IP/06 NAARMO RVSM Traffic Compliance Monitoring and Long-Term Height Monitoring Burden (LTHMB)

Background in RVSM LTHMB

Presented to: GTE/21

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Federal Aviation Administration

Overview

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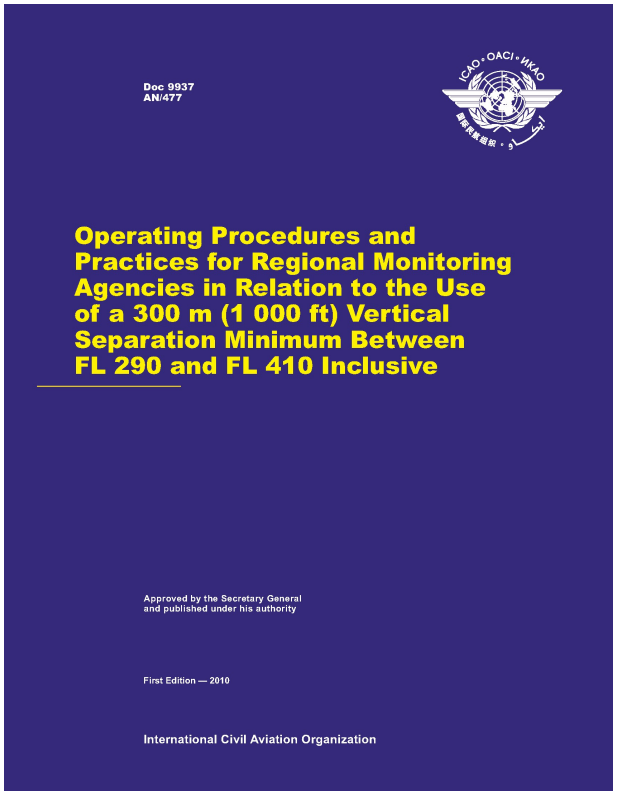
Regional Monitoring Agencies Worldwide

In all regions where RVSM has been implemented, regional monitoring agencies (**RMAs**) have been established by the appropriate planning and implementation regional groups (**PIRGs**) to satisfy the goals of the RVSM monitoring program.

ICAO-Endorsed Regional Monitoring Agencies

An RMA supports the continued safe use of RVSM within a designated airspace.

ICAO RMA Guidance



ICAO

In order to achieve a standardized approach to the way in which RMAs carry out their functions and the associated detailed duties and responsibilities of Doc 9574, ICAO guidance on RMA operating procedures is included in Doc 9937.

RVSM Height Monitoring

- All operators of aircraft approved to fly with a 1,000 ft vertical separation in RVSM airspace are required to participate in the global RVSM height monitoring program.
- The number of aircraft that require monitoring depends on both the size of an operator's fleet, and the variety of aircraft types operated.
- Monitoring aircraft height-keeping performance consists of:
  - collection of necessary data using specialized systems
  - estimation of relevant performance parameters and;
  - comparison of these parameter estimates to corresponding RVSM requirements, on both an individual-aircraft and a system-wide basis.

Establishment of Long-Term Height Monitoring Requirements

- ICAO Separation and Airspace Safety Panel (SASP) identified that height-keeping performance monitoring results for RVSM approved aircraft had, in some cases, demonstrated long-term adverse trends in altimetry system error (ASE) stability.

- The likely results of this trend, if not reversed, would be aircraft becoming non-compliant with RVSM requirements.

- Accordingly, to ensure that adverse trends in ASE stability were detected, it was recognized that globally applicable RVSM long-term height monitoring requirements would be necessary.

- As a result of proposals made by the SASP, during 2007 the ICAO Air Navigation Commission (ANC) agreed to amendments to Annex 6 – Operation of Aircraft.

RVSM Height Monitoring Requirements

- 7.2.6 The State of the Operator, in consultation with the State of Registry if appropriate, shall ensure that, in respect of those aeroplanes mentioned in 7.2.4 , adequate provisions exist for:
  - receiving the reports of height-keeping performance issued by the monitoring agencies established in accordance with Annex 11, 3.3.4.1; and
  - taking immediate corrective action for individual aircraft, or aircraft type groups, identified in such reports as not complying with the height-keeping requirements for operation in airspace where RVSM is applied.

