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ASSEMBLY — 40TH SESSION

TECHNICAL COMMISSION

Agenda Item 30: Other issues to be considered by the Technical Commission

ADOPTING A STATE-MANAGED ADS B HEIGHT MONITORING SYSTEM AS AN ALTERNATE MEANS FOR RVSM – SPECIFIC APPROVAL

(Presented by India)

EXECUTIVE SUMMARY

States are required to submit the data regarding aircraft height-keeping performance and the occurrence of large height deviations (LHDs) to respective regional monitoring agencies (RMAs) for seeking performance evaluation and submitting the same for respective regulators to issue RVSM approvals. Instead, the States can use ADS-B data and continually monitor height during normal aircraft operations and provide compliance data to their regulators for issue of RVSM approvals. The same data may be forwarded to RMAs for Estimated Collision Risk calculation.

In simple terms, the States, **in place of RMAs**, can monitor height using ADS-B and submit data to their regulator for RVSM specific approval. The move will substantially reduce the burden on the existing RMAs and benefit capable States by enabling them to maintain height monitoring and adopt alternative means for specific approvals for operation in RVSM airspace and achieve cost savings for airline operators.

Action: The Assembly is invited to consider permitting States to
a) undertake Height-keeping performance Monitoring using ADS-B Out technology; and
b) adopt state-managed RVSM specific approval process, considering its continual ADS-B Based Height monitoring capability.

Strategic Objectives:	This working paper relates to the Safety Strategic Objective.
Financial implications:	Considerable savings for capable States and operators that are ready to adopt State-managed RVSM approval process through continual ADS-B Based Height monitoring capability.
References:	ICAO Doc 9574, *Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive* Doc 9937, *Manual of 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* FLTOPSP/WG/6-WP12, APAC RASMAG 24 /IP 08& 09

1. INTRODUCTION

1.1 Since the initial operational implementation of Reduced Vertical Separation Minimum (RVSM) in the North Atlantic in 1997, implementation of RVSM in all global airspace has been completed.

1.2 Recognizing the significance of the step from a 2000 ft vertical separation minimum to a 1000 ft vertical separation minimum, intensive monitoring arrangements were put in place to ensure the continued safety of RVSM operations. Such monitoring considers RVSM safety performance in terms of two components. Technical risk relates to the technical performance of equipment, including altimetry systems. Operational risk relates to human performance error and, in simple terms, considers errors made by pilots and air traffic controllers.

1.3 One of the essential ICAO PIRG Objectives is to Establish and measure safety performance against agreed safety standards at a regional level.

1.4 With regard to RVSM, Safety Objectives of the RVSM monitoring program are detailed in the *Manual on a 300 m (1000 ft.) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive* (Doc 9574).

1.5 Doc 9574 states the need for:

a) verification that the target level of safety will be met upon implementation of RVSM and will continue to be met thereafter;

b) monitoring of the effectiveness of the altimetry system modifications which have been implemented to enable aircraft to meet the required height-keeping performance criteria; and

c) evaluation of the stability of altimetry system error (ASE).

1.6 In all regions where RVSM has been implemented, 12 regional monitoring agencies (RMAs) have been established by the appropriate planning and implementation regional groups (PIRGs) to satisfy the goals of the RVSM monitoring program.

1.7 For a standardized approach to the way in which RMAs carry out their functions and the associated detailed duties and responsibilities, ICAO guidance on RMA operating procedures is included in Doc 9937, *Manual of 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.

1.8 Determination of continued safe operations in RVSM airspace is measured against an ICAO-established safety goal – Target Level of Safety (TLS). One of the principal duties of an RMA is to conduct periodic safety assessments to determine whether the TLS continues to be met. Thus, an RMA supports the continued safe use of RVSM within a designated airspace. The safety assessment consists of estimating the risk of collision associated with RVSM in two risk categories: Operational risk and Technical risk.

