International Civil Aviation Organization

The Twentieth Meeting of the APANPIRG ATM/AIS/SAR Sub-Group (ATM/AIS/SAR/SG/20)

Singapore, 05 – 09 July 2010

Agenda Item 7: Review Outcomes of Twelfth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/12)

REPORT ON ACTIVITIES OF THE RASMAG

(Presented by the Secretariat)

SUMMARY

This paper presents an update on the general activities of the Regional Airspace Safety Monitoring Advisory Group of APANPIRG (RASMAG) since ATM/AIS/SAR/SG/19 (June 2009, Bangkok). Updates in relation to the specialist work of RASMAG in relation to Asia/Pacific Regional RVSM and Horizontal Safety Performance have been presented in WP/17, a companion working paper to this primary RASMAG paper.

This paper relates to

Strategic Objectives:

A: Safety – Enhance global civil aviation safety
D: Efficiency – Enhance the efficiency of aviation operations

Global Plan Initiatives:

GPI-2 Reduced vertical separation minima
GPI-5 Performance based navigation
GPI-6 Air Traffic Flow Management
GPI-7 Dynamic and flexible ATS route management
GPI-8 Collaborative airspace design and management
GPI-9 Situational awareness
GPI-17 Implementation of data link applications

1. INTRODUCTION

1.1 Since APANPIRG/20 (September 2009, Bangkok), the RASMAG could hold only one meeting due to a rescheduling for ICAO headquarters meetings, as follows:

- RASMAG/12 14-18 December 2009

1.2 This paper summarizes the reports of RASMAG/12 in order to provide an update on the activities of RASMAG for the information of ATM/AIS/SAR/SG/20 and the 14th Meeting of CNS/MET Sub-Group (CNS/MET/SG/14, July 2010). Copies of the full reports of RASMAG/12 is available from the website of the Asia/Pacific Regional office at http://www.bangkok.icao.int/ under the ‘Meetings’ menu.

2. DISCUSSION

2.1 The first day of RASMAG meetings had been used to conduct a technical meeting for Asia/Pacific Regional Monitoring Agencies (RMAs). However, as concerns were raised by the meeting that this objective was not being fully recognized and that given that all participants in RASMAG/12 were present for the technical meeting, it was decided that the meeting should proceed as a Plenary. The meeting agreed with this proposal and that a review of working papers provided under Agenda Item 2 should continue.

RVSM Manual

2.2 The task of reviewing the RVSM Manual (Doc 9574) had been assigned to Project Team 2 of the Separation and Airspace Safety Panel (SASP) that is responsible for vertical separation, and it had been agreed by that team that as in the near future RVSM will be implemented world-wide, the review needed to provide a new focus for the document, changing the primary purpose from one of implementation and maintenance, to one of maintenance only of the vertical standard. The meeting noted the significant work undertaken by SASP members Mr. Butcher (Australia) and Mr. Roberts (South Africa) who, together with input from Mr. Ewels, (Manager of the AFI RMA), have been instrumental in reviewing each chapter and the two appendices of the document. Additionally, it was noted that the SASP agreed to progress the update to the 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.

2.3 The meeting thanked the Chairman for providing RASMAG the opportunity to review and comment on the draft document. One suggestion made by the meeting was to include an example of the methodology used by the Asia/Pacific region to assess operational errors and that this could be included in Appendix A to supplement examples already detailed for the NAT and EUR regions. The United States noted that in providing that example, it should be highlighted in the document the importance of this activity for RMAs in terms of establishing scrutiny groups. As a result it was agreed that extra wording should be added to section 6.4.5. The meeting tasked the Chairman to develop the proposed wording and to circulate the material to the RASMAG members for review prior to the end of March 2010. The Chairman would ensure that the wording was included in the revised draft to be presented to SASP in May 2010.

Review of APANPIRG/20

2.4 The Secretary provided an overview of the outcome of APANPIRG/20. RASMAG/12 noted that APANPIRG had reviewed a consolidated report of the RVSM safety performance across the Asia/Pacific Region and that this report met the metric adopted as the Asia/Pacific Safety Metric *"Percentage of RMA sub-regions achieving the regional Target Level of Safety (TLS) for RVSM operations, as of April each year".* Additionally APANPIRG had adopted the following Conclusions and Decisions drafted by RASMAG:

Conclusion 20/20 – Adopt RVSM Minimum Monitoring Requirements
Decision 20/21 – Expand use of safety monitoring data
Conclusion 20/22 − Provide Annual Update of RVSM Approvals to RMAs
Conclusion 20/23 − Adopt RVSM Monitoring Impact Statement
Decision 20/24 − En-route Monitoring Agency (EMA)
Conclusion 20/25 − Adopt En-route Monitoring Agency (EMA) Handbook

2.5 The meeting recalled that APANPIRG had agreed RASMAG would be tasked to conduct further investigations and attempt to recommend the types and appropriate locations of monitoring systems to most effectively monitor the Asia/Pacific aircraft population with the least infrastructure investment. The meeting considered how best to proceed in responding to the APANPIRG task. Monitoring Agency for the Asia Region (MAAR) commented that there was an urgent need to identify the required monitoring system infrastructure for the Asia/Pacific region and that they were concerned that traditional ground-based systems may not be practical. In the view of MAAR a system based on ADS-B was the most cost efficient and practical given the planned implementation of ADS-B systems in the Region.

