International Civil Aviation Organization

The Thirteenth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/13)

Bangkok, Thailand, 02 - 05 August 2010

Agenda Item 5: Airspace Safety Monitoring Activities/Requirements in Asia/Pacific Region

THE PACIFIC APPROVALS REGISTRY AND MONITORING ORGANIZATION (PARMO) ASSESSMENT OF THE MONITORING RESPONSIBILITY ASSOCIATED WITH THE LONG-TERM HEIGHT MONITORING REQUIREMENTS

(Presented by the Pacific Approvals Registry and Monitoring Organization (PARMO))

SUMMARY

This information paper provides an assessment of the monitoring burden associated with the long term height monitoring requirements for operations observed in airspace for which the PARMO is the responsible Regional Monitoring Agency (RMA).

1. Introduction

1.1. The Seventh Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/7) discussed the long term monitoring requirements then under development by the International Civil Aviation Administration (ICAO) Separation and Airspace Safety Panel (SASP) (reference 1, paragraph 6.9). The Meeting noted that long-term monitoring requirements would be applicable to operators and aircraft with State approval for RVSM operation.

1.2. The meeting was also advised that the SASP had agreed that height-keeping performance monitoring results, contributed by EUROCONTROL and reviewed by the North Atlantic (NAT) Operations and Airworthiness Sub Group, had demonstrated long-term adverse trends in altimetry system error (ASE) drift, which, if not reversed, would result in aircraft becoming non-compliant with RVSM requirements. Additionally it had been agreed that globally applicable minimum long-term monitoring requirements were required as ASE could not be detected without specialized monitoring systems and could therefore pose a serious risk if uncorrected (reference 1, paragraph 6.11).

1.3. Subsequent SASP deliberations and actions by the ICAO Air Navigation Commission (ANC) have resulted in the addition of long-term RVSM monitoring requirements to Annex 6, with the effective date of the requirements planned for 2010. The following text was adopted by the ANC for Annex 6, Parts I and II, Chapter 7:

> *7.2.7 The State of the Operator that has issued an RVSM approval to an operator shall establish a requirement which ensures that 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.*

Note:— Monitoring data from any regional monitoring programme established in accordance with Annex 11, 3.3.5.2, may be used to satisfy the requirement.

1.4. RASMAG/8 concluded that a Regional Monitoring Agency (RMA) should carry out the following tasks related to the forthcoming long term monitoring requirements (reference 2):

a) Educate States and airspace users as to the roles and functions of an RMA;

b) Establish the monitoring requirements to be satisfied by each operator;

c) Coordinate with other RMAs so that monitoring results are shared; and

d) Ensure that an adequate monitoring system infrastructure exists.

These four tasks led to the development of six long term height monitoring (LTHM) actions listed in reference 2.

1.5. At the RASMAG/10 meeting, the Pacific Approvals Registry and Monitoring Organization (PARMO) reported the approach planned to address the LTHM actions (reference 5). The plan included the use of the December 2008 TSD to establish the monitoring requirements for each operator in the airspace for which the PARMO is responsible and determine the number of airframes which need monitoring within the first two year period (e.g. 2010 – 2012). PARMO is not responsible for supporting monitoring of all operator/aircraft-type combinations in the TSD, just those domiciled in States for which the PARMO is responsible.

1.6. At the RASMAG/11 meeting, an LTHM impact statement was prepared for the combined Asia/Pacific region to be presented to APANPIRG/20 for adoption and circulation as regional guidance material (reference 6).

1.7. It was reported at the RASMAG/12 meeting that the *Asia/Pacific Regional Impact Statement – RVSM Global Long Term Height Monitoring Requirements effective from November 2010* was accepted by APANPIRG/20 to be adopted and circulated as Asia/Pacific regional guidance material, but that concerns were raised regarding the additional monitoring infrastructure needed to meet the burden (reference 7). Therefore, RASMAG was tasked with continuing its investigation of the LTHM burden and providing a recommendation for a region-wide solution to most effectively monitor the Asia/Pacific aircraft population with the least overall infrastructure investment.

1.8. Toward the goal of accomplishing this task, the attendees of RASMAG/12 (December 2009, Bangkok) analyzed the Asia/Pacific traffic flows and identified five main blocks of airspace that contain the majority of the fleets. These are broadly described as:

1.8.1. Southeast Asia;

1.8.2. India/Pakistan;

1.8.3. China;

1.8.4. Japan; and

1.8.5. Australia including Indonesia, New Zealand and Papua New Guinea.

1.9. In addition to the above mentioned five blocks of airspace, this report includes operations expected to be monitored by the existing ground-based Aircraft Geometric Height Measurement Element (AGHME) system in the United States.

