INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

REPORT OF THE COMBINED MEETINGS OF THE ICAO REDUCED VERTICAL SEPARATION MINIMUM IMPLEMENTATION TASK FORCES EIGHTEEN AND NINETEEN (RVSM/TF/18/19)

BANGKOK, THAILAND

30 JUNE – 4 JULY 2003

The views expressed in this Report should be taken as those of the Task Force and not the Organization

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Page

History of the Meeting

Summary Report of the RVSM TF/18Meeting

Summary Report of the RVSM TF/19Meeting

Appendices

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1.1 Introduction

1.1.1 The Combined Eighteenth and Nineteenth Meetings of the Reduced Vertical Separation Minimum Implementation Task Force (RVSM/TF/18/19) was held at the ICAO Asia and Pacific Office in Bangkok, Thailand from 30 June to 4 July 2003.

1.1.2 The Terms of Reference for the Task Force are contained in **Appendix A** and the Task Force Work Groups at **Appendix B** to this Report.

1.2 Attendance

1.2.1 The meeting was attended by 60 participants from Australia, Cambodia, Hong Kong China, India, Indonesia, Japan, Lao PDR, Malaysia, Maldives, Nepal, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, Viet Nam, IATA, IFALPA and IFATCA. A complete list of participants is at **Appendix C**.

1.3 Officers and Secretariat

1.3.1 Mr. Sydney Maniam, Head (Standards), Civil Aviation Authority of Singapore (CAAS), Singapore, continued as Chairman of the Task Force. Mr. David J. Moores, Regional Officer ATM from the ICAO Asia and Pacific Office, Bangkok served as the Secretary for the meeting. They were assisted by Mr. John Richardson, Regional Officer ATM.

1.3.2 Mr. Yusfandri Gona, Head of Performance & Flight Test Section, Directorate General Air Communication (DGAC) Indonesia, and Mr. Ron Rigney, Operations Manager (International Activities), Airservices Australia, continued as Chairman of the Aircraft Operations & Airworthiness Work Group (OPS/AIR/WG) and of the ATC Operations Work Group (ATC/WG), respectively. Mr. Nopadol Sangngurn, Vice-President, Business Development Bureau, AEROTHAI, was the Chairman of the Safety & Airspace Monitoring Work Group (SAM/WG).

1.4 Opening of the Meeting

1.4.1 Mr. Sydney Maniam welcomed the delegates and opened the meeting. On behalf of the RVSM Task Force, he thanked Viet Nam for all preparations done to host the 18th Task Force Meeting in Hanoi in March 2003. He also expressed appreciation to Malaysia for offering to host the 19th Task Force Meeting. Due to unforeseen developments in the region, these meetings had to be postponed and conducted from 30 June to 4 July 2003 in the ICAO Asia and Pacific Regional Office in Bangkok, Thailand.

1.4.2 Mr. Maniam highlighted that the purpose of the 18th RVSM Task Force Meeting was to conduct a 1-year and 90-day review for Phase 1 and Phase 2 of RVSM implementation in the Western Pacific/South China Sea area. In this context, any difficulty or problem encountered in the application of RVSM should be addressed by the Task Force to ensure that RVSM operations would be continued in a safe and efficient manner. He reminded participants of the principles that the Task Force had adopted in developing the operational RVSM plan for the area. To this end, RVSM was implemented to alleviate congestion on major traffic flows and reduce ground delays at international airports in the region. He stressed that changes made should be consistent with the current RVSM operational plan and should not result in any reduction in safety and operational efficiency. In addition, detailed studies, including the necessary safety assessments, should be completed before any major change to the RVSM operational plan was made.

1.4.3 Mr. Maniam also outlined the preparations that had to be completed at the 19th RVSM Task Force Meeting for the implementation of RVSM in the Bay of Bengal and Beyond. In particular, the RVSM operational plan for the area had to be finalized so that RVSM could be implemented as planned on 27 November 2003. He stressed that the ultimate goal was to achieve seamless RVSM operations for traffic flows from Asia to Europe, through the Middle East. To this end, he urged all States concerned to continue to cooperate and work actively so that the use of airspace and management of traffic in the region could be further enhanced with the introduction of RVSM.

1.4.4 Mr. David Moores, on behalf of Mr. L.B. Shah, Regional Director, Asia and Pacific Regional Office welcomed participants to Bangkok for this important combined meeting of RVSM TF/18/19. Unfortunately, following a serious of distressing world events, and in particular, for this region the impact of SARS, the aviation industry had been suffering a severe economic crisis. The Regional Office's meeting programme had also been seriously disrupted, and coupled with a staffing shortage in the ATM Section and budget constraints, it had been difficult to reschedule meetings. It was regretted that some Regional Office meetings had to be cancelled or postponed at short notice, and this required meetings to be combined or scheduled back-to-back. In view of the importance to safety, operational efficiency and economic benefits of RVSM implementation in the Bay of Bengal and Beyond, it was imperative that the Task Force completes the outstanding tasks as soon as possible and all parties complete their arrangements in a timely manner to meet the implementation date of 27 November 2003. In this regard, the second Joint Coordination Meeting of the Asia and Middle East Task Forces had to be rearranged to be held on 27 to 28 August at Abu Dhabi, United Arab Emirates, and this was expected to be the final joint coordination meeting to harmonize the implementation plans of both regions.

1.4.5 The RVSM implementation programme to date has been an outstanding achievement and with the Bay of Bengal and Beyond implementation in November, the Task Force would be expected to continue its work to facilitate RVSM implementation as needed in the Asia/Pacific Region. The 13th ATS/AIS/SAR Sub-Group meeting held a week earlier identified a need for the Task Force to consider other areas where RVSM should be implemented, and to assist States concerned with their planning and implementation. He wished participants a successful meeting.

1.5 Documentation and Working Language

1.5.1 The working language of the meeting as well as all documentation was in English.

1.5.2 Fifteen Working Papers and eight Information Papers were presented to the RVSM/TF/18 meeting and ten Working Papers and two Information Papers were presented to the RVSM/TF/19. A list of papers is included at **Appendix D**.

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RVSM TF/18 MEETING

Agenda Item 1: Adoption of Agenda

1.1 The meeting reviewed the provisional agenda presented by the Chairperson and adopted it as the agenda for the meeting. This agenda is at **Appendix E** to the Report.

Agenda Item 2: Review Implementation Actions

Hong Kong, China

2.1 Hong Kong, China reported that along with other ATS providers in the Western Pacific/South China Sea (WPAC/SCS) areas, they implemented RVSM on 31 October 2002. They were pleased to inform the meeting that the transition to and subsequent operation of RVSM within Hong Kong airspace has been smooth and satisfactory.

2.2 Hong Kong reported that the traffic between Hong Kong and Taipei FIRs accounted for almost 50 percent of the traffic operating through the Hong Kong airspace. With the implementation of RVSM, the number of non-PDC flight levels on ATS/RNAV Routes A1, G581 and M750 within the RVSM stratum were progressively increased since 31 October 2002 to meet traffic demand. In conjunction with the application of uni-directional routes, the ATC system was able to handle more traffic throughput and the opportunity for flights being assigned optimum operating levels increased.

2.3 With the implementation of RVSM and the modified single alternate flight level orientation scheme (FLOS), the task of alleviating traffic congestion and resolving potential traffic conflicts was made easier for controllers. While this resulted in an increase in sector capacity, occasions of a sudden surge in ATC workload frequently occurred due to bunching of traffic. The experience gained by Hong Kong, China showed that controllers' awareness of the importance of preventing system overloading should be heightened and prudent flow management measures should be coordinated with adjacent ACC's in a timely manner.

2.4 During the early stage of RVSM operation, based on available data, Hong Kong, China noticed that there was a considerable amount of discrepancies in flight plans regarding the correct indication of RVSM status. In order to allow operators to reap the benefits of RVSM, Hong Kong, China made extra efforts to draw operators' attention to the importance of compliance with the published flight plan requirements. The situation has improved significantly since. It was noted that, unlike in other regions, a mechanism to confirm the RVSM status as declared in flight plans was not yet in place in this region.

2.5 It was understood that errors in the relay of flight level information between ACC's may lead to the operational error exceeding the agreed Target Level of Safety (TLS). Hong Kong, China was of the view that through the implementation of ATS Inter-facility Data Communication (AIDC) in the region, the chances of such error in communication through the speech circuit should be significantly reduced. In this connection, Hong Kong, China had conducted AIDC system trials and operational evaluation with the Guangzhou FIR with encouraging results. Plans for further trials with other neighbouring FIRs were being made.

2.6 The meeting was reminded of the discussion in RVSM/TF/16 regarding the use of 'flight level tree hundred' for FL300 in radiotelephony. Hong Kong, China reported to the meeting that confusion between FL330 (three three zero) and FL300 (three zero zero) did occur, requiring

extra attention and vigilance of pilots and controllers for clarification. Hong Kong, China will continue to monitor the situation and will report to the Task Force should the problem persist.

Indonesia

2.7 Indonesia provided information on RVSM implementation and the flight levels that will be implemented in the South China Sea and Bay of Bengal areas on 27 November 2003. RVSM was implemented on international routes and several domestic routes within Jakarta, Bali and Ujung Pandang FIRs on 31 October 2002 between FL350 and FL390 exclusive. These routes within Indonesia FIRs are connecting ATS routes in adjacent FIRs, such as Singapore, Kota Kinabalu, Brisbane and Melbourne FIRs.

2.8 With the implementation of RVSM, it was necessary to review the current flight level allocation scheme on ATS routes between Indonesia FIRs and other FIRs in order to ensure a smooth transition of traffic into/out of Indonesia airspace.

2.9 A flight level band FL350 to FL390 (except on EMARSSH Phase 1 route) was implemented in Jakarta, Bali and Ujung Pandang FIRs from 31 October 2002. For the second phase of implementation, it was proposed that within all Indonesia airspace, the flight level band would be FL290 to FL410 effective on 27 November 2003.

Lao PDR

2.10 Lao PDR reported that there were no major problems encountered since 31 October 2002 within Vientiane FIR due to RVSM operations/implementation. Although the modified single alternate FLOS had been implemented, Lao PDR could consider a move toward a harmonized and full RVSM implementation within the WPAC/SCS areas as expected in the near future. In this regard, a simple assignment of cruising levels for aircraft on North-South crossing routes (W76 with A1 and A202) was beneficial. Overall RVSM operations has improved the level of safety.

2.11 The ATC workload had increased slightly due to additional monitoring task, and checking through every flight plan for RVSM compliance.

2.12 No large height deviations (LHDs) had been reported since February 2002. All monthly NIL reports along with the air traffic sample of January 2003 were provided to APARMO.

2.13 Lao PDR advised the meeting that it was ready to coordinate with its neighbours and all other parties concerned to determine further activities for the RVSM implementation plan as required. In this regard, Lao PDR invited the meeting to consider organizing a sub-meeting especially among Japan, Korea, China, Viet Nam, Laos, Cambodia and Thailand to discuss the situation further due to constraints and problems affecting future planning of full-harmonized RVSM implementation within the WPAC/SCS areas.

Malaysia

2.14 Malaysia provided a review of the implementation of RVSM over the South China Sea area within Kuala Lumpur and Kota Kinabalu FIRs after 31 October 2002. RVSM was successfully implemented in the eastern portion of the Kuala Lumpur and Kota Kinabalu FIRs in two phases. The portion of airspace involved in Kuala Lumpur FIR was east of route M751/B469 and extended toward the Kuala Lumpur and Singapore FIR boundary. In the Kota Kinabalu FIR, RVSM was implemented in the whole airspace.

2.15 Overall RVSM was implemented without any problems and has enhanced efficiency of operations. The introduction of domestic ATS route Y331 on 31 October 2002 from TAXUL to PEKAN has provided operators an alternate route, in order to relieve congestion at PK (PEKAN). Operators are encouraged to use this route.

Philippines

2.16 The Philippines provided a review of their operations after implementation of RVSM in the WPAC/SCS areas on 21 February 2002 (Phase I) and 31 October 2002 (Phase II). In Phase I, Cambodia, China (on N892 only), Malaysia, Philippines, Singapore, Thailand and Vietnam (Ho Chi Minh FIR only), Taiwan (on N892 only) implemented RVSM on 21 February 2002. In Phase 2, RVSM was implemented in the rest of the oceanic airspace of the Sanya AOR, Hong Kong, China, Indonesia, Lao PDR, Vietnam (in the Hanoi FIR), and other areas in Taipei FIR on 31 October 2002

2.17 The Manila FIR was surrounded by the following FIRs, (starting clockwise from the Pacific to South China Sea), Naha FIR, Oakland FIR, Ujung Pandang FIR, Kota Kinabalu FIR, Singapore FIR, Ho Chi Minh FIR, Sanya AOR, Hong Kong FIR and Taipei FIR.

2.18 Phase II of RVSM implementation did not add any more transition areas inside the Manila FIR, since Ujung Pandang had agreed to perform transition tasks for overflights from Australia to Hong Kong or Taipei that would traverse the four parallel RNAV Routes within the Manila FIR, i.e. M767, N884, L625 and N892, where the modified single alternate FLOS was applied. This was agreed upon in the RVSM Special Coordination Meeting held in Manila in July 2002. It should be noted that Indonesia implemented RVSM based on the single alternate FLOS. This arrangement was working well, although there were times when Manila ACC would accept flight levels based on single alternate in order that additional flight levels would be available at those crossing points where traffic would sometimes occur.

2.19 Although transition tasks within the Manila FIR were still within manageable levels, problems occur during bad weather conditions (i.e. typhoons) resulting in Large Scale Weather Deviations (LSWD), especially along the parallel routes. Other problems were encountered when there are several re-routings, which require transitions outside of radar coverage from the single alternate to the modified single alternate FLOS .

2.20 Other concerns during adverse weather conditions were in regard to requests for re-routings wherein transitions had to be done outside of radar coverage. This occurred between the Naha FIR and Manila FIR boundary, with traffic to Hong Kong from either Korea or Japan opting to reroute inside the Manila FIR. Since Naha ACC applies single-alternate FLOS, Manila ACC controllers had to change these flight levels to the modified single alternate FLOS for the SCS area. In addition, since transition tasks were all done outside of radar coverage, flow control measures through flight level allocation are required to lessen the workload of ATCOs, as well as to enhance safety.

2.21 Weather deviation has been one of the problems encountered in FIRs located along the so called ‘typhoon belt areas’, like the Manila FIR. The transition tasks from modified single alternate to single alternate FLOS and vice versa, particularly during large-scale weather deviations, had given additional problems in some areas in the Manila FIR.

Singapore

2.22 Singapore reported that RVSM was successfully implemented in the Singapore FIR on 21 February 2002. To cater for major traffic flows, FL300, FL320, FL340, FL360, FL380 and FL 400 were allocated to RVSM-approved aircraft operating on the six parallel RNAV route (viz. L642, M771, N892, L625, N884 and M767). The eastbound levels FL 290, FL330, FL370 and FL410 and westbound levels FL310, FL350 and FL390 were allocated to RVSM-approved aircraft operating on routes that cross the six parallel RNAV routes.

2.23 The use of the modified single alternate FLOS provides six flight levels (viz. FL300, FL320, FL340, FL360, FL380 and FL400 FLOS) to aircraft operating on major traffic routes. These dedicated levels allow airlines to operate at or closer to their optimum vertical profiles, resulting in significant fuel savings. The modified single alternate levels also provides viable levels (viz. FL 290, FL330, FL370 and FL410 on eastbound direction and FL310, FL350 and FL390 on westbound direction) for aircraft operating on routes that cross the six parallel RNAV routes. Data on traffic movement in the WPAC/SCS areas show that during peak traffic periods, the levels that have been allocated for the six parallel RNAV routes and crossing routes were fully utilized. In addition, there was an equal balance usage of levels between aircraft on six parallel routes and those on the crossing routes.

2.24 The modified single alternate FLOS also optimized the applications of No-PDC procedures. Aircraft operating on the six parallel are assigned FL300, FL320, FL340, FL360, FL380 and FL 400, without any pre-departure coordination. This has facilitated better planning for airlines and simplified the assignment of levels by ATC. As a result, there has been significant reduction in ground delays at international airports in the region with the introduction of RVSM.

2.25 Singapore proposed to continue with the application of the modified single alternate FLOS in the WPAC/SCS areas to ensure that existing safety levels and operational efficiency are maintained.

Viet Nam

2.26 Viet Nam reported that the Civil Aviation Administration of Viet Nam (CAAV) had developed a comprehensive plan for RVSM implementation within the Ho Chi Minh and Ha Noi FIRs.

2.27 The main content of activities was summarized as follows:

a) development of implementation plan and operational regulations;

b) finalizing the flight operational procedures;

c) signing the ATC Supplementary LOAs with the Civil Aviation Authorities of other concerned countries;

d) enhancing communication and navigation facilities, especially the surveillance radar network and ATS direct speech;

e) training air traffic controllers and technical staff, air crew and flight dispatchers of airlines;

f) issuing the RVSM operational certificate for aircraft, air crew and supplementing the flight guidance documentation; and

g) publication of AIP Supp, etc.

2.28 Viet Nam reported that it had been closely co-coordinating with other Civil Aviation Authorities in the region to ensure smooth implementation over the South China Sea area. CAAV reviewed and signed the RVSM LOAs/SLOAs between Ho Chi Minh/Ha Noi ACCs and Singapore, Kuala Lumpur, Manila, Sanya, Bangkok, Vientiane and Phnom Penh ACCs.

2.29 The implementation of RVSM within the Ha Noi and Ho Chi Minh FIRs had being carried out in accordance with the phased approach. Phases I and II began on 21 February 2002 and 31 October 2002, respectively.

2.30 In Phase I the flight level arrangements were as follows:

a) Flight level spectrum from FL310 to FL410;

b) RVSM-approved aircraft operating on the four major RNAV routes L642, M771, N892 and L625 would be assigned FL320, FL340, FL360 and FL380;

c) RVSM-approved aircraft operating on routes that cross the four major routes would be assigned the eastbound levels FL330, FL370 and FL410 or westbound levels FL310, FL350 and FL390; and

d) a transition area is established in the Ho Chi Minh FIR for transition of aircraft operating between the area under control of Ho Chi Minh ACC and Sanya ACC from RVSM to CVSM and vice versa (for RNAV routes L642 and M771).

Note: Under Phase II, the above transition area was withdrawn from the operational plan.

2.31 In Phase II the flight level arrangements were as follows:

Flight level spectrum from FL290 to FL410;

a) on ATS/RNAV routes A1/P901, A202, R474: Modified single alternative:

- Eastbound levels: FL330, 370 and 410; and
- Westbound levels: FL310, 350 and 390.

b) on ATS domestic routes W1 and W2 (main trunk routes between Ha Noi and Ho Chi Minh City): Single alternate:

- Northbound levels: FL290, 310, 330, 350, 370, 390, 410; and
- Southbound levels: FL300, 320, 340, 360, 380, 400.

2.32 During Phase I and II, the RVSM procedures were successfully implemented and subsequent operations have been smooth. Most traffic (97%) operated at FL290-410 and the remaining (3%) operated below FL290 because aircraft did not meet RVSM or RNP10 requirements.

2.33 The current flight level allocation accommodates the traffic volume on each ATS/RNAV route, and most traffic had been cleared to fly at optimum flight levels. At present, the traffic volume on the above ATS routes was expected to increase.

2.34 During Phase I, the prescribed transition procedures from RVSM to CVSM and vice versa had been appropriate, all traffic operating on routes L642 and M771 adhering strictly to prescribed transition procedures. These procedures were withdrawn from Phase II implementation, as scheduled.

2.35 Co-ordination procedures between relevant ACCs in the RVSM environment proved to be satisfactory. There were no difficulties faced by controllers to date and the inter-center coordination improved significantly. The ATC workload and complexity have reduced.

2.36 Most operators were RVSM-approved. There were no reports from operators of large height deviations due to aircraft system failure or pilot error since the implementation of RVSM in February 2002.

2.37 Apart from the above mentioned advantages, there were some issues such as mixture of flight level orientation schemes (single and modified single alternate flight levels), as well as the airspace environment (RVSM and non-RVSM airspaces), existence of transition areas or joining segments for flight level changes, etc.

International Airline Transport Association (IATA)

2.38 IATA expressed satisfaction with the implementation of the modified single alternate FLOS over the SCS routes. There had been a dramatic drop in the number of ATC related delays to aircraft and more optimal flight levels were now available to both aircraft operating on the parallel routes as well as crossing routes.

2.39 IATA, however did not object to a change in the FLOS if States so desire, provided that at least the same level of efficiency and safety can be maintained. IATA urged that a comprehensive study be conducted before a decision was made.

