INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

REPORT OF THE TWENTY-NINTH MEETING OF
THE ICAO RVSM IMPLEMENTATION TASK FORCE (RVSM/TF/29)

BANGKOK, THAILAND

14 – 16 November 2006

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

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History of the Meeting

Report of RVSM TF/29

Appendices

1.1 Introduction

1.1.1 The 29th Meeting of the ICAO Reduced Vertical Separation Minimum Implementation Task Force (RVSM/TF/29) was held at Kotaite Wing of ICAO Asia and Pacific Office, Bangkok, Thailand from 14 to 16 November 2006.

1.1.2 The Terms of Reference (TOR) for the Task Force are as follows:

- *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;*
- *To consider any amendments to RVSM guidance material that may be proposed by States and international organizations;*
- *To address any other matters as appropriate and relevant to the implementation of RVSM;*
- *The Task Force will include participation from States and International Organizations that are considering or involved with the implementation of RVSM; and*
- *The Task Force will report to the ATS/AIS/SAR Sub-Group.*

(Adopted by the 10th Meeting of the ATS/AIS/SAR Sub-group, 2000)

1.2 Attendance

1.2.1 RVSM/TF/29 was attended by 24 participants from Hong Kong China, Japan, the Philippines, the Republic of Korea, Singapore, Thailand, IFALPA and Observers from IATA member airlines. IATA was unable to attend the meeting due to unforeseen circumstances and had relayed written regrets to the Regional Office. A complete list of participants is at **Appendix A** to this Report.

1.3 Officers and Secretariat

1.3.1 Mr. Kuah Kong Beng, Chief Air Traffic Control Officer, Civil Aviation Authority of Singapore (CAAS) served as the Chairperson of the Task Force. Mr. Kyotaro Harano, Regional Officer Air Traffic Management (ATM), ICAO Asia and Pacific Office served as the Secretary for the meeting.

1.4 Opening of RVSM/TF/29

1.4.1 Mr. Kyotaro Harano welcomed all the delegates to RVSM/TF/29, on behalf of Mr. L.B. Shah, Regional Director, ICAO Asia and Pacific Office. This meeting was the one-year review meeting of RVSM operation in Japan's domestic airspace and the Incheon FIR. Since the previous meeting in February for the 90-days review, the Secretary was informed from operators that they were enjoying the benefits of RVSM in the airspace. In this regard, Mr. Harano thanked Japan and the Republic of Korea for their successful implementation. Also, he expressed appreciation to

Hong Kong, China and Thailand for their cooperation and assistance for the RVSM operation by Japan and the Republic of Korea.

1.4.2 Mr. Harano drew to the attention of the meeting that RVSM/TF/29 would be the last scheduled meeting of the Task Force. The Task Force had a long history starting from 1998. Since then, RVSM was successfully introduced in the Pacific in 2000, in the Western Pacific and South China Sea (WPAC/SCS) in 2002, in the Bay of Bengal and Beyond area in 2003, and in the domestic portion of the Fukuoka FIR and the whole Incheon FIR in 2005. Mr. Harano congratulated all the States, ATS providers and international organizations for their collaborative efforts to successfully implement RVSM in the Asia and Pacific region. He wished a successful and fruitful meeting, as this would be the last scheduled meeting of the Task Force.

1.4.3 Japan expressed gratitude for the success of RVSM implementation in their domestic airspace on 29 September 2005, in conjunction with the implementation in the Incheon FIR of the Republic of Korea. Japan also echoed the Secretary's comment on this meeting being the last scheduled meeting as Japan has long been actively involved in the Task Force and an important member since its initial establishment in 1998.

1.4.4 The Republic of Korea appreciated States concerned, IATA and IFALPA for their support to introduce RVSM in the Incheon FIR. The Republic of Korea also expressed appreciation to Monitoring Agency for Asia Region (MAAR) for their tremendous efforts in the safety assessment and monitoring.

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 Eight Working Papers and thirteen Information Papers were presented to RVSM/TF/29. A list of papers is included at **Appendix B** to this Report.

Agenda Item 1: Adoption of Agenda

1.1 The meeting reviewed the provisional agenda proposed by the Secretary for RVSM/TF/29, and adopted the following agenda.

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: Any Other Business

Agenda Item 2: Operational Considerations

One-year Review of RVSM Operations in Japan

2.1 Japan presented a summary of their final study of one-year post-implementation RVSM benefits up to the end of September 2006. It was recalled that Japan had conducted an initial study on benefits derived from RVSM operations in the Japan's domestic airspace and reported the results to RVSM/TF/27 (February-March 2006, Bangkok) as a part of the 90-day review. This final study report was a follow-up activity, using the same methodology as the initial study. An extract of the final study is attached at **Appendix C** to this Report.

2.2 The study highlighted the following operational changes:

- the correspondence rate between the planned flight levels (FLs) and actual assigned FLs dropped from 64.0% of the pre-implementation of RVSM to 59.4% after RVSM implementation;
- the height value of difference between the planned FLs and the actually assigned FLs, if aircraft are not assigned to the planned FL, became smaller after RVSM implementation;
- peak FLs have been reduced and FLs are used more evenly; and
- the average FL actually flown by domestic flights increased by approximately 300ft (285ft) from FL328.70 to FL331.55, and a larger increase of 483ft from FL329.85 to FL334.68 with regard to international flights was observed as a result of RVSM implementation.

2.3 It was noted that this 300ft hike of average FLs by domestic flights was considered to lead to 0.4% fuel saving based on the assumption that an increase of cruise altitude by 2,000 ft would generally save fuel burn by approximately 3%. However, Japan advised that actual data collected by participating airlines did not clearly indicate such fuel saving yet. Some operators' data suggested certain saving close to 0.4% on limited routes though the majority of operators could not find any noticeable change in fuel burns. Therefore, Japan concluded that flight distance and duration at an RVSM cruise altitude were relatively short for domestic flights in Japan, and the expected benefit of fuel saving might not be achieved as estimated.

2.4 In this regard, the Secretariat draw to the attention of the meeting that though fuel to be saved by individual flights may not be large enough to be measured, but when such small savings are accumulated, a combined benefit could be significant.

2.5 The meeting also noted that there was no case of suspension of RVSM operations since its implementation in Japan, and comments from controllers and operators, including pilots, indicated their great satisfaction with RVSM operations.

2.6 As an overall review of RVSM operations in the Japanese domestic airspace, Japan expressed their satisfaction with the smooth implementation of RVSM and continued safe and effective operations over the last 12 months since the implementation.

2.7 An airline observer provided additional information that the airline had observed a similar trend of operational changes and experienced noticeable benefits. They also advised the meeting that Japanese operators were very thankful to Civil Aviation Bureau of Japan (JCAB) for the safe operations of RVSM.

2.8 The meeting recognized the hard work done by Japan and appreciated the efforts for the safe and effective operations as well as for the preparation and presentation of a comprehensive benefits analysis report.

One-Year Review of RVSM Operations in the Republic of Korea

2.9 The meeting noted the successful implementation of RVSM operations in the Incheon FIR. KCASA had maintained close cooperation and continued works with aircraft operators, military authorities, various organizations and other authorities of adjacent FIRs to ensure a safe and smooth implementation of RVSM operations. The meeting was informed that traffic flows had improved and brought operational advantages such as efficient use of airspace, orderly ATC services, and fuel-saving aircraft operations as the result of RVSM implementation.

2.10 The Republic of Korea informed the meeting on the summary of activities within the Incheon FIR for RVSM implementation as follows:

a) Korea Civil Aviation Act was amended as of 3 July 2004 in order to reflect the requirements of RVSM operation;

b) The Korea RVSM Task Force team was launched in 2001 and would be disbanded after the one-year review meeting.

c) AIP supplement (AIRAC AIP 5/05) which was modified in accordance with the result of RVSM/TF/26 was published on 18 August 2005 (Effective: 1900 UTC 29 September 2005);

d) NOTAM to remind operators and pilots of RVSM implementation was issued on 22 September 2005;

f) All aircrafts belonging to national carriers (Korean Airline and Asiana Airline) had obtained RVSM approval (airworthiness and operational approval) and training for aviation personnel had made good progress;

g) For ATC, Guidance & Scenarios for training was developed and basic classroom training and simulation training for RVSM implementation was completed. The test for all trainees to evaluate their training accomplishment was completed and comprehensive training was provided to each work shift;

h) Good coordination with adjacent States and facilities concerned was maintained and all the letter of agreements (LOAs between Incheon ACC and Fukuoka/Naha/Tokyo ACC, between KCASA and the US Air Force, between Incheon ACC and 14 radar approach controls within the Incheon FIR) was amended or concluded;

i) For the one-year post-implementation safety analysis, the Republic of Korea had submitted Traffic Sample Data (TSD, for the month of December 2005) and monthly Large Height Deviation (LHD) reports to MAAR and the Pacific Aircraft Registry and Monitoring Organization (PARMO). Annual December TSD, in accordance with the APANPIRG Conclusion 16/4, and monthly LHD would be continuously provided to PARMO and MAAR.

2.11 The meeting noted that the tendency of traffic movement after RVSM implementation was as follows:

a) The total of traffic volume had not much changed compared to that of prior to the RVSM implementation.

b) Even though traffic volume on specific timeframe increased as the result of RVSM implementation, operational environment between Incheon and Southeast Asia/United State/Japan significantly improved and delay was significantly reduced.

c) However, operational environment for traffic flows toward China/DPRK did not change. Because of the different altitude system and non-RVSM environment, the traffic flows towards these areas were as same as what was before RVSM implementation.

d) With regard to the RVSM implementation, it should be noted that the general operational environment was successfully improved.

2.12 The Republic of Korea informed the meeting that Japan and the Republic of Korea had maintained close cooperation to give more assurances for the safe and smooth operations. As a part of its mutual coordination, the LHD information was exchanged. As to the LHD occurrences over ATOTI, proactive actions and refresher training would be taken to prevent LHD occurrence during the transfer of control to Naha ACC. The Republic of Korea would continuously maintain close cooperation with Japan and other states/organizations concerned to ensure air safety and to improve operational environment.

2.13 The meeting was informed that KCASA, using Flight Data Processing (FDP) system, gathered the information of actual assigned FLs of all flight conducted between FL290 and FL410 for studying on the RVSM benefits. The periods for collecting sample data were September 2004 and September 2005 as pre-implementation periods, and October 2005, August 2006 and September 2006 as post-implementation periods. Basically, the operators' assumption that an increase of cruise altitude by 2,000ft would generally save fuel burn by approximately 3% was used for calculating the expected fuel savings.

2.14 According to the distribution of RVSM FLs between FL290 and FL410 (Figure 1 below), the use of peak FLs became lower and overall FLs are now used more evenly.

2.15 The meeting noted that the use of FL320, FL360 and FL380, which were not used before the RVSM implementation, was shown relatively high and the use of higher FLs between FL360 and FL410 was increased remarkably after the RVSM implementation.

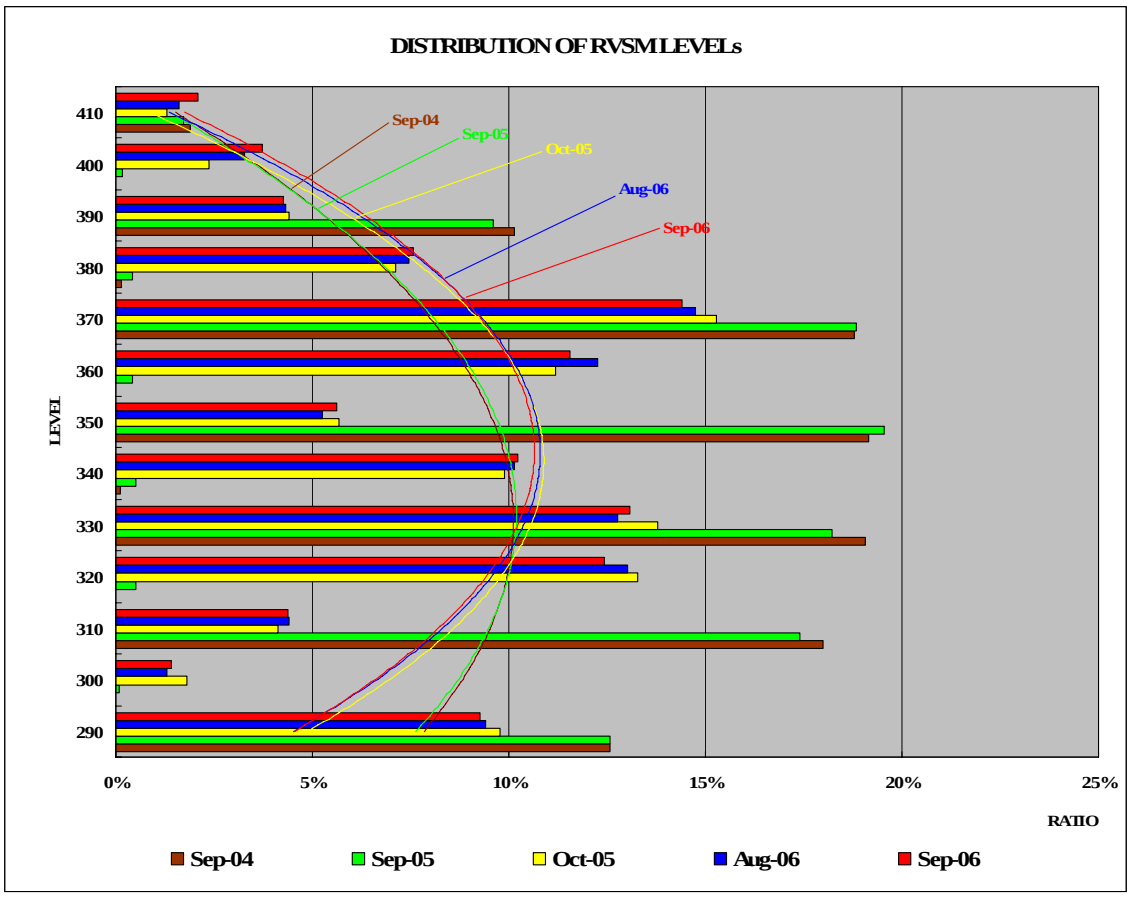

Figure 1. Distribution of RVSM Flight Levels

2.16 According to the comparison of average RVSM FL, the average FLs went up by approximately 530ft as a result of RVSM implementation on 29 September 2005. The 530ft up of average FLs was considered to lead to 0.8% fuel saving.

