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Ref: ES AN 4/44 - 0608

10 August 2004

Subject: AFI RVSM Safety Policy and National Safety Plan

Action Required: Reply by 30 September 2004

Sir/Madam,

I have the honour to refer to our letter Ref. ES AN 4/44 – 0423 dated 8 June 2004 on the above subject and AFI RVSM Task Force/4 meeting Conclusions 4/17 and 4/18 which *inter alia* advocated as follows:

Conclusion 4/17:

That the AFI Safety Policy shall apply in the AFI Region.

Conclusion 4/18:

That the National Safety Plan shall apply in the AFI Region.

As you are aware, each State is responsible for the safe implementation of RVSM in the airspace over which it has jurisdiction and will be responsible for providing assurance through National Safety Plans that their responsibilities have been met. You are therefore, urged to take note of the approved AFI Safety Policy and implement your own National RVSM Safety Plan at the earliest possible time but not later than 30 September 2004.

Attached please find guidance material for development of a National Safety Plan that is required for implementation of RVSM at national level. Furthermore, States, which may not be conversant with the RVSM implementation process, may wish to contact the ICAO RVSM Program Office in Nairobi. I would be grateful if you could forward copies of your Safety Plan to this office as soon as possible, but not later than **30 September 2004.**

Accept, Sir/Madam, the assurances of my highest consideration.

Lot Mollel
Regional Director

Attachment A: **AFI Safety Policy**
Attachment B: **National Safety Plan for Implementation of RVSM**

AFI REDUCED VERTICAL SEPARATION MINIMUM (RVSM)
RVSM SAFETY POLICY

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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. Except within the AFI RVSM Transitional Airspace Non-RVSM approved aircraft, other than state aircraft, shall not be permitted to operate within RVSM airspace.

For the transition between RVSM and non-RVSM airspace specific procedures shall be established to facilitate the safe transition between RVSM and Non-RVSM airspace. The transition tasks shall be accomplished so as to make RVSM operations transparent to adjacent non-RVSM regions.

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 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.

These Safety Objectives will be complemented by Safety Requirements which may arise as results from the detailed Functional Hazard Analysis which yet has to be carried out.

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 particular situation in States which have to ensure the transition between RVSM and non-RVSM airspace and (iii) 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.

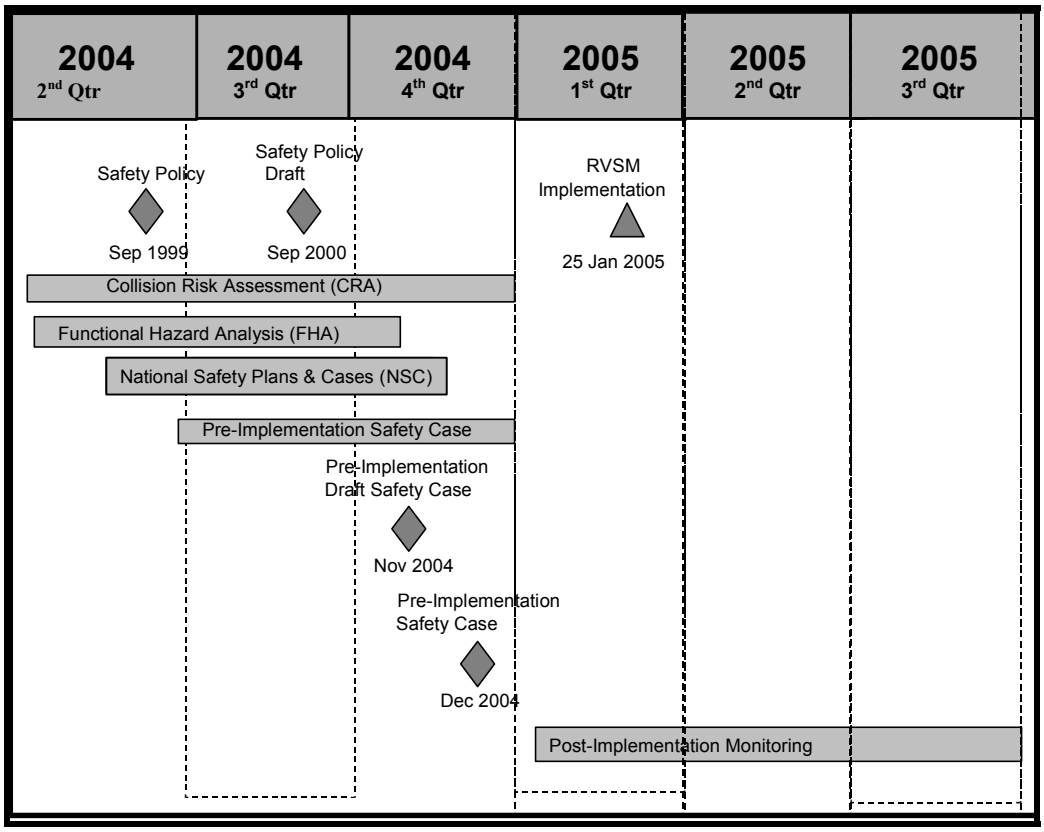
6.5 AFI RVSM Post-Implementation Safety Case

