



International Civil Aviation Organization

**The 18th Meeting of the Regional Airspace Safety Monitoring Advisory Group
(RASMAG/18)**

Bangkok, Thailand, 01 – 04 April 2013

Agenda Item 3: Reports from Asia/Pacific RMAs and EMAs

PARMO VERTICAL SAFETY REPORT

(Presented by the United States)

SUMMARY

This paper compares actual performance to safety goals that support the continued use of reduced vertical separation minimum (RVSM) in Pacific and North East Asia airspace. This report contains a summary of large height deviation reports received by the Pacific Approvals Registry and Monitoring Organization (PARMO) for the most recent reporting period of 1 January to 31 December 2012. There are a total of 13 reported large height deviations (LHDs) accounting for 153 minutes of operation at incorrect flight level in Pacific RVSM airspace. This report also contains an update of the vertical collision risk. The vertical collision risk estimate for Pacific airspace and for a portion of North East Asia airspace meets the target level of safety (TLS) value of 5.0×10^{-9} fatal accidents per flight hour.

This paper relates to –

Strategic Objectives:

A: *Safety – Enhance global civil aviation safety*

Global Plan Initiatives:

- GPI-2 Reduced vertical separation minima
- GPI-8 Collaborative airspace design and management
- GPI-9 Situational awareness
- GPI-16 Decision support systems and alerting systems
- GPI-21 Navigation systems

1. INTRODUCTION

1.1 The Pacific Approvals Registry and Monitoring Organization (PARMO) produces a periodic report which is distributed twice annually to Pacific and North East Asia air traffic service (ATS) providers and airspace users. The report presented in this paper fulfills the ICAO emphasis on safety management systems; such reporting for international airspace is a component of safety management systems.

1.2 This working paper contains the PARMO safety monitoring report for the time period 1 January to 31 December 2012. It contains a summary of large height deviation reports, and estimates of vertical risk for Pacific and North East Asia airspace.

2. DISCUSSION

2.1 **Attachment A** contains the PARMO Vertical Safety Monitoring Report for January to December 2012.

Executive Summary

2.2 **Table 1** summarizes Pacific airspace RVSM technical, operational, and total risks. **Figure 1** presents collision risk estimate trends during the period from 1 January 2012 to 31 December 2012.

Portions of Pacific Airspace – estimated annual flying hours = 1,163,968 hours			
<i>(note: estimated hours based on December 2012 traffic sample data)</i>			
Source of Risk	Risk Estimation	TLS	Remarks
<i>RASMAG 17 Total Risk</i>	3.93×10^{-9}	5.0×10^{-9}	<i>Below TLS</i>
Technical Risk	0.16×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	4.30×10^{-9}	-	-
Total Risk	4.46×10^{-9}	5.0×10^{-9}	Below TLS

Table 1: Pacific Airspace RVSM Risk Estimates

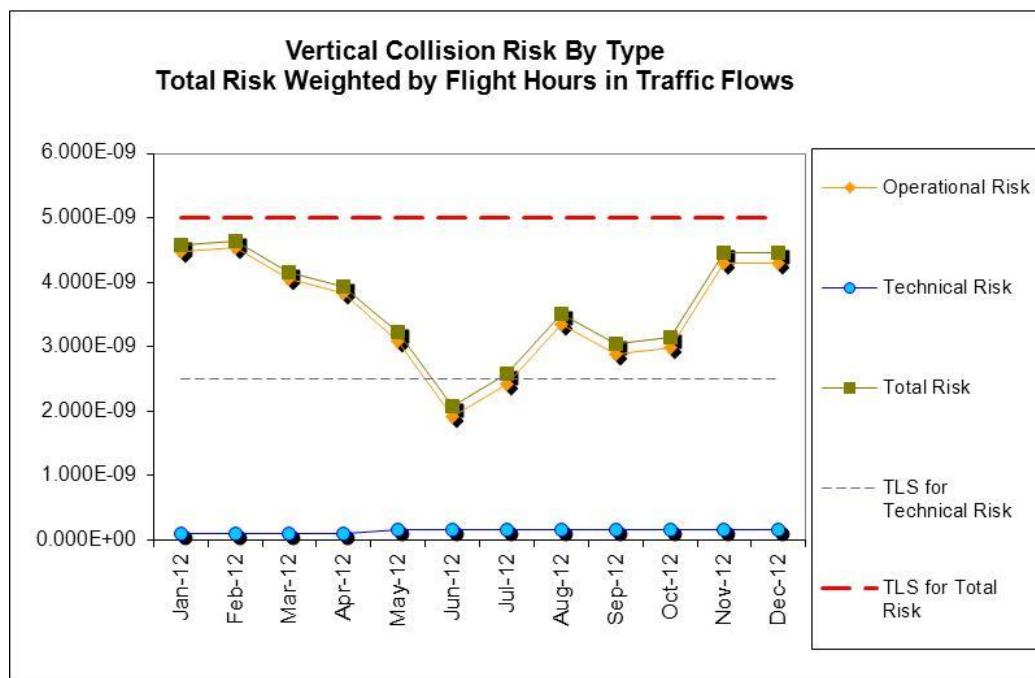


Figure 1: Pacific Airspace RVSM Risk Estimate Trends

2.3 **Table 2** presents a summary of the LHD causes within Pacific airspace from 1 January 2012 until 31 December 2012.