2.17 Airline observers thanked the Republic of Korea for the successful implementation of RVSM in the Incheon FIR. They reiterated the benefits to airlines in terms of fuel savings and increased efficiency.

2.18 IFALPA expressed concern that the operational and technical issues on A593 would remain although the Task Force had completed its tasks in the implementation of RVSM operations. The meeting noted that there would be an alternative ICAO forum such as the Special ATS Coordination Meeting (SCM) among the States and an international organization to address the issue.

2.19 The meeting noted the similar result of the Republic of Korea as that of Japan. Japan and the Republic of Korea had continued their work to introduce RVSM collaboratively, and the meeting recognized the commonality and the benefits of the RVSM operations by Japan and the Republic of Korea.

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

Review of the Sixth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/6)

Note: RASMAG/6 was held from 6-10 November 2006, immediately preceding RVSM/TF/29. Accordingly, the following review of RASMAG/6 was based on the draft *RASMAG/6 Report, which had not yet been authorized by the time of RVSM/TF/29. The authorized RASMAG/6 Report should be referred.*

3.1 RASMAG/6 noted that the vertical collision risk was estimated in order to determine whether the Target Level of Safety (TLS) continued to be met in Northeast Asia airspace (Japan's domestic airspace and the Incheon FIR), thus supporting the on-going safe application of RVSM in the airspace. The estimate of the technical error was below the TLS value of 2.5×10^{-9} fatal accidents per flight hour for technical risk. However, the initial operational risk estimate was 7.49×10^{-9} fatal accidents per flight hour, which did not satisfy the TLS value. PARMO determined that a variation to parameter values in the Collision Risk Modeling (CRM) would result in a more consistent approach to risk assessment. The re-calculation by PARMO resulted in the TLS for the Japan's domestic airspace and the Incheon FIR being satisfied, as further discussed under the Agenda Item 4.

3.2 IFALPA queried to the meeting who was responsible for taking the remedial action to reduce the LHD occurrences if the result exceeds the TLS. The Secretary responded that the State should be responsible for the safe operation of RVSM. In this regard, the Secretary drew attention of the meeting to APANPIRG Conclusion 16/3 as follows:

> ***Conclusion 16/3 – Large Height Deviations – Western Pacific/South China Sea area***
>
> *That, in noting the prevalence of RVSM large height deviation occurrences in the Western Pacific/South China Sea area, the Regional Office draw the attention of all States concerned to identify and put in place remedial actions to mitigate such significant errors on an urgent basis.*

3.3 APANPIRG/17 (August 2006, Bangkok) had agreed that the RVSM-related safety issues should be urgently scrutinized by a dedicated working group that would specifically address matters relating to the WPAC/SCS RVSM operations and adopted a Decision and associated TOR for the working group (Paragraph 5.15 of this Report refers). RASMAG/6 fully supported the establishment of the dedicated WPAC/SCS RVSM Scrutiny Group (WPAC/SCS/RSG), noting that the work of the Scrutiny Group was expected to address the problems that had previously been identified by RASMAG.

3.4 RASMAG/6 considered that respect for the privacy of parties identified in the safety data provided to the regional safety monitoring agencies was extremely important and that affected States should be made aware that, in addition to submissions directly from States, data from the Regional Monitoring Agencies (RMAs) would be used by the WPAC/SCS/RSG to analyze operations in the WPAC/SCS area.

3.5 In this context, RASMAG/6 considered that the TOR should be strengthened by inclusion of new text at b) and d) of the TOR that noted that the WPAC/SCS/RSG would "…analyze data, *including data from regional monitoring agencies*, and evaluate…". A copy of the TOR which includes the proposed wording has been included as **Appendix D** to this Report. RASMAG/6 requested that the Secretariat bring these proposals to the attention of the first meeting of the WPAC/SCS/RSG for consideration. If appropriate, the WPAC/SCS/RSG could then progress an amendment to the TOR via APANPIRG.

3.6 APANPIRG/17 had recognized that that any long-term monitoring requirements which may be developed by the ICAO Separation and Airspace Safety Panel (SASP) should be globally harmonized as opposed to the current regional approach.

RVSM Approval Data Verification by Japan

3.7 The meeting was reminded that aircraft intending to operate within RVSM airspace required an RVSM operational approval from the State of Registry and registration in an RVSM approval database. JCAB advised the meeting that they had verified the RVSM approval status of civil (excluding military) aircraft flying within the RVSM airspace (domestic and oceanic) against the RMA database of PARMO, MAAR and EUROCONTROL, using the traffic data in September 2006, and presented the following findings.

RVSM Approval Status of Aircraft Registered in Japan

3.8 The numbers of Japanese RVSM approved aircraft are shown on Table 1 below.

Aircraft Type	Number		Aircraft Type	Number
Operated by air carriers (100 or more pax seats/ MTOW 50,000kg or more)				
A300-600	23		A320/A321	35
B737	69		B747	36
B747-400	70		B767	105
B777	79		MD81/87	26
MD90	16			
Operated by other air carriers				
CRJ100	13			
Operated by general aviation				
BD700	2		RJ31A	1
G-V	2		G-IV	2
C560	5		C525	8
B300	1			
Note: this list indicates aircraft with performance to fly above FL290 only.				

Table 1. RVSM Capable Aircraft that Have Received RVSM Operational Approval by JCAB (as of 31 October 2006)

Verification of RVSM Approval Data and Results

3.9 JCAB collected data on RVSM approval status of civil aircraft by checking whether the aircraft flight plans indicated "W" in the filed 10, and by comparing flight plan data with the RVSM approval lists of PARMO, MAAR, and EUROCONTROL. The verification using the September 2006 data resulted in as follows (See Table 2 below):

a) there were 72,551 civil flights that flew within the RVSM airspace in September 2006;

b) there were 11 civil flights that did NOT have "W" in the plan and were NOT found in RMA databases of PARMO, MAAR and EUROCONTROL;

c) there were 4 civil flights that did NOT have "W" in the plan but were found in the RMA databases; and

d) there were 1,721 civil flights that had "W" in the plan but were NOT found in the RMA databases.

Status	Number	Percentage
Civil flights in RVSM airspace	72,551	----
with "W" and in RMA databases	70,815	100% (99.9998%)
with "W" but not in RMA databases	1,721	
without "W" and not in RMA databases	11	0% (0.0002%)
without "W" and in RMA databases	4	
in RMA databases	70,819	97.6%
not in RMA databases	1,732	2.4%

Table 2. Result of RVSM Approval Status Verification in September 2006

3.10 The meeting noted that practically 100% of the civil flights conducted within the Japanese RVSM airspace properly indicated "W" in the flight plan, and that 97.6% of civil flights within Japanese RVSM airspace were conducted by those aircraft registered in the RMA databases of PARMO, MAAR and EUROCONTROL.

3.11 JCAB considered it very important to maintain this percentage as close to 100% as possible because any disagreement could trigger action by air traffic controllers to confirm the status of RVSM approval with aircraft, and increase communication workload of ATC and pilots. Thus, JCAB would continue this verification regularly in order to maintain safety of RVSM operations.

Agenda Item 4: Safety and Airspace Monitoring Considerations

One-year Airspace Safety Oversight for the RVSM Implementation in Japan and the Republic of Korea by PARMO

4.1 The Secretary presented the one-year airspace safety oversight on behalf of PARMO. The RVSM implementation in the Japan's domestic airspace and the Incheon FIR had been supported by MAAR, in regard to safety-related matters. In January 2006, MAAR transferred the RMA responsibilities to PARMO for the airspace.

Large Height Deviations Report Summary

4.2 The meeting was informed that the LHD reports had been separated by categories based on the details provided for each deviation. There are two categories: risk-bearing LHD not involving whole numbers of flight levels, and risk-bearing LHD involving whole numbers of flight levels.

4.3 It was noted that there were 14 risk-bearing LHD not involving whole numbers of flight levels reported to PARMO. The causes of 10 deviations were reported as pilot response to Traffic Alert and Collision Avoidance System (TCAS) or Airborne Collision Avoidance System (ACAS) resolution advisories (RA). The causes of the remaining four deviations were reported to be turbulence or other weather-related cause. These LHDs contributed to the technical risk of the airspace.

4.4 It was further noted that there were nine risk bearing LHD involving whole numbers of flight levels reported to PARMO. Following is a summary of these events.

i) Four of the events were reported to be flight level errors in ATC-unit to ATC-unit transition messages (Category M). The remaining event related to ATC transition messages was caused by a negative transfer received from the transitioning ATC-unit (Category N).

ii) One event dated was caused by an ATC system loop error. In this case, ATC cleared the flight to descend to FL350, the pilot misunderstood the clearance and read back FL310, ATC missed verifying the pilot's read back. This event did not involve another aircraft, and the time spent at an incorrect flight level was 20 seconds.

iii) Another event was caused by the receiving ATC misunderstood the flight level assignment in a correct transfer message.

iv) Two events were caused by the aircrew not maintaining the level as cleared. These events both involved an aircraft overshoot/undershoot during a climb to a new flight level.

Estimate of Vertical Collision Risk for Northeast Asia Airspace

4.5 The meeting had before it the vertical collision risk estimate in order to determine whether the TLS continued to be met in Northeast Asia airspace, thus supporting the ongoing safe application of RVSM in the airspace. Table 3 below summarizes the results of the risk assessment in terms of technical, operational, and overall risk for the RVSM implementation in the Northeast Asia airspace.

Source of Risk	Risk Estimate	TLS	Remarks
Technical Risk	8.57×10^{-11}	2.5×10^{-9}	Below Technical TLS
Risk Due to Operation at Incorrect Flight Levels	1.24×10^{-9}	-	-
Overall Risk	1.33×10^{-9}	5.0×10^{-9}	Below Overall TLS

Table 3. Estimates of the Risk for Northeast Asia Airspace Safety Oversight

4.6 It was considered that the technical risk was estimated to be $8.57.x\ 10^{-11}$ fatal accidents per flight hour. This estimate was below the TLS value of 2.5×10^{-9} fatal accidents per flight hour for Technical Risk. The operational risk estimate was 1.24×10^{-9} fatal accidents per flight hour. The total risk estimate was 1.33×10^{-9} fatal accidents per flight hour; this value is roughly 73 percent below the TLS.

4.7 Figure 2 below presents the updated risk estimates for Northeast Asia RVSM airspace based on recent reports of LHD.

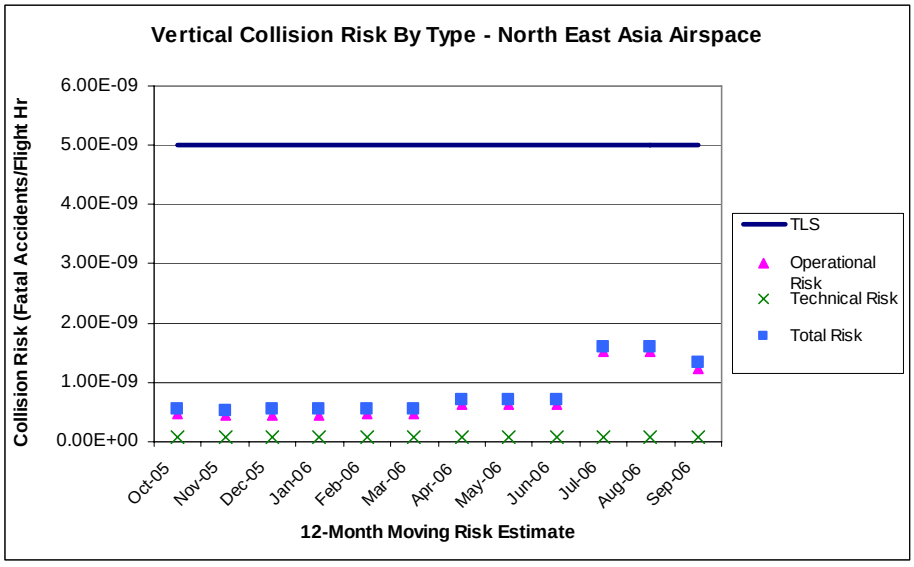

Figure 2. Estimates of the Risk for Northeast Asia Airspace by Month

One-year Airspace Safety Oversight for the RVSM Implementation in Japan by JCAB

4.8 Japan presented the meeting with the one-year post-implementation RVSM safety assessment for the Japanese domestic airspace, which was completed in coordination with PARMO and MAAR, and with the assistance of the Electronic Navigation Research Institute (ENRI) of Japan. The safety assessment had been conducted based on relevant TSD, including the December 2005 TSD and monthly LHD reports between October 2005 and September 2006. Details of this JCAB's assessment results are in **Appendix E** to this Report.

4.9 A total of 24 LHD occurrences were recorded between October 2005 and September 2006 in the Japanese domestic RVSM airspace. Of these, 10 were the result of TCAS response, 7 related to ATC transfer errors, and 7 to weather-related or other causes. JCAB had scrutinized each case of LHD, identifying LHDs caused by human errors (ATC-transfer errors, pilot misunderstands clearance message, ATC issues incorrect clearance, etc) as attributable to operational risk. LHDs caused by technical errors (aircraft equipment failure, TCAS RA, turbulence, contingency events, etc) were generally attributed to the technical risk. This review concluded that out of 24 reported LHDs, 11 LHD occurrences would be attributable to operational error and 13 LHD occurrences would be attributable to technical error.

