 11/26: Publication of AIC on GMU Height Monitoring

That ICAO request States to publish the AIC on GMU Height Monitoring at Appendix J.

Decision 11/1: Aircraft/Operators readiness survey

That, the results of ICAO/ARMA surveys be updated and presented at the RVSM TF meetings for consideration.

Report on Agenda Item 3

3. RVSM Safety Assessment Issues

3.1 The meeting recalled that RVSM Safety Assessment, the AFI RVSM collision risk assessment (CRA) report as conducted by NLR was presented to the Task Force. The CRA concluded that AFI does not meet the target level of safety as required by ICAO for implementation. The study concluded that AFI exceeded the required TLS of 5x10-9 fatal accidents per flight hour by a factor of 13.

3.2 The meeting was presented with a paper dealing with alternative perspective in relation to safety assessment and their relationship with the Target Level of Safety (TLS) approach to the implementation of system improvements under the safety management systems concept.

3.3 The paper compared the current system of reaching the TLS and an alternative flexible approach based on current ICAO provisions in RVSM manual, manual on Safety Management the experience from the other regions where RVSM is implemented and considered the following issues:

a) There is little demonstrable, direct, significant causal-effect relationship between RVSM implementation and meeting/maintaining a TLS of $5x10^{-9}$.

b) Post implementation experience in other regions indicate that achieving $5x10^{-9}$ before RVSM and maintaining after implementation may not be realistic.

c) The TLS method of assessing safety is a reactive measurement tool that does not actively help in identifying latent hazards in the system. Creates a false sense of security.

d) The RVSM Implementation Manual gives PIRGS alternate metrics and methods for the establishment of acceptable levels of safety.

3.4 The meeting discussed at length the contents of the paper and the issue of an alternative flexible approval to reaching an applicable CRA for the PISC while aiming at achieving the final TLS of 5×10^{-9} desired for the implementation of RVSM. The full paper appears at **Appendix K** to this report.

In light of the discussions, it was decided:

Decision 11/3 : Alternative approach for the achievement of the TLS

That the TF noted the proposed alternative approach for the achievement of the TLS and that certain elements of this proposal would be considered by the PMT in conjunction with the result of the PISC, incorporating the second CRA and subsequently report it to TF 12.

Funding of the RMA

3.5 The meeting was apprised on the discussions at ALLPIRG/5 relating to the Global approach to funding RMA. The meeting requested the Task Force to put in its programme all issues relating to funding of RMA and provide the update at all meetings of the Task Force.

In view of the discussions the following conclusion was formulated:

Conclusion 11/27: Funding of ARMA

That the requirement to share the cost of maintaining the ARMA, for the benefit of the Region, will need to be addressed in the foreseeable future in line with the global approach.

Non-receipt of Flight Plans

3.6 The meeting also discussed relating to non-receipt of flight plans at the respective ACCs and reiterated that there was a need to investigate the root cause of the problems. In light of the discussions the meeting formulated the following conclusion:

Conclusion 11/28: Non Receipt of Flight Plans

That:

a) **ICAO undertake a survey relating to missing flight plans to understand the extent of the problem and identify the causes and propose remedial action and;**
b) **the Project Management Team decide on the methodology to conduct such a survey.**

Report on Agenda Item 4

4. Review and update the AFI RVSM Strategy/Action Plan.

4.1 The meeting recalled that in noting the APIRG/14 Conclusion 14/21 (implementation of RVSM in the AFI Region) the ANC had expressed its concern that RVSM required a sophisticated implementation process and requested the States to monitor preparations and assist, to the extent possible, as an acceptable level of safety should be achieved and maintained.

4.2 The meeting noted that the ANC emphasized the provision of ATC and the required CNS facilities and services as a pre-requisite to the RVSM implementation. The ANC further requires the Pre-Implementation Safety Case to be presented for approval.

4.3 Furthermore, the meeting agreed that the updated AFI RVSM strategy/action plan at **Appendix G** be circulated to States for action.

4.4 The meeting agreed that the implementation of RVSM in AFI should be pursued in a pragmatic manner and in detail following the steps in the updated strategy/action plan. The meeting agreed that the strategy/action plan will be reviewed at each of the TF meetings before any decision is made to implement the RVSM. In light of the discussion, the following conclusion was formulated:-

Conclusion 11/22: AFI RVSM Strategy/Action Plan

That the updated AFI RVSM Strategy/Action Plan at Appendix G be circulated to States for action.

INTERNATIONAL CIVIL AVIATION ORGANIZATION
EASTERN AND SOUTHERN AFRICAN OFFICE

RVSM/RNAV/RNP/TF/11 MEETING (NAIROBI, 30 NOVEMBER 2006 TO 1 DECEMBER 2006)

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INTERNATIONAL CIVIL AVIATION ORGANIZATION
EASTERN AND SOUTHERN AFRICAN OFFICE

AFI REDUCED VERTICAL SEPARATION MINIMUM (RVSM) SAFETY POLICY

TABLE OF CONTENTS

AFI REDUCED VERTICAL SEPARATION MINIMUM (RVSM) SAFETY POLICY

1. INTRODUCTION

This document, the RVSM Safety Policy Document, sets out the Safety Policy, the Safety Objectives and describes the RVSM Safety Sub-Program tasks and actions necessary to ensure the safe implementation of RVSM in the AFI region.

The RVSM Safety Policy Document is intended to provide a framework to facilitate the safety regulation process of the AFI RVSM Program. As such, it is considered to be a formal deliverable of the RVSM Program.

The RVSM Safety Policy Document describes the deliverables of the RVSM Safety Sub-Program together with their role in the overall AFI RVSM Program and in the national safety assurance programs.

2. RVSM OPERATIONAL CONCEPT

The principal concept behind RVSM is the reduction of the vertical separation minimum between adjacent aircraft from 2000 feet to 1000 feet between the Flight Levels FL290 and FL410 inclusive. This will provide six additional cruising levels to air traffic, increase the capacity of the Air Traffic Management system and facilitate the task of Air Traffic Services in maintaining a safe, orderly and expeditious flow of traffic. It can be expected that the capacity and system benefits of RVSM will, by facilitating the Air Traffic Control function, also have the potential for possible safety benefits.

This vertical separation minimum shall be applied between RVSM approved aircraft within the airspace of the designated RVSM airspace. Therefore, all operators proposing to operate across the lateral limits of the RVSM airspace shall be required to indicate on Filed Flight Plans their RVSM status. Non-RVSM approved aircraft, other than state aircraft, shall not be permitted to operate within RVSM airspace.

There will be no RVSM Transition Airspace within the AFI Region.

The RVSM Program requires that specific training for aircrew and ATC staff shall be performed prior to the start of RVSM operations. The Program also requires ATC equipment and procedures to be modified according to specific Program requirements prior to the start of RVSM operations.

3. AFI RVSM PROGRAM SAFETY POLICY

The Safety Policy for RVSM implementation has been established to meet the requirements of ICAO Standards and Recommended Practices and guidance material on managing collision risk consequent on the implementation of RVSM.

The following statements define the Safety Policy of the RVSM Program:

(i) The AFI RVSM Program uses an explicit, pro-active approach to safety management in the development, implementation and continued operation of RVSM.

(ii) The responsibility of management for the safety performance of the RVSM Program is recognised. The RVSM Program Manager is responsible for the overall management of the Program. The RVSM Safety Program Manager is responsible to the RVSM Program Manager for ensuring the compliance of the Program with AFI Safety Policy and appropriate international standards and requirements. The RVSM Safety Program Manager is also responsible for liaison with the Regulation Authorities.

(iii) The implementation of RVSM shall be conducted in accordance with ICAO requirements and requires ninety percent RVSM approved aircraft operating within the Region;

(iv) The safety of air navigation has been given the highest priority in the development of the RVSM operational concept and the Implementation Program;

(v) The RVSM Program shall minimise the program's contribution to the serious or risk bearing incidents or aircraft accidents as far as is reasonably practicable.

4. RVSM IMPLEMENTATION SAFETY OBJECTIVES

(i) The RVSM Program shall conduct a full Functional Hazard Analysis looking at the whole system including air and ground segments and the proposed operational concept. This analysis shall adopt a total aviation system perspective and a risk based approach to the classification of hazards. The analysis shall include, but not be restricted to, those risks already identified by ICAO for RVSM implementation;

(ii) The RVSM Program shall, as its principal safety objective, minimise the program's contribution to the risk of an aircraft accident. The RVSM Program recognises the AFI Safety Objectives and Strategy, in particular the general objective to improve safety levels by ensuring that the number of ATM induced accidents and serious or risk bearing incidents do not increase and, where possible, decrease. Therefore, the implementation of RVSM shall not adversely affect the risk of en-route mid-air collision;

(iii) The RVSM Program shall establish an explicit Safety Sub-Program to ensure that Program's contribution to the risk of an aircraft accident is minimised in accordance with the principal safety objective;

(iv) In accordance with ICAO Guidance Material the management of vertical collision risk within RVSM airspace shall meet the Target Level of Safety of 5 x 10^{-9} fatal accidents per flight hour;

(v) In accordance with ICAO Guidance Material, the risk of mid-air collision in the vertical dimension within RVSM airspace, due to technical height keeping performance, shall meet a Target Level of Safety of 2.5 x 10^{-9} fatal accidents per flight hour.

(vi) Guidance shall be given to the States to explain the necessary activities to provide evidence about the safe implementation of RVSM on the national level and subsequently assure the preparedness of the States.

Safety Requirements that may arise as results from the detailed Functional Hazard Analysis that yet has to be carried out will complement these Safety Objectives.

5. RVSM IMPLEMENTATION SAFETY OBJECTIVES

As part of the RVSM Program, an RVSM Safety Sub-Program has been developed to provide evidence on the compliance of the Implementation Program with the RVSM Safety Policy and the RVSM Safety Objectives.

The work program of the RVSM Safety Program comprises the following elements:

(i) Detailed Hazard Analysis, Preliminary System Safety Assessment and System Safety Assessment of the proposed RVSM operational concept;

(ii) Assessment of operational error reports, both prior to and after implementation, to identify any additional risks and hazards associated with the proposed operational concept and to provide data for the assessment of the target levels of safety;

(iii) Establishment of formal requirements for participating states to demonstrate that all necessary national activities and actions have been undertaken prior to implementation.

(iv) Assessment of the risk of mid-air collision, using methods specified in ICAO guidance material;

(v) A major assessment of aircraft height keeping performance to monitor compliance with height keeping requirements.

Each of these elements will produce deliverables, in the form of reports, which will be formally presented to the ARTF as the Program proceeds.

6. RVSM SAFETY DELIVERABLES

In this section, the major deliverables of the RVSM Safety Sub-Program are described. Although the deliverables are in the form of formal documents, interim reports will be provided for review prior to completion of the final version of a deliverable document.

6.1 RVSM Functional Hazard Analysis

A detailed Functional Hazard Analysis (FHA) shall be carried out to provide assurance that all hazards and risks associated with RVSM have been identified and classified. The FHA shall cover (i) the situation that RVSM is operational one year after its introduction, (ii) the change-over on the day of RVSM introduction. The results of the FHA shall be documented in a detailed report and a hazard/risk matrix. It will be used as input to the Collision Risk Assessment and the National Safety Cases where appropriate. A summary of the results will constitute one chapter of the AFI RVSM Pre-Implementation Safety Case and the detailed report will appear as an Annex.

6.2 Collision Risk Assessment

A Collision Risk Assessment (CRA) shall be carried out in order to provide the evidence that the collision risk in RVSM airspace meets the Target Level of Safety required by ICAO. A summary of the results will form one chapter of the AFI RVSM Pre-Implementation Safety Case and the detailed report will appear as an Annex.

6.3 National Safety Plans

Guidance shall be given to the States to explain the necessary activities to provide evidence about the safe implementation of RVSM on the national level. Using the guidance material National Safety Plans should be produced by the States, submitted to the National Regulator as appropriate and shall be summarised by the RVSM Safety Sub-Program in to order to form one section of the AFI RVSM Pre-Implementation Safety Case.

6.4 AFI RVSM Pre-Implementation Safety Case

The AFI RVSM Pre-Implementation Safety Case shall provide the assurance that the objectives stated in the AFI RVSM Safety Policy Document are met. Evidence will be provided that (i) all identified hazards and risks are managed and mitigated, (ii) the collision risk meets the ICAO Target Level of Safety and (iii) States show they will safely implement RVSM through the development of national safety documentation.

6.5 AFI RVSM Post-Implementation Safety Case

The required contents of the Post-Implementation Safety Case will be developed as a result of the pre-implementation safety activities. However, the main objective will be to confirm assumptions and estimations being made in order to determine if in an operational RVSM environment the safety objectives can be met. It is expected that the document demonstrates *inter alia* that safety is continuously ensured, the aircraft approval process is effective, the target levels of safety are being met, operational errors do not increase and ATC procedures introduced for RVSM remain effective.

RVSM IMPLEMENTATION READINESS ASSESSMENT SURVEY: AFI REGION

State	

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
RVSM Implementation Program						
1. RVSM Implementation Program – Target Date 28 September 2006	Is the National RVSM Implementation plan/Program harmonized with the AFI RVSM Regional Implementation Plan?					Conclusion: ARTF 4/5
	Has your administration developed an RVSM aircraft and operators approval program?					Conclusion: ARTF 4/7
	Has your Administration submitted a National RVSM Implementation plan/Program to ICAO Regional Program Office?					Conclusion: ARTF 4/11 National RVSM Plan
	Has the National RVSM Implementation plan/Program taken into account the users requirements?					Doc. 9574 Chapter 3 National RVSM Plan
	Has the administration determined the RVSM status of the national fleet?					Doc. 9574 Chap 3 Conclusion: ARTF 4/11 & ARTF 4/12
	Has your administration disseminated the National RVSM Implementation Program to all stakeholders?					Conclusion: ARTF 4/11 National RVSM Plan
	Has the administration designated the National Program Manager for the RVSM implementation program?					Conclusion: 4/3 National RVSM Plan

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
RVSM Implementation Program						
	Has your administration designated an ATS Manger responsible for the ATM RVSM Sub-program?					National RVSM Plan
	Has your administration designated a Manager responsible for aircraft OPS/Airworthiness sub-program?					National RVSM Plan
	Has the administration designated a Manager responsible RVSM Safety Sub-Program?					Conclusion: 4/18 National RVSM Plan
	Will RVSM be implemented in the airspace on the date agreed upon by AFI?					Conclusion : ARTF 4/5
	Has your administration published the procedures to accommodate aircraft in RVSM airspace?					Conclusion: ARTF 4/11 National RVSM Plan
	Has your administration made provision to accommodate non-RVSM State aircraft in RVSM airspace?					Conclusion: ARTF 4/9 ICAO Doc 7030/4 National RVSM Plan
	Have national rules/regulations been developed/published for RVSM implementation?					Conclusion: ARTF 4/8

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
RVSM Implementation Program						
	Has your administration assess the impact of RVSM implementation on controller automation systems and plan for upgrades/ modifications?					Conclusion: ARTF 4/11 National RVSM Plan
	Have documents related with RVSM approval of aircraft and operators of the JAA Temporary Guidance Leaflet (TGL) 6 y/o FAA Document 91 RVSM been adopted?					Conclusion: ARTF 4/7
	Has the RVSM Advisory Circular been adopted for RVSM approval of aircraft and operators?					Conclusion: ARTF 4/7
	Has your Administration established National RVSM approved Aircraft Database?					Doc. 9574 Conclusion: ARTF 4/4
	Are RVSM approvals granted to aircraft and/or operators registered in your State?					Conclusion: ARTF 4/12
	Is a letter of Authorization issued when RVSM approval to individual aircraft granted?					
	Has AFI Regional monitoring Agency (ARMA) form been completed to communicate the status of RVSM approval or withdrawal to ARMA?					Conclusion: ARTF 4/4

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
RVSM Implementation Program						
	Has the Guidance material on the implementation of a 300 M (1000 FT) vertical separation minimum between FL290 and FL410 inclusive for application in the airspace of the AFI Region been adopted?					Conclusion: ARTF 4/4
	Has National RVSM implementation legislation been published?					Doc. 9574 Conclusion: ARTF 4/8
	Has the AIC been published in advance informing stakeholders of the date for RVSM implementation?					Conclusion: ARTF 4/11
	Is the administration disseminating RVSM legislation and documentation through adequate means?					Conclusion: ARTF 4/11
	Has the Guidance material on the implementation of a 300 M (1000 FT) vertical separation minimum between FL290 and FL410 inclusive for application in the airspace of the AFI Region been adopted?					Conclusion: ARTF 4/4
						Conclusion: ARTF 4/18

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
Operations & Airworthiness						
	Has your administration analysed the impact that would have in RVSM implementation if the required documentation were not taken into account?					
2. RVSM Operations &Airworthiness	Has your administration implemented the National RVSM Operator/ Aircraft approval Program?					Doc. 9574 Chapter 4.2 Conclusion: ARTF 2/8 & ARTF 4/11
	Does the program cover aircraft airworthiness certification (approval of modifications and major repairs) and operational separately?					Doc. 9574 Chapter 4 National RVSM Plan
	Will the program be completed before the RVSM implementation date 28 September 2006?					National RVSM Plan Conclusion: APIRG 14/21
	Has your Administration adopted TGL6 Revision 1 for approval of operators/aircraft for RVSM Operations?					Doc. 9574 Chapter 4 Conclusion: ARTF 4/7
	Has your administration published the National RVSM Operator/ Aircraft approval Legislation?					Doc. 9574 Chapter 4 Conclusion: ARTF4 2/8 & ARTF 4/8

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
Operations & Airworthiness						
	Has your administration published the required maintenance program to ensure RVSM airworthiness?					Doc. 9574 Chapter 5 National RVSM Plan
	Has your administration developed a Database for RVSM approved aircraft?					Doc. 9574 Chapter 5 Conclusion: ARTF4 4/11 National RVSM Plan
	Has your administration completed a RVSM approved aircraft readiness assessment?					Conclusion: ARTF4 4/12
3. RVSM Operations & Airworthiness Training	Has an RVSM training program been prepared for OPS/Airworthiness personnel?					Doc. 9574 Chapter 4/5 Conclusion: ARTF 4/6 & ARTF 4/11
	Does the program cover aircraft airworthiness certification (approval of modifications and major repairs) and operational (procedures approval and operator training program) separately?					Doc. 9574 Chapter 4 Conclusion: ARTF 4/7
	Will the program be completed before the RVSM implementation date 28 September 2006? If such were the case, the finalization of the training program?					Conclusion: APIRG 14/21
	Does the program have the RVSM training material in OPS/ Airworthiness areas?					