1.10. The Meeting then agreed upon the monitoring infrastructure required for each of the five identified regions. Each RMA was tasked with preparing an analysis correlating the proposed monitoring infrastructure with the monitoring burden of the States under their responsibility (under the assumption that the proposed monitoring infrastructure were in place).

1.11. At the fifth meeting of the Regional Monitoring Agencies Coordination Group (RMA CG/5), a new MMR table proposed by the European RMA was adopted by the attending RMAs (reference 8). The changes incorporate new aircraft types, modifications to two existing groups and an update to aircraft series.

1.12. The purpose of this paper is to provide an update to the assessment of LTHM requirements for States under PARMO monitoring responsibility with the December 2009 traffic sample and the updated MMR table, shown in Table 1, and correlate the resultant burden to the monitoring infrastructure proposed at RASMAG/12. The intent is that this revised assessment be incorporated with the revised assessments conducted by the other Asia/Pacific Region RMAs.

2. Discussion

2.1. The December 2009 TSD collected by PARMO was examined to determine the operators conducting operations within the Flight Information Regions (FIRs) for which PARMO is responsible (Anchorage, Auckland, Incheon, Nadi and Oakland). All unique operator/aircraft combinations were identified and mapped to a monitoring category in the Minimum Monitoring Requirements (MMR) chart shown in Table 1.

2.2. Appendix A contains the complete listing of the civil operations observed in the December 2009 TSD obtained from airspace for which the PARMO is the responsible RMA. The data in Appendix A includes the Responsible State, the ICAO operator code, minimum monitoring category, aircraft monitoring group, estimated fleet size and the estimated number of airframes to be monitored.

2.3. In addition to those operations for which the PARMO is the responsible RMA, the operations for which the North America Approvals Registry and Monitoring Organization (NAARMO) is the responsible RMA are also of interest to the PARMO. Both the NAARMO and PARMO RMA services are provided by the Separation Standards Group at the Federal Aviation Administration Technical Center.

MONITORING IS REQUIRED IN ACCORDANCE WITH THIS TABLE

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

CATEGORY		**AIRCRAFT GROUP**	**MINIMUM OPERATOR MONITORING FOR EACH AIRCRAFT GROUP**
1	GROUP APPROVED: DATA INDICATES COMPLIANCE WITH THE RVSM MASPS	A124, A300, A306, A310-GE, A310-PW, A318, A320, A330, A340, A345, A346, A3ST, AVRO, B712, B727, B737CL, B737C, B737NX, B747CL, B74S, B744-5, B744-10, B752, B753, B767, B764, B772, B773, BD100, CL600, CL604, CL605, C17, C525, C560, C56X, C650, C680, C750, CARJ, CRJ7, CRJ9, DC10, E135-145, E170-190, F100, F900, FA10, GALX, GLEX, GLF4, GLF5, H25B-800, J328, KC135, LJ40, LJ45, LJ60, MD10, MD11, MD80, MD90, PRM1, T154	Two airframes from each fleet* of an operator to be monitored
2	GROUP APPROVED: INSUFFICIENT DATA ON APPROVED AIRCRAFT	Other group aircraft other than those listed above including: A148, A380, AC95, AN72, ASTR, ASTR-SPX, B701, B703, B703-E3, B731, B732, BD700, BE20, BE30, BE40, B744-LCF, B748, C130, C500, C25A, C25B, C25C, C441, C5, C510, C550-552, C550-B, C550-II, C550-SII, D328, DC85, DC86-87, DC93, DC95, E120, E50P, EA50, F2TH, F70, FA20, FA50, FA7X, G150, GLF2, GLF2B, GLF3, H25B-700, H25B-750, H25C, HA4T, IL62, IL76, IL86, IL96, L101, L29B-2, L29B-731, LJ31, LJ35-36, LJ55, MU30, P180, PC12, SB20, SBR1, SBR2, T134, T204, T334, TBM, WW24, YK42	60% of airframes (round up if fractional) from each fleet of an operator **or** individual monitoring
3	Non-Group	Non-group approved aircraft	100% of aircraft shall be monitored

Table 1. Minimum Monitoring Requirements

2.4. The civil operation data in **Appendix A** show the total number of airframes to be monitored for which the PARMO/NAARMO is the responsible RMA is 680 airframes, based on the December 2009 traffic sample and the new MMR groupings. These result from 107 unique operator-aircraft group commercial combinations and 47 unique IGA aircraft groups. The resultant PARMO monitoring burden includes 21 airframes in the Australia area, 23 airframes in the Japan area, and 636 in the Canada/Mexico/US area.

2.5. Any potential overlap of operations by common operators and aircraft types in other RMA airspace should be further investigated to enhance the prospects of sharing monitoring results. Since many operators conduct operations outside of the Asia/Pacific Region, coordination between all RMAs will be needed to account for operators who have met the monitoring requirements in other regions.

