



IBAC Bulletin 02-05

Subject: EUR RVSM- Continuous monitoring of RVSM operations

Attached is an ICAO State Letter which requests States to promulgate by AIC information on the above. Attached to the letter is a specimen AIC. Pending promulgation action by States, operators should take note of the content of both the letter and, in particular, those sections of the specimen AIC which directly pertain to operators.

Prepared by:

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27 September 2002

Attachment: ICAO Letter Ref T 13/15.2e-L02-0655.ATM

Reference : T 13/15.2E - L02 - 0655.ATM

16 September 2002

Subject : **Continuous monitoring of Reduced Vertical Separation Minimum (RVSM) operations**

Action required : Promulgate the Aeronautical Information Circular (AIC) which is at the **Appendix**

Sir/Madam,

1. I have the honour to provide you with the following information regarding the revised monitoring requirements relating to the EUR RVSM programme. This State Letter and the attached specimen Aeronautical Information Circular (AIC) address two subjects: (1) the EUR RVSM post-implementation requirements to satisfy the post-implementation safety cases, and (2) monitoring arrangements for aircraft that are not RVSM approved.

Post-Implementation monitoring requirements for safety assessment purposes

2. With respect to the requirement for monitoring, ICAO Doc 9574 "*Manual for the implementation of a 300M (1000ft) Vertical Separation Minimum*" states that, after implementation, particular attention will need to be placed on those measures necessary to ensure that:

- a) all aircraft operating above FL 290 meet the RVSM performance requirements;
- b) the State approval process is effective;
- c) the monitoring of height-keeping performance continues to afford a representative sample of the aircraft population;
- d) there is regular assessment of the levels of risk in the system both against the Target Level of Safety (TLS) as well as any other safety goals deemed appropriate by the Regional Planning Group; and
- e) there is a timely and effective means of identifying and correcting causes for large height deviations.

3. In accordance with the above, the objective of the post-implementation monitoring requirements is to ensure that sufficient height keeping performance data is available to perform the EUR RVSM post-implementation Safety Cases scheduled for delivery in December 2002 and December 2004. In this connection, because post-implementation safety assessments are essential to ensure the safety of RVSM operations, the co-operation by State Authorities and aircraft operators is of high importance.

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4. The attached specimen AIC sets out the monitoring requirements to be met by aircraft operators. If an operator fails to meet these requirements due to lack of participation, State Authorities are expected to reflect this on their RVSM approval status. In the context of EUR RVSM, Eurocontrol, at the request of the European Air Navigation Planning Group (EANPG), is acting as the Regional Monitoring Agency (RMA), and as such will inform the State Authorities on lack of participation by aircraft operators.

5. In the event that the post-implementation monitoring programme identifies individual aircraft, or aircraft types/groups, which do not meet their specific height keeping performance requirements, the RMA will notify the relevant State Authority which is then expected to take prompt action to remove the associated safety risk from RVSM airspace.

6. In this context, it is important to note that when a performance issue has been identified with an aircraft type rather than an individual aircraft (i.e. when the ICAO group Altimetry System Error (ASE) requirement is exceeded), the authority of the type certificate holder (usually the aircraft manufacturer) will normally be notified by the RMA. After receipt of this RMA notification, the Certifying Authority is expected to take immediate action to ensure that the aircraft group/type meets the group requirement, or stops operating within RVSM airspace.

Monitoring of non-RVSM approved aircraft

7. Some State Authorities have decided that, to obtain an RVSM approval, satisfactory height monitoring is required, in addition to the approval requirements set out in ICAO Doc 7030/4, prior to granting the RVSM approval. These State Authorities will need to consider the means by which their operators can obtain the required data, as non-RVSM approved aircraft (except for State aircraft) cannot operate in RVSM airspace, in which the monitoring needs to take place.

8. As one potential solution to the above, those State Authorities may consider granting an “interim” RVSM approval, which would be valid for a specific time period, based on the RVSM approval requirements set out in ICAO Doc 7030/4 in order to allow the height monitoring to take place. This interim approval would authorise the aircraft operator to flight plan as RVSM approved, and be monitored by Height Monitoring Units (HMU) or a Global Positioning System (GPS) Monitoring Unit (GMU)*. Within this period, on receipt of successful height monitoring data, the Authority requiring this data can then grant ‘permanent’ RVSM approval. At the end of the period, if the height monitoring data has not been provided, the RVSM approval would cease to be valid.

