INTERNATIONAL CIVIL AVIATION ORGANIZATION

TWENTY-SECOND MEETING OF THE ASIA/PACIFIC AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL GROUP (APANPIRG/22)

Bangkok, Thailand, 5-9 September 2011

Agenda Item 3: Performance Framework for Regional Air Navigation Planning and Implementation

3.2 ATM/AIS/SAR

HMU IMPLEMENTATION IN JAPAN

(Presented by Japan)

SUMMARY

This paper presents the information on the progress of the preparation for the upcoming monitoring service to RVSM aircraft by a ground-based Height Monitoring Unit (HMU) in Japan.

1. INTRODUCTION

1.1 Global long term monitoring of altimetry systems for RVSM

1.1.1 To be approved for operation in RVSM airspace, States must ensure that aircraft comply with technical requirements that enable the actual height cleared by air traffic services to be accurately maintained. The RVSM monitoring programs around the world have collected extensive height keeping data to determine the stability of Altimetry System Error (ASE) in airframes used for RVSM operations. The results show that ASE drift is worse than anticipated.

1.1.2 Accordingly, provisions have recently been included in ICAO Annex 6 – *Operation of Aircraft* that took effect from 18th November 2010 and require the global long term monitoring of altimetry systems used for RVSM operations. The amendment to Annex 6 requires all operators of RVSM approved aircraft to submit a minimum of 2 aircraft, of each type operated, to be height monitored at least once every 2 years or 1,000 flying hours, whichever the greater.

1.1.3 Currently, the global airframe height monitoring is undertaken by means of either a portable unit temporarily mounted in the aircraft (GPS Monitoring Unit-GMU) or a ground-based system (HMUs, Geometric Height Measurement Elements (AGHME) or ADS-B).

1.1.4 GMU monitoring is widely used and effective, there is a lot of flexibility of flight course and time for measurement, however, it can be costly and inconvenient to operators. On the other hand, the ground-based height monitoring systems have advantages of not only operators' conveniences but also obtaining a large number of usable measurement data for analysis of airspace

safety assessment. The present situation is that these HMUs are only situated in Europe or in North America, so only the aircraft which flies internationally to those continents and new aircraft from the major manufacturers can utilize those systems.

1.2 Japan is preparing for the height monitoring service by the first HMU, which is officially named SETOUCHI HMU after the location of antennas, situated within Fukuoka Flight Information Region (FIR). The accuracy of the altitude is calculated automatically when the aircraft flies within the measurable coverage of the HMU. This paper provides the outline of Setouchi HMU and the process of height monitoring services.

2. DISCUSSION

2.1 Method of measurement

2.1.1 The HMU consists of the height monitoring equipment (HME) and the total vertical error (TVE) monitoring unit (TMU). In case of Japan, the HME captures mode S signals of aircraft's SSR transponder replying to interrogations from radar stations. Geometrical three-dimensional position of airplane is measured by computing the time difference of arrival (TDOA) of a signal to more than four receivers (multilateration method). This information is transmitted to the TMU installed at Air Traffic Management Center in Fukuoka. The data is then combined with flight level altitude data corrected by meteorological data to evaluate the overall value for TVE. Eventually, the monitoring process produces TVE, AAD (Assigned Altitude Deviation) and ASE readings for each aircraft measured. Height Monitoring results are automatically transmitted to the RVSM Analyzing and Evaluating System where the aircraft's performances are verified and recorded.

2.2 Location

2.2.1 The central antenna of the Setouchi HMU is mounted close to Shodo VOR/DME "STE" located about 60NM west of Osaka. The coverage of the HMU is approximately 45NM radius of central antenna. The aircraft's height keeping performance is measured and calculated automatically when the aircraft flies within the measurable coverage of Setouchi HMU. The HMU covers main ATS routes connecting Tokyo and Fukuoka/Shanghai.

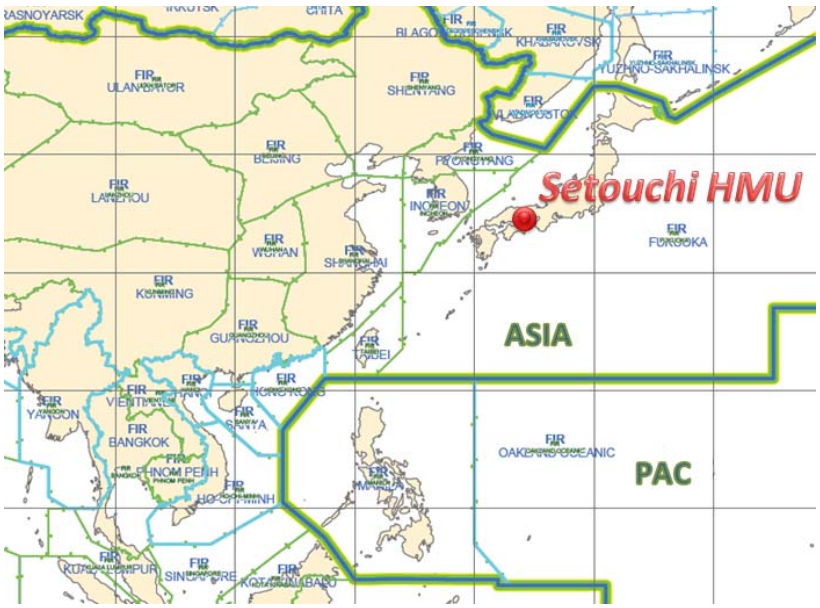

Figure: The location of the Setouchi HMU

2.3 The potential service scale of Setouchi HMU

2.3.1 The potential service scale of Setouch HMU is still under evaluation. The following estimation was derived from the one-week measurement data of 1-7 August 2011, from the RVSM Analyzing and Evaluating System.

2.3.2 992 flights were measured by the HMU for a week. 89.1% (884 flights) of these flights were Japanese airlines and 10.9% (108 flights) were Chinese, USA's and other foreign airlines. There were 286 different aircraft's registration numbers of these flights. 71.7% (205 registration numbers) had Japanese registration number and 28.3% (81 registration numbers) were others.

2.4 Current status

2.4.1 JCAB was planning to operate Setouchi HMU officially from 22 September 2011. However, the planned evaluation of the height monitoring data obtained from the HMU was delayed. It is partly due to the delay of releasing computer programs as a consequence of the national disaster. Another factor is software defects of the TMU. Responding to the initial review of the data, the manufacturer is currently modifying the software.

2.4.2 JCAB, therefore, has decided to postpone the official start date. The revised date of operation will be notified by NOTAM at least two months prior to the operation.

3. ACTION BY THE MEETING

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

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