2.6 New Zealand commented that there are two major questions to be resolved namely how do we monitor and where do we monitor. The view was put that GMUs are relatively flexible in where they can be deployed around the Region however the process may not be efficient in time and cost. New Zealand noted that existing ground based height monitoring units are fixed site and if they are to be deployed the locations selected will need careful planning. In New Zealand's view the ADS-B system may be more cost effective, however whatever the final mix of systems proposed, their location should be aligned with major traffic flows. The United States agreed with this view noting that current site selection exercises being conducted for the Aircraft Geometric Height Measurement Elements (AGHMEs) to be located on the United States west coast might provide a level of coverage for those Asia/Pacific aircraft that travel to the United States.

2.7 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 will provide the most cost efficient system given the extensive network now available and the high numbers of ADS-B equipped aircraft operating in the flight information regions (FIRs). Additionally with the benefit of a mandate for ADS-B equipage in the RVSM height bands, the issue of general aviation type operators and aircraft is resolved. 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

2.8 The meeting turned its attention to discussing possible options to develop a proposal to be provided to APANPIRG/21 that would identify possible height monitoring infrastructure required by the Region. Opening the discussion, the Chairman proposed that the traffic flows should provide the basis for the provision of the appropriate infrastructure. It was agreed that the focus should be on those elements of the regional fleet that did not have access to the ground-based height monitoring facilities in Europe and North America. In taking this view, such an analysis, while high-level in nature, would more clearly focus on the required systems to accommodate the regional fleets that do not have access to ground-based monitoring currently.

2.9 Through an analysis of the traffic flows and input from the respective RMAs, the meeting determined that there were five main blocks of airspace within the Asia and Pacific Region that contained the major traffic flows of the fleets that remained essentially within one or more of those five areas. These five areas could be broadly described as South-East Asia, India/Pakistan, China, Japan and Australia including Indonesia, New Zealand and Papua New Guinea. In assessing the types of monitoring infrastructure required in each of these areas, the meeting agreed with the following:

For the Japanese FIRs, a ground-based HMU to capture the domestic fleet plus those aircraft operating across the North Pacific or between Japan and SE-Asia.

For the China FIRs several ground-based HMU essentially to accommodate the large number of Chinese domestic fleet that operate within those FIRs only, and to be available for other international flights that may operate in that airspace. Additionally, monitoring capability is available by EGMU through the China RMA.

For South-East Asia, given the proposed infrastructure in the other areas, MAAR advised that their assessment is that any required monitoring of the fleet of States in this area can be accommodated by use of available EGMUs.

For the India/Pakistan area, a ground based HMU to cater primarily for the large domestic fleet that operates in that area. The type and location of the HMU is to be determined following a more in-depth analysis by India and Pakistan in coordination with MAAR. In the short term MAAR believes that monitoring could be effectively completed using EGMU.

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.

2.10 The meeting agreed that this initial analysis should be reviewed by each RMA and State represented at RASMAG to consider further details in the interim before RASMAG/13. Additionally, it was agreed that each of the RMAs would develop an analysis of the States for which they are responsible assuming that the proposed monitoring systems were in place. The analysis should then determine the aircraft numbers and types that would be monitored by those systems. The data is to be presented in tables similar to those used by Australia in WP/20 at this meeting. The data should be collected, analysed and forwarded to MAAR by end of April 2010, and thereafter reported by States to RASMAG/13.

Review of PBN Task Force 5 (PBN/TF/5)

2.11 The fifth meeting of the Performance Based Navigation Task Force (PBN/TF/5, July 2009) was held at ICAO Asia and Pacific Office in Bangkok, Thailand. PBN/TF/5 noted the information in the reports from RASMAG/11 (June 2009, Bangkok) and ATM/AIS/SAR/SG/19 (June 2009, Bangkok). PBN/TF/5 reviewed the draft EMA Handbook and noted that a final version of the document would be presented to APANPIRG/20 in September 2009. PBN/TF/5 also reviewed the draft APAC Regional PBN Implementation Plan (Interim Edition Version 0.2) that included the two appendices and incorporated the revisions. In relation to attempting to improve coordination between the Task Force, and ATM/AIS/SAR/SG and RASMAG, PBN/TF/5 noted the approximate schedule of future ATM/AIS/SAR/SG and RASMAG meetings, and agreed to adjust the schedule of PBN/TF meetings as best as possible.

2.12 In order for States to complete the required safety assessments for the implementation of PBN, the Task Force recognized that more guidance would be required from ICAO and there was a need to provide safety assessment training to States. PBN/TF considered, on its current assessment that there was no need for additional monitoring requirements to accommodate PBN-based operations.

China RMA Action to Improve Coordination and Assist the Collection of LHD

2.13 The meeting was informed by the China RMA that following the initial introduction of RVSM into the domestic Chinese airspace in November 2007, it has continued efforts to standardise the work flow and enhancing its ability to undertake its duties on behalf of ICAO. China RMA advised that to enhance the means to detect, report and investigate the occurrence of large

height deviations, it had established a reporting mechanism for Large Height Deviation (LHD) events from all the domestic Chinese operators since June 2009.