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
Operations & Airworthiness						
	Which documentation did the administration use to prepare RVSM training material?					
	Has the training material been approved by the corresponding authority?					
	How many phases are envisaged for the training?					
	Has OJT been foreseen and completed before RVSM implementation date?					
	Does the administration make sure that personnel training is appropriate and carried out in a professional manner?					
	Do OPS/Airworthiness instructors have sufficient experience?					
	Are the OPS/Airworthiness instructors used for training qualified to provide on the job training (OJT)?					
	Can the administration assure that the necessary time for an appropriate training was used or will be used?					
	Does training include the establishment of adequate refresher courses, if necessary?					

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
Air Traffic Management						
	Has the administration analysed the impact that would have in RVSM implementation if the requirements for personnel training were not taken into account?					
4. Modification in the Airspace Structure	Has your Administration implemented your RVSM National Plan?					Conclusion: ARTF 4/3 National RVSM Plan
	Will your Administration implement RVSM in the Airspace as identified by AFI?					
	Has your administration identified new entry/exit points to RVSM airspace?					Doc. 9574 National RVSM Plan
	Has your administration identified modifications to the existing route network?					Doc. 9574 National RVSM Plan
	Has your administration designated transition airspaces between RVSM and non-RVSM airspaces?					Doc. 9574 National RVSM Plan
	Has your administration identified Modifications in airspace sectorization for RVSM purposes?					Doc. 9574 Chapter 5 Conclusion: 2/13
	If such were the case, was the airspace structure subject to simulations?					Doc. 9574 National RVSM Plan

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
Air Traffic Management						
5. ATC Procedures	Has your administration identified changes in civil/military coordination?					Doc. 9574 Chapter 5 Conclusion: ARTF 4/2
	Does you administration consider air traffic flow management for your State?					
	Has the administration adopted the Cruise Levels Table of Appendix to ICAO Annex for the assignment of cruise levels in RVSM airspace?					Annex 2 Conclusion : ARTF 2/13
	Has the administration adopted adequate national contingency procedures?					Doc. 9574 Chapter 5 ICAO Doc 7030/4 Conclusion: ARTF 4/9 National RVSM Plan
	Have the procedures been duly supervised in order not to affect the safety in air operations?					Doc. 9574 Chapter 3
	Has ICAO guidance material been used in the preparation of procedures?					Conclusion: ARTF 2/13 National RVSM Plan
	The procedures and associated phraseology been included in the operational manual of the ATS unit?					Doc. 9574 Chapter 5 Conclusion: ARTF 2/13 National RVSM Plan
	Has ATC procedures been reviewed with operational personnel from ATC units?					Doc. 9574 Chapter 5 Conclusion: ARTF 3/6 National RVSM Plan

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
Air Traffic Management						
	Have the procedures affecting adjacent ATS been duly coordinated, approved and included in the letters of operational agreement?					Doc. 9574 Chapter 5 Conclusion: ARTF 4/11 National RVSM Plan
	Have ATC procedures and associated phraseology been subject to simulations?					Doc. 9574 Chapter 5 Conclusion : ARTF 3/6 National RVSM Plan
	Are RVSM ATC procedures being disseminated by the adequate means?					Conclusion: ARTF 4/11
	Has the administration analysed the impact it would have in RVSM implementation if the changes required have not been taken into account?					Doc. 9574 Chapters 3/5. National RVSM Plan

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
Air Traffic Management						
6. ATC Equipment	Does your administration has a modification plan of ATC equipment as a result of RVSM?					Doc. 9574 Chap. 5 Conclusion: ARTF2/13 National RVSM Plan
	Has your administration ensured that modifications in ATC equipment are appropriate?					Doc. 9574 Chap. 3 Conclusion: ARTF 4/11
	Do changes circumscribe to FDPS?					Doc. 9574 Chap. 3 National RVSM Plan
	Do changes circumscribe to RDPS?					Doc. 9574 Chap. 3 National RVSM Plan
	Do changes circumscribe to visualizing?					Doc. 9574 Chap. 3 National RVSM Plan
	Do changes circumscribe to STCA?					Doc. 9574 Chap. 3 National RVSM Plan
	Do changes circumscribe to MTCA?					Doc. 9574 Chap. 3 National RVSM Plan
	Do changes circumscribe to the systems software?					Doc. 9574 Chap. 3 National RVSM Plan
	Do changes circumscribe to ATC simulators?					Doc. 9574 Chap. 3 National RVSM Plan
	Does your administration have a contingency plan in case of delays in case of suffering delays in ATC equipment updating?					Doc. 9574 Chap. 5

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
Air Traffic Management						
7. RVSM ATCO Training	Has an RVSM training program been prepared for ATCOs?					Doc. 9574 Chap. 5 Conclusion: ARTF 3/6
	Is the program addressed for all ATC personnel?					Doc. 9574 Chap. 5 Conclusion: ARTF4/11
	Shall the program be completed before the RVSM implementation dated 28 September 2006? If such were the case, indicate finalization date of training program.					Conclusion: APIRG 14/21 Doc. 9574 Chap. 5 National RVSM Plan
	Does the program contemplate aspects related with the responsibilities of ATCOs?					Doc. 9574 Chap. 5 National RVSM Plan
	Does the program have RVSM training material?					Doc. 9574 Chap. 5 Conclusion: ARTF2/13 National RVSM Plan
	Which documentation did the administration use to elaborate RVSM?					Doc. 9574 Chap. 5 National RVSM Plan
	Has the training material been prepared under strict control and approved by the Operational Unit or the corresponding training centre?					Doc. 9574 Chap. 5 Conclusion: ARTF 3/6 National RVSM Plan
	Has OJT been programmed? When will this program end?					Doc. 9574 Chap. 5 National RVSM Plan

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
Air Traffic Management						
	Does the administration ensure that the personnel training is appropriate and is carried out professionally?					Doc. 9574 Chap. 5 National RVSM Plan
	Do instructors have training and sufficient knowledge of RVSM Operations and do/did they have experience enough?					Doc. 9574 Chap. 5 National RVSM Plan
	Are instructors used in training or were they qualified to provide OJT training?					Doc. 9574 Chap. 5 National RVSM Plan
	May the administration ensure that the necessary time is or was used for an appropriate training?					Doc. 9574 Chap. 5 National RVSM Plan
	Does your administration foresee to establish adequate refreshing courses?					Doc. 9574 Chap. 5 National RVSM Plan
	Has your administration analysed the impact it would have in RVSM implementation if no personnel training requirements were taken into account?					Doc. 9574 Chap. 5 National RVSM Plan

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
RVSM Safety Assurance						
8. RVSM Safety Assurance from FL 290 to FL 410 inclusive	Has your Administration implemented your RVSM National Safety Plan?					Doc. 9574 Chap. 3 Conclusion: ARTF 4/18 & ARTF 4/19
	Is the National RVSM Safety plan harmonized with the AFI RVSM Safety Policy?					Conclusion: ARTF 4/11
	Has your Administration submitted a National RVSM Safety plan to ICAO Regional Program Office?					Conclusion: ARTF 4/11
	Has your Administration informed National Operators of RVSM Implementation requirements?					National RVSM Plan
	Has your Administration adopted TGL6 Revision 1 for approval of operators/aircraft for RVSM Operations?					Doc. 9574 Chapter 3 Conclusion: ARTF 4/7
	Has your administration implemented the National RVSM Operator/ Aircraft approval Program?					Doc. 9574 Chap. Conclusion: ARTF 4/12
	Has your administration disseminated the National RVSM Implementation Program to all stakeholders?					Conclusion: ARTF4/11

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
RVSM Safety Assurance						
	Has your administration implemented the National RVSM ATS Training Program?					
	Has your administration published guidelines for RVSM Pilot Training?					Conclusion: ARTF 4/11 National RVSM Plan
	Has your administration developed a program for changes to ATC equipment to support the implementation of RVSM?					Conclusion: ARTF 4/11 National RVSM Plan
	Has the changes to ATS Equipment satisfactorily been installed?					Conclusion: ARTF4/17 National RVSM Plan
	Has the changes to ATS Procedures been approved?					Conclusion: ARTF 4/5 & 4/17
	Has your administration published the procedures to accommodate aircraft in RVSM airspace?					Conclusion: ARTF 4/8 & 4/9 National RVSM Plan
	Has the ATC Manual been approved?					Conclusion: ARTF 2/7 & ARTF4/11 National RVSM Plan
	Is the ATC Manual consistent with ICAO Doc 7030/4?					Conclusion: ARTF 4/9
	Has your administration coordinated the procedures required for RVSM at the ACC with adjacent ACCs?					

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
RVSM Safety Assurance						
	Has your administration amended the required Letters of Agreement (LoA) with adjacent ACCs for RVSM Operations?					Conclusion: ARTF 4/11
	Has the ATSU Operations Manual been amended to include changes as a result of RVSM?					
	Has your administration approved the changes to airspace design to support the implementation of RVSM?					
	Has your administration developed special procedures to enable safe switchover to RVSM?					
	Has your administration developed a program for ATC to report operational data errors?					Conclusion: ARTF 4/4

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
	RVSM Monitoring					
9. RVSM Operations Monitoring	Has the administration established adequate measures so that there is a monitoring before, during and after RVSM implementation in order to verify that the safety level is met?					Annex 11 Para. 2.26 Conclusion: ARTF 2/1 Conclusion: ARTF 4/4 National RVSM Plan
	Does the administration demand the operators/users the presentation of a monitoring program of aircraft for its approval?					
	Has the administration implemented a data collection program of large height deviations (LHD)?					Conclusion: ARTF 4/4
	Is this information submitted to ARMA monthly basis?					Conclusion: ARTF 4/4
	Is there a database with such information?					Conclusion: ARTF 4/4 National RVSM Plan
	Has the administration implemented a monthly data collection program for errors in the ATC communications circuit?					Doc. 9574 Chapter 5 National RVSM Plan
	Does the administration have a database with such information?					Conclusion: ARTF 4/4
	Is the information submitted to ARMA on the total of IFR movements on a monthly basis?					Conclusion: ARTF 4/4

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
RVSM Monitoring						
	Is there a database with such information?					Conclusion: ARTF 4/4
	Is information related to turbulence reports submitted to ARMA?					Conclusion: ARTF 4/4
	Is there a database with such information?					Conclusion: ARTF 4/4
	Has the administration established a continuous monitoring of the system?					Annex 11 para. 2.26 Doc. 9574 Chapter 6
	Has the administration assessed the impact that the lack of a continuous monitoring program and RVSM operations monitoring would have in air safety?					National RVSM Plan

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
RVSM Switch-Over						
10. RVSM Switchover	Has your administration adopted or will it adopt the measures to ensure a safe and effective transition to RVSM?					Doc. 9574 Chapter 5 National RVSM Plan Conclusion: ARTF4/11
	Have special procedures been established for the switchover period?					Doc. 9574 Chapter 5 National RVSM Plan
	Are contingency plan adequate for the switchover period?					Doc. 9574 Chapter 5 National RVSM Plan
	Has the administration foreseen the information process to ARMA during the next tour for RVSM implementation?					Doc. 9574 Chapter 5 National RVSM Plan
	Has the administration foreseen the information process to ARMA during the following 12 and 24 hours after RVSM implementation?					Doc. 9574 Chapter 5 National RVSM Plan)
	Has the administration assessed the impact that the lack of an RVSM transition plan and associated contingency measures could have in safety?					National RVSM Plan.

SUBJECT	ITEMS ASSESSED	Target Date (TD)	Date Completed (DC)	Not Applicable (NA)	REMARKS	Ref. ICAO Regional/National Doc
	RVSM Resources					
11. Assignment of Resources for the Implementation of RVSM program	Have adequate measures been adopted in order to have the necessary resources for a successful RVSM implementation?					Conclusion: ARTF 4/11 National RVSM Plan
	For changes in ATC equipment?					Conclusion: ARTF 4/17 & 4/18
	For personnel training and associated material?					Conclusion: ARTF 4/17 & 4/18
	For training of OPS/Airworthiness inspectors?					Conclusion: ARTF 4/17 & 4/18
	To face administrative costs?					National RVSM Plan
	Has the administration evaluated the impact that the lack of assignment of sufficient resources in the RVSM national implementation program would have in air safety?					National RVSM Plan

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AFI RVSM

SWITCH - OVER PLAN

T -24 ToS T+24

AFI RVSM SWITCHOVER PLAN

EXECUTIVE SUMMARY

The AFI RSVM Task Force has been tasked to provide guidance material for the States Switchover Plans so that they can refer to and adapt to their own local requirements. The AFI Functional Hazard Assessment final version, as accepted by Task Force 6, was referred to as guidance material when compiling the AFI Switchover Plan.

The switchover document satisfies the identified major switchover hazards resulting from the Functional Hazard Assessment that will need to be considered in order to accomplish a safe and successful switchover from CVSM to RVSM at time of switchover.

The switchover plan only addresses the switchover period and does not address the timelines as reflected in the action plan required to implement RVSM. The actions to RVSM implementation should be considered as the RVSM Task Force timetable that is issued periodically by the Task Force and lodged with the ARPO.

RECOMMENDATIONS

It is recommended that States:

- Review the switchover plan, against their own detailed switchover plan and incorporate any amendments as required.

- Action any additional requirements as issued periodically by the ARPO appropriate to the States switchover plans.

ARPO
ICAO ESAF
NAIROBI KENYA

AFI RVSM SWITCHOVER PLAN

1. INTRODUCTION

1.1 The AFI RVSM Task Force has been tasked to provide a Switchover Plan for States to adapt to their own local requirements. The principle concerns of the Aviation Community have been addressed in the AFI Switchover Plan. This document should be referred to by States/FIR's to produce a plan that will be relevant to their ACC. This will in effect mean that there will need to be greater detail for individual actions within each FIR.

1.2 The assumption within this switchover plan is that the Go decision will only be made if the fundamental processes for the implementation of RVSM are in place:

- The Safety Case, with special reference to the CRA and TLS, would have been presented, and assurances provided that the level of safety preparedness of the States as reflected in the NSP's is sufficient for the task.

1.3 The AFI RVSM implementation Decision Process should result in a Go/Delay decision being verified in late June 2006. In the event of a Go decision, the Switchover Plan will be continually reviewed and checked for the commencement of RVSM operations on 28th September 2006 with special reference to the switchover period. The process will culminate in the switchover from CVSM to RVSM at ToS, which will require specific attention to ensure a safe and effective changeover with the minimum disruption to the flow of air traffic. At the ToS the whole of the RVSM airspace will be in a transition phase for controllers and aircrews until it is reported that all aircraft are at the required RVSM FLAS.

1.4 The ARMA and ASECNA (via WACAF) will serve as the focal points of contact during the switchover period. ASECNA will be required to report all significant operations/events relating to the switchover, in the ASECNA area of operations to the ARMA.

2. ACTIONS PRIOR TO ToS AFI RVSM SWITCHOVER T-24

2.1 AFI RVSM implementation readiness reporting will continue throughout the switchover period with the National Program Managers reporting to the ARMA.

2.2 Airspace

It is essential that there is a stable airspace configuration during the Switchover period from CVSM to RVSM. The stability of the airspace will also require the utmost co-operation from military organizations.

2.3 Flight Planning

Flight planning, will continuously be checked during the switchover period for irregularities including incorrect RVSM status in Flight Plan and the flight level in the filed ATC Flight Plan not being in accordance with FLAS.

Within the switchover period there will continue to be increased contact between Aircraft Operators and ATS and the overall awareness as to the necessary flight planning and approval requirements for entry into RVSM airspace will be reinforced. Warnings will be provided to non-RVSM approved aircraft that would incorrectly penetrate AFI RVSM airspace.

Aircraft Operators and ATS should note that the submission of RPLs will require specific and separate attention. Operators of RVSM approved aircraft shall indicate the approval status by inserting the letter W in Field 10 of the ICAO FPL, regardless of the Requested Flight Level (RFL). From 26 September 2006, ATS may invalidate a flight plan that does not comply with the RVSM requirements at ToS.