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.

7. AFI RVSM SAFETY PROGRAM SCHEDULE

The following graphic depicts the timescales for the principal elements of the RVSM Safety Sub-Program and the major deliverables foreseen.



[*Insert Name of State*] Safety Plan For the Implementation of RVSM

DOCUMENT APPROVAL

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

AUTHORITY	NAME AND SIGNATURE	DATE
National RVSM Safety Manager		
National RVSM Program Manager		
Head of Operations in National ATS Provider		
Approval Authority		

NOTES

- This draft plan is written to provide a template for use by individual States
- Where possible the text is written to be suitable for direct inclusion in State's Safety Plans.
- Where additional text is required to be inserted by the State, this is indicated in the text in Italics within brackets, for example [*insert Name of responsible authority here*].
- Some of the text is illustrative. In such circumstances a State may need to develop text appropriate to its circumstances, which reflects its local environment and activities etc. The illustrative text does, however, broadly represent best practice and may be used by States for their planning. States should note that there may be more than one way to achieve best practice and the text in this draft plan only reflects one of these possibilities.
- This draft plan does not try to take into account all the specifics of safety planning in use in the States. Each State needs to identify those aspects of their safety planning that are not included in this draft plan. States should include, as appropriate, such aspects within their State Safety Plan

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1 INTRODUCTION

1.1 Safety Plan Objective

The objective of this Safety Plan for [*Name of State*] is to set out those National activities that are required to support the RVSM Safety Case. The plan also addresses safety requirements identified by the State's Regulator [*Insert Name of regulatory authority*]. Each of the National activities required for the implementation of RVSM by [*Name of State*] is described in some detail. The descriptions address:

- The role of the activity in support of the safe implementation and operation of RVSM in [*Name of State*],
- The standards to be applied to the conduct of the activity,
- The additional supporting activities that will provide confidence that the identified National activities will lead to the successful implementation of RVSM within [*Name of State*]. These supporting activities include:
  - Those that help achieve quality,
  - Those that help manage identified risks.

The purpose in showing this level of information is to provide early assurance that *[Name of State]* takes its safety responsibilities seriously and has developed a plan to achieve the safe implementation of RVSM.

This safety plan has also been produced to help those within *[Name of State]* who have responsibility for the provision and regulation of the State's Air Traffic Service [*insert Name of ATS Provider*]. It helps them understand the safety aspects of the State's RVSM activities and shows how the National Program Manager is managing these aspects.

1.2 Approach

This National safety plan is divided into sections that consider the National activities for RVSM as follows:

- Section 2: Aircraft and Operator Approvals for RVSM
- Section 3: ATS Training,
- Section 4: Changes to ATS Equipment,
- Section 5: Changes to ATS Procedures,
- Section 6: Airspace Design Changes,
- Section 7: RVSM Switchover,
- Section 8: Operational Monitoring of RVSM.