2.14 As part of this work, China RMA has drafted and published an Aviation Procedure to further clarify and regulate the work flow for RVSM Traffic Sample Data collection, large height deviation reporting, RVSM approval registration, airspace safety assessment and aircraft monitoring. Additionally, the China RMA indicated that they held meetings in 2009 to further educate the civil aviation management department and airspace users to clarify their duties and responsibilities defined in the regulation to achieve a long-term harmonized cooperation. It noted that the intention is to hold these meetings annually.

2.15 The meeting congratulated China RMA on its initiatives to improve the efficiency of its operations and obtain the support of the Chinese domestic operators as well as regulatory organisations within the Chinese aviation system. Australia commented that they were having similar problems as China RMA in not receiving LHD reports from airlines even though the requirement to report is clearly detailed within the Australian Aeronautical Information Publication (AIP). As a result, following discussions with the Australian Transport Safety Bureau (ATSB), pilot reports to the mandatory incident reporting system maintained by that organisation, and which fit the criteria for an LHD are now passed to the AAMA on a monthly basis. The United States stated that they considered the work that China is doing in this regard to assist reporting from operators is an activity of importance however can be difficult as it is realistically an ongoing process due to staff changeovers, new operators entering the airspace and other factors.

Large Height Deviation (LHD) between Japan and Republic of Korea

2.16 Japan reported that AIDC had been implemented among ACCs of the two countries (three ACCs of Japan and an ACC of ROK) since 15 June 2009. The record of LHD caused by ATC-unit to ATC-unit coordination errors which occurred to aircraft crossing the Fukuoka-Incheon FIR boundary via B576 was reviewed.

2.17 Four LHDs had been reported since the implementation of AIDC as shown in **Table 1** below. It was evident that the LHD on 15 November 2009 falls under the Category E LHD. At first, JCAB RMA considered the rest of three LHDs as Category F LHDs, which occurred by the coordination errors in the ATC-to-ATC transfer of control responsibility as a result of **technical** issues. But actually the source of information was only Naha ACC in Japan, and JCAB RMA has not yet asked Incheon ACC or PARMO whether the reason of non-existent coordination were attributed to technical issues of AIDC or human factor issues.

Event date	Source	Location of deviation	Duration of LHD (min)	Cause	code
21 Jul 09	Naha ACC	ATOTI (B576)	1	Non- existent coordination by AIDC from Incheon ACC to Naha ACC	E or F
21 Sep 09	Naha ACC	ATOTI (B576)	0	Non- existent coordination by AIDC from Incheon ACC to Naha ACC	E or F-
1 Oct 09	Naha ACC	ATOTI (B576)	0.75	Non- existent coordination by AIDC from Incheon ACC to Naha ACC	E or F-
15 Nov 09	Naha ACC	ATOTI (B576)	0.75	Non- existent coordination by AIDC from Naha ACC to Incheon ACC (Naha ACC controller did not find AIDC SEND ERROR message on CRT)	E

Table 1: LHDs on B576 Reported after the Implementation of AIDC between Japan and ROK

2.18 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 Documentation and Regional Guidance Material

RASMAG List of Competent Airspace Safety Monitoring Organizations

2.19 RASMAG is required by its terms of reference to recommend and facilitate the implementation of airspace safety monitoring and performance assessment services and to review and recommend on the competency and compatibility of monitoring organizations. Accordingly, the meeting reviewed and updated the *"RASMAG List of Competent Airspace Safety Monitoring Organizations"* (shown at **Attachment A** to this report) for use by States requiring airspace safety monitoring services.

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

EMA Handbook PBN Approvals Database Format

2.20 New Zealand drew to the attention of the meeting that the format for the databases of PBN approvals shown in the EMA Handbook did not adequately cover the wide range of possible approvals for an individual aircraft. It was recalled that RASMAG/11 considered that EMAs would, initially at least, only conduct safety assessments for en-route traffic. However, if the EMA databases were designed to include a set of PBN approval fields that covers all PBN approval types, they would be future-proofed against changes in the scope of the tasks of the EMAs.

2.21 A format had been developed that specifically includes all current PBN and data link approval types, as shown at **Attachment B** to this paper. New Zealand had proposed combining the RVSM, PBN and data link approvals databases, and so, in anticipation, the proposed format also allows for RVSM approvals. While Attachment B shows a proposed database record format, the same structure could be used as the form for States to report additions and changes to their approvals.

2.22 APANPIRG Conclusion 20/22 requested States to provide an annual update of their RVSM approvals to their RMA in conjunction with the annual traffic sample data. New Zealand suggested that the format at Attachment B could also be converted into spreadsheet format in anticipation that a similar request will eventually be made in respect of PBN and data link approvals.

2.23 The meeting thanked New Zealand for the revised proposal and discussed issues associated with the format. The meeting endorsed the format at Attachment B and tasked the Secretary to amend the EMA Manual accordingly. The meeting noted that Appendix C to WP/3 identified a number of other fields contained in the data base format and agreed to retain fields 1 and 3 but delete field 2.