International Federation of Airline Pilots Association (IFALPA)

2.40 IFALPA provided a review of the transformation of the ATS route structure over the South China Sea from the random ATS routes previously used to the introduction of an orderly ATS route structure on 1 November 2001. This was followed by a two-phased implementation of RVSM in February 2002 and October 2002. Pilots' feedback on RVSM operations over the South China Sea, based on the modified single alternate FLOS has been positive and favourable. Traffic flow has been extremely smooth and efficient over the last 12 months.

2.41 IFALPA recognized the significant overall improvement in operational efficiency and ATM over the South China Sea as a result of the introduction of the restructured routes and RVSM operations. Also, flight safety has been enhanced. In light of the operational results of operations in the South China Sea environment, and unless a better system could be found, IFALPA supported fully the continuation of the current RVSM operations over the South China Sea.

RVSM Phraseologies

2.42 The meeting was advised that the ATS/AIS/SAR/SG/13 Meeting had considered it appropriate for the RVSM-related phraseologies to be used in the Asia/Pacific Region to be included in the *Procedures for Air Navigation Services-Air Traffic Management* (PANS-ATM, Doc 4444). ICAO advised the meeting that an amendment proposal to the PANS-ATM was being prepared by ICAO Headquarters. The meeting also considered that the Manual of Radiotelephony (Doc 9432)

Second Edition - 1990 should be reviewed and updated, as it did not include changes contained in the PANS-ATM, Chapter 12.

Harmonization of Flight Level Orientation Scheme (FLOS)

Hong Kong, China

2.43 Hong Kong, China presented information on the feasibility of introducing the single alternate FLOS in the WPAC/SCS areas. In this regard, they had carried out a study on the feasibility of conducting transition to the single alternate FLOS in Hong Kong airspace without unduly increasing the loading on the ATS system, which may otherwise impact on flight safety.

2.44 In relation to the feasibility of conducting transition to the single alternate FLOS in Hong Kong airspace, a safety case study was performed. The objective of the study was to assess the safety impact on the Hong Kong ATC system due to the increase in workload in conducting the FLOS transition. Extensive radar simulation was employed to collect as much data as possible to assist in decision making.

2.45 Hong Kong, China reported that:

a) transition of levels from the Annex 2 Appendix 3b) FLOS to the single alternate FLOS in Hong Kong airspace for westbound traffic before IKELA (P901)/DAGON (A1) is feasible. However, before implementation the following conditions must be satisfied:

   i) FL300, FL320, FL340, FL360, FL380 and FL400 are made available as non-PDC (FLOS) levels; and

   ii) sufficient lead-time is available for proper and timely procedures documentation/promulgation and staff conversion training. In this connection it is considered that implementation of the new FLOS arrangement, if adopted, should not be earlier than the RVSM target implementation date for the Bay of Bengal and beyond, i.e. 27 November 2003.

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b) to lower the technical collision risk value, a dual-track system allowing unidirectional flow of traffic on A1/P901, instead of the present reciprocal track situation, is recommended, should the single alternate FLOS be applied; and

c) it was feasible to adopt the single alternate FLOS on the portion of ATS Route A202 within Hong Kong airspace. However, as a certain segment of A202 west of SIKOU is in non-RVSM airspace, it is anticipated that there will be difficulties in implementing the single alternate FLOS along the entire ATS Route A202.

Philippines

2.46 The Philippines presented a study on the transition to single alternate FLOS for the SCS area for the purpose of integration and harmonization with other States outside of the SCS area.

2.47 The implementation of RVSM in the WPAC/SCS areas in February 2002 brought about the introduction of the modified single alternate FLOS specifically for use in the revised new SCS route structure. With RVSM scheduled to be implemented in the Bay of Bengal and Beyond areas on 27 November 2003, the RVSM/TF/17 meeting agreed that the single alternate FLOS would be utilized for the application of RVSM in the Bay of Bengal and Beyond. This was to ensure that the assignment of RVSM levels would be consistent with the operational plan for the Middle East and thus obviate the need for transition areas.

2.48 The application of RVSM based on the modified-single-alternate (as adopted in the SCS area), requires some FIRs to perform vertical transition tasks in order to integrate the two types of RVSM flight level arrangements. As the Manila FIR was situated between the WPAC/SCS areas, the Manila ACC controllers have to change flight levels based on the flight level assignment agreed upon in the Letters of Agreement between ACCs.

2.49 The issues/concerns that led to the introduction of the modified single alternate in the SCS areas were as follows:

a) numerous bi-directional crossing tracks in the SCS airspace;
b) several airspace not covered by radar; and
c) large deviations due to adverse weather (typhoon) conditions in some FIRs.

2.50 At the RVSM/TF/16 meeting, discussions were held regarding harmonization of the modified single alternate FLOS with States outside of the SCS area, and some States proposed that the FLOS be reviewed. It was considered that "ultimately a single alternate flight level orientation scheme should be adopted", hence this study was made in preparation for any transition plan to single alternate FLOS.

2.51 The Philippines classified the routes in the South China Sea areas, with particular emphasis on the 6 SCS parallel routes, as the major point of concern in the classification. This would form the basis for the assignment of No-PDC flight levels.

2.52 Routes were classified as follows:

Class I the 6 parallel one-way RNAV routes;

Class II Routes crossing the 6 parallel one-way RNAV routes;

Class III Routes not crossing the 6 parallels but crossing Class II routes; and

Class IV Routes neither not crossing either 6 parallels or Class II routes.

2.53 Assignment of No-PDC levels for the 4 class of routes:

Route Classification	NO-PDC Flight Level	
	Eastbound	**Westbound**
Class I	FL310, 350, 390, 410	FL300, 340, 360, 400
Class II	FL290, 330, 370	FL280, 320, 380
Class III	FL310, 350, 390	FL300, 340, 360
Class IV	All flight levels available (subject to bilateral agreements between FIRs to avoid 'bunching effect')	

2.54 In view of transition tasks being undertaken outside of radar coverage, flow control measures through flight level allocation may be needed to reduce the workload of Air Traffic Controllers, and to enhance safety.

Thailand

2.55 Thailand presented a proposal to refine the current flight level orientation scheme used in the RVSM implementation in the WPAC/SCS region. Also, a review of the existing No-PDC arrangement in this region was proposed.

2.56 In conjunction with the RVSM implementation in the WPAC/SCS areas since February 2002, Thailand had also implemented Phase I RVSM in the southeast sector of Bangkok FIR. Phase II domestic RVSM implementation was planned to be implemented on 31 October 2002. However, as reported to RVSM/TF/16, there were issues relating to the assignment of levels for aircraft operating on ATS Routes A1 and P901. It was noted that there were difficulties associated with transitions from the modified single alternate FLOS to the single alternate FLOS. For safety purposes, Thailand deferred implementation of Phase II of domestic RVSM until 27 November 2003, which would coincide with the planned implementation of RVSM in the Bay of Bengal and Beyond airspace.

2.57 Thailand was of the view that, although RVSM implementation was successful and beneficial, the refinement of the current use of FLOS may improve the efficiency of the RVSM implementation in the WPAC/SCS areas in terms of safety, operation, and economic benefits.

2.58 In Phase II of the domestic RVSM planned for implementation on 27 November 2003, RVSM will be fully implemented for the entire Bangkok FIR exclusively. The detailed operational implementation plan is summarized as follows:

- FIR: Bangkok
- Flight level band: FL290 – FL410
- FLOS: Single Alternate
- Exclusive Airspace: Yes
- Initial Implementation: 27 November 2003

2.59 At present, the modified single alternate FLOS was used in the WPAC/SCS airspace, and based on the operational implementation plan for the Bay of Bengal and Beyond area, the single alternate FLOS had been adopted (RVSM/TF/17 report refers) on the new EMARSSH route structure. As the geographical location of Thailand overlaps between the WPAC/SCS and the Bay of Bengal areas, the differences in the FLOS utilization between these two regions meant that Bangkok FIR was a transition area, could result in complicated operational procedures. Thailand provided details of two alternatives and benefits to refining the modified single alternate FLOS.

2.60 Prior to refinement of the modified single alternate FLOS, Thailand proposed that contingency options be established for transition areas to cope with RVSM implementation on 27 November 2003. This will result in reduced transition workload. States will have to consider details of these procedures and issues when implementing transition areas for westbound traffic.

2.61 In addition to the proposed refinement of FLOS, it was important to note that the existing No-Pre Departure Coordination (No-PDC) arrangement has not been reviewed since the RVSM has been implemented in WPAC/SCS. Based on the fact that the number of traffic on crossing routes in the WPAC/SCS areas did not require any major pre-departure coordination, Thailand also proposed a review of the existing No-PDC arrangements.

Viet Nam

2.62 Viet Nam presented a proposal for a single alternate RVSM FLOS to be applied by the contiguous FIRs in the South China Sea area where the modified single alternate FLOS was used. This will harmonize the FLOS with the single alternate FLOS to be adopted in the Bay of Bengal. Also, this FLOS will facilitate all ACCs and avoid possible confusion over flight level assignment by ATC when traffic volume increases. Details of the flight levels to be assigned to the ATS routes was referred to the ATC WG.

2.63 The meeting noted the studies undertaken by States and appreciated the work they had done. There were many issues to be resolved and the meeting was of the view, at this stage, in view of the short time frame to implement RVSM in the Bay of Bengal and Beyond, maintaining the status quo may be the preferred option.

2.64 The meeting reviewed the modified single alternate FLOS that was utilized for RVSM operations in the WPAC/SCS areas. Some States proposed that the single alternate should be used in order to harmonize with the FLOS in adjacent areas, so that seamless RVSM operations between the Pacific, Asia, the Middle East and Europe could be achieved. Recognizing that the current FLOS had been operating well since RVSM implementation in February 2002 and that safety and operational efficiency had been enhanced, the meeting agreed that a detailed study should be conducted to support any change to the FLOS. This should include the necessary safety assessments relating to RVSM operations. IATA, IFALPA and IFATCA concurred with the need for the detailed study to be completed in order for any change to the FLOS to be done. The meeting decided to continue with the modified single alternate FLOS for the WPAC/SCS areas, with a view to review the FLOS when the study by States concerned was completed. The Philippines agreed to continue to transition flights operating between the Pacific and WPAC/SCS areas.

Special ATS Coordination Meeting on Transition Issues

2.65 The meeting recognized that procedures would have to be established to facilitate the transition of aircraft between the Western Pacific/South China Sea areas and the Bay of Bengal and Beyond, where the single alternate FLOS would be utilized from 27 November 2003. In this context, the meeting agreed to hold a Special Coordination Meeting from 3-5 September 2003 in Bangkok hosted by AEROTHAI to enable the States concerned to finalize the transition procedures.

2.66 The meeting updated the operational plan for the implementation of RVSM in the Western Pacific/South China Seas area as shown in Table 1 of **Appendix F** to the Report.

Future RVSM implementation plans

Japan and Korea

2.67 Japan and Korea jointly reported to the meeting that since February 2000, RVSM had been implemented in the oceanic airspace of Tokyo and Naha FIRs, which are under the responsibility of Japan Civil Aviation Bureau (JCAB), together with other FIRs in the Pacific Region.

2.68 There were many flights overflying Tokyo and Naha FIRs, which connect the United States and Asian countries, and the United States and the Republic of Korea. Under these circumstances, JCAB and the Civil Aviation Safety Authority, Republic of Korea (KCASA) decided to implement RVSM operation in all airspace of Tokyo, Naha and Incheon FIRs.

RVSM Implementation plan for Japan's domestic airspace

2.69 Japan planned to implement RVSM in domestic airspace in the first half of the year 2005. This will result in all of the airspace within Tokyo and Naha FIRs, both oceanic and domestic being RVSM airspace. The RVSM airspace will be defined as exclusive airspace with the exception of some special flights. The planned altitude stratum for the domestic RVSM was from FL290 to FL410 inclusive.

2.70 A coordinating group for the implementation of the domestic RVSM was established in April 2003, which consists of airline operators, ATC service providers, regulatory authorities and other interested parties. The details of the domestic RVSM implementation plan will be discussed at the coordinating group meetings. The final plan will be announced by NOTAM or AIC about a year prior to implementation. Interested parties in the Asia Region are welcome to join the coordinating meetings for the Japanese domestic RVSM. The meeting language is Japanese.

2.71 Since airspace safety monitoring required a good knowledge of airspace structure and characteristics, JCAB will establish an airspace safety-monitoring unit that will be responsible for the domestic RVSM safety assessment and continuous monitoring.

2.72 The airspace safety monitoring unit for the domestic RVSM would provide APARMO, which was responsible for the Pacific RVSM, with the information required for the RVSM monitoring programme.

2.73 The contact point for Japanese domestic RVSM implementation is;

Mr. Keizo UDAKA (ATS System Planning Division, JCAB)
E-mail: udaka-k2s5@mlit.go.jp
Tel: +81-3-5253-8739
Fax: +81-3-5253-1663

RVSM Implementation Plan for Incheon FIR

2.74 The Korea Civil Aviation Safety Authority (KCASA) has a plan to implement RVSM in the first half of the year 2005. The RVSM area will be all of the airspace within the Incheon FIR. The RVSM airspace will be defined as exclusive airspace for RVSM operation with the exception of some military aircraft. The planned altitude stratum for the Korean RVSM is FL290 to FL410 inclusive for the present, which would be coordinated with the Japanese domestic RVSM.

2.75 A task force for the implementation of the Korean RVSM was established in May 2001, which consisted of KCASA, Military National Defense (MND), Korea Airspace Research Institute (KARI), Korea Civil Aviation Pilot Association, Korean Air, Asiana Airline and Airlines Operation Committee. The details of the Korean RVSM implementation plan would be discussed at the Task Force and coordinated with JCAB for the expeditious flow of aircraft between FIRs of Japan and South Korea. The final plan would be announced by NOTAM or AIC about a year prior to the implementation. Interested parties in the Asia Region were welcome to join the Task Force meetings for the Korean RVSM. The meeting language is Korean and English.

2.76 Since airspace safety monitoring required a good knowledge of airspace structure and characteristics, KCASA would designate Incheon Air Traffic Control Center (ATCC) of Korea as an airspace safety-monitoring unit that was responsible for the Korean RVSM safety assessment and continuous monitoring.

2.77 Incheon ATCC would provide APARMO the Regional Monitoring Agency (RMA) responsible for the Pacific RVSM monitoring with the required monitoring information.

2.78 KCASA would maintain close cooperation with JCAB for the efficient RVSM operation in the Northeast Asia region and coordinate with the People's Republic of China and the Democratic People's Republic of Korea, if necessary.

2.79 The contact point for Korean RVSM implementation is;

Mr. Kim Shi-han (ATS Planning Division, KCASA)
E-mail: ksh5412@moct.go.kr
Tel: +82-2-2669-6422
Fax: +82-2-6342-7289

2.80 Also, JCAB and KCASA would coordinate with ACCs in adjoining FIRs, Shanghai ACC, Taipei ACC and Vladivostok ACC. Also, with Taipei ACC having started its RVSM operation last year, JCAB and KCASA would need to coordinate with Taipei about altitude usage between FIRs.

2.81 Japan and Korea invited the meeting to consider the necessity for FLOS harmonization for adopting a single alternate flight level orientation scheme over the whole South China Sea area as well as in the Regions. Also, they indicated that they would be interested to work with the ICAO RVSM Task Force to develop and implement their RVSM plan.

Agenda Item 3: Review Operations

Reports on Large Height Deviations (LHD)

3.1 The meeting reviewed the reports on LHDs due to operational errors that had been submitted by States to the Asia Pacific Aircraft Registry and Monitoring Organization (APARMO) through the Monitoring Agency for the Asia Region (MAAR). The meeting expressed concern that some States had not submitted reports. As incomplete data could have an impact on the estimation of operational risk and subsequent comparison to the TLS, the meeting strongly urged States concerned to submit the reports as soon as possible but not later than 31 July 2003. The meeting also reminded all States to continue to provide the APARMO through MAAR with monthly reports on LHDs including a 'NIL' occurrence report (where applicable).

3.2 The meeting noted an increase in large height deviations due to operational errors (e.g. ATC transfer of control coordination) in a few FIRs. Although the TLS had not been infringed, the meeting agreed that the States concerned should review current ATC operations and put measures in place to reduce such operational errors.

3.3 IATA expressed concern for the lack of complete data on LHDs and that some States had not submitted reports for a considerable time. As this was safety related, States should be urged to submit their reports on time. IFALPA agreed with IATA and requested that ICAO follow-up to advise States of their responsibilities on this matter. ICAO advised that action would be taken as a matter of priority to contact States who had not submitted reports. Reminders to this effect had been sent to all States and brought up at the ATS/AIS/SAR/SG, Also this would be brought to the attention of APANPIRG/14.

Review of RVSM Operations in Western Pacific / South China Sea Area

3.4 The meeting agreed that the continuous airworthiness programme and monitoring should be included in the State Authority Procedures and Airline Operations Manual, in order to assess that aircraft RVSM primary means were reliable and complied with the limit of RVSM system tolerances. A sample of continuous airworthiness monitoring and reporting forms used by MAAR are at **Appendix G**.

3.5 The meeting noted that the implementation of the Airborne Collision Avoidance System (ACAS) was a mandatory requirement of ICAO since 1 January 2003. The meeting also noted that most international fleets of RVSM operators were equipped with ACAS II (TCAS II, Version 7) so as to improve the operational safety level and meet the ICAO requirement. The meeting agreed to continue to coordinate the use of ACAS II (TCAS II V.7) for RVSM operations.

Updated Safety Assessment for the RVSM implementation in the Western Pacific/South China Sea

3.6 Thailand presented a summary of the results of applying the internationally accepted safety assessment process to the implementation of RVSM in the WPAC/SCS airspace. A review was carried out of the total risk estimated for Phase I, II, and the combined Phase I and II of the RVSM implementation in WPAC/SCS. The total risk included the technical risk due to aircraft height-keeping systems and operational risk arising from large height deviations occurred in this region. Further, information was presented on the refined total risk estimated for the RVSM implementation in accordance with the use of the modified single alternate FLOS in the WPAC/SCS airspace, and on the safety oversight for the post RVSM implementation in WPAC/SCS.

3.7 The analysis of the results concluded that the total risk attributable to all causes after RVSM was implemented did not exceed the agreed target level of safety (TLS). However, the total risk was greatly influenced by the level of operation risk arising from major large height deviations, which occurred in this airspace.

3.8 It was recalled that as envisioned by the Review of the ICAO General Concept of Separation Panel (RGCSP and renamed the Separation and Airspace Safety Panel (SASP)), introduction of RVSM would be safe if:

a) Collision risk due to all causes does not exceed 5 fatal accidents per 10^{-9} flying hours; and

b) Collision risk due to aircraft height-keeping systems does not exceed 2.5 fatal accidents per 10^{-9} flying hours.

3.9 The traffic sample data (TSD) between 15 November and 15 December 2001, and the LHD reports received from the related FIRs in the WPAC/SCS airspace were used to produce the risk estimates considered in the review.

3.10 According to the risk estimates calculated, the technical risk for Phase I, Phase II, and the combined Phase I and II RVSM implementations was 4.18×10^{-10}, 9.96×10^{-10}, and 5.08×10^{-10}, respectively. All of these estimates satisfy the agreed TLS value of no more than 2.5×10^{-9} fatal accidents per flight hour due to the loss of a correctly established vertical separation standard of 1,000 ft.

3.11 The total risk estimated for the Phase I, Phase II, and the combined Phase I and II RVSM implementations for the WPAC/SCS airspace was 1.21 x 10^{-9}, 5.02 x 10^{-9}, and 4.51 x 10^{-9} respectively. The results show that the total risk estimate associated with Phase I satisfies the agreed TLS value of no more than 5.0 x 10^{-9} fatal accidents per flight hour due to all causes. In contrast, the total risk estimate associated with Phase II of the RVSM implementation is slightly above the agreed TLS value. Nonetheless, the risk estimate for the combined Phase I and II RVSM implementation is still below the agreed TLS value due to all causes.

3.12 The RVSM/TF/16 discussed the need to refine the safety assessment since the assessment did not factor in the use of the modified single alternate FLOS for the Phase II RVSM implementation in the WPAC/SCS airspace, especially the flight level utilization on ATS routes A1/P901. It was concluded that the collision risk estimates for the Phase II RVSM implementation was overly conservative. In addition, the APARMO informed the meeting that, in light of this clarification, the technical risk for the Phase II RVSM implementation would be in the order of half the value reported previously (RVSM/TF WP/9 - 9.96 x 10^{-10} fatal accident per flight hour).

Refinement of Risk Estimates for the RVSM Implementation in WPAC/SCS reflecting the Modified Single Alternate FLOS on ATS Routes A1/P901

3.13 A refinement of risk estimates for the RVSM implementation in WPAC/SCS reflecting the modified single alternate FLOS on ATS Routes A1/P901 was carried out. The modifications made to the basic CRM took into account the use of modified single alternate FLOS on ATS routes A1/901 in the WPAC/SCS airspace.