Within each section the plan:

(a) Describes those activities that are necessary to provide an appropriate ATS following the implementation of RVSM in the AFI region;

(b) Identifies the appropriate responsible Authorities, together with a description as to how these Authorities discharge their responsibility;

(c) Describes the detailed activities and checks that underpin the achievement of quality of the activities described in item (a) above;

(d) Shows how the hazard and risk information that will be produced by AFI's RVSM Program will be addressed as appropriate by the State.

3 Organisation

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

(a) [*Insert Name*] has been appointed as the Safety Manager for RVSM and is responsible for the production of this plan;

(b) The National Program Manager [*insert Name*] has responsibility for the National RVSM program. He approves the safety plan and is responsible for obtaining the further approvals that are described below. In approving the plan the National Program Manager is confirming that in his view the plan is acceptable, and accurately describes the activities that are required to show that the stated safety requirements will be achieved;

(c) The Head of ATS Operations [*insert Name*] has overall responsibility for the ATS operations. In approving the plan the Head of Operations is confirming that from a safety perspective all necessary actions have been or will be undertaken by the ATS provider to ensure that RVSM can be safely implemented and operated within *[Name of State]*;

(d) The CAA/ATS provider company [*insert Name*] is the designated Authority and is responsible for the provision of an appropriate Air Traffic Service within the State. In approving the plan the DG is confirming that he is satisfied that responsibility for the safe implementation of RVSM has been properly delegated; that the staff delegated have been duly authorised to act on his behalf; and that they are competent to act on his behalf.

In addition to the above, specific approvals for individual activities are also required (see sections 2.4, 3.4 through to 8.4).

The above organisation applies during the pre-implementation phase of RVSM. There are activities (in particular safety monitoring activities) that take place post-implementation. The responsibility for post-implementation safety activities rests with responsible staff in the State and the ATS provider [*insert Names, otherwise state that the post-implementation safety organisation and responsibilities are not yet determined*].

2 AIRCRAFT AND OPERATOR APPROVALS

2.1 Introduction

This section deals with Aircraft/operator approval requirements for aircraft to operate within the AFI RVSM region and describes the approval program within the State.

2.2 Safety Requirement

The safety requirement is to show that all Operators based in *[Name of State]* are aware of the RVSM implementation and have obtained RVSM approval for themselves and their aircraft as appropriate. Both the aircraft and the Operator require approval if they are to operate in RVSM airspace. It is the responsibility of the State's CAA to describe their regulatory activities that will lead to documentary proof of the State's CAA diligence with respect to these approvals.

2.3 Standards Applied

[Name of State] is a member of APIRG and will use TGL6 revision 1 to conduct the approval for civil aircraft and operators for RVSM operations (Include as *Appendix* A).

2.4 Planned Aircraft/Operator Activities

An approval program has been developed to support the implementation of RVSM. The details of the program are found in [*Name of State*] National RVSM Plan (*Include as Appendix B*). The program subdivides into two main activities:

(a) Awareness Activities
Operators and State aircraft authorities have already been informed about RVSM approval and monitoring requirements through:

- AICs [*supply details of AICs issued and planned for issue*].
- RVSM Seminars/workshops [*Supply details of seminars/workshops already run and planned to be run*]
- A working group has been set up with the Operators and State aircraft Authorities to discuss RVSM implementation. [*supply details of working group*]

(b) Approval Activities
These are described in 2.5 below.

2.5 Approval Activities

There are two areas for which *[Name of State]* has an established approval/regulatory process:

(a) Operator Approval

Those Operators that are based in *[Name of State]*, and wish to operate within the AFI RVSM Airspace, will apply to the State CAA to obtain operational approval (in line with TGL 6). The responsible officer for giving such approvals is [*insert title and name of current jobholder*]. His approval is based on [*insert approval criteria – this should be based on establishing compliance with the relevant aspects of TGL 6*].

(b) Aircraft Certification and Approval

Operators (or owners) of aircraft registered within *[Name of State]* will apply to the State CAA for certification and approval (in line with TGL 6). The responsible officer for giving such approvals is [*insert title and name of current jobholder*]. His approval is based on [*insert approval criteria – this should be based on establishing compliance with the relevant aspects of TGL 6*].

