

SUBJECT: APPROVAL OF AIRCRAFT AND OPERATORS FOR FLIGHT IN RVSM AIRSPACE

EFFECTIVITY DATE: 08/07/2014

1. PURPOSE

- A. This TC contains guidance on airworthiness, continued airworthiness, and operational practices and procedures for obtaining IACM approval to conduct operations in RVSM airspace.
- B. It is also to be used by IACM inspectorate staff in charge of the review and approval of aircraft and operators for operation in RVSM airspace.
- C. It is established as an acceptance means to be used in the approval of aircraft and operators to conduct operations in airspace or on routes where Reduced Vertical Separation Minimum (RVSM) is applied.
- D. The contents of this CT is based on the information contained in JAA TGL N°6 Rev1 and FAA Interim Guidance 91-RVSM

2. APPLICABILITY

This TC applies to operators and aircraft intending to operate in airspace where an approval to conduct RVSM operations is required. It is also applicable to the IACM inspectorate staff charged with the RVSM review and approval process of aircraft and operators.

3. REFERENCE

- (1) ICAO Doc 7030
- (2) ICAO Doc 9754
- (3) JAA TGL n°6 Rev 1
- (4) FAA 91-RVSM
- (5) MOZCAR 121.5.01 (7)
- (6) ARMA RVSM website: <http://www.atns.com/arma-rvsm>
- (7) ARMA Circular 2/12

4. BACKGROUND

- 4.1. In 1982, under the overall guidance of the ICAO Review of the General Concept of Separation Panel (RGCSP), which has since been renamed the Separation and Airspace Safety Panel (SASP), several States initiated a series of comprehensive work programmes to examine the feasibility of reducing the vertical separation minimum above FL 290 from 600m (2,000 ft) to 300m (1,000 ft). Studies were made by member states of EUROCONTROL (France, Germany, the Kingdom of the Netherlands, and the United Kingdom - in an extensive co-operative venture which was co-ordinated by the EUROCONTROL Agency), Canada, Japan, the former Union of the Soviet Socialist Republics (USSR), and the United States of America (USA).
- 4.2. The primary objectives of these studies was to decide whether a global implementation of the Reduced Vertical Separation Minimum (RVSM):

- (1) would satisfy predetermined safety standards;
 - (2) would be technically and operationally feasible; and
 - (3) would provide a positive Benefit to Cost ratio.
- 4.3. These studies employed quantitative methods of risk assessment to support operational decisions concerning the feasibility of reducing the vertical separation minimum. The risk assessment consisted of two elements. First, risk estimation which concerns the development and use of methods and techniques with which the actual level of risk of an activity can be estimated; and second, risk evaluation which concerns the level of risk considered to be the maximum tolerable value for a safe system. The level of risk that is deemed acceptable is termed the Target Level of Safety (TLS). The basis of the process of risk estimation was the determination of the accuracy of height keeping performance of the aircraft population operating at/above FL 290. This was achieved through the use of high precision radar to determine the actual geometric height of aircraft in straight and level flight. This height was then compared with the geometric height of the flight level to which the aircraft had been assigned to determine the total vertical error (TVE) of the aircraft in question. Given this knowledge, it was possible to estimate the risk of collision solely as a consequence of vertical navigation errors of aircraft to which procedural vertical separation had been correctly applied. The RGCSP then employed an assessment TLS (2.5×10^{-9} fatal accidents per aircraft flight hour) to assess the technical feasibility of a 300m (1,000 ft) vertical separation minimum above FL 290 and also for developing aircraft height keeping capability requirements for operating with a 300m (1,000 ft) vertical separation minimum.
- 4.4. Using the assessment TLS of 2.5×10^{-9} fatal accidents per aircraft flight hour, the RGCSP concluded that a 300 m (1,000 ft) vertical separation minimum above FL 290 was technically feasible without imposing unreasonably demanding technical requirements on the equipment and that it would provide significant benefits in terms of economy and en-route airspace capacity. The technical feasibility referred to the fundamental capability of aircraft height keeping systems, which could be built, maintained, and operated in such a way that the expected, or typical, height keeping performance would be consistent with the safe implementation and use of a 300 m (1,000 ft) vertical separation minimum above FL 290. In reaching this conclusion on technical feasibility, the panel identified the need to establish:
- (1) airworthiness performance requirements in the form of a comprehensive Minimum Aircraft Systems Performance Specification (MASPS) for all aircraft which would be operated in RVSM airspace;
 - (2) new operational procedures; and
 - (3) a comprehensive means of monitoring for safe operation.
- 4.5. In the USA, RTCA Special Committee SC 150 was established with the purpose of developing minimum system performance requirements, identifying required aircraft equipment improvements and operational procedure changes and assessing the impact of RVSM implementation on the aviation community. SC 150 served as the focal point for the study and development of RVSM criteria and programmes in the US from 1982 to 1987.
- 4.6. In Europe, EUROCAE Working Group WG 30 was established in 1987 to prepare an altimetry specification appropriate for 300m (1,000 ft) vertical separation above FL 290. Draft specification documents produced in WG-30 formed a major input to the technical documentation on altimetry requirements developed by the ICAO North Atlantic System Planning Group/Vertical Studies Implementation Group.
- 4.7. The second major report published by RGCSP on RVSM was the Report of RGCSP/7 (Montreal, 30 October - 20 November 1990). This report provided the draft "Manual on Implementation of a 300m (1,000 ft) Vertical Separation Minimum (VSM) Between FL 290 and 410 Inclusive". This

material was approved by the ICAO Air Navigation Commission in February 1991 and published as ICAO Document 9574.

- 4.8 In the AFI region the RVSM program was successfully implemented on the 25th September 2008. The ARMA (AFI Regional Monitoring Agency) is delegated to South Africa and is hosted by ATNS.
- 4.9. The provisions necessary for the application of RVSM have been incorporated into ICAO Annex 2 — Rules of the Air, Annex 6 — Operation of Aircraft, Annex 11 — Air Traffic Services and the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444). More detailed guidance material is provided in the ICAO Manual on Implementation of a 300 M (1 000 FT) Vertical Separation Minimum between FL 290 and FL 410 Inclusive (Doc 9574). Including RVSM implementation planning, airworthiness requirements, flight crew procedures, ATC considerations and system performance monitoring.

5. DEFINITIONS AND ABBREVIATIONS

5.1. The following definitions apply to this CT:

- (1) **Aircraft Group.** A group of aircraft that are of nominally identical design and build with respect to all details that could influence the accuracy of height keeping performance.
- (2) **Altimetry System Error (ASE).** The difference between the pressure altitude displayed to the flight crew when referenced to the International Standard Atmosphere ground pressure setting (1013.2 hPa /29.92 in.Hg) and free stream pressure altitude.
- (3) **Assigned Altitude Deviation.** The difference between the transmitted Mode C altitude and the assigned altitude/ flight level.
- (4) **Authority** – The civil aviation authority of Mozambique (IACM)
- (5) **Automatic Altitude Control System.** Any system that is designed to automatically control the aircraft to a referenced pressure altitude.
- (6) **Avionics Error (AVE).** The error in the processes of converting the sensed pressure into an electrical output, of applying any static source error correction (SSEC) as appropriate, and of displaying the corresponding altitude.
- (7) **Basic RVSM Envelope.** The range of Mach numbers and gross weights within the altitude ranges FL 290 to FL 410 (or maximum attainable altitude) where an aircraft can reasonably expect to operate most frequently.
- (8) **Full RVSM Envelope.** The entire range of operational Mach numbers, W/δ , and altitude values over which the aircraft can be operated within RVSM airspace.
- (9) **General Air Traffic.** Flights conducted in accordance with the rules and provisions of ICAO.
- (10) **Height keeping Capability.** Aircraft height keeping performance that can be expected under nominal environmental operating conditions, with proper aircraft operating practices and maintenance.
- (11) **Height keeping Performance.** The observed performance of an aircraft with respect to adherence to a flight level.
- (12) **Non-Group Aircraft.** An aircraft for which the operator applies for approval on the characteristics of the unique airframe rather than on a group basis.
- (13) **RVSM Approval.** The approval that is issued by the appropriate authority of the State in which the Operator is registered.
- (14) **Residual Static Source Error.** The amount by which static source error (SSE) remains under-corrected or overcorrected after the application of SSEC.

- (15) **State Aircraft.** Aircraft used in military, customs and police services shall be deemed to be State aircraft
- (16) **Static Source Error (SSE).** The difference between the pressure sensed by the static system at the static port and the undisturbed ambient pressure.
- (17) **Static Source Error Correction (SSEC).** A correction for static source error.
- (18) **Total Vertical Error (TVE).** Vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level).

5.2. The following abbreviations are used in this CT:

- (1) AAD - Assigned Altitude Deviation
- (2) AOC - Air Operator's Certificate
- (3) ARMA – AFI Regional Monitoring Agency
- (4) ASE - Altimetry System Error
- (5) hPa - Hecto-Pascals
- (6) in.Hg - Inches of Mercury
- (7) M - Mach number
- (8) MEL - Minimum Equipment List
- (9) MMEL - Master Minimum Equipment List
- (10) QFE - Atmospheric pressure at aerodrome elevation (or at runway threshold)
- (11) QNH - Altimeter sub-scale setting to obtain elevation when on ground
- (12) SSE - Static Source Error
- (13) SSEC - Static Source Error Correction
- (14) TVE - Total Vertical Error

6. THE APPROVAL PROCESS

6.1 General

RVSM airspace is any airspace or route between FL 290 and FL 410 inclusive where aircraft are separated vertically by 300m (1,000 ft). Airspace where RVSM is applied should be considered special qualification airspace. The specific aircraft type or types that the operator intends to use will need to be approved by the Authority before the operator conducts flight in RVSM airspace. In addition, where operations in specified airspace require approval in accordance with an ICAO Regional Navigation Agreement, an operational approval will be needed. This CT provides guidance for the approval of specific aircraft type or types, and for operational approval.

6.2 Approval of Aircraft

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

6.3 Operational Approval

For certain airspace, as defined by ICAO Regional Navigation Agreements, operators are required to hold State approval to operate in that airspace, which may or may not include RVSM. Paragraph 11 contains guidance on operational procedures that an operator may need to adopt for such

airspace where RVSM is applied including advice on the operational material that may need to be submitted for review by the Authority.

7. RVSM PERFORMANCE

7.1 General

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

7.2 RVSM Flight Envelopes

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

7.3 Altimetry System Error

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

- (a) Unit to unit variability of avionics equipment.
- (b) Effect of environmental operating conditions on avionics equipment.
- (c) Airframe to airframe variability of static source error.
- (d) Effect of flight operating conditions on static source error.

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

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

- (a) At the point in the envelope where the mean ASE reaches its largest absolute value that value should not exceed 25 m (80 ft);
- (b) At the point in the envelope where absolute mean ASE plus three standard deviations of ASE reaches its largest absolute value, the absolute value should not exceed 60 m (200 ft).

