CHAPTER 33

REDUCED VERTICAL SEPARATION MINIMA (RVSM) AIRSPACE APPROVAL (TECHNICAL REQUIREMENTS)

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1.0 GENERAL

This chapter contains criteria to be used by airworthiness inspectors when asked to approve an operator's request for North Atlantic (NAT) RVSM airspace approval. The criteria used to obtain approval is developed from ICAO and FAA guidance material. The authority for RVSM airspace approval is contained in Nigeria CARs Part 8. ICAO requires operators to obtain approval from their CAA before conducting any operations within this airspace. The criteria and guidance to be used shall be the JAA Temporary Guidance Leaflet (TGL) No. 6, as amended herein attached as Appendix App 3-1. When the criteria for approval is met, the operations inspector will issue OpSpec paragraph B15. ICAO's Doc 9574, contains the airworthiness and operational requirements and defines the altitudes and NAT airspace boundaries. When applying, the operator must list the aircraft by type and series. If aircraft of the same type/series are equipped with different altimetry system configurations, they should be listed by the aircraft registration or serial number. If an operator has aircraft that are capable of flying within NAT MNPS/RVSM airspace but does not intend to operate there, they should not be issued B15, but OpSpec paragraph A 4.b. should have the statement, "Operate in NAT MNPS/RVSM airspace" inserted to ensure it is aware of the restriction.
Use RVSM Checklist.

1.1 REFERENCE: CHECKLIST: O-AWS033

2.0 THE APPROVAL PROCESS

Airspace where RVSM is applied should be considered special qualification airspace. Both the individual operator and the specific aircraft type or types which the operator intends to use should be approved by the NCAA before the operator conducts flight in RVSM airspace.

3.0 AIRCRAFT APPROVAL

Each aircraft type that an operator intends to use in RVSM airspace should have received airworthiness approval in accordance with the established criteria. Individuals or operators seeking approval for its aircraft should contact the manufacturer of the specific aircraft type and apply to the NCAA to determine/coordinate the process.

4.0 PRE-APPLICATION MEETING

A pre-application meeting should be scheduled between the operator and the NCAA to inform the operator of NCAA expectations in regard to the approval process to operate in a RVSM environment. The content of the operator RVSM application, NCAA review and evaluation of the application, validation flight and conditions for removal of RVSM authority should be basic items of discussion.

5.0 CONTENT OF OPERATOR RVSM APPLICATION

The following paragraphs describe the material which an operator applying for RVSM authority should provide to the NCAA for review and evaluation at least 60 days prior to the intended start of RVSM operations.

a) Description of Aircraft Equipment. The applicant should provide a configuration list which details all components and equipment relevant to RVSM operations.

b) Past Performance. An operating history should be included in the application. The applicant should show any events or incidents related to poor height keeping performance which may indicate weaknesses in training, procedures, maintenance, or the aircraft group intended to be used.

c) Minimum Equipment List. A minimum equipment list (MEL), adopted from the master minimum equipment list (MMEL), should include items pertinent to operating in RVSM airspace.

d) Airworthiness Documents and a Maintenance Programme. Sufficient documentation should be available to show that the aircraft and maintenance programme has been approved in accordance with Nig.CARs Part 8.

6.0 DEFINITIONS

The following definitions are intended to clarify certain specialized terms used in this advisory material:

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

b) Altimetry System Error (ASE) The difference between the pressure altitude displayed to the flightcrew when referenced to ISA standard ground pressure setting (29.92 in. Hg/1013.23hPa) and free stream pressure altitude.

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

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

e) 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.

f) Basic RVSM Envelope. The range of Mach numbers and gross masses within the altitude ranges FL 290 to FL 410 (or max available altitude) where an aircraft can reasonably be expected to operate most frequently.

g) 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.

h) Height-Keeping Capability. Aircraft height-keeping performance which can be expected under nominal environment and operating conditions with proper aircraft operating practices and maintenance.

i) Height-Keeping Performance. The observed performance of an aircraft with respect to adherence to a flight level.

j) 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.

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

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

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

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

o) W/δ. Aircraft weight/mass (e/m), divided by the atmospheric pressure ratio, δ, or mass

p) Approved Data Package. A package developed by the aircraft manufacturer or design organization through which RVSM airworthiness approval is sought from the regulatory authority of the manufacturer. Once the regulatory authority approves the package, the operator applies the procedures defined in the package to obtain approval from the operator's regulatory authority to utilize its aircraft to conduct flight in the RVSM airspace.

7.0 MAINTENANCE REQUIREMENTS

A. General.

(1) The integrity of the design features necessary to ensure that altimetry systems continue to meet RVSM standards should be verified by scheduled tests and/or inspections in conjunction with an approved maintenance programme. The operator should review its maintenance procedures and address all aspects of continuing airworthiness which are affected by RVSM requirements.