9. To use the above option, it is the State’s responsibility to accept that the aircraft is treated as RVSM approved, while the additional approval requirements as set by that State (i.e. the monitoring data) has not yet been met. However, it should be noted and ascertained that when granting this “interim” approval, the aircraft actually meets all approval requirements set by ICAO because the requirement for monitoring data is an additional requirement set by the State Authority.

10. An alternative option to meet this additional requirement set by the State is that the operator requiring RVSM approval approaches a State Authority and ATS provider for a special flight for monitoring purposes. This would be limited to designated airspace for which the responsible State and ATS provider have instituted procedures to allow for such special flights.

11. States and/or ATS Providers, who provide ATS in airspace within coverage of one of the HMUs, may issue procedures for HMU monitoring at FL290 or above for aircraft not yet RVSM approved.

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* The continued provision of GMU monitoring by Eurocontrol after 31 December 2002 is still under discussion.

AIC text

12. The text of the attached specimen AIC assumes that the State Authority does not require monitoring data for RVSM approval. In the case that the State Authority does require monitoring data prior to RVSM approval, the State is requested to indicate this requirement in the AIC. As appropriate, this should include the issues described above.

RVSM Approval notification

13. State Authorities should notify the RMA when it issues or withdraws an RVSM approval. This information is important for the RMA in order to verify aircraft approval status (e.g. as indicated in the ICAO flight plan), and to identify monitoring requirements and results. The approval notification process was provided to all concerned through State Letter T 13/15.2E – L00-1160.ATM of 15 December 2000.

General

14. Activities are under way within ICAO to establish globally coherent long term monitoring requirements. These requirements will enable the RMAs world wide to work to common principles, to ensure consistency in safety management and interfacing with State Authorities and aircraft operators. The monitoring requirement for the purposes of EUR RVSM post-implementation safety assessments is defined such that it is compatible with the evolving global long term monitoring requirements.

15. The information in the attached specimen AIC is intended to provide all information regarding the monitoring requirements in the context of RVSM. States may consider cancelling earlier AICs on this subject.

Action requested

16. The State Authority is requested to inform aircraft operators under their registry of the information provided in the attached specimen AIC. Furthermore, if the State Authority requires monitoring data prior to RVSM approval, it is requested to indicate this requirement in the AIC, taking into account the above issues.

17. The State Authority is requested to recognise the importance for all aircraft operators to participate in the post-implementation monitoring programme, in order to assure the safety of RVSM operations. In this context, the State Authority is to ensure the co-operation of the aircraft operators under its registry with the RMA so as to meet the post-implementation monitoring requirements. A lack of participation by the aircraft operators should be reflected upon their RVSM approval status.

18. Additionally, the Authorities are requested to ensure that Eurocontrol, acting as RMA for the EUR RVSM programme, is informed about the correct RVSM approval status of aircraft and operators under its responsibility.

Please accept the assurances of my highest consideration.

Christian Eigl
ICAO Regional Director
Europe and North Atlantic

DRAFT SPECIMEN AIC

EUR RVSM Post-Implementation Height Monitoring Requirements

1. GENERAL

1.1 This AIC provides important information regarding the post-implementation height monitoring requirements in the context of EUR RVSM.

2. EUR RVSM POST IMPLEMENTATION SAFETY CASE

2.1 The EUR RVSM **Pre**-implementation Safety Case was required to allow implementation of RVSM in EUR RVSM airspace. In order to address actual safety levels with RVSM in operation and confirmation of pre-implementation assumptions, two EUR RVSM **Post**-implementation Safety Cases are foreseen for issue in December 2002 and in December 2004.