Unified Approvals Database

2.24 New Zealand reported that in discussing the notion of a Regional PBN Approvals database, RASMAG/11 had agreed not to pursue the regional database at the present time but had requested States to consider the proposal and how to best provide data for inclusion when it was eventually established. The number of PBN approvals that an aircraft may hold requires a more complex database than for RVSM approvals. There are a number of navigation specifications that must be allowed for; the approvals are not hierarchical and may be airspace-dependent.

2.25 Both RVSM and PBN databases contain the same basic data on the aircraft, its operator and its state of registry. The PBN approvals database format suggested in the EMA Handbook is similar to that for the RVSM approvals, but also includes data link approvals. However, it is recognised that the PBN approvals field in this format is inadequate, and New Zealand proposed changes to the format.

2.26 Where an organisation provides both RMA and EMA functions it would be feasible to combine the RVSM, PBN and data link approvals databases. This would provide a single record for each aircraft and would avoid the duplication of the nine or more fields of common data for that aircraft, such as aircraft type, operator and state of registry. A combined RVSM, PBN and data link approvals database would allow States to provide approvals data to a single Monitoring Agency; the data will be distributed to other agencies through Monitoring Agency internal data exchange mechanism. Sending data to a single agency is considered to be a significant benefit in reducing overhead activities and minimizing the risks of errors.

2.27 Occurrences of non-approved aircraft indicating RVSM approved on flight plans have led some ANSPs to express a need for rapid access to approvals databases to ascertain the approval status of specific aircraft. This would not involve automatic checking of the approvals 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. Combined approvals databases would make such a process, if agreed to, simpler to establish and operate.

PBN Approvals Information on Flight Plans

2.28 Singapore presented the need to include all PBN approval types into the flight plan for all flights so as to facilitate future implementation of reduced horizontal separation; this would also greatly assist in the airspace monitoring duties of the En-route Monitoring Agency. Information about the PBN readiness of airline fleets is crucial to the timely execution of the Asia and Pacific Regional PBN Implementation Plan. However, this information is not readily available in the current flight plan, and the new ICAO Flight Plan, with requirements for PBN approval data, will not be implemented until 2012.

2.29 In order to ease this difficulty, airlines can make use of the flight plan form Field 18 "Other Information" to include all type of PBN approvals pertaining to that aircraft when filing a flight plan even if the PBN approval is not required in that segment(s), route(s) and/or area concerned. This information should also be captured in the December TSD submitted by States. The inclusion of PBN approvals of aircraft for segments, routes and areas that do not currently require any PBN approvals will provide information on airline fleet readiness when considering that airspace for reduced horizontal separation minima. This will be a proactive route to achieving the short and medium term goals of the Regional PBN Implementation Plan.

2.30 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 approvals 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

2.31 China reported that in 2002 when RVSM was implemented partially in the Sanya FIR, RVSM had not been introduced in domestic Chinese airspace. Considering the complexity of the air route structure and the extensive area, the General Administration of Civil Aviation of China (CAAC) determined to establish its own regional monitoring agency. China RMA received authorization from APANPIRG in 2008 in Conclusion 19/14. CAAC realized that it was important to enhance the management of domestic RVSM airspace and have 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 Sanya FIR from MAAR. It was agreed that China RMA would provide monthly LHD reports and the December TSD for the oceanic airspace to MAAR for the safety assessment of the South China Sea airspace.

2.32 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 the following draft Conclusion for submission to APANPIRG/21 in September 2010.

Draft Conclusion 20/XX − Responsibility area of China RMA

That, the China RMA be approved as an APANPIRG Asia/Pacific RVSM Regional Monitoring Agency with responsibility for all RVSM airspaces in China FIRs, and the Pyongyang FIR.

Aircraft Height-keeping Performance Monitoring in China

2.33 China RMA reported that its progress of the Height Monitoring program was behind schedule. In November 2009, China RMA had signed agreements with both China Eastern Airlines and China Southern Airlines, and 30 aircraft would be monitored in the near future. China RMA would strengthen its communication with operators and State CAAs to ensure the progress of the LTHM program. In November 2009, China RMA requested the Democratic People's Republic of Korea to commence initial monitoring as soon as possible and not later than 6 months after the RVSM implementation in Pyongyang FIR.

Ground-based Monitoring System for China RMA

2.34 At RASMAG/11, it was suggested that China establish a ground-based monitoring system to support the long-term height monitoring requirement. At the fourth Global RMA Special Coordination Meeting (RMASCM/4), PARMO submitted a working paper to provide a brief description of the monitoring systems currently available as well as the advantages and disadvantages of each system. The purpose of the paper was to suggest that a complete monitoring programme, from the standpoint of a RMA, should include a combination of ground-based and airborne monitoring systems.

2.35 China RMA's two EGMUs will 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

2.36 China RMA stated that an analysis of the traffic sample data revealed that there are some errors and null values for the aircraft's registration numbers which are further used to correlate the RVSM approval database. In the following process of the assessment, these records where the registration number were missing or not correct (about 4% of the total number of records) were excluded from the TSD.

2.37 The assessment undertaken showed that the total number of aircraft in the RVSM airspace without an RVSM approval was 2 335 which accounts for 1.944% of the total flights. **Figure 1** illustrates the distribution by Operator.

