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The operating procedure for the safety assessment of the RVSM airspaces and the height
keeping performance monitoring

Chapter 1 General rules

1.1. Objectives

This operating procedure is established in order to stipulate the implementation procedure for the safety assessment of the RVSM airspaces and the height keeping performance monitoring in conformity to the convention on international civil aviation, the ICAO RVSM manual “Manual on a 300m (1000ft) vertical separation minimum between FL290 and FL410 inclusive”, the ICAO RMA manual “Operating procedures and practices for regional monitoring agencies in relation to the use of a 300m (1000ft) vertical separation minimum between FL290 and FL410 inclusive” and “the licensing standards procedure for flights in RVSM airspaces”.

1.2. Definitions of the terms used

1. “RVSM (Reduced Vertical Separation Minimum)” refers to the operation procedure which applies 1000ft vertical ATC separations for airspaces between FL290 and FL410.
2. “RMA (Regional Monitoring Agency)” is a regional agency which monitor the safety of the RVSM airspaces that is approved by the ICAO.
3. “Height keeping performance monitoring of the aircraft operating in RVSM Airspaces” refers to a safety evaluation method of RMA which is stipulated in ICAO RVSM manual (Doc 9574) and ICAO RMA manual (Doc 9937).
4. “Japan airspace safety monitoring agency (JASMA)” is a Japanese RMA in which its office is allocated in the flight procedures and airspace program office of the civil aviation bureau’s air traffic control division.
5. “HMU (Height Monitoring Unit)” is an on-ground unit which monitors the height keeping performance of those aircrafts operating in RVSM airspaces. It is equivalent of AGHME (Aircraft Geometric Height Measurement Element) in the United States.

6. The height keeping performance monitoring unit utilizing ADS-B (Automatic Dependent Surveillance Broadcast) is an on-ground unit which monitors the height keeping performance of aircrafts operating in RVSM airspaces with the utilization of ADS-B. Its function is similar to that of HMU.
7. “GMU (GPS-based Monitoring Unit)” is an on-board unit which monitors the height keeping performance of those aircrafts operating in RVSM air spaces under the GPS guidance.
8. “Aircraft group” refers to a group of aircrafts which is manufactured under the same plan in considerations with the overall effect of the elements which may disturb the accuracy of the height keeping performance.
9. “Subjected aircrafts” are those aircrafts in which its height keeping performance is considered to be deteriorating as a result of height keeping performance monitoring.
10. “TVE (Total Vertical Error)” is a vertical variation between the actual pressure altitude in which the aircraft is flying and the pressure altitude that is set by the aircraft crew.
11. “AAD (Assigned Altitude Deviation)” is a variation in altitude between the transponded Mode C altitude and the altitude set by the aircraft crew.
12. “ASE (Altimetry System Error)” is a variation in altitude between the pressure altitude that is designated by the aircraft crew after the rectification by the standard atmospheric pressure and the pressure altitude under the standard atmosphere.
13. “TLS (Target Level of Safety)” is an acceptable safety standard which is agreed under the RMA of the ICAO Asia Pacific Region.

Chapter 2 Conducting the safety evaluation of the RVSM airspaces

2.1. Methods of safety evaluation of airspace

The safety evaluation of the RVSM airspaces will be carried out by JASMA to analyze the RVSM airspaces in the Fukuoka FIR in comparison to the safety target value (5×10^{-9}) based on ICAO Doc 9574. The safety evaluation will be conducted quantitatively by the use of collision risk calculation model.

2.2. Parameters used for the collision risk calculation model

The collision risk calculation model is stipulated in documents such as ICAO Doc 9574 meanwhile the parameters used for calculating the probability of vertical collisions will be based on values that is recommended by the ICAO when RVSM was first introduced. JASMA intends to select parameters that will make calculations for collision risk more precise and more applicable to actual conditions. This will be done by continuously collecting numerous data relating to the height keeping performance from aircrafts operating in the Fukuoka FIR.

Chapter 3 Conducting the height keeping performance monitoring in the RVSM airspaces

3.1. Monitoring the height keeping performance of aircrafts

JASMA will monitor the height keeping performance of aircrafts operating in RVSM airspaces in order to carry out safety evaluation of the RVSM airspaces. Subjected aircrafts for monitoring is as follows.

3.2. Scheduled Flights

The operators of scheduled flights which fly over HMU operated by the CAB in its flight plans may conduct height keeping performance monitoring without prior coordination. This may be carried out by making horizontally straight flight for more than 20NM above HMU as long as the conditions of other air traffic permits its flight.

3.3 Non-scheduled flights

For those operators who does not fly scheduled flights over HMU operated by the CAB in its flight plans, a flight for height keeping performance monitoring may be carried out after a coordination with the air traffic management center. In its coordination, following must also be reported; date of flight, call sign, name of an airport in which the aircraft is departing from and arriving to, route of flights, mode S address and other necessary information. A flight for height keeping performance monitoring may be conducted by making horizontally straight flight for more than 20NM above HMU as long as the conditions of other air traffic permits its flight.

Chapter 4 Standards of height keeping performance for aircrafts operating in RVSM airspaces

4.1. Aircraft group

It is stipulated in documents such as ICAO Doc 9937 that the average absolute ASE value should not exceed 80ft (25m). In addition, it is also stipulated that the results of average absolute ASE value plus 3times the ASE standard deviation value, should not exceed 245ft (75m). In compliance with these standards, JASMA will statistically analyze the results of height keeping performance from the aircraft group.