4.10 In regard to the seven LHDs caused by ATC operational errors relating to transfer between ATC units, JCAB coordinated the matter with the adjacent ATC units concerned with the aim of preventing further recurrence of similar errors. JCAB was advised that as a result of this coordination, remedial actions were taken by the affected ATC units, such as conduct of refresher training courses for air traffic controllers and establishment of procedures to strengthen monitoring capability by supervisor as to transfer of control. JCAB will continue monitoring the situation and cooperate with ATC units for any improvements.

4.11 A query was raised in relation to the ATC transfer errors that occurred at ATOTI (the boundary point between Incheon and Naha ACCs), in particular the high frequency of occurrences in July 2006. The Republic of Korea responded that they considered the errors were purely human errors and were caused by ATC memory slip. The Republic of Korea advised that they would endeavor to build better understanding and more awareness among ATC about the importance of a safety assessment and the relation between transfer errors and risk estimation in the assessment. In addition, the Republic of Korea informed the meeting that KCASA and JCAB had agreed to implement AIDC between Incheon ACC and Fukuoka/Naha/Tokyo ACCs by the end of 2007, and they expected that AIDC would eliminate ATC transfer errors.

4.12 Table 4 below summarizes the results of the airspace safety oversight in terms of the technical, operational and total risks for the RVSM implementation in the Japanese Domestic airspace.

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.44×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	4.53×10^{-9}	-	-
Overall Risk	4.97×10^{-9}	5.0×10^{-9}	Below Overall TLS

Table 4. Risk Estimates for the RVSM Implementation in Japanese Domestic airspace

4.13 Based on these collision risk estimates, both technical and total risks from the available TSD and LHD reports **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.

4.14 It was recognized that a collision risk calculation using the same model without the seven ATC-unit to ATC-unit transfer errors resulted in a significant reduction of the operational risk to 1.04×10^{-9} from 4.53×10^{-9}.

4.15 The meeting noted that JCAB considered that the overall risk estimate shown in this assessment was marginal, and would continue monitoring and take actions where necessary.

Review of Large Height Deviation Reporting Procedures in Japan

4.16 It was recalled that at RVSM/TF/27, IATA requested the Task Force to review Japan's reporting process of LHD, which had been in place since the Pacific RVSM was implemented in 2000. RVSM/TF/27 recommended that in regard to Japan's requirement, the report of LHD by pilot/operator be sent to the State/ATS provider responsible for the provision of ATS in the area where the LHD occurred. When a LHD occurred, the pilot should report to the ATC concerned or, in a situation where the pilot could not inform ATC directly, a report in a written form should be submitted by the pilot or the operator to the State of the occurrence or the ATS provider concerned, as required, as soon as possible. The State/ATS provider should send the LHD report to the RMA responsible for the airspace safety monitoring. The meeting reviewed the reporting process of LHD at Appendix I to the RVSM/TF/27 Report, which is reproduced as in **Appendix F** to this Report, and agreed that the current process should suffice. Japan informed RVSM/TF/27 that it would review the reporting requirements stated in the AIP to reflect the above process.

4.17 Japan advised the meeting that they had reviewed the current LHD reporting procedures specified in AIP Japan (**Appendix G** to this Report), ENR 3.6, 10.9 Large Height Deviation Report, taking into account the views expressed by RVSM/TF/27, and presented the results of the review.

4.18 One of the findings by the review was that the description of the reporting procedures in the AIP might lead pilots/operators to misunderstanding in terms of actions to be taken by them. For example, Sub-paragraph (3) in 10.9.1 does not clearly address the requirement for pilots to report to ATS unit via radio or data link, as soon as practicable, upon noticing an occurrence of LHD, and may imply that pilots are required to submit a report in a written form directly to JCAB headquarters.

4.19 The meeting noted that as an established procedure within JCAB, an ATS unit that has receive an LHD report from pilots forward such a report in writing to JCAB headquarters and take follow-up actions such as collection of relevant data. The collected data would assist the JCAB headquarters in investigating the event and finding cause of the event and remedial measures.

4.20 The meeting recognized that JCAB had observed since the implementation of RVSM in 2000 that there were several instances where ATS units were not able to receive LHD reports directly from pilots in flight or to notice vertical deviations even under radar environment. In these cases, only pilots and operators were in a position to provide details of LHD occurrence to JCAB. In high density airspace as in Japan, ATC and pilots would face difficulty in exchanging detailed information of LHD on radio frequency. Japan stressed that as the State authority responsible for safe provision of ATS in the Fukuoka FIR, JCAB should keep monitoring RVSM operations by collecting safety critical information not only from ATS units but also from aircraft operators, as recognized repeatedly at past meetings of RVSM/TF. In this connection, the meeting agreed that Contracting States hold the responsibility to ensure that safety is maintained in the provision of ATS within airspaces and at aerodromes.

4.21 Thus, Japan was of the view that detailed information of LHD occurrence should continue to be collected with a written form which ensures accuracy and correctness of information, and assists JCAB as the authority of "State of LHD Occurrence" in taking necessary actions as promptly as possible. JCAB has been providing all LHD reports, including NIL reports, to RMA responsible for Fukuoka FIR, and ensures that this process be maintained.

4.22 Japan drafted an amendment to the current procedures in order to clarify the original intent of the current LHD reporting procedures in Japan, and presented it as follows for comments by the meeting. (Changes are shown with underline).

4.23 Proposed changes to sub-paragraphs (3) and (4) of 10.9 Large Height Deviation Report (page ENR3.6-28) are as follows:

10.9.1 …

(3) Action to be taken by pilot
Pilot of aircraft operating in accordance with IFR, when deviating for any reason 300ft or more from the level cleared by ATC in the RVSM airspace, shall report to ATS unit via radio or datalink, as soon as practicable, on each occurrence of large height deviation. After completion of flight, the pilot shall also report to operators the details of deviation.
Large Height Deviation reports shall be submitted independently of "TCAS RA reports".

(4) Aircraft operators' involvement
When a large height deviation is reported by pilot as described in (3) above, operators shall submit the report, in principle, using the attached form, as soon as possible to the following address.

Flight Procedures and Airspace Program Office
Air Traffic Control Division, Air Traffic Services Dept.
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4.24 The meeting noted that JCAB does not intend to propose the LHD reporting procedure in Japan to be a regional/global standard, and that this draft amendment was yet to be finalized. JCAB would continue consultation with operators as necessary.

4.25 The airline observers present recognized with appreciation the JCAB's efforts to review the procedures in response to IATA's request, and agreed that safety critical information should be collected and shared.

4.26 Airline observers also expressed the view that the current procedures caused no difficulty to the national carriers, but foreign operators might still have difficulty in understanding the process and continue raising raise additional questions. In this regard, they would raise this issue with IATA and request IATA to coordinate the draft LHD reporting procedures among its members and refer their consolidated comments back to Japan in due course.

Agenda Item 5: Implementation Management Considerations

Overall Review of Introduction of RVSM in Asia and Pacific Region

5.1 The meeting reviewed the RVSM introductions in Asia and Pacific Region. The meeting recalled that the Task Force had met as many as 30 times since its institution in 1998, and conducted seven Special ATS Coordination Meetings (SCM), two joint coordination meetings with the Middle East RVSM/TF and six seminars. The 39 meetings including the SCMs and the joint coordination meetings are listed below:

TF/1 - Tokyo 18 November 1998;
TF/2 - Los Angeles 1-5 February 1999;
TF/3 - Honolulu 10-13 May 1999;
TF/4 - Brisbane 10-12 August 1999;
TF/5 - Tokyo 4-5 November 1999;
TF/5a - Honolulu 20-22 January 2000;
TF/6 - Singapore 10-14 April 2000;
TF/7 - Honolulu 17-18 April 2000;
TF/8 - Hong Kong, China 28 August-1 September 2000;
TF/9 - Bangkok 8-12 January 2001;
TF/10 - Honolulu 29-30 January 2001;
TF/11 - Kuala Lumpur 30 April-4 May 2001;
TF/12 - Denpasar 10-14 September 2001;
TF/13 - Singapore 14-18 January 2002;
TF/14 - Bangkok 30-31 May 2002;
TF/15 - Bangkok 3-7 May 2002;
SCM - Manila 29-31 July 2002;
TF/16 - Bangkok 23-25 September 2002;
RVSM Joint Coordination Meeting - Abu Dhabi 19-20 October 2002;
TF/17 - Bangkok 20-24 January 2003;
TF/18 - Bangkok 30 June-4 July 2003;
TF/19 - Bangkok 30 June-4 July 2003;
SCM – RVSM Operational Plan - Kuala Lumpur 11-13 August 2003;
Second RVSM Joint Coordination Meeting - Abu Dhabi 27-28 August 2003
SCM – RVSM Transition Procedures - Bangkok 3-5 September 2003
TF/20 - New Delhi 27-31 October 2003;
SCM – India and Pakistan Transition Procedures - Bangkok 7 – 9 January 2004
TF/21 - Bangkok 8-12 March 2004;
SCM/Singapore - Singapore 12-13 April 2004
SCM – RVSM in the Incheon, Naha and Tokyo FIRs - Bangkok 5-7 July 2004;
TF/22 - Bangkok 20-24 September 2004;
TF/23 - Bangkok 18-22 October 2004;
TF/24 - Bangkok 8-12 November 2004;
TF/25 - Incheon 23-25 March 2005;
TF/26 - Tokyo 4-8 July 2005;
SCM - FLOS - Bangkok 20 September 2005
TF/27 - Bangkok 27 February-1 March 2006;
TF/28 - Bangkok 24-28 April 2006; and
TF/29 - Bangkok 14-16 November 2006.

Pacific Implementations

5.2 In reviewing the past events in relation to RVSM in the Region, the meeting recalled that RVSM was successfully implemented on 24 February 2000 at 0700 UTC between FL290 and 390 inclusive in the Anchorage, Auckland, Brisbane, Honiara, Nadi, Naha, Nauru, Oakland, Tahiti and Tokyo FIRs.

5.3 APANPIRG/12 (2001, Bangkok) noted that RVSM/TF/10 undertook a one-year post implementation review of the Pacific RVSM implementation. RVSM/TF/10 agreed that there was a need to monitor factors affecting the continued safe use of the RVSM in the Pacific airspace and endorsed the long-term requirement for collection and analysis of information related to instances of LHD arising from turbulence, incorrect application of aircraft contingency procedures, response to ACAS alerts and errors in granting or following ATC clearances.

Asia/Europe/South of the Himalayas Implementations

5.4 The meeting recalled that RVSM in the WPAC/SCS area was implemented on 21 February 2002 as the Phase 1, followed by the Phase 2 on 31 October 2002.

Bay of Bengal and Beyond Implementation

5.5 APANPIRG/13 had noted that the definition of the "Bay of Bengal and Beyond (within the ICAO Asia Region)" was adopted by the Task Force to reflect a common definition for the airspace in which RVSM would be implemented on 27 November 2003. The RVSM airspace would include the Bangkok, Chennai, Colombo, Delhi, Dhaka, Jakarta, Karachi, Katmandu, Kolkata (Calcutta), Kuala Lumpur, Lahore, Male, Mumbai and Yangon FIRs.

5.6 RVSM/TF/19 continued implementation planning for the Bay of Bengal and Beyond area. Also, the implementation plan called for coordination with the MID RVSM/TF for joint implementation of RVSM in the Asia and MID Regions on 27 November 2003.

5.7 The MAAR reported to RVSM/TF/21 that the TLS continued to be well within the required safety level.

RVSM Implementation in the Incheon, Naha and Tokyo FIRs

5.8 The meeting recalled that APANPIRG/15 was updated on progress by Japan and the Republic of Korea to implement RVSM in the Naha and Tokyo FIRs (domestic) and the Incheon FIR, respectively. It was recalled that at RVSM/TF/18, the Republic of Korea had indicated that they would appreciate the assistance of the Task Force to support their implementation of RVSM.

5.9 RVSM/TF/26 reviewed the results of readiness assessments and noted that approximately 75% of aircraft operations would be conducted by State RVSM approved operators and aircraft. RVSM/TF/26 noted that approximately 92% of aircraft operations would be RVSM approved by 29 September 2005.

Review of RVSM flight level orientation scheme (FLOS) in the South China Sea

5.10 RVSM/TF/28 recalled that new flight level allocation (FLAS) and No-Pre-Departure Coordination (No-PDC) levels for each route category of the South China Sea area were proposed at RVSM/TF/22. Thailand reported to RVSM/TF/28 that some of the transition problems could be resolved when the new FLAS was introduced. Under the current FLAS, transitions were required for all westbound flights operating on A1 and P901 due to the single alternate FLOS in the Bangkok FIR.

5.11 The Philippines, who had proposed the Scenario 1 FLAS at RVSM/TF/22, reported to RVSM/TF/28 that they had reviewed it and decided to withdraw their FLAS proposal. The Philippines was against changing the current FLAS if the single alternate FLOS without any modification could not be adopted in the WPAC/SCS area.

5.12 Thailand, who had jointly proposed the Scenario 1 FLAS with the Philippines at RVSM/TF/22, highlighted the transition problems in the Bangkok FIR, particularly on A1 and P901. Thailand supported the new Scenario 2 proposed by MAAR.

5.13 As a consequence of the withdrawal by the Philippines of its support for the proposed Scenario 1 that was developed jointly with Thailand at RVSM/TF/22, it was felt that a consensus could not be reached to adopt the new FLAS.

Review of APANPIRG/17

5.14 The meeting noted that APANPIRG/17 reviewed a consolidated report of RASMAG/4 and 5 (October 2005 and June 2006, respectively), and the report of the sixteenth meeting of the Air Traffic Management/Aeronautical Information Services/Search and Rescue Sub-Group (ATM/AIS/SAR/SG/16, July 2006).

