



International Civil Aviation Organization

Middle East Regional Monitoring Agency Board

**Eleventh Meeting (MIDRMA Board/11)
(Cairo, 27–29 September 2011)**

Agenda Item 4: RVSM Monitoring and related Technical Issues

LARGE HEIGHT DEVIATION (LHD)

(Presented by MIDRMA)

SUMMARY

The aim of this working paper is to unify the procedures of reporting Large Height Deviation (LHD) with other RMAs in accordance with 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, and to be replaced with the monthly Altitude Deviation Reports (ADR) required to be submitted by each MIDRMA member states.

Action by the meeting is at paragraph 3.

REFERENCES

– ICAO Doc 9937

1. INTRODUCTION

1.1 The level of collision risk resulting from errors in ATC instructions and emergency procedures in the MID RVSM airspace needs to be assessed in addition to that resulting from technical height-keeping deviations.

1.2 Experience has shown that the primary source of reporting Altitude Deviation is the ATC units providing air traffic control services in the airspace where RVSM is applied, all MIDRMA member states are required to submit Altitude Deviation Reports and Coordination Failure Reports which occurred in their FIRs on a monthly basis even if none was reported during the month of reporting.

2. DISCUSSION

2.1 Since the establishment of the MIDRMA it was decided and agreed among all MIDRMA member states to follow the European methodology of reporting the Altitude Deviation in the Middle East Region, but in order to standardize the reporting of this important risk analysis element and to follow the 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 and to enhance the means of detecting, reporting and investigating the occurrences of height deviations, the MIDRMA would like to introduce the new mechanism of reporting Large Height Deviation (LHD) which is to be replaced with the procedures of reporting the Altitude Deviation Report (ADR).

2.2 ICAO Doc 9937 is defining the RVSM Large Height Deviation as: Large height deviation (LHD): A deviation of 90 m (300 ft) or more in magnitude from the cleared flight level.

2.3 Experience has shown that LHDs - errors of 300 ft. or more in magnitude - have had significant influence on the outcome of safety assessments before and after implementation of RVSM.

2.4 The MIDRMA raised their serious concerns to MIDANPIRG, MIDRMA Board members and to the ATM/SAR AIS SG in several occasions concerning the lack of receipt of ADRs and CFRs from some MIDRMA member states or the continuous receipt of NIL ADRs in some very busy MID FIRs which reflects unrealistic picture of the risk analysis carried out for the region.

2.5 The MIDRMA identified the issue of the continuous receipt of NILADRs or CFRs from some of the MIDRMA members that states are misunderstanding the exact meaning and reasons of submitting these reports while these reports are treated with high confidentiality and not given to a third party without a prior approval from the state concern, therefore in order to comply with this requirement the MIDRMA would like to simplify the reporting process of altitude deviations within the Middle East RVSM airspace by all member states and request to cancel the submission of both ADRs and CFRs and to be replaced with the LHD.

2.6 The new LHD reporting forms is extracted from ICAO Doc 9937 and attached with this working paper and shall be used by all reporting units/operators for all large height deviation of 300 ft. or more in magnitude.

2.7 The main causes of Large Height Deviation occurrences identified as follows :

- a) An error in the altimetry or automatic altitude control system of an aircraft;
- b) Turbulence and other weather-related phenomena;
- c) The crew not following established contingency procedures during an emergency descent by an aircraft;
- d) The response to airborne collision avoidance system (ACAS) resolution advisories;
- e) Not following an ATC clearance, resulting in flight at an incorrect flight level;
- f) An error in issuing an ATC clearance, resulting in flight at an incorrect flight level; and
- g) Coordination errors between adjacent ATC units in the transfer of control responsibility for an aircraft, resulting in flight at an incorrect flight level.

2.8 As an additional source of information for States, specific examples of incidents/reports for each LHD taxonomy category is provided in **Appendix A** to this working paper with suggested wording and examples for some of the LHD categories for consideration also a sample of the LHD form is available in **Appendix B**.

2.9 While the MIDRMA will be the recipient and archivist for reports of LHDs, it is important to note that the MIDRMA alone cannot be expected to conduct all activities associated with a comprehensive programme to detect, evaluate and examine LHDs, the MID RVSM Scrutiny Group shall support the MIDRMA for the evaluation and classification of LHDs which will be counted in the risk analysis.

2.10 The MIDRMA will continue to report to the MIDANPIRG any issue that has an impact on the safe operation of RVSM and will continue to conduct a periodic review of LHDs reports with a view to revealing systematic problems, should such a problem be discovered, the MIDRMA should report its findings to the body overseeing RVSM implementation which is MIDANPIRG.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this working paper;
- b) cancel the monthly submission of ADRs and CFRs to the MIDRMA; and
- c) approve the monthly submission of LHDs by all MIDRMA member states.