Code	LHD Category Description	No.
A	Flight crew fails to climb or descend the aircraft as cleared	0
B	Flight crew climbing or descending without ATC clearance	3
C	Incorrect operation or interpretation of airborne equipment	0
D	ATC system loop error	2
E	ATC transfer of control coordination errors due to human factors	4
F	ATC transfer of control coordination errors due to technical issues	1
G	Aircraft contingency leading to sudden inability to maintain level	1

H	Airborne equipment failure and unintentional or undetected level change	0
I	Turbulence or other weather related cause	0
J	TCAS resolution advisory and flight crew correctly responds	0
K	TCAS resolution advisory and flight crew incorrectly responds	0
L	An aircraft being provided with RVSM separation is not RVSM approved	1
M	Other	1
Total		13

Table 2: Summary of LHD Causes within Pacific Airspace

2.4 **Figure 2** provides the geographic location of risk bearing LHD reports within Pacific Airspace during the assessment period.

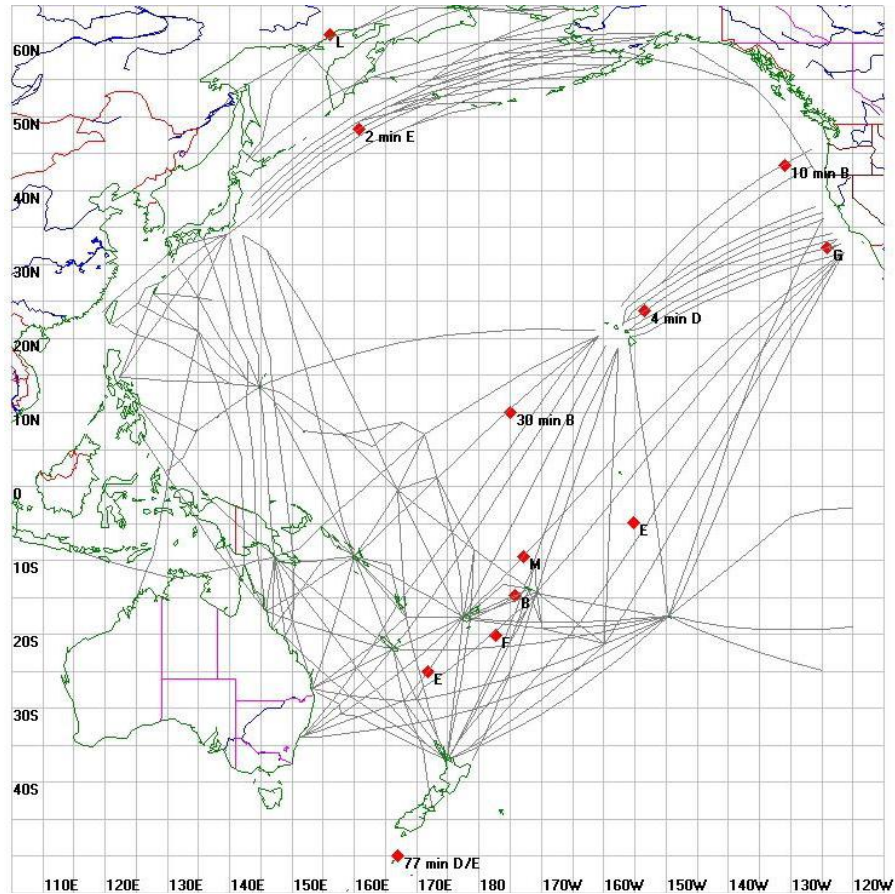


Figure 2: Pacific Airspace – Risk Bearing LHD

2.5 **Table 3** summarizes portions of North East (NE) Asia airspace RVSM technical, operational, and total risks. **Figure 3** presents collision risk estimate trends during the period from 1 January 2012 to 31 December 2012.

Portions of NE Asia Airspace – estimated annual flying hours = 492,360 hours <i>(note: estimated hours based on December 2012 traffic sample data)</i>			
Source of Risk	Risk Estimation	TLS	Remarks
RASMAG 17 Total Risk	0.22×10^{-9}	5.0×10^{-9}	Below TLS
Technical Risk	0.11×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	0.00×10^{-9}	-	-
Total Risk	0.11×10^{-9}	5.0×10^{-9}	Below TLS

