



International Civil Aviation Organization

**The 17th Meeting of the Regional Airspace Safety Monitoring Advisory Group
(RASMAG/17)**

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

POST IMPLEMENTATION REPORT OF SETOUCHI HMU

(Presented by Japan)

SUMMARY

This paper provides a summary of the height monitoring service and the scrutiny process concerning Setouchi height monitoring unit (HMU) which has been officially operational for five (5) months. This paper provides a summary of ongoing height monitoring service and the scrutiny process of Setouchi HMU.

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 JASMA has implemented the height monitoring service of Setouchi HMU on 30 March, 2012. The Setouchi HMU is the ground-based height monitoring system installed in the western region of mainland Japan. The HMU captures Japanese domestic fleet plus those aircraft operating between Japan and Korea/China/Southeast-Asia. The result of successful height monitoring is periodically uploaded to JASMA website (<http://www.jasma.jp>) and RMAs' knowledge sharing network (KSN) website.

2. DISCUSSION

2.1 A total of 15,387 monitored data were obtained from Setouchi HMU for the period between 30 March, 2012 and 31 July, 2012.

2.2 The mean TVE value of the 15,387 aircrafts measurements was 19 feet and the standard deviation of TVE was 66 feet. Comparison between the pre-implementation trial period and the post implementation period is shown in **Table 1**. The standard deviation of both TVE and ASE are almost the same, but the mean TVE and ASE show some gap between the pre-implementation trial period and the post implementation period. JASMA will keep track of the mean TVE/ASE values to find the cause of the gap, which may be related to seasonal matters or may be related to the change in monitoring groups by introducing new type of aircraft.

Number of measurement	Mean (feet)		Standard Deviation (feet)		Period
	TVE	ASE	TVE	ASE	
24,843	2	2	67	67	10 Sep 2011-29 Jan 2012
15,387	19	18	66	66	30 Mar 2012 - 31 Jul 2012

Table 1: Comparison between trial and post implementation period of Setouchi HMU

2.3 **Figure 1** shows the proportion of monitoring groups monitored by Setouchi HMU between 30 March 2012 and 31 July 2012. The four (4) percent “NON-AC” means that JASMA could not identify the type of monitored aircraft in the process of collation between Mode-S code and the RVSM aircraft database and/or RVSM flight plans.

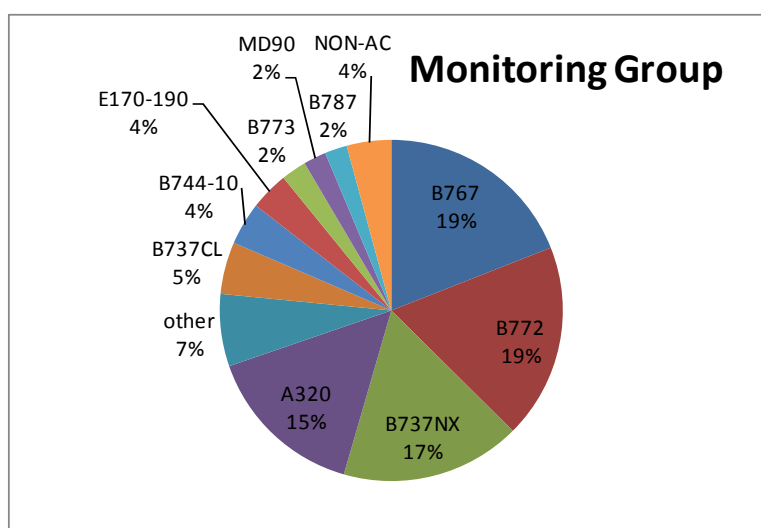


Figure 1: Percentage of Aircraft monitoring group monitored by Setouchi HMU (3/30-7/31 2012)

2.4 The following paragraphs provide summary of the latest monitoring result of Setouchi HMU based on the one (1) month data gathered between 16 June 2012 and 15 July, 2012.

2.5 622 airframes were successfully monitored between 16 June 2012 and 15 July, 2012. Table 2 and 3 present the aircraft operators whose RVSM aircraft were successfully monitored in the one (1) month period.