3.14 The safety assessment focused on the RVSM implementation for the entire WPAC/SCS airspace (combined Phase I and II). It was not necessary to calculate risk estimates for each phase. Thus, the refined safety assessment for the RVSM implementation in WPAC/SCS airspace will use the set of parameters calculated for the combined Phase I and II.

3.15 After the safety assessment for the RVSM implementation in WPAC/SCS was refined, it was found that the values of the opposite-direction vertical occupancy for a pair of aircraft at adjacent flight levels on the same routes, E_z(opposite), decreased significantly. This is logical with the use of modified single alternate FLOS because the proximate of two aircraft in opposite direction at adjacent flight level may occur solely on the airspace with crossing routes (i.e., ATS routes A1/P901). On the other hand, the value of the same-direction vertical occupancy for a pair of aircraft at adjacent flight levels on the same routes, E_z(same), is the combined value of the E_z(Same) of Phase I and Phase II.

Results of the Refined Risk Estimates for the RVSM Implementation in WPAC/SCS

3.16 According to the refinement of the collision risk estimates, the technical risk for the RVSM implementation in WPAC/SCS is 6.17 x 10^{-11} fatal accidents per flight hour. The total risk attributed to all causes is 1.35 x 10^{-9}. Both estimates satisfy the agreed TLS value of no more than 2.5 10^{-9} and 5.0 x 10^{-9} fatal accidents per flight hour due to the loss of a correctly established vertical separation standard of 1,000 ft and to all causes, respectively.

Safety Oversight for the Post RVSM Implementation in WPAC/SCS

3.17 The technical, operational, and total risks are updated to ensure the airspace safety after the RVSM was implemented over the WPAC/SCS airspace in October 2002.

3.18 For the safety oversight of the entire WPAC/SCS airspace, the collision risk estimate focused on the combined Phase I and II of the RVSM implementation in WPAC/SCS. The technical, operational, and total risks were estimated from July 2002 to May 2003 (most recent month with adequate LHD reports). Furthermore, the risk estimates for the post RVSM implementation took into account the use of the modified single alternate FLOS in the WPAC/SCS airspace. Thus, the values of the parameters used in the safety oversight of the post RVSM implementation were the same as the values used in the refined safety assessment (WP/3-Section 4), except for the probability of vertical overlap. This probability of vertical overlap changed due to the changing 12-month moving sum LHD.

3.19 For the post RVSM implementation in WPAC/SCS, the technical risk is 6.17×10^{-11} fatal accidents per flight hour. The total risk attributed to all causes is 1.92×10^{-9}. Both estimates satisfy the agreed TLS value of no more than 2.5×10^{-9} and 5.0×10^{-9} fatal accidents per flight hour due to the loss of a correctly established vertical separation standard of 1,000 ft and to all causes, respectively.

3.20 Although the risk estimates using the modified collision risk model (CRM) recommended that it is and had been safe for the RVSM to be implemented in the WPAC/SCS airspace, there were a number of LHDs that occurred after the implementation in October 2002. This greatly influences operational risks. Hence, careful monitoring of the LHD occurrences in WPAC/SCS is very important and required.

3.21 After the collision risk model was refined in order to reflect the use of the modified single alternate FLOS in the RVSM implementation over the WPAC/SCS airspace, the results show that all risks are below the agreed TLS values. This indicates that the RVSM implementation in WPAC/SCS is safe. However, the number of LHD occurrences were detected after the RVSM was implemented in October 2003. These LHD occurrences greatly influence operational risk for RVSM implementation. Therefore, careful monitoring of the LHD occurrences in WPAC/SCS is important and required. In this regard, the meeting noted that remedial actions to reduce the occurrence of LHD reported to the APARMO and MAAR is required.

3.22 The meeting considered the suggestion by India to include the information on operational approval of operators on Form F2 used by the RMA so that more information of approval data could be recorded in the RMA approval database. MAAR will seek comments from other RMAs and will advise the RVSM Task Force of the outcome. It was also suggested that, the approval data inherent to determining the RVSM approval status of aircraft, should be available to all organizations associated with RVSM implementation. Other information, such as the receipts of traffic samples and LHD reports, should also be made available on the RMA website for quick reference by States and ATS providers.

3.23 In view of the discussion on the use of single alternate FLOS in the ATC operations group, it would be beneficial to prepare the safety assessment based on the traffic sample data collected after RVSM was implemented in October 2002. In this regard, MAAR will coordinate with the APARMO to determine whether the available traffic samples can be used or the new traffic sample collection would be required. If it was decided to be the latter option, the selected time period for the traffic sample collection will be determined to reflect the time period of the high traffic movements in the region. The result of the safety assessment would assist in the decision making process for the use of single alternate FLOS in Western Pacific/South China Sea.

3.24 The meeting expressed appreciation to MAAR for the work accomplished and reiterated the need for States to support MAAR by providing the required information for the safety assessments and safety oversight for Western Pacific/South China Sea areas.

Monitoring Program for Height-Keeping Performance

3.25 The meeting reviewed the monitoring programme for aircraft height-keeping performance and large height deviations and noted the following:

3.26 Indonesia and Viet Nam reported that there were no reports from operators on large height deviations due to aircraft system failures or pilot error in the WPAC/SCS areas since the implementation of RVSM in February 2002.

3.27 The meeting noted that there were no large height deviations reported due to adverse weather or typhoon effects on RVSM operations in the WPAC/SCS areas since the implementation of RVSM in February 2002.

ICAO State letter on RVSM approval and monitoring requirements

3.28 The Secretary presented information on the ICAO State Letter ref. AN 13/11.1-03/6 dated 28 February 2003 on the subject of approval and monitoring requirements for aircraft operations in RVSM airspace. A copy of the State Letter is at **Appendix H** to this report.

Future OPS/AIR Work Programme

3.29 The meeting reviewed the RVSM Phraseologies for Controller-Pilot Data Link Communication and agreed that these should be standard application for all regions. The meeting requested ICAO to liase with the FANS Interoperability Teams, on the inclusion of the RVSM phraseologies in the PANS-ATM (Doc. 4444).

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19th ICAO RVSM Task Force Meeting

Agenda Item 1: Adoption of Agenda

1.1 The meeting reviewed the provisional agenda presented by the Chairman and adopted it as the agenda for the meeting. This agenda is at **Appendix E** to the Report.

Agenda Item 2: Operational Considerations

2.1 RVSM Operational Implementation Plan

2.1.1 The meeting sought an update on RVSM implementation in the Bay of Bengal and Beyond from the States present. Planning details and operational readiness reports were provided by India, Indonesia, Maldives, Malaysia, Nepal, Pakistan, Sri Lanka, and Thailand for RVSM implementation on 27 November 2003, as described below.

Bangladesh

2.1.2 As Bangladesh was not in attendance, and information on their RVSM implementation plan would be sought by the ICAO Regional Office.

India

2.1.3 India presented an update on their implementation plan and details of the flight level orientation scheme proposed for the Indian FIRs. Details also were provided on the typical traffic flows in Indian FIRs.

2.1.3.1 In regard to its implementation plan, the following requirements were established:

a) the airspace will be exclusive airspace over the oceanic area and non-exclusive airspace over the land area;

b) the implementation date will be 27 November 2003 coinciding with other countries in the South East Asia Region; and

c) the flight level band for RVSM operations will be from FL 290 to FL 410 (inclusive).

2.1.3.2 The meeting was provided with details of the Indian domestic and international traffic flow pattern summarized below**:**

Direction of traffic flow:

a) domestic traffic flow was mainly over land in a North to South and vice versa direction;

b) international traffic flow was mainly from East to West and vice-versa; and

c) the traffic primarily operates between 0005 UTC and 1800UTC.

International Traffic:

2.1.3.3 Though low density traffic continued throughout 24 hours, however, rush period of Westbound international traffic started over the continental airspace of India at the following times:

a) in the southern part of India in Chennai FIR on ATS Routes P570, M300, N563/B466, and N571, the westbound international traffic starts at about 1530UTC and continues throughout the night;

b) in Kolkata FIR on ATS route L301, N877, P628, L759, M770, P646, L507, and N895, the westbound International traffic enters Indian continental airspace at about 1800 UTC and continues untill late night when it is replaced by an eastbound international traffic flow, which continues untill about 0600 UTC of the next day;

c) at night time, it may be expected that all the flight levels in the RVSM Flight Level band would be available for the westbound international traffic.

d) extreme care has to be taken for control of crossing traffic in the Bay of Bengal on the following ATS routes:

i) L-301, which intersects 4 EMARSSH routes**,** namely M770, L759, P628 and N877;

ii) Routes M770, L759, P628 and N877 cater to mainly Singapore and Kuala Lumpur traffic and L-301 mainly serves for the traffic coming from Bangkok;

iii) N895 is an East –West EMARSSH route in the Bay of Bengal, intersected by L759 at Bhubneshwar BBS VOR and M770 at BUBKO;

iv) P 762, from Bangkok to Colombo intersects M 770, L 759 near Kolkata/Yangon FIR, P 628, N 877, N 571, B 466, P 574, N 563 in Chennai FIR and M 300 in Colombo FIR; and

v) L 645 from Phuket to Colombo intersects N 571, B 466, P 574 and N 563 in the Chennai FIR.

Criteria for establishment of the FLOS

2.1.3.4 In the early morning at about 0005UTC, the domestic traffic in India started and the flow continued up to about 0530UTC. This was the time when Eastbound international traffic also transits through Indian airspace. At this time, India primarily has to ensure the availability of optimum cruising levels for domestic traffic. Beyond 0530UTC up to 1630UTC there are traffic peaks in Indian airspace at about 0700UTC, 1000UTC and 1530UTC.

2.1.3.5 The FLOS has to provide an in-built separation for traffic passing on intersecting points of L301, N895, P762, and L645 with other routes as indicated above. In addition, the FLOS should ensure availability of optimum cruising levels for the domestic traffic operating mainly North to South and vice-versa in the continental airspace of India.

2.1.3.6 The FLOS for the Indian FIRS was presented to the meeting for consideration:

a) FLOS in the Bay of Bengal on H-24 basis:

ROUTE		W-BOUND	E-BOUND	REMARKS
EAST-WEST	P762	FL260, 340	FL290	Hot line required between MM/YY (matter pending with Myanmar)
	N563, P574, N571	All flight levels available, except FL260, 240 and 290 which are reserved for Route P762		
	L301	FL280, 300, 340	FL290, 310, 350	E-bound level applicable only EAST of 'VVZ" VOR
	N895	FL280, 300, 340	FL290, 310, 359	E-bound level applicable only EAST of 'BBS' VOR
NORTH-SOUTH	N877	W-Bound: a) Up to OKARA (Chennai/Kolkata FIR Boundary) all flight levels from FL280 and above are available except FL340, which is reserved for P762; b) West of OKARA FL280, 300 340 NOT available (These levels reserved for L301, which intersects N877 at 'VVZ' VOR). E-Bound: a) FL310, 330, 350, 370, 390, 410 available b) FL290 not available, which is reserved for P762		
	L759, P628, M770/M770A	FL320, 360, 380,400	FL330, 370, 390, 410	These routes intersect L301 and N895
	P646	FL280, 300, 340	FL330, 370, 390, 420	2. Westbound levels are same as those for N895 since traffic diverges from INBITA and SAGOD 3. Eastbound traffic is at IBITA and SAGIOD is separated by Kolkata
	L507	ALL LEVELS	ALL LEVELS	

b) FLOS at night time in Domestic Airspace over land area between 1900UTC and 0005 UTC:

a)	West of Nagpur 'NNP' VOR on routes N895, N877; and
b)	West of Bhopal 'BPL' VOR on route A791,
	FL 290 and FL 300 reserved for Domestic traffic operating between Delhi and Mumbai

c) FLOS daytime in Domestic Airspace over land area between 0005UTC to 1800 UTC:

i)	Levels reserved for Domestic traffic EAST Bound……..FL290, 330, 370, 410 WEST Bound…….FL300, 340, 380
ii)	Levels reserved for international traffic East bound…….FL310, 350, 390 on ATS routes A791, N877, L301, N571 WEST bound…….FL280, 320, 360, 400 on ALL ROUTES

Large scale weather deviations

2.1.3.7 India informed the meeting that large scale weather deviations occurred in the Bay of Bengal due to cyclonic activities during the monsoon season, which would necessitate large-scale deviations, and persist for long duration. To cater for this contingency, India planned to have a contingency-scheme built into the FLOS, where the adjacent parallel routes will have alternate flight levels allocated.

Harmonization of India's RVSM Implementation Program with neighbouring FIRs

2.1.3.8 India understood that Myanmar had indicated that they may not be able to implement RVSM in their airspace on 27 November 2003. This situation was of considerable concern since six EMARSSH routes namely, L507, P646, N895, M770, L301, and L759 enter Kolkota FIR from the Yangon FIR. It was suggested that ICAO should take up the issue with ATS Authorities of Myanmar. This matter was considered further by the meeting in paragraph 2.1.7 below.

Transition Airspace

2.1.3.9 India will have a transition airspace in the North Western part of its domestic airspace where domestic traffic merges with international traffic on route A466 near waypoint ASARI.

Indonesia

2.1.4 Indonesia advised the meeting that preparations for the introduction of RVSM for traffic departing the Jakarta FIR to the west on 27 November 2003 were progressing well. In addition, the use of RVSM in the Bay of Bengal and Beyond would include the height band from FL290 to FL410 utilizing the single alternate FLOS in exclusive airspace.

Malaysia

2.1.5 Malaysia reported that planning was well advanced for the implementation of RVSM using the single alternate FLOS in exclusive airspace across the Bay of Bengal from FL290 to FL410 inclusive on 27 November 2003. Malaysia provided an outline of their preparatory activities and readiness for implementation. RVSM was implemented on the eastern portion of the Kuala Lumpur FIR under the South China Sea Area Implementation Plan. The remaining portion of Kuala Lumpur FIR will implement RVSM in accordance with the Bay of Bengal and Beyond Implementation Plan.

2.1.5.1 A summary of progress of the preparatory work is as follows:

a) an AIC was published on 28 November 2002 (AIC 21/2002), which provided advance notification of RVSM implementation;

b) ATC automation system to be upgraded in order to cater for RVSM implementation;

c) provision of data on large height deviation to APARMO and MAAR for the purpose of safety monitoring is an ongoing process. Traffic movement data over Bay of Bengal from 15 December 2002 to 15 February 2003 has been provided to APARMO and MAAR; and

d) a training program has been developed to prepare air traffic controllers in Kuala Lumpur ACC for the introduction of RVSM over the Bay of Bengal was developed. The programme included theoretical and practical trainings mainly focused on the following:

i) application of RVSM
ii) coordination between Enroute Controllers
iii) coordination between adjacent ACCs
iv) transition from modified single alternate to single alternate FLOS and vice versa
v) application of Contingency Procedures

2.1.5.2 Training will commence at the beginning of November 2003 and was expected to be completed by 25 November 2003. This would ensure that the skill and knowledge acquired would still be fresh in the air traffic controllers' mind.

2.1.5.3 In regard to future action to be taken, the following activities will be pursued:

a) AIP Supplement concerning RVSM policy and procedures to be published;

b) signing of LOAs with adjacent ACCs; and

b) trigger NOTAM to be issued.

Maldives

2.1.6 Maldives reported that plans were developed for the implementation of RVSM in the Male FIR on 27 November 2003. Maldives planned to implement RVSM from FL290 to FL410 in exclusive airspace utilizing a single alternate FLOS.

Myanmar

2.1.7 The meeting expressed its concern that Myanmar had not attended this meeting and they may not be ready to implement RVSM as planned as no recent information had been provided on their RVSM readiness. ICAO advised the meeting that they had ongoing contact with Myanmar, and they had been expected to attend this meeting, and it would be necessary to confirm their present status. As a result of information provided by India that Myanmar may not be able to implement RVSM as planned on 27 November 2003, the meeting agreed that, if this was the case, there could be serious consequences on the successful implementation of RVSM in the Bay of Bengal and Beyond. Therefore, the meeting agreed that, as a matter of urgency, an ICAO Special ATS Coordination

Meeting with Myanmar, neighbouring States concerned and IATA should be held to brief Myanmar on the status of the RVSM Implementation Plan, assess their readiness status, and seek ways to provide assistance to implement the RVSM plan as appropriate. In this regard, the Secretariat was requested to arrange with Myanmar a meeting to be held as soon as possible at Yangon, Myanmar, and provisionally from 28 and 29 July 2002.

Nepal

2.1.8 Nepal informed the meeting that in view of its geographical location, the utilization of RVSM in Nepal's airspace would be limited. However, it was the view of the representative that Nepal should be fully involved with RVSM matters. Apart from a few flights between Katmandu and Chengdu, China, most of the other flights from Nepal were to/from India. RVSM implementation and operation in Nepal's airspace will depend largely on RVSM activities in adjacent States. After this meeting, it will be necessary to review Nepal's arrangements for RVSM to ensure that all necessary action was completed to meet the implementation date of 27 November 2003 in the interest of a seamless RVSM environment and harmonization in the Region. It was planned for RVSM to be implemented from FL290 to FL410 inclusive in exclusive airspace utilizing the single alternate FLOS.

Pakistan

2.1.9 Pakistan presented to the meeting details of its RVSM implementation plan. RVSM will be implemented in the Lahore and Karachi FIRs between FL290 to FL410 inclusive, and the airspace will be exclusive.

2.1.9.1 The meeting noted that Pakistan was geographically located at the interface between the Middle East and Asia Regions. Adjacent States to the North and Northwest of Pakistan, i.e. Afghanistan, Tajikistan and China were not implementing RVSM, and it was expected they would do so at a later stage. In this regard, Pakistan will provide the transition area and assume responsibility for the transition from RVSM to conventional vertical separation minimum (CVSM) in accordance with Letters of Agreement with the States concerned. The proposed transition areas for Lahore ACC on ATS routes to/from Kabul, Dushanbe and Urumqi FIRs will be based on LOAs between Delhi and Lahore, and Kabul and Lahore.

2.1.9.2 In regard to the Kabul FIR, the lower limit applicable, FL310 required that westbound traffic are assigned FLs310, 350 and 390 with longitudinal separation of 10 minutes between aircraft at the same level. Consequently, aircraft operating under RVSM FLs300, 340, 360 and 380 will change level to CVSM prior to the designated transfer of control points between Lahore/Karachi ACCs and Kabul FIC. In order to ensure a safe, smooth and efficient traffic flow, it was proposed that the following pairs of levels be considered the same for applying standard separation for westbound flights entering the Lahore/Karachi FIRs from the Delhi FIR at positions SAMAR and TIGER bound for the Kabul FIR:

a) FL 300 and FL320;
b) FL340 and FL360; and
c) FL380 and FL400 (not presently available in the Kabul FIR).

2.1.9.3 In regard to training, a group of 10 ATCOs recently underwent training abroad and they would be training other controllers. RVSM training was expected to be completed well before the implementation date, 27 November 2003.

2.1.9.4 The meetings was advised that Pakistan International Airline (PIA) at present had obtained RVSM approval for 15 of its 31 aircraft operating in the airspace to become RVSM compliant. Action was in hand for all PIA aircraft to become RVSM compliant.

Sri Lanka

2.1.10 Sri Lanka reported that plans were developed for the implementation of RVSM in the Colombo FIR on 27 November 2003 – FL290 to FL410 in exclusive airspace utilising a single alternate FLOS.

2.1.10.1 It will be necessary to make the following improvements to the ATM systems to support RVSM implementation:

a) software changes to the Radar Data Processing and Display System (RDPDS) and Flight Data Processing System (FDPS);

b) to provide an indication in the target label to identify RVSM compliant aircraft from non-compliant aircraft for controllers' ease of reference;

c) the Conflict Alert parameters will have to be changed to cater for RVSM requirements; and

d) the FDPS to be updated so that the system can read RVSM capability of the aircraft from its ICAO flight plan and print it on the flight progress strip.

2.1.10.2 In regard to RVSM compliance of aircraft, which had operated across Colombo FIR during the period under review, approximately 85 percent of aircraft were RVSM Compliant.

2.1.10.3 The traffic sample was prepared for the following items;

- Airspace users
- Aircraft types
- Entry point
- Entry flight level
- Entry time
- Exit point
- Exit flight level
- Exit time
- Point of departure
- Destination of flights

2.1.10.4 To determine the flight levels for RVSM implementation, air traffic statistics were collected and analyzed from 15 December 2002 to 15 February 2003 on air routes over Colombo airspace, namely: R461**, M300**, **L645,** A327, B340/A463, B344, G325, G462, G465**, P762**, **P570**, R456, A465 ,G454, B340F, A214, and A549 (EMARSSH routes are in bold type).