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

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

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

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

- (a) For all conditions in the Basic envelope:
 - | Residual static source error + worst case avionics | \leq 50 m (160 ft)
- (b) For all conditions in the Full envelope:
 - | Residual static source error + worst case avionics | \leq 60 m (200 ft)

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

7.4 Altitude Keeping

An automatic altitude control system is required capable of controlling altitude within ± 20 m (± 65 ft) about the selected altitude, when the aircraft is operated in straight and level flight under non-turbulent non-gust conditions.

Note: Automatic altitude control systems with flight management system/ performance management system inputs allowing variations up to ± 40 m (± 130 ft) under non-turbulent, non-gust conditions, installed in aircraft types for which an application for Type Certificate was made prior to January 1, 1997, need not be replaced or modified.

8. AIRCRAFT SYSTEM

8.1 Equipment for RVSM Operations. The minimum equipment fit is:

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

- (a) Cross-coupled static source/system, with ice protection if located in areas subject to ice accretion;
- (b) Equipment for measuring static pressure sensed by the static source, converting it to pressure altitude and displaying the pressure altitude to the flight crew;
- (c) Equipment for providing a digitally encoded signal corresponding to the displayed pressure altitude, for automatic altitude reporting purposes;
- (d) Static source error correction (SSEC), if needed to meet the performance criteria of subparagraphs 7.3.3, 7.3.4 or 7.3.6, as appropriate; and
- (e) Signals referenced to a pilot selected altitude for automatic control and alerting. These signals will need to be derived from an altitude measurement system meeting the criteria of this document, and, in all cases, enabling the criteria of sub-paragraphs 8.2.6 and 8.3 to be met.

8.1.2 One secondary surveillance radar transponder with an altitude reporting system that can be connected to the altitude measurement system in use for altitude keeping.

8.1.3 An altitude alerting system.

8.1.4 An automatic altitude control system.

8.2. Altimetry

8.2.1 System Composition. The altimetry system of an aircraft comprises all those elements involved in the process of sampling free stream static pressure and converting it to a pressure altitude output. The elements of the altimetry system fall into two main groups:

- (a) Airframe plus static sources.
- (b) Avionics equipment and/or instruments.

8.2.2 Altimetry System Outputs The following altimetry system outputs are significant for RVSM operations:

- (a) Pressure altitude (Baro-corrected) for display.
- (b) Pressure altitude reporting data.
- (c) Pressure altitude or pressure altitude deviation for an automatic altitude control device.

8.2.3 Altimetry System Accuracy The total system accuracy will need to satisfy the criteria of sub-paragraphs 7.3.3, 7.3.4 or 7.3.6 as appropriate.

8.2.4 Static Source Error Correction. If the design and characteristics of the aircraft and its altimetry system are such that the criteria of sub-paragraphs 7.3.3, 7.3.4 or 7.3.6 are not satisfied by the location and geometry of the static sources alone, then suitable SSEC will need to be applied automatically within the avionics equipment of the altimetry system. The design aim for static source error correction, whether applied by aerodynamic/ geometric means or within the avionics equipment, should be to produce a minimum residual static source error, but in all cases it should lead to compliance with the criteria of sub-paragraphs 7.3.3, 7.3.4 or 7.3.6, as appropriate.

8.2.5 Altitude Reporting Capability. The aircraft altimetry system will need to provide an output to the aircraft transponder as required by applicable operating regulations.

8.2.6 Altitude Control Output

- (a) The altimetry system will need to provide a signal that can be used by an automatic altitude control system to control the aircraft to a selected altitude. The signal may be used either directly, or combined with other sensor signals. If SSEC is necessary to satisfy the criteria of sub-paragraph 7.3.3, 7.3.4 or 7.3.6, then an equivalent SSEC may be applied to the altitude control signal. The signal may be an altitude deviation signal, relative to the selected altitude, or a suitable absolute altitude signal.
- (b) Whatever the system architecture and SSEC system, the difference between the signal output to the altitude control system and the altitude displayed to the flight crew will need to be kept to the minimum.

8.2.7 Altimetry System Integrity The RVSM approval process will need to verify that the predicted rate of occurrence of undetected failure of the altimetry system does not exceed 1×10^{-5} per flight hour. All failures and failure combinations whose occurrence would not be evident from cross cockpit checks, and which would lead to altitude measurement /display errors outside the specified limits, need to be assessed against this value. Other failures or failure combinations need not be considered.

8.3 Altitude Alerting

The altitude deviation system will need to signal an alert when the altitude displayed to the flight crew deviates from selected altitude by more than a nominal threshold value. For aircraft for which an application for a Type Certificate is made before 1 January 1997, the nominal threshold value will need to be not greater than ± 90 m (± 300 ft). For aircraft for which an application for a Type Certificate is made on or after 1 January 1997, the value will need to be not greater than ± 60 m (± 200 ft). The overall equipment tolerance in implementing these nominal values will need to be not greater than ± 15 m (± 50 ft).

8.4 Automatic Altitude Control System

8.4.1 As a minimum, a single automatic altitude control system with an altitude keeping performance complying with sub-paragraph 7.4 will need to be installed.

8.4.2 Where an altitude select/acquire function is provided, the altitude select/acquire control panel will need to be configured such that an error of no more than ± 8 m (± 25 ft) exists between the value selected by, and displayed to, the flight crew, and the corresponding output to the control system.

8.5 System Limitations

8.5.1 The Aircraft Flight Manual should include a statement of compliance against an acceptable standard (JAA TGL6, FAA 91-RVSM or equivalent guidance material) quoting the applicable Service Bulletin or build standard of the aircraft. In addition the following statement should be included:

“Airworthiness Approval alone does not authorise flight into airspace for which an RVSM Operational Approval is required by an ICAO Regional Navigation Agreement.”

8.5.2 Non-compliant aspects of the installed systems and any other limitations will need to be identified in the approved Aircraft Flight Manual amendment or supplement, and in the applicable and approved Operations Manual.

For example:

- a) Non-compliant altimeter systems, e.g. standby altimeter;
- b) Non-Compliant modes of the automatic pilot, e.g. altitude hold, vnav, altitude select;
- c) Weight Limit;
- d) Mach Limit;
- e) Altitude Limit.

9. AIRWORTHINESS APPROVAL

9.1 General

For aircraft registered in Mozambique the airworthiness approval issued by the Authority is based on the confirmation by the State of Design that the aircraft type meets the appropriate airworthiness requirements. It is the responsibility of the operator to ensure that aircraft conformity with the applicable standards is documented by the State of Design before an application is submitted for approval to the Authority. Usually this follows a two step process.

9.1.1. For the first step:

- a) in the case of a newly built aircraft, the aircraft constructor develops and submits to the State of Design, the performance and analytical data that supports RVSM airworthiness approval of a defined build standard. The data will be supplemented with maintenance and repair manuals giving associated continued airworthiness instructions. Compliance with RVSM criteria will be stated in the Aircraft Flight Manual including reference to the applicable build standard, related conditions and limitations. Approval by the responsible authority, and, where applicable, validation of that approval by other authorities, indicates acceptance of newly built aircraft, conforming to that type and build standard, as complying with the RVSM airworthiness criteria.
- b) in the case of an aircraft already in service, the aircraft constructor (or an approved design organisation), submits to the State of Design the performance and analytical data that supports RVSM airworthiness approval of a defined build standard. The data will be supplemented with a Service Bulletin, or its equivalent, that identifies the work to be done to achieve the build standard, continued airworthiness instructions, and an amendment to the Aircraft Flight Manual stating related conditions and limitations. Approval by the responsible authority, and, where applicable, validation of that approval by other authorities, indicates acceptance of that aircraft type and build standard as complying with the RVSM airworthiness criteria.

9.1.2 For the second step, an aircraft operator may apply to the Authority of the State in which the aircraft is registered, for airworthiness approval of specific aircraft. The application will need to be supported by evidence confirming that the specific aircraft has been inspected and, where necessary, modified in accordance with applicable Service Bulletins, and is of a type and build standard that meets the RVSM airworthiness criteria. The operator will need to confirm also that the continued airworthiness instructions are available and that the approved Flight Manual amendment or supplement has been incorporated. The Aircraft Flight Manual should include a statement of compliance against an acceptable standard (JAA TGL6, FAA 91-RVSM or equivalent guidance material) quoting the applicable Service Bulletin or build standard of the aircraft. Approval by the authority of the State of Registry indicates that the aircraft is eligible for RVSM operations. The authority will notify the designated monitoring cell accordingly.

9.1.3 For RVSM airspace for which an operational approval is prescribed, airworthiness approval alone does not authorise flight in that airspace.

10. CONTINUED AIRWORTHINESS (MAINTENANCE PROCEDURES)

10.1 General

- (a) The integrity of the design features necessary to ensure that altimetry systems continue to meet RVSM approval criteria should be verified by scheduled tests and inspections in conjunction with an approved maintenance programme. The operator should review its maintenance procedures and address all aspects of continued airworthiness that may be relevant.
- (b) Adequate maintenance facilities will need to be available to enable compliance with the RVSM maintenance procedures.

10.2 Maintenance Programmes

Each operator requesting RVSM operational approval should establish RVSM maintenance and inspection practices acceptable to, and as required by, the responsible authority, that include any required maintenance specified in the data package. Operators of aircraft subject to maintenance programme approval will need to incorporate these practices in their maintenance programme.

Although air carriers operating aircraft subject to a continuous airworthiness maintenance program do not have to comply with the provisions of MOZCAR 91 pertaining to altimeter system and altitude reporting equipment test and inspections, an effective maintenance program will, typically, incorporate these provisions as a requirement for maintenance program approval.

10.3 Maintenance Documents

The following items should be reviewed, as appropriate:

- (a) Maintenance Manuals.
- (b) Structural Repair Manuals.
- (c) Standard Practices Manuals.
- (d) Illustrated Parts Catalogues.
- (e) Maintenance Schedule.
- (f) MMEL/MEL.

10.4 Maintenance Practices

If the operator is subject to an approved maintenance programme, that programme should include, for each aircraft type, the maintenance practices stated in the applicable aircraft and component manufacturers' maintenance manuals. In addition, for all aircraft, including those not subject to an approved maintenance programme, attention should be given to the following items:

- (a) All RVSM equipment should be maintained in accordance with the component manufacturers' maintenance instructions and the performance criteria of the RVSM approval data package.
- (b) Any modification or design change which in any way affects the initial RVSM approval, should be subject to a design review acceptable to the responsible authority.
- (c) Any repairs, not covered by approved maintenance documents, that may affect the integrity of the continuing RVSM approval, e.g. those affecting the alignment of pitot/static probes, repairs to dents or deformation around static plates, should be subject to a design review acceptable to the responsible authority.
- (d) Built-in Test Equipment (BITE) testing should not be used for system calibration unless it is shown to be acceptable by the aircraft constructor or an approved design organisation, and with the agreement of the responsible authority.
- (e) An appropriate system leak check (or visual inspection where permitted) should be accomplished following reconnection of a quick-disconnect static line.
- (f) Airframe and static systems should be maintained in accordance with the aircraft constructor's inspection standards and procedures.
- (g) To ensure the proper maintenance of airframe geometry for proper surface contours and the mitigation of altimetry system error, surface measurements or skin waviness checks will need to be made, as specified by the aircraft constructor, to ensure adherence to RVSM tolerances. These checks should be performed following repairs, or alterations having an effect on airframe surface and airflow.