Table 3: Portions of NE Asia Airspace RVSM Risk Estimates

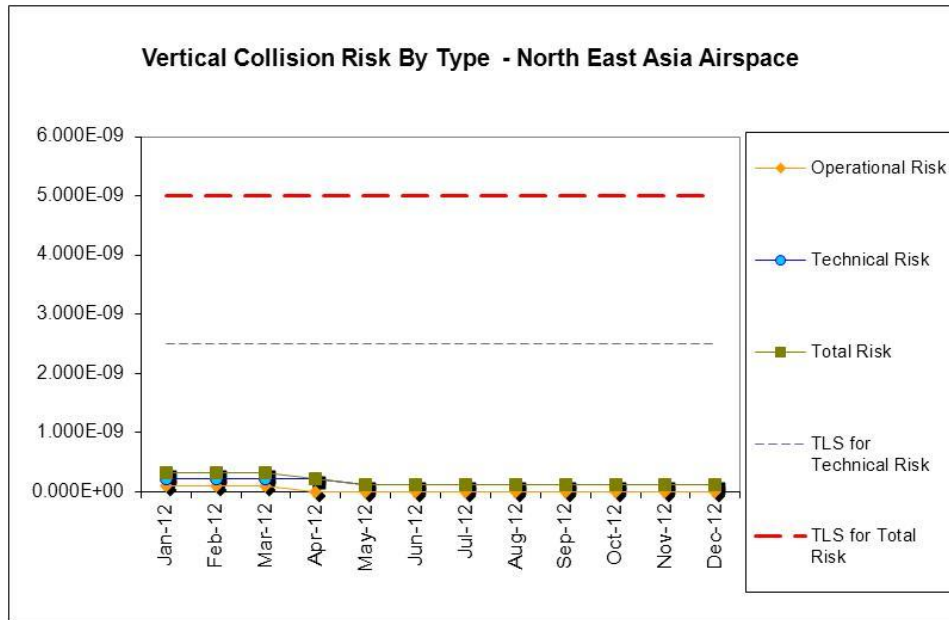


Figure 3: Portion of NE Asia Airspace RVSM Risk Estimate Trends

2.6 **Table 4** presents a summary of the LHD causes within a portion of NE Asia airspace from 1 January 2012 until 31 December 2012.

Code	LHD Category Description	No.
A	Flight crew fails to climb or descend the aircraft as cleared	0
B	Flight crew climbing or descending without ATC clearance	0
C	Incorrect operation or interpretation of airborne equipment	0
D	ATC system loop error	0
E	ATC transfer of control coordination errors due to human factors	0
F	ATC transfer of control coordination errors due to technical issues	0
G	Aircraft contingency leading to sudden inability to maintain level	0
H	Airborne equipment failure and unintentional or undetected level change	0
I	Turbulence or other weather related cause	0
J	TCAS resolution advisory and flight crew correctly responds	0
K	TCAS resolution advisory and flight crew incorrectly responds	0
L	An aircraft being provided with RVSM separation is not RVSM approved	0
M	Other	0
Total		0

Table 4: Summary of LHD Causes within a portion of NE Asia Airspace

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the results of the airspace safety oversight presented in this paper; and
- b) discuss any relevant matters as appropriate.

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Federal Aviation Administration

Pacific and North East Asia Airspace PARMO RVSM Safety Monitoring Report January to December 2012

Prepared by:
Pacific Approvals Registry and Monitoring Organization (PARMO)

Summary

The purpose of this report is to compare actual performance to safety goals that support the continued use of reduced vertical separation minimum (RVSM) in Pacific and North East Asia airspace. This report contains a summary of large height deviation reports received by the PARMO for the most recent reporting period of 1 January to 31 December 2012. There are a total of 13 reported large height deviations (LHDs) accounting for 153 minutes of operation at incorrect flight level in Pacific RVSM airspace. This report also contains an update of the vertical collision risk. The vertical collision risk estimate for Pacific airspace and for a portion of North East Asia airspace meets the target level of safety (TLS) value of 5.0×10^{-9} fatal accidents per flight hour.

1. Introduction

1.1. The Pacific Approvals Registry and Monitoring Organization (PARMO), a service provided by the U.S. Federal Aviation Administration's Technical Center, serves as the regional monitoring agency (RMA) for Pacific and for a portion of North East Asia airspace.

1.2. This report covers the current reporting period 1 January to 31 December 2012 in the PARMO's ongoing process of providing periodic updates of information relevant to the continued safe use of the RVSM in Pacific and North East Asia airspace. The PARMO produces two reports each calendar year following the standardize reporting period and format guidelines set forth by the International Civil Aviation Organization's (ICAO's) Asia and Pacific Region Regional Airspace Safety Monitoring Advisory Group (RASMAG). These guidelines are stated in reference 1, paragraph 5.34. This report includes information relevant to continued safe use of the RVSM in a portion of North East Asia airspace as well as the Pacific airspace.

1.3. Within this report, the reader will find the large height deviation reports received by the PARMO during the reporting period and the corresponding update to the vertical collision risk estimate. There were a total of 19 such reports submitted to the PARMO during the reporting period. A full description of the data sources used in this report is provided in reference 3.

2. Data Submission

2.1. The most recent annual one-month traffic movement samples for December 2012 were received from the Flight Information Regions (FIRs) listed in Table 1. These traffic movement samples are used to update the vertical risk estimates contained in this safety monitoring report.

Table 1: Summary of December 2012 Traffic Sample Data

State	FIR Name	Status
Fiji	Nadi	Received
New Zealand	Auckland	Received
Republic of Korea	Incheon	Received
Tahiti	Tahiti	Received
United States	Oakland	Received
	Anchorage	Received

Table 1: Summary of December 2012 Traffic Sample Data

2.2. Large Height Deviation (LHD) Data

2.2.1. The table in Appendix A presents the fidelity with which Pacific and North East Asia Flight Information Regions (FIRs) provided large height deviation reports (including ‘NIL reports’) to the PARMO each month during the reporting period. Since January 2012 the PARMO has received LHD reports for each month from all of the FIR’s. The PARMO continues to request that ATS providers forward reports of large height deviations (300-ft magnitude or more) on a monthly basis. The email address for the PARMO is: aparmo@faa.gov. The website address for the PARMO is http://www.faa.gov/air_traffic/separation_standards/parmo/.

3. Large Height Deviations Report Summary

3.1. A decrease in the total LHD duration (minutes), from 188 to 153 minutes was observed from the reported risk-bearing events in Pacific airspace. There were no new reports of risk-bearing events in the portion of North East Asia airspace during the current twelve-month reporting period. Table 2 summarizes the number of risk-bearing LHD occurrences and durations during the time period 1 January to 31 December 2012 in Pacific Airspace. A summary of these events can be found in Appendix C of this report.