Regional Airspace Safety Monitoring Advisory Group

5.15 APANPIRG/17 agreed that the RVSM-related safety issues should be urgently scrutinized by a dedicated working group that would specifically address matters relating to WPAC/SCS RVSM operations and adopted the following Decision and associated TOR for such a working group:

Decision 17/5 − Establishment of WPAC/SCS RVSM Scrutiny Working Group

Recognizing that:

a) incompatibilities exist between the modified single alternate flight level orientation scheme (FLOS) in use in the Western Pacific/South China Sea (WPAC/SCS) area and the single alternate FLOS in use in areas adjacent to the WPAC/SCS area, and

b) the RVSM Target Level of Safety in the WPAC/SCS area was not being satisfied and exhibited an adverse trend,

a Scrutiny Working Group be established to identify, study and address problems in the safety, efficiency and harmonization of WPAC/SCS RVSM operations in accordance with the Terms of Reference in Appendix A to the APANPIRG/17 Report on Agenda Item 2.1.

RVSM Implementation Task Force

5.16 APANPIRG/17 reviewed the activities of the Task Force. APANPIRG/17 noted that RVSM/TF/27 was updated with the results of the 90-day airspace safety oversight provided by MAAR as the interim RMA. The overall vertical risk (i.e. technical and operational) of 3.60×10^{-9} was calculated to satisfy the established regional RVSM TLS of 5×10^{-9} fatal accidents per flight hour.

5.17 China informed APANPIRG/17 that they acknowledged the benefits available from RVSM and had commenced active research in relation to implementing RVSM in China's sovereign airspace. As China shared its borders with about 10 neighboring FIRs which would be affected by RVSM implementation in China, including transition arrangements between flight levels defined in feet and meters, APANPIRG/17 considered that the knowledge and experience that had been gained by the RVSM/TF would be useful to China and surrounding States and would assist in inter-regional harmonization when China proceeded with RVSM implementation.

5.18 Accordingly, APANPIRG/17 agreed that the issue of whether to disband the Task Force would be raised during the next meeting of APANPIRG and if China wished to avail of the assistance of the RVSM/TF this would comprise part of the discussions at that time.

Funding of Regional Safety Monitoring

5.19 The meeting noted that APANPIRG/17 took into account the comprehensive proposal from RASMAG/5 that APANPIRG initiate steps to establish the *Regional Safety Monitoring Board – Asia* and the *Regional Safety Monitoring Board – Pacific* developed from the MID RMA model by inviting the States concerned to meet with the aim of preparing acceptable Memoranda of Agreement and taking the necessary follow-up steps to establish the Boards to support their activities.

5.20 The meeting recognized that APANPIRG/17 agreed to establish the Task Force to draft implementation proposals for the regional monitoring "committees" in order to allow States for time to consult within their own administrations and consider the matter thoroughly, formulating the following Decision:

Decision 17/47 – Task Force to establish Regional Airspace Safety Monitoring Committees

That a Task Force be established to develop and distribute to States by 30 June 2007 implementation proposals for the establishment of Regional Airspace Safety Monitoring Committees. The Task Force would work in accordance with the terms of reference in Appendix A to the Report on Agenda Item 2.4 and use, inter alia, recent ICAO guidance materials in relation to the global approach for the funding of airspace safety monitoring.

5.21 The TOR for the Regional Airspace Safety Monitoring Committees Task Force (RASMC/TF) is included in **Appendix H** to this Report.

Funding Arrangements for Pacific RMA and CRA

5.22 The meeting noted that the United States had requested that the regional partners involved commit to reimbursing the United States 50% of the cost for the CRA and RMA services rendered on behalf of the Pacific region for calendar year 2007 onward, by formalizing administrative agreements or modifying existing bi-lateral agreements in order to equitably distribute the cost of these services. In addressing the concern, the meeting formulated the following Conclusion:

Conclusion 17/48 − Funding of Pacific RMA & CRA

In recognizing that the United States/FAA was the current service provider of CRA and RMA services for the Pacific Region (with the exception of CRA services for Japan), it was acknowledged that:

a) FAA would remain the interim service provider for the Pacific Region until more formal arrangements have been made, and

b) Pacific States using these FAA services commit to reimburse the FAA for those CRA and RMA services rendered effective 30 June 2007.

5.23 The United States had informed RASMAG/6 that the FAA was more concerned with funding arrangements for the Central Reporting Agency (CRA) activity as this was significantly more expensive than activity associated with PARMO, given the cost of the number of specialists required for the CRA work.

Agenda Item 6: Review of Action Items

6.1 The meeting reviewed and updated Task List of RVSM/TF. The meeting agreed that all the items had been "Completed" except for the two items as follows:

i) SN#17: Notify States when significant changes occur to RVSM documentation

This task will be undertaken by the Regional Office via an established procedure. The meeting agreed to add the Regional Office in the Group Responsible and keep the task "On-going".

ii) SN#60: Perform follow-on monitoring

The follow-on monitoring of system performance is the responsibility of RMA. The meeting agreed to keep the task "On-going".

6.2 The meeting considered that SN#9: Report monthly large height deviations (including operational errors) to MAAR and PARMO, and SN#10: Collect traffic sample data for safety assessment for RVSM implementation could be on-going tasks. However, the tasks are covered by APANPIRG Conclusion 16/4 and other relevant State letters issued by the Regional Office. Consequently, the meeting agreed that the items were "Completed".

6.3 The updated Task List is at **Appendix I** to this Report.

6.4 Having reviewed the safety monitoring result provided by PARMO and completed all the tasks, the meeting confirmed the continued safe and efficient operations in the domestic airspace of the Fukuoka FIR (Japan) and in the Incheon FIR (Republic of Korea).

Agenda Item 7: Future Work – Meeting Schedule

7.1 As this was the last scheduled meeting, there was no meeting schedule for the foreseeable future.

7.2 An airline observer drew to the attention of the meeting that China had not implemented RVSM yet, and if they introduce RVSM in their airspace, the coordination process with the 10 neighboring FIRs would be quite difficult. They were of the view that the RVSM/TF should assist their RVSM implementation in their sovereign airspace.

7.3 The Secretariat informed the meeting that for ALL airspace where an RVSM is applied, a programme shall be instituted on a regional basis (Annex 11, Paragraph 3.3.5.1, etc). Further, the meeting was of view that the advantages of RVSM/TF resources should be taken by the State planning to introduce RVSM in their airspace. In this regard, the meeting agreed that RVSM/TF should not be disbanded, and requested the Chairman to report to ATM/AIS/SAR/SG/17 on the following Recommendation:

Recommendation – Continuation of RVSM Task Force

That the RVSM Task Force not be disbanded as the experiences and resources of the Task Force would be significant use to the State planning to introduce RVSM operation in their airspace.

Agenda Item 8: Any Other Business

Airbus A380 Wake Vortex – Revised Guidance

8.1 The meeting noted that the Regional Office issued the State letter Ref.: T3/4.4 – AP099/06 (ATM) on 10 October 2006 based on the report by the Working Group of Experts under the auspices of the United States Federal Aviation Administration, the European Organization for the Safety of Air Navigation (EUROCONTROL), the Joint Aviation Authorities (JAA) and the manufacturer.

ICAO Website of the Flight Safety Information Exchange

8.2 ICAO considers that cooperation between States and information exchange are essential elements for the success of any aviation safety-related activity, in pursuit of the common goal to improve aviation safety. The ICAO website at http://www.icao.int/fsix/ is intended as a portal to existing safety related websites as well as a place to exchange information through various news groups.

9. Closing of the Meeting

9.1 Japan thanked to the Republic of Korea for the close coordination and cooperation demonstrated and friendship built through this implementation programme. Japan also expressed their appreciation to the representatives of MAAR and PARMO for the conduct of safety assessment, as well as the Chairperson and the Secretariat of RVSM/TF for the smooth conduct of meetings, which have brought the RVSM implementation in Japan a success.

9.2 The Republic of Korea expressed their appreciation to MAAR and PARMO, the States concerned, the Chairperson and the Secretariat. The time for the RVSM implementation so far was invaluable and enjoyable.

9.3 In closing the meeting, Mr Kuah Kong Beng thanked the participations for attending the final milestone in the implementation of RVSM operations in the Asia Pacific Region. He said that the one-year review of the implementation of RVSM operations in the Republic of Korea and Japan airspace had brought the Task Force to the end of the journey. He added that the members had been together for eight years since APANPIRG/9 first established the Task Force in 1998. There were 30 task force meetings, 7 SCM and 2 Joint Coordination Meetings with the MID RVSM Task Force, a total of 39 RVSMTF forums, and 6 seminars. He noted that the long period together had built a very strong and close friendship among the members and they were able to resolve issues in a calm and amicable manner. He hoped that the same diligence, teamwork and close cooperation would also be displayed in other regional initiatives to increase airspace capacity and improve efficiency.

9.4 Finally, Mr. Kyotaro Harano reiterated that this was the last scheduled meeting and, on behalf of the past meeting secretaries and the Regional Office, expressed appreciation to the Chairpersons, States and international organizations for the assistance and cooperation rendered to the Task Force. He recalled that the Task Force had accomplished many important tasks in its long history since 1998, and all the challenging tasks could not be achieved without the cooperation and collaboration of all the participants at the 39 meetings. He thanked all the participants attended the past meetings.

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LIST OF WORKING PAPERS (WPs) AND INFORMATION PAPERS (IPs)

WORKING PAPERS

NUMBER	AGENDA	WORKING PAPERS	PRESENTED BY
WP/1	1	Provisional Agenda	Secretariat
WP/2	2	Review of Flight Level Allocation of RVSM in the South China Sea Area	Secretariat
WP/3	5	Overall Review of Introduction of RVSM in Asia and Pacific Region	Secretariat
WP/4	5, 7	Review of the 17th Meeting of Asia/Pacific Air Navigation Planning And Implementation Regional Group (APANPIRG/17)	Secretariat
WP/5	6	Task List for the Implementation of the Reduced Vertical Separation Minimum (RVSM)	Secretariat
WP/6	8	Airbus A380 Wake Vortex – Revised Guidance Material	Secretariat
WP/7	4	Review of Large Height Deviation (LHD) Reporting Procedures in Japan	Japan
WP/8	4	Summary of One-Year Post-Implementation RVSM Safety Assessment for the Japanese Domestic Airspace	Japan

INFORMATION PAPERS

NUMBER	AGENDA	INFORMATION PAPERS	PRESENTED BY
IP/1	-	List of Working Papers (WPs) and Information Papers (IPs)	Secretariat
IP/2	-	Terms of Reference of RVSM/TF	Secretariat
IP/3	-	Terms of Reference of RVSM/TF Work Groups	Secretariat
IP/4	4	Adoption of Amendment 44 To Annex 11	Secretariat
IP/5	8	ICAO Website of the Flight Safety Information Exchange	Secretariat
IP/6	3, 4	Review of the Sixth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/6)	Secretariat
IP/7	3, 4	Funding Arrangements for Regional Airspace Safety Monitoring	Secretariat
IP/8	4	WITHDRAWN	Secretariat
IP/9	3, 4	RVSM Approval Data Verification	Japan
IP/10	2	Final Study of One-year Post-implementation RVSM Benefits in Japan	Japan
IP/11	4	One-year Airspace Safety Oversight for the RVSM Implementation in Japan and Republic of Korea Domestic Airspace	PARMO

NUMBER	AGENDA	INFORMATION PAPERS	PRESENTED BY
IP/12	2,3,4	RVSM Operational Status after RVSM Implementation	Republic of Korea
IP/13	2	Study on RVSM Benefits in Incheon FIR	Republic of Korea

— END —

Final Study of One-year Post-implementation RVSM Benefits in Japan

1. ANALYSIS METHODOLOGY

1.1 From the experiences in other regions where RVSM was implemented earlier, the following benefits are expected from the implementation of RVSM in the Japan's domestic airspace, which would increase availability and flexibility in the flight level (FL) selection:

- fuel savings;
- cargo capacity increase;
- reduction of departure delay, including connecting flights at the first destination of certain passengers; and
- more flexibility of operations for ATC and pilots.

These expected benefits are considered to lead to overall efficiency in aircraft operational costs, revenue, schedule regularity and passengers' convenience.

1.2 In order to examine the above benefits, Japan Civil Aviation Bureau (JCAB) used our flight data processing (FDP) system and gathered information of planned FLs and actual assigned FLs of all flights conducted between FL250 and FL450 inclusive, for the entire 24 moths from October 2004 to September 2006. The collected information was used to compare operational difference between the pre-implementation period of 12 months (October 2004-September 2005) and the post-implementation period of 12 months (October 2005-September 2006), and determine to what degree actual flights were conducted at the planned FLs, and determine the average FL actually flown. There were 426,812 domestic flights for the pre-implementation period and 448,833 flights for the post period.

1.3 Then, using the calculated average FL, the expected fuel saving could be calculated based on the operators assumption as an indicator that an increase of cruise altitude by 2,000ft in RVSM environment would generally save fuel burn by approximately 3%.