2.1.10.5 Sri Lanka drew attention to traffic on route A327 which often conflicted with traffic on routes A463F, B340F, G462, P570, as route A327 crossed all the above routes. Therefore, flight level allocation for traffic on A327 would be restricted to FL410 for east bound traffic and FL400 for west bound traffic, and under RVSM this restriction could be relaxed.

2.1.10.6 The meeting noted the progress made by Sri Lanka with its RVSM operational plan for the Colombo FIR, and expressed its appreciation for the comprehensive and helpful data provided

on the traffic sample and measures in-hand to prepare for implementation on 27 November 2003. Sri Lanka presented the results of the sample of traffic collected during 15 December 2002 to 15 February 2003 within the Colombo FIR, which were analyzed for the implementation of RVSM in accordance with the Bay of Bengal and Beyond Implementation Plan.

Thailand

2.1.11 The meeting was reminded of the decision taken at the RVSM TF/18 meeting, to convene a Special ATS Coordination Meeting in Bangkok (AEROTHAI Headquarters) on 3 – 5 September, to discuss transitional arrangements for the Bangkok FIR and the adjoining South China Sea area.

2.1.11.1 In relation to the Bay of Bengal area, Thailand informed the meeting that plans were almost complete for the introduction of RVSM from FL290 to FL410, utilising the single alternate FLOS in exclusive airspace for traffic proceeding to and from the Bay of Bengal and beyond.

Bay of Bengal FLOS proposed by IATA

2.2 The meeting discussed the FLOS proposed by India for the Indian FIRs. In response to the proposed FLOS, IATA recommended several amendments as follows:

EMARSSH Routes (Over Bay of Bengal) 1600-2400 UTC

ROUTE	WESTBOUND	EASTBOUND
P570, M300, N563, P574, N571, N877, P628, L759, M770, P646, L507 N895	Limited Standard RVSM Flight Levels FL300, 320, 340	
Crossing Routes over Bay of Bengal L301, P762, L645	Blocked Flight Levels for use on these routes FL260, 280, 360, 380, 400	

Or alternatively:

ROUTE	WESTBOUND	EASTBOUND
P570, M300, N563, P574, N571, N877, P628, L759, M770, P646, L507 N895	All Standard RVSM Flight Levels FL 300, 320, 340, 360, 380, 400	
Crossing Routes over Bay of Bengal L301, P762, L645	Use non-standard Flight Levels FL 290, 310, 330	Available Flight Levels FL 350, 370, 390, 410
	Use non-standard Flight Levels FL 290,330,370	Available Flight Levels FL 310, 350, 390

EMARSSH Routes (Over Bay of Bengal) Outside 1600-2400 UTC

ROUTE	WESTBOUND Bay of Bengal	EASTBOUND
L759, P628, M770,N895, P646, L507, N563, P574, N571, P570, M300	FL 300, 320, 340	FL 350, 370, 410
	WESTBOUND OVER CONTINENTAL INDIA	
	FL 320, 340, 360	

CROSSING ROUTES	WESTBOUND	EASTBOUND
P762	FL 280, 360, 380	FL290, 310, 390
L301	FL 280, 360, 380	FL290, 310, 390,
N895	FL 280, 360, 380	FL 290, 310, 390
L645	FL 280, 360, 380	FL 290, 310, 390

2.3 In further consideration of the matter, the meeting noted that ATS route congestion had been discussed at the ATS/AIS/SAR/SG/13 Meeting (23 – 27 June 2003) and the following items had been identified as outstanding issues to be resolved:

a) Bottlenecks over Delhi India causing significant delays for Delhi westbound departures;

b) Restrictions on flight levels on ATS route L333 over India due to military considerations – require additional FL 280;

c) Requirement for new ATS route joining ASOPO to Rahim Yar Khan (RK) within Indian airspace which at present is unable to be used due to military considerations; and

d) Effective use of Mach Number Technique (MNT) procedures as application by some Bay of Bengal States was inconsistent and not in accordance with the ICAO Planning Manual, causing unnecessary delays to long-haul international aircraft.

2.4 With reference to the issues mentioned above, IATA recognised the problem of convergence over Northern Continental India and requested that consideration be given to the following areas:

a) ASOPO direct to RK– de-converge traffic at Delhi;

b) L333 – adjust MEA to FL280;

c) Danger areas – request restricted operations between 1600-2400 UTC; and

d) Additional FL280 in Kabul FIR.

2.5 The meeting noted that the purpose of RVSM implementation was to increase the number of cruising levels for RVSM-approved aircraft. The meeting agreed that during peak periods from 1600 to 2400 UTC, all RVSM levels should be made available. The meeting also recognized that as far as possible, operators should be able to flight plan at all levels outside the peak traffic periods.

2.6 The meeting further recognized that it was necessary to agree on the FLOS for RVSM airspace in India before the RVSM operational plan for the Bay of Bengal and Beyond could be finalized. In this context, the meeting agreed to hold a Special ATS Coordination Meeting from 11-12 August in Kuala Lumpur, Malaysia to finalize the FLOS for RVSM operations in India. States concerned would also finalize the No-PDC arrangements for RVSM operations in the Bay of Bengal and Beyond.

2.7 The meeting updated the provisional operational plan for the implementation of RVSM in the Bay of Bengal and Beyond as shown in Appendix F to the Report.

Reports on Large Height Deviations

2.8 The meeting reviewed the reports on large height deviations due to operational errors that had been submitted by States to the APARMO. The meeting expressed concern that some States had not submitted reports. As the incomplete data could have an impact on the estimation of operational risk and subsequent comparison to the TLS, the meeting strongly urged the States involved to submit the reports as soon as possible but not later than 31 July 2003. The meeting also reminded all Stated to continue to provide the APARMO with monthly reports on large height deviations, including a 'NIL' occurrence report (where applicable).

RVSM Phraseologies

2.9 The meeting was advised that the ATS/AIS/SAR/SG/13 Meeting had considered it appropriate to include RVSM-related phraseologies adopted and used in the Pacific and South China Sea areas in the *Procedures for Air Navigation Services-Air Traffic Management* (PANS-ATM, Doc 4444). ICAO would take action to process the amendment for global application.

Publication of AIP Supplement

2.10 The meeting recognized that some States would not be able to publish the AIP Supplement for RVSM implementation until the FLOS for Indian RVSM airspace was agreed. The meeting agreed that the AIP Supplement should be published as soon as possible but not later than 30 September 2003, following the Special ATS Coordination Meeting on the FLOS.

Agenda Item 3: Issues Relating to Airworthiness and Operation of Aircraft

Assessment of Operator Readiness

3.1 The meeting reviewed the readiness of aircraft and operators for RVSM operations on international routes in Bay of Bengal and Beyond. The meeting noted that more than 80 percent of international fleets were RVSM-approved. Some domestic and regional airlines were in the process of obtaining RVSM approval.

Monitoring Program for Height-Keeping Performance

3.2 The meeting reviewed the monitoring program for aircraft height-keeping performance and large height deviation and noted the following:

a) operators would continue to submit data on Height-Keeping Monitoring and Large Height Deviation to the APARMO and MAAR for safety assessments and continuous airworthiness monitoring purposes;

b) India, Indonesia, Sri Lanka and Thailand indicated that there were no reports of large height deviation over the Bay of Bengal and Beyond from operators, due to aircraft system failure, pilot error or adverse weather from January to May 2003; and

c) India reported that during monsoon season, large scale weather deviations could be encountered as a result of cyclonic activities and thunderstorm. India would provide more detailed information at the next Task Force Meeting.

In-flight Contingency Procedures for Lateral Offsets

3.3 The meeting reviewed the draft ICAO Guidelines on the use of lateral, which provided for application of a 1 NM offset procedure. At present a Regional Supplementary Amendment was being processed by ICAO for this procedure to be applied in some FIRs in the South Pacific. However the ICAO Separation and Airspace Safety Panel (SASP) was developing a 2 NM lateral offset procedure to the right of track that included wake turbulence procedures to be applicable on route systems with 30 and 50 NM track spacing. SASP studies to date indicate that this procedure should be possible. In this regard, ATS/AIS/SAR/SG/13 addressed this matter and has recommended that once ICAO adopts this procedure, it should be applied in all appropriate airspace in the Asia/Pacific Region. The meeting agreed that the ICAO proposed draft procedures should be reviewed and adopted for RVSM operations when applicable.

Continuous Airworthiness Program and Monitoring

3.4 The meeting agreed that the continuous airworthiness programme and monitoring should be included in State Authority Procedures and Airline Operations Manual, in order to assess that aircraft RVSM primary means were reliable and complied with the limits of RVSM system tolerances. An example of the continuous airworthiness monitoring and reporting presented by India is at **Appendix G**.

Future OPS/AIR Work Program

3.5 The meeting reviewed the RVSM Phraseologies for Controller-Pilot Data Link Communication and agreed these should be standard application for all regions. The meeting requested ICAO to liaise with the FANS Interoperability Teams, with a view to include the phraseologies in the PANS-ATM (Doc. 4444).

3.6 The meeting noted that the implementation of ACAS was a mandatory requirement of ICAO since January 2003. The meeting also noted that most international fleets of RVSM operators were equipped with ACAS II (TCAS II V.7) in order to improve the operational safety level and meet the ICAO requirement. The meeting agreed to continue to coordinate the use of ACAS II (TCAS II V.7) for RVSM operations.

Agenda Item 4: Safety and Airspace Monitoring Considerations

Transition Plan for the Transfer of Duties and Responsibilities of Regional Monitoring Agency in Asia Region

4.1 Thailand presented information on the transition plan to transfer the duties and responsibilities from the APARMO to MAAR. The progress of establishing MAAR had been reported periodically to the RVSM Task Force. At the RVSM/TF/17 held from 20 to 24 January 2003, Thailand informed the Task Force that all infrastructure of MAAR was in place and MAAR was ready to assume full RMA responsibilities for the Asia Region. The proposed transition plan included the MAAR duties and responsibilities, MAAR geographical area, adoption of the agency's name, date of transfer, and coordination principles with the APARMO before and after the proposed transition date.

4.2 The geographical areas which are intended to be under MAAR's responsibility are as follows:

- **Western Pacific/South China Sea**

China	–	Sanya AOR
Cambodia	–	Phnom Penh FIR
Hong Kong	–	Hong Kong FIR
Indonesia	–	Bali, Jakarta, and Ujung Pandang FIRs
Lao PDR		Vientiane FIR
Malaysia	–	Kuala Lumpur and Kota Kinabalu FIRs
Philippines	–	Manila FIR
Singapore	–	Singapore FIR
Taiwan	–	Taipei FIR
Thailand	–	Bangkok FIR
Viet Nam	–	Ha Noi and Ho Chi Minh FIRs

- **Bay of Bengal**

Bangladesh	–	Dhaka FIR
India	–	Chennai, Delhi, Kolkata, and Mumbai FIRs
Maldives	–	Male FIR
Myanmar	–	Yangon FIR
Nepal	–	Kathmandu FIR
Pakistan	–	Karachi and Lahore FIRs
Sri Lanka	–	Colombo FIR
Indonesia	–	Jakarta FIR
Malaysia	–	Kuala Lumpur FIR
Singapore	–	Singapore FIR
Thailand	–	Bangkok *FIR*

Note: The FIRs in "Italics" are located in both of the Western Pacific /South China Sea and Bay of Bengal areas

4.3 The meeting supported the transfer of duties and responsibilities from the APARMO to MAAR and endorsed the transition plan as shown in **Appendix J** to the report. The Transition Plan will be presented to APANPIRG/14.

4.4 The meeting was briefed on the various forms used by Regional Monitoring Agencies for RVSM approval process and large height deviation reports. These forms together with filling instructions are at **Appendix G.**

4.5 The meeting was provided with information on points of contact and the website for MAAR, such as details on RVSM procedures, approval process, form to be used and traffic data collection template.

Email: maar@aerothai.co.th
Fax: +66(2) 287-8155

Monitoring Agency for Asia Region (MAAR)
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Website: www.aerothai.co.th/maar/

Review of Safety Assessment for the Implementation of RVSM in Bay of Bengal

4.6 The meeting reviewed the summary of the traffic sample data (TSD) and LHD reports associated with the implementation of RVSM, focusing on the airspace in the Bay of Bengal area, as shown in **Appendix I,** Tables 1 and 2, respectively. The meeting expressed concern that some States had not submitted the reports on LHD. As the incomplete data could have an impact on the estimation of operational risk and subsequent comparison to the TLS, the meeting strongly urged the States involved to submit the missing TSD and LHD reports to the APARMO, through MAAR as soon as possible but **not later than 31 July 2003**. The meeting also reminded all Stated to continue to provide the APARMO through MAAR with monthly reports on large height deviations, including a 'NIL' occurrence report (where applicable). The LHD reports should be sent to the APARMO and MAAR **by the first week of the following month**. In addition, the meeting requested all States to submit the traffic sample data in **electronic format**.

4.7 The meeting noted two occurrences of LHD due to the ATC coordination on the transfer of control of aircraft within the Yangon FIR. The LHD duration of each occurrence was unknown, but assumed that the aircraft were flying at an incorrect flight level for the entire duration in Yangon FIR, which was approximately 20 minutes flying time for a heavy-type aircraft (e.g. B744) to transit the FIR. The meeting requested ICAO to liaise with Myanmar on the two reports of LHD and report to the APARMO.

4.8 The meeting reviewed the preliminary assessment of the readiness of operators and aircraft types for RVSM implementation in the Bay of Bengal and Beyond. Based on traffic samples collected between 15 December 2002 and 15 February 2003, 84.23 percent of operations in the Bay of Bengal area had been conducted by State-approved operators and aircraft. The APARMO and MAAR would jointly provide an update on the readiness assessment of operators and aircraft at the next Task Force Meeting.

4.9 The meeting also reviewed the development of a comprehensive profile of operators and aircraft types expected to operate in the Bay of Bengal airspace where RVSM would be applied. The analysis was based on available traffic samples of the Bay of Bengal area which indicated the following:

- Top 25 operators
- Predominant type of aircraft

- Flight level utilization
- Top 20 origins and destinations

4.10 The meeting noted the report of the preliminary safety assessment for the implementation of RVSM in the Bay of Bengal and Beyond as presented by MAAR. The report was not conclusive because the traffic sample data and LHD reports were incomplete. As these reports would have a significant impact on the safety assessment for RVSM operations in Bay of Bengal area, States concerned were reminded to provide the information and reports as indicated in paragraph 4.3. The APARMO and MAAR will provide the update on the safety assessment at the RVSM/TF/20 Meeting.

Agenda Item 5: Implementation Management Considerations

Task Force Work Groups

5.1 The combined 18th and 19th Task Force Meetings continued with the arrangement that in order to accomplish the tasks in the action plan, the Task Force should be divided into smaller Work Groups as follows:

a) Safety & Airspace Monitoring (SAM/WG);

b) ATC Operations (ATC/WG); and

c) Aircraft Operations & Airworthiness (OPS/AIR/WG).

5.2 The Terms of Reference of the Work Groups were reviewed as at Appendix B to the Report. A summary of discussions of the Work Groups is contained under Agenda Items 2, 3 and 4.

Review of RVSM Operations in the Western Pacific/South China Sea

5.3 Cambodia, Hong Kong China, Indonesia, Lao PDR, Malaysia, Philippines, Singapore, Thailand and Viet Nam provided updates on the implementation of RVSM in their respective FIRs in the Western Pacific/South China Sea area. These reports were further taken into account during the work of the ATC/WG.

Review of RVSM Implementation in the Bay of Bengal and Beyond

5.4 India, Indonesia, Malaysia, Maldives, Nepal, Pakistan, Sri Lanka and Thailand reported on the progress of RVSM implementation in their respective FIRs in the Bay of Bengal and Beyond. These reports were further taken into account during the work of the ATC/WG.

Harmonization of RVSM Operations with the Middle East Region

5.5 The meeting reviewed the plans to harmonise RVSM operations with the Middle East Region. To this end, a second Joint Coordination Meeting with the Middle East RVSM Task Force would be held from 27-28 August 2003 in Abu Dhabi, UAE to finalize ATC coordination procedures and Letters of Agreement.

Agenda Item 6: Review of Action Items

6.1 The meeting reviewed and updated the task list relating to the implementation of RVSM as shown at **Appendix K** to the Report.

Agenda Item 7: Future Work – Meeting Schedule

7.1 The meeting agreed on the future work of the Task Force as follows:

Special ATS Coordination Meeting for FLOS
in the Bay of Bengal and Beyond:

11-12 August 2003, Kuala Lumpur, Malaysia

2nd Joint Co-ordination Meeting between Asia/Pacific
and Middle East RVSM Task Forces:

27-28 August 2003 in Abu Dhabi, UAE

Special ATS Coordination Meeting for Transition
into the Bay of Bengal and Beyond:

3 -5 September 2003, Bangkok, Thailand

RVSM/TF/20: 5 days 20-24 October 2003, New Delhi, India (Provisional)
(Bay of Bengal and Beyond focus)

(Target Implementation Bay of Bengal and Beyond AIRAC date 27 November 2003)

RVSM/TF/21: 3 days February 2004 and location TBD
(90-day follow up review on Bay of Bengal and Beyond focus)

RVSM/TF/22: 2 days November 2004 and location TBD
(1-year follow up review on Bay of Bengal and Beyond focus)

RVSM Implementation Status

7.2 The meeting updated the status of RVSM implementation in the Asia/Pacific Region as shown in **Appendix L**.

Agenda Item 8: Other Business

8.1 IATA expressed appreciation for the excellent support provided by the Secretariat to the meeting especially from the ATM Section who is significantly under staffed.

9. Closing of the Meeting

9.1 Mr. Sydney Maniam expressed sincere appreciation to the ICAO Asia and Pacific Regional Office for the excellent conduct of the combined 18th and 19th RVSM Task Force Meetings. He thanked all staff concerned for their warm hospitality and professional support of the meetings. He also thanked all participants for their efforts and cooperation, which had contributed significantly to the successful completion of the meetings.

TERMS OF REFERENCE OF THE

RVSM IMPLEMENTATION TASK FORCE

1) To develop strategic, benefits-driven implementation plans (based on cost benefit studies), in concert with airspace users, for RVSM operations within selected areas and airspace of the Asia/Pacific Region, ensuring inter-regional harmonization;

2) To consider any amendments to RVSM guidance material that may be proposed by States and international organizations;

3) To address any other matters as appropriate and relevant to the implementation of RVSM;

4) The Task Force will include participation from States and International Organizations that are considering or involved with the implementation of RVSM; and

5) The Task Force will report to the ATS/AIS/SAR Sub-Group.

The Terms of Reference of the RVSM Implementation Task Force Work Group are as follows:

Safety & Airspace Monitoring Work Group (SAM/WG)

The SAM/WG is responsible for mathematical and statistical analysis to assist with the maintenance and on-going monitoring of safety through the assessment of collision risk for Asia/Pacific Region RVSM and other tasks as agreed with the RVSM Task Force. The main tasks of the SAM/WG are:

- To develop a monitoring program to ensure that the quantity and quality of data are collected to allow an assessment of vertical collision risk;

- To review existing mathematical and statistical techniques to assure their appropriateness for Asia/Pacific Region RVSM;

- To ensure the transferability of aircraft data collected from other airspace regions;

- To support the assessment of the safety of RVSM prior to and during the Verification and Operational Trials by the production of collision risk assessments based on altitude deviation incidents and altitude monitoring data to determine whether the TLS is being met;

- To devise suitable methodologies for incorporating the effects of projected traffic increases and system changes on occupancy and collision risk in the future environment;

- To identify those elements which are critical in the assessment of collision risk and suggest areas where improvements might be effective in reducing risk;

- To establish a policy for investigating those errors that may jeopardise satisfaction of the Target Level of Safety (TLS);

- To estimate periodically the vertical occupancies (traffic densities, passing frequencies, etc.) in the Asia/Pacific Region; and

- To perform periodically other data collections (e.g. ASE stability) in order to ensure that the parameter values used in the mathematical collision risk models remain current.

ATC Operations Work Group (ATC/WG)

The ATC/WG is responsible for addressing all matters relating to air traffic services within the RVSM and transition airspace, to include the following:

- To identify airspace in which RVSM will be applied based on statement of application and develop a regional operational concept, ensuring inter-regional harmonization;
- To develop procedures to mitigate wake turbulence;
- To establish transition areas and develop transition procedures;
- To develop contingency procedures; and
- To consider workload issues and identify the need for controller simulations.

Aircraft Operations & Airworthiness Work Group (OPS/AIR/WG)

The OPS/AIR/WG is responsible for addressing pilot operations, airworthiness, and aircraft approval issues, and:

- To harmonize policy on operations and airworthiness issues related to RVSM;
- To develop and harmonize guidance related to the implementation of RVSM and co-ordinate on issues which may arise in the application of the RVSM Minimum Aircraft System Performance Specifications (MASPS);
- To initiate necessary action to amend aeronautical charts to reflect navigational requirements related to RVSM;
- To develop policy for use of Airborne Collision Avoidance Systems (ACAS) as it relates to RVSM; and
- To review monitoring data prior to implementation and after implementation.