ICAO three letter	Aircraft Operating Agency, Authority or Service	State of the Operator
AAL	AMERICAN AIRLINES INC.	UNITED STATES
AAR	ASIANA AIRLINES	REPUBLIC OF KOREA
ACA	AIR CANADA	CANADA
AKX	AIR NIPPON NETWORK CO. LTD.	JAPAN
ALK	SRILANKAN AIRLINES	SRI LANKA
AMU	AIR MACAO	CHINA
AMX	Aeroméxico	MEXICO
ANA	ALL NIPPON AIRWAYS CO., LTD.	JAPAN
CAL	CHINA AIRLINES	CHINA (TAIWAN)
CAO	AIR CHINA CARGO	CHINA
CCA	AIR CHINA	CHINA
CES	CHINA EASTERN AIRLINES	CHINA
CKK	CHINA CARGO AIRLINES LTD	CHINA
CPA	CATHAY PACIFIC	CHINA (HONG KONG)
CQH	SPRING AIRLINES	CHINA
CSH	SHANGHAI AIRLINES	CHINA
CSN	CHINA SOUTHERN AIRLINES	CHINA
CSZ	SHENZHEN AIRLINES	CHINA
CYZ	CHINA POSTAL AIRLINES	CHINA
DAL	DELTA AIRLINES, INC.	UNITED STATES
EIA	EVERGREEN INTERNATIONAL AIRLINES	UNITED STATES
ETD	ETIHAD AIRWAYS	UNITED ARAB EMIRATES
EVA	EVA AIR	CHINA (TAIWAN)
FDA	FUJI DREAM AIRLINES	JAPAN
FDX	FEDERAL EXPRESS CORPORATION	UNITED STATES
HAL	HAWAIIAN AIRLINES	UNITED STATES
HVN	VIETNAM AIRLINES	VIETNAM
IBX	IBEX AIRLINES	JAPAN
JAL	JAPAN AIRLINES INTERNATIONAL CO., LTD	JAPAN
JEX	JAL EXPRESS	JAPAN
JJP	JETSTAR JAPAN	JAPAN
JTA	JAPAN TRANSOCEAN AIR	JAPAN
KAL	KOREAN AIR LINES CO., LTD.	REPUBLIC OF KOREA
NCA	NIPPON CARGO AIRLINES CO., LTD.	JAPAN
SFJ	STAR FLYER	JAPAN
SIA	SINGAPORE AIRLINES	SINGAPORE
SKY	SKYMARK AIRLINES INC.	JAPAN
SNJ	SKYNET ASIA AIRWAYS	JAPAN
SQC	SINGAPORE AIRLINES CARGO	SINGAPORE
THA	THAI AIRWAYS INTERNATIONAL	THAILAND
UAL	UNITED AIRLINES INC.	UNITED STATES
UPS	UNITED PARCEL SERVICE COMPANY, (LOUISVILLE, KY)	UNITED STATES
YAY	CIVIL AVIATION BUREAU	JAPAN
YZR	YANGTZE RIVER EXPRESS AIRLINES CO., LTD	CHINA

Table 2: Operators whose aircraft were successfully monitored by Setouchi HMU (6/16-7/15 2012)

Table 3: Operator-A/C type combination successfully monitored by Setouchi HMU (6/16-7/15 2012)

ICAO three letter (A~C)	A/C types	operator (D~Y, IGA, other)	A/C types
AAL	B772		
AAR	B763		
ACA	B763		
	B772		
AKX	B735		
	B737		
	B738		
ALK	A343		
AMU	A319		
AMX	B772		
ANA	A320		
	B737		
	B738		
	B74D		
	B763		
	B772		
	B773		
	B77W		
	B788		
	B788		
CAL	A340		
	A343		
	B738		
	B744		
CAO	B744		
CCA	A319		
	A321		
	B738		
CES	A319		
	A320		
	A321		
	A332		
	A333		
	A346		
	B738		
CKK	B744		
	B772		
	B77L		
CPA	B744		
	B748		
	B773		
CQH	A320		
CSH	B752		
CSN	A321		
	B744		
	B772		
	B77L		
CSZ	A320		
	B738		
CYZ	B734		
		DAL	A333
			B763
		EIA	B742
		ETD	A330
		EVA	A333
			B744
			B773
			MD11
		FDA	E170
		FDX	B77L
			MD11
		HAL	B763
		HVN	A321
			A332
		IBX	CRJ7
		JAL	B738
			B763
			B772
			B773
			MD90
		JEX	B738
		JJP	A320
		JTA	B734
		KAL	A306
			B739
			B744
		NCA	B744
		SFJ	A320
		SIA	B773
		SKY	B738
			B734
		SNJ	B738
		SQC	B744
		THA	A333
		UAL	B744
			B772
		UPS	B744
			B763
			MD11
		YAY	GLEX
		YZR	B733
			B744
		other	E170
			C560

2.6 Monitoring groups of B737NX, B767, B772, A320, B744-10, A330, B737CL, MD11, B773, E170-190, MD90 and B787 make up ninety-seven (97) percent of all measurements in the one month period. Table 4 shows the mean and the standard deviation of TVE, AAD and ASE of the twelve (12) monitoring groups. Figure 2 draws focus to the data of mean ASE of each monitoring group and made it a bar graph.