- (h) The maintenance and inspection programme for the autopilot will need to ensure continued accuracy and integrity of the automatic altitude control system to meet the height keeping standards for RVSM operations. This requirement will typically be satisfied with equipment inspections and serviceability checks.
- (i) Whenever the performance of installed equipment has been demonstrated to be satisfactory for RVSM approval, the associated maintenance practices should be verified to be consistent with continued RVSM approval. Examples of equipment to be considered are:
 - (i) Altitude alerting.
 - (ii) Automatic altitude control system.
 - (iii) Secondary surveillance radar altitude reporting equipment.
 - (iv) Altimetry systems.

10.4.1 *Action for Non-compliant Aircraft.* Those aircraft positively identified as exhibiting height keeping performance errors that require investigation, as discussed in sub-paragraph 11.7, should not be operated in RVSM airspace until the following actions have been taken:

- (a) The failure or malfunction is confirmed and isolated; and,
- (b) Corrective action is taken as necessary if any aircraft is identified as having an ASE exceeding $\pm 60\text{m}$ ($\pm 200\text{ ft}$) and verified to support RVSM approval.

10.4.2 *Maintenance Training* New training may be necessary to support RVSM approval. Areas that may need to be highlighted for initial and recurrent training of relevant personnel are:

- (a) Aircraft geometric inspection techniques.
- (b) Test equipment calibration and use of that equipment.
- (c) Any special instructions or procedures introduced for RVSM approval.

10.4.3 Test Equipment

- (a) The test equipment should have the capability to demonstrate continuing compliance with all the parameters established in the data package for RVSM approval or as approved by the responsible authority.
- (b) Test equipment should be calibrated at periodic intervals as agreed by the responsible authority using reference standards whose calibration is certified as being traceable to national standards acceptable to that authority. The approved maintenance programme should include an effective quality control programme with attention to the following:
 - (i) Definition of required test equipment accuracy.
 - (ii) Regular calibrations of test equipment traceable to a master standard. Determination of the calibration interval should be a function of the stability of the test equipment. The calibration interval should be established using historical data so that degradation is small in relation to the required accuracy.
 - (iii) Regular audits of calibration facilities both in-house and outside.
 - (iv) Adherence to approved maintenance practices.
 - (v) Procedures for controlling operator errors and unusual environmental conditions which may affect calibration accuracy.

11. OPERATIONAL APPROVAL

11.1 Purpose and Organisation

Paragraph 6 gives an overview of the RVSM approval processes. For airspace where operational approval is required, this paragraph describes steps to be followed and gives detailed guidance on the required operational practices and procedures. (Refer to Appendix 1 Par. 8).

11.2 RVSM Operations

Approval will be required for each aircraft group and each aircraft to be used for RVSM operations. Approval will be required for each operator and the Authority will need to be satisfied that:

- (a) each aircraft holds airworthiness approval according to paragraph 9;
- (b) each operator has continued airworthiness programmes (maintenance procedures) according to paragraph 10;
- (c) where necessary, operating procedures unique to the airspace have been incorporated in operations manuals including any limitations identified in paragraph 8.5.
- (d) high levels of aircraft height keeping performance can be maintained.

11.3 Content of Operator RVSM Application

11.3.1 An application for the issue of RVSM approval should be submitted using forms F120-043A and F120-043B provided in Appendix 2, including all required attachments.

11.3.1 The following material should be made available to the responsible authority, in sufficient time to permit evaluation, before the intended start of RVSM operations.

- (a) *Airworthiness Documents.* Documentation that shows that the aircraft has RVSM airworthiness approval. This should include an Approved Flight Manual amendment or supplement.
- (b) *Description of Aircraft Equipment.* A description of the aircraft appropriate to operations in an RVSM environment.
- (c) *Training Programmes and Operating Practices and Procedures.* Holders of Air Operators Certificates (AOC) may need to submit training syllabi for initial, and where appropriate, recurrent training programmes together with other appropriate material to the responsible authority. The material will need to show that the operating practices, procedures and training items, related to RVSM operations in airspace that requires State operational approval, are incorporated. Non-AOC operators will need to comply with local procedures to satisfy the responsible authority that their knowledge of RVSM operating practices and procedures is equivalent to that set for AOC Holders, sufficient to permit them to conduct RVSM operations. Guidance on the content of training programmes and operating practices and procedures is given in Appendix 1. In broad terms, this covers flight planning, pre-flight procedures, aircraft procedures before RVSM airspace entry, in-flight procedures, and flight crew training procedures. The procedures used within airspace of the AFI region and the procedures unique to the AFI Airspace for which specific State operational approval is required are stated in Doc 7030 (Refer to Appendix 1, Par.8).
- (d) *Operations Manuals and Checklists* The appropriate manuals and checklists should be revised to include information/guidance on standard operating procedures as detailed in Appendix 1. Manuals should include a statement of the airspeeds, altitudes and weights considered in RVSM aircraft approval; including identification of any operating limitations or conditions established for that aircraft group. Manuals and checklists may need to be submitted for review by the authority as part of the application process.

- (e) *Past Performance.* Relevant operating history, where available, should be included in the application. The applicant should show that changes needed in training, operating or maintenance practices to improve poor height keeping performance have been made.
- (f) *Minimum Equipment List.* Where applicable, a minimum equipment list (MEL), adapted from the master minimum equipment list (MMEL) and relevant operational regulations, should include items pertinent to operating in RVSM airspace.
- (g) *Maintenance.* When application is made for operational approval, the operator should establish a maintenance programme acceptable to the responsible authority, as detailed in paragraph 10.
- (h) *Plan for Participation in Verification/Monitoring Programmes* The operator should establish a plan acceptable to the Authority, for participation in any applicable verification/ monitoring programme (See 11.6). This plan will need to include, as a minimum, a check on a sample of the operator's fleet by an independent height monitoring system.

11.4 Demonstration Flight(s)

The content of the RVSM application may be sufficient to verify the aircraft performance and procedures. However, the final step of the approval process may require a demonstration flight. The responsible authority may appoint an inspector for a flight in RVSM airspace to verify that all relevant procedures are applied effectively. If the performance is satisfactory, operation in RVSM airspace may be permitted.

11.5 Form of Approval Documents

11.5.1 Approvals issued by Authority will be processed as follows:

- (a) *Holders of an Air Operator's Certificate* Approval to operate in designated RVSM airspace areas will be granted in the operator's Operations Specifications. Each aircraft group for which the operator is granted approval will be listed.
- (b) *Non AOC Holders.* These operators will be issued with an Approval document using Form 90-004 included in Appendix 3. These approvals will be valid for a period of 2 years.

11.5.2 The Authority will notify ARMA of any RVSM approvals, or amendments thereof issued to operators and aircraft under its registry. Such notification will be submitted using the ARMA Form F2 included in Attachment A1.

11.6 Airspace Monitoring

For airspace where a numerical Target Level of Safety is prescribed, monitoring of aircraft height keeping performance in the airspace by an independent height monitoring system is necessary to verify that the prescribed level of safety is being achieved. However, an independent monitoring check of an aircraft is not a prerequisite for the grant of an RVSM approval.

Note: "If an operator adds new RVSM compliant airframes of a type for which it already has RVSM operational approval and has completed monitoring requirements for the type in accordance with the Minimum Monitoring Requirements, the new airframes are NOT required to be monitored. If an operator adds new RVSM compliant airframes of an aircraft type for which it has NOT previously received RVSM operational approval, then the operator should complete monitoring in accordance with the requirements." (ARMA Circular 2/12)

11.7 Suspension, Revocation and Reinstatement of RVSM Approval

The incidence of height keeping errors that can be tolerated in an RVSM environment is small. It is expected of each operator to take immediate action to rectify the conditions that cause an error. The operator should report an occurrence involving poor height keeping to the Authority within 72 hours. The report should include an initial analysis of causal factors and measures taken to prevent repeat

occurrences. The need for follow up reports will be determined by the responsible authority. Occurrences that should be reported and investigated are errors of:

- (a) TVE equal to or greater than ± 90 m (± 300 ft),
- (b) ASE equal to or greater than ± 75 m (± 245 ft), and
- (c) Assigned altitude deviation equal to or greater than ± 90 m (± 300 ft).

11.7.1 *Height keeping Errors* Height keeping errors fall into two broad categories:

- (a) errors caused by malfunction of aircraft equipment; and
- (b) operational errors.

11.7.2 An operator that consistently experiences errors in either category will have approval for RVSM operations suspended or revoked. If a problem is identified which is related to one specific aircraft type, then RVSM approval may be suspended or revoked for that specific type within that operator's fleet. In such case the Authority will complete Form F3 in Attachment A2 and submit it to ARMA, no later than the next business day after such suspension or revocation.

Note: The tolerable level of collision risk in the airspace would be exceeded if an operator consistently experienced errors.

11.7.3 *Operators Actions.* The operator should make an effective, timely response to each height keeping error. The Authority may consider suspending or revoking RVSM approval if the operator's responses to height keeping errors are not effective or timely. The Authority will consider the operator's past performance record in determining the action to be taken.

11.7.4 *Reinstatement of Approval.* The operator will need to satisfy the Authority that the causes of height keeping errors are understood and have been eliminated and that the operator's RVSM programmes and procedures are effective. At its discretion and to restore confidence, the Authority may require an independent height monitoring check of affected aircraft to be performed.

Approved

/Chairman of The Board



Capt. João Martins de Abreu



APPENDIX 1 TRAINING PROGRAMMES AND OPERATING PRACTICES AND PROCEDURES

1. INTRODUCTION

Flight crews will need to have an awareness of the criteria for operating in RVSM airspace and be trained accordingly. The items detailed in paragraphs 2 to 6 of this appendix should be standardised and incorporated into training programmes and operating practices and procedures. Certain items may already be adequately standardised in existing procedures. New technology may also remove the need for certain actions required of the flight crew. If this is so, then the intent of this guidance can be considered to be met.

Note: This document is written for all users of RVSM airspace, and as such is designed to present all required actions. It is recognised that some material may not be necessary for larger public transport operators.

2. FLIGHT PLANNING

During flight planning the flight crew should pay particular attention to conditions that may affect operation in RVSM airspace.

These include, but may not be limited to:

- (a) verifying that the airframe is approved for RVSM operations;
- (b) reported and forecast weather on the route of flight;
- (c) minimum equipment requirements pertaining to height keeping and alerting systems; and
- (d) any airframe or operating restriction related to RVSM approval.