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Mr. Rosly Saad	Deputy Chief SATCC Civil Aviation Authority of Singapore Singapore Changi Airport P.O. Box 1 Singapore 918141	Tel: +65-6541-2430 Fax: +65-6545-6252 E-mail: rosly_saad@caas.gov.sg
SRI LANKA		
Mr. D.M.P. Dissanayake	Officer-in-charge/Personnel Licensing Civil Aviation Authority of Sri Lanka No. 64 Galle Road Colombo 03, Sri Lanka	Tel: 94-1-436552 Fax: 94-1-440231 E-mail: parad@sri.lanka.net

Mr. K.H. Rathnasiri (RVSMTF/19)	Air Traffic Controller	Tel: + Fax: + E-mail:
THAILAND		
Mr. Vasan Thanomsing	Aviation Safety Inspector Flight Standards Bureau Department of Civil Aviation 71 Soi Ngarmdu-Plee Tungmahamek Bangkok 10120	Tel: +66-2-286 2374 Fax: +66-2-286 2913 E-mail: doavasan@yahoo.com
Mr. Nopadol Sangngurn	Vice President, Business Development Bureau Aeronautical Radio of Thailand Ltd. (AEROTHAI) 102 Ngarmduplee Thungmahamek Bangkok 10120, Thailand	Tel: 66-2-285 9054 Fax: 66-2-285 9488 E-mail: nopadol@aerothai.co.th
Mr. Paisit Herabat, Ph.d.	Systems Engineer Planning and Project Department AEROTHAI 102 Ngamduplee Thungmahamek Bangkok 10120, Thailand	Tel: +66-2-287 8190 Fax: +66-2-287 8155 E-mail: paisit@aerothai.co.th maar@aerothai.co.th
Mr. Tinnagorn Choowong	Air Traffic Control Manager Bangkok Area Control Centre AEROTHAI 102 Ngamduplee Thungmahamek Bangkok 10120, Thailand	Tel: +66-2-285 9975 Mobile: +66-9-8166486 Fax: +66-2-285 9406 E-mail: tinnagorn.ch@aerothai.co.th
Mr. Siwaphong Boonsalee	System Engineer Bangkok Area Control Centre AEROTHAI 102 Ngamduplee Thungmahamek Bangkok 10120, Thailand	Tel: +66-2-287 8311 Fax: +66-2-285 9406 E-mail: boonsalee@aerothai.co.th

Capt. Werasak Wiroonpetch	Manager, International Aviation Affairs & Development Department Thai Airways International Public Company Ltd. 89 Vibhavadi Rangsit Road Bangkok 10900, Thailand	Tel: +66-2-545 2665 Fax: +66-2-545 3849 E-mail: werasak.w@thaiairways.com
Mr. Aumphol Tuatulanon	Aircraft Engineer, Avionics System Group Technical Department Thai Airways International Public Company Ltd. 89 Vibhavadi Rangsit Road Bangkok 10900, Thailand	Tel: +66-2-563 8261 Fax: +66-2-504 3360 E-mail: aumphol.t@thaiairways.com
Mr. Somkiat Prakitsuvan	Route Planning Analysis Division Manager Flight Operations Department Thai Airways International Public Co., Ltd 89 Vibhavadi Rangsit Rd Bangkok 10900, Thailand	Tel: 66-2-535 2449 Fax: 66-2-504 3814 E-mail: somkiat.p@thaiairways.com
VIET NAM		
Mr. Dang Quang Thong	ATS-AIS Specialist ATS-AIS Division Viet Nam Air Traffic Management Civil Aviation Administration of Viet Nam Gialam Airport, Hanoi The Socialist Republic of Vietnam	Tel: +84-4-8730320/21 Fax: +84-4-8272597
Mr. Phan Dinh Tuan	ATS Officer Viet Nam Air Traffic Management Civil Aviation Administration of Viet Nam Gialam Airport, Hanoi The Socialist Republic of Vietnam	Tel: +84-8271513 ext 362 E-mail: khongvan@vnn.vn
Mr. Nguyen Dinh Cong	Deputy Director NORATS Northern Air Traffic Services Centre Viet Nam Air Traffic Management Civil Aviation Administration of Viet Nam Noi Bai International Airport The Socialist Republic of Vietnam	Tel: +84-48865094 Fax: +84-48860956 E-mail: ndcong@hotmail.com

Mr. Pham Van Long	Ho Chi Minh ACC Manager Southern Air Traffic Services Centre Viet Nam Air Traffic Management Civil Aviation Administration of Viet Nam 58 Truong Son Street, Ho Chi Minh City The Socialist Republic of Vietnam	Tel: +84-8-8847152 Fax: +84-8-8443705 E-mail: sorats@hcm.vnn.vn
IATA		
Mr. Soon Boon Hai	Assistant Director, Safety Operations & Infrastructure – Asia/Pacific International Air Transport Association 77 Robinson Road #05-00 SIA Building Singapore 068896	Tel: +65-6239 7262 Fax: +65-6536 6267
Mr. Owen B. Dell	Manager, International Operations Cathay Pacific Airways Limited International Affairs Department 9/F Central Tower, Cathay Pacific City 8 Scenic Road Hong Kong International Airport Lantau, Hong Kong, China	Tel: +852 2747 8829 Fax: +852 2141 8829 SITA: HKGVLCX E-mail: owen_dell@cathaypacific.com
Capt. Aric Oh	Management Pilot - Technical Singapore Airlines 161 Tai Keng Gardens Singapore 535433	Tel: +65-6540 3693 Fax: +65-6542 9564 E-mail: aric.oh@singaporeair.com.sg ciraho@pacific.net.sg
Mr. A. Purushotomadas (2-4 July)	Assistant Manager SIA Technical Singapore Airlines Singapore Airlines Limited SIA Training Centre 04-C 720 Upper Changi Road East Singapore 486852	Tel: +65-6540 3693 Fax: +65-6542 9564 E-mail: a_purushotomodas@singaporeair.com.sg
IFALPA		
Capt. Ng Kok Seong	IFALPA Representative 47 Limau Grove Singapore 467841	Tel: +65-64449425 Fax: +65-64449425 E-mail : kokseong@singnet.com.sg

IFATCA		
Mr. Kyotaro Harano	IFATCA Representative 44-9-201 Aza-Gibo Tomishiro Okinawa Japan	Tel: +81-98-856 6523 Fax: +81-98-856 6523 E-mail : ipacg@ifatca.org
ICAO		
Mr. David J. Moores	Regional Officer, ATM ICAO Asia and Pacific Office 252/1 Vibahvadi Rangsit Road Ladyao, Chatuchak Bangkok 10900 Thailand	Tel: +66-2-537 8189 ext 159 Fax: +66-2-537 8199 E-mail: dmoores@bangkok.icao.int icao_apac@bangkok.icao.int
Mr. John E. Richardson	Regional Officer, ATM ICAO Asia and Pacific Office 252/1 Vibahvadi Rangsit Road Ladyao, Chatuchak Bangkok 10900 Thailand	Tel: +66-2-537 8189 ext 152 Fax: +66-2-537 8199 E-mail: jrichardson@bangkok.icao.int icao_apac@bangkok.icao.int

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LIST OF RVSM TF/18 WORKING PAPERS (WPs) AND INFORMATION PAPERS (IPs)

NUMBER	AGENDA	WORKING PAPERS	PRESENTED BY
WP/1	1	Provisional Agenda for Task Force/18	Chairperson/ Secretariat
WP/2	2	Implementation of the Reduced Vertical Separation Minimum (RVSM) in the Western Pacific/South China Sea	Chairperson
WP/3	3	Proposed Agenda for the ATC Operations Work Group	Chairperson
WP/4	3	Proposed Agenda for the Safety And Airspace Monitoring Work Group	Chairperson SAM/WG
WP/5	6	RVSM Implementation Plan in Incheon, Tokyo and Naha FIRs	Republic of Korea & Japan
WP/6	3	Approval and Monitoring Requirements for Aircraft Operations in RVSM Airspace	Secretariat
WP/7	3	A Study on the Transition to Single-Alternate Flight Level Orientation Scheme for the South China Sea Areas	Philippines
WP/8	3	Single Alternate Flight Level Orientation Scheme (FLOS) for Westbound Traffic on ATS/RNAV Routes A1/P901	Hong Kong, China
WP/9	2	Summary of LHD Reports in connection with the Post RVSM Implementation in Western Pacific/South China Sea	Thailand
WP/10	3	Final Transition Plan for the Transfer of Duty Responsibility of Regional Monitoring Agency in Asia Region	Thailand
WP/11	3	Implementation of the Reduced Vertical Separation Minimum (RVSM)	Singapore
WP/12	4	Summary of the Updated Safety Assessment for the RVSM Implementation in Western Pacific/South China Sea	Thailand
WP/13	2	RVSM Implementation Plan in Bangkok FIR	Thailand
WP/14	2	Proposal for a Single Alternate Flight Level Orientation Scheme for the coming Phase of RVSM Implementation	Viet Nam
WP/15	2	Proposal for Flight Level will be implemented in Indonesia FIRs	Indonesia

NUMBER	AGENDA	INFORMATION PAPERS	PRESENTED BY
IP/1	-	List of Working Papers and Information Papers	Secretariat
IP/2	3	Review of RVSM Implementation in the Manila FIR after Phase 2	Philippines
IP/3	2	Review on the Implementation of Reduced Vertical Separation Minimum (RVSM) over South China Sea area within Kuala Lumpur and Kota Kinabalu FIRs	Malaysia
IP/4	3	Review on RVSM Operations in Vientiane FIR	Lao PDR
IP/5	3	RVSM Implementation Report	Hong Kong, China
IP/6	2	Report on the RVSM Implementation Status within Ho Chi Minh and Ha Noi FIRs	Viet Nam
IP/7	3	ATS Route Structure and RVSM Operations over the South China Sea	IFALPA
IP/8	2	RVSM Implementation Plan	Pakistan

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LIST OF RVSM TF/19 WORKING PAPERS (WPs) AND INFORMATION PAPERS (IPs)

NUMBER	AGENDA	WORKING PAPERS	PRESENTED BY
WP/1	1	Provisional Agenda for Task Force/19	Chairperson/ Secretariat
WP/2	2	Proposed Agenda for the ATC Operations Work Group (ATC/WG)	Chairperson
WP/3	3	Proposed Agenda for the Aircraft Operations/Airworthiness Work Group (OPS/AIR/WG)	Chairperson OPS/AIR/WG
WP/4	4	Proposed Agenda for the Safety And Airspace Monitoring Work Group	Chairperson SAM/WG
WP/5	5	RVSM Implementation Plan in Colombo FIR	Sri Lanka
WP/6	4	Summary of Traffic Sample Data and Large Height Deviation Reports in connection with the RVSM Implementation in Bay of Bengal	Thailand
WP/7	4	Preliminary Assessment of the Readiness of Operators and Aircraft Types for the RVSM Implementation in the Bay of Bengal Airspace	Thailand
WP/8	4	Development of a Comprehensive Profile Of Operators and Aircraft Types Expected to operate in the Bay Of Bengal Airspace where the Reduced Vertical Separation Minimum (RVSM) is to be Provisionally Applied	Thailand
WP/9	5	RVSM Implementation – FLOS in India FIRs	India

NUMBER	AGENDA	INFORMATION PAPERS	PRESENTED BY
IP/1	-	List of Working Papers and Information Papers	Secretariat
IP/2	2	Preparation for Implementation of RVSM in Kuala Lumpur FIR	Malaysia

NUMBER	AGENDA	INFORMATION PAPERS	PRESENTED BY
Flimsy No.1	5	MAAR and LHD Forms	Thailand

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AGENDA FOR TASK FORCE/18

Agenda Item 1: Adoption of Agenda

Agenda Item 2: Review Implementation Actions

Agenda Item 3: Review Operations

Agenda Item 4: Review of Action Items

Agenda Item 5: Future Action Plan

Agenda Item 6: Other Business

AGENDA RVSM/TF/19
BAY OF BENGAL AND BEYOND

Agenda Item 1: Adoption of Agenda

Agenda Item 2: Operational Considerations

Agenda Item 3: Issues Relating to Airworthiness and Approval of Aircraft

Agenda Item 4: Safety and Airspace Monitoring Considerations

Agenda Item 5: Implementation Management Considerations

Agenda Item 6: Review of Action Items

Agenda Item 7: Future Work – Meeting Schedule

Agenda Item 8: Other Business

PROPOSED OPERATIONAL PLAN FOR THE IMPLEMENTATION OF RVSM IN THE ASIA REGION

Flight Information Region/Area of Responsibility	Flight Levels	Flight Level Orientation Scheme (FLOS)	Exclusive Airspace * *Note 1*	Initial Implementation	Remarks
Bangkok (South China Sea)	290 - 410	Single Alternate	Yes	21 Feb 2002 (Phase 1)	G474 R468(BKK-BOKAK) R588(KAKET-SOPOL) R334 N891(BKK-XONAN)
Bangkok (Bay of Bengal and Beyond)	290 - 410	Single Alternate	Yes	27 Nov 2003 (Phase 2)	Domestic and International routes in the entire BKK FIR
Chennai	330 - 410	Single Alternate	Exclusive over Oceanic airspace and non-exclusive over territorial airspace	27 Nov 2003	P570 M300 N563 P762. FL290 - FL410 on L645 request prior coordination levels
Colombo	290 - 410	Single Alternate	Yes	27 Nov 2003	Levels to be reserved for crossing routes P762, L645 and A327
Delhi	330 - 410	Single Alternate	Exclusive over Oceanic airspace and non-exclusive over territorial airspace	27 Nov 2003	
Dhaka	TBD	Single Alternate	Yes	27 Nov 2003	To be coordinated by ICAO
Jakarta (South China Sea)	350 - 390 (phase 1)	Single Alternate	Yes	31 Oct 2002	Phase 1: N646, N752, L764, L895, L511, B592, G464, A464, A576, G462, A585, G220
Jakarta (South China Sea)	290 - 410 (phase 2)	Single Alternate	Yes	17 April 2003	Jakarta – Australia FL290 – FL410 and Jakarta – Singapore FL310 – FL410 on existing routes where RVSM is currently being applied.
Jakarta (South China Sea)	290 - 410 (phase 3)	Single Alternate	Yes	AIRAC Feb 2004	
Jakarta (Bay of Bengal)	310 - 410	Single Alternate	Yes	27 Nov 2003	EMARSSH routes and R461, B344, A585, A576, B335, G468, B466, A327, R469, A330
Karachi	290 - 410	Single Alternate	Yes	27 Nov 2003	Subject to coordination with adjacent FIRs. Implementation on a route specific basis. Transition issues (including Afghanistan) being examined.

Flight Information Region/Area of Responsibility	Flight Levels	Flight Level Orientation Scheme (FLOS)	Exclusive Airspace ** Note 1*	Initial Implementation	Remarks
Kathmandu	330 - 410	Single Alternate	Yes	27 Nov 2003	Subject to coordination with adjacent FIRs.
Kolkata	330 - 410	Single Alternate	Exclusive over Oceanic airspace and non-exclusive over territorial airspace	27 Nov 2003	L301 FL290 – FL410 (subject to prior coordination)
Kuala Lumpur (South China Sea)	290 - 410 (Phase 2)	Single Alternate/ Modified Single Alternate	Yes	31 Oct 2002	
Kuala Lumpur (Bay of Bengal)	290 - 410	Single Alternate	Yes	27 Nov 2003	Subject to coordination with adjacent FIRs.
Lahore	290 - 410	Single Alternate	Yes	27 Nov 2003	Subject to coordination with adjacent FIRs. Implementation on a route specific basis. Transition issues (including Afghanistan) being examined.
Male	290 - 410	Single Alternate	Yes	27 Nov 2003	
Mumbai	290 - 410	Single Alternate	Exclusive over Oceanic airspace and non-exclusive over territorial airspace	27 Nov 2003	Routes passing through Calcutta will be FL330 – FL410. A451, G450, B459, A474 FL290 – FL410 with level reservations
Singapore (South China Sea)	310-410	Modified Single Alternate ***Note 2***	Yes	21 Feb 2002	
Singapore (Phase 2)	290-410	Modified Single Alternate ***Note 2***	Yes	31 Oct 2002	Routes from Singapore to Jakarta FIR FL350 – FL390
Singapore (Phase 3)	290 - 410	Modified Single Alternate ***Note 2***	Yes	17 April 2003	Routes from Singapore to Jakarta FIRs will expand to FL310 – FL410
Yangon	TBD	TBD	TBD	27 November 2003	To be coordinated by ICAO

Table 2.1 – RVSM Implementation Bay of Bengal and Beyond (within the ICAO Asia Region)

Note 1.— "Exclusive" means non-RVSM approved aircraft may NOT flight plan into airspace where RVSM may be applied. Aircraft that have not received State RVSM approval may be cleared to operate in airspace where RVSM may be applied in accordance with policy and procedures established by the ATS Provider States provided that 2,000ft vertical separation is applied. Some States may choose to allow non-RVSM State aircraft to flight plan into RVSM airspace.

Note 2.— "Single Alternate" indicates an assignment of levels that complies with the RVSM Table of Cruising Levels. "Modified Single Alternate" means the RVSM levels for the six major RNAV routes (L642, M771, N892, L625, N884 and M767) in the South China Sea Region i.e. FL320, FL340, FL360, FL380 and FL400. RVSM approved aircraft operating on routes that cross the six one-way tracks would be assigned the eastbound levels FL330, FL370 and FL410 or westbound levels FL310, FL350 and FL390 accordingly. Individual State AIPs describe the details.

Note.— This Draft Operational Implementation Plan has been developed as an indication of States' current implementation plans – elements of this plan are subject to review by States.

MAAR FORM F1
CONTACT/CHANGE OF CONTACT DETAILS FOR MATTERS RELATING TO ASIA REGION APPROVALS

This form should be completed and returned to the address below on the first reply to the Monitoring Agency for Asia Region (MAAR) or when there is a change to any of the details requested on the form (PLEASE USE BLOCK CAPITALS).

STATE OF REGISTRY:

STATE OF REGISTRY (ICAO 2 LETTER IDENTIFIER):

Enter the 2-letter ICAO identifier as contained in ICAO Doc 7910/92. In the event that there is more than one identifier for the same State, the one that appears first in the list should be used.

ADDRESS:

CONTACT PERSON:

Full Name:

Title: Surname: Initials:

Post/Position:

Telephone #: Fax #:

E-mail:

Initial Reply*/Change of Details* (**Delete as appropriate*)

When complete, please return to the following email (preferable), fax, or mailing address:

E-Mail: maar@aerothai.co.th
Fax: 662-287-8155
Monitoring Agency for Asia Region (MAAR)
ATS Operations Bureau, AEROTHAI
102 Ngamduplee Tungmahamek, Sathorn
Bangkok 10120 Thailand

MAAR FORM F2
RECORD OF APPROVAL TO OPERATE IN ASIA REGION RVSM AIRSPACE

1. When a State of Registry approves or amends the approval of an operator/aircraft for operations within the Asia Region airspace, details of that approval must be recorded and sent to the Monitoring Agency for Asia Region (MAAR) to reach it by the tenth day of the month following the month that the approval was issued.

2. *Before providing the information as requested below, reference should be made to the accompanying notes* **(PLEASE USE BLOCK CAPITALS)**.

2.1 State of Registry:

2.2 Name of Operator:

2.3 State of Operator:

2.4 Aircraft Type:

2.5 Aircraft Series:

2.6 Manufacturers Serial No:

2.7 Registration No:

2.8 Mode S Address Code:

2.9 Airworthiness Approval:

2.10 Date Airworthiness Approval Issued:

2.11 RVSM Approval:

2.12 Date RVSM Approval Issued:

2.13 Date of Expiry (If Applicable):

2.14: Remarks:

When complete, please return to the following email (preferable), fax, or mailing address:

E-Mail: maar@aerothai.co.th
Fax: 662-287-8155
Monitoring Agency for Asia Region (MAAR)
ATS Operations Bureau, AEROTHAI
102 Ngamduplee Tungmahamek, Sathorn
Bangkok 10120 Thailand

MAAR FORM F3
WITHDRAWAL OF APPROVAL TO OPERATE IN ASIA REGION RVSM AIRSPACE

1. When a State of Registry has cause to withdraw the approval of an operator/aircraft for operations within the Asia Region RVSM airspace, details as requested below, must be submitted to the Monitoring Agency for Asia Region (MAAR) by the most appropriate method.

2. *Before providing the information as requested below, reference below, reference should be made to the accompanying notes* **(PLEASE USE BLOCK CAPITALS)**.

