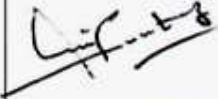








RVSM MONITORING – ATS RESPONSIBILITIES

AIR SAFETY CIRCULAR

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OFFICE OF PRIME INTEREST : Airspace & Air Navigation Standards (ANS) - DAAR

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TYPE OF DOCUMENT	AIR SAFETY CIRCULAR (ASC)		
STATUS OF DOCUMENT	CONTROLLED		

A. PURPOSE:

- A1.** This Air Safety Circular (ASC) is issued to provide Air Traffic Service (ATS) Providers and ATC officers:
- A1.1 General awareness of the Reduced Vertical Separation Minimum (RVSM) monitoring mechanism used by the operators and Regional Monitoring Agencies in the Asia/Pacific Region; and
- A1.2 Guidance regarding the applicable provisions and the responsibilities of ATS Providers for RVSM monitoring in order to ensure regular and efficient collection and reporting of required data.

B. SCOPE:

- B1.** This Air Safety Circular is applicable to all ATS units in general and Karachi and Lahore ACCs in particular being responsible for the provision of ATS within controlled airspace of Karachi and Lahore FIRs between FL290 and FL410 (inclusive) designated as RVSM airspace.

C. DESCRIPTION:

C1. BACKGROUND:

- C1.1 Widespread RVSM implementation has taken place globally since initial implementation of RVSM in North Atlantic in 1997. In Asia/Pacific Region, implementation started in 2000 from Pacific. RVSM was implemented in Pakistan on 27th November 2003.
- C1.2 Aircraft use altimeter to determine height and follow common QNH of 1013 in RVSM airspace. The errors in the aircraft altimetric sensing systems are not apparent during routine operations. During routine calibration, the aircraft systems are maintained on the ground while at rest, so the dynamic nature of Altimetry System error cannot be seen. Aircraft altimetry system utilizes parts that wear over time and/or are subject to damage. It is also affected by the modification of airframes. All these activities are capable of producing significant error in true height.
- C1.3 In order to ensure that the implementation and continued application of this Vertical Separation Minimum meets the safety objectives, ICAO provisions of Annex 11 "Air Traffic Services" requires that for all airspace where a Reduced Vertical Separation Minimum of 300 m (1000 ft) is applied between FL290 and FL410 inclusive, a programme shall be instituted on a regional basis, for monitoring the height-keeping performance of aircraft operating at these levels,. Pakistan has adopted the same provisions in national regulations contained in air navigation order ANO-002-DRAN.
- C1.4 The principal objectives of an RVSM monitoring programme are to provide:
- C1.4.1. evidence of the effectiveness of the RVSM Minimum Aircraft System Performance Specification (MASPS), and altimetry system modifications made in order to comply with the MASPS, in achieving the desired height-keeping performance;
- C1.4.2. confidence that the technical Target Level of Safety (TLS) will be met when RVSM is implemented and will continue to be met thereafter; and
- C1.4.3. evidence of Altimetry System Error (ASE) stability.

- C1.5 Specialist assessment bodies known as Regional Monitoring Agencies (RMAs); which are specifically established to undertake the on-going monitoring of RVSM operations in order to meet ICAO/National Standards undertake assessment of the safety performance of RVSM airspace. An RMA must be prepared to collect the information necessary to assess the in-service technical height keeping performance of the aircraft operating in the airspace for which it has monitoring responsibility. In addition, it must establish procedures for the collection of information concerning Large Height Deviations (LHDs), any deviations equal to or greater than 90m (300ft) from cleared levels and operational errors caused by non-compliance with ATC instructions or loop errors within the ATC system.
- C1.6 The monitoring of aircraft technical height-keeping performance is a challenging task requiring specialized systems. Currently within the Asia/Pacific Region, airframe monitoring is undertaken either by means of a ground-based system where monitoring is undertaken by aircraft flying in proximity to the Height Monitoring Units (HMUs) or using portable GPS Monitoring Unit (GMU) which is a carry-on system installed in an aircraft for a single flight. ***(However, the detailed knowledge of these systems is not a subject related to ATC therefore considered beyond the scope of this document.)***
- C1.7 The organizing and overseeing the collection of LHD information also necessitates special procedures. Experience has shown that LHDs – errors of 90 m (300 ft) or more in magnitude could have significant influence on the outcome of safety assessments of RVSM. RMAs play a key role in the collection and processing of reports of such occurrences whereas ATC Units are the primary source for such LHD reports. The information available to these units, in the form of voice reports, ADS-C reports and by ATS surveillance systems such as Radars, ADS-B or MLAT, provides the basis for identifying LHDs. In addition, RMA may collect any traffic sampling data to perform the function assigned whereas States ATS authorities are responsible for provision of required data to RMAs in order to enable them to perform required functions.
- C1.8 There are different RMAs working in the Asia/Pacific Region. Pakistan falls under the area of responsibility of Monitoring Agency for Asia Region (MAAR) which was established by Aeronautical Radio of Thailand, Ltd. (AEROTHAI) under the approval of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) to assume the duties and responsibilities of the RMA. The principal role of the MAAR is to assist the International Civil Aviation Organization (ICAO) in the continuation of the safety assessment program for the RVSM and other monitoring requirements as determined by the APANPIRG.