3. PRE-FLIGHT PROCEDURES AT THE AIRCRAFT FOR EACH FLIGHT

The following actions should be accomplished during the pre-flight procedure:

- (a) review technical logs and forms to determine the condition of equipment required for flight in the RVSM airspace. Ensure that maintenance action has been taken to correct defects to required equipment;
- (b) during the external inspection of aircraft, particular attention should be paid to the condition of static sources and the condition of the fuselage skin near each static source and any other component that affects altimetry system accuracy. This check may be accomplished by a qualified and authorised person other than the pilot (e.g. a flight engineer or ground engineer);
- (c) before takeoff, the aircraft altimeters should be set to the QNH of the airfield and should display a known altitude, within the limits specified in the aircraft operating manuals. The two primary altimeters should also agree within limits specified by the aircraft operating manual. An alternative procedure using QFE may also be used. Any required functioning checks of altitude indicating systems should be performed.

Note. The maximum value for these checks cited in operating manuals should not exceed 23m (75ft).

- (d) before take-off, equipment required for flight in RVSM airspace should be operative, and any indications of malfunction should be resolved.

4. PROCEDURES PRIOR TO RVSM AIRSPACE ENTRY

The following equipment should be operating normally at entry into RVSM airspace:

- (a) Two primary altitude measurement systems.
- (b) One automatic altitude-control system.
- (c) One altitude-alerting device.

Note: Dual equipment requirements for altitude-control systems will be established by regional agreement after an evaluation of criteria such as mean time between failures, length of flight segments and availability of direct pilot-controller communications and radar surveillance.

- (d) Operating Transponder. An operating transponder may not be required for entry into all designated RVSM airspace. The operator should determine the requirement for an operational transponder in each RVSM area where operations are intended. The operator should also determine the transponder requirements for transition areas next to RVSM airspace.

Note: Should any of the required equipment fail prior to the aircraft entering RVSM airspace, the pilot should request a new clearance to avoid entering this airspace;

5. IN-FLIGHT PROCEDURES

5.1 The following practices should be incorporated into flight crew training and procedures:

- (a) Flight crews will need to comply with any aircraft operating restrictions, if required for the specific aircraft group, e.g. limits on indicated Mach number, given in the RVSM airworthiness approval.
- (b) Emphasis should be placed on promptly setting the sub-scale on all primary and standby altimeters to 1013.2 (hPa) /29.92 in.Hg when passing the transition altitude, and rechecking for proper altimeter setting when reaching the initial cleared flight level;
- (c) In level cruise it is essential that the aircraft is flown at the cleared flight level. This requires that particular care is taken to ensure that ATC clearances are fully understood and followed. The aircraft should not intentionally depart from cleared flight level without a positive clearance from ATC unless the crew are conducting contingency or emergency manoeuvres;
- (d) When changing levels, the aircraft should not be allowed to overshoot or undershoot the cleared flight level by more than 45 m (150 ft);

Note: It is recommended that the level off be accomplished using the altitude capture feature of the automatic altitude-control system, if installed.

- (e) An automatic altitude-control system should be operative and engaged during level cruise, except when circumstances such as the need to re-trim the aircraft or turbulence require disengagement. In any event, adherence to cruise altitude should be done by reference to one of the two primary altimeters. Following loss of the automatic height keeping function, any consequential restrictions will need to be observed.
- (f) Ensure that the altitude-alerting system is operative;
- (g) At intervals of approximately one hour, cross-checks between the primary altimeters should be made. A minimum of two will need to agree within ± 60 m (± 200 ft). Failure to meet this condition will require that the altimetry system be reported as defective and notified to ATC;
 - (i) The usual scan of flight deck instruments should suffice for altimeter cross-checking on most flights.
 - (ii) Before entering RVSM airspace, the initial altimeter cross check of primary and standby altimeters should be recorded

Note: Some systems may make use of automatic altimeter comparators.

- (h) In normal operations, the altimetry system being used to control the aircraft should be selected for the input to the altitude reporting transponder transmitting information to ATC.
- (i) If the pilot is advised in real time that the aircraft has been identified by a height-monitoring system as exhibiting a TVE greater than ± 90 m (± 300 ft) and/or an ASE greater than ± 75 m

(±245 ft) then the pilot should follow established regional procedures to protect the safe operation of the aircraft. This assumes that the monitoring system will identify the TVE or ASE within the set limits for accuracy.

- (j) If the pilot is notified by ATC of an assigned altitude deviation which exceeds ±90 m (±300 ft) then the pilot should take action to return to cleared flight level as quickly as possible.

5.2 Contingency procedures after entering RVSM airspace are:

5.2.1 The pilot should notify ATC of contingencies (equipment failures, weather) which affect the ability to maintain the cleared flight level, and co-ordinate a plan of action appropriate to the airspace concerned. Detailed guidance on contingency procedures are contained in the relevant publications dealing with the airspace. (Refer to Paragraph 8 of this Appendix).

5.2.2 Examples of equipment failures which should be notified to ATC are:

- (a) failure of all automatic altitude-control systems aboard the aircraft;
- (b) loss of redundancy of altimetry systems;
- (c) loss of thrust on an engine necessitating descent; or
- (d) any other equipment failure affecting the ability to maintain cleared flight level;

5.2.3 The pilot should notify ATC when encountering greater than moderate turbulence.

5.2.4 If unable to notify ATC and obtain an ATC clearance prior to deviating from the cleared flight level, the pilot should follow any established contingency procedures and obtain ATC clearance as soon as possible.

6. POST FLIGHT

6.1 In making technical log entries against malfunctions in height keeping systems, the pilot should provide sufficient detail to enable maintenance to effectively troubleshoot and repair the system. The pilot should detail the actual defect and the crew action taken to try to isolate and rectify the fault.

6.2 The following information should be recorded when appropriate:

- (a) Primary and standby altimeter readings.
- (b) Altitude selector setting.
- (c) Subscale setting on altimeter.
- (d) Autopilot used to control the aeroplane and any differences when an alternative autopilot system was selected.
- (e) Differences in altimeter readings, if alternate static ports selected.
- (f) Use of air data computer selector for fault diagnosis procedure.
- (g) The transponder selected to provide altitude information to ATC and any difference noted when an alternative transponder was selected.

7. SPECIAL EMPHASIS ITEMS: FLIGHT CREW TRAINING

7.1 The following items should also be included in flight crew training programmes:

- (a) knowledge and understanding of standard ATC phraseology used in each area of operations;
- (b) importance of crew members cross checking to ensure that ATC clearances are promptly and correctly complied with;
- (c) use and limitations in terms of accuracy of standby altimeters in contingencies. Where applicable, the pilot should review the application of static source error correction/ position error correction through the use of correction cards;


Note: Such correction data will need to be readily available on the flight deck.

- (d) problems of visual perception of other aircraft at 300m (1,000 ft) planned separation during darkness, when encountering local phenomena such as northern lights, for opposite and same direction traffic, and during turns; and
- (e) characteristics of aircraft altitude capture systems which may lead to overshoots;
- (f) relationship between the aircraft's altimetry, automatic altitude control and transponder systems in normal and abnormal conditions;
- (g) any airframe operating restrictions, if required for the specific aircraft group, related to RVSM airworthiness approval.


8. SPECIFIC REGIONAL OPERATIONAL PROCEDURES

- 8.1 The areas of applicability (by Flight Information Region) of RVSM airspace in identified ICAO regions is contained in the relevant sections of ICAO Document 7030. In addition these sections contain operational and contingency procedures unique to the regional airspace concerned, specific flight planning requirements, and the approval requirements for aircraft in the designated region.
- 8.2 Operators and inspectorate staff in charge of the RVSM approval process should also refer to the ARMA (AFI Regional Monitoring Agency) web site at <http://www.atns.com/arma-rvsm> for additional information on RVSM matters.

Appendix 2 - Application for PBN / RVSM /MNPS Approval

<p>REPÚBLICA DE MOÇAMBIQUE</p>  <p>IACM INSTITUTO DA AVIAÇÃO CIVIL DE MOÇAMBIQUE</p>		<p>APPLICATION FOR PERFORMANCE BASED NAVIGATION (PBN) / RVSM / MNPS APPROVAL</p>					
1. Applicant							
Operator Name:							
AOC/Operator N°:			Date of Issue			Expiry date:	
Date on which the operator/owner intends to start PBN / RVSM / MNPS operations:							
2. Organisation information							
Business Address							
Telephone			Fax:		E-mail		
Base of Operations Address:							
Base of Maintenance Address (If AMO certificate holder)							
Name and address of Air Operator legal representative							
3. Management Personnel (as applicable)							
Function	Name					Telephone./E-mail	
Operations Director							
Maintenance Director							
Quality Director							
4. Scope of Application <input type="checkbox"/> Initial Request <input type="checkbox"/> Additional Request							
ADD	Navigation-related approval			ADD	Navigation-related approval		
<input type="checkbox"/>	1. RNAV 10			<input type="checkbox"/>	7. A-RNP		
<input type="checkbox"/>	2. RNAV 5			<input type="checkbox"/>	8. RNP APRCH		
<input type="checkbox"/>	3. RNAV 2 and RNAV 1			<input type="checkbox"/>	9. RNP AR APRCH		
<input type="checkbox"/>	4. RNP 4			<input type="checkbox"/>	10. RNP 0.3		
<input type="checkbox"/>	5. RNP 2			<input type="checkbox"/>	11. RVSM		
<input type="checkbox"/>	6. RNP 1			<input type="checkbox"/>	12. MNPS		
5. Aircraft intended to be approved for PBN / RVSM / MNPS operation							
Aircraft	1	2	3	4	5	6	
Registration Mark							
Make/Model/Series							
Serial No.							
Mode "S" Code (hexadecimal)							
Airworthiness Certification Refer.							

