



***ELEVATED RISK OF MID – AIR COLLISION (MAC)
AT AIRSPACE BOUNDARIES IN REDUCED VERTICAL
SEPARATION MINIMA (RVSM) AIRSPACE***

1 Purpose

- 1.1 This Safety Information (SI) is to raise awareness to air operators and air navigation services providers (ANSPs) regarding the elevated risk of Mid – Air Collisions (MAC) in Reduced Vertical Separation Minima (RVSM) airspace. The focus is specifically on the risk posed by ATC Unit to ATC Unit coordination errors, which manifest as Category E Large Height Deviations (LHDs).

2 Background

- 2.1 In airspace where separation between aircraft is reduced – such as Reduced Vertical Separation Minimum (RVSM) airspace – a robust safety monitoring mechanism is essential. This includes having formal monitoring arrangements and conducting annual assessments of Mid – Air Collision (MAC) risk. Reports of airspace incidents play a key role in understanding and managing this risk.
- 2.2 One critical type of incident is a Large Height Deviation (LHD) – defined as a vertical deviation of 300 feet or more from the altitude assigned or coordinated by air traffic control (ATC), potentially caused by human error, equipment malfunction, or environmental factors.
- 2.3 Besides altitude deviations, LHDs also occur when an aircraft occupies a point in the airspace unexpectedly by the air traffic controllers (ATCs). In other words, the actual aircraft trajectory no longer matches the trajectory anticipated by ATCs and this lack of accuracy may potentially result in another aircraft cleared to the same location, thus increasing the risk of a mid-air collision.
- 2.4 Category E LHDs are a specific type of LHD defined as coordination errors during the ATC-unit-to-ATC-unit transfer of control responsibility. These errors typically stem from human factors issues such as late or non-existent coordination, incorrect time estimates, or incorrect flight level or ATS route information not aligning with agreed parameters. These coordination errors, particularly prevalent in oceanic airspace during aircraft transfers across airspace boundaries, result in the aircraft being

unprotected by ATC, either because the receiving ATC is unaware of the aircraft's presence in its airspace or holds an incorrect understanding of its position.

- 2.5 Regional Monitoring Agencies (RMAs), established by the International Civil Aviation Organization (ICAO) regional planning and implementation group uses these LHDs to calculate airspace collision risk and identify airspace 'Hot Spots' globally. Their data helps improve airspace safety through better awareness and targeted action.

3 Key Considerations & Recommendations

- 3.1 The elevated MAC risk associated with Category E LHDs calls for immediate attention. To mitigate this risk, the following measures are recommended:
- a) Established and maintain a robust, standardised procedures for the safe and effective transfer of aircraft across Flight Information Region (FIR) airspace boundaries and for transfer of control responsibilities for cross-border flights between ATC Units or service providers;
 - b) Ensure the procedures include adequate redundancies and are formally documented in inter- or intra-facility agreement documents, to ensure consistency and accountability;
 - c) Conduct an internal safety assurance review to confirm the establishment of effective procedures for transferring aircraft across FIR airspace boundaries and to determine compliance with these procedures.
 - d) Any lack of effectiveness or non – compliance to be addressed in a Corrective Action Plan (CAP) to mitigate the associated risk of mid – air collision in a timely and effective manner;
 - e) Reinforce awareness among air traffic controllers regarding the critical importance of accurate, timely and coordinated aircraft transfers when transitioning across airspace boundaries.
 - f) Leverage ICAO data provided by Regional Monitoring Agencies (RMA) to better understand MAC trends and LHD occurrences and actively contribute to regional safety monitoring by reporting LHD data to the relevant RMA.
 - g) Conduct regular coordination meetings with neighbouring or regional ANSPs to discuss cross airspace boundary safety issues, systemic non-compliance issues, lessons learned, and best practices.

4 Conclusion

- 4.1 Proactive and collective action is essential to eliminate Category E LHDs and reduce the risk of mid – air collisions in RVSM airspace. All aviation stakeholders – particularly air navigation service providers and air operators – must evaluate the

contributing factors to such occurrences within their operations and implement targeted risk mitigation strategies.

- 4.2 Through strengthened procedures, improved coordination, and data-driven decision-making, the aviation community can enhance the overall safety of aircraft operations and ensure continued compliance with international aviation safety standards.

5 Reference

- a) Regional Aviation Safety Group – Asia Pacific Safety Advisory (RSA) No. 25-001 June 2025.



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