In addition military Authorities have elected to submit identified military transport aircraft for RVSM certification and approval. The responsibility for this rests with *[Name of State]* Ministry of Defence. It has elected to implement the principles embodied in TGL 6 Issue 1. The responsible officer for giving such approvals is [*insert title and name of current jobholder*]. His approval is based on [*insert approval criteria*].

2.6 Quality Assurance of Activities

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

2.6.1 Aircraft Technical Height Keeping Performance Monitoring

The ARMA has established a Height Monitoring Infrastructure that will provide ongoing monitoring of a substantial proportion of the aircraft fleet operating within the AFI RVSM region. Aircraft that are not within the specified standards will be reported to the appropriate State Authorities that approved the aircraft for RVSM operations. The Operator of the non-compliant aircraft will also be contacted. [*Insert Name of State Authority*] will follow up all such reports with the Operators concerned. This review will take place within the normal framework of aircraft certification and operator licensing.

2.6.2 Operational Error Monitoring

The AFI Regional Monitoring Agency (ARMA) has an established and ongoing program of operational error data collection and assessment. Information is obtained from ACCs and States on operational altitude deviations of 300 ft or greater. ARMA will use the data as part of the RVSM Safety Case. At present mechanisms have not been developed to inform the appropriate States of

clusters of events associated with a specific operator or region of airspace. These will be established prior to the implementation of RVSM.

In addition to the above, [*insert Name of State Authority*] monitors and reviews aircraft airworthiness and Operator Licenses both on a regular basis and in response to identified concerns or trends.

2.7 Aircraft and Operator Risk Management

Hazards associated with regulatory or approval processes are not normally covered within FHAs. It is however appropriate to review those hazards in the AFI FHA that are associated with aircraft, aircrew and Operator hazards. The results of the FHA are currently not available to the States. When made available, *[Name of State]* will review the hazards and risks that will have been identified by the FHA. The purpose of the review is to identify those aspects where the local circumstances are different from those assumed within the AFI FHA (*Include as Appendix C*). Any additional activities, required as a result of this review, will be listed as actions in future updates to this safety plan.

3 ATS TRAINING

3.1 Introduction

This section focuses on [*Name of State*] ATS training activities that are needed to ensure that operational staff is familiar with RVSM procedures. Additionally further details are provided to show how this training program supports and underpins the safe implementation of RVSM.

3.2 Safety Requirement

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

3.3 Standards Applied

There are no standards. The AFI training material supplied by AFI has been used as reference guidance for the development of *[Name of State]*'s training material. (*Include as Appendix D*).

3.4 Planned ATS Training Activities

An ATS training program has been developed to support the implementation of RVSM. The details of the program are found in [*insert reference to appropriate documents*]. The detailed program subdivides into four main activities and shows that it is the intent to train all controllers licensed in RVSM airspace sectors prior to RVSM Implementation on 25 Jan 2005.

3.4.1 Training Roles and Responsibilities

Staff has been identified to lead, prepare and deliver RVSM training to ACC Staff. [Include *Names, staff positions and RVSM training roles*].

3.4.2 Training Material

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

3.4.3 Training Program

A program of courses will be established at each ACC [*Names of the ACCs and summary of each training program to be included*]. The program will be developed in close co-operation with managers at each ACC. All controllers who will have operational responsibility in the AFI RVSM region (ie above FL 290) will receive this training. Other controllers and staff within the Air Traffic Provider will as a minimum be familiarise with RVSM operations and how it affects them in their duties. As far as is practical all controllers at an ACC will receive the full RVSM training. This is subject to operational and staffing constraints.

3.4.4 ACC Training Program

Courses will be run at each ACC as required. Follow-up and refresher training will be provided as needed.

3.5 RVSM Training Program Approval

There are two aspects of these training activities for which *[Name of State]* has established an approval process. These two aspects are:

3.5.1 Training Material Approval

All ATS training material is subject to strict control and changes must be approved prior to first use. The RVSM training material is subject to this process. The responsible officer for the approval of the training material is [*insert title and name of current jobholder*]. His approval is based on [*insert approval criteria*].