Table 2. Summary of LHD Occurrences and Durations in Pacific Airspace

Month-Year	No. of LHD Occurrences	LHD Duration (Minutes)
Jan-12	2	10
Feb-12	2	10
Mar-12	1	5
Apr-12	1	0
May-12	1	30
Jun-12	1	5
Jul-12	1	4
Aug-12	1	10
Sep-12	0	0
Oct-12	1	2
Nov-12	1	77
Dec-12	0	0
Total	12	153

3.2. The large height deviation reports are separated by categories based on the details provided for each deviation. There are three such categories: large deviations contributing to technical risk, large height deviations contributing to operational risk and large height deviations occurring outside of RVSM airspace or airspace for which the PARMO is the responsible RMA. Appendix B contains no reported events contributing to technical risk.

3.3. Details of thirteen large height deviations contributing to operational risk provided to the PARMO during the reporting period are contained in Appendix C. All of these events were reported for Pacific airspace. The following sections contain summaries of some of the LHD data; the events are separated into those which involve errors related to air traffic control and those related to flight procedures.

Errors Related to Air Traffic Control

3.4. Seven of the thirteen events that contribute to operational risk were related to air traffic control. The cause of five of these seven events related to air traffic control involved errors in coordination of control between ATC facilities.

3.5. Two events related to air traffic control were ATC loop errors. One of these errors occurred in a remote portion of Pacific airspace, and accounted for 72 minutes of unprotected operation due to misunderstanding between ATC and the pilot.

Errors Related to Flight Procedures

3.6. Three events listed in Appendix C were caused by the flight crew climbing/descending without clearance, and not following the clearance properly. These events accounted for 45 minutes of operation at incorrect flight level.

3.7. One event listed in Appendix C involved an aircraft contingency event leading to sudden inability to maintain the assigned flight level. And another event was assigned to the cause 'M' because a cause of the event has not been determined. In this event, ATC expected the aircraft to be operating within block altitudes F350-F370; however the aircraft was observed at F380 operating within block altitudes F350-F380. There were no other aircraft involved in this event.

3.8. To identify trends in risk-bearing large height deviations, the causes of each of the thirteen risk-bearing reports contained in Appendix C are summarized in Figure 1. The large height deviation error codes are defined in Table 3. Table 4 presents a summary of the reported errors by deviation code for Pacific airspace.

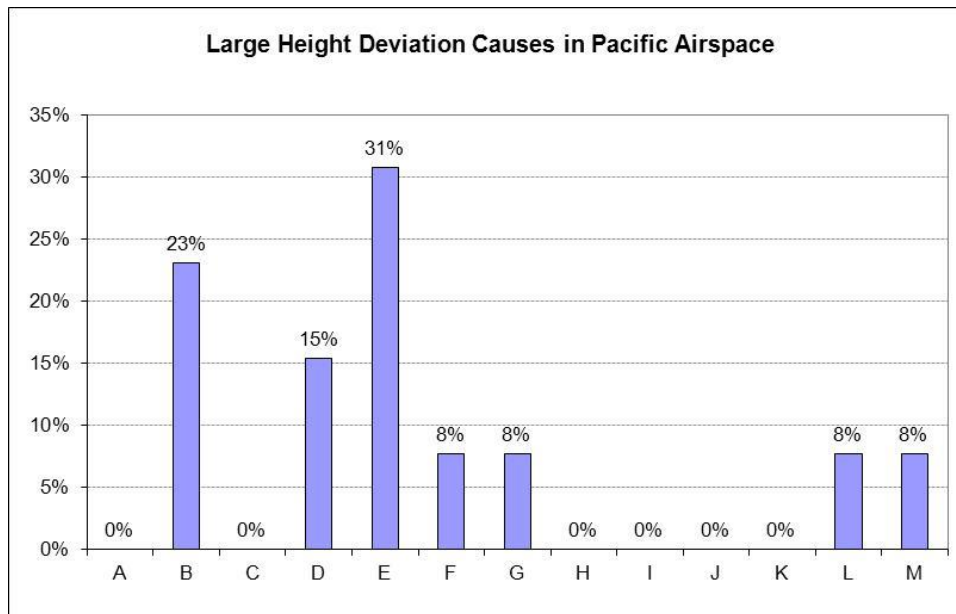


Figure 1. Percent of Large Height Deviations by Category in Pacific Airspace

Table 3. Large Height Deviation Code Definitions for Figure 1

Deviation Code	Cause of Deviation
Operational Errors	
A	Flight crew failing to climb/descend the aircraft as cleared;
B	Flight crew climbing /descending without ATC clearance;
C	Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance etc.);
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);
E	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);
F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues;
Aircraft Contingency Events	
G	Aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure);
H	Airborne equipment failure leading to unintentional or undetected change of flight level (e.g. altimetry errors);
Deviation due to Meteorological Condition	
I	Turbulence or other weather related causes;
Deviation due to TCAS RA	

Deviation Code	Cause of Deviation
J	TCAS resolution advisory; flight crew correctly following the resolution advisory;
K	TCAS resolution advisory; flight crew incorrectly following the resolution advisory
Others	
L	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC misinterpretation of flight plan);
M	Other