C2. PROCEDURES:

- C2.1 As part of the RMA duties and responsibility, the MAAR conducts periodic safety assessments, to ensure that the RVSM implementation in the Asia Region continues to be safe. The reports are presented to Regional Airspace Safety Monitoring Advisory Group (RASMAG) working under the APANPIRG. In this regard, the support from the States concerned by timely submission of required data is of vital importance.
- C2.2 The required information includes:
- C2.2.1. **RVSM approvals data:** Continuous update of RVSM approvals data for all aircraft operating in the RVSM airspace, including granting of RVSM approval, withdrawal of RVSM approval and annual snapshot of all RVSM approvals data. This information is required to be provided by State Regulatory Authority.

- C2.2.2. **Traffic Sample Data (TSD):** In the Asia Region, States concerned shall collect and submit (electronically) the TSD for the month of December every year using the provided TSD template to satisfy airspace safety monitoring requirements. TSD template alongwith the guidance to complete TSD can be downloaded from MAAR website; <http://www.aerothai.co.th/maar/>
- C2.2.3. **Large Height Deviation (LHD) Reports:** States concerned shall report the occurrence(s) of LHD to MAAR on a monthly basis using the LHD report template, including the Nil report (report of No LHD Occurrence).
- C2.3 The possible causes of such LHD errors may be but not limited to:
- C2.3.1. an error in the altimetry or automatic altitude control system of an aircraft;
- C2.3.2. turbulence and other weather-related phenomena;
- C2.3.3. the crew not following established contingency procedures during an emergency descent by an aircraft;
- C2.3.4. the response to airborne collision avoidance system (ACAS) resolution advisories;
- C2.3.5. not following an ATC clearance, resulting in flight at an incorrect flight level;
- C2.3.6. an error in issuing an ATC clearance, resulting in flight at an incorrect flight level; and
- C2.3.7. an error in coordination between adjacent ATC units in the transfer of control responsibility for an aircraft, resulting in flight at an incorrect flight level.
- C2.4 The causes of these LHDs are crucial for RMA to determine the remedial actions required to ensure continuous safety of the RVSM airspace. Therefore, states are required to give a description of cause of large height deviation occurrences. Details of description of causes to be used in reporting is given in Appendix – A to this ASC whereas Template for reporting LHD is given in Appendix – B.

C3. ACTION REQUIRED:

- C3.1 Air Navigation Service Providers are required to implement the existing procedures and to ensure that air traffic controllers record all Large Height Deviations equal to or greater than 90m (300ft) from cleared levels using appropriate LHD reporting form (Form A).
- C3.2 Karachi and Lahore ACCs shall maintain a register for recording all LHDs within their area of responsibility. A monthly report shall be submitted to MAAR by each ACC for its area of responsibility by fifth (5th) of the following month.
- C3.3 Karachi and Lahore ACCs shall also ensure the recording of TSD for the month of December each year on the TSD template and its submission to MAAR by 10th of January.
- C3.4 Monthly LHD reports and TSD shall be forwarded to MAAR through e-mail with a copy to GM AANS – DAAR on the following addresses.
maar@aerothai.co.th
gmans@caapakistan.com.pk

D. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

D1. ACRONYMS:

AAD	Assigned Altitude Deviation
ACAS	Airborne Collision Avoidance System
ADS-B	Automatic Dependent Surveillance — Broadcast
ADS-C	Automatic Dependent Surveillance — Contract
AGHME	Aircraft Geometric Height Measurement Element
ASE	Altimetry System Error
ATC	Air Traffic Control
ATS	Air Traffic Services
FIR	Flight Information Region
GMU	GPS-based Monitoring Unit
GPS	Global Positioning System
HMU	Height-Monitoring Unit
ICAO	International Civil Aviation Organization
LHD	Large Height Deviation
MAAR	Monitoring Agency for the Asia Region
MASPS	Minimum Aircraft System Performance Specification
MLAT	Multilateration
MMR	Minimum Monitoring Requirements
PARMO	Pacific Approvals Registry and Monitoring Organization
PIRGs	Planning and Implementation Regional Groups
RA	Resolution Advisory
RASMAG	Regional Airspace Safety Monitoring Advisory Group
RMA	Regional Monitoring Agency
RVSM	Reduced Vertical Separation Minimum
SSR	Secondary Surveillance Radar
TCAS	Traffic Alert and Collision Avoidance System
TLS	Target Level of Safety
VSM	Vertical Separation Minimum

D2. RECORDS:

D2.1 File No. HQCAA/6426/1/14/ANS

D3. REFERENCES:

D3.1 ANO-002-DRAN “Air Traffic Services”

D3.2 ICAO Annex 11 “Air Traffic Services”

D3.3 ICAO Doc 9574 “Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive

- D3.4 ICAO Doc 9937 “Operating Procedures and Practices for Regional Monitoring Agencies in Relation to the Use of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive
- D3.5 Asia/Pacific Regional Impact Statement RVSM Global Long Term Height Monitoring

IMPLEMENTATION:

This Air Safety Circular is implemented with effect from 1st July 2011.

Dated: - 30 June, 2011
File No. HQCAA/6426/1/14/ANS



(KHALID CHOUDHRY)
Air Marshal (Retd.)
Director General
Pakistan Civil Aviation Authority

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APPENDIX A

Code	RVSM Operations LHD Categorization
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 to ATC transfer or 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 or control responsibility as a result of equipment outage or technical issues
Aircraft Contingency Events	
G	Deviation due to aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure)
H	Deviation due to airborne equipment failure leading to unintentional or undetected change of flight level
Deviation due to Meteorological Condition	
I	Deviation due to turbulence or other weather related cause
Deviation due to TCAS RA	
J	Deviation due to TCAS resolution advisory, flight crew correctly following the resolution advisory
K	Deviation due to 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 – this includes situations of flights operating (including climbing/descending) in airspace where flight crews are unable to establish normal air-ground communications with the responsible ATS unit.



APPENDIX B

**MONITORING AGENCY FOR ASIA REGION
(MAAR)**

LARGE HEIGHT DEVIATION REPORT

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

Name of FIR: _____

What should be considered as a Large Height Deviation?

The Asia/Pacific Regional Airspace Safety Monitoring Advisory Group has adopted the following plain language definition of a large height deviation for RVSM operations:

A RVSM Large Height Deviation (LHD) is defined as any vertical deviation of 90 metres/300 feet or more from the flight level expected to be occupied by the flight

(Please complete Section I or II as appropriate)

SECTION I:

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

SECTION II:

There was/were _____ report(s) of an altitude deviation of 300 ft or more between FL290 and FL410. Details of the altitude deviation are attached (Form A).

(Please use a separate form for each report of large height deviation).

SECTION III:

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

E-Mail : maar@aerothai.co.th
Fax : +66-2-287-8155

Monitoring Agency for Asia Region (MAAR)
Aeronautical Radio of AEROTHAI
102 Ngamduplee Tungmahamek
Sathorn, **Bangkok 10120**
THAILAND



Form A

LHD Report between FL 290 and FL 410

- (1) Reporting Agency: _____
- (2) Location of deviation (Fix/Airway/Latitude-Longitude): _____
- (3) Date of Occurrence (UTC): _____
- (4) NOPAC/CENPAC/CEP/SOPAC/Japan-Hawaii/South China Sea/BOB/Other: Pakistan (BOB)
- (5) Flight Identification and Type: _____
- (6) Assigned/Expected Flight Level: _____
- (7) Observed/Reported Final Level Mode C/Pilot Report: _____
- (8) Duration at the Incorrect Flight Level: _____
- (9) Cause of Deviation (write code or describe as given in appendix A): _____
- (9a) If Cause of Deviation is due to coordination errors in the ATC – to – ATC transfer of control responsibility as a result of human factors issues (Category E). Was an automated capability (e.g. AIDC) used for the coordination of the flight?
- Yes No
- (9b) If applicable, were the Supervisors of the transferring and receiving ACCs advised of this LHD occurrence?
- Yes No
- (10) Other Traffic: _____
- (11) Crew Comments (if any, when noted): _____
- (12) Remarks: _____
-
-