3.5.2 Controller Competence in RVSM Operations

The change to RVSM does not require changes to the controller's ATC license (or certificate of competence). However the ATS provider does accept the responsibility to ensure that controllers are capable of RVSM operations. To discharge this responsibility the manager of that ACC approves the RVSM training program for each ACC. Approval of the program represents a commitment from each ACC to ensure that all appropriate staff receives

RVSM training and that this training makes full use of the approved training material.

3.6 RVSM Training Quality Assurance

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

3.6.1 Use of the AFI Material as Guidance

The AFI material has been developed by Air Traffic Navigation Services (ATNS) in South Africa and has been subject to extensive review within the RVSM Program. This material forms the core of the training material developed for the State RVSM training program.

3.6.2 ATC Instructors

The responsibility for the development and delivery of the training rests with [*insert Name(s) and roles*]. They are experienced training instructors and are licensed as On-the-Job Training (OJT) Instructors. [*Further evidence of their experience may be usefully provided here*]. They are familiar with RVSM procedures. [*Insert Name(s)*] has attended the AFI Training Course on the RVSM Training material [*insert dates*]. They in turn will ensure that all the other designated instructors become familiar with, and understand, the material.

3.6.3 Training Material Review

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

3.6.4 Timely Training Program

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

- The training program allows controllers sufficient time from their operational duties to attend one of the courses,
- That accurate course attendance records are kept (including time spent on training simulators), and
- Controllers are encouraged to seek clarification, and further training if necessary, on those aspects they did not fully understand.

3.6.5 Interactive Training Program

Specific interaction will be encouraged through a course feedback questionnaire. The questionnaire will seek attendee views on the quality and ease of understanding of the course. This will be fed back to the instructors

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

3.6.6 Refresher Training

RVSM training may, through operational and staffing constraints, be provided to a controller more than 6 months in advance of RVSM. In such circumstances in the weeks prior to implementation, refresher training will be provided, so that what was learnt on the course is refreshed in the mind. [Provide d*etails of the provisions at each ACC for such refresher and follow-up training*].

3.7 ATS Training Risk Management

A key part of the management of safety is that the safety risks associated with poor or inadequate training are identified and, as appropriate, shown to be acceptably low. Within the AFI RVSM program there is commitment to perform a Functional Hazard Assessment (FHA) (which identifies hazards and assesses the risk associated with such hazards). The results of the FHA are currently not available to the States. When made available, *[Name of State]* will review the hazards and risks that will have been identified by the FHA. The purpose of the review is to identify those aspects where the local circumstances are different from those assumed within the AFI FHA. Any additional activities, required as a result of this review, will be listed as actions in future updates to this safety plan.

4 ATS EQUIPMENT

4.1 Introduction

This section addresses those changes to ATS equipment required for RVSM Operations and describes the program of activities that has been established to make the required changes to ATS equipment. Additionally further details are provided to show that these changes will be completed successfully and will underpin the safe implementation of RVSM.

4.2 Safety Requirement

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

4.3 Standards Applied

ICAO Technical Document 7030/4 (*Include as Appendix E*) provides the standards for procedures. ARPO has developed an AFI ATC manual that is consistent with ICAO Document 7030/4 and provides further information.

(*Include as Appendix F)*. This latter document provides the basis for the changes to ATS equipment that are required for the AFI RVSM Region.

4.4 Planned ATS Equipment Changes

[*Name of State*] has developed a program for changes to ATS equipment to support the implementation of RVSM. The details of the program are found in [*insert reference to the National RVSM Plan*]. This detailed program shows that it is the intent to complete the ATS equipment changes well before the implementation of RVSM on 25 Jan 2005. [*Dates to be inserted and tight timescales requires each the State to summarize the contingency plans that have been developed to mitigate the risk of slippage in the dates*].

In [*Name of State*] changes are required to the Flight Date Processing (FDP), Radar Data Processing (RDP), Display, flightstrip and On-Line Data Interchange (OLDI) systems. Software Modifications are required to all these systems to ensure that they are compatible with the ATC Manual for RVSM.

The State ATS Provider [*insert Name of ATS Provider*] is in contract with an external supplier who will make the necessary changes to the above systems. The contractor will make the changes to the systems, and test them. Following on from the successful conclusion of these tests, the ATS provider will accept the changed software and apply to the [*State CAA*] for approval to operate with the changed software.