Table 4. Summary Large Height Deviations by Category – Pacific Airspace

LHD Category Code	LHD Category Description	No of LHD Occurrences	LHD Duration (Min)	No. of Flight Levels Transitioned Without Clearance
A	Flight crew failing to climb/descend the aircraft as cleared;	0	0	0
B	Flight crew climbing /descending without ATC clearance;	3	45	12
C	Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance etc.)	0	0	0
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);	2	76	2
E	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);	4	17	0
F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues;	1	5	0
G	Aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure);	1	0	10 ¹
H	Airborne equipment failure leading to unintentional or undetected change of flight level (e.g. altimetry errors)	0	0	0
I	Turbulence or other weather related causes	0	0	0
J	TCAS resolution advisory; flight crew correctly following the resolution advisory	0	0	0

¹ Event report indicated pilot successfully offset from cleared track prior to emergency descent

LHD Category Code	LHD Category Description	No of LHD Occurrences	LHD Duration (Min)	No. of Flight Levels Transitioned Without Clearance
K	TCAS resolution advisory; flight crew incorrectly following the resolution advisory	0	0	0
L	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC misinterpretation of flight plan);	1	5	0
M	Other	1	5	1

3.9. As shown in Figure 1, the contributor to risk-bearing large height deviations in Pacific airspace is split amongst many classifications. The largest contributions, in terms of number of events, are coordination errors in the ATC-to-ATC transfer of control responsibility. There were four reported events attributed to coordination errors due to human factor issues and one event reported attributed to coordination errors due to technical issues. These five events accounted for 22 minutes of operation at incorrect flight levels.

3.10. Figure 2 shows the approximate locations of the reported LHD events received by the PARMO for the current reporting period. It is not always possible to mark the exact location of the event from the information provided in the report. The approximate locations are marked with a blue circle, the text to the right of the marker indicates the number of minutes and category associated with the LHD event.

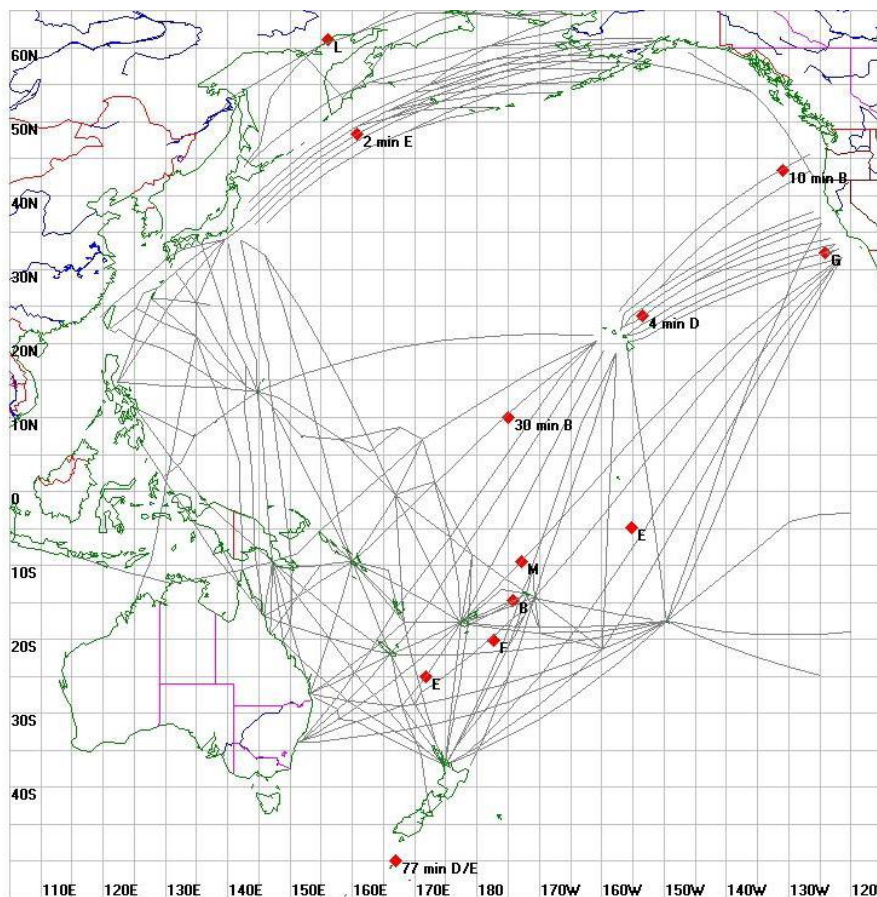


Figure 2. Locations of the Pacific LHD Events for the Current Reporting Period

3.11. Appendix D contains the details of all reported large height deviations occurring outside of RVSM airspace and airspace for which the PARMO is not the responsible RMA. These large height deviations do not affect the risk estimate for Pacific or North East Asia airspace but are presented in this report for completeness. There are six such large height deviations.

4. Estimate of Vertical Collision Risk for Pacific Airspace

4.1. The vertical collision risk was estimated in order to determine whether the target level of safety (TLS) continued to be met in Pacific airspace, thus supporting the ongoing safe application of RVSM.

4.2. The estimate of vertical collision risk has been updated in the same manner used in reference 4. Figure 3 provides the vertical collision risk estimates by type (e.g. technical, operational, and total) for each month during the current reporting period. Each monthly risk estimate was ‘weighted’ by the estimated number of flight hours in each Pacific airspace flow. Table 5 provides the definitions used for each Pacific airspace flow. Table 5 also provides the estimated flying hours and the proportion of flying hours for each traffic flow. The proportion of flying hours is used to weight the collision risk estimates from each traffic flow to calculate the overall vertical collision risk in Pacific airspace.