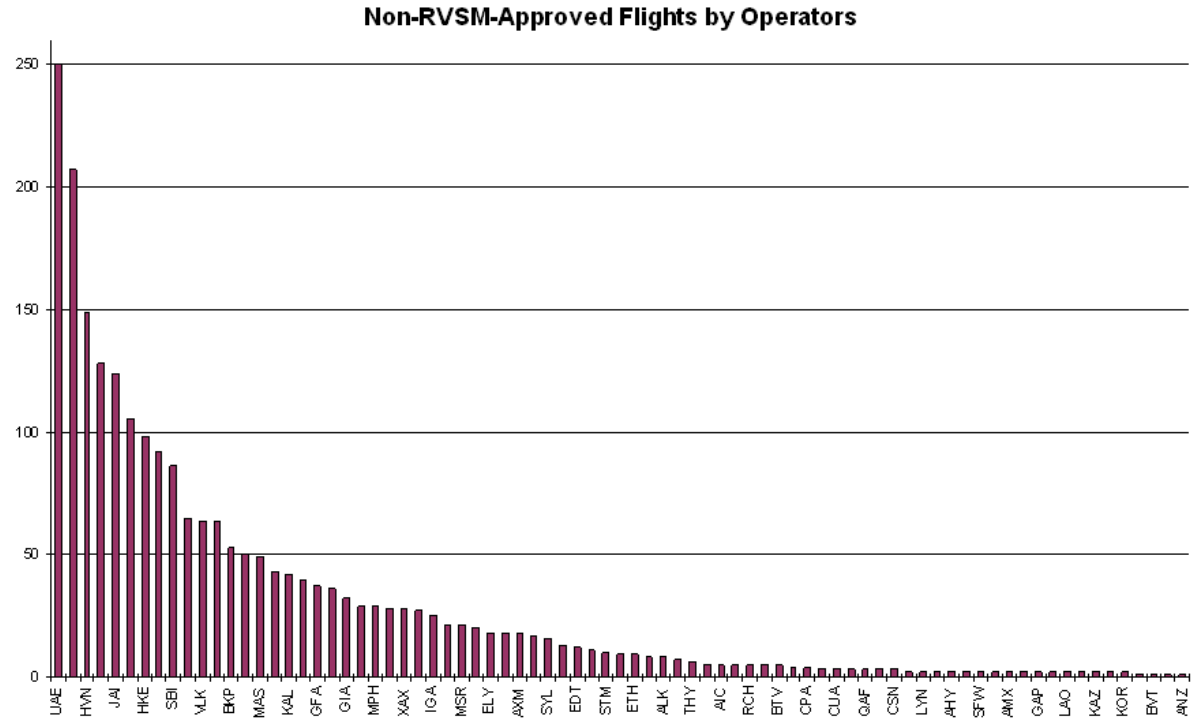

Figure 1: RVSM Non-Approved Flights by Operators

2.38 Australia also provided an analysis of 'rogue' aircraft operations within the Australian RVSM airspace. The meeting was informed that the presence of non-approved aircraft was closely monitored in Australian airspace to ensure the risk is adequately controlled so that aircraft are not separated with less than the required minimum in situations where one aircraft in a separation pair is not RVSM approved. Australia stated that the AAMA commenced a scheduled review of all flight plan data on a monthly basis to identify Australian registered 'rogue' aircraft operating within the Australian FIRs. The overwhelming majority of those aircraft were general aviation operated airframes.

2.39 Australia explained that checks in January 2009 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 data base updated following the issuing of approvals to operators. Pro-active discussions between the AAMA and the State authority saw these 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. Australia informed the meeting that the AAMA was now

confident that the issue of rogue airframes operating in RVSM airspace within the Australian FIRs was being effectively controlled through close cooperation with the State authority.

2.40 The meeting thanked both China and Australia for their significant work in monitoring non-RVSM approved aircraft and encouraged all RMAs to continue this 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 MID RMA and relied on by China in their analysis. China stated that they now have relevant points of contact within the MID RMA and expects the accuracy of the data base to be improved in the short term. Australia sought clarification on whether China RMA was intending to follow up the occurrences involving International General Aviation aircraft identified in the analysis. General discussion took place among the RMAs as to the process required to undertake this activity. 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

2.41 Australia and the United States jointly informed the meeting that the FAA and Airservices Australia presented WP/24 to SASP-WG/WHL/16 that provided details on the cooperative research agreement to further progress the investigation on the use of aircraft geometric height data derived from ADS-B sources for estimating aircraft ASE. Work under this agreement commenced during the week of 31 August 2009 in Canberra, Australia where the group successfully processed a week's worth of ADS-B data using the AGHME processing software. The paper also provided some initial results of the ASE estimates from the various ADS-B ground stations in Australia.

2.42 The initial ASE estimates vary by location of the ADS-B ground station. There are 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. The group is investigating the cause of the observed bias in the ASE estimates by ADS-B ground station. In addition, the group will be revisiting the assumptions related to ground height and the WGS-84 spheroid model used in the ASE software.

RVSM Approved Aircraft ADS-B Equipage in Australia

2.43 Given the extensive coverage of ADS-B within the RVSM flight levels in Australia, the AAMA has been undertaking an analysis to determine which operators and aircraft type have the potential to be monitored using ADS-B surveillance system in the short-term. In doing this work, the AAMA was cognizant of the fact that after 12 December 2013, all aircraft operating over Australian territory above FL290 must be ADS-B equipped. This paper provides some details of that analysis.

