International Civil Aviation Organization

The 10th Meeting of the FANS Implementation Team for South-East Asia (FIT-SEA/10) and the 17th Meeting of South-East Asia ATS Coordination Group (SEACG/17)

Singapore, 24 – 27 May 2010

Agenda Item 3: Review Outcomes of Related Meetings

OUTCOMES OF THE 12TH MEETING OF THE REGIONAL AIRSPACE SAFETY MONITORING ADVISORY GROUP

(Presented by the Secretariat)

SUMMARY

This paper presents relevant material from the 12th Meeting of the Asia/Pacific Regional Airspace Safety Monitoring Advisory Group (RASMAG/12, December 2009) report for review by the meeting.

1. INTRODUCTION

1.1 The 12th Meeting of the Asia/Pacific Regional Airspace Safety Monitoring Advisory Group (RASMAG/12, December 2009) was held in Bangkok, Thailand from 14-18 December 2009.

2. DISCUSSION

Review Outcomes of Related Meetings

RVSM Manual

2.1 It was noted that the Separation and Airspace Safety Panel (SASP) agreed to progress the update to the RVSM Manual (doc 9574) document with the goal of completing a final draft at its next working group meeting in May 2010. To that end, the Chairman provided a copy of the draft document for RASMAG's review, seeking any feedback to be provided to the Chairman by 30 March 2010.

Review of APANPIRG/20

2.2 Australia stated that plans for the use of ADS-B as a height monitoring system were well advanced given the positive results from the joint research activity being conducted with the United States. In the Australian context, ADS-B would provide the most cost-efficient system given the extensive network now available and the high numbers of ADS-B equipped aircraft operating in their flight information regions (FIRs). However, for other parts of the Asia/Pacific region, while ADS-B systems are being planned, the timing and lack of mandate for ADS-B equipage would mean that other monitoring systems will need to be implemented in the short-term.

Long-Term Height Monitoring Infrastructure

2.3 Through an analysis of the traffic flows and input from the respective Regional Monitoring Agencies (RMAs), the meeting determined that there were five main blocks of airspace within the Asia/Pacific region that contained the major traffic flows of the fleets that remained essentially within one or more of those five areas. Those five areas could be broadly described as Southeast Asia, India/Pakistan, China, Japan, and Australia including Indonesia, New Zealand and Papua New Guinea.

2.4 In assessing the types of monitoring infrastructure required for each of those areas, the meeting agreed with the following:

For the Japanese FIR, a ground-based height monitoring unit (HMU) to capture the domestic fleet plus those aircraft operating across the North Pacific or between Japan and Southeast Asia.

For Southeast Asia, given the proposed infrastructure in the other areas, the Monitoring Agency for Asia Region (MAAR) advised that their assessment was that any required monitoring of the fleet of States in this area can be accommodated by use of available Enhanced GPS Monitoring Units (EGMUs).

For the Australian area including Indonesia, New Zealand and Papua New Guinea, the widespread Australian and Indonesian ADS-B network and the proposed ADS-B mandate for Australian airspace effective 2013 will provide significant monitoring capability without the need for other ground-based systems.

Reports from Asia/Pacific RMAs and EMAs

AAMA's RMA Activities

Australian Airspace

2.5 **Table 1** below summarizes the results of the airspace safety oversight in terms of the technical, operational and total risks for the RVSM implementation in the Australian airspace.

Australian RVSM Airspace – estimated annual flying hours = 445,363.07 hours *(note: estimated hours based on December 2008 traffic sample data)*			
Source of Risk	**Lower Bound Risk Estimation**	**TLS**	**Remarks**
Technical Risk	0.026×10^{-9}	2.5×10^{-9}	Satisfies Technical TLS
Operational Risk	3.09×10^{-9}	-	-
Total Risk	**3.12×10^{-9}**	5.0×10^{-9}	**Satisfies Overall TLS**

Table 1: Risk Estimates for the RVSM Implementation in Australian Airspace

Indonesian Airspace

2.6 Large Height Deviations (LHDs) were summarized as follows:

- In December 2008, there were five Category E (Coordination errors) LHDs with total assessed time duration of 15 minutes. Additionally in December 2008, there was one Category L LHD (RVSM non-approved) report of 15 minutes assessed duration.

