



**INTERNATIONAL CIVIL AVIATION ORGANIZATION
WESTERN AND CENTRAL AFRICAN OFFICE**

**FOURTEENTH APIRG ATM/AIM/SAR/SG/14 MEETING
(Dakar Senegal, 11 - 14 May 2015)**

Agenda Item 3: Status of implementation of the Sub-Group work programme and related Task Forces/Working Groups as assigned by APIRG

3.1 Air Traffic Management

AFI RVSM Collision Risk Assessment (CRA) 8

(Presented by ARMA)

Summary

This Working Paper Discusses the 4th post implementation CRA in the AFI Region. Two of the AFI RVSM Safety Policy objectives are addressed, i.e. an assessment of the Technical Vertical Collision risk and the Total Vertical Collision risk.

Ref: Collision Risk Assessment for RVSM in the Africa Indian Ocean Region CRA8
ICAO Strategic Objectives A & B

Action required is documented in paragraph 3.

1. INTRODUCTION

- 1.1 Collision Risk Assessment CRA 8 provides, inter alia, an assessment and information about ATM Coordination failures and breakdown of separation at crossing points on ATS routes which are generically captured in the Total Vertical Collision Risk estimate where applicable. Coordination failures remain a serious concern contributing to the agreed to Target Level of Safety not being met. Together with the afore mentioned the breakdown of standard separation at ATS route crossing points will require attention and remedial action. All available means are being considered to improve ATM Coordination failures and the breakdown of separation at ATS route crossing points.
- 1.2 CRA 8 (2013) presents the 4th post-implementation CRA for RVSM in the AFI Region. The assessment addresses two of the AFI RVSM Safety Policy objectives, i.e. an assessment of the Technical Vertical Collision risk evaluated against the agreed to TLS of 2.5×10^{-9} fatal accidents per flight hour, and an assessment of the Total Vertical Collision risk evaluated against a TLS of 5×10^{-9} fatal accidents per flight hour.

- 1.3 The meeting should recall that ARMA manages CRA's for the AFI region on an annual basis utilising the safety assessment data captured by States/FIR's/ACC's and submitted to ARMA as well as UCR's processed through TAG and AIAG. CRA's are compiled in the year following the data capture. i.e. the 2013 data is processed in 2014 and the 2014 data is processed in 2015.
- 1.4 CRA 9 for 2014 is currently under construction and will be presented at SG15.
- 1.5 The meeting should recall that the last CRA was presented at SG13 which summarised CRA 6. Due to the time period between SG 13 and SG14 an overview of CRA 7 was distributed via email to each States RVSM National Program Manager.

2. DISCUSSION

- 2.1 The estimate of the Technical Vertical Collision risk was once again calculated to be below the agreed to Technical Vertical TLS of 2.5×10^{-9} fatal accidents per flight hour however the estimate of the agreed to Total Vertical collision risk does not meet the Total Vertical TLS of 5×10^{-9} fatal accidents per flight hour
- 2.2 The estimate of the Technical Vertical Collision risk was found to be met by a factor of approximately 1.2 below the agreed to TLS. This estimate is moving towards the TLS with the accuracy of GNSS navigation significantly contributing hence the urgency for the implementation of SLOP where applicable.
- 2.3 The two main components affecting the Total Vertical Collision Risk is the risk due to flight levels being crossed without an ATC clearance and due to flying at an incorrect flight level. The current CRA 8 estimates for both components were considerably higher than CRA 7 estimates. The increase in the probability of lateral overlap for aircraft on the same track resulting from an increased assumed proportion of GNSS navigation accuracy also increased the risk which could be counter acted by SLOP. Improper crossings at waypoints or navigational facilities where air craft are at the correct same semi-circular rule flight level with standard RVSM separation being broken has increased. The meeting should recall that TCAS is not a separation tool and does not support RVSM.
- 2.4 The precision of lateral navigation is an important factor with regard to vertical collision risk. It has been assumed that 65% of the flying time in AFI RVSM airspace would be made with GNSS navigation and the remaining 35% with VOR/DME navigation. The risk mitigating effect of strategic lateral offsets has not been incorporated therefore the benefits or lost.
- 2.5 Vertical events for the previous CRA 7 were recorded as 23 with CRA 8 increasing to 29. Although there were no Large Height Deviations reported for whole numbers of flight levels to be assessed this should be treated with caution. Without adequate surveillance LHD are almost impossible to detect except if reported by air crew which should be the case.
- 2.6 Overall the assessment is once again indicating signs of deterioration after the reasonably good recovery in CRA 7.
- 2.7 The immediate processing of UCR's, RVSM vigilance whilst providing an ATM service and operating in RVSM airspace in order to arrest and bring the Total Vertical Risk back towards the agreed to TLS cannot be over emphasized to bring down the overall risk. Greater emphasis needs to

be placed on coordination failures and breakdown of separation at crossing points which are creating an environment for greater RVSM risk.

- 2.8 The root causes that influence the high Total Vertical Risk estimate not meeting the Target Level of Safety remain as follows:
- Generically Human Factors, either ATC or flight deck originated, were assessed as the main contributing cause of safety events leading to UCR's or a combination of the two
 - The lack of or improper coordination between ATC sectors and FIRs continues to be dominant cause of Safety events leading to UCR's
 - The lack of or non adherence to procedures is a contributing factor
- 2.9 Further to this an improvement in the collection of all related RVSM safety data is required to ultimately benefit RVSM safety and identifying hotspots. This includes UCR's. Self-reporting is starting to take place which is a good sign that the safety culture is changing for the better.
- 2.10 The CRA is in general an indication of the successes, failures, errors and remedial actions required. The remedial actions debated and implemented towards eliminating coordination failures and the breakdown of separation at ATS route crossing points will be imperative.
- 2.11 The TAG has achieved successes with the management of co-ordination failures so it is therefore true to report that a practical remedial action is in place and will remain so until co-ordination failures have reached an acceptable level.
- 2.12 Regarding the breakdown of separation at ATS route crossing points the ARMA is obliged to propose that the ARMA via the TAG process and manage a monitoring program for a single hotspot crossing waypoint in conjunction with the relevant State and major airlines operating via the hotspot until such stage as the safety events are reduced to an acceptable level. With such a process ATC and crew will be focused on the hotspot and any short comings could be immediately identified and addressed. Monthly reports and discussions would then take place during the TAG telephone conferences.
- 2.13 Continual RVSM vigilance and remedial actions will contribute to reducing risk.

3. ACTION BY THE MEETING

- 3.1 The meeting is invited to:
- a) note and review the contents of this working paper;
 - b) support all efforts to reduce the break down of separation at crossing points including the collection of all safety assessment data to this effect.
 - c) Support the efforts to complete SLOP implementation