2.2 The Post-implementation Safety Case has the same data requirements as for Pre-implementation. Therefore, aircraft operators are required to continue participating in the ongoing monitoring activities. This may include the need for re-monitoring of aircraft that already were monitored as part of the pre-implementation monitoring activities. As this safety monitoring activity is considered of high importance in the context of safety of operations in EUR RVSM airspace, non-participation can result in the withdrawal of RVSM approval.

2.3 The monitoring requirement as set out below is, in its current form, applicable for EUR RVSM operations, specifically to fulfil the requirements for the EUR RVSM Post-implementation Safety Cases. However, activities are under way to harmonise the detailed (pre- and post implementation) monitoring requirements globally. The monitoring requirement as detailed does not contradict the evolving global requirement.

3. EUR RVSM POST IMPLEMENTATION MONITORING REQUIREMENT

3.1 In order to have sufficient confidence in safety assessment results, sufficient monitoring data is required. This data will need to be available by Sept 2002 to allow for timely processing for the first Post-implementation Safety Case.

3.2 Where possible available pre-implementation data will be used to meet the data requirements. However, due to the potential changes to altimetry performance over time, there is a limitation on the age of data that can be used for the assessments. This will lead to the need to obtain new data and may result in the requirement for re-monitoring of certain aircraft types and airframes.

3.3 A number of operators have not yet met the monitoring requirements that were set prior to implementation of RVSM. These operators will need to participate as a matter of high priority to the post-implementation monitoring activities.

3.4 Consequently, there is a requirement for ongoing participation by aircraft operators in the post-implementation monitoring programme. Most data will be obtained through monitoring by the existing ground based Height Monitoring Units (HMUs, see §4.1). Where overflight of an HMU is not practicable, the required data can be obtained by the use of a GPS Height Monitoring Unit (GMU^{*}). This requires the active participation of the operator in carrying the GMU on the flight deck.

3.5 Since much of the data is obtained automatically, no specific action is required from operators unless they are approached by the Regional Monitoring Agency (RMA), i.e. either by

* The continued provision of GMU monitoring by EUROCONTROL after 31 December 2002 is still under discussion.

EUROCONTROL or by a company contracted by EUROCONTROL. Where such an approach is made, the operator is required to co-operate, either by arranging a special flight to overfly an HMU or by agreeing to the carriage of the GMU. In case an operator fails to co-operate, action will be taken to withdraw the RVSM approval of the aircraft and/or operator in question. This approach is required, given the direct importance of post-implementation monitoring for the safety of RVSM operations.

3.6 For aircraft operator specific information, such as how many of his/her aircraft of a particular aircraft type needs be monitored and within what time frame, the operator may contact the RMA (see §6).

4. POST-IMPLEMENTATION MONITORING PROCEDURES

4.1 Monitoring Systems

4.1.1 The EUR RVSM monitoring system consists of Ground Based Height Monitoring Units (**HMU**) which collect the majority of data and is supplemented until 1 January 2003 by portable GPS Monitoring Units (**GMUs**). These systems are described briefly below.

4.1.2 The **HMU** is a passive ground based system which measures aircraft height keeping over an approximately circular area. Each system consists of a set of ground stations arranged as a central site with four additional receivers arranged in a square. Each site receives aircraft SSR replies (Modes A, C and S) from which the 3D position of the aircraft is derived. Using meteorological information and the Mode C/S height data the altimetry system error is calculated. The HMUs are operating at the following locations:

- a) Linz in Austria [centre 48°12'N, 014°18'E]
- b) Nattenheim in Germany [centre 49°57'N, 006°28'E]
- c) Geneva in Switzerland [centre 46°22'N, 005°56'E]

Note 1: The existing HMU's as developed and implemented in the context of NAT RVSM (such as the HMU near Strumble, Wales) is also available for monitoring.

4.1.3 ATS route segments within HMU coverage can be determined by considering a circle with 45 NM radius around the centre co-ordinates given above. Up-to-date information can be obtained from the RMA (see §6).

4.1.4 The **GMU** is a portable carry-on recording system. Using antennas fitted to the rear flight deck windows using suction pads, it can receive and record the GPS data which, together with ground station differential corrections provides accurate 3D aircraft positions. The GMU is totally self contained and does not need to be connected to any aircraft systems. The system installation and subsequent removal can be accomplished during a normal turn round period.