6. Airspace (area, route, airport) where PBN / RVSM / MNPS Navigation is to be conducted (add pages, as necessary)							
AFI <input type="checkbox"/>	CAR <input type="checkbox"/>	EUR <input type="checkbox"/>	MID/ASIA <input type="checkbox"/>	NAM <input type="checkbox"/>	NAT <input type="checkbox"/>	PAC <input type="checkbox"/>	SAM <input type="checkbox"/>
Airport _____		Airport _____		Route _____		Route _____	
Airport _____		Airport _____		Route _____		Route _____	
7. Additional Application Attachments (documents must be submitted for each model/variant/serial number, as applicable)							
<input type="checkbox"/> 1. Individual aircraft eligibility statement		<input type="checkbox"/> 6. MEL		<input type="checkbox"/> 11*. Database subscription document			
2. Document confirming eligibility: <input type="checkbox"/> AFM, AFM supplement <input type="checkbox"/> TC, STC <input type="checkbox"/> Statement by Manufacturer		<input type="checkbox"/> 7. Maintenance procedures (MCM)		<input type="checkbox"/> 12*. Database integrity procedures			
3. Compliance Statement with: <input type="checkbox"/> CT 120-006 - PBN <input type="checkbox"/> CT 120-005 – RVSM <input type="checkbox"/> CT 120-007 - MNPS		<input type="checkbox"/> 8. Maintenance personnel training programs		<input type="checkbox"/> 13*. Database Supplier Approval			
4. Relevant Operations Manuals: <input type="checkbox"/> General OM (Part A) <input type="checkbox"/> FCOM (Part B) <input type="checkbox"/> SOPs (Part B) <input type="checkbox"/> OM (Part C)		<input type="checkbox"/> 9. Maintenance programme		<input type="checkbox"/> 14*. Other:			
<input type="checkbox"/> 5. Crew training programs (Part D)		<input type="checkbox"/> 10. Modification Approval document		*PBN only			
8. Additional Information to this application							
9. Applicant Certification Signature – The undersigned certify that all statements and answers provided on this application form and as attachments are complete and true to the best of their knowledge and agree that they are to be considered as part of basis for issuance of any PBN / RVSM / MNPS approval.							
Operations Director:					Date:		
Maintenance Director:					Date:		
Quality Director:					Date:		
10. IACM Certification							
10.1 <input type="checkbox"/> APPROVED with the associated authorizations <input type="checkbox"/> All Requests Granted <input type="checkbox"/> Limitations (describe):					10.2 <input type="checkbox"/> DISAPPROVED		
10.3 Signature		10.4 Title	10.5 Date		10.6 SRAS Code/ID:		
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 <p>REPÚBLICA DE MOÇAMBIQUE INSTITUTO DA AVIAÇÃO CIVIL DE MOÇAMBIQUE</p>	<p>PBN / RVSM / MNPS INDIVIDUAL AIRCRAFT ELEGIBILITY STATEMENT</p>
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1. Applicant

1. OPERATOR/OWNER NAME:

2. Aircraft to be operated

2.1. MAKE/MODEL/SERIES	2.2. AIRCRAFT REGISTRATION	2.3. AIRCRAFT SERIAL NUMBER
2.4. DATE OF MANUFACTURE	2.5. ENGINE MAKE/MODEL/SERIES	2.4. SEATING CAPACITY

3. Intended scope of PBN / RVSM / MNPS approval (Check one specification only in ADD column)

Initial Request Additional Request

ADD	Navigation-related approval	ADD	Navigation-related approval
<input type="checkbox"/>	RNAV 10:	<input type="checkbox"/>	7. A-RNP
<input type="checkbox"/>	RNAV 5	<input type="checkbox"/>	8. RNP APRCH
<input type="checkbox"/>	RNAV 2 and RNAV 1: GNSS <input type="checkbox"/> DME/DME <input type="checkbox"/> DME/DME/IRU <input type="checkbox"/> Other: <input type="checkbox"/> _____	<input type="checkbox"/>	9. RNP AR APRCH
<input type="checkbox"/>	4. RNP 4	<input type="checkbox"/>	10. RNP 0.3
<input type="checkbox"/>	5. RNP 2	<input type="checkbox"/>	11. RVSM _____
<input type="checkbox"/>	6. RNP 1	<input type="checkbox"/>	12. MNPS

4. Airspace (route, airport) where PBN / RVSM / MNPS Navigation is to be conducted (add pages, as necessary)

AFI <input type="checkbox"/>	CAR <input type="checkbox"/>	EUR <input type="checkbox"/>	MID/ASIA <input type="checkbox"/>	NAM <input type="checkbox"/>	NAT <input type="checkbox"/>	PAC <input type="checkbox"/>	SAM <input type="checkbox"/>
Airport: _____		Airport: _____		Airport: _____		Airport: _____	
Route: _____		Route: _____		Route: _____		Route: _____	

5. PBN / RVSM / MNPS Navigation Equipment Installed (add pages, as necessary)

System #1 Description:			
	Component #1	Component #2	Component #3
1. Description			
2. Make			
3. Model			
4. Part Number			
5. TSO			
6. Software (as applic.)			
System #2 Description:			
	Component #1	Component #2	Component #3
1. Description			
2. Make			
3. Model			
4. Part Number			
5. TSO			
6. Software (as applic.)			

System #3 Description:			
	Component #1	Component #2	Component #3
1. Description			
2. Make			
3. Model			
4. Part Number			
5. TSO			
6. Software (as applic.)			
System #4 Description			
	Component #1	Component #2	Component #3
1. Description			
2. Make			
3. Model			
4. Part Number			
5. TSO			
6: Software (as applic.)			
6. Aircraft PBN / RVSM / MNPS eligibility document			
	Document	Reference	
<input type="checkbox"/>	1. AFM/AFM Supplement		<input type="checkbox"/>
<input type="checkbox"/>	3. Manufacturer Statement		<input type="checkbox"/>
<input type="checkbox"/>	3.2 SB		<input type="checkbox"/>
<input type="checkbox"/>	3.4 Other		
7. ADDITIONAL INFORMATION PERTINENT TO THIS APPLICATION (add pages, as necessary)			
8. APPLICANTS CERTIFICATION- The undersigned certifies that all statements and answers provided on this aircraft conformity record are complete and true to the best of his knowledge and agree they are to be considered as part of the basis for issuance of any PBN / RVSM / MNPS approval.			
Name:	Title Maint. Director/ Owner/Operator	Signature	Date
9. IACM Certification			
PBN / RVSM / MNPS CONFORMITY ACCEPTABLE:			9.2 <input type="checkbox"/> DISAPPROVED
9.1 <input type="checkbox"/> APPROVED (Aircraft added to Operations Specifications with PBN / RVSM / MNPS authority)			
<input type="checkbox"/> All Requests Granted			
<input type="checkbox"/> Limitations (describe):			
9.3 Signature of approving official	9.4 Title	9.5 Date	9.6 SRAS Code/ID:
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Appendix 3 – Sample Letter of Authorization for Operations in RVSM Airspace
FORM F90-001



LETTER OF AUTHORISATION (LOA) N^o _____

Operations in Reduced Vertical Separation Minimum (RVSM) Airspace:

MOZCAR Part 91

1. *Authorization.* The Operator [*Insert Operator Name*] is authorized to conduct operations within airspace designated as Reduced Vertical Separation Minimum (RVSM) airspace in accordance with the limitations and provisions of this letter of authorization (LOA) and is subject to the conditions that all operations conducted within RVSM Airspace are in accordance with:
 - a) MOZCAR Part 91 and the flight rules contained in International Civil Aviation Organization (ICAO) Annex 2, and
 - b) MOZCAR 91.05.2 Navigation Equipment, and
 - c) MOZCAR 91.07.1 Routes and areas of operation.
2. *Authorized Airplanes.* The operator is authorized to use the airplanes listed below for operations in designated RVSM airspace when the required altitude-keeping equipment is approved and maintained in accordance with an approved RVSM maintenance program:

Table 1 – Airplanes Approved for RVSM

Serial Number	Registration Number	Airplane M/M/S	Remarks

3. *Crew Training.* Crew training conducted by [*training organization*]. In accordance with MOZCAR Part 91, § 91.3 and 91.703(a)(1)(2) and ICAO Annex 2 (Rules of the Air), paragraph 2.3.2 (Pre-flight action) crews are responsible for policies and procedures in areas of operations where flights are conducted.
4. *Responsible Person.* This person should be the individual person who will be the operator, or if the operator is a legal entity, then an officer, employee, or person who that entity has contracted with in order to act on behalf of the legal entity with respect to the RVSM authorization. This person must be a Mozambique citizen, or a person who holds a Mozambique pilot certificate and who accepts responsibility for complying with the stated regulations.

- a) If the Responsible Person named on this LOA relinquishes responsibility, this LOA becomes invalid.
- b) Enter the name, email address, and telephone number of the Responsible Person in Table 2:

Table 2 – Responsible Person

Name	E-mail Address	Telephone Number

- 5. RVSM Point of Contact (POC). If the operator has decided to use a separate individual other than the Responsible Person to fulfil this role, then the POC will be listed in Table 3, otherwise the Responsible Person will be listed in Tables 2 and 3.
 - a) The POC is the individual the IACM should first contact with respect to the operator's RVSM - Compliant Aircraft operations and maintenance status.
 - b) If the POC is other than the Responsible Person that individual is not authorized to sign the LOA.
 - c) Enter the name, email address, and telephone number of the RVSM Point of Contact in Table 3:

Table 3 – RVSM Point of Contact

Name	E-mail Address	Telephone Number

- 6. Deviation from RVSM Requirements. In accordance with § 91.180 the Administrator may authorize an operator to deviate from RVSM requirements for a specific individual flight in RVSM airspace if:
 - a) The operator submits an appropriate request with the air traffic control (ATC) center controlling the airspace in advance of the operation.
 - b) At the time of filing the flight plan for the flight, ATC determines that the airplanes may be provided appropriate separation and the flight will not interfere with, or impose a burden on other operators.
- 7. A copy of this LOA must be kept on the applicable aircraft while operating in RVSM airspace.
- 8. Date of Issue: [dd/mm/yyyy]
- 9. Validity: [dd/mm/yyyy]. This LOA is valid until for 24 months from the date of issue.

Signature,

Signature

(Issuing Authority)

(Responsible Person)

ATTACHMENT A1



AFI REGIONAL MONITORING AGENCY (ARMA)

RMA FORM F2

RECORD OF APPROVAL TO OPERATE IN ARMA RVSM AIRSPACE

1. When a State of Registry approves or amends the approval of an operator/aircraft for RVSM operations, details of that approval must be recorded and sent to the ARMA without delay.

2. **PLEASE USE BLOCK CAPITALS**

State of Registry ¹ :	<input type="text"/>
Name of Operator ² :	<input type="text"/>
State of Operator ¹ :	<input type="text"/>
Aircraft Type ³ :	<input type="text"/>
Aircraft Series ⁴ :	<input type="text"/>
Manufacturers Serial No:	<input type="text"/>
Registration No:	<input type="text"/>
Mode S Address Code ⁵ :	<input type="text"/>
Airworthiness Approval ⁶ :	<input type="text"/>
Date Issued ⁷ :	<input type="text"/>
RVSM Approval ⁶ :	<input type="text"/>
Date Issued ⁷ :	<input type="text"/>
Date of Expiry ⁷ (If Applicable):	<input type="text"/>
Method of Compliance (Service Bulletin, STC etc) ⁸ :	
Remarks ⁸ :	

When complete, please return to the following address.

RMA Address

Telephone: +27 11 928 6506

Fax: +27 11 928 6546

E-Mail: afirma@atns.co.za

ATTACHMENT A2



AFI REGIONAL MONITORING AGENCY (ARMA)

RMA FORM F3

WITHDRAWAL OF APPROVAL TO OPERATE IN ARMA RVSM AIRSPACE

1. When a State of Registry has cause to withdraw the approval of an operator/aircraft for operations within the ARMA airspace, details as requested below, must be submitted to the ARMA by the most appropriate method.
2. *Before providing the information as requested below, reference below, reference should be made to the accompanying notes (PLEASE USE BLOCK CAPITALS).*

State of Registry ¹ :	<input type="text"/>	<input type="text"/>			
Name of Operator ² :	<input type="text"/>	<input type="text"/>	<input type="text"/>		
State of Operator ¹ :	<input type="text"/>	<input type="text"/>			
Aircraft Type ³ :	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Aircraft Series ⁴ :	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Manufacturers Serial No:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Registration No:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mode S Address Code ⁵ :	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Date of Withdrawal of RVSM Approval ⁷ :	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Reason for Withdrawal of RVSM Approval ⁸ :					
Remarks ⁸ :					

When complete, please return to the following address.