2.44 In a parallel activity to that being undertaken in terms of the joint research project with the FAA, which is validating the use of ADS-B for height-keeping monitoring, the AAMA has commenced an analysis of aircraft operating within the Australian FIRs that could potentially be monitored using this system. Particularly the AAMA is interested in identifying the number of aircraft types by operator that can be monitored using ADS-B in the period from December 2010 to 12 December 2013, the latter being the currently scheduled time-frame for the introduction of an ADS-B equipage mandate in Australia. Importantly, the AAMA was intent in assessing not only Australian operators, but also foreign operators that were present in the Australian FIRs and who could potentially have a portion of their fleet type monitored using ADS-B while in that airspace.

2.45 **Table 2** below summarises the main Australian operators that flight planned within the RVSM airspace during May 2009 and whether they have aircraft that are ADS-B equipped that would enable height-keeping monitoring using that system.

Australian Operator	Aircraft Type	ADS-B equipped
Qantas	A330	yes
	A380	yes
	B737CL	no
	B737NX	yes
	B747CL	no
	B744	yes
	B767CL	no
Virgin Blue	B737NX	yes
	E170-190	no
Jetstar Australia	A320	yes
	A330	yes
V Australia	B773	yes
National Jet Systems Group	B712	no
	AVRO	no
Alliance Airlines	F100	no
SkyWest Airlines	F100	yes
Tiger Airways Australia	A320	yes
Strategic Airlines	A320	yes
	A330	no
Pel-Air	LJ35/6	no
	IAI1124	no
Airnorth	E170-190	no

Table 2: Australian Operators That Flight Planned within the RVSM Airspace during May 2009

2.46 Of the international operators identified, 22 are based in Asia/Pacific region States. The data suggests that a significant portion of the major airline fleets and specific type groups based in this region already have the potential for being height-monitored using ADS-B within the Australian airspace alone. 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, demonstrates 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. Primarily these will be airline operators. Additionally, the AAMA was keen to progress discussions with Indonesian authorities with a view to obtaining ADS-B data for RVSM monitoring purposes from the extensive ADS-B network available in that State.

Data Link Performance

2.47 New Zealand noted a report to the Informal South Pacific ATS Coordination Group (ISPACG) FANS Interoperability Team (FIT) Central Reporting Agency (CRA) that an A345 fleet had displayed a downward trend in data link performance in terms of both ADS-C and CPDLC round-trip times. This was thought to be due to increasing use of on-board passenger facilities for the Internet access and in-flight telephone connectivity via satellite. The performance of this fleet had

degraded below that required by the Oceanic SPR. The New Zealand ANSP had, as a result, curtailed reduced distance-based separation for that A345 fleet that required compliance with the Oceanic SPR communications performance standards. It was understood that a software upgrade to the ground earth station would resolve the problem, and that this upgrade had been approved.

2.48 The meeting thanked New Zealand for bringing this issue of A345 fleet displaying a downward trend in data link performance to its attention and asked that it be kept appraised of any further developments. The Chairman stated that in his view and as initially proposed when RASMAG was established, that the group should be provided with meeting outcomes and data analysis presented at CRA and FIT meetings so that RASMAG can maintain a high-level overview of issues that may impact safety in the region. This was agreed by the meeting and the Secretary was tasked to write formally to the Chairs of the relevant groups asking for such material to be provided to RASMAG on an on-going basis.

3. SUMMARY OF SIGNIFICANT POINTS

3.1 RASMAG could hold only one meeting since APANPIRG/19 - RASMAG/12 in December 2009. During the meeting, RASMAG:

1) was provided with a copy of the draft revised RVSM Manual for RASMAG's review for any feedback to be provided to the Chairman by 30 March 2010;

2) made one suggestion to include an example of the methodology used by the Asia/Pacific region to assess operational errors and that this could be included in Appendix A to supplement examples already detailed for the NAT and EUR regions;

3) noted that APANPIRG had reviewed a consolidated report of the RVSM safety performance across the Asia/Pacific Region and this report met the metric adopted as the Asia/Pacific Safety Metric "*Percentage of RMA sub-regions achieving the regional Target Level of Safety (TLS) for RVSM operations, as of April each year*";

4) proposed that the traffic flows should provide the basis for the provision of the appropriate long term height monitoring infrastructure;

5) In assessing the types of monitoring infrastructure required in each of the identified areas within the Region, the meeting agreed with the following:

For the Japanese FIRs, a ground-based HMU to capture the domestic fleet plus those aircraft operating across the North Pacific or between Japan and SE-Asia.

For the China FIRs several ground-based HMU essentially to accommodate the large number of Chinese domestic fleet that operate within those FIRs only, and to be available for other international flights that may operate in that airspace.

For South-East Asia, given the proposed infrastructure in the other areas, MAAR advised that their assessment is that any required monitoring of the fleet of States in this area can be accommodated by use of available EGMUs.

For the India/Pakistan area, a ground based HMU to cater primarily for the large domestic fleet that operates in that area.

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.