4.1.5 The unit has been produced to meet aircraft equipment standards and will be accompanied with the appropriate documentation to allow on-board carriage and use in all phases of flight. On the basis of the LBA (Germany) equipment qualification and as supported by the Joint Aviation Authorities (JAA), the GMU may be installed on board the aircraft without further technical investigation or approval provided that the instructions and precautions given in Installation Manual AD-GMU-110 are observed.

4.1.6 The continued provision of GMU monitoring after 31 December 2002 by EUROCONTROL is still under discussion.

4.2 Organisation of Monitoring Activities

4.2.1 On behalf of ICAO, the EUROCONTROL Agency acts as “Regional Monitoring Agency” (RMA). The information which will be obtained through the monitoring programme on aircraft compliance status and measured height keeping performance will be combined with the information available from monitoring agencies in other regions.

4.2.2 The RMA will support operators and approval authorities on any issue related to RVSM approval and monitoring. The RMA will require information on the aircraft which are intended to operate in EUR RVSM airspace, and which therefore will need to be monitored on a periodic basis as part of the continuing safety assessment. To this end, the RMA will also be in contact with State approval authorities. The RMA is based at the EUROCONTROL Headquarters in Brussels, Belgium.

4.2.3 The RMA will ensure the continuous operation of the monitoring systems and will manage the measured height keeping performance data. The RMA will identify any height deviations that are outside the specifications of the ICAO RVSM performance requirements, and will follow-up as required.

4.2.4 The portable GPS Monitoring Units (GMUs) are operated by GMU operators contracted by EUROCONTROL. After initial agreement between the RMA and aircraft operators as to which airframe(s) need to be monitored by GMU, the aircraft operator will be contacted by the GMU operator to agree on arrangements for the monitoring flight. Based on those arrangements, the GMU operator will deal with installation and operation of the GMU on board of the aircraft. The continuation of this arrangement after 31 December 2002 is still under discussion.

4.3 General Monitoring Procedures

4.3.1 This section describes the different steps required to fulfil the EUR RVSM monitoring requirements. The procedures have been developed with the objective to make the monitoring as transparent as possible to aircraft operators. These procedures are different from the pre-implementation monitoring procedures as issued in a previous AIC.

- I.* For aircraft and operators that are already RVSM approved and operating in EUR RVSM airspace, the RMA will have received the aircraft details from the State Authority. The RMA will establish the monitoring requirement based on this information and on existing height monitoring data.
- II.* For new aircraft and operator RVSM approvals, the operator will need to follow the approval procedure established on the basis of the State requirements for RVSM approval, which in itself is based on JAA TGL6 Rev1, or equivalent. After RVSM approval is issued, the State Authority will provide the relevant information to the RMA. Aircraft RVSM approval information is exchanged between the different RMAs.
- III.* Operators are to inform the State Authority of any aircraft they intend to remove from their fleet of RVSM approved aircraft. The State Authority will pass this information to the RMA.
- IV.* Operators that regularly operate aircraft within the coverage of the HMUs (see §4.1), are expected to fulfil the monitoring requirements for those aircraft during the course of their day-to-day operations.
- V.* Based on of the aircraft and operator information held by the EUR RMA, the RMA will:
 - identify the need for monitoring of airframes to meet the monitoring requirements, taking into account available monitoring data for these airframes, including the age of that data;
 - establish whether the required data will be obtained through HMU monitoring without the need for a notification to the operator, or whether the operator should be contacted to ensure monitoring takes place;