1.9 Further, an RMA should design a height-keeping performance monitoring program to provide ongoing summary information of Altimetry System Error (ASE) performance by aircraft-type group so that adverse trends can be identified quickly. The primary function of a height-keeping performance monitoring system is to estimate the ASE of an aircraft by comparing the actual height of the aircraft to the height of the flight level as indicated by the aircraft's own altimetry system.

1.10 Current Duties and responsibilities of an RMA include establishing/maintaining a database of RVSM approvals, monitoring aircraft height-keeping performance and the occurrence of LHDs and reporting the results appropriately, conducting safety and readiness assessments and reporting the results appropriately, monitoring operator compliance with State approval requirements and initiating initiate necessary remedial actions if RVSM requirements are not met.

1.11 However, in the recently held RASMAG 24 meeting, the United States submitted IP 08 and 09 on "Alternative to specific approvals for operations in RVSM airspace", wherein it states " though the specific approval process for Reduced Vertical Separation Minimum (RVSM) operations was established in 1997, maturity of RVSM standards, improvements in aircraft RVSM design, stability in RVSM operating procedures, and altitude-keeping performance monitoring programs may obviate the need to issue RVSM specific operational approvals when States can monitor RVSM performance using ADS-B Out."

1.12 The conclusion of IP 09 states "Given more than two decades of successful RVSM operations, civil aviation authorities should consider that a performance-based and ADS-B height-monitoring system may be considered as an acceptable alternative means for an RVSM specific approval".

2. DISCUSSION

2.1 Presently, the jurisdiction of RMA in many regions is so huge involving multiple States that it is virtually impossible for RMAs to carry out the above-mentioned critical functions with the required frequency and precision. Any delay or compromise in discharging the assigned functions by an RMA may in the long-term lead to undesirable results, particularly in view of massive fleet expansion plans by Member States to meet the growing traffic demand in the APAC Region.

2.2 To cite a reference for the vastness of jurisdiction of an RMA, MAAR (Monitoring Agency for Asia Region) provides services for 20 Member States spanning 25 FIRs for an estimated 3731421 annual Aircraft flying hours (RASMAG20) for the Airspace analysed by them.

2.3 In addition to the vast Airspaces of responsibilities for the limited number of existing RMAs, the exponential increase in traffic growth across regions adds another dimension to the complex problem of monitoring the Airspace for ensuring continued safe use of RVSM.

2.4 With the advent of extensive ADS-B based surveillance across many Regions/States, effective height monitoring can be done in the respective Airspaces at no extra cost. More importantly such States can take an appropriate and early action if the height keeping performance monitoring system detects an individual aircraft whose ASE or Total Vertical Error (TVE) exceeds acceptable levels. In such cases, States can establish a process to examine the findings through consultation with the group of identified Airworthiness and operations specialist. Such States will be able to efficiently carry out periodic checks of the approval status of operators and aircraft using RVSM airspace. In fact, the ideal requirement of compliance monitoring for the entire airspace even on a daily basis could be a reality sooner than later.

2.5 As brought out in FLTOPSP/WG /6-WP/12, with the on-going aggressive implementation of ADS-B Out through appropriate mandates by many States, authorities have demonstrated the ability to use this technology to monitor individual aircraft RVSM height-keeping performance quickly whenever aircraft operate in monitored areas. This continual monitoring provides increased height-keeping performance data on a larger number of aircraft and enables authorities to identify non-compliant altimetry performance sooner. Hence, the aviation authority can gain quicker mitigation of risk posed by poor performing aircraft and more effectively maintain airspace safety compliance. The advent of space-based ADS B will further enhance this monitoring capability.

2.6 In view of the above, the Assembly is requested to consider permitting the use of Alternative state-managed RVSM approval process through ADS-B Out Based Continual Height monitoring. The move will substantially reduce the burden on the existing RMAs and benefit capable States by enabling them:

a) to maintain effective height monitoring and adopt alternative means for specific approvals for operation in RVSM airspace as brought out by the United States in the references;

b) to achieve cost savings for airline operators as they otherwise incur significant cost by way of charges to their hitherto assigned RMAs and above all; and

c) to ensure enhanced safety of aircraft operations in RVSM airspace.

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