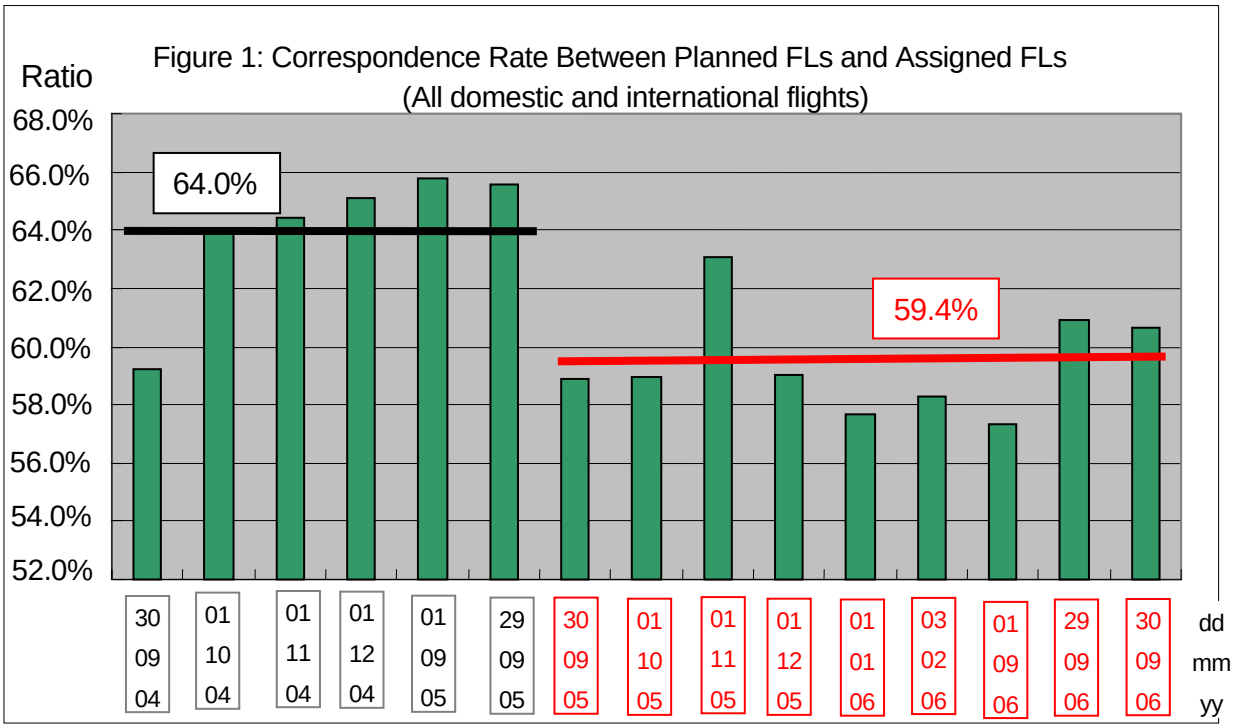
1.4 Data concerning departure delays at all domestic airports were collected by operators for the same period in order to examine the possible impact on schedule regularity.

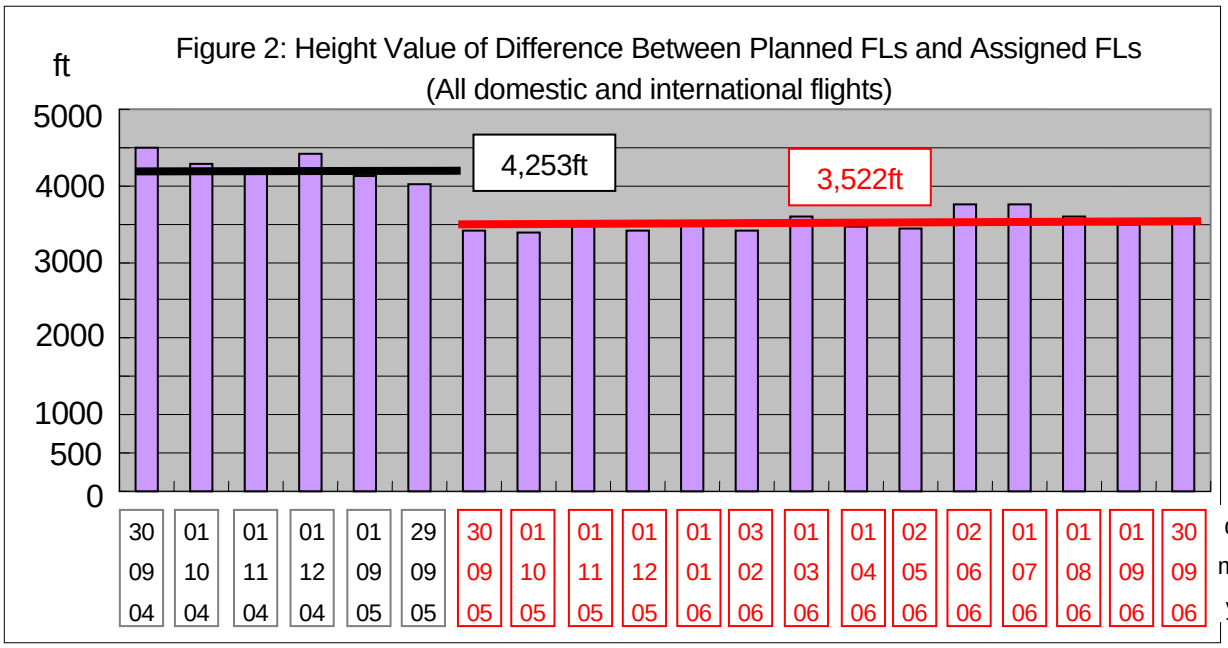
1.5 Comments received from all airspace users, such as air traffic controllers, airlines pilots, general aviation and the defense authority, were reviewed.

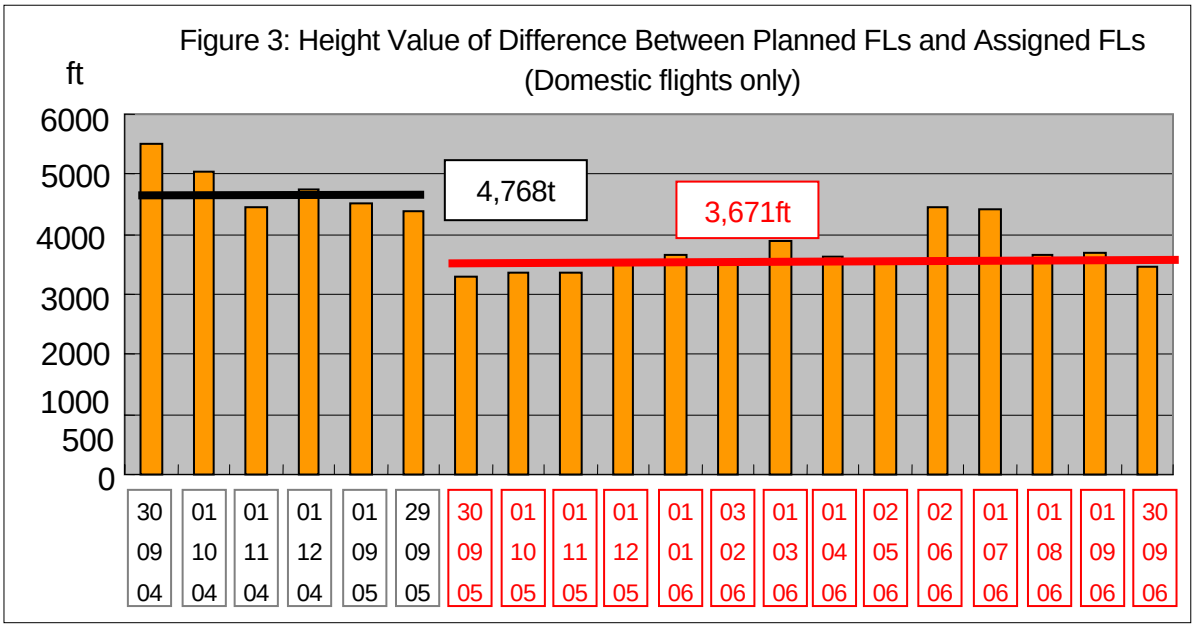
2. ANALYSIS RESULTS

2.1 Sampling data indicate that the correspondence rate between the planned FLs and actual assigned FLs was 64.0% before RVSM, but decreased to 59.4% after RVSM (see Figure 1). However, in case of aircraft which were not assigned to the planned FL, the height value of difference between the planned FLs and the actually assigned FLs became smaller after RVSM implementation (see Figures 2 and 3). Based on this analysis, it is considered that RVSM operations permit aircraft to fly at FLs closer, if not

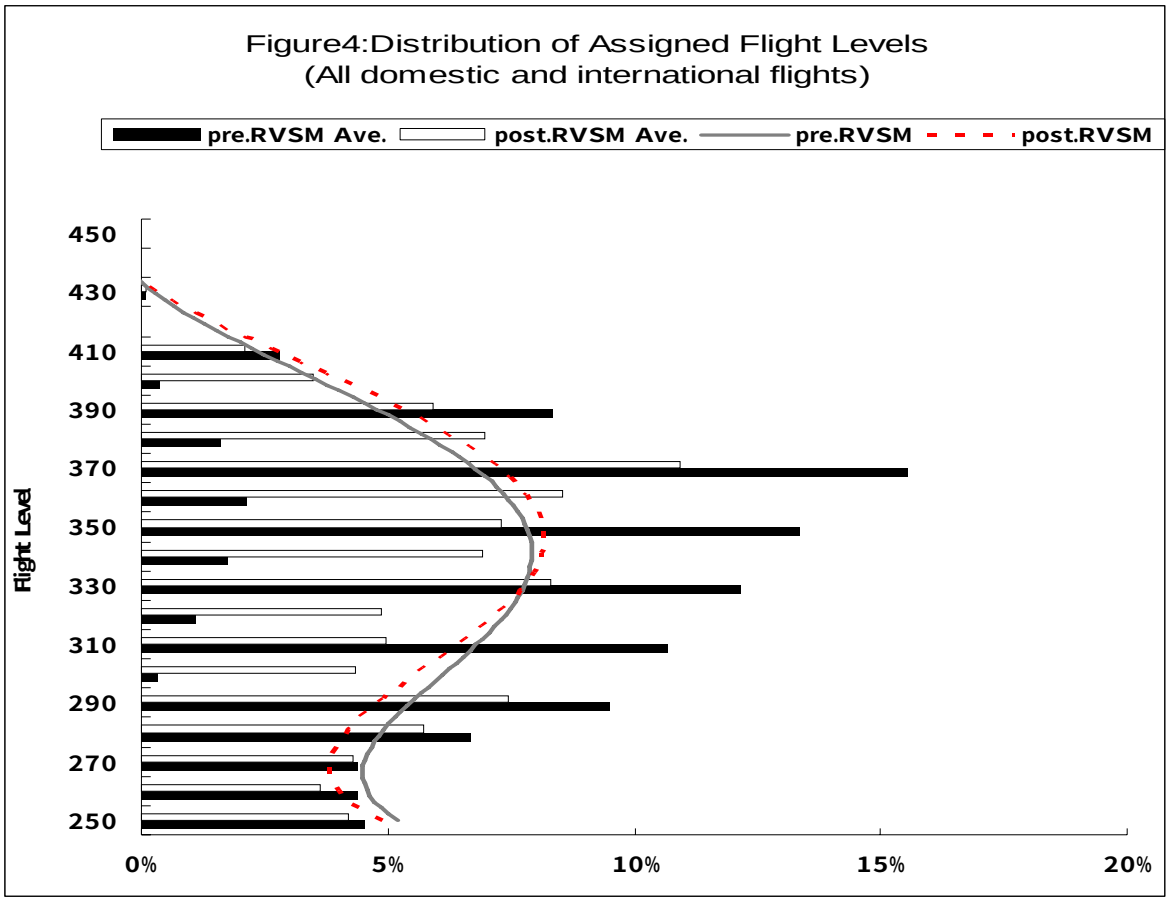
at the planned FLs, to the planned FLs than before; in other words, aircraft have more opportunity to fly at more fuel efficient FLs than before.

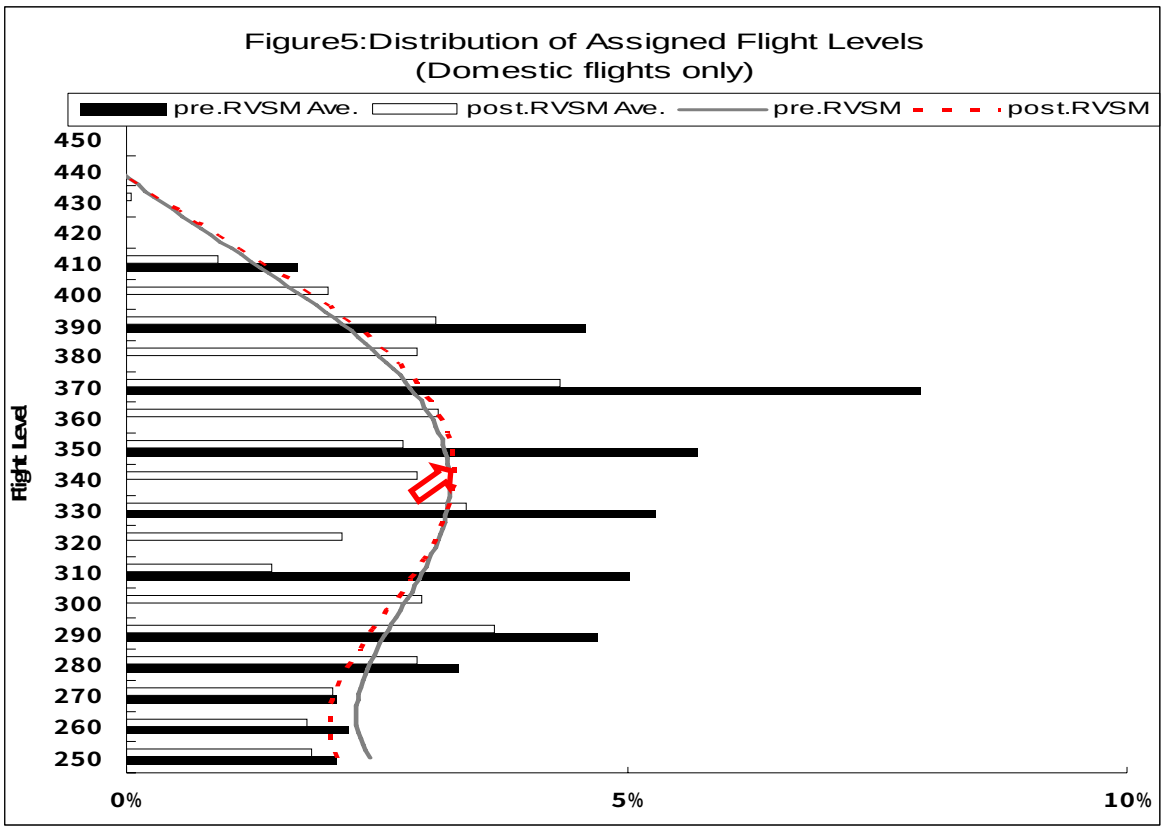






2.2 A comparative analysis of FL distribution between FL250 and FL450 between the pre-implementation period and the post-implementation period indicates that peak FLs have been lowered and FLs are now used more evenly. Figures 4 and 5 show how RVSM FLs are used and the peak has shifted to higher altitude.