2.4 Civil/Military Coordination

Military exercises during switch over period should be suspended as per the FHA. If they do need to take place they should be coordinated with the greatest of care.

2.5 Ground Communications

During the switchover period redundant ground communication facilities must be available and ready for immediate use and adequately supported by competent technical staff.

2.6 Letters of Agreement/Procedures LOAs/LOP's.

States/FIR'/ACC's will ensure that the current LOA/LOP is easily accessible for reference purposes during the Switchover period. The following points should be carefully and continuously reviewed with regard to:

- FLAS for consistency with RVSM
- RVSM status of aircraft on the flight plan and if in doubt verify information with ARMA

3. AWARENESS CAMPAIGN

3.1 During the switchover period operators should be reminded of the flight planning requirements as well as the requirement of RVSM operator/aircraft approvals in order to operate within the AFI RVSM airspace.

4. SWITCHOVER (28 SEPTEMBER 2006) ToS

4.1 Switchover

A prime activity of the switchover period will be the switchover from CVSM to RVSM.

- Non RVSM approved flights airborne in the immediate period prior to the switchover may be adjusted to their new levels below FL290
- Operators must manage contingency fuel requirements as appropriate.
- At ToS, aircraft will be reassigned to their new levels.
- Operation above FL410 will not be permitted during the specified interval during the Switchover period by non RVSM approved aircraft.

4.2 Timing of Change.

The AFI RSVM Task Force has conducted a traffic analysis to determine a quiet and stable period, which confirmed the suitability for the switchover at 0001 HRS (UTC) 28 September 2006 ToS.

4.3 Aircraft in Flight at Time of Switchover.

The sequence of events at switchover will be:

- Warning of Switchover from CVSM to RVSM by all ground stations
- Implementation of Switchover from CVSM to RVSM by all RVSM approved aircraft and the exclusion of all non-RVSM approved aircraft. State aircraft will be managed accordingly.
- An on going verification of Operator/Aircraft approval status
- Heightened vigilance for any irregularities and reporting to ARMA

Inevitably, there will be a mixed population of air traffic being handled at the time of switchover however preparations to limit the amount of non RVSM aircraft should be increased prior to the switchover.

Repeated broadcasts of the pending switchover will be made to aircraft in flight commencing 45 minutes before switchover. Phraseology for broadcast as an example is:

"All stations, All stations, (*ACC identification*) Control Broadcast, RVSM operations commence at time 0001 HRS 28th September 2006."

4.4 Flow Management.

ACC's should apply flow management during the switchover period if required.

4.5 Staffing Levels at Time of Switchover.

- ACC staffing will be a major focus of attention with a need for back-up staff, engineering staff and in particular software support as reflected in the FHA.
- Comprehensive briefings will be provided by supervisors to all operational staff during ToS.
- ACC management shall suspend operational training during the switchover period.

4.6 Weather Phenomena during Switchover Period

Any adverse weather phenomena, sand storms or volcanic activity will be reported immediately to the ARMA during the Switchover period to assist with contingency planning.

4.7 Contingency Planning.

Contingency plans are already in place for the normal operation of ACCs. The RVSM ATC manual provides some guidance on contingency procedures for degradation of aircraft equipment associated with height keeping or the occurrence of weather phenomena, which directly affect the ability of aircraft to maintain their allocated flight level.

ACCs should therefore review their contingency arrangements prior to switchover and then have them readily available during the switchover period for any eventuality. Various failure conditions will have to be considered.

4.8 Hazard Identification and Mitigation.

National Safety Plans shall satisfy the requirements of the AFI FHA Appendix E.2 (AFI RVSM Switchover Period) and Appendix F.2 (allocated safety requirements for AFI RVSM Switch over period.)

5. IMMEDIATE POST IMPLEMENTATION PHASE (SWITCHOVER – 28 SEPTEMBER 2006 PLUS 24 HOURS

Twenty four hours after the introduction of RVSM each FIR will be required to provide a report to ARMA. FIR's experiencing problems or envisaging problems will report as such so that remedial action can be suggested. The report shall also include any large height deviations, wake vortex encounters and any other reportable incident brought about by the implementation of RVSM.

6. CONCLUSION

6.1 The AFI RVSM Task Force has been tasked to provide a switchover plan for States to utilize as guidance material. The launch of the Switchover Plan will commence on acceptance by the AFI RVSM Task Force.

6.2 National Program Managers must action any additional requirements as issued periodically by the ARPO appropriate to the States switchover plans.

6.3 The Switchover from CVSM to RVSM will require further activity within States with further guidance and direction provided to ACCs by their Civil Aviation Authorities. Aircraft Operators will also need to note the flight planning aspects and the operational aspects of the switchover.

TEMPLATE

LETTER OF PROCEDURE/LETTER OF AGREEMENT BETWEEN

..... AREA CONTROL CENTRE AND ....AREA CONTROL CENTRE

1. PREAMBLE

The authorized representatives of ..... and ..... agree that the procedures contained in this document shall remain in force from the effective date specified until either amended or cancelled.

This letter of Agreement supersedes and cancels the existing Letters of Agreement between ..... and ..... dated .....

2. EFFECTIVE DATE

The provisions in the Letter of Agreement shall be implemented on ..... at 0001 UTC.

3. OBJECTIVE

The objective of this Letter of Agreement is to specify co-ordination procedures between ..... and .....

4. SCOPE

4.1 The procedures contained herein are supplementary to the ICAO Standards and Recommended Practices in Annexes 2 and 11, the Procedures for Air Navigation Services in Document 4444 and the Regional Supplementary Procedures (Doc 7030). They detail the conditions under which the responsibility for the provision of air traffic services shall be transferred between the ATS units mentioned in paragraph 3 above.

4.2 This Letter of Agreement also formalises the delegation of responsibility from ..... to ..... and vice versa for the provision of air traffic services within those portions of airspace which lie between the FIR boundaries and the agreed points of transfer of responsibility as defined in paragraph 7.4.1. The establishment of transfer points is based on operational considerations only and does not therefore contribute to, neither can it be invoked for, any other purpose beyond this context.

5. AMENDMENTS

5.1 Any change to this Letter of Agreement, including its cancellation or replacement, requires the consent of the ATS units concerned. This applies to the substance of the change as well as to its date of applicability. Any change shall be made either in the context of a meeting between the two units, or by exchange of correspondence, or by exchange of AFTN messages, with acknowledgement by all signatories.

5.2 Whilst temporary deviations from these procedures may be agreed between the ACC supervisors concerned, as specified in paragraph 8.1 below, permanent amendments to this document shall be effective only in the form of a written amendment duly signed by authorized representatives.

6 AFI RVSM AIRSPACE

6.1 The AFI Region airspace between FL 290 and FL 410 inclusive, encompassing all FIRs in the AFI Region is the designated AFI RVSM airspace.

6.2 There is no transition airspace in the AFI RVSM airspace.

6.3 PROCEDURES FOR THE AFI RVSM AIRSPACE

6.3.1 The applicable RVSM procedures in the AFI RVSM airspace are contained in the Regional Supplementary Procedures – Doc. 7030/4 – African Indian Ocean Region. The detailed procedures are contained in the ATC Operations Manual for RVSM in AFI Region.

6.3.2 RVSM compliant aircraft and non-RVSM compliant aircraft entering RVSM airsapce from a non-RVSM airspace shall be established at a flight level in accordance with the ICAO Table of Cruising Levels, as published in ICAO, Annex 2, Appendix 3, (a).

6.3.3 **The following table contains RVSM FL applicable in the AFI RVSM airspace.**

Cruising levels as per direction of flight – FL280 to FL430	
Route from 180 degrees to 359 degrees*	**Route from 000 degrees to 179 degrees ***
← **FL 430 (non RVSM level above RVSM airspace)**	
	FL410 →
← FL400	
	FL390 →
← FL380	
	FL370 →
← FL360	
	FL350 →
← FL340	
	FL330 →
← FL320	
	FL310 →
← FL300	
	FL290 →
← FL280 (non RVSM level below RVSM airspace)	

6.3.4 **Flight operations within the AFI RVSM airspace.**

6.3.4.1 Except for State aircraft as defined in Article 2 to the Chicago Convention (Doc. 7333) only RVSM approved aircraft shall be approved to operate within the AFI RVSM airspace.

6.4 CONTINGENCY PROCEDURES FOR INCREASED SEPARATION

6.4.1 (*Name*) ACC will consider increasing vertical separation within affected areas of the (*Name*) FIR RVSM airspace when there are pilot reports of greater than moderate turbulence. Within areas where significant turbulence is reported, vertical separation minimum between all aircraft will be increased.

7. PROCEDURES

7.1 Movement and control messages

7.1.1 Flight plans

Filed Flight Plan (FPL) messages shall be transmitted for flights originating within one FIR and entering the other, not less than ..... minutes before the estimated time of the aircraft over the common FIR boundary.

7.1.2 Departures

Departure (DEP) messages shall be transmitted for all flights mentioned in 7.1.1 above, as soon as practicable after the aircraft is airborne.

7.1.3 Estimates

Estimate (EST) messages shall be transmitted for all flights crossing the common FIR boundary, in sufficient time to permit its receipt by the receiving ATS unit at least .... minutes before the estimated time of the aircraft over the transfer points specified in paragraph 7.4.1 below.

7.1.4 Revisions

Co-ordination (CDN) messages shall be transmitted as soon as practicable whenever the estimated time of the aircraft over the transfer point differs by .... minutes or more from the estimated time originally passed or when a change of cleared level and/or crossing condition is planned.

7.1.5 Acceptance

Co-ordination messages (EST and CDN) require an operational acceptance, in the form of an acceptance (ACP) message, to be transmitted to the transferring unit.

7.2 Message transmission and co-ordination procedures

7.2.1 FPL Messages shall be transmitted via AFTN. DEP messages shall be transmitted by AFTN or ATS/DS or both as applicable.

7.2.2 Co-ordination messages (EST, CDN and ACP) shall be transmitted using (the ATS direct speech circuits (ATS/DS) as applicable.

7.2.3 In case of non-availability of the ATS direct speech circuit between the ATS units concerned, the transferring ATS unit shall forward the relevant flight data to the receiving ATS unit by means of HF radiotelephone (RTF) and/or AFTN.

7.2.4 When effecting the necessary co-ordination by use of the AFTN or HF RTF the transferring ATS unit shall send the appropriate co-ordination message in sufficient time to permit its receipt by the receiving ATS unit at least ..... minutes prior to the aircraft's estimated time over the transfer point.

7.2.5 After co-ordination of the transfer, the conditions of transfer shall not be changed by the transferring unit, unless prior agreement has been obtained from the accepting unit.

7.2.6 In case of flights departing from aerodromes (.....) for which, due to their proximity to the FIR boundary, application of the procedures set out in 7.1.2 above would not be possible after departure, co-ordination 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.

7.2.7 In the event of communications failure between the ATS units concerned, a departing aircraft shall be cleared only to such a level as can be reached before it arrives within 10 minutes flying time from the transfer of control point. If such a level is lower than that specified in the flight plan, the aircraft shall be instructed to request approval for a higher level direct from the accepting unit and then obtain clearance from the transferring unit to climb to the level approved by the accepting unit.

7.3 Transfer of communications

7.3.1 Aircraft shall be instructed to establish communications with the accepting unit **5** minutes before the transfer of control point. Transfer of communications does not constitute transfer of control.

7.3.2 In case of communications failure between the ATS units concerned, the transferring ATS unit will inform the aircraft of the absence of co-ordination between the two ATS units and will instruct the aircraft to establish contact with the accepting ATS unit 10 minutes before the boundary in order to provide it with the necessary flight data.

7.3.3 Whenever the accepting ATS unit is unable to establish contact with an aircraft within .... minutes after its estimated time over the transfer point, it shall inform the transferring ATS unit so that appropriate measures may be taken.

7.3.4 With reference to paragraph 10.4.2.4.4 of Part VIII of the PANS-ATM, the accepting ATS unit need not, as a matter of routine, notify the transferring ATS unit that radiocommunication has been established with an aircraft being transferred.

7.3.5 Whenever an aircraft is unable to establish or maintain radio communication 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.

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

ATS route	ATS unit call sign	Frequency

7.3.7 Secondary frequency assignment, for use when no contact can be made on the primary frequencies, is as follows:

ATS route	ATS unit call sign	Frequency

7.4 Transfer of responsibility

7.4.1 Responsibility for the provision of air traffic services shall be transferred to the accepting unit at the following significant points:

ATS route	Transfer of Control point
a)	(e.g. ABAB at 3030S 9015E, ~~or bearing a distance from a VOR/DME~~)
b)	(or bearing a distance from a VOR/DME)

7.4.2 If transfer of responsibility is required at points other than those specified in 6.4.1 above, this shall be co-ordinated individually for each flight.

7.4.3 The accepting unit shall assume responsibility of a transferred aircraft as soon as it has reported to that unit passing the appropriate transfer point. There is no requirement for additional transfer or acceptance messages unless requested.

7.4.4 Control of traffic communicating with the accepting unit shall not be assumed prior to the aircraft passing the transfer point, unless specifically agreed by the transferring unit.

7.5 Flight levels

7.5.1 Aircraft outside ATS route shall be assigned flight levels as follows:

ATS route	From	To	Flight Levels

7.6 Separation

7.6.1 Aircraft at the same level shall be longitudinally separated by not less than **10** minutes.

7.6.2 When the succeeding aircraft is faster than the preceding aircraft, the transferring unit shall notify the accepting unit and seek its approval of the transfer of control. The accepting unit shall have the right to determine the transfer of control conditions.

7.7 Clearance limit

7.7.1 The clearance limit shall normally be the destination aerodrome. However, if the necessary co-ordination cannot be effected in good time (paragraph 6.4 refers) e.g. due to communications failure between ATS units, the clearance limit shall be the transfer point and the aircraft instructed to request onward clearance from the accepting unit before proceeding beyond that point.

7.8 Weather Information

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

7.9 Flow control (if applicable)

7.9.1 Should it become necessary to implement flow control to avoid excessive delays at destination aerodromes within their respective FIRs, ATS units shall negotiate and agree a mutually acceptable number of aircraft per hour. All such agreements shall be terminated at_____ as soon as circumstances permit resumption of normal operations. The decision of the ACC supervisors shall be sufficient authority in all such cases.

8. Deviations

8.1 Deviation from the procedures specified in this Letter of Agreement shall only be permitted in exceptional circumstances and not without prior co-ordination on a case-by-case basis.

8.2 Any deviations from these provisions, that arise due to an emergency or are applied to ensure the safety of air traffic, shall immediately be notified to the other ATS unit(s) concerned and shall be terminated as soon as the circumstances that caused the deviation cease to exist.

9. Search and Rescue

9.1 Search and Rescue operation within the respective areas of responsibility of _____ and _____ shall be conducted in full compliance with the Standards and Recommended practices indicated in Annex 12 to the Chicago Convention and the related organization of National Search and Rescue procedure.

10. Authorized signatories

For.....

Place.....

Date.....

ATTACHMENT

PROPOSAL FOR AMENDMENT TO THE REGIONAL SUPPLEMENTARY PROCEDURES – DOC.7030/4 AFRICAN INDIAN OCEAN (AFI) REGION

(Serial No. ESAF-S 06/03 – AFI RAC/1)

a) **Proposed by:**

AFI Planning and Implementation Regional Group (APIRG)

b) **Proposed amendment:** *(cf. Regional Supplementary Procedures,* Doc.7030/4 – AFI, Part 1, Rules of the Air, Air Traffic Services and Search and Rescue, incorporating Amendment No…)

Amend the SUPPs in the AFI Region as follows:

AFI REGIONAL SUPPLEMENTARY PROCEDURES

PART 1 – RULES OF THE AIR, AIR TRAFFIC SERVICES AND SEARCH AND RESCUE

These procedures are supplementary to the provisions contained in Annex 2, Annex 6 (Part II), Annex 11, PANS-ATM (Doc 4444) and PANS-OPS (Doc 8168).

1.0 FLIGHT RULES

....

2.0 FLIGHT PLANS

2.1 Contents of flight plans

(A2 – 3.3; P-ATM, 4.4.1 and Appendix 2)

. . .

2.1.3 RVSM Approval status and aircraft registration

2.1.3.1 Item 10 of the flight plan (Equipment) shall be annotated with the letter W in field 10 of the ICAO flight plan if the aircraft and operator have received RVSM State approval or Item Q of the RPL, regardless of the requested flight level. Furthermore, the aircraft registration shall be indicated in Item 18 of the flight plan.

. .

2.3 Flight Planning for RVSM Approved Aircraft

2.3.1 Operators of RVSM approved aircraft and non-RVSM approved State aircraft intending to operate within the AFI RVSM airspace, shall include the following in Item 15 of the ICAO flight plan form:

2.3.2 Operators of non-RVSM approved State aircraft with a requested flight level of FL 290 or above shall insert STS/NON RVSM in Item 18 of the ICAO flight plan form.

Note. *Non-RVSM aircraft intending to operate above FL 410 will need to flight plan in accordance with RVSM procedures of neighbouring regions should the flight commence or terminate in those regions.*

3.0 AIR GROUND COMMUNICAITONS AND IN-FLIGHT REPORTING

. . .