2.6. Based on these findings, the PARMO/NAARMO will contact the appropriate State authorities of the observed operators to remind them of the coming LTHM requirements.

3. Recommendation

3.1. The meeting is invited to:

a) note the information presented in this paper;

b) incorporate the information contained in this paper with similar data obtained from other Asia Pacific RMAs.

References

1) Report of the Seventh Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/7), Bangkok, Thailand, 4-8 June 2007.

2) Report of the Eighth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/8), Bangkok, Thailand, 10-14 December 2007.

3) "Global Long Term RVSM Height Monitoring," ICAO State Letter, AN 13/11.1-07/72, 7 December 2007.

4) *Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive*. ICAO Doc 9574, Second Edition 2002.

5) "The Pacific Approvals Registry and Monitoring Organization (PARMO) Plan for Assessing the Monitoring Responsibility Associated with the Long-Term Height Monitoring Requirements," IP/8, The Tenth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/10), Bangkok, Thailand, 15-19 December 2008.

6) Report of the Eleventh Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/11), Bangkok, Thailand, 8-12 June 2009.

7) Report of the Twelfth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/12), Bangkok, Thailand, 14-17 December 2009.

8) Summary of Discussions and Conclusions from the Fifth Meeting of the Regional Monitoring Agencies Coordination Group (RMA CG/5), Atlantic City, New Jersey, USA, 3-7 May 2010.

Appendix A
Estimated RVSM Monitoring Burden for PARMO

Traffic Flow and Monitoring Source: Australian Area, ADS-B or EGMU					
Responsible State	**Operator**	**MMR Category (1, 2 or 3)**	**Aircraft Monitoring Group**	**Total # Airframes under Monitoring Group**	**Resultant Monitoring Burden (# airframes)**
Fiji	FJI	1	B737C	1	1
		1	B737NX	2	2
		1	B744	2	2
		1	B767	1	1
Total Fiji				**6**	**6**
New Zealand	ANZ	1	A320	12	2
		1	B737CL	15	2
		1	B744	7	2
		1	B767	5	2
		1	B772	8	2
	PBN	1	B737NX	8	2
	IGA	3	CVLT	1	1
	IGA	1	GLF4	1	1
Total New Zealand				**57**	**14**
Vanuatu	AVN	1	B737NX	1	1
Total Vanuatu				**1**	**1**
Total Australian Area, ADS-B/EGMU				**64**	**21**

Traffic Flow and Monitoring Source: Japan Area, HMU					
Responsible State	**Operator**	**MMR Category (1, 2 or 3)**	**Aircraft Monitoring Group**	**Total # Airframes under Monitoring Group**	**Resultant Monitoring Burden (# airframes)**
Republic of Korea	AAR	1	A320	13	2
		1	A330	8	2
		1	B744	12	2
		1	B767	8	2
		1	B772	11	2
	KAL	1	A306	8	2
		1	A330	19	2
		1	B737NX	34	2
		1	B744	44	2
		1	B772	18	2
		1	B773	4	2
	IGA	1	GLF4	1	1
Total Republic of Korea				**180**	**23**
Total Japan Area, HMU				**180**	**23**

Traffic Flow and Monitoring Source: Canada/Mexico/United States, AGHME					
Responsible State	**Operator**	**MMR Category (1, 2 or 3)**	**Aircraft Monitoring Group**	**Total # Airframes under Monitoring Group**	**Resultant Monitoring Burden (# airframes)**
Canada	ACA	1	A320	77	2
		1	A330	8	2
		1	B767	30	2
		1	B772	6	2
		1	B773	12	2
	CJA	1	B737NX	6	2
	SWG	1	B737NX	9	2
	TSC	1	A310	14	2
		1	A330	5	2
	WJA	1	B737C	64	2
		1	B737NX	12	2
	IGA	2	ASTR	1	1
	IGA	1	C56X	1	1
	IGA	1	C680	2	2
	IGA	1	CL600	6	6
	IGA	2	FA50	3	3
	IGA	1	GLEX	1	1
	IGA	1	GLF5	2	2
	IGA	1	LJ45	1	1
Mexico	AMX	1	B737C	27	2
		1	B767	3	2
		1	B772	4	2
	MXA	1	A318	10	2
		1	A320	53	2
	TNO	1	A300	1	1
	VOI	1	A320	19	2
	IGA	1	B737CL	1	1
	IGA	2	BE40	1	1
	IGA	1	C650	2	2
	IGA	1	F900	1	1
	IGA	1	H25B	3	3
	IGA	2	LJ35-36	2	2
	IGA	1	LJ45	3	3
United States	AAL	1	B752	124	2
		1	B767	73	2
		1	B772	47	2
	ABX	1	B767	38	2
	ASA	1	B737C	19	2
		1	B737CL	30	2
		1	B737NX	67	2
	ATN	2	DC86-87	13	8