4.5 Approval of Activities

There are two aspects of these ATS equipment changes for which *[Name of State]* has established an approval process.

4.5.1 Modified ATS Equipment

With the exception of minor updates to software, all changes require approval from the [*State CAA*] prior to their installation at ACCs. The responsible officer is [*insert title and name*]. He will approve the changes to ATS equipment prior to installation. His approval is based on [*insert approval criteria*].

4.5.2 Modified ATS Equipment for Operational Use at ACCs.

The changes to ATS equipment need to be installed satisfactorily at each ACC. The acceptance of the installed changes is required at each ACC by the [*State CAA*]. The responsible officer is [*insert title and name*] He will approve the equipment at each ACC prior to operational use. His approval is based on [*insert approval criteria or responsible officer's terms of reference, where available and appropriate*].

4.6 Quality assurance of ATS Equipment Changes

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

4.6.1 Functional Requirements

Functional Requirements for the change have been established [*reference to be supplied by State*] and the delivered changes will be judged against these requirements. These functional requirements were an integral part of the specification agreed with the contractor.

4.6.2 Software Development

Contractors have development processes for software modifications needed for RVSM operations. These are internal contractor procedures and have been established for some time [*supply ref to these procedures*].

4.6.3 Developed Software

Developed software will go through a series of tests and user trials prior to acceptance. Each of the identified functional requirements will be formally tested against agreed acceptance criteria [*ref on acceptance criteria to be supplied here*].

4.6.4 The Human Machine Interface

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

4.7 Risk Management of ATS Equipment Changes

A key part of the management of safety is that the safety risks associated with poor or inadequate ATS equipment are identified and, as appropriate, shown to be acceptably low. Within the AFI RVSM program there is commitment to perform a Functional Hazard Assessment (FHA) (which identifies hazards and assesses the risk associated with such hazards). The results of the FHA are currently not available to the States. When made available, *[Name of State]* will review the hazards and risks that will have been identified by the FHA. The purpose of the review is to identify those aspects where the local circumstances are different from those assumed within the AFI FHA. Any additional activities, required as a result of this review, will be listed as actions in future updates to this safety plan.

5 ATS PROCEDURES

5.1 Introduction

This section identifies changes required to ATS Procedures for implementation of RVSM in the AFI region and to implement new ATS procedures within each ACC. Additionally further details are provided to show how these activities underpin the safe implementation of RVSM.

5.2 Safety Requirement

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

5.3 Standards Applied

ICAO Document 7030/4 provides the standards. AFI has developed an ATC manual that is consistent with ICAO Document 7030/4 and provides further amplification of its implementation in the AFI region.

5.4 ATS RVSM Procedures

A program of activities has been established to develop and co-ordinate the changes to the ATS procedures. The details of the program are found in [*Name of State*] National RVSM Plan. The program subdivides into the following main activities:

5.4.1 State Aircraft Authorities Co-ordination

State aircraft in [*Name of State*] have no restriction on operating between flight levels FL290 and FL410 and do not require special procedures or co-ordination. State aircraft will operate within a policy of the flexible use of airspace and in co-operation with the Civil Authorities. The implementation of RVSM potentially imposes additional requirements on both State and Civil Authorities. A co-ordinating committee [*insert Name*] has been formed with these State-aircraft Authorities to ensure that satisfactory procedures are developed and that the high standards of co-operation and co-ordination continue following the Implementation of RVSM.

5.4.2 Adjacent ACC Co-ordination

The changes to procedures required for RVSM at an ACC will need to be co-ordinated with adjacent ACCs. New (or amended) letters of agreement (LoAs) are required. The Head of the ATS Provider is responsible for making the necessary agreements.

5.4.3 ATSU Operations Manual Changes

Each ACC will need to change its ATSU Operations Manual to include the changes as a result of RVSM. This is the responsibility of ACC management. The changes will include these appropriate changes due to the new LoAs, and any new agreements with the State Authorities concerning the use of RVSM airspace by State aircraft.