2.1 State of Registry:

2.2 Name of Operator:

2.3 State of Operator:

2.4 Aircraft Type:

2.5 Aircraft Series:

2.6 Manufacturers Serial No:

2.7 Registration No.:

2.8 Aircraft Mode S Address Code:

2.9 Date of Withdrawal of RVSM Approval:

2.10 Reason of Withdrawal of RVSM Approval:

2.11 Remarks:

When complete, please return to the following email (preferable), fax, or mailing address:

E-Mail: maar@aerothai.co.th
Fax: 662-287-8155
Monitoring Agency for Asia Region (MAAR)
ATS Operations Bureau, AEROTHAI
102 Ngamduplee Tungmahamek, Sathorn
Bangkok 10120 Thailand

MONITORING AGENCY FOR ASIA REGION
(MAAR)

Large Height Deviation Report

Report to the Monitoring Agency for Asia Region (MAAR) of an altitude deviation of 300ft or more, including those due to TCAS, turbulence and contingency events.

Name of FIR: _____

(Please complete Section I or II as appropriate)

SECTION I:

There were no reports of large altitude deviation for the month of _____

SECTION II:

There was/were _____ report(s) of an altitude deviation of 300 ft or more between FL290 and FL410.
Details of the altitude deviation are attached (Form A).
(Please use a separate form for each report of large height deviation).

SECTION III:

When complete, please return to the following email (preferable), fax, or mailing address:

E-Mail: maar@aerothai.co.th
Fax: 66-2-287-8155
Monitoring Agency for Asia Region (MAAR)
ATS Operations Bureau, AEROTHAI
102 Ngamduplee Tungmahamek, Sathorn
Bangkok 10120 Thailand

Form A

Report of an Altitude Deviation of 300 ft or More Between FL 290 and FL 410

(1) Reporting agency

(2) Location of deviation

(3) Date of occurrence (UTC)

(4) NOPAC/CENPAC/CEP/SOPAC/Japan-Hawaii/South China Sea/Other

(5) Flight identification and type

(6) Flight level assigned

(7) Observed/reported final level Mode C/Pilot report

(8) Duration at flight level

(9) Cause of deviation

(10) Other traffic

(11) Crew comments, if any, when noted

(12) Remarks

REDUCED VERTICAL SEPARATION MINIMUM (RVSM)
MONITORING APPLICATION
(Return completed form to the MAAR by Email via maar@aerothai.co.th or Fax at 662-287-8155)

Operator Name: _____

Address: _____

_____

Operator Primary Point of Contact

Name: _____ Title: _____

Telephone Number: _____ Fax Number: _____

Email Address: _____

Secondary Point of Contact

Name: _____ Title: _____

Telephone Number: _____ Fax Number: _____

Email Address: _____

Civil Aviation Authority Contact

Name: _____ Title: _____

Telephone Number: _____ Fax Number: _____

Email Address: _____

AIRCRAFT INFORMATION
(Please be sure to include data for the ENTIRE fleet)

Aircraft Model	Registration Number	Serial Number

Form F1 Instruction

It is important that the Monitoring Agency for Asia Region (MAAR) has an accurate record of a point of contact for any queries that might arise. Recipients are therefore requested to include a completed MAAR F1 with their first reply to the MAAR. Thereafter, there is no further requirement unless there has been a change to the information requested on the form.

Instruction for Form MAAR F2

If recipients are unable to pass the information requested in the MAAR F2 to the MAAR through the Internet, by direct electronic transfer, or by data placed on a 3.5" floppy disk, a hard copy MAAR F2 must be completed for each aircraft granted RVSM approval. The numbers below refer to the superscript numbers on the blank MAAR F2.

The numbers listed below refer to the number of the data entries in Form MAAR F2 - "Record of Approval to Operate in Asia Region RVSM Airspace."

2.1 **State of Registry –** Enter the single letter ICAO identifier as contained in ICAO Doc 7910/92 (03/99). If more than one identifier is designated for the States, use the letter identifier that appears first.

2.2 **Name of Operator –** Enter the operator's 3-letter ICAO identifier as contained in ICAO Doc 8585/109 (03/99):

- Enter "IGA" for general aviation aircraft
- Enter "MIL" for military aircraft
- If none, place an "X" in the field and write the name of the operator/owner in the Remark row.

2.3 **State of Operator –** Enter the single letter ICAO identifier as contained in ICAO Doc 7910/92 (03/99). In the case of their being more than one identifier designated for the State, use the letter identifier that appears first.

2.4 **Aircraft Type –** Enter the ICAO designator as contained in ICAO Doc 8643/27 (07/99). Example:

- Enter A320 for Airbus A320-211
- Enter B744 for Boeing B747-438

2.5 **Aircraft Series –** Enter series of aircraft, or manufacturer's customer designation. Example:

- Enter 211 for Airbus A320-211
- Enter 400 or 438 for Boeing B747-438

2.6 **Manufacturers Serial No**.

2.7 **Registration No.** – Example, for AA-XYZ write AAXYZ

2.8 **Mode S Address Code** – Enter ICAO allocated Aircraft Mode S (6 characters, hexadecimal) address code.

2.9 **Airworthiness Approval** – Enter "yes" or "no"

2.10 **Date Airworthiness Approval Issued** – MM/DD/YY. Example:

- Write 10/26/98 for October 26, 1998

2.11 **RVSM Approval** – Enter "yes" or "no"

2.12 Date RVSM Approval Issued – MM/DD/YY. Example
- Write 10/26/98 for October 26, 1998

2.13 Date of Expiry (if applicable) – MM/DD/YY. Example
- Write 10/26/98 for October 26, 1998

2.14 Remarks

Instruction for Form MAAR F3

MAAR F3 must be completed and forwarded to MAAR immediately when the state of registry has cause to withdraw the approval of an operator/aircraft for operations with Asia Pacific RVSM Airspace.

The numbers listed below refer to the number of the data entries in Form MAAR F3 - "Withdrawal of Approval to Operate in Asia RVSM Airspace."

2.1 State of Registry – Enter the single letter ICAO identifier as contained in ICAO Doc 7910/92 (03/99). If more than one identifier is designated for the States, use the letter identifier that appears first.

2.2 Name of Operator – Enter the operator's 3-letter ICAO identifier as contained in ICAO Doc 8585/109 (03/99):
- Enter "IGA" for general aviation aircraft
- Enter "MIL" for military aircraft
- If none, place an "X" in the field and write the name of the operator/owner in the Remark row.

2.3 State of Operator – Enter the single letter ICAO identifier as contained in ICAO Doc 7910/92 (03/99). In the case of their being more than one identifier designated for the State, use the letter identifier that appears first.

2.4 Aircraft Type – Enter the ICAO designator as contained in ICAO Doc 8643/27 (07/99). Example:
- Enter A320 for Airbus A320-211
- Enter B744 for Boeing B747-438

2.5 Aircraft Series – Enter series of aircraft, or manufacturer's customer designation. Example:
- Enter 211 for Airbus A320-211
- Enter 400 or 438 for Boeing B747-438

2.6 Manufacturers Serial No.

2.7 Registration No. – Example, for AA-XYZ write AAXYZ

2.8 Mode S Address Code – Enter ICAO allocated Aircraft Mode S (6 characters, hexadecimal) address code.

2.9 Date of Withdrawal of RVSM Approval – MM/DD/YY. Example: write 10/26/98 for October 26, 1998

2.10 Reason Withdrawal of RVSM Approval

2.11 Remarks

Instruction for LHD Report Form

1. Enter the name of FIR reporting LHD to the appointed Regional Monitoring Agency (RMA).

2. If there is no Large Height Deviation occurred in the particular month, enter Month to Section I

3. If there is(are) Large Height Deviation(s) occurred in the particular month, enter the number of LHD occurrences to Section II, followed by the detailed information in Form A

4. Follow instruction in Section III

INTERNATIONAL CIVIL AVIATION ORGANIZATION
ORGANISATION DE L'AVIATION CIVILE INTERNATIONALE
ORGANIZACIÓN DE AVIACIÓN CIVIL INTERNACIONAL
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ГРАЖДАНСКОЙ АВИАЦИИ
منظمة الطيران المدني الدولي
国 际 民 用 航 空 组 织

999 UNIVERSITY STREET, MONTREAL, QUEBEC, CANADA H3C 5H7

Tel.: (514) 954-8219 Internet: icaohq@icao.org Telex: 05-24513
Fax: (514) 954-6077 Sitatex: YULCAYA Cables: ICAO MONTREAL

Tel.: +1 (514) 954-8219 ext. 6401

Ref.: AN 13/11.1-03/6 28 February 2003

Subject: Approval and monitoring requirements for aircraft operations in RVSM airspace

Action required: As indicated in paragraph 9.

Sir/Madam,

1. I have the honour to draw your attention to certain aspects of the requirements associated with the approval of aircraft and operators for operations in airspace where a reduced vertical separation minimum (RVSM) of 300 m (1 000 ft) is applied above Flight Level 290, and the height monitoring programs which are instituted in RVSM airspace.

Approval of aircraft and operators for RVSM operations

2. The requirements and procedures for RVSM were developed by the Air Navigation Commission's Review of the General Concept of Separation Panel (RGCSP), which has since been renamed the Safety and Airspace Separation Panel (SASP). These requirements and procedures were derived from safety studies conducted by this panel, and are contained in the *Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive* (Doc 9574). In order to ensure that the overall safety objectives for the ATS system can be met in airspace where RVSM is implemented, all aircraft operating in the airspace are required to hold an approval, issued by the State of the Operator or State of Registry as appropriate, indicating that they meet all the technical and operational requirements for such operations. The criteria on which these approvals are based can be found in Joint Aviation Authority (JAA) Temporary Guidance Leaflet (TGL) No. 6, *Guidance Material on the Approval of Aircraft and Operators for Flight in Airspace above Flight Level 290 where a 300 m (1 000 ft) Vertical Separation Minimum is Applied*; Federal Aviation Administration (FAA) Document 91-RVSM, *Interim Guidance on the Approval of Operators/Aircraft for RVSM Operations;* or similar documents issued by other States which have implemented RVSM approval procedures.

Operating procedures

3. It should be noted that RVSM approvals are valid globally. The technical performance requirements are common to all RVSM implementations. This should also apply to operating procedures insofar as this is possible. However, there may be some cases where differences are unavoidable; for example, contingency and weather deviation procedures in oceanic versus high density continental airspace. In such cases, the States concerned will need to ensure that all other State authorities responsible for issuing RVSM approvals, and all flight crews of aircraft with existing RVSM approvals which could operate in the airspace, are made aware of the differences.

Systems performance monitoring

4. Doc 9574 indicates that there is a need for system performance monitoring during both implementation planning and the post-implementation operational use of RVSM. The principles and procedures for monitoring are described in Chapter 6 of Doc 9574. In all regions where RVSM has been implemented, Regional Monitoring Agencies (RMA) have been established, by the appropriate Planning and Implementation Regional Groups (PIRGS), to undertake these functions. The objectives of the RVSM monitoring program, as described in paragraph 3.3 e) of Doc 9574, include, inter alia:

a) verification that the RVSM approval process remains effective;

b) verification that the target level of safety will be met on implementation of RVSM, and will continue to be met thereafter;

c) monitoring the effectiveness of the altimetry system modifications which have been implemented to enable aircraft to meet the required height-keeping performance criteria; and

d) evaluation of the stability of altimetry system error (ASE).

5. In some of the initial implementations of RVSM, monitoring of height-keeping performance was a prerequisite for approval. This is not a requirement in Doc 9574, JAA-TGL6 or FAA 91-RVSM; however, it was considered prudent to require this in the early implementations until an adequate database of aircraft height-keeping performance could be accumulated. If any such requirements for height monitoring prior to issuance of an approval still exist in State documentation, they can now be removed.

6. States are also reminded of the need to ensure that details of all RVSM approvals issued are notified promptly to the appropriate RMA, so that the approvals databases maintained by these bodies will be as up-to-date as possible.

7. While monitoring prior to issuance of the RVSM approval is not necessary, all RVSM approved operators are required to participate in the monitoring program. The guidance on the approval process contained in JAA TGL-6 and FAA 91-RVSM requires an operator to submit a plan for participation in the monitoring program as part of the application for approval. Compliance with this monitoring plan is a condition for maintenance of the RVSM approval.

8. When an operator is found not to be complying with the requirements of the monitoring plan, or when the height-keeping performance of a particular aircraft or an aircraft type group is found, as a result of monitoring, to be exceeding the prescribed limits, the RMA will notify, as appropriate, the aircraft operator in question and the appropriate State authorities as described in the Attachment to this letter. The RMAs are bodies which operate within the framework of the ICAO regional planning and implementation process, and play an essential role in ensuring the safety of RVSM operations. On receipt of such a notification from an RMA, the operator and the responsible State authority should take immediate action to resolve the matter. If an immediate solution to the problem cannot be found, the appropriate action may involve revoking the RVSM approval for that operator, aircraft, or aircraft type(s) if the group limits have been exceeded, until the problem is rectified.

9. The Attachment to this letter contains additional explanatory material on the monitoring process, the required height-keeping performance criteria, and the role of RMAs.

10. All States are requested to ensure that their regulations and procedures concerning the approval of aircraft and operators for operation in RVSM airspace adequately take into account the matters raised in this letter.

Accept, Sir/Madam, the assurances of my highest consideration.

D/ANB

R.C. Costa Pereira
for Secretary General

Enclosure:
Explanatory material on RVSM
height-keeping monitoring procedures
and performance criteria

ATTACHMENT to State letter AN 13/11.1-03/6

EXPLANATORY MATERIAL ON RVSM HEIGHT-KEEPING MONITORING PROCEDURES AND PERFORMANCE CRITERIA

Height-keeping performance requirements

Separate performance criteria have been specified for individual aircraft, and aircraft type groups[1]. The prescribed performance limits are:

Individual aircraft:	ASE ≤ ±245 ft TVE ≤ ±300 ft
Aircraft type groups:	mean ASE ≤ ±80 ft mean ASE + 3 standard deviations ≤ 245 ft

The monitoring process

Monitoring of aircraft height-keeping performance may be done by either a ground-based Height Monitoring Unit (HMU) or a portable GPS Height Monitoring Unit (GMU), which is carried on board the aircraft. In regions with HMUs, aircraft operators may meet the monitoring requirements without any specific action on their part, other than ensuring that the aircraft undertakes a flight within the area of coverage of an HMU within the time period within which monitoring should take place. For monitoring with the portable GMUs, operators need to arrange for a monitoring flight. RMAs will notify operators sufficiently in advance regarding the time scales when specific aircraft require monitoring.

In both methods of monitoring, the aircraft's flight level is converted to a geometric height above the geoid, using current meteorological data, and this height is compared to the aircraft's geometric height as measured by the height monitoring system. This comparison gives the Total Vertical Error (TVE). There are two components to TVE, Altimetry System Error (ASE) and Assigned Altitude Deviation (AAD). AAD can also be determined by the height monitoring system (using Mode C information in the case of a ground-based HMU). Subtracting AAD from TVE gives the ASE. RMAs are therefore able to monitor both TVE and ASE.

In assessing compliance the height-keeping performance requirements, an appropriate correction is applied by the RMA to take into account the measurement error of the monitoring system used.

When the measurements indicate that the performance of an individual aircraft is outside the permissible limits, the RMA will, as soon as practicable, notify the operator as well as the State authority responsible for issuance of the RVSM approval. When the measurements over a large number of different aircraft in the same aircraft type group indicate that the group performance requirements are not being met, the RMA will notify the aircraft manufacturer or type certificate holder of the aircraft group in question, and also notify the State authority responsible for the approval or certification of the RVSM solution for that aircraft group.

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[1] A group is defined as an aircraft type or variant or combination of aircraft type/variants that have nominally identical altimetry

In the case of an observed error by an individual aircraft, the action to be taken by the operator and the relevant State authority will depend on whether the occurrence was the result of a flight crew or ATC error, or an aircraft system problem. When the group performance limits are exceeded, the relevant State authority and the aircraft manufacturer or provider of the RVSM solution for the aircraft type will need to take action to identify and rectify the problem. Unless the cause can be immediately identified and remedied, the appropriate initial action would be for the RVSM approval for that aircraft type group to be withdrawn until the performance problem has been appropriately addressed.

If the permissible limits for group ASE performance are exceeded, it will have serious consequences for both the safety of operations and the approval status of all aircraft in that group. It has therefore been agreed that an RMA should notify the type certificate holder and responsible State authority when an aircraft group's mean ASE + 3 standard deviations exceeds 200 ft, so that remedial action can be initiated before the group ASE exceeds the permissible limits.

— END —

APPENDIX I

EXAMPLE OF AN OPERATOR'S REPORT FORM OF CONTINUOUS AIRWORHINESS MONITORING

REDUCED VERTICAL SEPERATION MINIMUM (RVSM)
HEIGHT-KEEPING SYSTEMS POST FLIGHT DEFECT LOG

NOTE:1) Pilot should detail the actual defect and the crew action taken to try to isolate and rectify the fault such as selection of alternate systems and ops manual / AFM procedures followed , if any, in the remarks column.
2) The information required in the table below should be recorded at the time defect occurs
3) Record / tick / specify details in boxes:

A/C REG. VT-_____ FLT. NO : AI - _____ DATE : _____ SECTOR : _____ TIME(UTC) : _____

Defect : _____

FRM Code (If known) : _____

How defect was detected : EICAS MESSAGE [ ] OBSERVATI ON BY CREW [ ]

REPORTED BY ATC [ ] OTHER [ ] (Specify) _____

S/N	Height Keeping System Parameters	Readings / Systems Status Prior to defect			Readings / Systems Status after crew action		
		Pilot's PFD	F/O's PFD	STBY. ALTM.	Pilot's PFD	F/O's PFD	STBY. ALTM.
1.	Altitude Reading (feet)						
2.	Altitude Selection (feet) Selected Altitude in PFD (MAGENTA)						
3.	Barometric Setting (in.Hg)						
4.	Auto Pilot in use	L C R			L C R		
5.	AFDS Pitch Mode FMA ANNUNCIATION						
6.	Air Data Source Selection - Pilot's	L C R			L C R		
	- F/O's	L C R			L C R		
7.	ATC Transponder	L R			L R		
8.	FMS in use	L R			L R		

9. In flight defect rectified after Crew action by :(TICK MARK)

a) Using Alternate Auto Pilot [ ]

b) Changing AFDS Pitch Mode [ ]

c) Using Alternate Air Data Source PILOT [ ]

F/O [ ]

d) Using Alternate ATC Transponder [ ]

e) Using Alternate FMS [ ]

f) Others (Specify) _____ [ ]

g) Defect not rectified during flight inspite of crew action as above [ ]

PILOT'S SIGNATURE : _____

SECTOR REPORT

B747-437 VT [ ][ ][ ] FLT NO. [ ][ ][ ] FROM [ ][ ][ ] TO [ ][ ][ ] DATE [ ][ ][ ][ ][ ][ ]

TIME	BLOCK HR	BLOCK MIN	AIR HR	AIR MIN
ARR/LDG.				
DEP/T.O.				
SECTOR TIME				

UPLIFT (QTS) (ARR.)

ENG. OIL				IDG. OIL				HYD. FLUID				APU
1	2	3	4	1	2	3	4	1	2	3	4	

AME SIGN./
LIC. NO./DATE

DEPARTURE

ENG. OIL				IDG. OIL				HYD. FLUID				APU
1	2	3	4	1	2	3	4	1	2	3	4	

AME SIGN./
LIC. NO./DATE

AME CERTIFICATION – TRANSIT/TERMINAL TRANSIT/BASE TRANSIT/CHECK A CARRIED OUT AT _____

CAT.	AME SIGNATURE	APP/LIC NO.	DATE
A			
C			
R (FOR BASE ONLY)			

PILOT'S ACCEPTANCE CERTIFICATE :-

I AM SATISFIED THAT THE CONDITIONS STIPULATED IN APPLICABLE CURRENT CAR SERIES 'O' PART II HAVE BEEN COMPLIED WITH.

DATE _____ PILOT'S SIGN _____ TIME _____

FUEL TANK DATA IN KG.	BEFORE FUELLING	DEPARTURE
2R		
1		
2		
CWT		
3		
4		
3R		
TOTAL		
SP. GR.		
REQD. DEP. FUEL		
TOTAL FUEL BEFORE FUELLING		
ESTIMATED FUEL UPLIFT		
ACTUAL FUEL UPLIFT		
DISCREPANCY		

NOTE – FUEL CHECK AS PER D G C A REQUIREMENT CARRIED OUT.
DEP. AME SIGN _____
LIC. NO. _____

RVSM HEIGHT KEEPING SYSTEMS MONITORED AND FOLLOWING OBSERVED

SYSTEMS NORMAL [ ] DEFECTIVE [ ]

REF. DEFECT: PILOT'S SIGNATURE _____

CERTIFICATION FOR RVSM FLIGHTS
BASED ON ABOVE OBSERVATION & INSPECTION PER RVSM SCHEDULE
THE DEFECT RECTIFICATION COMPLETE / NOT COMPLETE
A/C CLEARED [ ] NOT CLEARED [ ] FOR RVSM FLIGHT

RVSM MEL AME SIGNATURE _____

ORIGINAL – NOT TO BE DETACHED FROM THE BOOK.