4.0 SPECIAL PROCEDURES FOR IN-FLIGHT CONTINGENCIES INVOLVING LOSS OF VERTICAL NAVIGATION PERFORMANCE REQUIRED FOR FLIGHT WITHIN THE AFI RVSM AIRSPACE

5.0 CLEARANCE INTO THE AFI RVSM AIRSPACE

5.1 Procedures

5.1.1 Only RVSM approved aircraft shall, be issued an air traffic control clearance to join and operate within the AFI RVSM airspace. Non-RVSM approved State aircraft shall, subject to ATM capacity, be issued a clearance to operate within the AFI RVSM airspace.

5.1.2 Non-RVSM approved aircraft intending to operate above FL 410 will be required to execute an uninterrupted climb or descend through the AFI RVSM airspace .Such flights shall be given appropriate ATC clearances, which will be subject to traffic levels at the time of clearance is requested..

5.1.3 Air traffic control clearance into the AFI RVSM airspace shall <u>not</u> be issued to formation flights.

6.0 SEPARATION OF AIRCRAFT

. . .

6.3 Vertical separation

A minimum vertical separation of 300 m (1 000 ft) between RVSM approved aircraft shall be applied between FL 290 and FL 410 inclusive

in Accra, Addis Ababa, Algiers, Antananarivo, Asmara, Beira, Brazzaville, Cairo, Canarias, Cape Town, Casablanca, Dakar, Dakar Oceanic, Dar es Salaam, Entebbe, Gaborone, Harare, Johannesburg, Johannesburg Oceanic, Kano, Khartoum, Kinshasa, Lilongwe, Luanda, Lusaka, Mauritius, Mogadishu, Nairobi, N'Djamena, Niamey, Roberts, Sal Oceanic, Seychelles, Tripoli, Tunis and Windhoek flight information regions (FIRs).

A minimum vertical separation of 600 m (2000 ft) shall be applied between non-RVSM approved State aircraft and any other aircraft operating within the AFI RVSM airspace in accordance with FLAS

Note 1 – The volume of airspace referred to as "AFI RVSM airspace" includes the FIRs listed in the paragraph above.

6.3.5 *Target level of safety (TLS)*

Application of RVSM in the airspace designated in 6.3.1 should meet a TLS of 5×10^{-9} fatal accidents per aircraft flight hour due to all causes of risk in the vertical dimension.

c) Proposer's reason for amendment:

Implementation of Reduced Vertical Separation Minimum (RVSM) in the AFI Region. The reduction in vertical separation will improve the provision of air traffic services in the areas concerned and is in line with the implementation strategy adopted in the AFI CNS/ATM implementation plan. This will improve ATC efficiency and airspace capacity.

d) Proposed implementation date of the amendment:

Upon approval by Council.

e) Proposal has been circulated to the following States and International Organizations:

Afghanistan	Cape Verde	Ethiopia	Japan
Algeria	Central African Republic	Finland	Jordan
Angola	Chad	France	Kenya
Argentina	Chile	Gabon	Kuwait
Armenia	China	Gambia	Lebanon

Australia	Colombia	Germany	Lesotho
Austria	Congo	Ghana	Libyan Arab Jamahiriya
Bahrain	Comoros	Greece	Liberia
Bangladesh	Cote d'Ivoire	Guinea	Luxembourg
Belarus	Croatia	Guinea Bissau	Madagascar
Belgium	Cuba	Hungary	Malawi
Benin	Cyprus	Iceland	Malaysia
Bosnia and Herzegovina	Czech Republic	India	Maldives
Botswana	Democratic Republic of Congo	Indonesia	Mali
Brazil	Democratic Peoples' Republic of Korea	Iran, Islamic Republic of	Malta
Bulgaria	Denmark	Iraq	Mauritania
Burkina Faso	Rwanda	Switzerland	United States
Burundi	Russian Federation	Syrian Arab Republic	Uruguay
Cameroon	Sao Tome and Principe	Sri Lanka	Viet Nam
Canada	Saudi Arabia	Sudan	Yemen
Namibia	Senegal	Swaziland	Zambia
Netherlands	Seychelles	Thailand	Zimbabwe
New Zealand	Sierra Leone	The former Yogoslav Republic of Macedonia	Mauritius
Niger	Singapore	Togo	Mexico
Nigeria	Slovakia	Tunisia	Morocco
Norway	Slovenia	Turkey	Mozambique
Oman	Somalia	Ireland	ASECNA
Pakistan	South Africa	Israel	IATA
Philippines	Spain	Italy	IFALPA
Poland	Djibouti	Jamaica	IFATCA
Portugal	Egypt	Uganda	
Qatar	Equatorial Guinea	United Arab Emirates	
Republic of Korea	Eritrea	United Kingdom	
Romania	Sweden	United Republic of Tanzania	

f) Secretariat comments

1) This amendment proposal has been developed within the framework or the APIRG/12, 13 and 14 Meetings Conclusions/Decisions 12/66, 13/58 and 14/21 respectively concerning the planning and evolutionary implementation of RVSM in the AFI Region.

2) Implementation of RVSM in the AFI Region would enable aircraft operating in the AFI RVSM airspace to continue under RVSM in EUR/NAT, MID/ASIA, CAR/SAM and ASIA/PAC RVSM airspaces, thereby enhancing the efficiency of seamless flight operations.

AFI RVSM IMPLEMENTATION STRATEGY/ACTION PLAN

Legend

Planning

In Progess

Overdue

Target Date, Target Date Met ✓, Target Date Not Met X — TD

Continuous

NO.	ITEM DESCRIPTION	JAN '06	FEB '06	MAR '06	APR '06	MAY '06	JUN '06	JUL '06	AUG '06	SEP '06
	Program Management									
1	Structure of TF									
2	SIP Report									
3	TF/2 Meeting									
4	Identify resources for performing specialist technical tasks									
5	Investigate methods of funding any outside assistance									
6	Finalize the RVSM Implementation Strategy/ Action Plan									
7	Circulate RVSM Implementation Strategy/Action									
8 (a)	Doc 7030 amendment Proposal									
8 (b)	Circulate proposal to States									
8 (c)	ANB Approval									

8(d)	ANB Approved doc for circulation									
8(e)	State Comment									
8 (f)	ANC Approval									
9	States comments on RVSM implementation Strategy / Action Plan									
10	Regional RVSM informational Website									
11	RVSM Seminar/RVSM ITF3									
12	RVSM Seminar /RVSM/ITF/4									
13	Coordination and harmonization of procedures with adjacent Regions									
14	States to send AIC to notify their intention to Implementation of RVSM									
15	Determine target AIRAC implementation date (AIP Supplement to be published)									
16	Regional RVSM implementation status reports									
17	State Readiness Assessment, CRA, PISC,NSP									
18	RVSM/ARTF/5									
19	RVSM/ARTF/6									
20	RVSM/ARTF/7 ATS/AIS/SAR/SG/8									
21	RVSM/ARTF/8 and RVSM Seminar									

22	RVSM/ARTF/9 Meeting				TD✓						
23	RVSM TF/10 Meeting and GO/Delay Meeting						TD✓				
24	Publish Trigger NOTAM										
25	Develop AFI switch over plan (SWOP)				TD✓						
26	Develop/Publish National SWOP										
27	RVSM Task Force 11 Meeting								TD X		
28	RVSM Task Force 12 Meeting										

Aircraft Operations and Airworthiness

29	Regional OPS/Airworthiness RVSM Guidance										
30	Develop regional Pilot Training RVSM Guidance Material										
31	Provide pilot training RVSM guidance material to							TD✓			
32	Aircraft Operational approval process guidelines										
33	Aircraft RVSM Approval Survey										
34	Ensure aircraft/operator approval process										

Air Traffic Management

35	National RVSM plan										

36	National Safety Plan Validation Panel			TD✓							
37	APIRG/15 Consideration of TF Reports										
38	Regional ATC OPS Manual					TD✓					
39	Determine the limits of RVSM airspace										
40	Regional ATC Training Program & Guidance Material							TD✓			
41	Letters of Agreement/Procedure (LOA/LOP)										
42	Civil/Military coordination										
43	National RVSM Regulatory Material										
44	Collect weather and turbulence data for analysis										

RVSM Safety Assurance

45	State Implementation of CNS infrastructure to support provision of ATC Service in the AFI RVSM airspace										TD✓
46	Provision of ATC Service in the proposed AFI RVSM Airspace										
47	Conduct data collection and compile readiness assessment										
48	Develop AFI RVSM Safety Policy										
49 (a)	Submit final NSP's after validation comments have being taken into account										

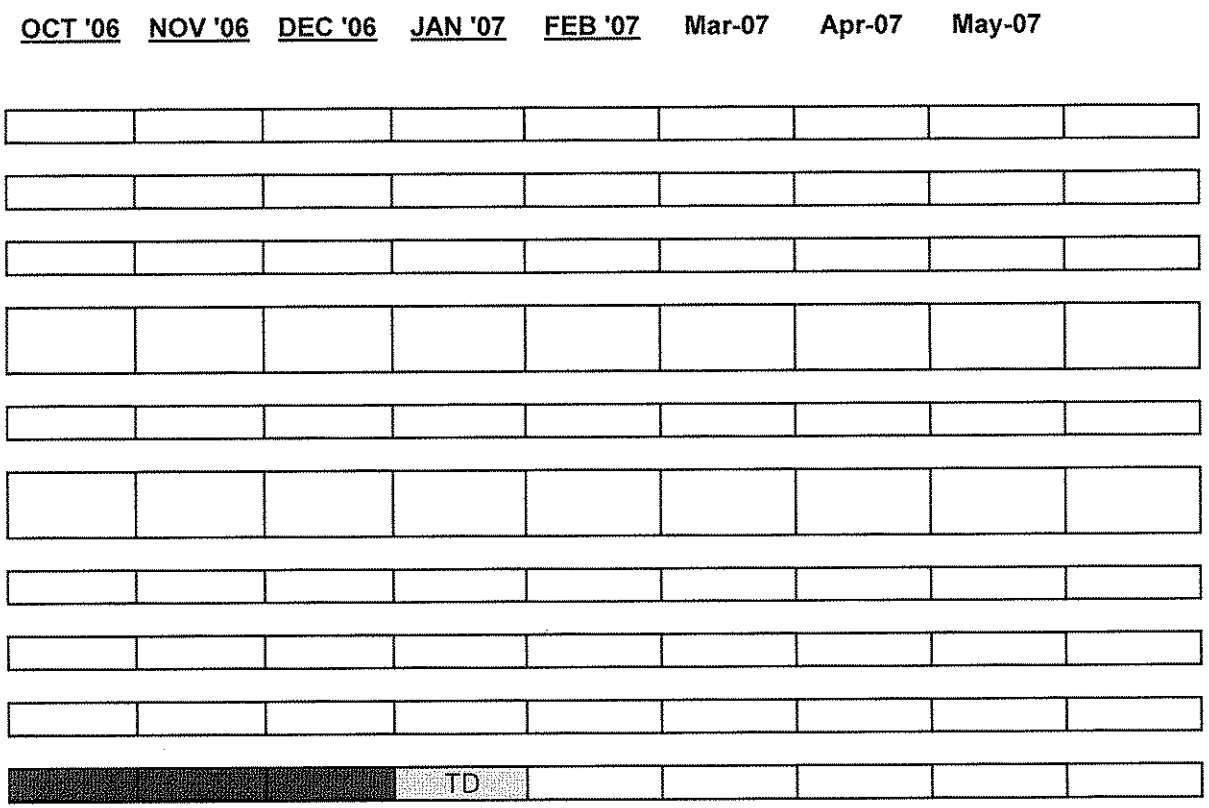
49 (b)	States to confirm their readiness for implementation									
49 (c)	Conduct NSP workshops facilitated by ATC experts									
49 (d)	Once NSP's are implemented, DCA's to confirm State readiness to Implement RVSM in writing									
49 (e)	Update State readiness document									
50	RVSM Functional Hazard Assessment (FHA)									
51	Validate Functional Hazard Assessment									
52	RVSM Collision Risk Assessment II									
53	Validate Collision Risk Assessment II									
54	AFI Pre-Implementation Safety Case Development									
55	AFI Pre-Implementation Safety Case: APIRG/ANC									
56	RVSM Implementation date (decision)									TD X
57	Improved incident reporting and investigation to reduce incident rates to support positive CRA results									

Monitoring Agency

58	Evaluate options for setting up AFI RMA									
59	Identify an AFI RMA									
60	Establish an AFI RMA.									
61	Validate State readiness template									

Post Implementation Safety Case (POSC)