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

5.5 Approval of ATS Procedures Changes

There are two aspects of these changes to procedure activities for which *[Name of State]* has established an approval process.

5.5.1 ATSU Operations Manual Approval

Any change to an ACC Operations Manual is subject to strict control. All changes must be approved prior to use. The responsible officer is [*insert title and name of current jobholder*]. He will approve the changes to the manual for use. His approval is based on [*insert approval criteria*].

5.5.2 ACC Amended Agreements (LoAs)

Changes to LoAs are approved (signed) by ACC managers of both centers. For ACCs within [*Name of State*] approval is based on [*insert approval criteria*].

In addition within [*Name of State*] it is policy for to require additional, more senior signatures where the Adjacent or subjacent ACC is in another State. In [*Name of State*] the Director General/CEO of the CAA signs. His approval is based on [*insert approval criteria or responsible officer's terms of reference, where appropriate*].

5.6 ATS Procedures Changes Quality assurance

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

5.6.1 ICAO and AFI Material

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

5.6.2 Operational Staff Review

Operational staff at each ATSU will review the ATSU Operations Manuals. The review comments will be documented and where appropriate the manual will be modified.

5.6.3 LoA Control Process

All LoAs within *[Name of State]* are subject to extensive review. Within [*Name of State*] this includes the Airspace policy staff, and ACC operational staff.

5.6.4 Procedure and Airspace Design Change Simulation

[Name of State] has a computer based simulation capability. The changes to airspace design and use of RVSM procedures will be subject to simulation. The simulation validates the use of the new RVSM procedures and changes to airspace policy. [Insert s*imulation dates, constraints and objectives*].

5.7 ATS Procedure Risk Management

A key part of the management of safety is that the safety risks associated with poor or inadequate ATC procedures are identified and as appropriate shown to be acceptably low. Within the AFI RVSM Program there is commitment to perform a Functional Hazard Assessment (FHA) (which identifies hazards and assesses the risk associated with such hazards. The results of the FHA are currently not available to the States. When made available, *[Name of State]* will review the hazards and risks that will have been identified by the FHA. The purpose of the review is to identify those aspects where the local circumstances are different from those assumed within the AFI FHA. Any additional activities, required as a result of this review, will be listed as actions in future updates to this safety plan.

6 AIRSPACE DESIGN

6.1 Introduction

This section addresses airspace design activities needed to ensure safe and effective RVSM operations. Additionally further details are provided to show how these airspace changes underpin the safe implementation of RVSM.

6.2 Safety Requirement

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

6.3 Standards Applied

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

6.4 Planned Airspace Design Changes

A program for airspace design changes has been developed to support the implementation of RVSM. The details of the program are found in [*Name of State*] National RVSM Plan. There are several changes to the design of airspace that have been proposed to support the effective implementation of RVSM. These include:

(a) Changes to entry, reporting and exit points to minimise possible congestion at these points;
(b) Changes to **DFL**, if it is currently an RVSM level;
(c) A new flight level allocation scheme;
(d) Re-sectorisation of the upper airspace to allow the capacity in the upper airspace to increase to take advantage of the new RVSM levels;
(e) Some modifications to allow more direct routings.

Some of these changes need to be agreed with ACCs in adjoining states and are reflected in the LoA change process described in section 5.3 above.

6.5 Approval of Airspace Design Changes

There are two aspects of these airspace design activities for which *[Name of State]* accepts responsibility and has established an approval process.

6.5.1 Approval of the Changes

All airspace design issues are subject to strict change control and must be approved prior to first use. The responsible officer [*insert title and name of current jobholder*] will approve the changes. His approval is based on [*insert approval criteria*].

6.5.2 Changes Included in the LoAs as Necessary

This approval process is described above in section 5.5.

6.6 Airspace Design Quality Assurance

It is important to ensure that the changes to airspace design are effective. There are several elements that provide confidence in this effectiveness.

6.6.1 Use of Simulations

Simulations have been performed [*insert ref here*]. The studies show that the airspace design changes are effective within simulations of RVSM Operations. The simulation shows that controllers can safely handle RVSM operations.

6.6.2 Review Airspace Changes

The proposed airspace design changes receive extensive review by management staff within each of the ACCs. The review comments will be documented and where appropriate the manual will be modified.