- 7.2.7 The State of the Operator that has issued an RVSM approval to an operator shall establish a requirement which ensures that a minimum of two aeroplanes of each aircraft type grouping of the operator have their height-keeping performance monitored, at least once every two years or within intervals of 1 000 flight hours per aeroplane, whichever period is longer. If an operator aircraft type grouping consists of a single aeroplane, monitoring of that aeroplane shall be accomplished within the specified period

Performance And Minimum Monitoring Requirements For Transport Category Operators Are Outlined In Annex 6 Part I

Reference: Annex 6, Part 1, paragraphs 7.2.6, 7.2.7

RVSM Height Monitoring Requirements

- 2.5.2.7 The State of Registry that has issued an RVSM approval to an owner/operator shall establish a requirement which ensures that a minimum of two aeroplanes of each aircraft type grouping of the owner/operator have their height-keeping performance monitored, at least once every two years or within intervals of 1 000 flight hours per aeroplane, whichever period is longer. If an owner/operator aircraft type grouping consists of a single aeroplane, monitoring of that aeroplane shall be accomplished within the specified period.

Minimum Monitoring Requirements for IGA Operators are Outlined in Annex 6 Part II

Reference: Annex 6, Part II, paragraph 2.5.2.7

Monitoring Methods

Monitoring systems available:

GPS-based Monitoring Unit (GMU) – a portable device brought on board and operated by trained technicians. This method uses GPS data to collect the aircraft's position that is then used in the ASE process.

Ground-based Monitoring System - Aircraft Geometric Height Measuring Element (AGHME) – with this method, the true altitude is currently measured by the ground-based AGHME multilateration technique systems operated by the FAA.

Automatic Dependent Surveillance-Broadcast (ADS-B) Height Monitoring System (AHMS) – provides a source of aircraft position data for use in the ASE calculations.

Monitoring Methods by RMA

RMA		GMU	HMU	ADS-B
AAMA	Australian Airspace Monitoring Agency	✓		✓
ARMA	African and Indian Ocean (AFI) Regional Monitoring Agency	✓		
CARSAMMA	Caribbean and South American Monitoring Agency	✓		
China RMA	China Regional Monitoring Agency	✓		✓
EurAsia RMA	Regional Monitoring Agency Eurasia	✓	✓	✓
Eur RMA	European Regional Monitoring Agency	✓	✓	✓
JASMA	Japan Airspace Safety Monitoring Agency	✓	✓	✓
MAAR	Monitoring Agency for Asia Region	✓		✓
Mid RMA	Middle East Regional Monitoring Agency	✓		
NAARMO	North American Approvals Registry and Monitoring Org	✓	✓	✓
NAT CMA	North Atlantic Central Monitoring Agency	✓	✓	✓
PARMO	Pacific Approvals Registry and Monitoring Organization	✓		✓
SATMA	South Atlantic Monitoring Agency	✓		

Determination of Operator Compliance with RVSM Minimum Monitoring Requirements (MMR)

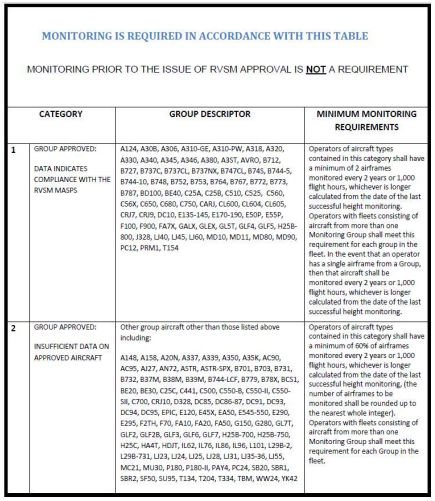
The minimum monitoring requirements (MMR) document lists the aircraft types which are eligible for RVSM approval under the group provisions and the groups to which they belong. It also suggests the level of monitoring that should be expected for each operator.

Determine the number of aircraft in a given fleet that need to be height monitored using the RVSM MMR Chart.

Determine when the last successful height monitoring was recorded on the aircraft by accessing the RVSM Approvals Database

If the aircraft has been successfully height monitored within the last two years it meets the RVSM MMR

