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 the Asia/Pacific Region

ANALYSIS TO DETERMINE THE POTENTIAL OF THE FIRST HEIGHT MONITORING UNIT (HMU) IN JAPAN

(Presented by Japan)

SUMMARY

This working paper presents an analysis undertaken by Japan RMA to determine the potential of the first ground-based Height Monitoring Unit (HMU) in Japan. The HMU is targeted to start monitoring services in the third quarter of 2011.

1. Introduction

1.1 In the paragraph 2.16 of the RASMAG/12 report, the analysis to determine the aircraft numbers and types that would be monitored by the respective monitoring system was requested.

1.2 Japan RMA has indicated its intention to deploy three HMUs situated within the airspace of Japan, with the first HMU (Okayama HMU: HMU-1) targeted to become operational in the third quarter of 2011.

1.3 This paper provides an analysis undertaken by Japan RMA to determine the future potential of HMU-1 as the first ground-based height-keeping performance monitoring system in Japan. The estimation was derived from the one-week traffic sample data of 23-29 May 2010.

2. Discussion

2.1 The coverage of the HMU-1 is about forty (40) nautical miles radius. The aircraft needs to maintain straight and level flight in the RVSM altitude stratum at least twenty (20) nautical miles within the coverage. Once the aircraft changes its altitude or its heading after entering the coverage,

the height-keeping performance data of the aircraft will be deleted unless the aircraft already accomplishes a straight and level flight of twenty (20) nautical miles or more.

2.2 The aircraft has to be equipped with Mode-S transponder to get height-monitoring by the HMU in Japan.

2.3 There are several ATS routes run through the coverage of HMU-1 as shown in **Figure 2**. The following analysis was conducted by counting the actual flight plans which filed these ATS routes and one of RVSM altitudes between 23rd May 2010 and 29th May 2010 to estimate the operators, types of aircraft, and the number of aircraft which will be measurable by HMU-1.