6.7 Airspace Design Change Risk Management

A key part of the management of safety is that the safety risks associated with poor or inadequate changes to airspace design are identified and as appropriate shown to be acceptably low. Within the AFI RVSM program there is commitment to perform a Functional Hazard Assessment (FHA) (which identifies hazards and assesses the risk associated with such hazards). The results of the FHA are currently not available to the States. When made available, *[Name of State]* will review the hazards and risks that will have been identified by the FHA. The purpose of the review is to identify those aspects where the local circumstances are different from those assumed within the AFI FHA. Any additional activities, required as a result of this review, will be listed as actions in future updates to this safety plan.

7 RVSM SWITCHOVER

7.1 Introduction

Switchover is the operational process of managing the actual conversion of ATS from a 2000-ft separation (CVSM) environment to a 1000-ft (RVSM) environment. It covers the changes in the few hours before switchover on 25 Jan 2005 and the first few hours after the switchover. This switchover is the key operational aspect of the countdown to the implementation of RVSM. This section confirms that the operational impact of switchover to RVSM has been addressed and contingency plans exist. Details are provided to show how this changeover activity supports and underpins the safe implementation of RVSM.

7.2 Safety Requirement

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

7.3 Applied Standards

[Name of State] will use the AFI RVSM countdown plan as the basis for its own countdown plan. (*Include as Appendix G*).

7.4 Planned Switchover

Activities need to be planned to enable the safe and effective switchover to RVSM. The details of these planning actives are found in [*insert ref*]. The plan assumes that the AFI countdown activities will identify the optimum way to handle the switch from CVSM to RVSM. *[Name of State]* planning activity focuses on the establishing information and special procedures for its ACCs and establishing suitable arrangements and staffing levels for the switchover period.

7.5 Approval of Switchover Plans

There is one aspect of this switchover for which *[Name of State]* accepts responsibility and has established an approval process.

7.5.1 Approval of Special Procedures Developed for each ACC

These special ATS procedures (to cover switchover) will require approval prior to use just like any other ATS procedure. The responsible officer is [*insert title and name of current jobholder*]. He will approve the material for use and the approval is based on [*insert approval criteria*].

7.6 Switchover Quality Assurance

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

7.6.1 AFI Countdown Material

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

7.6.2 Review of Switchover Procedures

Operational and management staff at each ACC will review the material. The review comments will be documented and the material will be amended as appropriate.

7.7 Switchover Risk Management

A key part of safety management is that the safety risks associated with the switchover are identified and shown to be acceptably low. Within the AFI RVSM program there is commitment to perform a Functional Hazard Assessment (FHA) (which identifies hazards and assesses the risk associated

with such hazards). The results of the FHA are currently not available to the States. When made available, *[Name of State]* will review the hazards and risks that will have been identified by the FHA. The purpose of the review is to identify those aspects where the local circumstances are different from those assumed within the AFI FHA. Any additional activities, required as a result of this review, will be listed as actions in future updates to this safety plan.

8 RVSM OPERATIONAL SAFETY MONITORING AND REVIEW

8.1 Introduction

This section identifies activities required for post-implementation monitoring of the safety performance of RVSM operations by *[Name of State]*.

8.2 Safety Requirement

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

8.3 Applied Standards

There are no appropriate standards.

8.4 Monitoring Activities

The post-implementation monitoring arrangements are not yet determined. This determination is part of the establishment of post-implementation arrangements. In [*Name of State*] this will be considered as one aspect of the development of national countdown arrangements.

There are two key activities:

(a) ATS Performance Safety Monitoring

These arrangements will be a specific aspect of the normal monitoring of safety performance by the State.

(b) Operational Error Reporting

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

8.5 Approvals

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

8.6 Quality Assurance

[Name of State] will develop monitoring arrangements that achieve the safety requirement to monitor operational performance. However, as the arrangements have not yet been determined, it is not possible to identify requirements at present as to the aspects of these arrangements that give confidence in the achievement of quality.

8.7 Risk Management

Monitoring arrangements will help manage operational risks and do not introduce additional risks.