MMR Document



MONITORING IS REQUIRED IN ACCORDANCE WITH THIS TABLE

MONITORING PRIOR TO THE ISSUE OF RVSM APPROVAL IS **NOT** A REQUIREMENT

	CATEGORY	GROUP DESCRIPTOR	MINIMUM MONITORING REQUIREMENTS
1	GROUP APPROVED: DATA INDICATES COMPLIANCE WITH THE RVSM MASPS	A124, A30B, A306, A310-GE, A310-PW, A318, A320, A330, A340, A345, A346, A380, A35T, AVRO, B712, B727, B737C, B737CL, B737NX, B747CL, B745, B744-5, B744-10, B748, B752, B753, B764, B767, B772, B773, B787, BD100, BE40, C25A, C25B, C510, C525, C560, C56X, C650, C680, C750, CARJ, CL600, CL604, CL605, CRJ7, CRJ9, DC10, E135-145, E170-190, E5OP, E55P, F100, F900, FA7X, GALX, GLEX, GLST, GLF4, GLF5, H25B-800, J328, LJ40, LJ45, LJ60, MD10, MD11, MD80, MD90, PC12, PRML, T154	Operators of aircraft types contained in this category shall have a minimum of 2 airframes monitored every 2 years or 1,000 flight hours, whichever is longer calculated from the date of the last successful height monitoring. Operators with fleets consisting of aircraft from more than one Monitoring Group shall meet this requirement for each group in the fleet. In the event that an operator has a single airframe from a Group, then that aircraft shall be monitored every 2 years or 1,000 flight hours, whichever is longer calculated from the date of the last successful height monitoring.
2	GROUP APPROVED: INSUFFICIENT DATA ON APPROVED AIRCRAFT	Other group aircraft other than those listed above including: A148, A158, A20N, A337, A339, A350, A35K, AC90, AC95, AJ27, AN72, ASTR, ASTR-SPX, B701, B703, B731, B732, B37M, B38M, B39M, B744-LCF, B779, B78X, BCS1-BE20, BE30, C25C, C441, C500, C550-B, C550-II, C550-SII, C700, CRJ10, D328, DC85, DC86-87, DC91, DC93, DC94, DC95, EPIC, E120, E45X, EA50, E545-550, E290, E295, F2TH, F70, FA10, FA20, FA50, G150, G280, GLF7, GLF2, GLF2B, GLF3, GLF6, GLF7, H25B-700, H25B-750, H25C, HA4T, HDJT, IL62, IL76, IL86, IL96, L101, L29B-2, L29B-731, LJ23, LJ24, LJ25, LJ28, LJ31, LJ35-36, LJ55, MC21, MU30, P180, P180-II, PAY4, PC24, SB20, SBR1, SBR2, SF50, SU35, T134, T204, T334, TBM, WW24, YK42	Operators of aircraft types contained in this category shall have a minimum of 60% of airframes monitored every 2 years or 1,000 flight hours, whichever is longer calculated from the date of the last successful height monitoring, (the number of airframes to be monitored shall be rounded up to the nearest whole integer). Operators with fleets consisting of aircraft from more than one Monitoring Group shall meet this requirement for each Group in the fleet.

Approvals Database

Monitoring Result

Burden

NAARMO Monitoring Burden

State	Total # of Approved Airframes	Resultant Monitoring Burden (# Airframes)	Total # of Airframes Not Monitored within two years as of 05/April/2021
CANADA	1453	880	134
MEXICO	670	324	56
USA	20,330	13,577	584
NAARMO Total	**22,453**	**14,781**	**774**

NAARMO Itemized LTHMB

CANADA	Total # of Approved Airframes	Resultant Monitoring Burden (# Airframes)	Total # of Airframes Not Monitored within two years as of 05/April/2021
IGA	570	570	110
Commercial	883	310	24
Total Canada	***1,453***	***880***	***134***
MEXICO	**Total # of Approved Airframes**	**Resultant Monitoring Burden (# Airframes)**	**Total # of Airframes Not Monitored within two years as of 05/April/2021**
IGA	97	97	16
Commercial	573	227	40
Total Mexico	***670***	***324***	***56***
US	**Total # of Approved Airframes**	**Resultant Monitoring Burden (# Airframes)**	**Total # of Airframes Not Monitored within two years as of 05/April/2021**
IGA	13,060	13,060	583
Commercial	7,270	517	1
Total US	***20,330***	***13,577***	***584***
NAARMO Total	***22,453***	***14,781***	***774***

Non-Approved Operations from New York West Airspace
December 2020 – Traffic Sample

RMA	STATE	REGISTRATION	AIRCRAFT TYPE	COUNT
ARMA Total: 1				
ARMA	Algeria	7TVPR*	GLF4	1
CARSAMMA Total: 2				
CARSAMMA	Barbados	8PASD	GLF6	2
CARSAMMA	Venezuela	YV3507	A343	1
NAARMO Total: 4				
NAARMO	Canada	CGSMR*	F2TH	1
NAARMO	Mexico	XAJLJ	H25B	2
NAARMO	Mexico	XARCE	H25B	1
NAARMO	United States	N711SW*	GL7T	1
Airframe Total: 7				

* NAARMO received an approval after the information paper was submitted

Summary

- Aircraft operators must comply with the RVSM height monitoring requirements provided in ICAO Annex 6
- RMAs provide a variety of height monitoring systems for operators to meet the Annex 6 requirements
- RMAs identify aircraft operators that have not met the Annex 6 requirements by comparing RVSM approval records to recent height monitoring data
- The aircraft operators identified in the previous bullet are what RMAs call LTHMB

Questions ?