RMA Address

Telephone: +27 11 928 6506

Fax: +27 11 928 6546

E-Mail: afirma@atns.co.za

NOTES TO AID COMPLETION OF ARMA FORMS F2 and F3

Please read these notes before attempting to complete forms RMA F2 and F3.

The numbers below refer to the superscript numbers on the blank forms F2 and F3:

1. Enter the 2 letter ICAO identifier as laid down in ICAO Doc 7910. In the event of there being more than one identifier for the same State, the one that appears first in the list should be used.
2. Enter the operator's 3 letter ICAO identifier as laid down in ICAO Doc 8585. If military, write 'MIL' and put the name of the aircraft's unit in the 'Remarks' field. If IGA, write 'IGA' and put the name of the operator/owner in the 'Remarks' field.
3. Enter the ICAO designator as laid down in ICAO Doc 8643 e.g. B767-200 = B762.
4. Enter Mark or Series of aircraft type e.g. 200.
5. Enter Aircraft Mode S address code in hexadecimal format.
e.g. 0001 0010 0011 0100 1101 1111 is equivalent to 1234DF in hexadecimal.
6. Enter Yes or No.
7. Example: For 26 June 2014 write 26:06:14.
8. Use a separate sheet of paper if insufficient space available.

If required, a Form F3 'Withdrawal of Approval to Operate in ARMA RVSM Airspace' must be completed and forwarded to ARMA by the most expeditious means available, no later than the next business day after any withdrawal of RVSM approval.

ATTACHMENT C

- A. This Attachment provides an EXAMPLE of an operator application for authority to conduct RVSM operations. It shows a suggested format and content for such an application. **It is provided for example purpose only!!!**
- B. Each operator must review the applicable paragraphs in this TC and provide information pertinent to the specific aircraft type or group for which it intends to seek approval and to the operator's individual operations and maintenance programs.
- C. This example has been prepared following the requirements described in this TC. It should provide a useful aid for operators preparing to submit an application to the Authority.

EXAMPLE OPERATOR APPLICATION:

SAMPLE COVER LETTER

Date:

Att: Mr. ZZZ

IACM – Instituto de Aviação Civil de Moçambique
Maputo – Republica de Moçambique

Subject: Application for Approval of XYZ Airline's Reduced Vertical Separation Minimum (RVSM)
Program - ABC Aircraft

Dear Sir:

Airline XYZ respectfully requests IACM approval to conduct flight operations in the AFI Region RVSM airspace between flight levels (FL) 290 and 410 with 1,000 feet vertical separation (i.e., RVSM operations) using ABC aircraft.

In support of this request, we have prepared the attached approval package. This document has been developed in accordance with the guidance in TC 120-005. In addition, this document will satisfy all requirements for issuance of approved Operations Specifications in accordance with MOZCAR.

Your review and approval of our attached application for RVSM operations with aircraft ABC is requested. If you have any questions, or require any additional information, please contact Mr. () at (238) ().

Sincerely,

Mr. Officer
Officer's Title

RVSM APPLICATION FOLDER

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- Request for Approval (See cover letter)
- Completed Application Form

APPROVAL FACTORS: BASED ON TC 120-005 – APPROVAL OF AIRCRAFT AND OPERATORS FOR FLIGHT IN RVSM AIRSPACE

	<u>TC 120-005 Reference</u>	<u>Page</u>
I. AIRWORTHINESS APPROVAL		
• Airworthiness Approval	Paragraph 9	Page 4
II. CONTINUED AIRWORTHINESS - MAINTENANCE PROCEDURES		
• General	Paragraph 10.1	Page 5
• Maintenance Programmes	Paragraph 10.2	Page 6
• Maintenance Documents	Paragraph 10.3	Page 7
• Maintenance Practices	Paragraph 10.4	Page 8
• Maintenance Practices for Non-compliant Aircraft	Paragraph 10.4.1	Page 10
• Maintenance Training	Paragraph 10.4.2	Page 11
• Test Equipment	Paragraph 10.4.3	Page 12

Appendices

Appendix I - Aircraft ABC Service Bulletin XXXX, dated 1-08-14

Appendix II - Airline XYZ Engineering Authorization (EA) 1-11111-11, dated 1-1-11
or

Appendix III - Aircraft ABC copy of AFM RVSM conformity statement.

Appendix IV – Copy of Aircraft ABC maintenance program requirements

III. OPERATIONAL APPROVAL

• Content of Operator RVSM Application	Paragraph 11.3	Page 15
• Demonstration Flight(s)	Paragraph 11.4	Page 21
• Form of Approval Documents	Paragraph 11.5	Page 22
• Airspace Monitoring	Paragraph 11.6	Page 23
• Suspens. Revoc. and Reinstatement of RVSM Approval 11.7	Paragraph Page 24	Paragraph

Appendices

Appendix V – Copy of relevant pages in Operations Manual Part A, B, C and D

Appendix VI – Statement of Compliance with TC 120-005

Appendix VII – Plan for participation in Verification/Monitoring Programme.

XYZ STATEMENT OF COMPLIANCE WITH TC 120-005

Requirement:

9. AIRWORTHINESS APPROVAL

Paragraph 9 of TC 120-005 specifies the requirements for airworthiness approval of an RVSM data package.

[This requirement has been complied with by the aircraft manufacturer, and is documented in Aircraft ABC Service Bulletin (SB) XXXX, dated 1-1-11.

This SB meets the requirements for the manufacturer's data package, as specified in Paragraph 9 of TC 120-005 and has been received the approval of the competent authority. Consequently, no additional operator-specific approval is required; an operator need only meet the requirements of this SB.

A copy of this SB is included as Appendix I. Airline XYZ has complied with this SB on our ABC aircraft in accordance with Airline XYZ Engineering Order (OE) 1-11111-11, dated 1-1-11. A copy of this OE is included as Appendix II.]

Or

[This requirement has been complied with by the aircraft manufacturer and is documented in Aircraft ABC AFM Ch. X, Section X, Pages X to XX approved by the competent authority, dated 1-1-11. A copy of the AFM relevant section is included as Appendix III.]

Requirement:

10. CONTINUED AIRWORTHINESS (MAINTENANCE PROCEDURES)

10.1. General:

- (a) The integrity of the design features necessary to ensure that altimetry systems continue to meet RVSM approval criteria should be verified by scheduled tests and inspections in conjunction with an approved maintenance programme. The operator should review its maintenance procedures and address all aspects of continued airworthiness that may be relevant.
- (b) Adequate maintenance facilities will need to be available to enable compliance with the RVSM maintenance procedures.

Airline XYZ Response:

Airline XYZ conducts operations as a flag air carrier in accordance with MOZCAR Part 121. XYZ maintains its aircraft under an IACM-approved continuous airworthiness maintenance program (CAMP) in accordance with MOZCAR Part 121, and in accordance with IACM approved Operations Specifications. IACM oversight of Airline XYZ's CAMP and Operations Specifications is provided by the Flight Safety Directorate of IACM. Accordingly, Airline XYZ's current approved maintenance program is sufficient to maintain the aircraft systems and equipment in accordance with RVSM requirements.

Specific information related to Airline XYZ's maintenance procedures and CAMP for RVSM is contained in subsequent sections in this application.

Airline XYZ operates sufficient maintenance facilities for its ABC aircraft to ensure continued compliance with RVSM requirements. Airline XYZ's primary maintenance base is located at [Airport Name] Airport, in City, State. Additional maintenance support is provided by contracted IACM approved maintenance organizations under MOZCAR Part 145.

Requirement:

10. CONTINUED AIRWORTHINESS (MAINTENANCE PROCEDURES)

10.2 Maintenance Programmes:

Each operator requesting RVSM operational approval should establish RVSM maintenance and inspection practices acceptable to, and as required by, the responsible authority, that include any required maintenance specified in the data package. Operators of aircraft subject to maintenance programme approval will need to incorporate these practices in their maintenance programme.

Although air carriers operating aircraft subject to a continuous airworthiness maintenance program do not have to comply with the provisions of MOZCAR 91 pertaining to altimeter system and altitude reporting equipment test and inspections, an effective maintenance and inspection program will, typically, incorporate these provisions as a requirement for maintenance program approval.

Airline XYZ Response:

The following pages list aircraft components required for RVSM, together with scheduled maintenance requirements for that equipment. No RVSM-specific maintenance requirements have been identified by the aircraft manufacturer. A copy of Aircraft ABC Service Bulletin (SB) XXXX, dated 1-1-11, which outlines maintenance requirements for RVSM equipment, is included as Appendix II.

- There are no RVSM-specific maintenance requirements for the Aircraft ABC Altimetry/Air-Data system. XYZ Airline operates under MOZCAR Part 121 and complies with MOZCAR Part 121 requirements for periodic maintenance via the Aircraft ABC continuous maintenance program (CAMP) meet the requirements of MOZCAR 121.09.5 (maintenance program) and therefore need not perform the periodic (2 year) altimeter check for either RVSM or normal operations.
- No RVSM-specific maintenance requirements exist for the automatic altitude control system.
- No scheduled maintenance requirements are outlined for the altitude alert module.
- Periodic checks of the ATC/MODE C Transponder shall be performed per MOZCAR Part 91 at 24 month intervals. Airline XYZ conducts a functional check of the Air Traffic Control System (ATC) at intervals not to exceed 24 months per CAMP Task (XXXX).

Requirement:

10. CONTINUED AIRWORTHINESS (MAINTENANCE PROCEDURES)

10.3 Maintenance Documents

The following items should be reviewed, as appropriate:

- (a) Maintenance Manuals.
- (b) Structural Repair Manuals.
- (c) Standard Practices Manuals.
- (d) Illustrated Parts Catalogues.
- (e) Maintenance Schedule.
- (f) MMEL/MEL.

Airline XYZ Response:

No RVSM-specific MM procedures have been identified; current MM procedures are sufficient for RVSM equipment.

Airline XYZ will revise the Aircraft ABC SRM to identify the area around the pitot-static probes as RVSM-critical, and to require the Airline XYZ Structures Engineer to be contacted for specific repair instructions in this area. A draft SRM revision is enclosed.

Airline XYZ's Standard Practice Manual will be revised in accordance with the enclosed draft revision. This manual will outline Airline XYZ's standard practices for the necessary RVSM maintenance requirements.

Airline XYZ will revise the aircraft ABC IPC in accordance with Airline XYZ's Engineering Authorization (EA) 22222 (draft copy enclosed) to identify RVSM-critical equipment. This equipment will also be identified as required inspection items (RIIs).