- Overall, three Category L LHDs were identified with a cumulative total duration of 75 minutes.

2.7 **Table 2** below summarizes the results of the airspace safety oversight in terms of the technical, operational, and total risks for the RVSM implementation in the Indonesian airspace.

Indonesian RVSM Airspace – estimated annual flying hours = 492097.32 hours *(note: estimated hours based on December 2008 traffic sample data)*			
Source of Risk	**Lower Bound Risk Estimation**	**TLS**	**Remarks**
Technical Risk	0.475×10^{-9}	2.5×10^{-9}	Satisfies Technical TLS
Operational Risk	3.95×10^{-9}	-	-
Total Risk	**4.43×10^{-9}**	5.0×10^{-9}	**Satisfies Overall TLS**

Table 2: Risk Estimates for the RVSM Implementation in Indonesian Airspace

China RMA's Activities

2.8 **Table 3** below provides the results of the airspace safety oversight, as of October 2009, in terms of the technical, operational and total risks for the RVSM implementation in the sovereign Chinese RVSM airspace.

Chinese sovereign RVSM Airspace – estimated annual flying hours = 1 990 071.8 hours *(Note: estimated hours based on the December 2008 traffic sample data. Estimate represents the sum of total flying hours for Radar and Procedural control area)*			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
Technical Risk	1.681×10^{-10}	2.5×10^{-9}	Satisfies Technical TLS
Operational Risk	2.966×10^{-9}	-	-
Total Risk	**3.134×10^{-9}**	**5.0×10^{-9}**	**Satisfies Overall TLS**

Table 3: Risk Estimates for RVSM implementation in Chinese RVSM airspace

JCAB's RMA Activities

2.9 **Table 4** below presents the estimates of vertical collision risk in the Japanese airspace.

Japanese RVSM Airspace – estimated annual flying hours = 915 968 hours *(note: estimated hours based on December 2008 traffic sample data)*			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
Technical Risk	0.35×10^{-9}	2.5×10^{-9}	Satisfies Technical TLS
Operational Risk	7.21×10^{-9}	-	-
Total Risk	**7.56×10^{-9}**	**5.0×10^{-9}**	**Does Not Satisfy Overall TLS**

Table 4: Risk Estimates for the RVSM implementation in the Japanese airspace

MAAR's RMA Activities

Western Pacific/South China Sea Airspace

2.10 MAAR provided a summary of airspace safety oversight for RVSM implementation in the Western Pacific/South China Sea (WPAC/SCS) area. The RVSM safety oversight had been conducted based on a one-month traffic sample data (TSD) collected in December 2008 and the most recent rolling 12 months of LHD reports between October 2008 and September 2009 submitted by relevant States in the WPAC/SCS region. The meeting was informed that annual flight hours,

calculated based on the December 2008 TSD, were 917,128 hours for the WPAC/SCS airspace, and that LHD occurrences in the WPAC/SCS RVSM airspace could be summarized as follows:

- The total LHD duration was 110 minutes;
- Average duration of LHD occurrence improved from 1.69 to 1.62 minutes; and
- Significant portion is attributable to coordination errors in Category E.

2.11 **Table 5** below summarizes the results of the airspace safety oversight, as of April 2009, in terms of the technical, operational, and total risks for the RVSM implementation in the WPAC/SCS airspace.

Western Pacific/South China Sea RVSM Airspace – estimated annual flying hours = 917 128 hours *(note: estimated hours based on December 2008 traffic sample data)*			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
Technical Risk	0.77×10^{-9}	2.5×10^{-9}	Satisfies Technical TLS
Operational Risk	2.98×10^{-9}	-	-
Total Risk	**3.75×10^{-9}**	**5.0×10^{-9}**	**Satisfies Overall TLS**

Table 5: Risk Estimates for the RVSM Implementation in WPAC/SCS Airspace

PARMO's RMA Activities

Pacific Airspace

2.12 **Table 6** below summarizes the results of the airspace safety oversight, as of September 2009, in terms of the technical, operational and total risks for the Pacific RVSM airspace.