4.3. Figure 3 provides the PARMO’s updated risk estimates for Pacific RVSM airspace based on recent reports of large height deviations. The estimated flying hours in the portion of Pacific RVSM airspace for which the PARMO is the responsible RMA is 1,163,968 flying hours per year.

4.4. Figure 3 shows that the overall estimate of vertical collision risk was lower than the TLS during the reporting period. The risk calculation maintains the event reports for 12-calendar months in the estimate of collision risk.

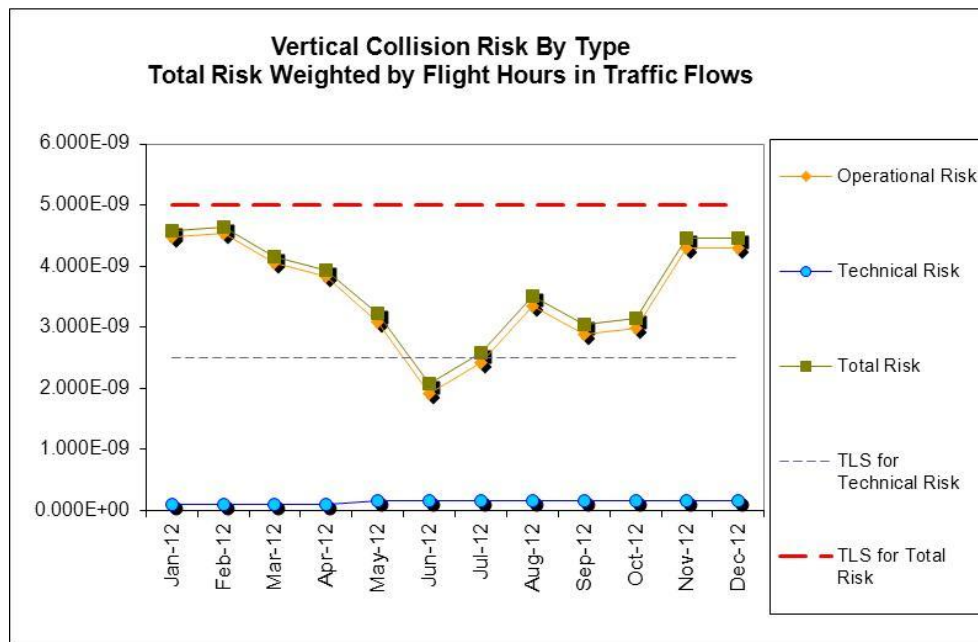


Figure 3. Vertical Collision Risk for Pacific RVSM Airspace

Table 5. Traffic Flows Used in Pacific Vertical Collision Risk Estimate

Sub-Region of Pacific	Flow	Description of Flow	Estimated Annual Flying Hours	Proportion of Flying Hours in Airspace
North Pacific	NOPAC	North America west to Japan/Korea/beyond plus Japan/Korea to and from Alaska and beyond	119,079	10.23%
	Central Pacific (CENPAC)	Japan/Korea/other Asian origins east to North America	218,075	18.74%
	Central East Pacific (CEP)	North American mainland to and from Hawaii	241,295	20.73%
	Hawaii/Japan	Japan/Korea to and from Hawaii	74,460	6.57%
	Japan/Guam	Japan/Korea to and from Guam/Saipan/other proximate destinations	2,872	0.25%
	Other	All other North Pacific flights not covered above	37,563	3.23%
South Pacific and Pacific trans-equatorial	New Zealand/South Pacific States	Australia to and from New Zealand; Australia to and from South Pacific island states; New Zealand to and from South Pacific states	172,620	14.83%
	Nadi	Fiji to and from all airports except those in Australia or New Zealand	23,268	2.00%
	Australia-New Zealand/Japan	Australia to and from Japan/Korea; New Zealand to and from Japan/Korea	51,336	4.41%
	SOPAC	Australia to and from airports in northern hemisphere; New Zealand to and from airports in northern hemisphere	221,400	19.02%

4.5. Table 6 presents the estimates of vertical collision risk for Pacific airspace. The technical risk is estimated to be 0.160×10^{-9} fatal accidents per flight hour (fapfh). The operational risk estimate is 4.30×10^{-9} fapfh. The estimate of the overall vertical collision risk is 4.46×10^{-9} fapfh. This estimate meets the regionally agreed TLS value of 5.0×10^{-9} fapfh. This new estimate is based on the most recent 12 months of large height deviation reporting and collision risk parameters based on the December 2012 traffic samples collected.

Table 6. Vertical Collision Risk Estimates for Pacific Airspace

<i>Portions of Pacific RVSM Airspace – estimated annual flying hours = 1,163,968 hours (note: estimated hours based on the December 2012 traffic sample data)</i>			
Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.16×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	4.30×10^{-9}	-	
Total Risk	4.46×10^{-9}	5.0×10^{-9}	Below Overall TLS

5. Estimate of Vertical Collision Risk for North East Asia Airspace

5.1. The vertical collision risk was estimated in order to determine whether the target level of safety (TLS) is met in a portion of North East Asia airspace. Table 7 presents the estimates of vertical collision risk for a portion of North East Asia airspace. The technical risk is estimated to be 0.114×10^{-9} fapfh. The LHD reports received during the most recent 12 calendar months are included in the estimate of vertical operational risk. There were no reports of operational error in the current twelve month period, the December 2012 operational risk value is 0.0×10^{-9} fapfh. The estimate of the overall vertical collision risk is 0.114×10^{-9} fapfh. This estimate meets the regionally agreed TLS value of 5.0×10^{-9} fapfh. This new estimate was based on the most recent 12 months of large height deviation reporting and the traffic sample received in December 2012. The estimated annual flying hours for this portion of North East Asia airspace is 492,360 flying hours per year. Table 7 presents the current collision risk model (CRM) parameters used in the vertical safety assessment for the Incheon FIR.