No change to the aircraft ABC maintenance schedule is required for RVSM. Please refer to Page 3-1 for additional information on the required maintenance schedules (reference CT 120-005, RVSM Approval Process Paragraph 10.2: "Continued Airworthiness (Maintenance Procedures) - Maintenance Programmes").

Please refer to Page 16-1 for a discussion of MMEL/MEL changes for RVSM (reference CT 120-005, RVSM Approval Process 11.3.(f): "Minimum Equipment List").

Requirement:

10. CONTINUED AIRWORTHINESS (MAINTENANCE PROCEDURES)

10.4 Maintenance Practices

If the operator is subject to an approved maintenance programme, that programme should include, for each aircraft type, the maintenance practices stated in the applicable aircraft and component manufacturers' maintenance manuals. In addition, for all aircraft, including those not subject to an approved maintenance programme, attention should be given to the following items:

- (a) All RVSM equipment should be maintained in accordance with the component manufacturers' maintenance instructions and the performance criteria of the RVSM approval data package.
- (b) Any modification or design change which in any way affects the initial RVSM approval, should be subject to a design review acceptable to the responsible authority.
- (c) Any repairs, not covered by approved maintenance documents, that may affect the integrity of the continuing RVSM approval, e.g. those affecting the alignment of pitot/static probes, repairs to dents or deformation around static plates, should be subject to a design review acceptable to the responsible authority.
- (d) Built-in Test Equipment (BITE) testing should not be used for system calibration unless it is shown to be acceptable by the aircraft constructor or an approved design organisation, and with the agreement of the responsible authority.
- (e) An appropriate system leak check (or visual inspection where permitted) should be accomplished following reconnection of a quick-disconnect static line.
- (f) Airframe and static systems should be maintained in accordance with the aircraft constructor's inspection standards and procedures.
- (g) To ensure the proper maintenance of airframe geometry for proper surface contours and the mitigation of altimetry system error, surface measurements or skin waviness checks will need to be made, as specified by the aircraft constructor, to ensure adherence to RVSM tolerances. These checks should be performed following repairs, or alterations having an effect on airframe surface and airflow.
- (h) The maintenance and inspection programme for the autopilot will need to ensure continued accuracy and integrity of the automatic altitude control system to meet the height keeping standards for RVSM operations. This requirement will typically be satisfied with equipment inspections and serviceability checks.
- (i) Whenever the performance of installed equipment has been demonstrated to be satisfactory for RVSM approval, the associated maintenance practices should be verified to be consistent with continued RVSM approval. Examples of equipment to be considered are:
 - (i) Altitude alerting.
 - (ii) Automatic altitude control system.
 - (iii) Secondary surveillance radar altitude reporting equipment.
 - (iv) Altimetry systems.

Airline XYZ Response:

No RVSM-specific maintenance requirements have been identified for aircraft ABC, as detailed in Appendix IV. Please refer to Page 3-1 for additional information on required maintenance (reference CT 120-005, Approval of Aircraft and Operators for Flight in RVSM Airspace 10.2: "Continued Airworthiness (Maintenance Procedures) - Maintenance Programmes"). Current Maintenance Manual procedures are acceptable for RVSM, and will continue to be followed.

All RVSM equipment will be identified in the IPC as RVSM-critical, and will be identified as required inspection items. Please refer to Page 4-1 of this application for details on this subject (reference CT-120-005, Approval of Aircraft and Operators for Flight in RVSM Airspace , Paragraph 10.3: “Continued Airworthiness (Maintenance Procedures) - Maintenance Documents”).

Requirement:

10. CONTINUED AIRWORTHINESS (MAINTENANCE PROCEDURES)

10.4.1 *Action for Non-compliant Aircraft.* Those aircraft positively identified as exhibiting height keeping performance errors that require investigation, as discussed in sub-paragraph 11.7, should not be operated in RVSM airspace until the following actions have been taken:

- (a) The failure or malfunction is confirmed and isolated; and
- (b) Corrective action is taken as necessary if any aircraft is identified as having an ASE exceeding $\pm 60\text{m}$ ($\pm 200\text{ ft}$) and verified to support RVSM approval.

Airline XYZ Response:

Airline XYZ will prepare a Standard Practice manual section that outlines responsibilities for RVSM. This manual will detail the requirements for noncompliant aircraft, including notification of Airline XYZ's Maintenance Coordination Center (MCC) and aircraft ABC Fleet Team. The MCC and fleet team will coordinate appropriate action, including:

- adding flight plan remarks to prevent aircraft operation in RVSM airspace until corrective action is accomplished;
- implementing corrective action; and
- if required, advising Airline XYZ's AAC Quality Department to report AAC the height-keeping performance error to AAC within 72 hours, along with initial analysis of causal factors and measures to prevent further events (refer to Page XX for additional information)

A draft copy of this manual is enclosed with Page 7 of this application (reference CT-120-005, Approval of Aircraft and Operators for Flight in RVSM Airspace, Paragraph 10.3: "Continued Airworthiness (Maintenance Procedures - Maintenance Documents)").

Requirement:

10. CONTINUED AIRWORTHINESS (MAINTENANCE PROCEDURES)

10.4.2 *Maintenance Training* New training may be necessary to support RVSM approval. Areas that may need to be highlighted for initial and recurrent training of relevant personnel are:

- (a) Aircraft geometric inspection techniques.
- (b) Test equipment calibration and use of that equipment.
- (c) Any special instructions or procedures introduced for RVSM approval.

Airline XYZ Response:

Airline XYZ's initial maintenance training will be revised to: highlight the importance of the area surrounding the pitot-static probe; emphasize that any defects in the fuselage skin around the probe can affect the accuracy of the altimetry system, and; require inspection of the area around the probe whenever a probe is replaced. Additionally, general RVSM awareness information will be added to the training.

Airline XYZ does not conduct routine recurrent maintenance training. The above information for initial training will also be included in a Maintenance Bulletin for all mechanics who have completed initial training prior to the aforementioned initial training program revision.

Test equipment calibration/usage techniques are currently taught by Avionics coordinators in the Avionics Maintenance area, as "on-the-job training" (OJT). As detailed on Page 3-1 of this application, no changes to the maintenance programs or inspection schedule are necessary. Accordingly, we believe our current training of test equipment calibration/usage techniques is sufficient, and no changes are warranted.

In addition, since no changes to the maintenance programs or inspection schedule are required, we do not anticipate the need for any special documentation or procedures.

Requirement:

10. CONTINUED AIRWORTHINESS (MAINTENANCE PROCEDURES)

10.4.3 Test Equipment

- (a) The test equipment should have the capability to demonstrate continuing compliance with all the parameters established in the data package for RVSM approval or as approved by the responsible authority.
- (b) Test equipment should be calibrated at periodic intervals as agreed by the responsible authority using reference standards whose calibration is certified as being traceable to national standards acceptable to that authority. The approved maintenance programme should include an effective quality control programme with attention to the following:
 - (i) Definition of required test equipment accuracy.
 - (ii) Regular calibrations of test equipment traceable to a master standard. Determination of the calibration interval should be a function of the stability of the test equipment. The calibration interval should be established using historical data so that degradation is small in relation to the required accuracy.
 - (iii) Regular audits of calibration facilities both in-house and outside.
 - (iv) Adherence to approved maintenance practices.
 - (v) Procedures for controlling operator errors and unusual environmental conditions which may affect calibration accuracy.

Airline XYZ Response:

The maintenance programs identified for RVSM operations can be accomplished without specialized test equipment. Airline XYZ does utilize several test equipment sets to troubleshoot the air data computer system on an "as-needed" basis. These sets are highly accurate, and their calibration procedures can be traced to the national standard.

Additionally, the calibration and accuracy of test equipment used in the Avionics instruments shop are verified in accordance with the requirements outlined in the Component Maintenance Manual and by the equipment manufacturers. The calibration of individual components is performed at periodic intervals, and can be traced to the national standard.

Requirement:

11. OPERATIONAL APPROVAL

11.3 Content of Operator RVSM Application

The following material should be made available to the responsible authority, in sufficient time to permit evaluation, before the intended start of RVSM operations:

- (a) *Airworthiness Documents*. Documentation that shows that the aircraft has RVSM airworthiness approval. This should include an Approved Flight Manual amendment or supplement.

Airline XYZ Response:

Specific IACM Airworthiness Approval for RVSM operations with the ABC aircraft has been obtained by Airline XYZ for Aircraft ABC through the accomplishment of Service Bulletin (SB) XXXX, dated 1-1-11. A copy of this SB is enclosed as Appendix I. For additional discussion of the Airworthiness Approval for RVSM operations with the ABC aircraft, please refer to Page 4 of this application (Airworthiness Approval).

The IACM-approved Operations Specifications for Airline XYZ, Air Operator Certificate XYZA0000, authorize Airline XYZ to conduct operations under MOZCAR Part 121 using the aircraft listed. Airline XYZ's ABC aircraft, the subject of this RVSM application, are listed in the AOC OpSpecs. A copy of Airline XYZ' Operations Specifications is enclosed.

Requirement:

11. OPERATIONAL APPROVAL

11.3 Content of Operator RVSM Application

The following material should be made available to the responsible authority, in sufficient time to permit evaluation, before the intended start of RVSM operations:

- (b) *Description of Aircraft Equipment.* A description of the aircraft appropriate to operations in an RVSM environment.

Airline XYZ Response:

The following pages list aircraft components required for RVSM, together with scheduled maintenance requirements for that equipment.

This equipment will be identified in the IPC as RVSM-critical components. Additionally, this equipment will be identified as "Required Inspection Items" (RIIs). Please refer to Page 7 for additional information on the IPC and RIIs (reference CT 120-005, Approval of Aircraft and Operators for Flight in RVSM Airspace, Paragraph 10.3: "Continued Airworthiness (Maintenance Procedures - Maintenance Documents)").

Aircraft ABC SB XXXX requires replacement of pitot-static probes that have been in service for more than three (3) years. Airline XYZ's aircraft ABC Fleet Team will monitor this requirement, and ensure that pitot-static tubes that have been in service for three or more years are replaced before the aircraft is operated in RVSM operations. However, we anticipate that certification activities currently underway by Pitot static Company (the manufacturer of the probes) will result in a plated probe that will have unlimited service life, and will not require replacement after three years of service. We plan to install these probes on our ABC aircraft when the probes are available.

Requirement:

11. OPERATIONAL APPROVAL

11.3 Content of Operator RVSM Application

The following material should be made available to the responsible authority, in sufficient time to permit evaluation, before the intended start of RVSM operations:

- (c) *Training Programmes and Operating Practices and Procedures* Holders of Air Operators Certificates (AOC) may need to submit training syllabi for initial, and where appropriate, recurrent training programmes together with other appropriate material to the responsible authority. The material will need to show that the operating practices, procedures and training items, related to RVSM operations in airspace that requires State operational approval, are incorporated. Non-AOC operators will need to comply with local procedures to satisfy the responsible authority that their knowledge of RVSM operating practices and procedures is equivalent to that set for AOC Holders, sufficient to permit them to conduct RVSM operations. Guidance on the content of training programmes and operating practices and procedures is given in Appendix 1. In broad terms, this covers flight planning, pre-flight procedures, aircraft procedures before RVSM airspace entry, in-flight procedures, and flight crew training procedures. The procedures used within airspace of the AFI region and the procedures unique to the AFI Airspace for which specific State operational approval is required are stated in Doc 7030/4 Part 1 (Refer to Appendix 1, Par.8).