62	Data collection to continue for submission to ARMA
63	Evaluate system safety after implementation
64	Monitor system safety in adjacent Regions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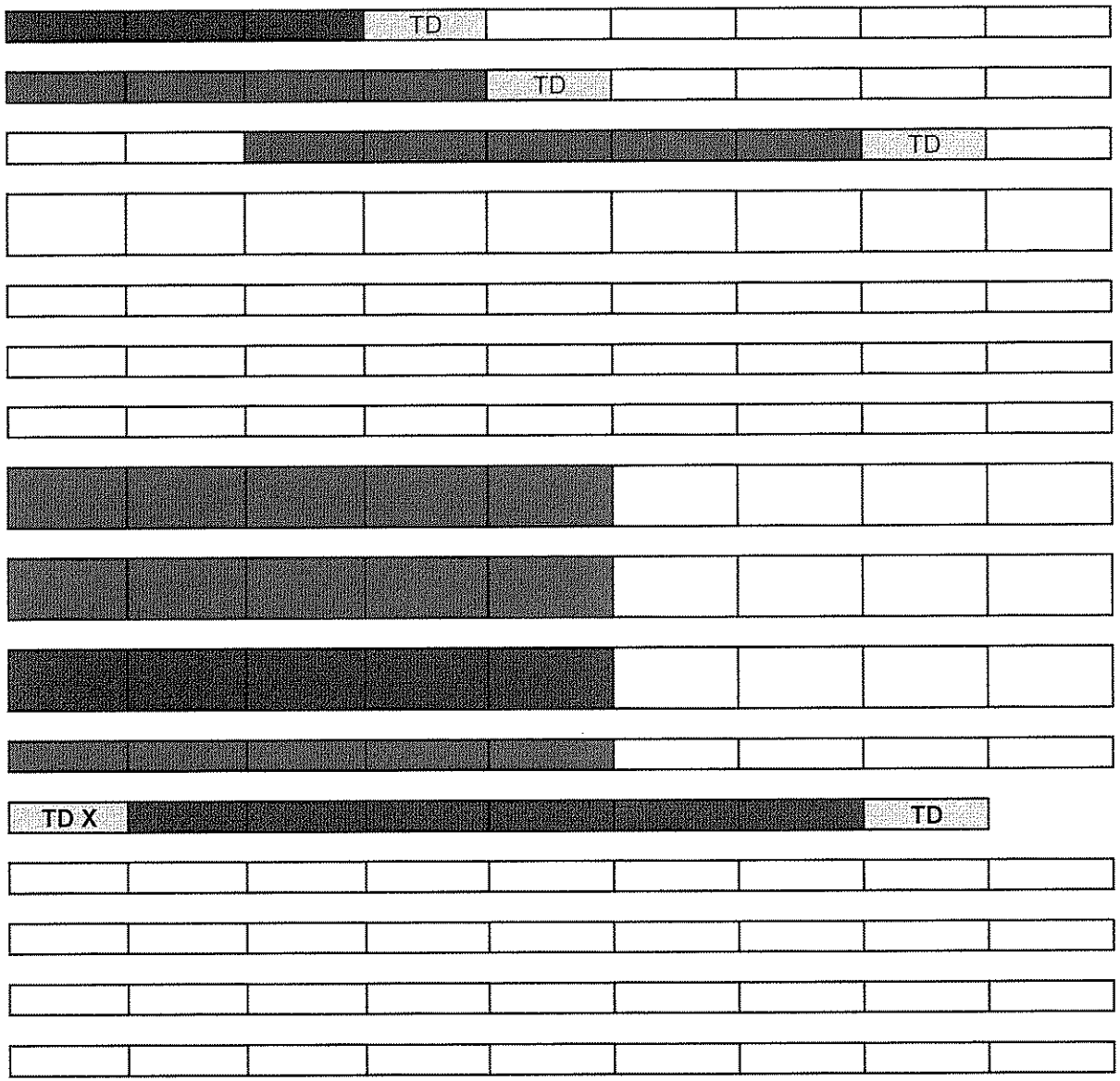
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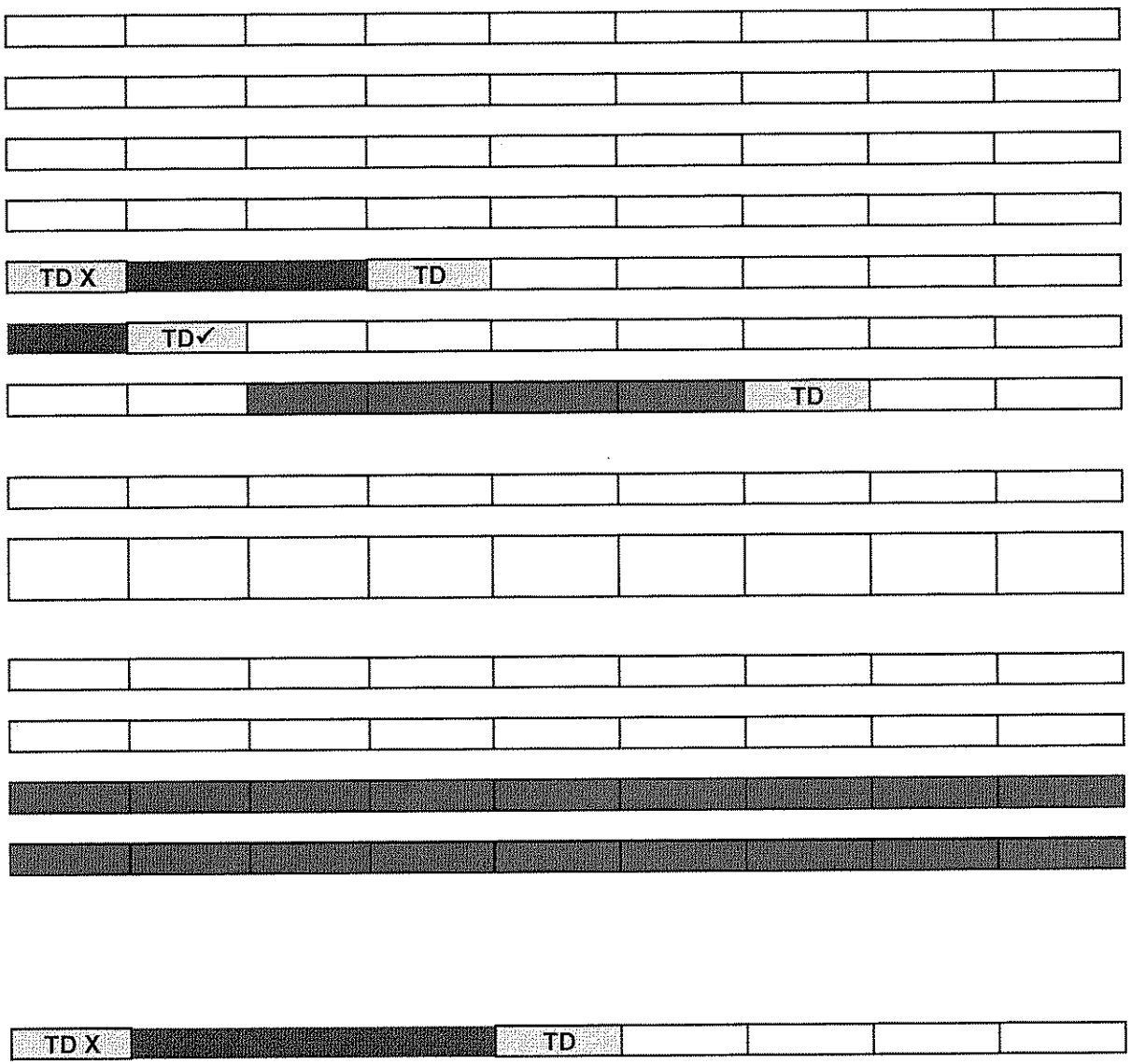
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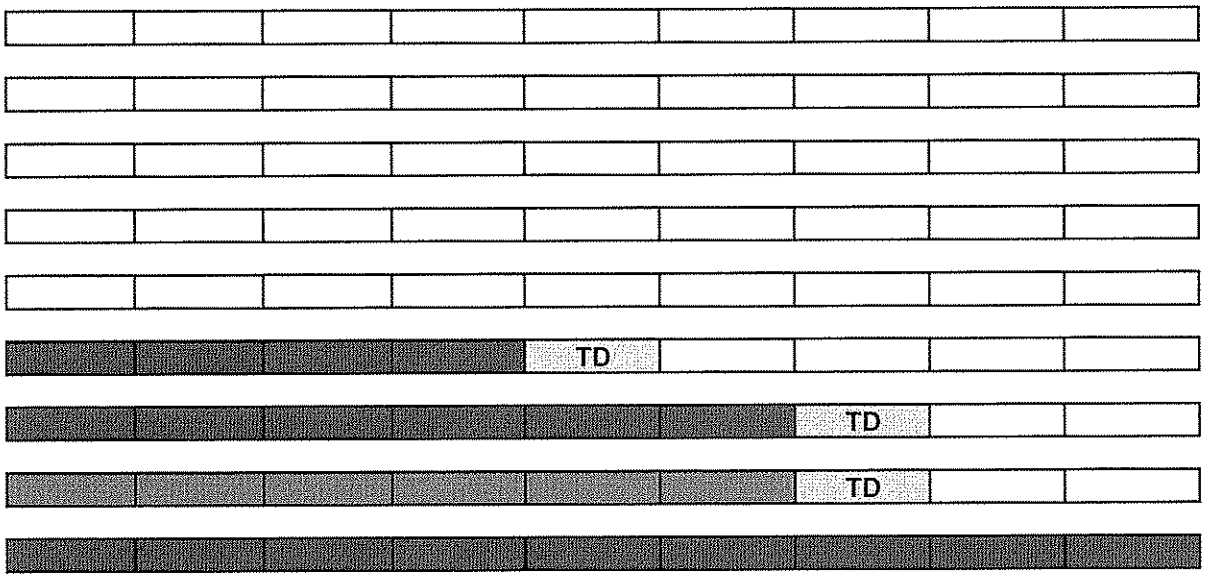
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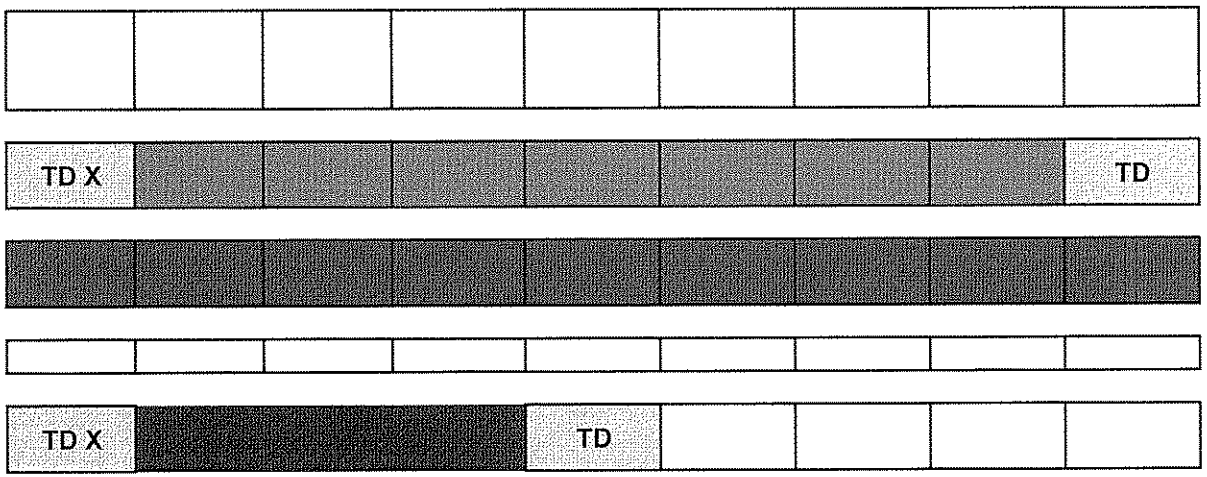
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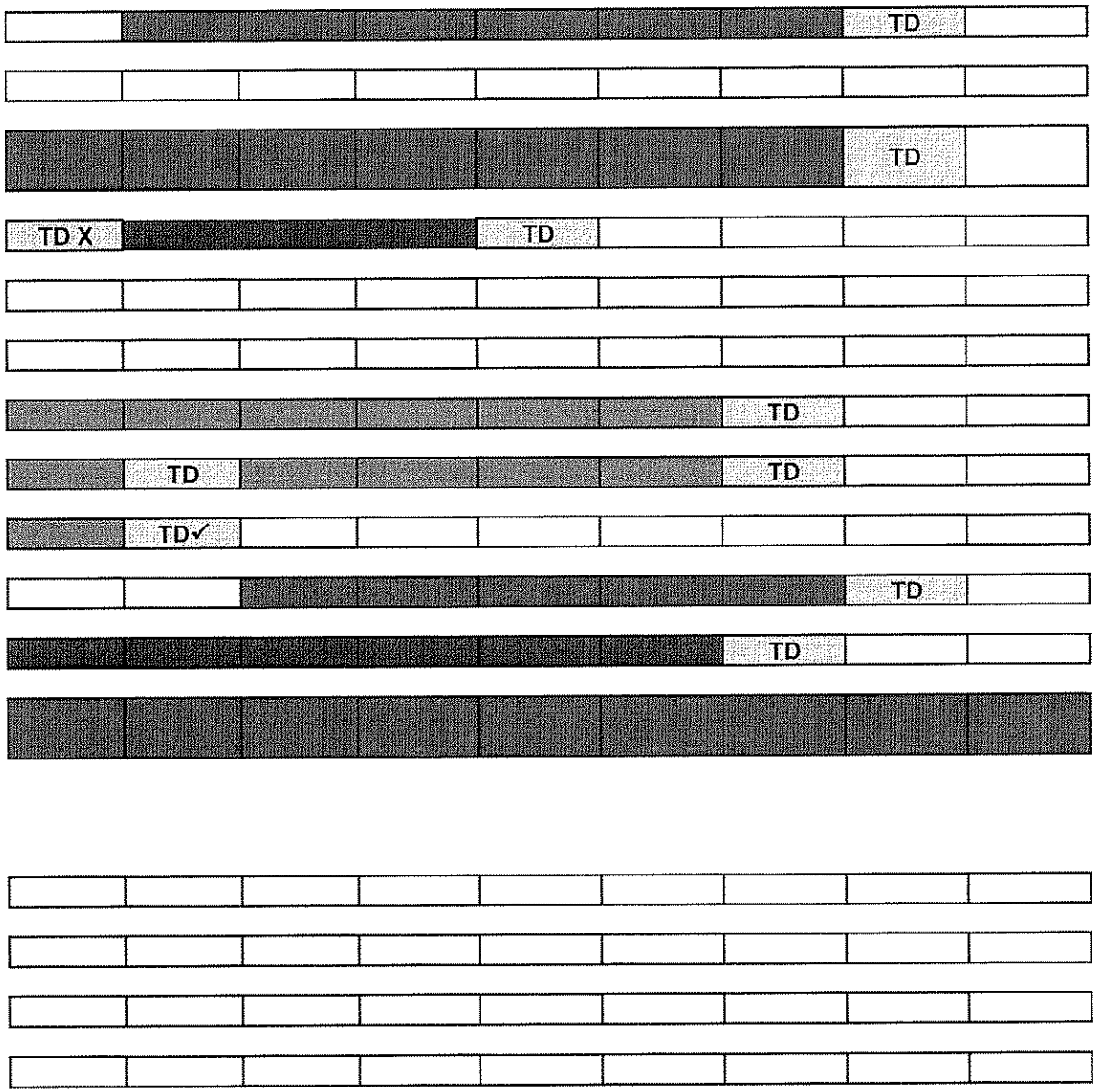
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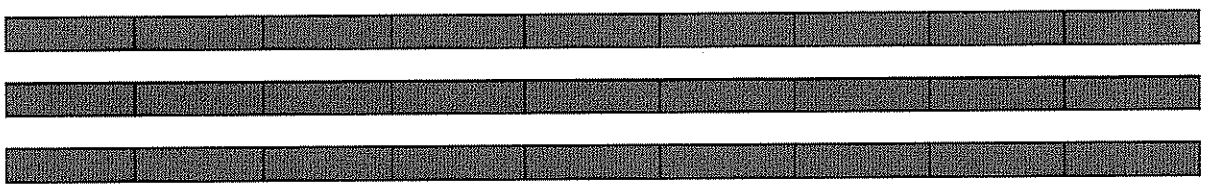

AFI REGIONAL MONITORING AGENCY (ARMA)

ARMA forms for use in obtaining information from a State authorities and/or Service Providers

NOTES TO AID COMPLETION OF ARMA FORMS

1. Please read these notes before attempting to complete forms for the ARMA.

2. It is important for the ARMA to have an accurate record of a point of contact for any queries that might arise. States are therefore requested to identify their National Program Manager with their first reply to the ARMA. Thereafter, there is no further requirement unless there has been a change to the information requested on the form.

3. If recipients are unable to pass the information requested to the ARMA through the Internet, by direct electronic transfer, or by data placed on a floppy disk/CD, a hard copy must be completed.

    (1) Enter the single letter ICAO identifier as contained in ICAO Doc 7910. In the case of their being more than one identifier designated for the State, use the letter identifier that appears first.
    (2) Enter the operator's 3 letter ICAO identifier as contained in ICAO Doc 8585. For International General Aviation, enter "IGA". For military aircraft, enter "MIL". If none, place an X in this field and write the name of the operator/owner in the Remarks row.
    (3) Enter the ICAO designator as contained in ICAO Doc 8643, e.g., for Airbus A320-211, enter A320; for Boeing B747-438 enter B744.
    (4) Enter series of aircraft type or manufacturer's customer designation, e.g., for Airbus A320-211, enter 211; for Boeing B747-438, enter 400 or 438.
    (5) Enter ICAO allocated Aircraft Mode S address code.
    (6) Date example: For October 26, 1998 write 10/26/98.
    (7) Use a separate sheet of paper if insufficient space available.

AFI REGIONAL MONITORING AGENCY (ARMA)

POINT OF CONTACT DETAILS/CHANGE OF POINT OF CONTACT DETAILS FOR MATTERS RELATING TO RVSM APPROVALS

This form should be completed and returned to the address below on the first reply to the ARMA or when there is a change to any of the details requested on the form (PLEASE USE BLOCK CAPITALS).

STATE OF REGISTRY: enter State here

STATE OF REGISTRY (ICAO 2 LETTER IDENTIFIER): enter 2 letter State here
Enter the 2-letter ICAO identifier as contained in ICAO Doc 7910. In the event that there is more than one identifier for the same State, the one that appears first in the list should be used.

ADDRESS:

CONTACT PERSON:

Full Name: enter full name here

Title: Surname: Initials:

Post/Position:

Telephone #: Fax #:

E-mail:

Initial Reply/Change of Details (*Delete as appropriate)*

When complete, please return to the following address:

RMA Address: Mr Kevin Ewels, Manager: ARMA Private Bag X1, Bonaero Park South Africa 1622

Telephone: 27-11- 928-6433

Fax: 27-11- 928-6420

E-Mail: afirma@atns.co.za

AFI REGIONAL MONITORING AGENCY (ARMA)

HEIGHT DEVIATIONS (Form 1)

STATE:	**ACC:**	**MONTH:**
State of Registry		
Flight Identification		
Operator		
State of Operator		
Aircraft Type and Series		
Registration		
Serial Number		
Mode S Address		
Total height deviation		
Total time of deviation		
Cause of Deviation[1]		

Date and Time of Measurement	Assigned Flight Level	Observed Flight Level	Air route	Geographical Location

Provide description of incident including total height profile if available

[1] Include Number from List Below

1. Error in altimetry or altitude-keeping system of an aircraft
2. Turbulence or weather related phenomena
3. Emergency descent by aircraft without crew following established contingency procedures
4. Response to Airborne Collision Avoidance System (ACAS) advisories
5. Error in following a correctly issued ATC clearance, resulting in flight at an incorrect flight level
6. Error in issuing an ATC clearance, resulting in flight at an incorrect flight level
7. Errors in coordination or transfer of control responsibility for an aircraft between adjacent ATC units, resulting in flight at an incorrect flight level
8. Other reason, include reason in Description of incident.