Table 7. Vertical Collision Risk Estimates for North East Asia Airspace

<i>Portions of NE Asia RVSM Airspace – estimated annual flying hours = 492,360 hours (note: estimated hours based on the December 2011 traffic sample data)</i>			
Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.114×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	0.00×10^{-9}	-	
Total Risk	0.114×10^{-9}	5.0×10^{-9}	Below Overall TLS

Table 11. CRM Parameters used in the vertical risk estimate for the Incheon FIR

Parameter Symbol	Parameter Definition	Parameter Value	Source for Value
$ \overline{\Delta V} $	Average relative along-track speed between aircraft on same direction routes	38.3 knots	Estimated from TSD
$ \overline{V} $	Average absolute aircraft ground speed	480 knots	Conservative value used in NAT and Pacific vertical safety assessments
$ \overline{y} $	Average absolute relative cross track speed for an aircraft pair nominally on the same track	5 knots	Estimated from processing GMU-collected GPS-derived positions of aircraft monitored in connection with Pacific RVSM
$ \overline{z} $	Average absolute relative vertical speed of an aircraft pair that have lost all vertical	1.5 knots	Conservative value used in NAT vertical safety assessment

Parameter Symbol	Parameter Definition	Parameter Value	Source for Value
	separation		
$\dot{h}(\theta)$	Average relative horizontal speed during horizontal overlap for aircraft pairs on routes with crossing angle θ ($\theta=45^\circ$)	367.4 knots	Value used in Western Pacific/South China Sea safety assessment (corresponds to an average aircraft speed of 480 knots)
λ_x	Average aircraft length	0.0280 NM	Estimated from TSD
λ_y	Average aircraft wingspan	0.0250 NM	Estimated from TSD
λ_z	Average aircraft height	0.0082 NM	Estimated from TSD
$E_z(\text{same})$	Same direction vertical occupancy value	0.0225	Estimated from TSD
$E_z(\text{opposite})$	Opposite direction vertical occupancy value	0.0097	Estimated from TSD

5.2. Figure 4 provides the PARMO’s updated risk estimates for a portion of North East Asia RVSM airspace based on recent reports of large height deviations.

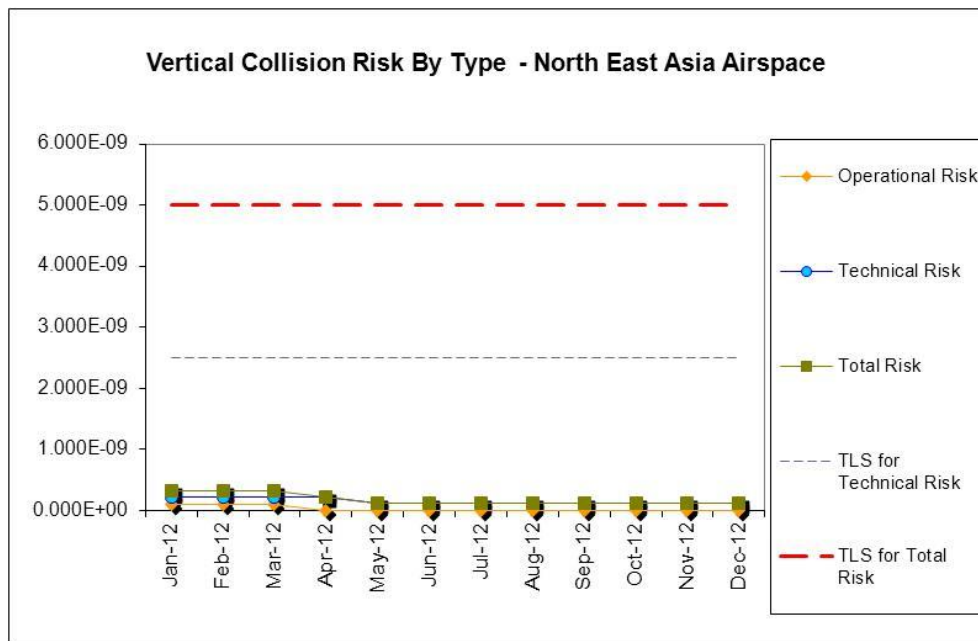


Figure 4. Vertical Collision Risk for North East Asia RVSM Airspace

6. Summary and Conclusions

6.1. This report has presented an update of the vertical collision risk for Pacific and a portion of North East Asia airspace, and a summary of large height deviation reports received by the PARMO for the current reporting period, 1 January through 31 December 2012.

6.2. The update of the vertical collision risk was performed to determine whether the TLS continued to be met in support of the ongoing safe use of RVSM in Pacific airspace. The estimate of

the overall vertical collision risk, 4.46×10^{-9} fapfh, is below the TLS value of 5.0×10^{-9} fapfh. This new estimate reflects the most-recent reports of large height deviations.