- if required, contact the operator to establish if there is a need for specific action to enable the monitoring to take place. The RMA will consult the operator for possibilities to overfly an HMU during check flights, during transiting to/from the operator's maintenance facility or through making a practicable deviation from any intended flight.
- VI.** For a successful measurement by an HMU, it is required that the aircraft is in level flight for approximately 5 minutes, between FL290 and FL410 (inclusive) within the coverage of the HMU.
- VII.** Where the aircraft is not expected to overfly one of the HMUs, the RMA will ask the operator to co-operate for a GMU monitoring flight. Based on the agreement, arrangements will be made for the GMU operator to install and operate the system on a suitable flight in the European airspace. The GMU operator, on behalf of the RMA, will contact the operator to agree GMU flight details. The GMU operator will be responsible for installation of the GMU on the flight deck. Whether the GMU operator will stay with the GMU during the measurements, is subject to the agreement with the aircraft operator.
- VIII.** If the EUR GMU is to be used for monitoring, the flight must be undertaken in the ECAC Area due to the availability of accurate meteorological data. The continued provision of GMU monitoring by EUROCONTROL is still under discussion. If the GMU of the North Atlantic and Asia Pacific RMA are to be used, the operator should contact those RMAs for specific information on the areas in which these GMUs can operate.

Note: The preferred method for monitoring is considered to be overflying an HMU, given the advantages of this method of monitoring compared to GMU monitoring in terms of, amongst others, operator involvement and turn-around time. For GMU monitoring, results are expected to take at least one week from the execution of the monitoring flight.

- IX.** Operators may consult the EUROCONTROL RVSM Web Site (www.eur-rvsm.com) or the contact RMA (see contact details §6) to ascertain that the information stored about the aircraft is correct and to identify whether the aircraft have been monitored and acceptable performance has been demonstrated.
- X.** States might restrict RVSM approval (i.e. issue an “interim” approval) to ensure monitoring occurs within a defined period after granting the approval. Where such a restriction is placed upon the operation, the RMA should be provided with the aircraft and operator details as soon as possible to ensure the monitoring can occur within the required time scale.
- XI.** If aberrant or anomalous height keeping performance on an individual airframe is measured which is deemed to require follow-up, the RMA will contact the operator to address the issue. This may require further follow up through the appropriate State Authority.
- XII.** If an aircraft type or group of types does not appear to meet the ICAO group performance requirements, the RMA will follow up with the Manufacturer (the Type Certificate Holder) and their State Authority. Resulting actions by the State Authority may include withdrawal of certification of the type/group RVSM solution.

4.3.2 It is important for the RMA to have an accurate record of points of contact for aircraft operators, in order to exchange information on monitoring requirements, and for follow-up in case of anomalous height keeping performance. Operators are therefore requested to include a completed **USC Form 2** with their first reply to the RMA. Thereafter there is no further requirement unless there has been a change to the details requested on the form.

Note: USC Form 1 has been withdrawn as a means for the operator to notify the RMA when an aircraft is eligible for monitoring. For post-implementation monitoring, the approval notification by the State Authority to the RMA will fulfil this purpose. However, there may be individual cases where the operator will be requested for airframe details by using USC Form 1.

5. GLOBAL LONG TERM MONITORING REQUIREMENTS

5.1 As indicated in section 3, the monitoring requirement in section 4 of this AIC is aimed at meeting the performance data requirements for the EUR RVSM Post-implementation safety cases, planned for December 2002 and December 2004. However, ICAO already identified the need for ongoing monitoring to ensure the safety objectives continue to be met and to ensure the continued maintenance of height keeping performance of approved aircraft. This longer term monitoring is seen to be essential for the ongoing safety of RVSM operations.

5.2 The detailed global long-term monitoring requirements are still to be established, but they will almost certainly include the need for maintaining up to date performance data thus some periodic re-monitoring will be required. This monitoring requirement will be kept to the minimum subject to meeting the above objectives, to reduce any burden on aircraft operators. It is expected that most data will continue to be obtained during normal operations using the HMUs. However, as it is essential to obtain the performance data to establish the safety of operations, aircraft operators will be required to co-operate when so requested. This co-operation with the RMA will be enforced through the State Authority.

5.3 The EUR RVSM post-implementation monitoring requirement outlined in section 3 is defined in such a way that is not out of conformance with the evolving global long term monitoring requirements.

6. GENERAL

6.1 For more information on post-implementation monitoring and associated subjects, please contact:

[Contact details State Authority]

or

EUROCONTROL (currently acting as RMA in the context of EUR RVSM):
AMN User Support Cell (USC)
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This information, and much more on EUR RVSM aspects, can be found on www.eur-rvsm.com