NOTE: Complete with available information

AFI REGIONAL MONITORING AGENCY (ARMA)		
MONTHLY MOVEMENTS		(FORM 2)
STATE:	ACC:	MONTH:
TOTAL IFR MOVEMENTS FOR THE MONTH:		
TOTAL MONTHLY IFR MOVEMENTS IN THE BAND F290 – F410		
AVERAGE TIME PER MOVEMENT IN LEVEL BAND F290 – F410		
	LEVEL FLIGHT	
	CLIMBING AND DESCENDING	

AFI REGIONAL MONITORING AGENCY (ARMA)

OTHER OPERATIONAL CONSIDERATIONS		(Form 3)
STATE:	**ACC:**	**MONTH:**

COORDINATION FAILURES

NUMBER OF EVENTS IN MONTH	

COMMUNICATION FAILURE

DATE	TIME	DURATION	CAUSE OF COMMUNICATION FAILURE

TOTAL TIME FOR MONTH	

TURBULENCE

DATE	TIME	DURATION	MAGNITUDE[1]	LOCATION

[1] Magnitude as measured from Meteorology Turbulence Scale

ACAS INDICENTS

Date	Time	Description of ACAS Incident

AFI REGIONAL MONITORING AGENCY (ARMA)

AIRCRAFT TRAFFIC FLOW DATA

(Form 4)
*Revised by RVSM/TF/6
May 2005

STATE: ACC: MONTH:

Please include information on all flights within the flight level band F290 – F410 (inbound, outbound and over flights)

DATE	ROUTE	CALLSIGN	AIRCRAFT TYPE	OPERATOR	DEPARTURE AERODROME	DESTINATION AERODROME	NAV EQUIPMENT	WAYPOINT/ REPORTING POINT	TIME AT WAYPOINT/ REPORTING POINT	FLIGHT LEVEL
01-01-2005	UR978	AFR827	A319	AFR	FCPP	LFPG		ERKEL	00:24	350
								KAMER	03:02	350
								ATAFA	01:04	350
								BOD	01:21	350
								ELO	02:11	350
								NADJI	02:21	350
01-01-2005	UR978	KQA310	B744	KQA	HKJK	VABB		ERKEL	00:59	370

Note: Please include all waypoints/reporting points, times and FL for the entire route per FIR

AFI REGIONAL MONITORING AGENCY (ARMA)

AIRCRAFT TRAFFIC FLOW DATA

(Form 4)
*Revised by RVSM/TF/6
May 2005

STATE: **ACC:** **MONTH:**

Please include information on all flights within the flight level band F290 – F410 (inbound, outbound and over flights)

DATE	ROUTE	CALLSIGN	AIRCRAFT TYPE	OPERATOR	DEPARTURE AERODROME	DESTINATION AERODROME	NAV EQUIPMENT	WAYPOINT/ REPORTING POINT	TIME AT WAYPOINT/ REPORTING POINT	FLIGHT LEVEL

Note: Please include all waypoints/reporting points, times and FL for the entire route per FIR

International Civil Aviation Organization

SAMPLE AIR TRAFFIC CONTROL OPERATIONS MANUAL FOR IMPLEMENTATION OF REDUCED VERTICAL SEPARATION MINIMUM IN THE AFI REGION

(State Name)

(Date)

ATC Manual for RVSM in Africa-Indian Ocean

DOCUMENT IDENTIFICATION SHEET		
DOCUMENT DESCRIPTION		
Document Title **ATC Manual for a Reduced Vertical Separation Minimum (RVSM) in Africa - Indian Ocean**		
PROGRAMME REFERENCE INDEX	**EDITION:**	
	EDITION DATE:	
Abstract 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 Africa - Indian Ocean		
Keywords RVSM Reduced Vertical Separation Minimum AFI		
CONTACT PERSON:	**TEL:**	**DIVISION:**

DOCUMENT STATUS AND TYPE					
STATUS		**CATEGORY**		**CLASSIFICATION**	
Working Draft	□	Executive Task	□	General Public	□
Draft	□	Specialist Task	□	Restricted	□
Proposed Issue	□	Lower layer Task	□		
Released Issue	□				

ATC Manual for RVSM in Africa-Indian Ocean

DOCUMENT APPROVAL

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

AUTHORITY	NAME AND SIGNATURE	DATE

ATC Manual for RVSM in Africa-Indian Ocean

DOCUMENT CHANGE RECORD

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

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED

ATC Manual for RVSM in Africa-Indian Ocean

AMENDMENT SUMMARY

Note: This document was developed by AFI RVSM/RNAV/RNP Task Force and will be amended as required.

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

ATC Manual for RVSM in Africa-Indian Ocean

CHECKLIST OF PAGES

(Released Edition)

Page	Dated	Page	Dated	Page	Dated	Page	Dated

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ATC Manual for RVSM in Africa-Indian Ocean

LIST OF ABBREVIATIONS

ACAS	Airborne Collision Avoidance System
ATC	Air Traffic Control
ACC	Area Control Centre
ACT	Activation Message
AIC	Aeronautical Information Circular
AFI	Africa and Indian Ocean
AIP	Aeronautical Information Publication
APIRG	AFI Planning and Implementation Regional Group
ASE	Altimetry System Error
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
FAA	Federal Aviation Administration (USA)
FDPS	Flight Data Processing System
FIR	Flight Information Region
FL	Flight Level
FLAS	Flight Level Allocation Scheme
FPL	Flight Plan
GA	General Air Traffic
GMU	GPS Height Monitoring Unit
GPS	Global Positioning System
HMU	Height Monitoring Unit
IFPS	Integrated Initial Flight Plan
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
MEL	Minimum Equipment List
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

ATC Manual for RVSM in Africa-Indian Ocean

NOTAM	Notice to Airmen
OAT	Operational Air Traffic
OLDI	On-Line Data Interchange
RA	Resolution Advisory (ACAS
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 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 (TGL-JAA)
TLS	Target Level of Safety (TLS)
TSE	Total System Error
TVE	Total Vertical Error
VFR	Visual Flight Rules
VSM	Vertical Separation Minimum
UAC	Upper Area Control Centre
UIR	Upper Flight Information Region

ATC Manual for RVSM in Africa-Indian Ocean

DEFINITIONS

Flight Level Allocation Scheme (FLAS)

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

General Air Traffic (GAT)

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

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 based or of the State in which the aircraft is registered. To obtain such RVSM approval, Operators shall satisfy the said State:

1) that 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 Specification (MASPS).

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

3) That they have instituted flight crew procedures for operations in the AFI RVSM airspace.

*Note: For the purposes of the application of RVSM, the term: "**RVSM APPROVED**" shall be used to indicate that an aircraft has been granted RVSM Approval.*

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 AFI RVSM airspace, normally the first reference point for applying a reduced vertical separation minimum.

RVSM Exit Point

The last reporting point over which an aircraft passes or is expected to pass immediately before, upon, or immediately after leaving AFI RVSM airspace, normally the last reference point for applying a reduced vertical separation minimum.

State Aircraft

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

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

Strategic Flight Level

A flight level which is flight-plannable in accordance with the Table of Cruising Levels of ICAO Annex 2, Appendix 3 and the FLAS, as specified in the relevant Aeronautical Information Publications (AIPs).

Tactical Flight Level

A flight level which is not flight-plannable and which is reserved for tactical use by ATC.

ATC Manual for RVSM in Africa-Indian Ocean

RVSM REFERENCE DOCUMENTS

- ICAO Annexes; 2,3.2;A6,Part 1,6.18; A10 Vol. IV; A11, 2.4.2; P-OPS,Vol.1 Part VIII; P-ATM, CAP 4.
- EUROCONTROL - RVSM
- NAT RVSM
- FAA RVSM manuals

SAMPLE AIR TRAFFIC CONTROL OPERATIONS MANUAL FOR IMPLEMENTATION OF REDUCED VERTICAL SEPARATION MINIMUM

1 INTRODUCTION

In the late 1970s, the International Civil Aviation Organization (ICAO) initiated a comprehensive program of studies to examine the feasibility of reducing the 2000 ft vertical separation minimum (VSM) applied above flight level (FL) 290 to the 1000 ft VSM as used below FL 290. Throughout the 1980s, various studies were conducted under the auspices of ICAO in Canada, Europe, Japan and the United States.

The studies demonstrated that the global reduction of vertical separation was safe, feasible and without the imposition of unduly demanding technical requirements and would be cost-beneficial. The studies also showed that the North Atlantic (NAT) minimum navigation performance specification (MNPS) airspace was an ideal area for the introduction of a reduced vertical separation minimum (RVSM) because of the types of aircraft and the essentially unidirectional tidal flow of traffic. Planning for RVSM in the NAT Region commenced in 1990. The first stage of the Operational Evaluation phase, using the 1000 ft RVSM (between FL 330 and FL 370 inclusive), began in March 1997. A second stage extended RVSM to between FL 310 and FL 390 inclusive in October 1998.

NAT Region implementation involves the application of RVSM in the transition area of States within the European Region. In an early stage of the studies, it was determined that the introduction of RVSM in upper European airspace would have considerable benefits. However, from the outset, it was clear that the complex nature of the European air traffic services (ATS) route structure, its wide variety of aircraft types and high traffic density, as well as the high percentage of aircraft climbing and descending, would be a more demanding environment than the NAT Region. Therefore, the introduction of RVSM in the European environment addressed all aspects of en-route operations such as the safety implications of European traffic complexity, the mix of aircraft types, the many stakeholders involved (39 RVSM participating States, industry, aircraft operators), etc.

2 AFI RVSM IMPLEMENTATION BACKGROUND

ESTABLISHMENT OF APIRG RVSM/RNAV/RNP TASK FORCE

Pursuant to APIRG/13 Decision 13/58 which *inter alia* stated that:

DECISION 13/58 ESTABLISHMENT OF A TASK FORCE ON RVSM AND RNAV/RNP IMPLEMENTATION

THAT AN APIRG TASK FORCE DEDICATED TO RVSM AND RNAV/RNP IMPLEMENTATION BE ESTABLISHED, WITH THE FOLLOWING TERMS OF REFERENCE, WORK PROGRAMME AND COMPOSITON:

2.1 Terms of Reference of the ICAO RVSM/RNAV/RNP Implementation Task Force

The RVSM/RNAV/RNP Task Force was established within the framework of the ATS/AIS/SAR Sub-Group in order to explore ways and means for the implementation of RVSM/RNAV/RNP in the AFI Region.

2.2 Terms of Reference of RVSM and RNAV/RNP Task Force

a) To develop a comprehensive implementation plan for RVSM, RNAV and RNP in the AFI Region, taking into account the requirements contained in the ICAO Doc.9574, Doc.9613, Doc.9689, Doc.4444 and other relevant reference documents.
b) To identify any areas within the AFI Region where it may be feasible to introduce RVSM and RNAV/RNP in the initial implementation.
c) To determine the extent to which a cost/benefit analysis is required prior to implementation of RVSM and RNAV/RNP.
d) To coordinate with the bodies responsible for the implementation of RVSM and RNAV/RNP in adjacent regions in order to harmonize implementation plans.
e) To develop guidance material for RVSM and RNAV/RNP implementation in the AFI Region, including taking due account of experience gained in the SAT Region and existing material developed by other ICAO Regions (CAR/SAM,EUR, MID,NAT, ASIA/PAC, etc.).
f) To address any other matters, as appropriate, which are relevant to the implementation of RVSM and RNAV/RNP.

APIRG has endorsed the objectives of capacity and potential economy benefits associated with future implementation of a 1 000 ft reduced vertical separation minimum in the AFI Region and, therefore, concluded that such implementation planning should be progressed as a priority item. It is recognized that a number of complex issues need to be addressed, including meteorological and topographical considerations, aircraft equipment and air traffic control questions.

3 THE NEED FOR RVSM

It is accepted that major changes to the AFI ATM systems will be necessary in order to cope with the continued traffic growth. 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 AFI airspace from FL 290 to FL 410 inclusive.

3.1 The AFI RVSM Implementation Programme

The programme consists of a series of co-ordinated activities, performed within the AFI Region ICAO, Participating States and User Organisations.

The programme has followed the general strategy set out in the ICAO Doc.9574 (First Edition) – " Manual on Implementation of a 300 m (1000 ft) Vertical Separation Minimum between FL 290 and FL 410 inclusive" which proposed a multi-step approach within four distinct phases :

Phase 1 Initial Planning

Phase 2 Advanced Planning and Preparation

Phase 3 Verification of Aircraft Performance

Phase 4 Introduction of RVSM.

3.2 Supporting Documentation

The following reference documents will be amended to incorporate the changes necessitated by the introduction of RVSM in the AFI airspace :

- ICAO Doc. 7030 – Africa-Indian Ocean (AFI) Regional Supplementary procedures
- ICAO Doc. 9574 – Manual on Implementation of a 300 m (1000 ft) Vertical Separation Minimum between FL 290 and FL 410 inclusive.

The following documents are in the course of preparation and will provide the detailed procedures and requirements necessary for the implementation of RVSM in the AFI RVSM airspace :

- ICAO Guidance Material on the Implementation and Application of a 300 m (1000 ft) Vertical Separation Minimum in the AFI RVSM Airspace.
- JAA Temporary Guidance Leaflet on Approval of Aircraft and Operators for Flight in RVSM Airspace – TGL No.6.
- National AICs and/or. AIPs.

4 AFI RVSM AIRSPACE DESCRIPTION

4.1 AFI RVSM Airspace

4.1.1 RVSM shall be applicable in that volume of airspace between FL 290 and FL 410 inclusive in the following AFI Flight Information Regions (FIRs)/Upper Information Regions (UIRs):Accra, Addis Ababa, Algiers, Antananarivo, Asmara, Beira, Brazzaville, Cairo, Canarias, Cape Town, Casablanca, Dakar, Dakar Oceanic, Dar-es-Salaam, Entebbe, Gaborone, Harare, Johannesburg, Johannesburg Oceanic, Kano, Khartoum, Kinshasa, Lilongwe, Luanda, Lusaka, Mauritius, Mogadishu, Nairobi, N'Djamena, Niamey, Roberts, Sal Oceanic, Seychelles, Tripoli, Tunis, Windhoek.

4.1.2 There is NO transition airspace in entire AFI RVSM airspace.

4.2 AFI RVSM Transition Airspace

Transition tasks associated with the application of a 1 000 ft vertical separation minimum within the AFI RVSM Airspace shall be carried out in all, the adjacent FIRs/UIRs to the AFI RVSM airspace.

ATC units on the interface of AFI RVSM Airspace shall:

- establish RVSM approved & non-RVSM approved State aircraft entering RVSM Airspace at the appropriate RVSM FL
- apply 1,000 ft VSM between RVSM approved aircraft, otherwise apply 2,000 ft RVSM;
- establish non-RVSM approved civil aircraft below FL 290 if landing at an aerodrome below the RVSM Airspace;
- establish non-RVSM approved civil aircraft above FL 410 if transiting above the RVSM Airspace & landing at an aerodrome outside AFI RVSM Airspace;
- for aircraft leaving AFI RVSM Airspace, apply 2,000ft VSM and establish them at the appropriate non-RVSM levels.

4.3 AFI Interface with Adjacent Regions (ATSP_1-7)

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 adjacent Regions (ie. Europe) 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 the ATS Letter of Agreement.

4.4 ICAO Table of Cruising Levels for AFI RVSM Airspace(ATSP_1-2)

With the implementation of AFI RVSM, cruising levels within AFI Airspace will be organized 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 AFI Region with the implementation of RVSM. As illustrated below:

Cruising levels as per direction of flight – FL280 to FL430	
Route from 180 degrees to 359 degrees*	**Route from 000 degrees to 179 degrees ***
← **FL 430 (non RVSM level above RVSM airspace)**	
	FL410 →
← FL400	
	FL390 →
← FL380	
	FL370 →
← FL360	
	FL350 →
← FL340	
	FL330 →
← FL320	
	FL310 →
← FL300	
	FL290 →
← FL280 (non RVSM level below RVSM airspace)	

4.5 Flight Operations Within the AFI RVSM Airspace (ATSP_1-2)

Except for State aircraft as defined in Article 2 to the Chicago Convention (Doc 7333) ONLY RVSM approved aircraft shall be permitted to operate within the AFI RVSM airspace It should be noted that within the AFI RVSM Airspace all cruising levels are equally assignable by ATC to all RVSM approved and State aircraft, provided that the applicable vertical separation minimum is applied.

ATC shall:

- Only clear IFR RVSM approved aircraft & State aircraft into AFI RVSM Airspace;
- provide a 1,000 ft vertical separation minimum (VSM) between RVSM approved aircraft;
- provide 2,000 ft VSM between all military formation flights and any other aircraft.

5. RVSM PROCEDURES

Detailed RVSM procedures are contained the Regional Supplementary Procedures DOC 7030/4 AFI Region

5.1 General (ATSP_1-1)

- Only approved State aircraft shall be entitled to operate within the AFI RVSM Airspace, regardless of the RVSM status of the aircraft. (ATSP_1-1)

- The Integrated Initial Flight Plan Processing System (IFPS) shall disseminate Item 8 flight plan information to the flight data processing systems (FDPS) concerned for the purpose of providing a clear indication to ATC that where such non-RVSM approved flights are "State aircraft", they are permitted to operate

- 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.

- 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.

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

- Operators of non-RVSM approved State aircraft with a requested flight level of FL 290 or above shall insert "***STS/NONRVSM***" in Item 18 of the ICAO Flight Plan.

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

  (i) the **entry point** at the lateral limits of the AFI RVSM Airspace, and the requested flight level for that portion of the route commencing immediately after the RVSM entry point; and

  (ii) the **exit point** at the lateral limits of the AFI RVSM Airspace, and the requested flight level for that portion of the route commencing immediately after the RVSM exit point.

- Operators of non-RVSM approved civil aircraft shall flight plan to operate outside of the AFI RVSM Airspace.

5.2 State Aircraft operating Within AFI RVSM Airspace (ATSP_1-1)

All State aircraft operating in AFI RVSM Airspace will be considered as non-RVSM MASPS compliant and therefore non- RVSM approved. Therefore, the VSM required between State and other traffic shall be 2,000 ft. State aircraft, i.e. military aircraft, might be exempted from AFI RVSM requirements and where applicable, the indication that a non-RVSM approved aircraft is a State aircraft should be displayed. The requirement for ATC to accommodate non-RVSM approved State aircraft within the AFI RVSM Airspace imposes 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.

5.3 Cruising Levels Appropriate to Direction of Flight (ATSP_1-2)

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

5.4 In-Flight Contingency Procedures (ATSP_2-1)

An in-flight contingency affecting flight in the AFI 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 AFI RVSM Airspace.

- The pilot shall inform ATC as soon as possible of any circumstances where the vertical navigation performance requirements for the AFI RVSM Airspace cannot be maintained.

- In above mentioned case, 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.

- Air traffic control actions will be based on the intentions of the pilot, the overall air traffic situation, and the real-time dynamics.

- Suspension of RVSM refers to a discontinuance of the use of a vertical separation minimum of 1 000 ft between RVSM approved aircraft operating within the AFI RVSM Airspace.

- A vertical separation minimum of 2 000 ft shall be applied between all aircraft operating within the portion of the AFI RVSM Airspace where RVSM has been suspended, regardless of the RVSM approval status of the aircraft.

