



International Civil Aviation Organization

**The 18th Meeting of the Regional Airspace Safety Monitoring Advisory Group
(RASMAG/18)**

Bangkok, Thailand, 1 – 4 April 2013

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

PROGRESS ON MAAR'S AHMS

(Presented by MAAR)

SUMMARY

This paper summarizes MAAR's progress on the ADS-B Based Height Monitoring System (AHMS). MAAR's AHMS has observed 2,274 airframes. Through the assistance from the Australian Airspace Monitoring Agency (AAMA), two additional corrections have also been applied to the estimation process. In addition, MAAR has requested States for more ADS-B data in order to increase the effectiveness of the ASE estimation. As a monthly operation, MAAR conducts further analysis on airframes that may be aberrant, and, when necessary, notifies the responsible parties to take preventive actions. One non-compliant airframe was detected, after which the operator promptly took remedial actions.

This paper relates to –

Strategic Objectives:

A: *Safety – Enhance global civil aviation safety*

Global Plan Initiatives:

GPI-2 Reduced vertical separation minima

1. INTRODUCTION

1.1 With the assistance from the FAA Technical Center and the Australian Airspace Monitoring Agency (AAMA), MAAR started providing ADS-B Height Monitoring Service in October 2012.

1.2 The ADS-B data is processed monthly and the results are shared with the other RMAs via the Knowledge Sharing Network (KSN). Also, the last successful monitoring dates are published along with the approval records on MAAR's website (<http://www.aerothai.co.th/maar/approvals.php>).

2. DISCUSSION

Current Status

2.1 As of February 2013, the number of observed airframes as was 2,274 airframes, of which 1,048 airframes (46%) still have unidentified height reference. Appendix A shows the number of observed airframes by operator and monitoring group.

2.2 Due to the current system's small coverage, the range of geoid difference was not wide enough for MAAR to confidently establish the height assumption for most airframes. In most cases, MAAR can still conclude that the airframes have been successfully monitored because both ASE values calculated assuming each height assumption are within the acceptable range. This accounts for 98.4% of all airframes with unidentified height reference. However, the unknown height reference becomes a problem when one value is not within the acceptable range while the other is.

2.3 The solution to this problem is to obtain more data from other States and to share data with the other RMAs, which would widen the range of geoid difference and allow MAAR to identify the correct height assumption more effectively. This initiative has been discussed in the previous meeting and subsequently developed into APANPIRG Conclusion 23/16.

2.4 In this regard, MAAR contacted Hong Kong, Singapore, India, Vietnam, Maldives, Myanmar, Taiwan, requesting ADS-B data from their receivers.

AAMA Visit

2.5 In December 2013, MAAR visited the Australian Airspace Monitoring Agency (AAMA) at Canberra, Australia to discuss matters related to AHMS.

2.6 The AAMA made significant advancement in their AHMS, especially the additional source of errors contributing to the ASE estimates. One was due to the difference in the resolution of the coordinate grids used to interpolate Mean Sea Level between the MET data (finer grids) and those used on the aircraft (rougher grids). The other was due to the effect of different time of day when the data was collected.

2.7 The AAMA also assisted in tailoring the software to better help analyze airframes with smaller samples, which are mostly the cases found in MAAR's data. This significantly improved the effectiveness of MAAR's AHMS.

2.8 MAAR would like to take this opportunity to thank the AAMA for their supports on the development of MAAR's AHMS.

Follow-Up Actions on Aberrant and Non-Compliant Airframes

2.9 MAAR conducts further analysis on airframes that have absolute values of average ASE greater than 175 feet or have ranges outside of [-200, 200] feet on a monthly basis. When necessary, MAAR also notifies the responsible parties to take preventive actions.

2.10 MAAR's AHMS detected one non-compliant airframe, having an average ASE for the most recent 9 days equal to -245 feet. The operator promptly investigated the problem and took remedial actions.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) discuss any relevant matters as appropriate.