Pacific RVSM Airspace – estimated annual flying hours = 840 000 hours *(note: estimated hours based on December 2008 traffic sample data)*			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
Technical Risk	0.060×10^{-9}	2.5×10^{-9}	Satisfies Technical TLS
Operational Risk	3.096×10^{-9}	-	
Total Risk	3.157×10^{-9}	**5.0×10^{-9}**	**Satisfies Overall TLS**

Table 6: Vertical Collision Risk Estimates for Pacific Airspace

SEASMA's EMA Activities

2.13 Both the estimates of lateral and longitudinal risks showed compliance with the respective TLS value during all months of the monitoring period. Since the assessment of compliance with the lateral TLS used traffic counts and Large Lateral Deviations (LLDs) reported for all six RNAV routes, it can be concluded that a 50 NM lateral separation standard between any two of the routes would be satisfy the lateral TLS.

LHD between Japan and Republic of Korea

2.14 Japan reported that four LHDs had been reported since the implementation of AIDC. The source of information was only from Naha Area Control Centre (ACC) of Japan and Japan Civil Aviation Bureau (JCAB) RMA was not sure whether the non-existent coordination was attributable to technical issues of AIDC or human factor issues.

2.15 Comparing five month records of LHDs before and after the implementation of AIDC showed the LHD occurrences were decreasing. Japan concluded that AIDC was effective in reducing human errors but not perfect.

2.16 The meeting thanked Japan for the report which provided a good outcome for the coordination issues being experienced on that particular air route. New Zealand suggested that possibly Japan could bring a further update of the analysis. The Chairman commented that Australia could also provide a similar analysis given that AIDC was expected to become operational between Australia and Indonesia in the near future. As a result, the meeting agreed to task the RMAs that could provide data and analysis in relation to the effect of AIDC on Category E LHDs, to do so.

Airspace Safety Monitoring Activities/Requirements in the Asia/Pacific Region

Unified Approvals Database

2.17 Occurrences of non-approved aircraft indicating RVSM-approved on flight plans had led some ANSPs to express a need for rapid access to approval databases to ascertain the approval status of specific aircraft. This would not involve automatic checking of the approval status of every aircraft, but would allow ANSPs to request a check and receive a response within a few minutes when a specific aircraft's approval status was in some doubt.

PBN Approvals Information on Flight Plans

2.18 The meeting discussed the need to include all PBN approval types in the flight plan and to make use of the flight plan form Field 18 as the means to include the PBN approval types. Australia noted that the entry of PBN approval information in Field 18 was published in the Australia AIP as a requirement in Australia, and understood that other States such as the United States had also made such a requirement. The meeting endorsed the proposal to use Field 18 of the flight plan on a regional basis to identify an aircraft's PBN approvals. The Secretary was tasked with coordinating this proposal to the Flight Plan Task Force and to the ATM/AIS/SAR Sub-Group.

China as RMA for the Oceanic Airspace of the Sanya FIR

2.19 China RMA received an authorization from APANPIRG in 2008 under Conclusion 19/14. Civil Aviation Authority of China (CAAC) realized that it was important to enhance the management of domestic RVSM airspace and had a thorough knowledge of the risk for the entire Chinese airspace. So China RMA was willing to take over the responsibility for the oceanic airspace of the Sanya FIR from MAAR.

2.20 The meeting noted the intention of China and endorsed the proposed action. In Conclusion 19/14**,** APANPIRG had explicitly authorised China as the RMA for China's sovereign airspace. It was also noted that RASMAG/11 had endorsed China RMA's taking over from MAAR as the RMA for the Pyongyang FIR. The meeting therefore drafted a draft Conclusion for submission to APANPIRG/21 in September 2010.

