

Group Approval - Commercial Operator's Perspective

FAA Flight Standards

Background

- This presentation was originally given by Clay Satterlee, United Airlines Maintenance Staff, at the 1999 Asia-Pacific RVSM Seminar in Singapore.
- It describes United Airlines experience with the RVSM approval process in preparation for North Atlantic operations.

PRESENTATION OVERVIEW

- Qualification Process Flow
- Concerns During Qualification
- Confirmed Aircraft Configuration
- B747 Qualification - by type
- B767 Qualification - by type
- B777 Qualification - by type
- Document Changes
- Training
- Height Verification Monitoring
- Application for RVSM Approval
- Aircraft Data to FAA and CMA
- Delivery of new (non RVSM) aircraft through RVSM airspace
- United's Fleet Today and Tomorrow
- Summary

CONCERNS DURING QUALIFICATION

- Accuracy of altimeter systems - Need for recalibration?
- Lead times for parts and tooling
- Quick disconnect fittings - inspections
- Availability of altimetry test equipment
- Timely response to request for Computational Fluid Dynamics (CFD) analysis from Boeing
- Need for skin shims due to waviness problems
- Delivery flights through RVSM airspace
- FAA had concern for continued airworthiness

CONFIRMED AIRCRAFT EQUIPMENT AND CONFIGURATION

- Reviewed Service Bulletins and Aircraft Avionics equipment to ensure configuration complied with 91-RVSM

747-400 Qualification

- Qualified twenty six aircraft for RVSM
- Aircraft after line number 1050 - RVSM qualified from factory

747-400 Qualification: Service Bulletins

- B747-53-2393 Visually Inspect Pitot-Static Probe/AOA Sensor
 - Twenty six aircraft
 - 1 labor hour each
- B747-53-2394 Inspect/Measure Skin Waviness
 - Twelve aircraft
 - 12 labor hours each.
 - Fifty percent required CFD analysis from Boeing
 - None required skin rework

747-400 Qualification: Service Bulletins

- B747-53-2398 Replace Probes with Nickel Plated Probes
 - Twelve aircraft
 - 12 labor hours each
- MAINTENANCE PROGRAM CHANGES:
 - Visual inspection of skin at pitot tubes every 2A, Max 1000 Hrs

767 Qualification

- Qualified thirty one aircraft for RVSM
- Aircraft after line number 561 - RVSM qualified from factory

767 Qualification: Service Bulletin

- B767-SL-02-011 Qualification of 767 Airplanes for RVSM
 - Replaced Air Data Computers on eight aircraft
 - Rewired aircraft for SSEC corrections on eight aircraft
 - Replaced Pitot probes on thirty one aircraft
 - Visual inspection of critical area on thirty one aircraft
 - Found no damage in critical area
- MAINTENANCE PROGRAM CHANGES:
 - Visual inspection of skin at pitot tubes every 2A, Max 1000 Hrs

777 Qualification

- Qualified eighteen aircraft for RVSM
- Aircraft after line number 57 - RVSM qualified from factory
- Service Bulletins:
 - 777-SL-02-002 Qualification of 777 aircraft for RVSM
 - 777-53-007 Visual inspection of fuselage - critical area
 - Eighteen aircraft
 - 1 labor hour each
 - No damage found
- MAINTENANCE PROGRAM CHANGES:
 - Visual inspection of skin at pitot tubes every 2A, Max 1000 Hrs

DOCUMENT CHANGES

→ CHANGE OF MM - QUICK DISCONNECT FITTINGS: Per 91-RVSM

- If a quick disconnect is broken for any reason, one of the following must be done.
 - A. Visual inspection by second qualified mechanic with signoff by both mechanics.
 - B. A low range leak check of the affected system.
- If both quick disconnects are broken for any reason, a low range leak check must be done.

DOCUMENT CHANGES

→ INTERNAL DOCUMENTS

- New procedure on how to notify FAA of discrepant aircraft and remove an aircraft from RVSM authority.

→ MEL CHANGES

- Special equipment requirements for RVSM

TRAINING

→ Recurrent training includes:

- RVSM background
- Aircraft Avionics equipment and configuration
- Special tooling for skin measurements
- Damage repair in critical areas
- Height keeping verification
- Maintenance program requirements

→ Additional Training:

- Alert Bulletins
- Company Newsletter Articles
- Station visits
- Meetings and discussions

HEIGHT MONITORING

- GMU monitoring was used on fifteen 767 and three 747
- HMU monitoring was used on fourteen 767 and eleven 777

APPLICATION FOR RVSM APPROVAL (ENGINEERING)

→ 1.0 Purpose

→ 2.0 Initial In-Service Airworthiness

→ Aircraft Equipment

→ Airframe Requirements

APPLICATION FOR RVSM APPROVAL (ENGINEERING)



- 3.0 Continued Airworthiness Compliance
 - A. Maintenance Program Data (MPD) Requirements
 - (1) Altimetry and Avionics Systems
 - (2) Corrosion Prevention and Control
 - (3) Structural Inspection
 - (4) Maintenance Planning Data (MPD) Revisions
 - B. Aircraft Maintenance Manual Requirements
 - C. Structural Repair Manual
 - D. Maintenance Training Requirements
 - E. Air Data Test Equipment Requirements
 - F. Maint. Operating Procedures Manual
 - G. Future Aircraft Acquisitions and RVSM Compliance
 - H. RVSM Formal 'F' Report

APPLICATION FOR RVSM APPROVAL (ENGINEERING)



→ 4.0 Operational Compliance

- A. Master Equipment List (MEL) Requirements
- B. Operations Manual Airspeed/Mach Restrictions
- C. Altimetry Usage/Restrictions
- D. 747-400 Altimetry History
- E. Height Keeping Verification and Monitoring Program
- F. Conditions for Removal of RVSM Authority

APPLICATION FOR RVSM APPROVAL (ENGINEERING)



→ A Separate Flight Operational qualification package was submitted to the FAA by United Flight Operations, in Denver. This included the flight crew training and dispatch training and flight procedures as well as a copy of the Engineering qualification application.

SUPPLIED AIRCRAFT DATA TO FAA AND CMA

- USED SPECIAL FORM TITLED: RECORD OF APPROVAL TO OPERATE IN NORTH ATLANTIC NMPS/RVSM AIRSPACE
- DATA INCLUDED:
 - State of Registry
 - Name of operator
 - State of Operator
 - Aircraft type
 - Serial Number
 - Registration
 - Transponder code
 - RVSM approval date.

Approval Process Summary

- Reviewed 91-RVSM
- Obtained Funding For Project
- Verified aircraft equipment and Configuration
- Discussed with local FAA CMO, Boeing and other operators
- Ensured height monitoring was completed (GMU and HMU)
- Created Maintenance Program for continued airworthiness
- Modified Aircraft
- Revised Documents
- Provided adequate training to all line stations
- Revised MEL
- Applied for FAA Approval by fleet type- Engineer and Flight Ops
- Supplied aircraft data to FAA for PRTS database and CMA

FINAL NOTE

- Approval achieved for approximately 135 aircraft for North Atlantic and Asia-Pacific operations
- Qualification for RVSM was not as difficult as anticipated