6) agreed that each of the RMAs would develop an analysis of the States for which they are responsible assuming that the proposed monitoring systems were in place;

7) noted that China RMA advised that to enhance the means to detect, report and investigate the occurrence of large height deviations, it had established a reporting mechanism for LHD events from all the domestic Chinese operators since June 2009;

8) noted, following discussions with the Australian Transport Safety Bureau (ATSB), pilot reports to the mandatory incident reporting system maintained by that organisation, and which fit the criteria for an LHD are now passed to the AAMA on a monthly basis. The United States stated that they considered the work that China is doing in this regard to assist reporting from operators is an activity of importance however can be difficult as it is realistically an ongoing process due to staff changeovers, new operators entering the airspace and other factors;

9) Japan reported that AIDC had been implemented among ACCs of the two countries (three ACCs of Japan and an ACC of ROK) since 15 June 2009;

10) 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;

11) noted if the EMA databases were designed to include a set of PBN approval fields that covers all PBN approval types, they would be future-proofed against changes in the scope of the tasks of the EMAs;

12) endorsed the format at Attachment B and tasked the Secretary to amend the EMA Manual accordingly. The meeting noted that Appendix C to WP/3 identified a number of other fields contained in the data base format and agreed to retain fields 1 and 3 but delete field 2;

13) noted that occurrences of non-approved aircraft indicating RVSM approved on flight plans have led some ANSPs to express a need for rapid access to approvals databases to ascertain the approval status of specific aircraft;

14) Singapore highlighted the need to include all PBN approval types into the flight plan for all flights so as to facilitate future implementation of reduced horizontal separation; this would also greatly assist in the airspace monitoring duties of the En-route Monitoring Agency;

15) was suggested, in order to ease this difficulty, airlines can make use of the flight plan form Field 18 “Other Information” to include all type of PBN approvals pertaining to that aircraft when filing a flight plan even if the PBN approval is not required in that segment(s), route(s) and/or area concerned;

16) tasked the Secretary with coordinating this proposal to the Flight Plan Task Force and to the ATM/AIS/SAR Sub-Group;

17) noted that China RMA was willing to take over the responsibility for the oceanic airspace of Sanya FIR from MAAR;

18) noted that the assessment undertaken by China RMA showed that the total number of aircraft in the RVSM airspace without an RVSM approval was 2,335 which accounts for 1.944% of the total flights;

19) was explained by Australia that checks in January 2009 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 data base updated following the issuing of approvals to operators;

20) was informed that the AAMA was now confident that the issue of rogue airframes operating in RVSM airspace within the Australian FIRs was being effectively controlled through close cooperation with the State authority.;

21) noted the continuing research being undertaken by Australia and the United States in relation to the use of ADS-B for estimating altimetry system error; and

22) noted that the data suggests that a significant portion of the major airline fleets and specific type groups based in this region already have the potential for being height-monitored using ADS-B within the Australian airspace alone;

4. ACTION BY THE MEETING

4.1 The meeting is invited to

a) note the activities of RASMAG as reported in this paper;

b) note the summary of significant points;

c) discuss 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; and

d) consider the matters arising, especially in regard to safety issues, and any further action to be taken by the Sub-Group and APANPIRG.

……..

APANPIRG Asia/Pacific Airspace Safety Monitoring

RASMAG LIST OF COMPETENT AIRSPACE SAFETY MONITORING ORGANIZATIONS

The Regional Airspace Safety Monitoring Advisory Group of APANPIRG (RASMAG) is required by its terms of reference to recommend and facilitate the implementation of airspace safety monitoring and performance assessment services and to review and recommend on the competency and compatibility of airspace monitoring organizations. In order to assist in addressing these requirements, RASMAG updates and distributes the following list of competent airspace safety monitoring organizations for use by States requiring airspace safety monitoring services. In the context of the list, abbreviations have meanings as follows:

- RMA – Regional Monitoring Agency – safety assessment and monitoring in the vertical plane (i.e. RVSM);
- EMA – En-route Monitoring Agency – safety assessment and monitoring in the horizontal plane (i.e. RHSM, RNAV10, RNP4);
- CRA – Central Reporting Agency – technical performance of data link systems (i.e. ADS/CPDLC); and
- FIT – FANS 1/A Interoperability/Implementation Team – parent body to a CRA.

(Last updated 17 December 2009)

Organisation *(including contact officer)*	State	Competency	Status	Airspace assessed (FIRs)
Australian Airspace Monitoring Agency (AAMA) - Airservices Australia http://www.airservicesaustralia.com/organisations/aama/default.asp Mr. Robert Butcher, Operational Analysis Manager, Safety and Environment Group email: robert.butcher@airservicesaustralia.com or aama@airservicesaustralia.com	Australia	APANPIRG RMA	Current	Brisbane, Honiara, Jakarta, Melbourne, Nauru, Port Moresby and Ujung Pandang FIRs.
		EMA	Current	Brisbane, Melbourne FIRs.