Ground-Based Monitoring System for China RMA

2.21 China RMA's two EGMUs would be barely enough to meet the minimum monitoring requirement in the long-run and cannot be used to examine the performance for the aircraft type group. So, a ground-based monitoring system is a necessity for China. However, to establish a ground-based monitoring system is a very significant project for which China RMA would need strong financial support from CAAC.

RVSM Non-Approved Operators Using RVSM Airspace

2.22 The assessment undertaken by China showed that the total number of aircraft in the RVSM airspace without an RVSM approval was 2,335 which accounted for 1.944% of the total flights. Australia explained that checks in January 2009 conducted for their airspace, while identifying a number of 'rogue' aircraft, also revealed a number of issues related to the approvals database held by the State authority due in part to delays in having that database updated following the issuing of approvals to operators. Proactive discussions between the Australia Airspace Monitoring Agency (AAMA) and the State authority saw those data base issues effectively resolved as evidenced in the significant reduction in the number of rogues identified in subsequent months. Additionally, the State authority now responds quickly to resolve issues with the operators concerned with the result being a significant improvement in instances of recurring incorrect flight plans by the same operators.

2.23 The meeting thanked both China and Australia for their significant work in monitoring RVSM non-approved aircraft and encouraged all RMAs to continue that work and report results to RASMAG/13 so that further advice regarding this issue can be provided to APANPIRG/21. The United States commented on the outdated data set provided by the Middle East (MID) RMA and relied on by China in their analysis. China stated that they now had relevant points of contact at the MID RMA and expected the accuracy of the database to be improved in the short term. The meeting agreed that in circumstances where the identified aircraft were not registered in a State within the responsibility of the assessing RMA, then that RMA would pass the information on to the RMA who is responsible for the relevant State of the operators identified, and the latter RMA would then provide the information to the relevant State authorities for resolution.

ADS-B Height Monitoring Research

2.24 The initial ASE estimates varied by location of the ADS-B ground station. There were many factors to be considered to determine the exact cause or causes for these differences including the different mix of aircraft type passing over each ground station. The ADS-B ground stations themselves are unlikely to cause the difference since their role is to simply relay the available data. However, a bias may be introduced into the results due to the available meteorological information for the airspace covered by the ADS-B ground station. An SASP working group is investigating the cause of the observed bias in the ASE estimates by ADS-B ground station.

RVSM Approved Aircraft ADS-B Equipage in Australia

2.25 The AAMA was cognizant of the fact that after 12 December 2013, all aircraft operating over Australian territory above FL 290 must be ADS-B equipped. The analysis undertaken by the AAMA showed that currently a significant number of RVSM approved aircraft operating within the Australia FIRs were equipped with ADS-B. This fact, and the expectation of increased fitment in the next few years due to new aircraft purchases and the Australian FIR mandate for fitment scheduled for December 2013 demonstrate the short-term ability of the AAMA to use ADS-B to provide initial and long-term monitoring for a number of Asia/Pacific-based operators and aircraft types that are already equipped with ADS-B.

Any Other Business

2.26 As a result of a number of enquiries from Japanese operators, JCAB RMA requested if RASMAG could provide a list of available sources of height monitoring globally. In discussing this request, the RMAs present identified the following:

a. Asia/Pacific – No ground-based monitoring systems are currently deployed. Height monitoring using EGMUs is available from the AAMA, China RMA, MAAR and PARMO.

b. North America – Six ground-based AGHME systems are deployed, with two in Canada. A seventh site is to be deployed shortly on the West Coast. EGMU monitoring is also available through NAARMO.

c. South America – Monitoring using EGMUs is available through CARSAMMA in Brazil.

d. Europe – Three ground-based height monitoring systems are available, one at Strumble in Wales managed by NAT CMA, and two in Europe at Linz in Austria and Nattenheim in Germany, managed by Eurocontrol RMA. EGMU monitoring is also available.

e. Middle East – no height monitoring systems are currently available.

f. Africa – EGMU monitoring is available through AFI RMA.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) review related discussions from RASMAG/12, and

b) identify any actions arising for SEACG/17.

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