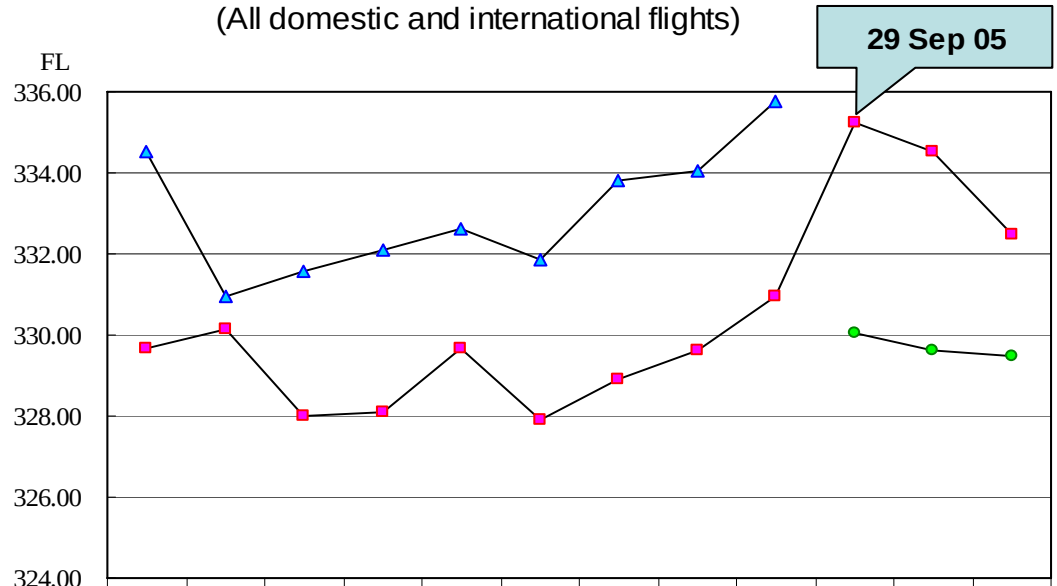


2.3 Figures 6 and 7 illustrate the changes of average FLs actually flown by aircraft between pre-implementation and post-implementation. Tables 1, 2 and 3 present such changes in details. From this analysis, it is concluded that the average FL actually flown by domestic flights has gone up by approximately 300ft (285ft) from FL328.70 to FL331.55 as a result of RVSM implementation. This 300ft increase of average FL is considered to lead to **0.4%** fuel saving when applying the assumption that an increase of cruise altitude by 2,000ft in RVSM environment would generally save fuel burn by approximately 3%.

2.4 As to the change of average FL by international flights for the same period, the analysis indicates a larger increase of 483ft from FL329.85 to FL334.68. The overall change of average FL by domestic and international flights is 395ft from FL329.34 to FL333.29.

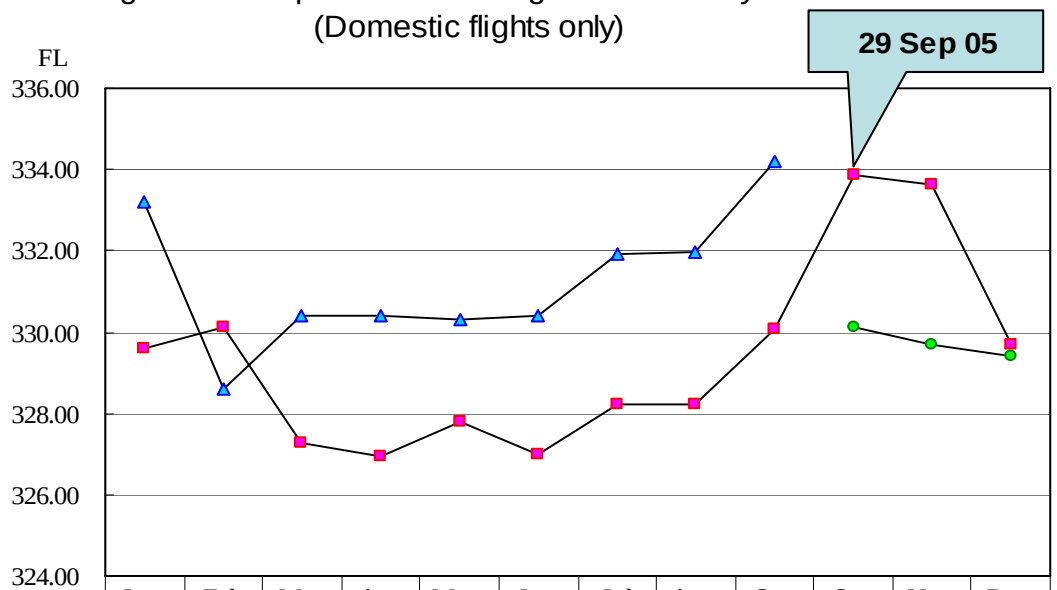
2.5 Operators' actual data also suggest a similar result of average FLs flown by domestic flights.

Figure 6: Comparison of Average FLs Acturally Flown
(All domestic and international flights)



	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004										330.04	329.60	329.49
2005	329.65	330.14	327.98	328.11	329.67	327.89	328.92	329.63	330.96	335.26	334.52	332.50
2006	334.51	330.96	331.56	332.08	332.64	331.87	333.80	334.03	335.76			

Figure 7: Comparison of Average FLs Acturally Flown
(Domestic flights only)



	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004										330.11	329.68	329.42
2005	329.58	330.10	327.28	326.96	327.78	326.97	328.20	328.24	330.06	333.88	333.65	329.69
2006	333.22	328.60	330.41	330.40	330.31	330.39	331.91	331.95	334.21			

Table 1: Comparison of Average FLs Actually Flown (All domestic and international flights)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	**Ave.**
pre-	330.04	329.60	329.49	329.65	330.14	327.98	328.11	329.67	327.89	328.92	329.63	330.96	**329.34**
post-	335.26	334.52	332.50	334.51	330.96	331.56	332.08	332.64	331.87	333.80	334.03	335.76	**333.29**

Table 2: Comparison of Average FLs Actually Flown (Domestic flights only)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	**Ave.**
pre-	330.11	329.68	329.42	329.58	330.10	327.28	326.96	327.78	326.97	328.20	328.24	330.06	**328.70**
post-	333.88	333.65	329.69	333.22	328.60	330.41	330.40	330.31	330.39	331.91	331.95	334.21	**331.55**

Table 3: Comparison of Average FLs Actually Flown (International flights only)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	**Ave.**
pre-	329.99	329.53	329.54	329.71	330.18	328.56	328.98	331.17	328.58	329.49	330.81	331.67	**329.85**
post-	336.43	335.21	334.81	335.53	332.80	332.46	333.36	334.41	332.99	335.35	335.79	337.01	**334.68**

2.6 Notwithstanding above, actual data collected by participating airlines have not clearly indicated such fuel saving yet. Some operators' data suggest certain saving close to 0.4% on limited routes though the majority of operators could not find any noticeable change in fuel burns. The RVSM WG of JCAB has concluded that flight distance and duration at an RVSM cruise altitude are relatively short for domestic flights in Japan, and the expected benefit of fuel saving may not be achieved as estimated. For example, the amount of fuel burn of a typical domestic flight of less than 2 hours by a B747 is around 20,000 to 30,000lbs, and only a few hundred lbs of fuel may be saved even if 0.5% saving is achieved. This fuel saving of few hundred lbs can be consumed quickly by holding or radar vector at the destination airports, and may not be measurable at each flight.

2.7 As to the departure delay, airlines collected data on gate-off time based on their schedule and any delays caused by ATC. All participating airlines' data do not show any noticeable improvement in departure delays. The RVSM WG will continue the collection and analysis of data for better understanding of the situation.

2.8 Comments from air traffic controllers and operators, including pilots, indicated their great satisfaction with RVSM operations, and are summarized as follows:

Air traffic controllers:

- reduction of time to issue clearance;
- smoother coordination to respond to pilot's request for in-flight altitude change;

- elimination of FL transition between domestic airspace and oceanic airspace; and
- increase of ATC workload during peak hours in changing altitudes of international out-bound traffic to Manila and Taipei FIRs, to meet their FLOS requirement.

Operators

- particular aircraft, such as MD11/90, B737 and A300, which used to fly below FL310, now can have wider altitude selection up to FL370;
- improvement in adverse weather and turbulence avoidance; and
- more choices in FL considerations.

2.9 There was no case of suspension of RVSM operations since its implementation.

3. SUMMARY

3.1 This final study of one-year post-implementation RVSM benefits has identified the following:

a) RVSM operations provide aircraft with more fuel efficient FLs than before;

b) the average RVSM FL actually flown by domestic flights increased by approximately 300ft;

c) controllers and pilots have more operational flexibility;

d) actual fuel saving has not been clearly detected based on operators' data; and

e) reduction of departure delays has not been clearly detected based on operators' data.

3.2 The RVSM WG has concluded with satisfaction that the RVSM in the Japanese domestic airspace was implemented smoothly and has been operated safely and effectively over the last 12 months since the implementation.

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TERMS OF REFERENCE

Western Pacific/South China Sea RVSM Scrutiny Working Group (WPAC/SCS/RSG)

Proposed to Be Amended by RASNAG/6

Objective

To identify, study and address problems in the safety, efficiency and harmonization of RVSM operations in the Western Pacific/ South China Sea area.

Terms of Reference

a) To assemble subject matter experts from affected States and international organizations, including those experienced in air traffic control, data analysis and risk modeling;

b) To analyze ***data, including data from regional monitoring agencies,*** and evaluate problems in air traffic operations in the RVSM airspace of the WPAC/SCS area regarding RVSM transition activities;

c) To promote the minimization of transition activities and enhance the harmonization of flight level assignment with the adjacent regions where RVSM was implemented;

d) To analyze ***data, including data from regional monitoring agencies,*** and evaluate problems in air traffic operations in the RVSM airspace of the WPAC/SCS area regarding large height deviation (LHD) occurrences;

e) To identify any other problems associated with RVSM operations in WPAC/SCS airspace;

f) To recommend remedial actions to improve safety and reduce risk in RVSM operations; to identify beneficial trends in system performance and promote practices that ensure continued safe operations;

g) To report to the ATM/AIS/SAR Subgroup in order to assist in determining the safety, efficiency, and harmonization of RVSM implementation in the WPAC/SCS area; and

h) To keep the Regional Airspace Safety Monitoring Advisory Group of APANPIRG (RASMAG) up to date with developments.

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SUMMARY OF ONE-YEAR POST-IMPLEMENTATION RVSM SAFETY ASSESSMENT FOR THE JAPANESE DOMESTIC AIRSPACE

1. Introduction

1.1 Civil Aviation Bureau of Japan (JCAB) conducted a one-year RVSM safety assessment for the domestic airspace in coordination with PARMO and MAAR, and with the assistance of the Electronic Navigation Research Institute (ENRI) of Japan.

2. Large Height Deviation (LHD) reports

2.1 For the period of 12 months from October 2005 to September 2006, JCAB received 24 LHD reports in connection with the Japanese domestic airspace. Table 1 summarizes the number and causes of these LHD reports.

Table 1: Summary of LHD reports received from Oct 2005 to Sep 2006

Year Month	Causes of Occurrences	Cumulative No. of LHD Occurrences
2005		
Oct	1 (TRF error)	1
Nov	0	1
Dec	1 (over shoot)	2
2006		
Jan	0	2
Feb	2 (undershoot, sunk to lower level)	4
Mar	2 (wind shear, heavy headwind)	6
Apr	5 (3 TCAS, 1 communication error, 1 TRF error)	11
May	2 (1 turbulence, 1 TCAS)	13
Jun	0	13
Jul	7 (5 TRF error, 2 TCAS)	20
Aug	1 (TCAS)	21
Sep	3 (TCAS)	24

2.2 According to the Regional Monitoring Agency (RMA) LHD letter-coding scheme (Table 2), JCAB scrutinized each case of LHD. LHDs caused by human errors (ATC-transfer errors, pilot misunderstands clearance message, ATC issues incorrect clearance, etc) attribute to the operational risk. LHDs caused by technical errors (aircraft equipment failure, TCAS RA, turbulence, contingency events, etc) attribute to the technical risk.

Table 2: Codes Defining Causes of LHD Occurrences

Code	Cause of LHD Occurrences
A	Failure to climb/descend as cleared
B	Climb/descend without ATC Clearance
C	Entry into airspace at an incorrect flight level
D	Deviation due to turbulence or other weather related cause
E	Deviation due to equipment failure

F	Deviation due to collision avoidance system (TCAS) advisory
G	Deviation due to contingency event
H	Aircraft not approved for operation in RVSM restricted airspace
I	ATC system loop error; (e.g. pilot misunderstands clearance message or ATC issues incorrect clearance)
J	Equipment control error encompassing incorrect operation of fully functional FMS or navigation system (e.g. by mistake the pilot incorrectly operates INS equipment)
K	Incorrect transcription of ATC clearance or re-clearance into the FMS
L	Wrong information faithfully transcribed into the FMS (e.g. flight plan followed rather than ATC clearance or original clearance followed instead of re-clearance)
M	Error in ATC-unit to ATC-unit transferred/transition message
N	Negative transfer received from transferring/transition ATC-unit
O	Other

2.3 This scrutiny action concluded that out of 24, 11 LHD occurrences would be attributable to operational error and 13 LHD occurrences would be attributable to technical error. Tables 3 and 4 detail the LHD occurrences attributable to operational error and technical error respectively.