6.3. The update of the vertical collision risk was performed to determine whether the TLS is met in support of the ongoing safe use of RVSM in a portion of North East Asia airspace. The estimate of the overall vertical collision risk, 0.114×10^{-9} fapfh meets the TLS value of 5.0×10^{-9} fapfh. This estimate reflects the most-recent reports of large height deviations.

6.4. There were 19 reported large height deviations occurring within Pacific RVSM airspace during the reporting period. Thirteen risk-bearing events contributed to the operational risk in Pacific RVSM airspace. A large contributor to risk-bearing large height deviations errors in terms of duration spent at unexpected/incorrect flight levels was flight crews climbing/descending without ATS clearance. Details of all deviations were provided in this report and its appendices.

6.5. ATS providers should continue to forward reports of height deviations of 300 ft or more in magnitude to the PARMO on a monthly basis. A 'NIL report' (where applicable) is as valuable as a report containing actual incidents. Therefore, if zero large-height-deviation events occur during a calendar month, the PARMO requests that a 'NIL report' be submitted. The email address for the PARMO is: aparmo@faa.gov. The website address for the PARMO is http://www.faa.gov/air_traffic/separation_standards/parmo/.

References

1. "Report of the Seventh Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/7)," International Civil Aviation Organization, Bangkok, Thailand, June 2007.
2. *Handbook for a Regional Monitoring Agency Supporting Implementation and Continued Safe Use of the Reduced Vertical Separation Minimum: RMA Handbook*, International Civil Aviation Organization, August 2003 Edition.
3. "Pacific Airspace RVSM Safety Monitoring Report October – December 2004," Draft Version 1.0, Prepared by the PARMO, February 2004.
4. "Update of Pacific Reduced Vertical Separation Minimum (RVSM) Safety Assessment," WP/3, Tenth Meeting of the ICAO Reduced Vertical Separation Minimum (RVSM) Implementation Task Force (RVSM TF/10), Honolulu 29-30 January 2001.

Appendix A
Monthly Large Height Deviations Reports Received by the PARMO

STATE	FIJI	NEW ZEALAND	REPUBLIC OF KOREA	TAHITI	UNITED STATES	
FIR	<i>Nadi</i>	<i>Auckland</i>	<i>Incheon</i>	<i>Tahiti</i>	<i>Anchorage</i>	<i>Oakland</i>
Jan-12	X	X	X	X	X	X
Feb-12	X	X	X	X	X	X
Mar-12	X	X	X	X	X	X
Apr-12	X	X	X	X	X	X
May-12	X	X	X	X	X	X
Jun-12	X	X	X	X	X	X
Jul-12	X	X	X	X	X	X
Aug-12	X	X	X	X	X	X
Sep-12	X	X	X	X	X	X
Oct-12	X	X	X	X	X	X
Nov-12	X	X	X	X	X	X
Dec-12	X	X	X	X	X	X

X = Large Height Deviation Report was received for the specified month (including reports indicating "NIL" events)

Appendix B
**Height Deviations Contributing to Technical Risk in the Pacific and a Portion of North East Asia Airspace
Reported to the PARMO during the Reporting Period**

No events to list

Appendix C
Height Deviations Contributing to Operational Risk in the Pacific and a Portion of North East Asia Airspace
Reported to the PARMO during the Reporting Period

Event date	Source	Assigned FL	Observed / Reported FL	Duration at incorrect FL	Cause
13-Jan-12	ATS 4	FL360	FL380	Unkown	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination,
30-Jan-12	ATS 4	FL360	FL375	Unknown	Flight crew climbing /descending without ATC clearance
6-Feb-12	ATS 7	FL330	FL330	Unknown	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC
12-Feb-12	ATS 4	FL350FL370	FL380 in Block FL350FL380	Unknown	Other - aircraft cleared for block altitude 350B370, was observed at FL380 reported cleared for block 350B380
9-Mar-12	ATS 4	FL350	FL370	Unknown	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination,
23-Apr-12	ATS 8	F380	F260	0 minutes	Aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure);
18-May-12	ATS 8	FL330	Block FL350 - FL370	30 minutes	Flight crew climbing /descending without ATC clearance;
8-Jun-12	ATS 4	FL310	FL320	Unknown	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues;
23-Jul-12	ATS 8	F320	F330	4 minutes	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);
16-Aug-12	ATS 8	F380	F270	10 minutes	Flight crew climbing /descending without ATC clearance;

Event date	Source	Assigned FL	Observed / Reported FL	Duration at incorrect FL	Cause
11-Oct-12	ATS 3	F330	F340	2 minutes	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination,
1-Nov-12	ATS 4	F380	Block F390F400	72 minutes	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);
16-Nov-12	ATS 4	Block F340F360	Block F340F400	Unknown	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination,

Appendix D
Height Deviation Incidents Occurring Outside of Exclusionary RVSM Airspace and/or Airspace for which the PARMO is the Responsible RMA

Event date	Source	Assigned FL	Observed / Reported FL	Duration at incorrect FL	Cause
8-Jan-12	ATS 7	Unknown	FL320	Unknown	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues
27-Mar-12	ATS 7	FL190	FL197	Unknown	Flight crew climbing /descending without ATC clearance;
27-Jul-12	ATS 7	FL040	FL045	Unknown	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);
19-May-12	ATS 7	FL150	FL160	Unknown	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);
31-Aug-12	ATS 7	FL060	FL038	Unknown	Flight crew failing to climb/descend the aircraft as cleared;
9-Oct-12	ATS 7	FL005	FL003	Unknown	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);