Responsible State	Operator	MMR Category (1, 2 or 3)	Aircraft Monitoring Group	Total # Airframes under Monitoring Group	Resultant Monitoring Burden (# airframes)
United States	AWE	1	A320	165	2
		1	B737CL	22	2
		1	B752	24	2
		1	B767	10	2
	BSK	1	B737C	1	1
		1	B737NX	7	2
	CKS	1	B744	3	2
		1	B747CL	21	2
	CMI	1	B737NX	9	2
		1	B764	4	2
	COA	1	B737NX	160	2
		1	B752	41	2
		1	B753	21	2
		1	B764	14	2
		1	B767	10	2
		1	B772	20	2
	DAL	1	B737NX	71	2
		1	B744	15	2
		1	B752	168	2
		1	B767	69	2
		1	B772	18	2
	EIA	1	B744	1	1
		2	B744-LCF	1	1
		1	B747CL	9	2
	FDX	1	A310	49	2
		1	B752	36	2
		1	B772	6	2
		1	DC10	66	2
		1	MD11	59	2
	GTI	1	B744	9	2
		1	B747CL	14	2
	HAL	1	B767	18	2
	JUS	2	DC93	7	5
	MGE	1	B727	3	2
	NAC	2	B732	3	2
	NAO	1	B752	5	2
		1	B767	5	2
	NWA	1	A330	11	2
		1	B744	16	2
		1	B747CL	17	2
		1	B752	45	2
		1	B753	16	2

Responsible State	Operator	MMR Category (1, 2 or 3)	Aircraft Monitoring Group	Total # Airframes under Monitoring Group	Resultant Monitoring Burden (# airframes)
United States	OAE	1	B752	3	2
		1	DC10	15	2
	PAC	1	B744	6	2
	RYN	1	B767	6	2
	SOO	1	B747CL	17	2
		1	B747CL	1	1
	UAL	1	A320	152	2
		1	B744	25	2
		1	B752	96	2
		1	B767	35	2
		1	B772	19	2
	UPS	1	B744	12	2
		1	B752	75	2
		1	B767	34	2
		1	MD11	38	2
	WOA	1	B744	2	2
		1	MD11	14	2
	IGA	2	ASTR	3	3
	IGA	1	B737C	5	5
	IGA	1	B737CL	1	1
	IGA	1	B767	4	4
	IGA	1	BD100	7	7
	IGA	2	BD700	1	1
	IGA	2	BE40	2	2
	IGA	2	C25A	3	3
	IGA	2	C25B	11	11
	IGA	2	C500	4	4
	IGA	2	C510	5	5
	IGA	1	C525	5	5
	IGA	2	C550	7	7
	IGA	1	C560	9	9
	IGA	1	C56X	12	12
	IGA	1	C650	1	1
	IGA	1	C680	5	5
	IGA	1	C750	25	25
	IGA	1	CL600	21	21
	IGA	1	CRJ9	1	1
	IGA	1	E135-145	3	3
	IGA	2	F2TH	15	15
	IGA	2	EA50	1	1
	IGA	1	F900	28	28
	IGA	1	FA10	1	1

Responsible State	Operator	MMR Category (1, 2 or 3)	Aircraft Monitoring Group	Total # Airframes under Monitoring Group	Resultant Monitoring Burden (# airframes)
United States	IGA	2	FA20	1	1
	IGA	2	FA50	15	15
	IGA	2	G150	2	2
	IGA	1	GALX	18	18
	IGA	1	GLEX	20	20
	IGA	2	GLF2	4	4
	IGA	2	GLF3	15	15
	IGA	1	GLF4	60	60
	IGA	1	GLF5	57	57
	IGA	1	H25B	8	8
	IGA	2	HA4T	1	1
	IGA	3	LJ24	1	1
	IGA	2	LJ35-36	31	31
	IGA	1	LJ40	1	1
	IGA	1	LJ45	2	2
	IGA	1	LJ60	7	7
	IGA	1	MD80	2	2
	IGA	1	MD83	2	2
	IGA	2	MU30	1	1
	IGA	2	P180	1	1
	IGA	2	WW24	3	3
Total Canada/Mexico/United States				**3052**	**636**
Total Canada/Mexico/United States, AGHME				**3052**	**636**

PARMO Grand Total *(Fiji + New Zealand + Republic of Korea + Vanuatu + Asia/Pacific operations conducted by North America operators (Canada + Mexico + United States)*	**Total # Airframes under Monitoring Group**	**Resultant Monitoring Burden**
	3296	**680**