PMA209 develops, integrates, and delivers avionics solutions that meet customer requirements, enable interoperability, and maximize affordability.

PMA209 RVSM Update

ASE Workshop
FAA Tech Center, Atlantic City
PMA209 CNS/ATM

- PMA209 is certification authority for Communication Navigation Surveillance/Air Traffic Management (CNS/ATM) functionalities for Navy and Marine Aircraft
  - Mode Select (Mode S)
  - Automatic Dependent Surveillance-Broadcast Out (ADS-B Out)
  - Required Navigation Performance/Area Navigation (RNP/RNAV)
  - 8.33 kHz Channel Separation
  - Reduced Vertical Separation Minimum (RVSM)
NAVAIR RVSM Requirements

- Aircraft are evaluated and tested IAW NAVAIR Functional Requirements Document (FRD) for RVSM Rev A
  - The FRD is based on FAA AC 91-85 of 21 Aug 2009

- NAVAIR Requirements Verification Matrix (RVM) developed from the FRD
  - Validates compliance with the FRD for RVSM
  - Baseline document for Certification Data Package (CDP)
Single Altimetry Certification

- Memorandum of Understanding signed between FAA and DoD 25 July 2001
- Agreement governs the use of DRVSM Airspace by DoD aircraft Policy:
  - The FAA recognizes the DoD need to approve Single Altimetry Tactical aircraft for RVSM
  - These aircraft may be approved providing the altimetry systems meet the performance requirements of AC 91-85
  - DoD agrees to follow periodic height-keeping performance monitoring required by FAA
RVSM Initial Certification

- When the aircraft has been determined to need RVSM certification the steps are:
  - RVSM Qualification Analysis and Report (typically Original Equipment Manufacturer (OEM))
    - Requires flight test for Altimetry System Error (ASE) data (AIR 5.1.6 and OEM)
  - Verification Flight Test with a calibrated truth source (AIR 5.1.6)
  - Development of the aircraft RVSM configuration inspection to validate Type Model Series (TMS) configuration by BuNo (Aircraft PMA)
  - Initial Monitoring Plan (PMA209 Navigation IPT joint with Aircraft PMA)
  - Collection of initial monitoring data (Aircraft PMA designated)
  - Analysis of initial monitoring data (PMA209, 5.1.6.2, and FAA)
  - Development of Operator and Maintenance Procedures including training materials (OEM and Aircraft PMA)
  - Completion of RVM (PMA209 Navigation IPT)
  - Assembly of Certification Data Package (CDP) (PMA209 Test & Cert)
  - Review of CDP by PMA209
  - Execution of certification letter (PMA209)
  - Fleet release of capability to aviators (Aircraft PMA)
Initial Monitoring Flights

- Demonstrated satisfactory ASE performance prior to issuing RVSM certification
- RVSM Configuration Inspection
  - Verifies compliance with airframe RVSM equipage requirements
  - Executed on all aircraft selected for initial monitoring
- 10% of existing or projected fleet subjected to Initial Monitoring to verify predicted ASE performance (USN minimum sample size)
- Onboard instrumentation, Mode S Aircraft Geometric Height Measurement Element (AGHME) site or GPS Monitoring Unit (GMU) used to measure RVSM height keeping performance (ASE performance)
  - Data reduction and analysis conducted by the FAA Tech Center, Atlantic City
- Initial Monitoring Flight results reviewed by PMA209 RVSM SMEs
Continuation of Certification and Re-Certification

• RVSM Model Group Certification requires a Continuation of Certification (CoC) or Re-certification (R-Cert) for:
  – Hardware changes (from Equipment Configuration List)
  – Software changes (from Equipment Configuration List)
    • FCC/MC software changes
  – Airframe modifications
    • Vicinity of air data sensors
    • Moldline changes
  – External stores changes

• Changes are assessed by PMA209 RVSM SMEs to determine if CoC or R-Cert is required based on the changes to the RVSM certified configuration
Continuation of Certification and Re-Certification

• **Continuation of Certification (CoC)**
  – Change to the RVSM certified configuration that does not affect compliance with RVSM FRD requirements
  – Examples include most SCS changes
  – May require supporting artifacts

• **Re-Certification (R-Cert)**
  – Change to the RVSM certified configuration that affects compliance with RVSM FRD requirements
  – Examples include new SSEC, new sensor such as AoA vanes
Re-Certification Requirements

- Re-certification requirements are developed on a case by case basis depending on the nature of the change to the RVSM certified configuration
- Scope of Re-certification varies
- Re-certification may require
  - Flight Tests as needed to support analysis
  - Updated RVSM Analysis
  - Verification Flight Tests
  - Initial Monitoring
Post-Certification

• **Required to perform Periodic Monitoring in two year cycles**
  – COMNAVAIRPAC/COMNAVAIRLANT INST 13200.1B
  – PMA209 RVSM Periodic Monitoring Policy – 14 Jul 15
  – Number of aircraft from a group that require to be monitored is determined by PMA209 RVSM SMEs
  – PMA209 can provide Periodic Monitoring Special Instructions (SPINS) for operators

• **Monitoring Methods Used**
  – AGHME
  – On-board GPS Recording
  – TCTS Pod
Periodic Monitoring Tracking

- An Access database is maintained by the PMA209 Navigation team (currently Adrianne Cooper)
  - Database contains:
    - A table of monthly DoD AGHME reports from the FAA Tech Center
    - A table for each aircraft group with their Mode S and BuNos
    - Queries for each aircraft group on their current monitoring period results and monitoring results since their initial certification
    - Will eventually contain initial monitoring data
  - Matlab code has been developed to calculate aircraft ASE statistics to include in 6 month report
  - A monitoring update report is generated every 6 months and provided to each aircraft group to notify them of their status and when their 2 year monitoring is due
NAVAIR RVSM Certifications

- 7 Certified Groups
- 5 Groups in certification process for initial certification.
Questions?
Backup
Domestic US RVSM

- On 20 Jan 05, the FAA implemented Reduced Vertical Separation Minimum (RVSM) between flight level (FL) 290-410 (inclusive) in the following airspace: the airspace of the lower 48 states of the United States, Alaska, Atlantic and Gulf of Mexico High Offshore Airspace and the San Juan Flight Information Region (FIR)
  - Includes – Houston and Miami Oceanic FIRs
  - Coincided with RVSM implementation in Southern Canada, Mexico, Caribbean States and South America
OEM RVSM Analysis

- Airframe OEM performs an RVSM Analysis IAW FRD requirements
  - Group/Non-Group classification
  - RVSM Configuration
  - Equipage Definition
  - Flight Envelope Definition (Basic and Full)
  - ASE Error Model
  - ASE Compliance Analysis
  - Altimeter/Air Data System – Integrity and Reliability
  - Altitude Control, Altitude Alerting, ATC Transponder
  - Inspection and Maintenance Procedures
  - Operational Material (NATOPS Flight Manual Inputs)