Organisation *(including contact officer)*	State	Competency	Status	Airspace assessed (FIRs)
China RMA - **Air Traffic Management Bureau, (ATMB) of Civil Aviation Administration of China (CAAC)** http://www.chinarma.cn (secure site) Mr. Tang Jinxiang, Engineer of Safety and Monitoring Technical Group, ATMB email: tangjx@adcc.com.cn	China	APANPIRG RMA	Current	Beijing, Guangzhou, Kunming, Lanzhou, Shanghai, Shenyang, Urumqi Wuhan Sanya and Pyongyang FIR.
JCAB RMA - **Japan Civil Aviation Bureau** Mr. Noritoshi Suzuki, Special Assistant to the Director, Flight Procedures and Airspace Program Office, email: suzuki-n248@mlit.go.jp	Japan	APANPIRG RMA	Current	Fukuoka FIR
		EMA	Available fourth quarter – 2009	Fukuoka FIR
Monitoring Agency for the Asia Region (MAAR) – Aeronautical Radio of Thailand LTD http://www.aerothai.co.th/maar Mr. Nuttakajorn Yanpirat, Executive Officer, Systems Engineering,Aeronautical Radio of Thailand Ltd. email: nuttakajorn.ya@aerothai.co.th or maar@aerothail.co.th	Thailand	APANPIRG RMA	Current	Bangkok, Kolkatta, Chennai, Colombo, Delhi, Dhaka, Hanoi, Ho Chi Minh, Hong Kong, Karachi, Kathmandu, Kota Kinabalu, Kuala Lumpur, Lahore, Male, Manila, Mumbai, Phnom Penh, Singapore, Taibei, Ulaan Bataar, Vientiane, Yangon FIRs

Organisation *(including contact officer)*	State	Competency	Status	Airspace assessed (FIRs)
Pacific Approvals Registry and Monitoring Organization (PARMO) – Federal Aviation Administration (US FAA) http://www.tc.faa.gov/acb300/parmo Mr. Dale Livingston, Manager, Separation Standards Analysis Team, FAA, email: dale.livingston@faa.gov or aparmo@faa.gov	USA	APANPIRG RMA	Current	Anchorage Oceanic, Auckland Oceanic, Incheon, Nadi, Oakland Oceanic, Tahiti FIRs
		EMA	Current	Anchorage Oceanic, Oakland Oceanic
South East Asia Safety Monitoring Agency (SEASMA) - Civil Aviation Authority of Singapore (CAAS) Mr. Kuah Kong Beng, Chief Air Traffic Control Officer, email: KUAH_Kong_Beng@caas.gov.sg	Singapore	EMA for South China Sea	Current	Hong Kong, Ho Chi Minh, Kota Kinabalu, Kuala Lumpur, Manila, Sanya and Singapore FIRs
FIT - SEA (ICAO Regional Office email icao_apac@bangkok.icao.int & **CRA Japan** Mr. Mitsuo Hayasaka, Deputy Director, Air Traffic Control Association Japan, email:hayasaka@atcaj.or.jp	ICAO Regional Office & CRA Japan	FIT & CRA	Current	South China Sea FIRs

Organisation *(including contact officer)*	State	Competency	Status	Airspace assessed (FIRs)
IPACG/FIT Mr. Takahiro Morishima, JCAB Co-Chair email: morishima-t2zg@mlit.go.jp & Mr. Reed Sladen, FAA Co-Chair, email: reed.b.sladen@faa.gov	Japan & USA	FIT & CRA	Current	North & Central Pacific (Oceanic airspace within Fukuoka FIR, and Anchorage & Oakland FIRs)
CRA Japan Mr. Mitsuo Hayasaka, Deputy Director, Air Traffic Control Association Japan, email: hayasaka@atcaj.or.jp	Japan	CRA	Current	Fukuoka FIR for IPACG/FIT Ho Chi Minh, Manila, Singapore FIRs for FIT-SEA
FIT - BOB ICAO Regional Office email icao_apac@bangkok.icao.int & Mr. Bradley Cornell, Boeing Engineering email: Bradley.D.Cornell@Boeing.Com	ICAO Regional Office & Boeing USA	FIT & CRA	Current	Bay of Bengal FIRs, Ujung Pandang and Jakarta FIRs, provides assistance to the members of the Arabian Sea/Indian Ocean ATS Coordination Group (ASIOACG)
ISPACG/FIT Mr. Bradley Cornell, Boeing Engineering email: Bradley.D.Cornell@Boeing.Com	Boeing USA	FIT & CRA	Current	South Pacific FIRs and members of the Informal South Pacific ATS Coordination Group (ISPACG)

PROPOSED APPROVALS DATABASE RECORD FORMAT

Aircraft & Operator Details	
Registration No	
State of Registry	
Registration Date	
Name of Operator	
State of Operator	
Operator Identifier	
Operator Type	*[CIV/MIL]*
Aircraft Type	
Aircraft Series	
Manufacturers Serial No	
Mode S Address Code	

Approval	Airworthiness Approval *(State)*	Primary Sensor Type *(DME-DME/ INS/IRS/GNSS)*	Time Limit *(hrs)*	Vertical Guidance *(APV/LPV)*	RF Leg Capable *(Yes/No)*	Limitations *(text)*	Date	Operational Approval *(State)*	Date	Expiry date	Approval withdrawn *(date)*	Information provided by State authority	Regional approval
RNAV10													
RNAV5													
RNAV2													
RNAV1													
RNP4													
RNP2													
Basic RNP1													
Advanced RNP1													
RNP APCH													
RNP AR APCH													
RVSM													
VDL													
Mode S													
SATCOM													
HF													
Remarks													