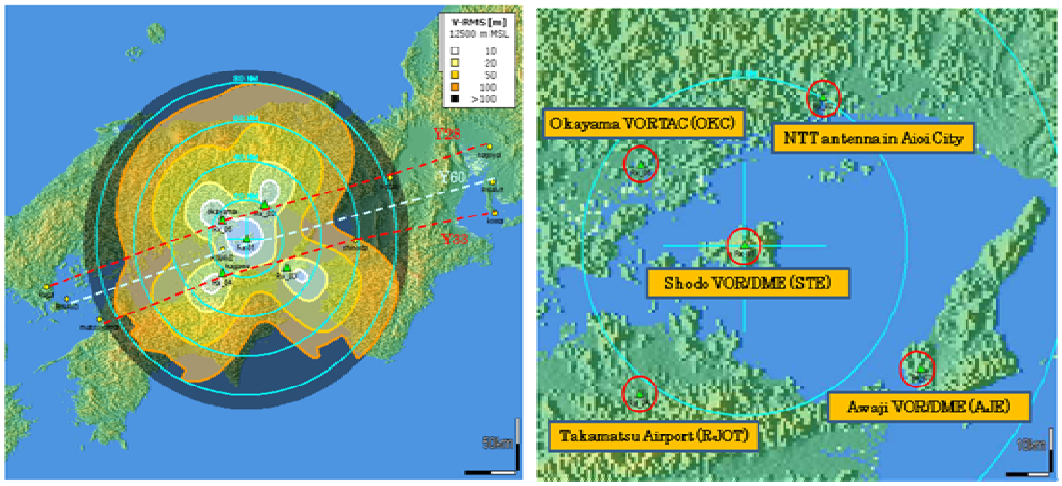

Figure 1: Site of Height Monitoring Elements (HMEs) of HMU-1 and its coverage

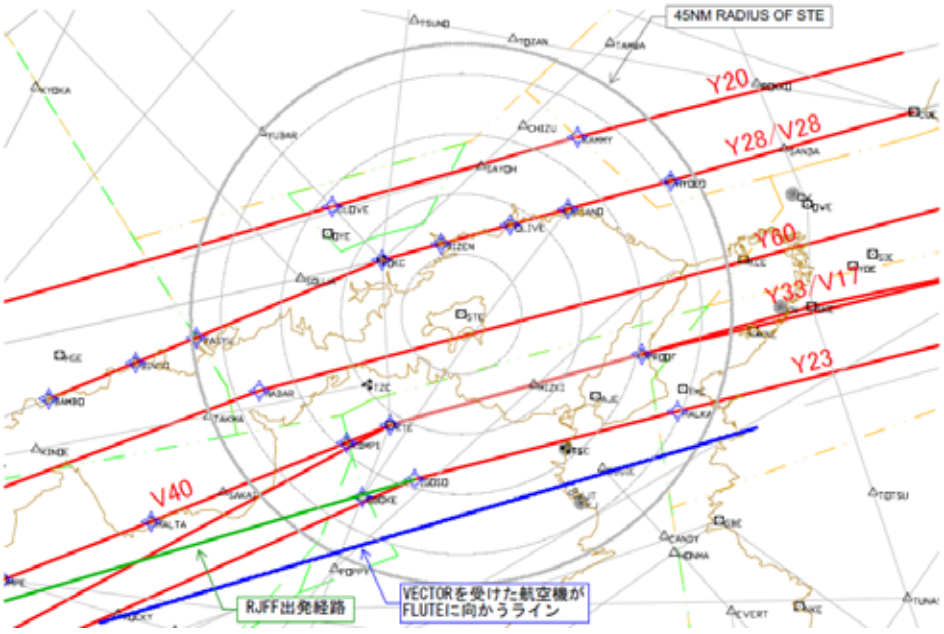

Figure 2: ATS routes run through the coverage of HMU-1

2.4 **Table 1** shows the result of analysis concerning the operators of the estimated measurable aircraft by HMU-1. Japanese operators are identified by blue shading.

Three letter	Aircraft Operating Agency, Authority or Service	State of the Operator
AAL	AMERICAN AIRLINES INC.	UNITED STATES
ACA	AIR CANADA	CANADA
AIC	AIR INDIA	INDIA
ALK	SRILANKAN AIRLINES	SRI LANKA
AMX	AEROVIAS DE MEXICO, S.A.DE C.V.	MEXICO
ANA	ALL NIPPON AIRWAYS CO., LTD.	JAPAN
ANK	AIR NIPPON CO. LTD.	JAPAN
CAL	CHINA AIRLINES	CHINA (TAIWAN)
CAO	AIR CHINA CARGO CO., LTD	CHINA
CCA	AIR CHINA	CHINA
CES	CHINA EASTERN AIRLINES	CHINA
CKK	CHINA CARGO AIRLINES LTD	CHINA
COA	CONTINENTAL AIR LINES INC.	UNITED STATES
CSH	SHANGHAI AIRLINES	CHINA
CSN	CHINA SOUTHERN AIRLINES	CHINA
CSZ	SHENZHEN 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
GTI	ATLAS AIR, INC. (JAMAICA, NY)	UNITED STATES
GWL	GREAT WALL AIRLINES CO., LTD	CHINA
HKE	HONG KONG EXPRESS AIRWAYS LTD	HONG KONG, CHINA
HVN	HANG KHONG VIET NAM	VIET NAM
JAL	JAPAN AIRLINES INTERNATIONAL CO., LTD	JAPAN
JTA	JAPAN TRANSOCEAN AIR CO., LTD.	JAPAN
KAL	KOREAN AIR LINES CO., LTD.	REPUBLIC OF KOREA
NCA	NIPPON CARGO AIRLINES CO., LTD.	JAPAN
PAC	POLAR AIR CARGO WORLDWIDE, INC. (WASHINGTON, DC)	UNITED STATES
QFA	QANTAS AIRWAYS LIMITED	AUSTRALIA
SFJ	STAR FLYER INC	JAPAN
SKY	SKYMARK AIRLINES INC.	JAPAN
SNJ	SKYNET ASIA AIRWAYS CO., LTD	JAPAN
SOO	SOUTHERN AIR, INC. (COLUMBUS, OH)	UNITED STATES
SQC	SINGAPORE AIRLINES CARGO PTE LTD	SINGAPORE
TNA	TRANS ASIA AIRWAYS	CHINA (TAIWAN)
UAL	UNITED AIRLINES INC.	UNITED STATES
UPS	UNITED PARCEL SERVICE COMPANY, (LOUISVILLE, KY)	UNITED STATES
YZR	YANGTZE RIVER EXPRESS AIRLINES CO., LTD	CHINA

Table 1: Operators of the estimated measurable aircraft by HMU-1

2.5 **Table 2** shows the result of analysis concerning the aircraft type-operator pairs which estimated as measurable by HMU-1.