APPENDIX A

HD TAXONOMY

Code	LHD Cause
<i>Operational Errors</i>	
A	<p>Flight crew failing to climb/descend the aircraft as cleared</p> <p><i>Example: Aircraft A was at FL300 and assigned FL360. A CLAM alert was seen as the aircraft passed FL364. The Mode C level reached FL365 before descending back to FL360.</i></p>
B	<p>Flight crew climbing/descending without ATC Clearance</p> <p><i>Example: At 0648, Aircraft A reported leaving cruise level FL340. The last level clearance was coincident with STAR issue at 0623, when the flight was instructed to maintain FL340. ATC was applying vertical separation between Aircraft A and two other flights. The timing of the descent was such that Aircraft A had become clear of the first conflicting aircraft and there was sufficient time to apply positive separation with the other.</i></p>
C	<p>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)</p> <p><i>Example: The aircraft was maintaining a flight level below the assigned altitude. The altimeters had not been reset at transition. The FL assigned was 350. The aircraft was maintaining FL346 for in excess of 4 minutes.</i></p>
D	<p>ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message. Includes situations where ATC delivery of operational information, including as the result of hear back and/or read back errors, is absent, delayed, incorrect or incomplete, and may result in a loss of separation.)</p> <p><i>Example: All communications between ATC and aircraft are by HF third party voice relay. Aircraft 1 was maintaining FL360 and requested FL380. A clearance to FL370 was issued, with an expectation for higher levels at a later point. A clearance was then issued to Aircraft 2 to climb to FL390, this was correctly read back by the HF operator, but was issued to Aircraft 1. The error was detected when Aircraft 1 reported maintaining FL390.</i></p>
E	<p>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)</p> <p><i>Example 1: Sector A coordinated Aircraft 1 to Sector B at FL380. The aircraft was actually at FL400.</i></p> <p><i>Example 2: The Sector A controller received coordination on Aircraft 1 for Waypoint X at FL370 from Sector B. At 0504 Aircraft 1 was at Waypoint X at FL350 requesting FL370.</i></p>
F	<p>Coordination errors in the ATC to ATC transfer or control responsibility as a result of equipment outage or technical issues</p> <p><i>Example: Controller in FIR A attempts to send AIDC message to coordinate transfer of aircraft at FL320. Messaging unsuccessful and attempts to contact adjacent FIR by telephone fail. Aircraft contacts adjacent FIR without</i></p>

Code	LHD Cause
Operational Errors	
	<i>coordination being completed.</i>
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) <i>Example: Aircraft 1 descended from F400 to F300 with a pressurisation issue.</i>
H	Deviation due to airborne equipment failure leading to unintentional or undetected change of flight level <i>Example: Aircraft 1 cruising at FL380. ATC receives alert indicating aircraft climbing through FL383. Flight crew advises attempting to regain cleared level with autopilot and navigation system failure.</i>
Deviation due to Meteorological Condition	
I	Deviation due to turbulence or other weather related cause <i>Example: During the cruise at F400, the aircraft encountered severe turbulence, resulting the aircraft descending 1,000 ft without a clearance.</i>
Deviation due to TCAS RA	
J	Deviation due to TCAS resolution advisory, flight crew correctly following the resolution advisory <i>Example: Aircraft 1 was cruising at FL350. Flight crew received "Traffic Alert" from TCAS and almost immediately after an "RA Climb" instruction. Flight crew responded and climbed Aircraft 1 to approx FL353 to comply with TCAS instruction. TCAS display indicated that opposite direction Aircraft 2 descended to approx FL345 and passed below Aircraft 1.</i>
K	Deviation due to TCAS resolution advisory, flight crew incorrectly following the resolution advisory.
Other	
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) <i>Example 1: Original flight plan details submitted by FIR A for outbound leg showed Aircraft 1 as negative RVSM. Subsequent flight plan submitted by FIR B showed Aircraft 1 as RVSM approved. FIR A controller checked with aircraft shortly after entering FIR A and pilot confirmed negative RVSM.</i> <i>Example 2: Aircraft 2 cruising FL310 was handed off to the Sector X controller who noticed the label of Aircraft 2 indicated RVSM approval. The Sector X controller had controlled the aircraft the day before. It was then a non-RVSM aircraft. The controller queried the status of Aircraft 2 with the pilot who advised the aircraft was negative RVSM.</i>
M	<i>Other – this includes situations where:</i> <i>i) There has been a failure to establish or maintain a separation standard between aircraft; or</i> <i>ii) Where flights are operating (including climbing/descending) in airspace where flight crews are unable to establish normal air-ground communications with the responsible ATS unit.</i>

Code	LHD Cause
<i>Operational Errors</i>	
	<i>Example 1: Aircraft 1 cruising at FL350. At time xxxx Aircraft 1 advised "Negative RVSM" due equipment failure. At that time Aircraft 2 on converging reciprocal track FL360 less than 10 minutes prior to time of passing.</i>

APPENDIX B



The information contained in this form is confidential and will be used for statistical safety analysis purposes only.

**MIDRMA F4
 LARGE HEIGHT DEVIATION FORM (LHD)**

Report to the MIDRMA of an altitude deviation of 100ft or more, including those due to ICAO, Turbulence and Contingency Events			
1. Today's date:	2. Reporting Unit:		
DEVIATION DETAILS			
3. Operator Name:	4. Call Sign: ACFT Registration Number:	5. Aircraft Type:	6. Mode C Displayed: <input type="checkbox"/> Yes. Which FL? _____ <input type="checkbox"/> No.
7. Date of Occurrence:	8. Time UTC:	9. Occurrence Position (lat/long or Fix):	
10. Cleared Route of Flight:			
11. Cleared Flight Level:	12. Estimated Duration at Incorrect Flight Level (seconds):	13. Observed Deviation (+/- ft):	
14. Other Traffic Involved:			
15. Cause of Deviation (<i>brief title</i>): (Examples: ATC Loop Error, Turbulence, Weather, Equipment Failure)			
AFTER DEVIATION IS RESTORED			
16. Observed/Reported Final Flight Level*: *Please indicate the source of information: <input type="checkbox"/> Mode C <input type="checkbox"/> Pilot	Mark the appropriate Box 17. Is the FL above the cleared level: <input type="checkbox"/> 18. Is the FL below the cleared level: <input type="checkbox"/>		19. Did this FL comply with the ICAO Annex 2 Tables of Cruising Levels? <input type="checkbox"/> Yes <input type="checkbox"/> No
NARRATIVE			
20. Detailed Description of Deviation (Please give your assessment of the actual track flown by the aircraft and the cause of the deviation.)			
21 - CREW COMMENTS (IF ANY)			

When complete please forward the report(s) to:
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