(2) Each person or operator should demonstrate that adequate maintenance facilities are available to ensure continued compliance with the RVSM maintenance requirements.

B. Maintenance Programme Approval Requirements. Each operator requesting RVSM operational approval should submit a maintenance and inspection programme which includes any maintenance requirements defined in the approved data package as part of a continuous airworthiness maintenance programme approval. The maintenance and inspector programme will incorporate altimeter system and altitude reporting equipment tests and inspections as a requirement for maintenance programme approval.

C. Maintenance documents Requirements: The following items should be reviewed as appropriate for RVSM maintenance approval:

(1) Maintenance Manuals and Aircraft Service Bulletins

(2) Structural Repair Manuals.

(3) Standards Practices Manuals

(4) Illustrated Parts Catalogues.

(5) Maintenance Schedule.

(6) MMEL/MEL.

D. Maintenance Practices.

1) If the operator is subject to an ongoing approved maintenance program, that programme should contain the maintenance practices outlined in the applicable aircraft and component manufacturer's maintenance manuals for each aircraft type. The following items should be reviewed for compliance for RVSM approval and if the operator is not subject to an approved maintenance programme the following items should be followed by the Operator:

(i) All RVSM equipment should be maintained in accordance with the component manufacturer's maintenance requirements and the performance requirements outlined in the approved data package.

(ii) Any modification, repair, or design change which in any way alters the initial RVSM approval, should be subject to a design review by persons approved by the approving authority for the manufacturer.

(iii) Any maintenance practices which may affect the continuing RVSM approval integrity, e.g., the alignment of pitot/static probes, dents, or deformation around static plates, should be referred to the approving authority or persons delegated by the authority for the manufacturer.

(iv) Built-in Test Equipment (BITE) testing is not an acceptable basis for system calibrations, (unless it is shown to be acceptable by the airframe manufacturer with the approval authorities agreement) and should only be used for fault isolation and troubleshooting purposes.

(v) Some aircraft manufacturers have determined that the removal and replacement of components utilizing quick disconnects and associated fittings, when properly connected, will not require a leak check. While this approach may allow the aircraft to meet static system certification standards when properly connected, it does not always ensure the integrity of the fittings and connectors, nor does it confirm system integrity during component replacement and reconnections. Therefore, a system leak check or visual inspection should be accomplished any time a quick disconnect static line is broken.

(vi) Airframe and static systems should be maintained in accordance with the airframe manufacturer's inspection standards and procedures.

(vii) 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 should be made if needed to ensure adherence to the airframe manufacturer's RVSM tolerances. These tests and inspections should be performed as established by the airframe manufacturer. These checks should also be performed following repairs, or alterations having an effect on airframe surface and airflow.

(viii) The maintenance and inspection programme for the autopilot should 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.

(ix) Where the performance of existing equipment is demonstrated as being satisfactory for RVSM approval, it should be verified that the existing maintenance practices

are also consistent with continued RVSM approval integrity. Examples of these are:

(A) Altitude alert.

(B) Automatic altitude control system.

(C) ATC altitude reporting equipment

(D) Altimetry systems.

E. Maintenance Practices for Non-compliant Aircraft. Those aircraft positively identified as exhibiting height-keeping performance errors which require investigation should not be operated in airspace where RVSM is applied until the following actions have been taken.:

(1) The failure or malfunction is confirmed and isolated by maintenance action by the operator or the Maintenance organization under which the aircraft is maintained and,

(2) Corrective action is carried out as required and verified by the operator's quality system to ensure RVSM approval integrity.

F. Maintenance Training Requirements. It is expected that new training requirements will be introduced by the RVSM approval processes. Areas that may need to be highlighted for initial and recurrent training of shop and line personnel are:

(1) Aircraft geometric inspection techniques.

(2) Test equipment calibration/usage techniques

(3) Any special documentation or procedures introduced by RVSM approval.

G. Test Equipment.

(1) General: The test equipment should have the capability to demonstrate continuing compliance with all the parameters established for RVSM approval in the initial data package or as approved by the approving authority.

(2) Standards. Test equipment should be calibrated utilizing reference standards whose calibration is certified as being traceable to the national standard. It should be calibrated at periodic intervals as agreed by the approving Authority. The approved maintenance programme should encompass an effective quality control programme which includes the following:

(i) Definition of required test equipment accuracy.

(ii) Regular calibrations of test equipment traceable to a master in-house standard. Determination of calibration interval should be a function of the stability of the test equipment. The calibration interval should be established on the basis of 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 acceptable shop and line maintenance practices.

(v) Procedures for controlling operator errors and unusual environmental conditions which may affect calibration accuracy.