Table 3: Detailed information of LHD occurrences attributable to operational error

Item	Reporting Agency	LHD Causes	Date (dd/mm/yy)	Time (UTC)	Duration of LHD (min)	Position
1	Naha ACC	M (TRF error)	9 Oct 05	0048	3.0	ATOTI
2	Sapporo ACC	I (overshoot)	23 Dec 05	0954	0.3	ATE 270/4NM
3	Tokyo ACC	I (communication error)	7 Apr 06	0800	0.3	YZ 210/25NM
4	Naha ACC	M (TRF error)	14 Apr 06	0126	3.0	ATOTI
5	Naha ACC	M (TRF error)	2 Jul 06	0840	0.0	ATOTI
6	Tokyo ACC	I (TCAS)	5 Jul 06	2340	0.5	XAC 270/20NM
7	Tokyo ACC	I (TCAS)	5 Jul 06	2340	0.3	XAC 270/20NM
8	Naha ACC	M (TRF error)	8 Jul 06	0204	1.0	ATOTI
9	Naha ACC	M (TRF error)	9 Jul 06	2010	0.0	APITO
10	Naha ACC	M (TRF error)	10 Jul 06	0954	3.0	ATOTI
11	Naha ACC	M (TRF error)	14 Jul 06	0140	3.0	ATOTI
					TOTAL 14.4	

Table 4: Detailed Information of LHD Occurrences Attributable to Technical Error

Item	Reporting Agency	LHD Causes	Date (dd/mm/yy)	Time (UTC)	Duration of LHD (min)	Position
1	operator	E (undershoot)	25 Feb 06	2320	0.3	KEC 275/30
2	operator	E (sunk to lower level)	26 Feb 06	0030	0.1	XAC 270/55
3	operator	D (wind shear)	15 Mar 06	0320	0.1	HIKNE
4	operator	D (heavy headwind)	18 Mar 06	0153	0.1	HALON 30/E
5	Tokyo ACC	F (TCAS)	5 Apr 06	0639	3.0	MJE 100/30
6	Tokyo ACC	F (TCAS)	13 Apr 06	0904	0.6	KEC 080/20
7	Naha ACC	F (TCAS)	26 Apr 06	0139	1.1	ATOTI
8	operator	D (turbulence)	7 May 06	0259	1.0	KNE
9	Fukuoka ACC	F (TCAS)	21 May 06	0432	0.3	MIKNI-ISOGO

10	Tokyo ACC	F (TCAS)	31 Aug 06	2358	0.7	XAC 270/40
11	Tokyo ACC	F (TCAS)	2 Sep 06	0520	0.5	KCC 270/5
12	Tokyo ACC	F (TCAS)	11 Sep 06	2350	0.2	YZ
13	Tokyo ACC	F (TCAS)	14 Sep 06	0025	0.5	YZ 270/30
					TOTAL 8.5	

2.4 With regard to the particular seven LHDs caused by the ATC operational errors relating to transfer (TRF) between ATC units, JCAB coordinated the matter with the adjacent ATC units concerned with the aim of preventing further recurrence of similar errors, and was advised that remedial actions were taken by the those ATC units, such as conducting refresher training courses for air traffic controllers and establishment of procedures to strengthen monitoring capability by supervisor as to transfer of control. JCAB will continue monitoring the situation and cooperate with other ATC units for any improvements.

3. Risk Calculation

3.1 Based on the Traffic Sample Data (TSD) for one month of December 2005 extracted from the JCAB flight data processing system (FDPS), the numbers of passing events, np(same) and np(opp), were calculated for each route segment consisting of two fixes.

3.2 Collision Risk Model (CRM)

3.2.1 Using the CRM parameters, such as average size of aircraft and average relative speed of the aircraft pair, contained in Table 5 below, coefficients of passing frequencies for the same and opposite direction traffic can be calculated by

$$K(same) = 1 + \frac{\lambda x}{Vrx(same)}\left(\frac{Vry}{\lambda y} + \frac{Vrz}{\lambda z}\right) \qquad (1)$$

$$K(opp) = 1 + \frac{\lambda x}{Vrx(opp)}\left(\frac{Vry}{\lambda y} + \frac{Vrz}{\lambda z}\right) \qquad (2)$$

3.2.2 The Technical Risk can be calculated by

$$N_{az}^{\ technical} = N_{az}^{\ technical}(o+s) + N_{az}^{\ technical}(cross) \qquad (3)$$

where,

$$N_{az}(o+s) = P_z(1000)P_y(0)N_x^{\ z}(e)K(o) \qquad (4)$$

$$N_{az}^{technical}(cross) = P_z(1000)\sum_{\theta} P_h(\theta)E_z^{cross}(\theta)\left[\frac{2\left|\overline{\dot{h}(\theta)}\right|}{\pi\lambda_{xy}} + \frac{\left|\overline{\dot{z}}\right|}{2\lambda_z}\right] \qquad (5)$$

$P_h(\theta)$ was calculated assuming that a standard deviation of the distribution of cross-track deviations is 0.132 NM, which is the value estimated by radar data analysis, and that of along-track deviations is 5 NM, which is radar separation standard, over the square root of six. $P_h(\theta)$, $E_z^{cross}(\theta)$ and $V_{rh}(\theta)$ were calculated every ten degrees.

3.2.3 The Operational Risk can be calculated by

$$N_{az}^{operational} = N_{az}^{operational}(o+s) + N_{az}^{operational}(cross) \qquad (6)$$

where,

$$N_{az}^{operational}(o+s) = \frac{\sum P_z(z)T(z)}{H} P_y(0)N_x^{z}(e)K(o) \qquad (7)$$

$$N_{az}^{operational}(cross) = \frac{\Sigma P_z(z)T(z)}{H}\sum_{\theta} P_h(\theta)E_z^{cross}(\theta)\left[\frac{2\left|\overline{\dot{h}(\theta)}\right|}{\pi\lambda_{xy}} + \frac{\left|\overline{\dot{z}}\right|}{2\lambda_z}\right] \qquad (8)$$

Table 5: CRM Parameters for RVSM Safety Assessment in Japan

Parameter Symbol	Parameter Definition	Parameter Value	Source for Value
Vry	Average cross track speed of aircraft pairs	11.6 kt	Kushiro Air Route Surveillance Radar data (R220 route, NOPAC)
Vrz	Average vertical speed of aircraft pairs	1.5 kt	Value often used
λx	Average aircraft length	0.0364 nm	FDP data (NOPAC)
λy	Average aircraft width	0.0321 nm	FDP data (NOPAC)
λz	Average aircraft height	0.0101 nm	FDP data (NOPAC)
Vrx(same)	Average same direction along track speed	28.9 kt	Kushiro Air Route Surveillance Radar data (R220 route, NOPAC)
Vrx(opp)	Average opposite direction along track speed	960 kt	Value often used
$Nx^z(e)$	Equivalent opposite-direction passing frequency	0.255	FDP data (December 2005)
K(same)	Coefficient of passing frequency for same direction traffic	1.64	Calculated by above-mentioned parameter values
K(opp)	Coefficient of passing frequency for opposite direction traffic	1.02	Calculated by above-mentioned parameter values

Pz(1000)	Probability that two aircraft nominally separated by the vertical separation minimum 1000 feet are in vertical overlap	1.7×10^{-8}	Value specified in ICAO Doc. 9574
Pz(0)	Probability of vertical overlap in operational risk estimation for the assigned vertical separation z=1000 ft	0.54	Value often used (shown in RVSM/TF-9-IP/2)
Py(0)	Probability that two aircraft on the same track are in lateral overlap	0.091	Using the data of secondary surveillance radar obtained by the Hachinohe Air Route Surveillance radar (domestic RNAV route)
Naz(cross, technical)	The collision risk for crossing routes (technical dimension)	4.0×10^{-11} [accidents/flight hour]	FDP data (November 2005)
Naz(cross, operational)	The collision risk for crossing routes (operational dimension)	2.3×10^{-10} (2.1×10^{-10} for 19-month period) [accidents/flight hour]	FDP data (November 2005)
H	Total flight hours of aircraft flying on the route segments within airspace under consideration	714967.19 flight hours	12 times of December 2005
T(0)	LHD duration in hours	0.24 flight hours (0.02, if there were no TRF error)	24 LHD reports received from Oct 2005 to Sep 2006

4. Result of calculation of the collision risk in the Japanese domestic airspace

4.1 This section summarizes the results of the post implementation safety assessment for the one-year period of the Japanese domestic RVSM airspace.

4.2 Table 6 below provides the estimates of technical risk calculated by collision risk model in paragraph 3.2.2, the operational risk calculated by collision risk model in paragraph 3.2.3, and the overall risk for the Japanese domestic RVSM airspace.

Table 6: Risk Estimates for One-year Post-implementation Safety Assessment of the Japanese Domestic RVSM Airspace

Source of Risk	Lower Bound Risk Estimation [accidents / flight hour]	TLS [accidents / flight hour]	Remarks
Technical Risk	0.44×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	4.53×10^{-9}		
Overall Risk	4.97×10^{-9}	5.0×10^{-9}	Below Overall TLS

4.3 These values are smaller than the TLS value for Technical Risk and Overall Risk suggested by the ICAO RVSM Manual (Doc.9574) for a regional monitoring agency supporting the implementation and continued safe use of the RVSM.

4.4 A collision risk calculation using the same CRM without the 7 ATC unit-to-unit transfer errors, the estimated Operational Risk is 1.04×10^{-9}.

4.5 JCAB considers that the Overall Risk estimate shown in this assessment is marginal, and will continue monitoring and take actions where necessary.

5. Conclusions

5.1 This result of this post-implementation RVSM safety assessment for the Japanese domestic airspace indicates that the regionally agreed TLS is met for the first one-year RVSM operation. JCAB will continue collecting TSD and LHD reports and conduct safety assessment to ensure the safe RVSM operations.

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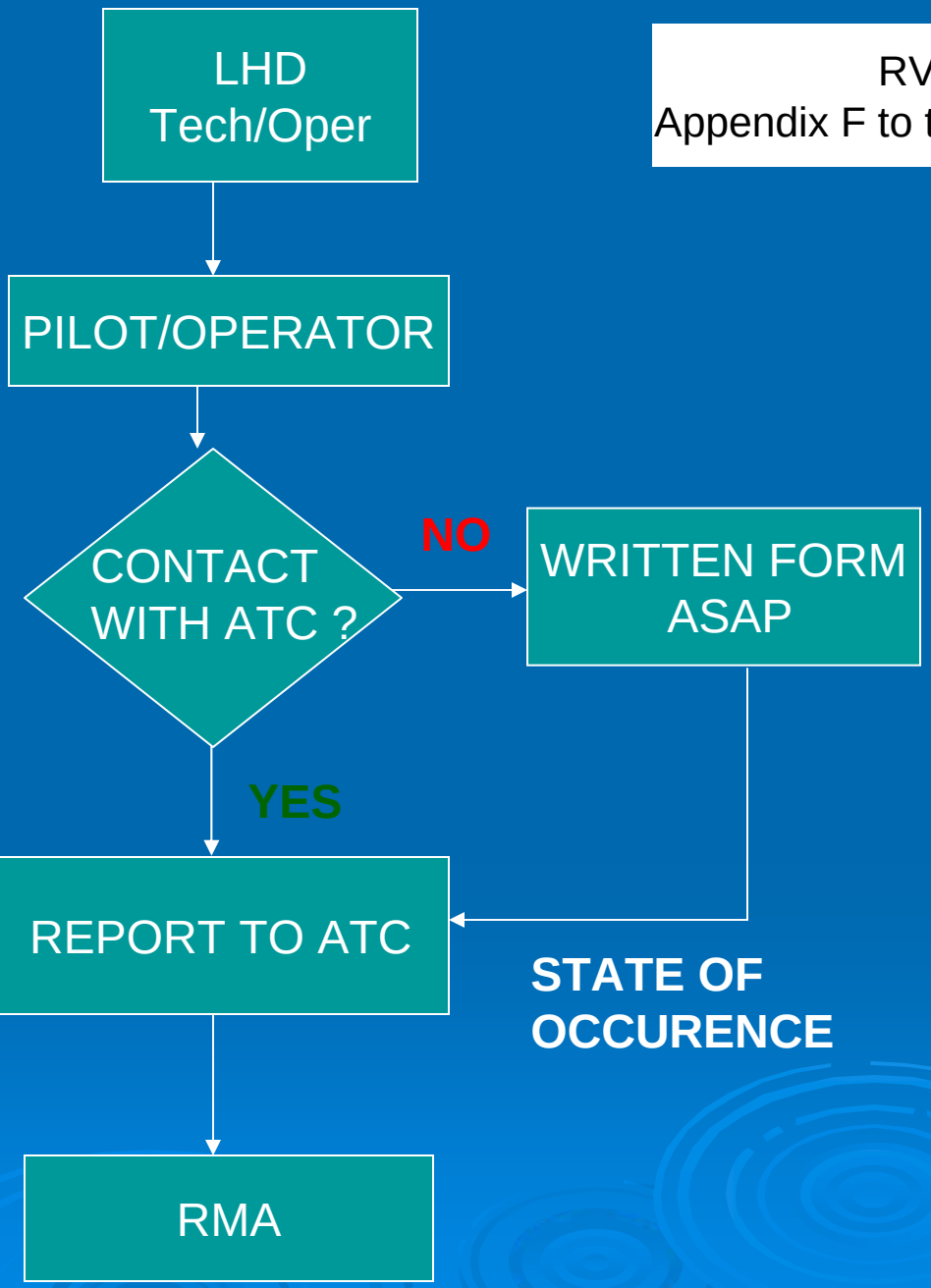
PROCEDURE FOR REPORTING LARGE HEIGHT DEVIATIONS (LHD)

RVSM/TF/29
Appendix F to the Report



10.9. 高度逸脱報告

10.9.1 ICAO文書のDoc.9574に基づき、空域安全性評価、及び空域安全性監視の目的で高度逸脱報告を収集する。本収集における個々のデータは、空域安全性評価及び空域安全性監視の目的にのみ用いられる。

(1) 対象空域
福岡ＦＩＲ
(2) 対象高度帯
ＦＬ２９０以上ＦＬ４１０以下
(3) パイロットがとるべき措置
計器飛行方式により飛行中の航空機の機長は、RVSM適用空域及び対象高度帯において、いかなる理由であっても、管制指示高度から300ft以上の高度逸脱があった場合、原則として別添の様式による報告書を作成し提出すること。なお、Large Height Deviationレポートは、RAレポートとは別個に提出されるべきものである。
(4) 運航者がとるべき措置
運航者は、パイロットから提出されたLarge Height Deviationレポートを速やかに下記の住所宛送付すること。

〒１００－８９１８
東京都千代田区霞が関２－１－３
国土交通省航空局　管制保安部　管制課
空域調整整備室
電　　話：03-5253-8750
ファックス：03-5253-1664
電子メール：RVSM_report@mlit.go.jp

10.9. Large Height Deviation Report

10.9.1 In order to conduct the airspace safety assessment and monitoring referred to ICAO Doc 9574, Large Height Deviation reports should be collected. Information contained in the collected reports shall be used only for airspace safety assessment and safety monitoring.
(1) Applicable airspace
Entire airspace within the Fukuoka FIR.
(2) Applicable flight level stratum
Between FL290 and FL410 inclusive.
(3) Action to be taken by pilot
Pilot of aircraft operating in accordance with IFR, when deviating for any reason 300ft or more from the level cleared by ATC in the RVSM airspace, shall file a Large Height Deviation report using the attached form on each occurrence of an altitude deviation.
Large Height Deviation reports shall be submitted independently of "RA reports"
(4) Aircraft operators involvement
Operators shall collect all Large Height Deviation reports described in (3) above and submit them as soon as possible to the following address.