Airline XYZ Response:

Initial training: RVSM will be introduced to Airline XYZ aircraft dispatchers and flight crewmembers during the 2014 recurrent training classes, commencing in January, 2014, using the enclosed training syllabi. These same syllabi will be added to, and become a standard part of, the initial flight training for flight crewmembers, and the international initial class curriculum for new aircraft dispatchers.

Recurrent Training: In 2014 and subsequent recurrent classes, a review of RVSM operations and any new or changed procedures will become a standard part of the curriculum.

Our operating practices and procedures will be standardized in accordance with the enclosed syllabi in Appendix VI.

Requirement:

11. OPERATIONAL APPROVAL

11.3 Content of Operator RVSM Application

The following material should be made available to the responsible authority, in sufficient time to permit evaluation, before the intended start of RVSM operations:

- (d) *Operations Manuals and Checklists.* The appropriate manuals and checklists should be revised to include information/guidance on standard operating procedures as detailed in Appendix 1. Manuals should include a statement of the airspeeds, altitudes and weights considered in RVSM aircraft approval; including identification of any operating limitations or conditions established for that aircraft group. Manuals and checklists may need to be submitted for review by the authority as part of the application process.

Airline XYZ Response:

The Operations Manual has been updated with information about RVSM:

Part A: Generalities, RVSM approved flight, turbulence flying procedure, in-flight cross-check of required equipment and instruments, flight Plan and RFPL procedure, procedures in case of equipment degraded below RVSM requirements, procedure when unable to notify ATC, etc)

Part A: Abnormal Procedures and the Minimum Equipment List (MEL).

Part C: Concerned routes, RT procedures and procedures to be followed in case of equipment degraded below RVSM requirements. This part will be revised to include specific RVSM operational procedures applicable to EUR RVSM airspace.

Part D: Dispatch and Flight Crew Training programmes, including flight simulator requirements. In this new manual, the description of the international initial and recurrent classes will include references to RVSM training, down to the level of detail on aircraft dispatcher's RVSM training syllabus, if appropriate.

Requirement:

11. OPERATIONAL APPROVAL

11.3 Content of Operator RVSM Application

The following material should be made available to the responsible authority, in sufficient time to permit evaluation, before the intended start of RVSM operations:

- (e) *Past Performance.* Relevant operating history, where available, should be included in the application. The applicant should show that changes needed in training, operating or maintenance practices to improve poor height keeping performance have been made.

Airline XYZ Response:

The flightcrew operating report system was reviewed for the previous 12 months. No incidents of height-keeping performance errors were noted for the aircraft ABC fleet.

A review of the Equipment Removal History will be conducted for the previous 12 months, to determine if any failures have been detected on RVSM equipment. This review will examine the components and equipment relevant to RVSM operations.

Requirement:

11. OPERATIONAL APPROVAL

11.3 Content of Operator RVSM Application

The following material should be made available to the responsible authority, in sufficient time to permit evaluation, before the intended start of RVSM operations:

- (f) *Minimum Equipment List.* Where applicable, a minimum equipment list (MEL), adapted from the master minimum equipment list (MMEL) and relevant operational regulations, should include items pertinent to operating in RVSM airspace.

Airline XYZ Response:

The aircraft manufacturer has stated that no MMEL revisions specific to RVSM are planned.

The current Airline XYZ aircraft ABC Minimum Equipment List (MEL) requires the primary altimeter, flight control computer, ACAS, and altitude hold systems to be operational. The Airline XYZ aircraft ABC MEL will be revised to require the Altitude Alert System (AAS) to be operative for flights in RVSM airspace.

Requirement:

11. OPERATIONAL APPROVAL

11.3 Content of Operator RVSM Application

The following material should be made available to the responsible authority, in sufficient time to permit evaluation, before the intended start of RVSM operations:

- (g) *Maintenance*. When application is made for operational approval, the operator should establish a maintenance programme acceptable to the responsible authority, as detailed in paragraph 10.

Airline XYZ Response:

No RVSM-specific maintenance program changes will be required. Please refer to Page 6 of this application for details (reference CT 120-005, Approval of Aircraft and Operators for Flight in RVSM Airspace, Paragraph 10.2: "Continued Airworthiness (Maintenance Procedures) - Maintenance Programmes").

Requirement:

11. OPERATIONAL APPROVAL

11.3 Content of Operator RVSM Application

The following material should be made available to the responsible authority, in sufficient time to permit evaluation, before the intended start of RVSM operations:

- (h) *Plan for Participation in Verification/Monitoring Programmes* The operator should establish a plan acceptable to the Authority, for participation in any applicable verification/ monitoring programme (See 11.6). This plan will need to include, as a minimum, a check on a sample of the operator's fleet by an independent height monitoring system.

Airline XYZ Response:

Airline XYZ has submitted a plan for participation in verification/monitoring programme of aircraft altitude-keeping performance in Appendix VIII. This plan includes a check of all the aircraft listed in the application package by the AFI RMA.

Requirement:

11. OPERATIONAL APPROVAL

11.4 Demonstration Flight(s)

The content of the RVSM application may be sufficient to verify the aircraft performance and procedures. However, the final step of the approval process may require a demonstration flight. The Authority may appoint an inspector for a flight in RVSM airspace to verify that all relevant procedures are applied effectively. If the performance is satisfactory, operation in RVSM airspace may be permitted.

Airline XYZ Response:

Airline XYZ does not believe a demonstration flight should be required, for the following reasons:

- As noted previously, aircraft ABC RVSM operations will not require any maintenance program changes or use of any new, specialized maintenance procedures;
- Airline XYZ operates in accordance with an IACM-approved continuous airworthiness maintenance program (CAMP) in accordance with MOZCAR Part 121 and in accordance with IACM-approved Operations Specifications; Airline XYZ operated and the aircraft operated are maintained by IACM approved Maintenance Organizations in accordance with MOZCAR Part 145.
- Airline XYZ has operated and maintained ABC aircraft since [date];
- Airline XYZ's crew training and operational programs are AAC-approved, and;
- A review of the Airline XYZ flight crew operating report system for the previous 12 months revealed no height-keeping performance errors.

Accordingly, we do not believe a validation flight is necessary.

If AAC requires a demonstration flight, we propose to accomplish such a flight in conjunction with a scheduled Airline XYZ revenue operation (i.e., a revenue demonstration flight).

Requirement:

11. OPERATIONAL APPROVAL

11.5 Form of Approval Documents

11.5.1 Approvals issued by Authority will be processed as follows:

- (a) *Holders of an Air Operator's Certificate* Approval to operate in designated RVSM airspace areas will be granted in the operator's Operations Specifications. Each aircraft group for which the operator is granted approval will be listed.
- (b) *Non AOC Holders*. These operators will be issued with an Approval document in the form of an Letter of Authorisation included in Appendix 3. These approvals will be valid for a period of 2 years.

Airline XYZ Response:

Approval to operate in RVSM should be granted through the issuance of an operations specifications. However, Interim approval can be granted through a letter to the operator stating that RVSM approval has been given.

Airline XYZ requests appropriate authorizing documents be issued to authorize aircraft ABC RVSM operations, based upon the data contained in this application.

Requirement:

11. OPERATIONAL APPROVAL

11.6 Airspace Monitoring

For airspace where a numerical Target Level of Safety is prescribed, monitoring of aircraft height keeping performance in the airspace by an independent height monitoring system is necessary to verify that the prescribed level of safety is being achieved. However, an independent monitoring check of an aircraft is not a prerequisite for the grant of an RVSM approval.

Airline XYZ Response:

Airline XYZ aircraft ABC will be monitored by an independent height monitoring system which is used by ARMA over regional airspace.

Periodic (specify) reports of height monitoring checks will be obtained from ARMA to allow Airline XYZ to verify compliance with the prescribed Target Level of Safety.

Requirement:

11. OPERATIONAL APPROVAL

11.7 Suspension, Revocation and Reinstatement of RVSM Approval

The incidence of height keeping errors that can be tolerated in an RVSM environment is small. It is expected of each operator to take immediate action to rectify the conditions that cause an error. The operator should report an occurrence involving poor height keeping to the Authority within 72 hours. The report should include an initial analysis of causal factors and measures taken to prevent repeat occurrences. The need for follow up reports will be determined by the responsible authority. Occurrences that should be reported and investigated are errors of:

- (a) TVE equal to or greater than ± 90 m (± 300 ft),
- (b) ASE equal to or greater than ± 75 m (± 245 ft), and
- (c) Assigned altitude deviation equal to or greater than ± 90 m (± 300 ft).

11.7.1 *Height keeping Errors* Height keeping errors fall into two broad categories:

- (a) errors caused by malfunction of aircraft equipment; and
- (b) operational errors.

11.7.2 An operator that consistently experiences errors in either category will have approval for RVSM operations suspended or revoked. If a problem is identified which is related to one specific aircraft type, then RVSM approval may be suspended or revoked for that specific type within that operator's fleet.

11.7.3 Operators Actions. The operator should make an effective, timely response to each height keeping error. The Authority may consider suspending or revoking RVSM approval if the operator's responses to height keeping errors are not effective or timely. The Authority will consider the operator's past performance record in determining the action to be taken.

11.7.4 Reinstatement of Approval. The operator will need to satisfy the Authority that the causes of height keeping errors are understood and have been eliminated and that the operator's RVSM programmes and procedures are effective. At its discretion and to restore confidence, the Authority may require an independent height monitoring check of affected aircraft to be performed.

Airline XYZ Response:

The Airline XYZ Operations Manual Part A will outline the responsibilities for monitoring Airline XYZ's RVSM program. A draft copy of this manual is enclosed with Page XX of this application (reference CT-120-005, Approval of Aircraft and Operators for Flight in RVSM Airspace 10.3: "Continued Airworthiness (Maintenance Procedures) - Maintenance Documents").

A revision to the Airline XYZ Operations Manual Part C will describe flight crewmember reporting functions for any suspected RVSM height-keeping performance errors. The Aircraft ABC program manager will be responsible for monitoring the flight crew operating report system, and notifying appropriate departments (Aircraft ABC Fleet Team, Maintenance Coordination Center (MCC), etc.) of any height-keeping errors. The MCC and fleet team will coordinate appropriate action, including:

- adding flight plan remarks to prevent aircraft operation in RVSM airspace until corrective action is accomplished;
- implementing corrective action, and ;
- advising Airline XYZ's Quality Department to report the height-keeping performance error to IACM within 72 hours, along with initial analysis of causal factors and measures to prevent further events.

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