operator (A～E)	A/C types
AAL	B772
ACA	B763
	B77L
	B77W
AIC	B77L
ALK	A332
	A343
AMX	B772
ANA	A320
	B735
	B737
	B738
	B74D
	B763
	B772
	B773
ANK	B735
CAL	B744
CAO	B744
CCA	A319
	A320
	B738
	B772
CES	A319
	A320
	A321
	A332
	A333
	A343
	A346
CKK	A306
	B744
	MD11
COA	B772
CSH	B763
CSN	A320
	B744
	B772
CSZ	A320
DAL	B744
	B772
	B77L
EIA	B742
ETD	A332
EVA	B744
	B77W
	MD11

Operator (F～Y, IGA, other)	A/C types
FDA	E170
FDX	B77L
	MD11
GTI	B744
GWL	B744
HKE	B738
HVN	A321
	A332
JAL	A306
	B734
	B738
	B744
	B763
	B772
	B773
	CRJ2
	E170
	MD81
	MD90
JTA	B734
KAL	A306
	B739
NCA	B744
PAC	B744
QFA	B744
SFJ	A320
SKY	B738
SNJ	B734
SOO	B742
SQC	B744
TNA	A320
	A321
UAL	B744
	B772
UPS	B744
	B763
	MD11
YZR	B744
IGA	GLEX
	FA7X
	GL5T
other	CL60
	GLEX
	GLF5
	K35R

Table 2: Aircraft type-operator pairs estimated as measurable by HMU-1

2.6 **Figure 3** shows the result of analysis concerning the number of aircraft which estimated as measurable by HMU-1 in one week. In total, 2298 aircraft were estimated as measurable. 1805 (78.5%) were the aircraft of Japanese airlines, and 487 (21.2%) were the aircraft of non-Japanese airlines. The rest of 6 aircraft belonged to Japanese International General Aviation, Japan Civil Aviation Bureau (JCAB), or military.

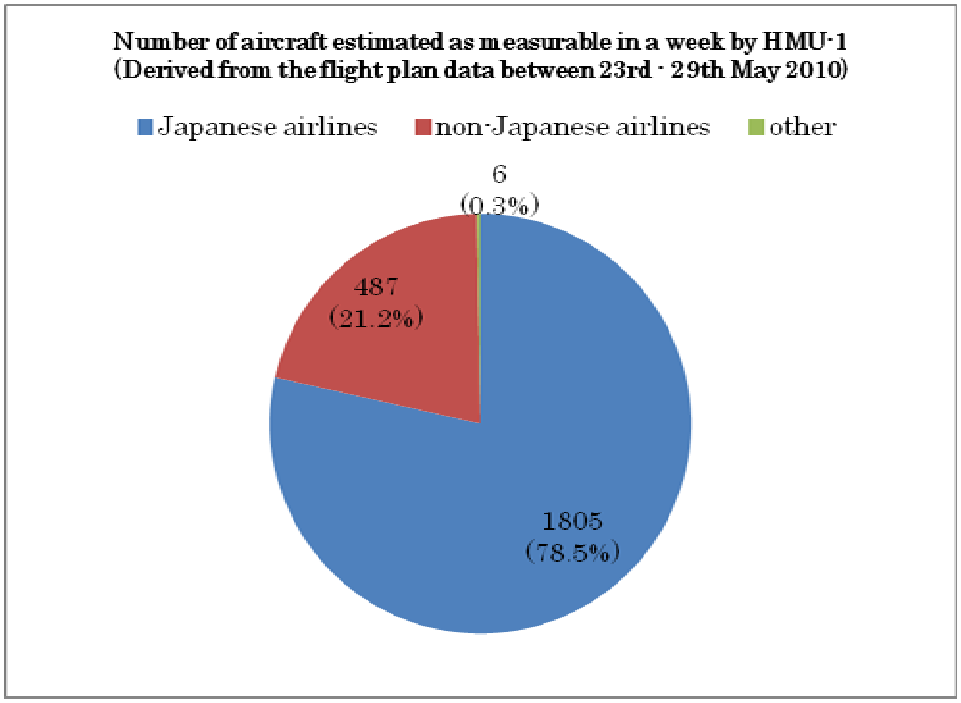

Figure 3: Number of aircraft estimated as measurable in a week by HMU-1

2.7 The estimations above are rough calculation by using flight plan data and the HMU's Dilution of Precision (DOP) chart. More accurate estimations will be available only after the flight validation of HMU-1, which is planned early next year. In addition, the height-keeping performance monitoring is vulnerable to meteorological conditions. It is obvious that not negligible number of monitoring will be voided depending on the weather.

3. Action by the meeting

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

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