Flight Procedures and Airspace Program Office
Air Traffic Control Division, Air Traffic Services Dept.
Civil Aviation Bureau, Ministry of Land, Infrastructure and Transport

2-1-3 Kasumigaseki, Chiyoda-ku Tokyo, JAPAN 100-8918
Phone: 03-5253-8750 (+81-3-5253-8750 from overseas)
Fax: 03-5253-1664 (+81-3-5253-1664 from overseas)
e-mail: RVSM_report@mlit.go.jp

LARGE HEIGHT DEVIATION REPORT

Message format for a report to JCAB of any altitude deviation of 300ft or more, including those due to Traffic Alert and Collision Avoidance System (TCAS), turbulence, and contingency events.

1. Date and time of occurrence [UTC]
2. Location of deviation [ ]
3. North Pacific (NOPAC) / Central Pacific (CENPAC) / Domestic Airspace
   (Circle one of the above choices)
4. Aircraft operator [ ]
5. Name / telephone [/]
   (optional)
6. Flight identification, registration-number and aircraft type
   [/ /]
7. Flight level assigned [FL]
8. Deviated final flight level [FL]
9. Duration at or above 300ft from the cleared flight level
   [min sec]
10. Cause of deviation [ ]
11. Other traffic if found out [ ]
12. Crew comments [ ]
13. Weather condition [ ]
14. Remarks [ ]
    (In the event of contingency action, indicate whether prior clearance was obtained)

TERMS OF REFERENCE

**Task Force for establishment of
Regional Airspace Safety Monitoring Committees
(RASMC/TF)**

Objective

To develop proposals and take action to implement Regional Airspace Safety Monitoring Committees for the Asia/Pacific Region.

Terms of Reference

a) Develop proposals for the establishment of Regional Airspace Safety Monitoring Committees including terms of reference;

b) Identify the appropriate regional monitoring entities and determine the number and area of responsibility;

c) Formulate the duties, responsibilities and scope of regional monitoring entities;

d) Establish a formula for the basis of cost recovery as well as cost recovery mechanism;

e) Determine a methodology for assigning the responsibility for a regional monitoring entity to a State.

f) The RASMC/TF will report via RASMAG to the APANPIRG.

Composition

ICAO will facilitate the Task Force, which will consist of designated experts from the following States:

1. Australia,
2. China,
3. Fiji,
4. India,
5. Japan,
6. New Zealand,
7. Republic of Korea,
8. Singapore,
9. Thailand,
10. United States of America

SN	Activity	Start	Complete	Present Status	Group Responsible	
1	**Identify Operational Need**					
2	Agree operational concept for Naha and Tokyo FIRs and Incheon FIR	5-Jul-04	7-Jul-04	**Completed**	ATC/WG, RVSM Task Force	
3	**Safety Assessment**					
4	Review available summary data (non-compliant aircraft, aberrant aircraft etc)	5-Jul-04	8-Jul-05	**Completed**	SAM/WG, MAAR, RVSM Task Force	
5	Examine history of height keeping errors related to ATC clearances and assess possible RVSM impact	5-Jul-04	8-Jul-05	**Completed**	SAM/WG, MAAR, RVSM Task Force	
6	Confirm RVSM risk model assumptions/parameters are consistent with airspace where RVSM is to be applied	5-Jul-04	8-Jul-05	**Completed**	SAM/WG, MAAR, RVSM Task Force	
7	Conduct simulations to predict occupancy after RVSM implementation	5-Jul-04	8-Jul-05	**Completed**	SAM/WG, MAAR, RVSM Task Force	
8	Collect weather and turbulence data for analysis	5-Jul-04	On-going	**Completed**	SAM/WG, OPSAIR, RVSM Task Force	
9	Report monthly large height deviations (including operational errors) to MAARand PARMO	1-Mar-04	On-going	**Completed**	ATS Providers, Users	
10	Collect traffic sample data for safety assessment for RVSM implementation	1-Aug-04	30-Sep-04	**Completed**	ATS Providers	
11	**Feasibility Analysis**					
12	Examine the operational factors and workload associated with RVSM implementation	5-Jul-04	8-Jul-05	**Completed**	ATC/WG, RVSM Task Force	
13	**Determination of Requirements (airborne & ground systems)**					
14	States assess the impact of RVSM implementation on controller automation systems and plan for upgrades/modifications	5-Jul-04	8-Jul-05	**Completed**	States	
15	**Aircraft & Operator Approval Requirements**					
16	Promulgate the operational approval process	5-Jul-04	On-going	**Completed**	OPS/AIR/WG, RVSM Task Force	
17	Notify States when significant changes occur to RVSM documentation	5-Jul-04	On-going	**On-going**	OPS/AIR/WG, RVSM Task Force, ICAO Regional Office	
18	**Perform Rulemaking (if required)**					
19	Recommend State airspace regulatory documentation	5-Jul-04	7-Jul-05	**Completed**	States	
20	**Perform Necessary Industry & International Co-ordination**					
21	Establish target implementation date	5-Jul-04	7-Jul-04	**Completed**	RVSM Task Force, States	
22	Report to ATM/AIS/SAR/SG/15	25-Jul-05	29-Jul-05	**Completed**	RVSM Task Force Chairman	
	Report to ATM/AIS/SAR/SG/16	26-Jun-06	30-Jun-06	**Completed**	RVSM Task Force Chairman	
	Report to ATM/AIS/SAR/SG/17	2-Jul-07	6-Jul-07		RVSM Task Force Chairman	
23	Process Doc 7030 amendment	5-Jul-04	7-Jul-05	**Completed**	ICAO Regional Office ~~(to include BOB FIRs)~~	
24	Publish advance AIC	5-Jul-04	31-Jul-04	**Completed**	States	
25	Publish AIP Supplement containing RVSM policy/procedures	5-Jul-04	7-Jul-05	**Completed**	States	
26	Review inter-facility coordination procedures	5-Jul-04	8-Jul-05	**Completed**	States	
27	Finalize changes to Letters of Agreement	5-Jul-04	8-Jul-05	**Completed**	States	
28	Disseminate information on RVSM policy and procedures through RVSM Website	5-Jul-04	On-going	**Completed**	OPS/AIR WG, RVSM Task Force	

SN	Activity	Start	Complete	Present Status	Group Responsible	
29	**Approval of Aircraft & Operators**					
30	Establish approved operations readiness targets	5-Jul-04	8-Jul-05	**Completed**	IATA, ATC/WG, RVSM Task Force	
31	Assess operator readiness	5-Jul-04	8-Jul-05	**Completed**	IATA, OPS/AIR/WG	
32	**Develop Pilot & ATC Procedures**					
34	Review weather and contingency procedures for applicability under RVSM	5-Jul-04	7-Jul-05	**Completed**	RVSM Task Force	
35	Publish appropriate Pilot/ATC policy & procedures on RVSM website	5-Jul-04	On-going	**Completed**	RVSM Task Force	
36	Identify transition areas and procedures	5-Jul-04	7-Jul-05	**Completed**	States, ATC/WG	
37	Conduct simulation modelling to assess impact of RVSM operations	5-Jul-04	7-Jul-05	**Completed**	States, ATC/WG	
38	Report on simulation activity	5-Jul-04	8-Jul-05	**Completed**	ATC/WG, RVSM Task Force	
39	Coordinate use of ACAS II (TCAS V.7) for RVSM operations	5-Jul-04	On-going	**Completed**	OPS/AIR/WG, RVSM Task Force	
40	Develop procedures for handling non-compliant aircraft (inc ferry & mntce) in ATS documentation	5-Jul-04	7-Jul-05	**Completed**	OPS/AIR/WG, ATC/WG, RVSM Task Force	
41	Develop mutually acceptable ATC procedures for non-approved State acft to transit RVSM airspace	5-Jul-04	7-Jul-05	**Completed**	ATC/WG, RVSM Task Force	
42	Implement procedures for suspension of RVSM	5-Jul-04	5-Sep-05	**Completed**	ATC/WG, RVSM Task Force	
43	Liaise with State defense authorities regarding military operations	5-Jul-04	8-Jul-05	**Completed**	States	
44	**Pilot & ATC Training**					
45	Provide Pilot/ATC training documentation based on past experience	31-Oct-04	On-going	**Completed**	IATA, RVSM Task Force	
46	Conduct local RVSM training for air traffic controllers	5-Jul-04	31-Aug-05	**Completed**	States, ATC/WG	
47	**Perform System Verificiation**					
48	Height keeping performance monitoring needed to undertake initial safety analysis	5-Jul-04	On-going	**Completed**	MAAR and SAM/WG, RVSM Task Force	
49	Provide representative traffic movement data to MAAR	1-Aug-04	30-Sep-04	**Completed**	States	
50	Undertake initial safety analysis	1-Oct-04	8-Jul-05	**Completed**	SAM/WG, RVSM Task Force	
51	Prepare/maintain regional status report detailing RVSM implementation plans	5-Jul-04	8-Jul-05	**Completed**	RVSM Task Force	
52	**Final Implementation Decision**				RVSM Task Force	
53	Review aircraft altitude-keeping performance and operational errors	5-Jul-04	8-Jul-05	**Completed**	SAM/WG, OPS/AIR/WG	
54	Complete ATS State documentation	5-Jul-04	7-Jul-05	**Completed**	States	
55	Publish Trigger NOTAM	19-Sep-05	19-Sep-05	**Completed**	States	
56	Complete readiness assessment	31-May-05	8-Jul-05	**Completed**	MAAR and SAM/WG, RVSM Task Force	
57	Complete safety analysis	31-May-05	8-Jul-05	**Completed**	MAAR and SAM/WG, RVSM Task Force	
58	**Declare Initial Operational Capability**				MAAR and SAM/WG, RVSM Task Force	
59	**Monitor System Performance**					
60	Perform Follow-On Monitoring	29-Sep-05	On-going	**On-going**	PARMO, MAAR, OPS/AIR/WG, SAM/WG	

SN	Activity	Start	Complete	Present Status	Group Responsible	
61	Adopt the global use of Minimum Monitoring Requirements (MMR)	5-Jul-04	On-going	**Completed**	RVSM Task Force	
62	**Declare Full Operational Capability**				RVSM Task Force	
63	Special ATS Coordination Meeting (Bangkok) - Japan & Korea Implementation - 3 days	5-Jul-04	7-Jul-04	**Completed**	RVSM Task Force	
64	Task Force/22 (Bangkok) - Review of FLOS for Western Pacific/South China Sea - 5 days	20-Sep-04	24-Sep-04	**Completed**	RVSM Task Force	
66	Task Force/23 (Bangkok) - Japan & Korea Implementation - 5 days	18-Oct-04	22-Oct-04	**Completed**	RVSM Task Force	
67	Task Force/24 (Bangkok) - 1 year follow up Bay of Bengal and Beyond implementation - 5 days	8-Nov-04	12-Nov-04	**Completed**	RVSM Task Force	
68	RVSM Seminar/6	21-Mar-05	22-Mar-05	**Completed**	RVSM Task Force	
69	Task Force/25 (Incheon) - Japan & Korea Implementation - 3 days	23-Mar-05	25-Mar-05	**Completed**	RVSM Task Force	
70	Task Force/26 (Tokyo) - Japan & Korea Implementation (Go/ No-Go Meeting) - 5 days	4-Jul-05	8-Jul-05	**Completed**	RVSM Task Force	
70	Task Force/27 (Bangkok) - 90 days follow up Japan & Korea implementation - 3 days	27-Feb-06	1-Mar-06	**Completed**	RVSM Task Force	
71	Task Force/28 (Bangkok) - Review of FLOS for Western Pacific/South China Sea - 5 days	24-Mar-06	28-Mar-06	**Completed**	RVSM Task Force	
71	Task Force/29 (Bangkok) - 1 year follow up Japan & Korea implementation - 3 days	14-Nov-06	16-Nov-06	**Completed**	RVSM Task Force	