5.4.1 Degradation of Aircraft Equipment (ATSP_2-2); (ATSP_2-3); (ATSP_2-4)

- The failure in flight of any component of the Minimum Equipment List (MEL) required for RVSM operations shall render the aircraft non-RVSM approved.
- Where an aircraft's Mode C displayed level differs from the cleared flight level by 300 ft (the allowable tolerance for Mode C readout) or more, the controller shall inform the pilot accordingly and the pilot shall be requested to check the pressure setting and confirm the aircraft's level.
- When the pilot of an RVSM approved aircraft confirms that the aircraft's equipment no longer meets the RVSM MASPS, the controller shall consider the aircraft as non-RVSM approved and take action immediately to provide a minimum vertical separation of 2 000 ft, or an appropriate horizontal separation minimum, from all other aircraft concerned.

- An aircraft rendered non-RVSM approved shall be cleared out of the AFI RVSM Airspace by air traffic control and the ACC/UAC to co-ordinate with adjacent ACCs/UACs.
- ATC shall manually apply the display of the a RVSM approved aircraft's associated radar label and/or radar position symbol, in accordance with established local radar display features applicable to non-RVSM approved aircraft in case of required RVSM equipment failure.

5.4.2 Severe Turbulence – Not Forecast (single aircraft) (ATSP_1-11)

When an aircraft operating in the AFI RVSM Airspace encounters severe turbulence due to weather or wake vortex which the pilot believes will impact the aircraft's capability to maintain its cleared flight level, the pilot shall inform ATC. ATC is required to establish either an appropriate horizontal separation minimum, or an increased vertical separation minimum of 2 000 ft. **(ATSP_1-12)**

- 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: ***"UNABLE RVSM DUE TURBULENCE".***
- 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. (ATSP_2-9)

- An aircraft experiencing severe turbulence while operating within the AFI RVSM Airspace need not be cleared out of RVSM airspace. If the pilot has informed ATC that the severe turbulence will impact the aircraft's capability 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 AFI RVSM Airspace, traffic permitting.

5.4.3 *Severe Turbulence – Not Forecast (multiple aircraft)* (ATSP_2-9)

- 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 AFI RVSM Airspace, the controller shall provide for an increased vertical separation minimum or an appropriate horizontal separation minimum. (ATSP_2-5)

5.4.4 *Severe Turbulence – Forecast* (ATSP_2-10)

- Where a meteorological forecast is predicting severe turbulence within the AFI 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.

- Consideration should be given to the development of a contingency FLAS to supplement any existing FLAS between ACCs/UACs.
- 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

6. PHRASEOLOGY

RVSM R/T Phraseology must be developed. A few examples are:

- ATC wish to know RVSM status of flight - ***CONFIRM RVSM APPROVED***
- Pilot indication that flight is RVSM approved - ***AFFIRM RVSM***
- Pilot indication that flight is NON RVSM approved - ***NEGATIVE RVSM***
- Pilot of State aircraft indicating that flight id NON RVSM approved - ***NEGATIVE RVSM STATE AIRCRAFT***
- ATC refuse clearance into RVSM Airspace - ***UNABLE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN [or DESCEND TO, or CLIMB TO] FL ...***
- Pilot reporting severe turbulence / weather affecting ability to maintain RVSM height keeping requirements - ***UNABLE RVSM DUE TURBULENCE***
- Pilot reporting equipment degraded below RVSM requirements - ***UNABLE RVSM DUE EQUIPMENT***
- ATC requesting pilot to report when able to resume RVSM - ***REPORT ABLE TO RESUME RVSM***
- Pilot ready to resume RVSM after equipment/weather contingency - ***READY TO RESUME RVSM***

7. VERTICAL SEPARATION

Reduced Vertical separation

7.1 Between FL 290 and FL 410 inclusive within the AFI RVSM airspace, the vertical separation minimum shall be;

a) 300M (1000 ft) between RVSM approved aircraft;

b) 600m (2000 ft) between
-non-RVSM approved State aircraft and any other aircraft operating within the AFI RVSM airspace in accordance with FLAS.

7.2 ATC shall provide a minimum vertical separation of 600M (2000ft between an aircraft experiencing a communication failure in flight and any other aircraft, where both aircraft are operating within the AFI RVSM airspace in accordance with FLAS.

7.3 Within the designated airspace where RVSM transition tasks are carried out, the applicable vertical separation minimum shall be 1 000 ft between RVSM approved aircraft, and 2 000 ft between any non-RVSM approved aircraft and any other aircraft.

7.4 The applicable vertical separation minimum between all formation flights of State aircraft and any other aircraft operating within the AFI RVSM Airspace shall be 2 000 ft.

7.5 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 AFI RVSM Airspace, shall be 2 000 ft, unless an appropriate horizontal separation minimum exists.

7.6 All activities occurring within restricted or danger airspaces 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 airspaces non-participating aircraft operating within the RVSM airspace is 2,000 ft, above the upper and below the lower limits of such airspaces.

8. COMMUNICATION FAILURE

8.1 Communication Failure Procedures (ATSP_2-6)

The ICAO Regional Supplementary Procedures for AFI will 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 AFI RVSM Airspace, shall be 2 000 ft, unless an appropriate horizontal separation minimum exists.

8.2 Compulsory Reporting Points

- 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. These points should be strategically located
  so as to enhance ATC's ability to detect air-ground communication failures on a timely basis, taking into account ATC separation and co-ordination requirements.
- There is a requirement to establish RVSM entry/exit points at or near the boundaries between the AFI RVSM Airspace and adjacent Regions for all ATS routes which cross the lateral limits of the AFI RVSM Airspace. The
- designation of these points as compulsory reporting points could also enhance ATC's ability to detect air-ground communication failures.

8.3 Laterally-Spaced, Uni-Directional ATS Routes

The use of laterally-spaced, uni-directional ATS routes as a means of strategically separating opposite-direction traffic operating to/from the AFIRVSM Airspace should be addressed.. In the context of air-ground communication failure procedures, laterally-spaced, uni-directional ATS routes between AFI RVSM Airspace and adjacent Regions could help mitigate the differences between cruising levels appropriate for direction of flight within the AFI RVSM Airspace versus the cruising levels applicable within adjacent Regions.

8.4 Flight Level Allocation Schemes (FLAS)

The strategic use of Flight Level Allocation Schemes should be considered and could also be used in the context of air-ground communication failure procedures.

9. ATS SYSTEMS SUPPORT

It is essential that ATC be aware as to the RVSM approval status of all aircraft operating within, outside of and in close proximity to the AFI RVSM Airspace if they are required to accommodate non-RVSM approved State aircraft.

9.1 Flight Data Processing Systems (FDPS).

In order to ensure RVSM separation between approved aircraft, it is important that ACCs/UACs receive the support of IFPS for the purpose of rejecting flight plans filed with for aircraft which do not qualify for operation within the AFI RVSM Airspace.

9.2 Radar Display Systems.

Radar display systems must provide controllers with continuous and unambiguous information on the RVSM approval status of all flights under their responsibility;

- In a radar environment, the radar position symbols and/or radar labels associated with aircraft operating within the AFI RVSM Airspace **shall** provide a clear indication of the current non-RVSM approval status.

- 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 AFI RVSM Airspace.

- 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.

- The possibility for the manual manipulation of the radar position symbols and/or radar labels of aircraft **shall** be available.

9.3 Flight Strips

Flight strips must display the non-RVSM approved status of all civil and State aircraft to controllers.

- 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).
- Information regarding a State or civil aircraft's current non-RVSM approval status **shall** be displayed on the flight strip. Message example:
  (NON RVSM).

- 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**)*

9.4 On-Line Data Interchange (OLDI)

OLDI should:

- include the current RVSM approval status of an aircraft, as well as the information regarding an aircraft's status as being a "State" aircraft, where applicable.
- support the systematic transfer of information related to requests for "Special Handling" in the AFI RVSM Airspace, in Item 18 of the ICAO Flight Plan (Item 18 message: ***STS/NON RVSM***).

9.5 Short Term Conflict Alert (STCA), and Medium Term Conflict Detection (MTCD)

Automatic conflict alert systems should be modified to use the RVSM approval or non-approval status of aircraft and apply the appropriate VSM of 1,000/2,000 ft.

- STCA systems of ACCs/UACs applying RVSM **should** be able to selectively assess the applicable vertical separation minimum of either 1 000 ft or 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.
- Medium Term Conflict Detection (MTCD) systems of ACCs/UACs applying RVSM **shall** be able to assess the selective application of a vertical separation minimum of either 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.

9.6 Flight Planning Requirements

Specific Flight Planning procedures are contained in the AFI RVSM in ICAO Doc 7030/4 AFI Regional Supplementary Procedures. The flight plan (FPL) shall include:

- the entry point at the lateral limit of AFI RVSM airspace and requested flight level after the entry point;
- the exit point at the lateral limit of the RVSM airspace and the requested flight level after the exit point;

- operators of RVSM approved aircraft shall insert "W" in Item 10 of the FPL regardless of requested FL;
- operators of non-RVSM approved State aircraft with a requested flight level of 290 or above shall insert "STS/NONRVSM" in Item 18 of the FPL;
- operators of formation flights of RVSM-approved State aircraft shall NOT insert **"W"** in Item 10 of the FPL;
- operators filing Repetitive Flight Plans (RPLs) shall include in Item Q of the RPL the RVSM approval status "**EQPT/W**" for RVSM approved aircraft, & "EQPT/ " for non-RVSM approved aircraft;
- if a change of aircraft on an RPL results in a modification of the RVSM approval status in Item Q, the operator shall submit a modification message (CHG).

10. AIR TRAFFIC MANAGEMENT CONSIDERATIONS (ATST_1-1); (ATST_1-2)

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. Individual ACCs/UACs may wish to take the opportunity to maximize the operational benefits to be gained from the introduction of RVSM by undertaking an extensive critical operational analysis and the training of air traffic controllers in the following activities:-

10.1 The ATS Route Network

- It is expected that the existing ATS route network will be through a combination of Flight Level Allocation Schemes, sectorisation, and, to a lesser extent, changes to the ATS route network itself.

- 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.

- The introduction of AFI RVSM will permit 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.

- The implementation of AFI RVSM may require an analysis of the optimal levels to be used for delineating the vertical limits of control sectors within ACCs/UACs.

- States shall ensure that the vertical limits of control sectors within ACCs/UACs also facilitate the requirement to provide a vertical separation minimum of 2,000 ft between a. non-RVSM approved aircraft and any other aircraft operating within the AFI RVSM Airspace;

- Consideration should be given to the impact on ATC co-ordination workload resulting from the requirement to provide a 2,000 ft vertical separation minimum for such aircraft operating at levels immediately above or below vertical sector boundaries within the AFI RVSM Airspace.

10.2 ATC Sectorisation

- The implementation of AFI RVSM will 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.

- The vertical limits of control sectors within the AFI RVSM Airspace should also facilitate the requirement to provide a vertical separation minimum of 2 000 ft between RVSM approved and non-approved aircraft.

- The impact on ATC co-ordination workload resulting from the requirement to provide a 2,000 ft vertical separation minimum, for such aircraft operating at levels immediately above or below vertical sector boundaries within the AFI RVSM Airspace should be determined.

- Inter-Centre Letters of Agreement must be amended to reflect any changes to sector boundaries, where applicable. (ATSP_1-5)

10.3 Special Procedures applicable to designated airspaces

Such special procedures are contained in the Regional SUPPs (Doc. 7030) for the AFI regional

10.4 Flight Level Allocation Schemes (FLAS) (ATSP_1-2)

States should consider a Flight Level Allocation Scheme whereby specific flight levels are applied to specific segments within the ATS route network.

Organizing the use and non-use of flight levels on specific route segments could avoid potential traffic conflicts.

A Strategy could therefore be developed as to when to discontinue the use of FL 310, FL 350, and FL 390 as eastbound cruising levels taking into account different traffic scenarios at these flight levels.

10.5 *ATC* Clearances (ATSP_1-1) (ATSP_1-3)

- only RVSM approved aircraft and non-RVSM approved State aircraft shall, subject to ATC capacity be issued an air traffic control clearance to join and operate within the AFI RVSM Airspace.
- Non-RVSM aircraft intending to climb or descend through the AFI RVSM airspace shall be given appropriate ATC clearance.
- ATC clearance into the AFI RVSM airspace shall **not** be issued to formation flights in the AFI RVSM controlled airspace.
- ATC shall assign flight levels to non-RVSM approved aircraft in accordance with a published table.
- All ATC clearances must be read back and acknowledged.

10.6 ATS Letters of Agreement (ATSP_1-5) (ATSP_1-6) (ATSP_2-13)

10.6.1 ACCs/UACs should review existing Inter-Centre Letters of Agreement for the purpose of updating the content to include RVSM-related changes prior to the implementation of AFI RVSM.

10.6.2 ACCs/UACs should review existing Civil/Military LOAs and/or develop new LOAs defining ATS coordination procedures in RVSM environment.

10.7 Inter-Centre Co-ordination

10.7.1 Flight Plans (ATSP_1-4) (ATSP_2-8)

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.

10.7.2 Computer-assisted Co-ordination of Estimate Messages (ATSP_1-1) (ATSP_1-6)

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. 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 message verbally, using the term "***Negative RVSM***' or "***Negative RVSM State Aircraft***", as applicable.

10.7.3 Verbal Co-ordination of Estimate Messages (ATSP_1-6)

- 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 operations at the end of the verbal estimate message, using the term "***Negative RVSM***" or "***Negative RVSM State Aircraft***", as applicable.

- 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.

10.7.4 Training for air traffic controllers and ATC maintenance personnel (Civil and Military) for RVSM. (ATST_1-1 to ATST_1-11); (ATST_2-1 to ATST 2-10); (ATST_3-1)

- 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. It is therefore essential that ATS providers recognize its responsibility for the competence of Air Traffic Controllers (ATC) in the provision of ATS in RVSM airspace.

- States must ensure that Air Traffic controllers and ATS Equipment personnel undergo full training and orientation in all the activities concerning the ATM Safety Elements Required for the safe implementation of RVSM in the AFI Continental airspace.

11 AIRCRAFT COLLISION AVOIDANCE SYSTEM

11.1 Carriage and Operation of Airborne Collision Avoidance System (ACAS) and Pressure-Altitude Reporting Transponder

The ICAO Standards relating to ACAS II as contained in the ICAO Annex 6, Part I paragraph 6.18 *inter alia* require that:

> 6.18.1 "From **1 January 2003**, all turbine-engined aeroplanes of a maximum certified take-off mass in excess of 15 000 kg or authorized to carry more than 30 passengers shall be equipped with an airborne collision avoidance system (ACAS II)".
>
> 6.18.2 "From **1 January 2005**, all turbine-engined aeroplanes of a maximum certified take-off mass in excess of 5 700 kg or authorized to carry more than 19 passengers shall be equipped with an airborne collision avoidance system (ACAS II)".
>
> 6.18.3 "An airborne collision avoidance system (ACAS) shall operate in accordance with the relevant provisions of ICAO Annex 10, Volume IV".

The ICAO Standards relating to pressure-altitude reporting transponders as contained in Annex 6, Part I paragraph 6.19 *inter alia* require that:

> 6.19 "All aeroplanes shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of Annex 10, Volume IV" and; The ICAO Standards relating to pressure-altitude transponders as contained in Annex 6, Part II paragraph 6.13.1 *inter alia* require as follows:
>
> 6.13.1 "**From January 2003**, unless exempted by the appropriate authorities, all aeroplanes shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of Annex 10, Volume IV".

Furthermore, other relevant ICAO provisions are contained in Annex 2, paragraph 3.2, Annex 11, paragraph 2.4.2, PANS/OPS Doc.8168, Volume I, Part VIII and PANS/ATM, Doc.4444 Chapter 8, paragraph 8.5.

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. TCAS II, Version 6.04A (or earlier) models, were designed for an operating environment where a minimum vertical separation of 2 000 ft is applied above FL 290. TCAS II, Version 7, includes modifications intended to address operational issues, including its compatibility for operations within RVSM Airspace.

RVSM REFERENCE DOCUMENTS

ICAO The material is covered in the following documents:
Annex 2; chapter 3, para.2
Annex 6; part 1, paragraph 6.18
Annex 10;vol.iv
Annex 11; Para. 2.4.2
PANS-OPS; vol.1, part viii
PANS- ATM; chapter 4.

- EUROCONTROL - RVSM
- NAT RVSM
- FAA RVSM manuals

AFI GMU HEIGHT MONITORING SERVICE

The ARMA has contracted the GMU Height Monitoring services of ARINC, who have a proven record in this field, for the provision of a professional Height Monitoring Service within the AFI Region.

The results of Height Monitoring test missions have been processed, evaluated and accepted by the ARMA. The AFI GMU Height Monitoring service is now available for operational use to those aircraft requiring height monitoring within Africa. The results of height monitoring received from RMA's in other regions for AFI aircraft will also be utilized.

AFI has access to three GMU's, which will be utilized for Height Monitoring in AFI and all carry certification papers, EASA Form 1, for operation on board aircraft either on the flight deck or within the cabin. It should be recalled that GMU Height Monitoring has been operational in other regions for some time and is thus a safe and tested method of gathering Height Monitoring Data. Further to this ARMA will issue to the relevant authorities on request a set of the certification papers for reference purposes. Requests should be made to ARMA/ARINC for these copies either electronically or via fax if required.