Monitoring Group	count	Mean (ft)			SD (ft)		
		TVE	AAD	ASE	TVE	AAD	ASE
B737NX	125	15	0	15	39	1	39
B767	111	-58	0	-57	48	14	48
B772	89	27	0	27	47	2	46
A320	85	58	2	56	52	5	51
B744-10	45	-76	1	-77	58	8	61
A330	33	33	1	32	58	5	59
B737CL	30	-21	0	-20	62	1	61
MD11	29	32	7	25	74	16	73
B773	23	37	0	37	33	0	33
E170-190	16	30	0	29	38	2	39
MD90	9	48	0	48	47	0	47
B787	8	42	0	42	32	1	33
other	19	17	0	17	69	0	69

Table 4: Result of recent height monitoring per monitoring groups (total 622 airframes)

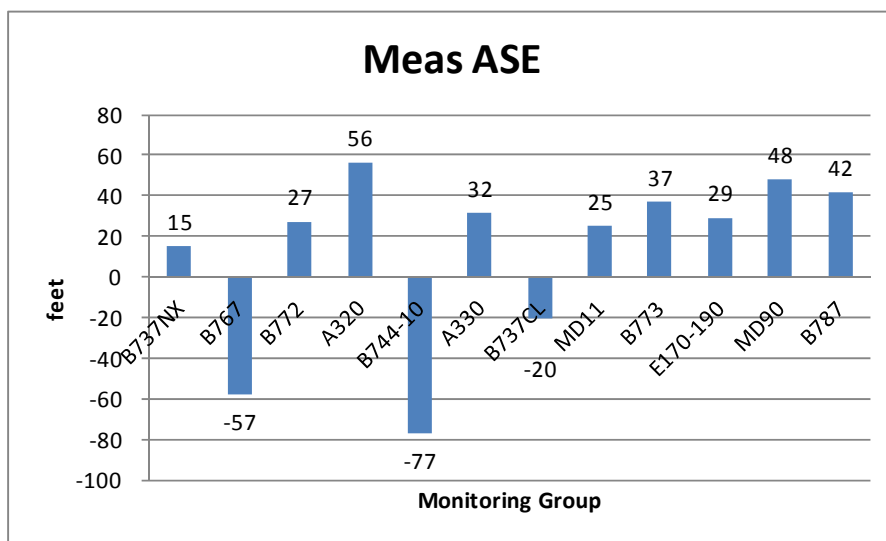


Figure 2: Mean ASE of each Monitoring Group

2.7 The scrutiny of the monitoring data is conducted by JASMA every month. As the HMU measures geometric height of RVSM aircraft by calculating time difference of arrival (TDOA) of mode-S signal to five (5) HMU receivers, the accuracy of mode-S identification is required in the scrutiny process. When a monitored mode-S code identifies two (2) or more registration mark in the RVSM approval database, the collation between its flight plan and the registration marks is conducted. JASMA conducts careful verification including monitoring flight information over Setouchi HMU to updating the KSN site and JASMA Web site.

2.8 Another point in the scrutiny process is the record of double measurement of height-keeping performance toward a single straight/level flight of an aircraft in the HMU coverage. HMU is supposed to produce a single track from the plot data measured every second if the flight in its coverage is level in altitude and straight in direction. Nevertheless JASMA finds a high incidence of double measurements with different height-keeping performance values toward a single straight/level flight of an aircraft. There are several causes of double measurement that JASMA is well understood, but currently the adoption judgment is conducted manually in the scrutiny process. JASMA and manufacturers keep working through the software to solve the monitoring results problems. Concerning the duplicated registration number assigned to one Mode S code problem, JASMA has found out the origin from the database of the other RMAs.

2.9 After experienced some scrutiny of the monitoring data, JASMA determined to reduce the radius of Setouchi HMU coverage from initial 45NM to 40NM on 12 June 2012.

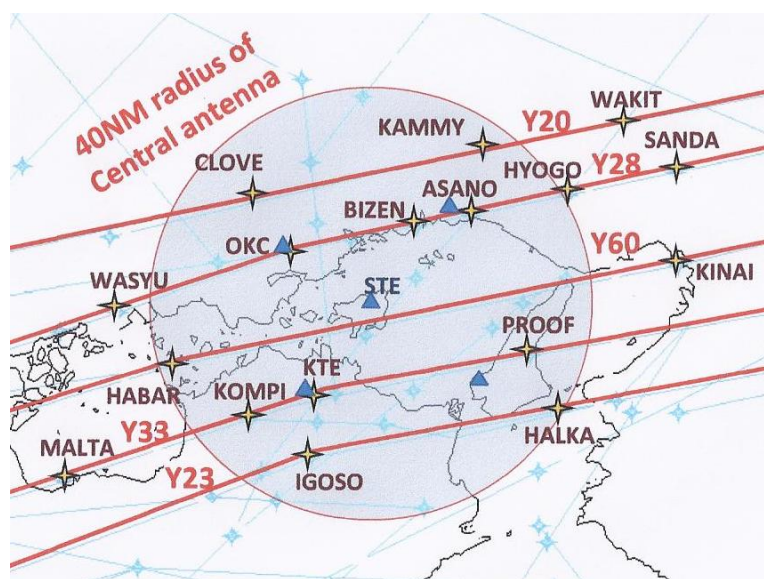


Figure 3: Reduced the radius of Setouchi HMU

2.10 Japan Civil Aviation Bureau (JCAB) is planning to build two more HMUs by March 2013 in Niigata region and Sendai region. The more details will be informed in JASMA website.



Figure 4: Location of current and future HMUs in Japan

3. ACTION BY THE MEETING

3.1 The meeting is invited to note the information contained in this paper.

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