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APPENDIX A: Observed Airframes by Operator and Monitoring Group

MMIR Group/ Op Code	A306	A310-PW	A320	A330	A340	A345	A346	A380	B737NX	B744-10	B744-5	B748	B752	B767	B772	B773	CL604	CL605	MD11	Total
AAR				6						2					5					13
ABD										3	3									6
AEA				2																2
AFL				9										7						16
AFR															9	8				17
AHK	1																			1
AIC			3																	3
AIQ			29																	29
AJV														1						1
AJX														1						1
ALK				7	6															13
ANA									1					23	2					26
AUA															2					2
AWQ			23																	23
AXB									1											1
AXM			67																	67
BAW										31	12				5					48
BBC																2				2
BIE			1																	1
BKP			13																	13
BOX															8					8
BPA														1						1
CAL				22	6				4	31										63
CBJ									1											1
CCA			18	3					19						9					49
CEB			32																	32
CES			57	17			5		44											123
CFG														3						3
CHH									38											38
CKK										4					5					9
CKS										2										2
CLX										8	1	5								14
CPA				30						27	10				5	28				100
CQH			8																	8
CRK			7	12					2											21
CSC			18																	18
CSN			39	3					22											64
CSZ									1											1
DAL				30																30
DHK														1						1
DKH			10																	10
DLH					5	11	8		12	13										49
EIA									1											1
ELY										6					5					11

MMR Group/ Op Code	A306	A310-PW	A320	A330	A340	A345	A346	A380	B737NX	B744-10	B744-5	B748	B752	B767	B772	B773	CL604	CL605	MD11	.	Total
ENT									1												1
ESR									1												1
ETD				3												10					13
ETH													2	5	4						11
EVA			3	9						9						15					36
FDX	5	8																	46		59
FFM									1												1
FIN				8	7																15
GEC																			13		13
GFA				10																	10
GIA									41												41
GSS										1		3									4
GTI										11		1									12
HDA			3	3					1	1	1										9
HKE									4												4
HVN			36												4						40
IAC			24	1																	25
IGA					1				1	1								2			5
IGO			14																		14
JAI				2	1				22												25
JAL														13	7	5					25
JAV				1																	1
JJA									7												7
JSA			18																		18
JST				11																	11
KAC					4																4
KAL				17					12	31	4				8	5					77
KFR			1																		1
KLM										8	4				11	7					30
KQA														1	4						5
KZR													1								1
LAO			4																		4
MAS				21					32	2					9						64
MAU				2	2																4
MDG					1																1
MDL			5																		5
MIL									1												1
MMA			3																		3
MSR				4												6					10
MTJ									1												1
NCA										8											8
NOK									7												7
NWS													1	1							2
OEA										3											3
OMA				7																	7

MMR Group/ Op Code	A306	A310-PW	A320	A330	A340	A345	A346	A380	B737NX	B744-10	B744-5	B748	B752	B767	B772	B773	CL604	CL605	MD11	-	Total
ORB															1						1
PAL			14	4	1																19
QFA				14				12		6	8										40
QTR				29											11	18					58
RBA															6						6
REU									2						2						4
RJA				3																	3
RMF									1												1
SAA					6		5														11
SAS					7																7
SAZ																	1				1
SCO															4						4
SIA				19		5		17		3					37	27					108
SLK			14																		14
SOO															1						1
SOR			2																		2
SQC										13											13
SRQ			5																		5
SVA										4	1								4		9
SVR			1																		1
SWR					9																9
TAY										4					3						7
TBJ			1																		1
TGW			21																		21
THA			5	14		4	6			15	3				14	13					74
THY				17	7											2					26
TNA			1																		1
TOM													1								1
TSO										8					2	4					14
TUA									2												2
TVS									1												1
TYA									1												1
TYR															2						2
UAE				13	2			12							7	88					122
UAL										6	4				28						38
UPS										13									27		40
UTA													3								3
UZB														3							3
VAV			1																		1
VJC			2																		2
VJS																		1			1
VLK				2																	2
XAX				8																	8
YZR				1																	1
-																				4	4
Total	6	8	503	364	65	9	27	49	273	273	64	9	8	62	222	234	1	3	90	4	2274