Operators requiring Height Monitoring should use the following points of contact in order to obtain information, secure the service and plan the event:

- Preferably direct contact with ARINC on email address afirvsm@arinc.com
- If unsure of the process make contact with the ARMA on email address afirma@atns.co.za
- The Operational Base in Johannesburg will serve as the planning base for the event. The operator will be provided with contact details for the Johannesburg Operational Base when appropriate.

Note 1: No Height Monitoring results will be released from the Operations Base, as they will only have raw unprocessed data, which will need to be processed at the Gatwick OCC. This raw data is of no use to the operator until processed.

Note 2: Operators are requested to refrain from contacting ARINC directly for the outcome of the Height Monitoring flight as ARINC may not release this information.

Note 3: All Height Monitoring results will be forwarded to the ARMA by ARINC and released officially to the applicable operator by the ARMA.

INTERNATIONAL CIVIL AVIATION ORGANIZATION
EASTERN AND SOUTHERN AFRICAN OFFICE

ELEVENTH MEETING OF THE RVSM/RNAV/RNP TASK FORCE
(NAIROBI, 30 NOVEMBER TO 1 DECEMBER 2006)

Agenda Item 3.2: SAFETY ASSESSMENT ISSUES

(Presented by the Secretariat)

SUMMARY

This paper presents an alternative perspective in relation to safety assessments and their relationship with the Target Level of Safety approach to the implementation of system improvements under the Safety Management Systems concept

1. INTRODUCTION

1.1 The AFI Region States supported by the ICAO regional offices in Nairobi and Dakar have been working on preparations for RVSM implementation for several years in the Region. In this context, it must be acknowledged that a significant amount of work has been advanced so far and any future activity aimed at implementing RVSM should continue to build on the work already advanced up to now.

1.2 As it is known, several proposed RVSM implementation dates have been advanced but for various reasons, those dates have slipped and implementation has not been possible in the region. One of the stumbling blocks to RVSM implementation has been that a safety case analysis conducted so far has shown that the acceptable risk of collision (Target Level of Safety, TLS), as agreed upon by the APIRG, would be exceeded if RVSM were to be implemented under current conditions.

1.3 The target TLS number selected by the APIRG to be met prior to implementation is the same as what is recommended in Doc. 9574 and also used by the NAT and all other regions in carrying out RVSM implementation. The chosen TLS is $5x10^{-9}$ fatal accidents per aircraft flying hour.

1.4 A collision risk analysis for African airspace carried out in 2005 showed that if RVSM were to be implemented in the AFI region under the current conditions, the collision risk would be over $63x10^{-9}$ fatal accidents per aircraft flying hour. This means that the proposed TLS would be exceeded by over 12 times and thus RVSM could not proceed. Regional States, supported by ICAO have been working in making improvements to the system in order to reduce this number ever since.

2. DISCUSSION

2.1 In this effort, it needs to be highlighted that the African region in its RVSM implementation plans is carrying out an extremely more detailed and comprehensive process than has been undertaken by many regions up to now. Specifically, the AFI will implement RVSM based not only on ensuring compliance with a safety assessment based on meeting a TLS, but also based on satisfying a very thorough Pre-Implementation Safety Case (PISC) analysis.

2.2 The combination of these processes, meeting a TLS plus satisfying a PISC will help in ensuring that RVSM implementation in the region proceeds only after the most stringent safety measures have been identified and compliance with them has been demonstrated.

2.3 In this regard, it can be fairly said that the AFI region is engaged in complying with implementation of RVSM by utilizing ATS Safety Management Systems techniques as outlined in ICAO Annex 11, the PANS/ATM and the ICAO Safety Management Manual (Doc. 9859). The combination of these techniques, that is, compliance with a safety assessment based on a TLS and a Safety Management Systems (SMS) approach, constitutes an excellent process in RVSM implementation that is at least as good or better than what has been used in other regions thus far.

2.4 It stands to reason that the combination of these efforts aimed at improving safety in the region will bring the collision risk closer to the stated target TLS of $5x10^{-9}$ fatal accidents per aircraft flying hour whether RVSM is implemented or not.

2.5 Given the additional safety improvements being made by the use of the PISC and associated SMS work, a decision that the RVSM TF may wish to make is whether it would be desirable to revisit the requirement of meeting the current TLS number, prior to implementation. Specifically, given all the other improvements, the group may wish to consider whether reaching the TLS number must be demonstrated **prior to RVSM implementation** or if an alternative method may be acceptable at a regional level prior to reaching the TLS of $5x10^{-9}$.

2.6 The point may be made that other regions have complied with the TLS of $5x10^{-9}$ therefore, the AFI too should demonstrate meeting that number prior to implementation. An additional argument may be made in that satisfying the TLS is a requirement of the RVSM Implementation Manual. These facts are uncontrovertible. There are however some issues that should be addressed in relation to this topic:

1. There is little demonstrable, direct, significant causal-effect relationship between RVSM implementation and meeting/maintaining a TLS of $5x10^{-9}$.

2. Post implementation experience in other regions indicate that achieving $5x10^{-9}$ before RVSM and maintaining after implementation may not be realistic.

3. The TLS method of assessing safety is a reactive measurement tool that does not actively help in identifying latent hazards in the system. Creates a false sense of security.

4. The RVSM Implementation Manual gives PIRGS alternate metrics and methods for the establishment of acceptable levels of safety.

3. THERE IS LITTLE DEMONSTRABLE, DIRECT, SIGNIFICANT CAUSAL-EFFECT RELATIONSHIP BETWEEN RVSM OPERATIONS AND MEETING/MAINTAINING A TLS OF $5X10^{-9}$.

3.1 The most significant, critical difference in RVSM operations compared to conventional operations is the fact that under RVSM operations aircraft are vertically separated by one thousand feet. To ensure this separation is carried out safely, aircraft's altimetry systems must meet exacting criteria for certification and follow-up.

3.2 The Manual on Implementation of a 300m (1000ft) Vertical Separation Minimum Between Fl 290 and FL 410 Inclusive (Doc. 9574) in Chapter 2, Par. 2.1.4 states that "The RVSM safety objective for technical risk is a TLS of $2.5x10^{-9}$ fatal accidents for flight hour" This needs to be viewed under the context that total risk would be the TLS of $5x10^{-9}$ Consequently, the contribution to risk from all other causes of error would be $2.5x10^{-9}$.

3.3 In the paragraph above technical risk means failures due aircraft height keeping performance. Overall risk, is the risk of collision due to all causes which includes technical risk. To demonstrate the relationship between the two and the impact of each on the overall risk, this paper utilizes as an example the performance of the North Atlantic (NAT) RVSM airspace over the last seven years.

3.4 In the NAT, the results of the yearly reviews of RVSM performance are shown in the tables below reproduced from the Forty-second Meeting of the Mathematician's Working Group of the NATSPG (NAT SPG/42 MWG)

RVSM Vertical Operational Collision Risk Estimates between 1999 and 2005

(All figures are in fatal accidents per flight hour and should be multiplied by 10^{-9}. These should be compared against the TLS of 5×10^{-9}.)

	1999 Phase II	2000 Phase II	2001 Phase II	2002† Full RVSM	2003 Full RVSM	2004 Full RVSM	2005 Full RVSM
OTS	6.0	0.5	3.0	0.6	6.3	6.3	4.8
Random	8.9	6.6	16.3	41.6	46.3	25.1	59.0
Combined	7.2	3.0	9.0	20.5	27.8	16.3	34.6

†: 2002 values estimated for full RVSM (January 24 to December 31) using twelve months of LHD data.
Note that $P_y(0)$ was increased in both 2000 and 2002.
Note that risk estimates for 2005 were calculated using the revised lateral overlap probability and aircraft dimensions.

3.5 As it can be seen, the collision risk for OTS and random traffic in the NAT during the year 2005 was 34.6×10^{-9} collisions per aircraft flying hour. The same report, (NAT SPG/42 MWG) informs that the estimate of vertical technical risk for 2005 was 1.4×10^{-9} fatal accidents per flight hour. It can be concluded then that if RVSM operations were suspended in the NAT immediately, the action would only remove technical risk (1.4×10^{-9}) and the overall collision risk would still be 33.2×10^{-9} (34.6 minus 1.4) fatal accidents per flight hour.

3.6 **This clearly shows that RVSM by itself is a minute contributor to the overall risk in the NAT.** In other words, whether RVSM operations are continued or suspended in the NAT tomorrow, the TLS of 5×10^{-9} would still be exceeded by more than 6 times.

3.7 In light of the foregoing, if as a result of the efforts through the PISC program it is demonstrated that the risk in AFI is brought down to say, 20×10^{-9}, not implementing RVSM brings with it the risk that leaving things as they are could actually be more hazardous than implementing RVSM. This would be because all other factors remaining equal, the introduction of RVSM by itself would result in improved safety simply by the decrease in aircraft density due to the availability of a greater number of altitudes.

4. EXPERIENCE IN OTHER REGIONS INDICATES THAT THE NUMBER $5X10^{-9}$ MAY NOT BE REALISTIC

4.1 Referring once again to the previous table, it can be seen that for 6 of the past 7 years, the NAT has exceeded the TLS of $5x10^{-9}$ for OTS and random traffic combined. Simple arithmetic shows us that the average in the NAT over the past 7 years has been $16.8x10^{-9}$ and yet, RVSM operations are still being conducted with the endorsement of the NATSPG. This is perfectly legal because the RVSM Implementation Manual, Doc. 9574 Ch. 2, par. 2.1.6 allows "...other appropriate metrics and methods of assessment providing an acceptable level of safety may be established by States and, as appropriate, implemented by regional agreement;"

4.2 It should also be remembered that the NAT has some of the most sophisticated air navigation service providers as well as users.

4.3 If one of the most sophisticated regions, based on level and type of traffic and quality of service providers, is having difficulty meeting the TLS, then to expect the Africa region to truly meet the TLS of $5x10^{-9}$ prior to RVSM implementation may be counterproductive and result in a deliberate although unintended action to maintain the region at a lower level of safety than it could otherwise be possible. It is not absolutely necessary to discard the TLS of $5x10^{-9}$ as the ultimate goal, but the AFI region may wish to consider attaining an interim goal while striving for the $5x10^{-9}$ just as the NAT has been doing for the past seven years.

5. THE TLS METHOD OF ASSESSING SAFETY IS A REACTIVE MEASUREMENT TOOL THAT DOES NOT ACTIVELY HELP IN IDENTIFYING LATENT HAZARDS IN THE SYSTEM. CREATES A FALSE SENSE OF SECURITY.

5.1 The TLS method of assessing safety relies on data of events that have occurred typically over the past year or similar period. The key observation about this is that the TLS is only an indicator of incidents that have been reported and may or may not necessarily be accurate and that it may or may not be a predictor of future performance. Past performance is not necessarily an indication of future trends.

5.2 The TLS is based on reports of incidents/deviations by controllers or pilots or other users or service providers in the system. It is a given that there may be errors that go unreported either intentionally or unintentionally. There also may be errors that occur that are not detected at all. There could still be others that are reported as errors when they are not. As such, the TLS approach, like accident investigations, is in a way a *post-mortem, forensic* approach and may be inaccurate, that looks back at what happened but, by itself in not necessarily an indicator of what may happen in the future.

5.3 Dangerous latent conditions could or may exist for years and be completely undetected until they cause an incident or worse, an accident. As such, simply demonstrating meeting a TLS may cause a false sense of security in the part of the user. The TLS then captures only the "tip" of the iceberg, that is, incidents that protrude above and beyond the last layer of protection. The TLS does not give a picture at all of underlying causes or risks or show potential incidents that were caught by safety nets. A "good" TLS then may give a false sense of complacency that everything is going well with the system when it may not be.

5.4 Further, reliance on reports by pilots and controllers in order to determine the TLS is questionable due to the very nature of the source of the data. These data originate on reports that may or may not be made by pilots or controllers. Acceptance of a collision risk number based on these reports should at best be questioned. Incomplete and incorrect data, whether it leans the TLS one way or the other should be studied vary carefully, if at all, to use as the sole decision-making tool on whether RVSM should be implemented or not.

5.5 Use of the TLS as a decision making tool must be taken with an extreme dose of care. It is invitingly easy to put complete reliance on meeting a number. Given that focus, other areas of potential hazards and associated risks may be overlooked due to the focus on the TLS. The TLS by its very nature, a number that if met means things are acceptable, could lure implementers into a false sense of security. Number is met, things are acceptable.

5.6 Obviously, the best solution to overcoming this deficiency is the adoption of proactive safety management systems approach that is constantly monitoring the system by direct observation and feedback to identify hazards, study the risks and mitigate as necessary. This SMS process, coupled with a TLS approach may be the most desirable solution for RVSM implementation.

6. THE RVSM IMPLEMENTATION MANUAL GIVES PIRGS ALTERNATE METRICS AND METHODS FOR THE ESTABLISHMENT OF ACCEPTABLE LEVELS OF SAFETY.

6.1 Meeting a TLS of 5x10-9 is only one suggested option. Doc.9574, Chapter 2, Par. 2.1.6, states that "The RVSM safety objective for the **overall risk** should be set by regional agreement. Due account should be taken of existing ICAO guidance on safety objectives and safety objectives applied in other regions." It is worth repeating that further on the same paragraph, it is stated that "...for implementation of en-route systems after the year 2000, a target level of safety of $5x10^{-9}$ fatal accidents per flying hour per dimension should be applied. However, other appropriate metrics and methods of assessment providing an acceptable level of safety may be established by States and, as appropriate, implemented by regional agreement;"

6.2 Given the experience with the TLS in the NAT region, and in light of all the improvements being brought upon by the PISC process, the AFI PIRG may well wish to take advantage of this last paragraph and agree upon an alternative, interim metric and corresponding acceptable level of safety.

7. THE PISC PROCESS

7.1 In reviewing the AFI RVSM implementation process, the ICAO Air Navigation Commission (ANC) suggested the completion of a Pre-Implementation Safety Case (PISC) analysis to include compliance with the TLS process as recommended in the ICAO RVSM implementation manual. The overall aim of the PISC process is to show, by means of arguments and supporting evidence, that the application and implementation of RVSM in the AFI region can proceed in a manner that is consistent with the highest standards of safety achievable. Once the overall collision risk is shown to be at or below 5x10-9 and the PISC is completed satisfactorily, then RVSM implementation may proceed.

7.2 The three deliverables that must be successfully completed as part of the PISC are, the Functional Hazard Assessment (FHA), the Collision Risk Assessment (CRA) and the National Safety Plans (NSP). Fully completing these three phases of the PISC are a pre-requisite to RVSM implementation

Functional Hazard Analysis

The FHA is a comprehensive study that will help in determining how safe the system will be by specifying the safety integrity requirements of the system. The FHA looks at requirements from the perspective of its three elements: people, equipment and procedures. The FHA is being conducted to demonstrate compliance with the AFI safety policy and to provide assurance that all the hazards and risks associated with RVSM implementation in AFI have been identified, classified and mitigated. The FHA is being conducted by ALTRAN, a France-based company.

Collision Risk Assessment

The CRA is the process of risk estimation in order to assess the levels of collision risk in the vertical plane due to all causes. This is the analysis that would show whether or not the TLS of $5x10^{-9}$ is being met in the AFI prior to RVSM implementation. This study is also being carried out by Netherlands Laboratories in conjunction with ALTRAN.

National Safety Plans

The AFI RVSM Program also requires the creation of National Safety Plans for each of the States in the AFI region. These comprehensive plans contain information and guidance for States to use as they prepare their domestic organizations to be able to regulate, oversee, and provide services to RVSM compliant aircraft. Full compliance with these plans will help States in carrying out their regulatory duties in regard to their RVSM implementation responsibilities. The vast majority of AFI States have submitted NSPs and are in the process of fulfilling the details of those plans. An executive committee, known as the National Safety Plan Validation Panel is charged with examining these plans and endorsing them when they are deemed complete. To date, only three AFI States have not submitted a NSP

7.3 In addition to the PISC, another element contributing to the enhancement of safety in the region is the implementation of a pair or RNAV/RNP 10 routes linking South Africa with the European continent. As a result of this implementation, several States have improved their navigation and communications infrastructure thus indirectly enhancing overall safety and improving service in future RVSM airspace. Many States now even provide Class A service in their upper airspace.

8. ALTERNATIVE APPROACH

8.1 In conclusion, taking into consideration the points discussed above about the TLS, the development of the PISC as an integral part of RVSM implementation and the provisions outlined in Doc. 9574, allowing an alternative regional approach to RVSM implementation, the region may wish to consider a flexible approach to RVSM implementation.

8.2 The approach should not necessarily discard the ultimate TLS number, but given the experience in the NAT, it may wish to begin RVSM operations while improving to meet the TLS of $5x10^{-9}$. As an example the following process could be used as a starting point for discussions about this alternative approach.

8.3 Upon successful completion of the PISC and using the TLS of $5x10^{-9}$ as a final target, agree to implement RVSM in the region when:

a) The PISC collision risk analysis shows a collision risk of 16x10-9 and,
b) A positive, improving trend is forecast based on the CRA, and
c) Yearly follow-up CRAs confirm this trend.

9. ACTION BY THE RVSM/TF

9.1 The AFI RVSM/TF is invited to consider the information contained in this paper and proceed accordingly.

- END -