DIVERTED TO [ ][ ][ ] T/O & F/O (TRG/FLT)

CAPT

F.O. _____

NOTE: DEPARTURE CHECK AS APPLICABLE IS CARRIED OUT PRIOR TO EVERY DEPARTURE.

S/NO.	DEFECT	CAPT. SIGN.	RECTIFICATION	AME SIGN. LIC. NO. DATE

RVSM HEIGHT KEEPING PARAMETER RECORDING AT STABLE CRUISE ABOVE FL-290

TIME (UTC)	FL	XPDR CODE /SOURCE	ALTIMETER READING PILOT'S PFD	F/O'S PFD	STBY ALTN	AUTO PILOT IN USE L,C,R	FMS IN USE YES/NO

COMPONENT CHANGE DETAILS A/C REGN _____

ITEM NO.	COMPONENT NAME & REASON	PART NO.	OFF S/NO.	ON S/NO.	RELEASE NO.	AME SIGN LIC. NO. DATE

FINAL TRANSITION PLAN OF REGIONAL MONITORING AGENCIES FOR ASIA REGION

1. INTRODUCTION

In order to support preparation for the Reduced Vertical Separation Minimum (RVSM) implementation in the Asia/Pacific Region, the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG)[1] has established the Asia/Pacific Approvals Registry and Monitoring Organization (APARMO) as the Regional Monitoring Agency (RMA). The required services of the APARMO are provided by the United States Federal Aviation Administration's William J. Hughes Technical Center (FAA/TC).

At the 11th Meeting of the RVSM Task Force (RVSM/TF/11) held from 30 April to 4 May 2001, the Task Force was informed that the FAA would no longer be able to provide the services associated with the APARMO in the Asia Region due to other domestic and international commitments. Therefore, the Task Force was required to identify a new organization to provide the services associated with the APARMO as quickly as possible.

At the APANPIRG/12 held from 20 to 24 August 2001, AEROTHAI expressed the willingness to assist the International Civil Aviation Organization (ICAO) in the continuation of the safety assessment program for the RVSM implementation. The offer was also conveyed and

[1] All acronyms are listed and defined in the Glossary.

acknowledged at subsequent RVSM/TF meetings. In addition, the FAA and AEROTHAI have been working closely to establish the successful transfer of duties and responsibilities of the APARMO to AEROTHAI.

At the APANPIRG/13 held from 9 to 13 September 2002, the meeting supported and agreed with the transition plan transferring the APARMO's duties and responsibilities in support of further RVSM implementation in the Asia Region to AEROTHAI.

AEROTHAI established the Monitoring Agency for Asia Region (MAAR) to assume the duties and responsibility of the RMA for the Asia Region based on the knowledge transferred from the APARMO. The principal role of MAAR is to assist ICAO in the continuation of the safety assessment program for the RVSM implementation as determined by the APANPIRG.

The progress of establishing MAAR has been reported periodically to the ICAO RVSM related task forces. At the RVSM/TF/17 held from 20 to 24 January 2003, AEROTHAI informed the Task Force that all infrastructure of MAAR have been in place and MAAR is ready to assume full RMA responsibilities for the Asia Region. The meeting advised the FAA and AEROTHAI to finalize the transition plan with regards to the exact date for the transfer of responsibilities as well as define the geographical area of each agency. The final transition plan would be presented for approval from the APANPIRG through the APANPIRG ATS/AIS/SAR Subgroup.

2. OBJECTIVE

This document proposes the final transition plan to the APANPIRG in regards to the transfer of the RMA duties and responsibilities from the APARMO to MAAR. The proposed transition plan includes the MAAR duties and responsibilities, MAAR geographical area, adoption of the agency's name, date of transfer, and coordination principles with the APARMO before and after the proposed transition date.

3. DUTIES AND RESPONSIBILITIES

The duties and responsibilities of MAAR are the same as the ones set for the APARMO, which include:

- To establish and maintain a central registry of State RVSM approvals of operators and aircraft using the Asia Region airspace where RVSM will be applied;
- To facilitate the transfer of approval data to and from other RVSM regional monitoring agencies;
- To establish and maintain a database containing the results of height keeping performance monitoring and all altitude deviations of 300 ft or more within the Asia airspace;
- To provide timely information on changes of monitoring status of aircraft type classifications to State authorities and operators;
- To assume responsibility for administration of the Global Positioning System based Monitoring System (GMS) and for assessing compliance of operators and aircraft with RVSM height-keeping performance requirements in conjunction with RVSM introduction in the Asia Region;

- To provide the means for identifying non-RVSM approved operators using Asia Region airspace where RVSM is applied; and notify the appropriate State approval authority; and
- To develop the means for summarizing and communicating the content of relevant databases to ICAO RVSM Task Force decision makers for use in agreeing on the timing and extent of RVSM application within the airspace under their administration.

It is important to note that MAAR accepts monitoring results from other approved regional monitoring agencies (e.g. APARMO, EUROCONTROL, NAT CMA, etc.). In addition, there is no fee for MAAR's services in respect to maintaining the aircraft approval database and conducting readiness and safety assessments. Nonetheless, the user of GMU monitoring services will be charged on a cost recovery basis.

4. GEOGRAPHICAL AREA

The geographical area under MAAR responsibility is the Asia Region, which includes the ICAO Western Pacific/South China Sea (WPAC/SCS) and Bay of Bengal (BOB) areas. The FIRs/AOR in the WPAC and BOB areas are the followings:

4.1 Western Pacific/South China Sea

- China – Sanya AOR
- Cambodia – Phnom Penh FIR
- Hong Kong – Hong Kong FIR
- Indonesia – Bali, *Jakarta*, and Ujung Pandang FIRs
- Lao PDR – Vientiane FIR
- Malaysia – *Kuala Lumpur* and Kota Kinabalu FIRs
- Philippines – Manila FIR
- *Singapore* – *Singapore FIR*
- Taiwan – Taipei FIR
- *Thailand* – *Bangkok FIR*
- Vietnam – Hanoi and Ho Chi Minh FIRs

4.2 Bay of Bengal

- Bangladesh – Dhaka FIR
- India – Chennai, Delhi, Kolkata, and Mumbai FIRs
- Maldives – Male FIR
- Myanmar – Yangon FIR
- Nepal – Kathmandu FIR
- Pakistan – Karachi and Lahore FIRs
- Sri Lanka – Colombo FIR
- *Indonesia* – *Jakarta FIR*
- *Malaysia* – *Kuala Lumpur FIR*
- *Singapore* – *Singapore FIR*
- *Thailand* – *Bangkok FIR*

Note: The FIRs in "*Italic*s" are located in both of the WPAC/SCS and BOB areas

5. ADOPTION OF NAMES FOR THE RMAS FOR ASIA REGIONS

In regard to the naming of the monitoring agency for the Asia Region, the meeting recalled that the fourth meeting of the Asia Pacific Airspace Safety Monitoring Task Force (APASM/TF/4) held from 9 to 12 December 2002 had raised the question of a suitable name for the agency and referred the matter to the RVSM/TF/17.

At the RVSM/TF/17, the proposed names of:

- "**Pacific Approvals Registry and Monitoring Organization (PARMO)**", and
- "**Monitoring Agency for the Asia Region (MAAR)**"

were to be used by the regional monitoring agencies for the Pacific and Asia Region, respectively. The meeting agreed that both names were suitable, and would cause no confusion as to what agency and geographical area was involved. The final decision on the name was proposed to be taken by the APANPIRG.

Upon the approval by the APANPIRG, the changes of name would require minimum modifications to existing documents referring to the APARMO, in particular, the *Guidance Material on the Implementation of a 300 m (1 000 ft) Vertical Separation Minimum (VSM) Between FL 290 and FL 410 Inclusive for Application in the Airspace of the Asia Pacific Region*.

6. DATE FOR THE TRANSFER OF RESPONSIBILITIES

Based on the advice of the RVSM/TF for the FAA and AEROTHAI to finalize the transition plan with regard to the exact date for the transfer of responsibilities, the FAA and AEROTHAI propose to set the official transition date to **September 2nd, 2003**.

After this date, MAAR would assume full RMA duties and responsibilities for the Asia Region, while the APARMO would continue to assume the duties and responsibilities of the RMA for Pacific Region.

7. COORDINATION PRINCIPLES WITH APARMO AND OTHER RMAS

This section discusses the proposed coordination principles between the APARMO and MAAR before and after the proposed transition date. These principles ensure smooth transition of work and information flow between the two RMAs. Such principles include the following functions:

7.1 Point of Contact Database

The points of contact (POC) of the people involved in the RVSM implementation are stored in the POC database. Prior to the transition date, the APARMO provide their POC information for MAAR. The POC information sharing ensures the smooth information flow from the APARMO and MAAR.

After MAAR becomes officially active, MAAR will keep a separate point of contact database, which includes people that MAAR has dealt with from the beginning. The POC information will be exchanged periodically between the APARMO and MAAR and other RMAs as imposed in the

RMA handbook. In addition, the POC information that was previously completed via the APARMO Form F1 will be filed through MAAR Form F1[2] (**Appendix A**) after the transition date.

A schematic description of the above process can be described by **Figures 1** and **2**.

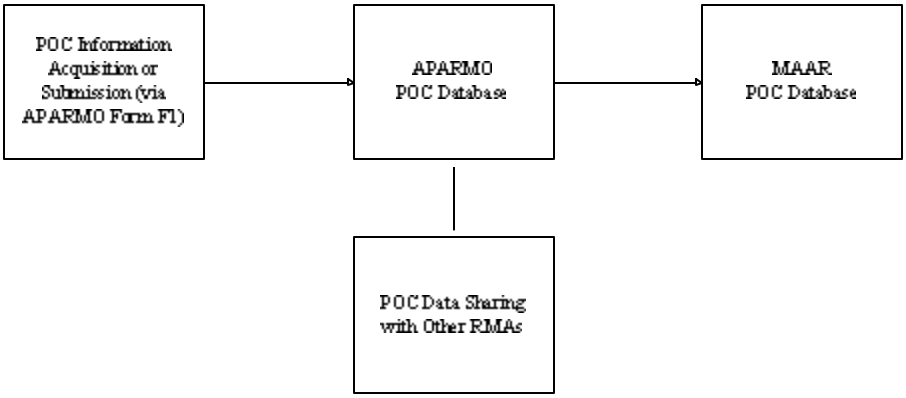

Figure 1: Present POC Information Flow

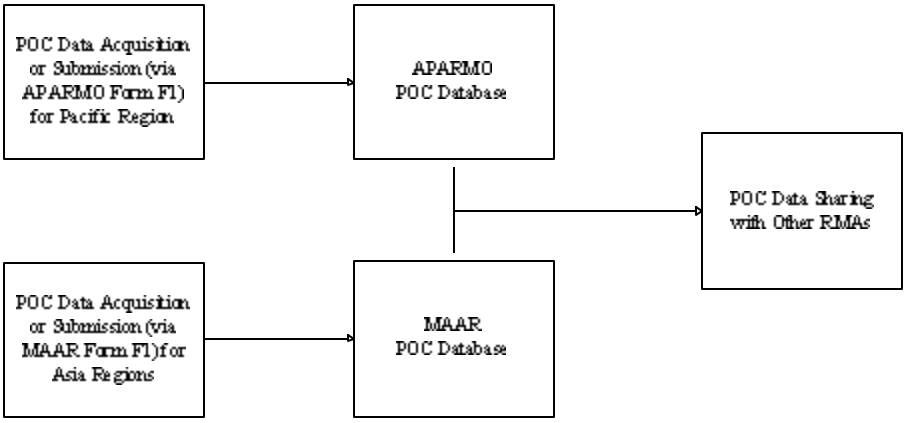

***Figure 2**: Proposed POC Information Flow after Transition Date*

7.2 Approval Database

The approval database is currently supplied by the APARMO. MAAR also developed the approval database from the data of aircraft in the approval process of the RVSM implementation. The required data are listed in the RMA handbook. Note that, although the structure and interface of MAAR database are different than the APARMO's, the functionalities of the two databases are the same and compatible.

[2] All MAAR's forms are identical to the APARMO's except the returning addresses are the MAAR points of contact (e.g., telephone, fax, email, and mailing address)

After MAAR becomes officially active, related entities will be asked to send the approval or withdrawal records of aircraft operating in the RVSM airspace to MAAR, using MAAR Form F2 and F3 (**Appendix B** and **C**, respectively).

A schematic description of the above process can be described by **Figures 3** and **4**

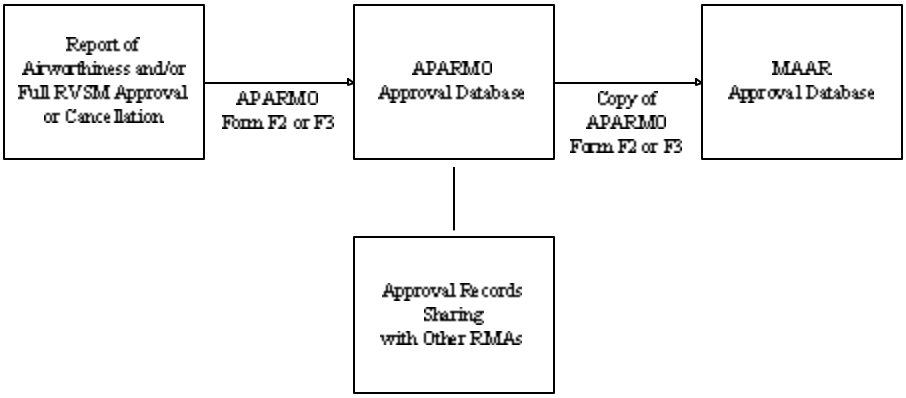

Figure 3: Current Approval Database Flow

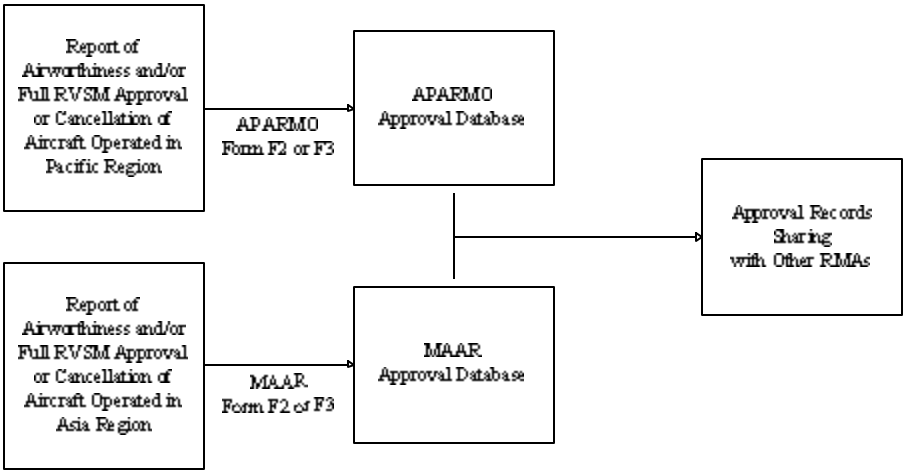

Figure 4: Proposed Approval Database Flow after Transition Date

7.3 GMU Monitoring Program

The GMU monitoring service is provided to operators who require height keeping performance monitoring for the aircraft to be operated in the RVSM airspace in the Asia Region. The request of monitoring service is filed to MAAR via the Monitoring Application Form (**Appendix D**). After conducting the monitoring, the results collected by the GMU units are then sent to the APARMO for the post processing and ASE analysis.

A schematic description of the above process can be described by **Figure 5**.

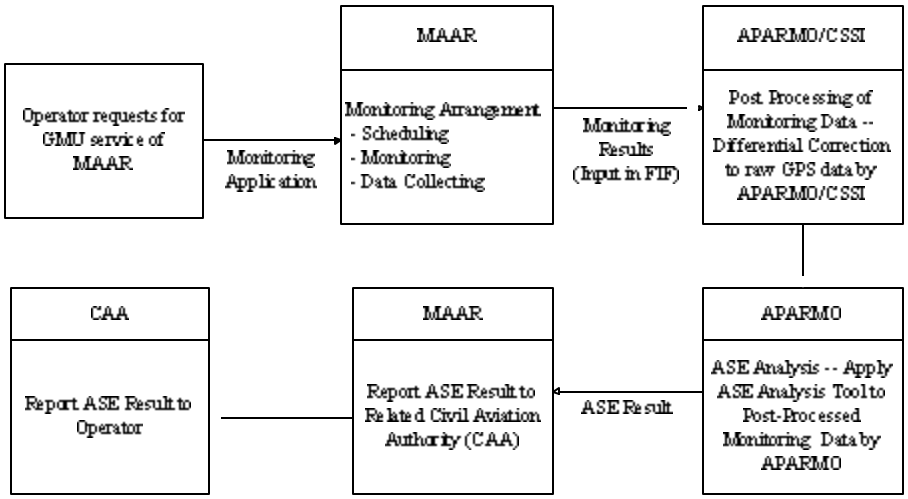

Figure 5: GMU Monitoring Service of MAAR

7.4 Readiness and Safety Assessments

At present, the readiness and safety assessment process of MAAR starts with the reception of traffic sample data (TSD) and large height deviation (LHD) report from the APARMO. Then, MAAR integrates and analyzes the received TSD and LHD data in order to produce the readiness and safety assessments. The results of the readiness and safety assessments are reported to the RVSM/TF.

After MAAR becomes officially active, the requested TSD and LHD reports from responsible FIRs shall be sent directly to MAAR. The results of the readiness and safety assessments are reported to the RVSM Task Force by MAAR. A copy of the reports will also be forwarded to the APARMO.

A schematic description of the above process can be described by **Figure 6** and **7**.

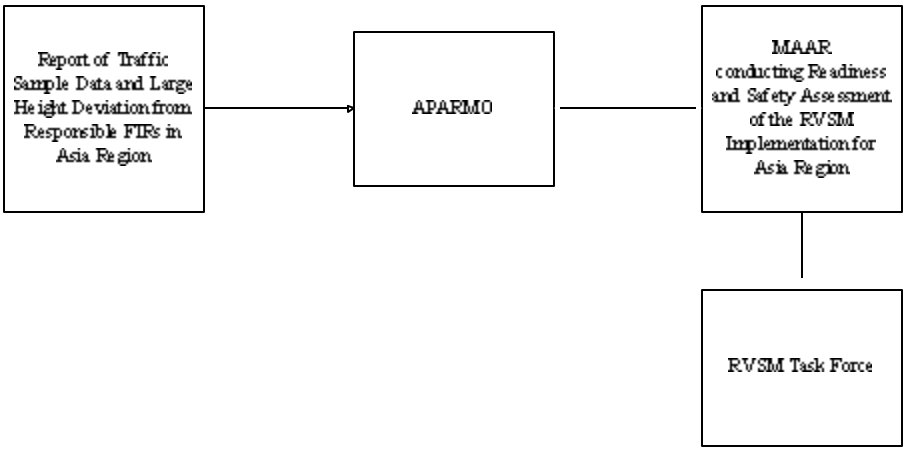

Figure 6: Current Readiness and Safety Assessments

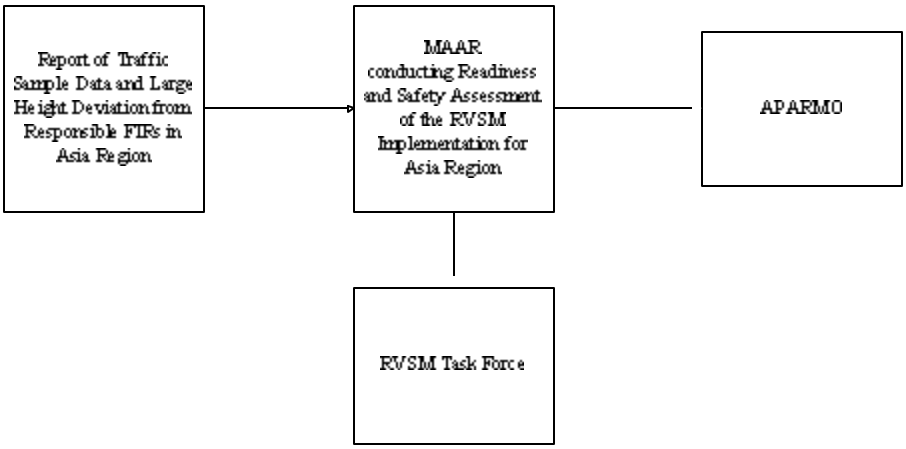

Figure 7: Proposed Process of Readiness and Safety Assessments after Transition Date

In summary, prior to the proposed transition date, all of the required data will be reported to the APARMO. Then, the MAAR will coordinate with the APARMO to obtain the submitted data. Following the transition date, the required data shall be reported directly to MAAR. MAAR will share all of the received data with the APARMO and other RMAs as imposed in the RMA handbook.

GLOSSARY

AOR	Area of Responsibility
APANPIRG	Asia/Pacific Air Navigation Planning Regional Group
APASM/TF	Asia/Pacific Airspace Safety Monitoring Task Force
APARMO	Asia/Pacific Approvals Registry and Monitoring Organization
BOB	Bay of Bengal
CAA	Civil Aviation Authority
CRM	Collision Risk Model
FAA/TC	Federal Aviation Administration's William J. Hughes Technical Center
FIF	Flight Information Form
FIR	Flight Information Region
GMU	Global Positioning System (GPS) Monitoring Unite
ICAO	International Civil Aviation Organization
IATA	International Air Transport Association
LHD	Large Height Deviation
MAAR	Monitoring Agency for Asia Region
MAAR/WG	Monitoring Agency for Asia Region Working Group
MFR	Manufacturer
OPR	Operator
PARMO	Pacific Approvals Registry and Monitoring Organization
POC	Point of Contact
PPD	Planning and Projecting Department
RMA	Regional Monitoring Agency
RVSM	Reduced Vertical Separation Minima

RVSM/TF	RVSM Task Force
STE	State (Military)
TSD	Traffic Sample Data
WPAC/SCS	Western Pacific/South China Sea

……

Appendix A

MAAR FORM F1
CONTACT/CHANGE OF CONTACT DETAILS FOR MATTERS RELATING TO ASIA REGION APPROVALS

This form should be completed and returned to the address below on the first reply to the Monitoring Agency for Asia Region (MAAR) or when there is a change to any of the details requested on the form (PLEASE USE BLOCK CAPITALS).

STATE OF REGISTRY:

STATE OF REGISTRY (ICAO 2 LETTER IDENTIFIER):

Enter the 2-letter ICAO identifier as contained in ICAO Doc 7910/92. In the event that there is more than one identifier for the same State, the one that appears first in the list should be used.

ADDRESS:

CONTACT PERSON:

Full Name:

Title: Surname: Initials:

Post/Position:

Telephone #: Fax #:

E-mail:

Initial Reply*/Change of Details* (**Delete as appropriate*)

When complete, please return to the following email (preferable), fax, or mailing address:

E-Mail: maar@aerothai.co.th
Fax: 662-287-8155

Monitoring Agency for Asia Region (MAAR)
ATS Operations Bureau, AEROTHAI
102 Ngamduplee Tungmahamek, Sathorn
Bangkok 10120 Thailand

Appendix B

MAAR FORM F2
RECORD OF APPROVAL TO OPERATE IN ASIA REGION RVSM AIRSPACE

1. When a State of Registry approves or amends the approval of an operator/aircraft for operations within the Asia Region airspace, details of that approval must be recorded and sent to the Monitoring Agency for Asia Region (MAAR) to reach it by the tenth day of the month following the month that the approval was issued.

2. *Before providing the information as requested below, reference should be made to the accompanying notes* **(PLEASE USE BLOCK CAPITALS)**.

2.1 State of Registry:

2.2 Name of Operator:

2.3 State of Operator:

2.4 Aircraft Type:

2.5 Aircraft Series:

2.6 Manufacturers Serial No:

2.7 Registration No:

2.8 Mode S Address Code:

2.9 Airworthiness Approval:

2.10 Date Airworthiness Approval Issued:

2.11 RVSM Approval:

2.12 Date RVSM Approval Issued:

2.13 Date of Expiry (If Applicable):

2.14: Remarks:

When complete, please return to the following email (preferable), fax, or mailing address:

E-Mail: maar@aerothai.co.th
Fax: 662-287-8155

Monitoring Agency for Asia Region (MAAR)
ATS Operations Bureau, AEROTHAI
102 Ngamduplee Tungmahamek, Sathorn
Bangkok 10120 Thailand

Appendix C

MAAR FORM F3
WITHDRAWAL OF APPROVAL TO OPERATE IN ASIA REGION RVSM AIRSPACE

1. When a State of Registry has cause to withdraw the approval of an operator/aircraft for operations within the Asia Region RVSM airspace, details as requested below, must be submitted to the Monitoring Agency for Asia Region (MAAR) by the most appropriate method.

2. *Before providing the information as requested below, reference below, reference should be made to the accompanying notes* **(PLEASE USE BLOCK CAPITALS)**.

2.1 State of Registry:

2.2 Name of Operator:

2.3 State of Operator:

2.4 Aircraft Type:

2.5 Aircraft Series:

2.6 Manufacturers Serial No:

2.7 Registration No.:

2.8 Aircraft Mode S Address Code:

2.9 Date of Withdrawal of RVSM Approval:

2.10 Reason of Withdrawal of RVSM Approval:

2.11 Remarks:

When complete, please return to the following email (preferable), fax, or mailing address:

E-Mail: maar@aerothai.co.th
Fax: 662-287-8155

Monitoring Agency for Asia Region (MAAR)
ATS Operations Bureau, AEROTHAI
102 Ngamduplee Tungmahamek, Sathorn
Bangkok 10120 Thailand

Appendix D

REDUCED VERTICAL SEPARATION MINIMUM (RVSM)
MONITORING APPLICATION
(Return completed form to the MAAR by Email via maar@aerothai.co.th or Fax at 662-287-8155)

Operator Name: _____

Address: _____

_____

Operator Primary Point of Contact

Name: _____ Title: _____

Telephone Number: _____ Fax Number: _____

Email Address: _____

Secondary Point of Contact

Name: _____ Title: _____

Telephone Number: _____ Fax Number: _____

Email Address: _____

Civil Aviation Authority Contact

Name: _____ Title: _____

Telephone Number: _____ Fax Number: _____

Email Address: _____

AIRCRAFT INFORMATION
(Please be sure to include data for the ENTIRE fleet)

Aircraft Model	Registration Number	Serial Number

Appendix E

MAAR USE

Flight Information Form (FIF)

Please Email to maar@aerothai.co.th or Fax to MAAR at 662-287-8155,
24 hours prior to flight and within 6 hours of landing.

INFORMATION TO BE RECORDED PRIOR TO FLIGHT		
Airline/Operator:	GMU Container Number:	
Point of Contact for Operator: Name: Phone: Fax:		
Aircraft Type/Series:	Aircraft Registration Number:	
Call Sign:	Airframe Serial Number:	
Planned: Origin:	Departure Date (UTC):	Departure Time (UTC):
Planned: Destination:	Arrival Date (UTC):	Arrival Time (UTC):
Installer (Name/Org.):	Retriever (Name/Org.):	
Mode S Equipped (Yes/No):	Separation Between Mounted Antennas (ft.):	
Installer/Operator Comments:		

INFORMATION TO BE RECORDED BY FLIGHT CREW/GMU OPERATOR	
Data Collection: Start Date (UTC):	Start Time (UTC):
GMU File Name:	
Departure Time (UTC):	Origin (ICAO ID):

Please record the requested information as soon as practical when:

1. Aircraft is first established in level flight at or above FL 290, or
2. The ATC assigned transponder code is changed at or above FL 290, or
3. There is a flight level change and aircraft remains at or above FL 290, or
4. An autopilot change is initiated at or above FL 290, or
5. The ARTCC or FIR changes.

Time	Assigned	Mach/Air	Xpndr	Altimeter Reading		Autopilot (L, R, C)		FMS/PMS	ARTCC/FIR
(UTC)	FL	Speed	Code/Source	Pilot	Co-pilot	Pilot	Co-pilot	(Y/N)	(ICAO ID)

Data Collection: End Date (UTC):	End Time (UTC):
Arrival Time (UTC):	Destination ICAO (ID):

Comments on flight conditions affecting height keeping performance, i.e. turb, and location

Appendix K to the RVSM/TF/18/19 Report
Task List for the Bay of Bengal

ID	Description	Start	Finish by	Present Status	Resource Names
1	**Identify Operational Need**	**18-Jan-02**	**30-Nov-02**	Completed	
2	Agree operational concept for Bay of Bengal and beyond (within ICAO Asia Region)	18-Jan-02	30-Nov-02	Completed	ATC/WG, RVSM Task Force
6	**Safety Assessment**	**18-Jan-02**	**31-Oct-03**	In progress	
7	Review available summary data (non-compliant aircraft, aberrant aircraft etc)	18-Jan-02	31-Oct-03	In progress	SAM/WG, RVSM Task Force
8	Examine history of height keeping errors related to ATC clearances and assess possible RVSM impact	18-Jan-02	31-Oct-03	In progress	SAM/WG, RVSM Task Force
9	Confirm RVSM risk model assumptions/parameters are consistent with airspace where RVSM is to be applied	18-Jan-02	31-Oct-03	In progress	SAM/WG, RVSM Task Force
10	Conduct simulations to predict occupancy after RVSM implementation	18-Jan-02	31-Oct-03	In progress	SAM/WG, RVSM Task Force
11	Collect weather and turbulence data for analysis - this should include Himalayan standing wave analysis	18-Jan-02	31-Oct-03	In progress	SAM/WG, OPSAIR, RVSM Task Force
12	Report monthly large height deviations to APARMO or equivalent monitoring agency (including operational errors)	18-Jan-02	Ongoing	In progress	ATS Providers, Users
13	**Feasibility Analysis**	**18-Jan-02**	**31-Oct-03**	In progress	
14	Examine the operational factors and workload associated with implementation	18-Jan-02	31-Oct-03	In progress	ATC/WG, RVSM Task Force
15	**Determination of Requirements (airborne & ground systems)**	**18-Jan-02**	**31-Oct-03**	In progress	
17	States assess the impact of RVSM implementation on controller automation systems (e.g., equipment suffixes) and plan for upgrades/modifica	18-Jan-02	31-Oct-03	In progress	States
18	**Aircraft & Operator Approval Requirements**	**18-Jan-02**	**27-Nov-03**	In progress	
19	Promulgate the operational approval process	18-Jan-02	7-Jun-02	Completed	OPS/AIR/WG, RVSM Task Force
20	Notify States when significant changes occur to RVSM documentation	18-Jan-02	Ongoing	In progress	OPS/AIR/WG, RVSM Task Force
21	**Perform Rulemaking (if required)**	**18-Jan-02**	**27-Nov-03**	In progress	
22	Recommend State airspace regulatory documentation	18-Jan-02	27-Nov-03	In progress	States
23	**Perform Necessary Industry & International Co-ordination**	**18-Jan-02**	**27-Nov-03**	In progress	
24	Establish target implementation date	18-Jan-02	27-Nov-03	Completed	RVSM Task Force
25	Report to ATS/AIS/SAR/SG/13	23-Jun-03	27-Jun-03	Completed	RVSM Task Force Chairman
26	Process Doc 7030 amendment	18-Jan-02	27-Nov-03	In progress	ICAO Regional Office
27	Publish advance AIC	18-Jan-02	31-Jan-03	Completed	States
28	Publish AIP Supplement containing RVSM policy/procedures	18-Jan-02	30-Sep-03	In progress	States
29	Review inter-facility coordination procedures	18-Jan-02	31-Oct-03	In progress	States
30	Finalize changes to Letters of Agreement	18-Jan-02	31-Oct-03	In progress	States
31	Disseminate information on RVSM policy and procedures through FAA RVSM Website	7-Jun-02	Ongoing	In progress	OPS/AIR WG, RVSM Task Force
32	**Approval of Aircraft & Operators**	**18-Jan-02**	**27-Sep-03**	In progress	
33	Establish approved operations readiness targets	18-Jan-02	27-Sep-03	In progress	IATA, ATC/WG, RVSM Task Force
34	Assess operator readiness	18-Jan-02	27-Sep-03	In progress	IATA, OPS/AIR/WG

ID	Description	Start	Finish by	Present Status	Resource Names
35	**Develop Pilot & ATC Procedures**	**18-Jan-02**	**27-Nov-03**	In progress	
36	Review application of tactical offset procedure to mitigate the effects of wake turbulence and TCAS alerts	18-Jan-02	30-Sep-03	In progress	RVSM Task Force
37	Review weather and contingency procedures for applicability under RVSM	18-Jan-02	30-Sep-03	In progress	RVSM Task Force
38	Publish appropriate Pilot/ATC policy & procedures on RVSM website	18-Jan-02	Ongoing	In progress	RVSM Task Force
39	Identify transition areas and procedures	18-Jan-02	30-Sep-03	In progress	States, ATC/WG
40	Conduct simulation modelling to assess impact of RVSM operations	18-Jan-02	31-Oct-03	In progress	States, ATC/WG
41	Report on simulation activity	18-Jan-02	31-Oct-03	In progress	ATC/WG, RVSM Task Force
42	Coordinate use of ACAS II (TCAS V.7) for RVSM operations	18-Jan-02	Ongoing	In progress	OPS/AIR/WG, RVSM Task Force
43	Develop procedures for handling non-compliant aircraft (inc ferry & mntce) in ATS documentation	18-Jan-02	30-Sep-03	In progress	OPS/AIR/WG, ATC/WG, RVSM Task Force
44	Develop mutually acceptable ATC procedures for non-approved State acft to transit RVSM airspace	18-Jan-02	30-Sep-03	In progress	ATC/WG, RVSM Task Force
45	Consider procedures for suspension of RVSM	18-Jan-02	30-Sep-03	In progress	ATC/WG, RVSM Task Force
46	Liaise with State defense authorities regarding "due regard" military operations	18-Jan-02	27-Nov-03	In progress	States
47	**Pilot & ATC Training**	**18-Jan-02**	**27-Nov-03**	In progress	
48	Provide Pilot/ATC training documentation based on past experience	18-Jan-02	Ongoing	In progress	IATA, RVSM Task Force
49	Conduct local RVSM training for air traffic controllers	18-Jan-02	27-Nov-03	In progress	States, ATC/WG
50	**Perform System Verificiation**	**18-Jan-02**	**31-Oct-03**	In progress	
51	Height keeping performance monitoring needed to undertake initial safety analysis	18-Jan-02	31-Oct-03	In progress	APARMO, MAAR and SAM/WG, RVSM Task Force
52	Provide representative traffic movement data to APARMO (period 15 Jan - 15 Mar 03)	18-Jan-02	Ongoing	In progress	States
53	Undertake initial safety analysis	18-Jan-02	31-Mar-03	Completed	SAM/WG, RVSM Task Force
54	Prepare/maintain regional status report detailing RVSM implementation plans	18-Jan-02	Ongoing	In progress	RVSM Task Force
55	**Final Implementation Decision**	**18-Jan-02**	**27-Nov-03**	In progress	**RVSM Task Force**
56	Review aircraft altitude-keeping performance and operational errors	18-Jan-02	31-Oct-03	In progress	SAM/WG, OPS/AIR/WG
57	Complete ATS State documentation	18-Jan-02	30-Sep-03	In progress	States
58	Publish Trigger NOTAM	18-Jan-02	22-Nov-03	In progress	States
59	Complete readiness assessment	18-Jan-02	31-Oct-03	In progress	APARMO
60	Complete safety analysis	18-Jan-02	31-Oct-03	In progress	RVSM Task Force
61	**Declare Initial Operational Capability**	18-Jan-02	**27-Nov-03**	In progress	**APARMO and SAM/WG, RVSM Task Force**
62	**Monitor System Performance**	18-Jan-02	**27-Nov-04**	In progress	
63	Perform Follow-On Monitoring	18-Jan-02	Ongoing	In progress	OPS/AIR/WG, SAM/WG
64	Complete transition of monitoring functions from FAA to AEROTHAI	30-May-02	27-Sep-03	In progress	SAM/WG

ID	Description	Start	Finish by	Present Status	Resource Names
65	**Declare Full Operational Capability**	18-Jan-02	**27-Nov-04**	In progress	**RVSM Task Force**
66	Task Force/15 (Bangkok)	3-Jun-02	7-Jun-02	Completed	RVSM Task Force
67	Special Coordination Meeting (Manila) - Western Pacific/South China Sea Focus	29-Jul-02	31-Jul-02	Completed	RVSM Task Force
68	Task Force/16 (Bangkok) - Western Pacific/South China Sea Focus	23-Sep-02	25-Sep-02	Completed	RVSM Task Force
69	Joint Interface Meeting with Middle East RVSM Task Force	19-Oct-02	20-Oct-02	Completed	RVSM Task Force
70	Seminar/5 (Bangkok) - 3 days	15-Jan-03	17-Jan-03	Completed	RVSM Task Force
71	Task Force/17 (Bangkok) - Bay of Bengal and beyond Focus - 5 days	20-Jan-03	24-Jan-03	Completed	RVSM Task Force
72	Task Force/18/19 (Bangkok) - 1 year/90 day follow up review on Western Pacific/South China Sea/ Bay of Bengal Focus - 5 days	30-Jun-03	4-Jul-03	Completed	RVSM Task Force
	Special ATS Coordination Meeting (Kuala Lumpur) - FLOS for Bay of Bengal and Beyond	11-Aug-03	12-Aug-03		
74	Second Joint Interface Meeting with Middle East RVSM Task Force (Location TBD) - 3 days	27-Aug-03	28-Aug-03		RVSM Task Force
	Special ATS Coordination Meeting (Bangkok) - Transition for Bay of Bengal and Beyond	3-Sep-03	5-Sep-03		
75	Task Force/20 (New Delhi) - **Go/No-Go** for Bay of Bengal and beyond implementation - 5 days	20-Oct-03	24-Oct-03		RVSM Task Force
76	Task Force/21 (Location TBD) - 90 day follow up review on Bay of Bengal and beyond implementation - 3 days	00 Feb 04	00 Feb 04		RVSM Task Force
77	Task Force/22 (Location TBD) - 1 year follow up Bay of Bengal and beyond implementation - 3 days	00 Nov 04	00 Nov 04		RVSM Task Force

ASIA/PACIFIC REGION RVSM IMPLEMENTATION PLANS STATUS REPORT

Note: Star indicates RVSM implementation complete

FIR/AOR	RVSM Implementation Date	Comments
Anchorage Arctic	24 Feb 2000	RVSM Transition Airspace only
Anchorage Continental	24 Feb 2000	RVSM Transition Airspace only
*Anchorage Oceanic	24 Feb 2000	
*Auckland Oceanic	24 Feb 2000	
Bali	31 Oct 2002	Phased implementation
Bangkok	21 Feb 2002	Phased implementation
Beijing		
Biak	Not applicable	Subject to Indonesia upper airspace consolidation
*Brisbane	24 Feb 2000	Oceanic East of Australia 24 Feb 2000 - Remainder of FIR 1 Nov 2001
Chennai	27 Nov 2003	
Colombo	27 Nov 2003	
Delhi	27 Nov 2003	
Dhaka	27 Nov 2003	
Guangzhou		
*Hanoi	31 Oct 2002	Phased Implementation
*Ho Chi Minh	21 Feb 2002	Phased Implementation
*Hong Kong	31 Oct 2002	
*Honiara	24 Feb 2000	
Incheon	TBD	
Jakarta	31 Oct 2002	Phased Implementation
Karachi	27 Nov 2003	
Kathmandu	27 Nov 2003	
Kolkata	27 Nov 2003	
Kota Kinabalu	21 Feb 2002	
Kuala Lumpur	21 Feb 2002	Phased Implementation – Bay of Bengal - 27 Nov 2003
Kunming		

FIR/AOR	RVSM Implementation Date	Comments
Lahore	27 Nov 2003	
Lanzhou		
Male	27 Nov 2003	
*Manila	21 Feb 2002	
*Melbourne	1 Nov 2001	
Mumbai	27 Nov 2003	
*Nadi	24 Feb 2000	
Naha	24 Feb 2000	Pacific Oceanic
*Nauru	24 Feb 2000	
*New Zealand	13 July 2000	Non-exclusive
*Oakland Oceanic	24 Feb 2000	
*Phnom Penh	21 Feb 2002	
*Port Moresby	13 Apr 2000	
Pyongyang		
Sanya AOR	31 Oct 2002	N892 within the oceanic airspace of Sanya AOR on 21 February 2002
Shanghai		
Shenyang		
*Singapore	21 Feb 2002	
*Tahiti	24 Feb 2000	Non-exclusive RVSM airspace
Taibei	21 Feb 2002	
Tokyo	24 Feb 2000	Oceanic
Ujung Pandang	31 Oct 2002	Phased Implementation
Ulaan Baatar		
Urumqi		
*Vientiane	31 Oct 2002	
Wuhan		
Yangon	27 Nov 2003	

— END —