4.2. Individual aircrafts

- (1) The standards of height keeping performance for aircrafts in the aircraft group based on ICAO Doc 9937 is that the absolute value of TVE or AAD must be less than 300ft (90m) and the absolute value of ASE must not exceed 245ft (75m). A statistical analysis on height keeping performance of aircrafts will be also conducted by JASMA in order to ensure these standards have been met. However, if the absolute value of ASE statistically tends to be more than the threshold value of 200ft (60m), the performance of an aircraft is deemed to be deteriorating and a report will be made as noted in 5.2.2.
- (2) For those aircrafts not in the aircraft group based on ICAO Doc 9937, the standard for absolute ASE value is not to exceed 160ft (50m). The result of height keeping performance monitoring is statistically analyzed by JASMA in order to ensure that the aircrafts are complying with the standard required. If the result of an aircraft statistically tends to exceed the standard requirement, a report will be made as noted in 5.2.2.

Chapter 5 Analyzation and reporting of the result of height keeping performance monitoring

5.1 Analyzation of the results of height keeping performance monitoring

The results of height keeping performance monitoring which is obtained from HMU (operated by either the civil aviation bureau of Japan or foreign RMA), height keeping performance monitoring unit that utilizes ADS-B or GMU will be analyzed by JASMA based on the standards noted in “chapter 4 Standards of height keeping performance for aircrafts operating in RVSM airspaces”.

5.2. Reporting of results

5.2.1 Aircraft group

Upon receiving results on height keeping performance monitoring or results which shows deterioration in height keeping performance from HMU or relative foreign RMA, JASMA will make report as follows.

- (1) After evaluation through meetings such as RMA conference, a report will be made to organizations such as aircraft makers if necessary.

5.2.2 Individual aircrafts

Upon receiving results on height keeping performance monitoring or results which shows deterioration in height keeping performance from HMU or relative foreign RMA, JASMA will make report as follows.

(1) Specified domestic operators

A report will be made to the operator of the aircraft, flight standards division and airworthiness division of the aviation safety and security department in accordance with the “the report on height keeping performance monitoring in RVSM airspaces”

(2) Domestic operators excluding specified domestic operators

A report will be made to the operator of the aircraft, flight standards division and airworthiness division of the aviation safety and security department or to the operations division of the regional civil aviation bureau in accordance with “the report on height keeping performance monitoring in RVSM airspaces”

(3) Others

Reports will be made to the operators not categorized in (1) or (2) and the foreign RMA which has jurisdiction over the operator, in accordance with “the report on height keeping performance monitoring in RVSM airspaces”, if necessary.

5.2.3. Report of results after the second height keeping performance flight

(1) A result within the height keeping performance standards

A report, in form 1-2 (in case of foreign aircraft, form 2-2) will be received from JASMA in accordance with the procedure noted in 5.2.2. In addition, a report in form 1-1 (in case of foreign aircraft, form 2-1) will be received, given the results of the aircraft which has undergone a second height keeping performance flight meets the standard required in 4.2.

(2) A result which exceeds the height keeping performance standards

A report, in form 1-2 (in case of foreign aircraft, form 2-2) will be received from JASMA in accordance with the procedure noted in 5.2.2. Furthermore, another report in form 1-2 (in case of foreign aircraft, form 2-2) will be received, if in case the results of the aircraft which has undergone a second height keeping performance flight exceeds the standard required in 4.2.

RVSM 空域における航空機の高度維持性能監視結果報告書

宛先：(運航者) 殿

JASMA (空域調整整備室)

1. 対象航空機

下記の運航者の対象航空機の高度維持性能の監視結果を報告致します。

運航者	
航空機型式／シリーズ／製造番号	
航空機登録番号／モード S アドレス (16 進数)	
高度維持性能測定場所／年月日／ASE	

2. 高度維持性能監視結果

高度維持性能監視結果を統計的に検証した結果、対象航空機は、ICAO Doc 9937 等に基づく RVSM 空域での航空機の高度維持性能基準値^(注)を満たしています。

^(注)TVE 又は AAD の絶対値が 300 ft (90 m) 未満であること、並びに ASE の絶対値が 245 ft (75 m) を超えないこと。

3. 添付資料

別添のとおり。

CC 宛先：

安全部運航安全課 殿

航空機安全課 殿

地方航空局運用課 殿

RVSM 空域における航空機の高度維持性能監視結果報告書

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高度維持性能測定場所／年月日／ASE	

2. 高度維持性能監視結果

ICAO Doc 9937 等に基づく RVSM 空域での航空機の高度維持性能基準は、TVE 又は AAD の絶対値が 300 ft (90 m) 未満であること、並びに ASE の絶対値が 245 ft (75 m) を超えないことと規定されています。

JASMA では、この性能基準を満たす高度維持性能を統計的に検証するための閾値を ASE の絶対値が 200 ft としています。検証の結果、対象航空機は高度性能の低下の傾向が認められます。適切な措置の後にモニタリングのための飛行計画を立ててください。

3. 添付資料

別添のとおり。

CC 宛先：

安全部運航安全課 殿

航空機安全課 殿

地方航空局運用課 殿

HEIGHT-KEEPING PERFORMANCE IN RVSM AIRSPACE

(Name of RMA or airframe operator)

Japan Airspace Monitoring Agency (JASMA) has been established by the International Civil Aviation Organization (ICAO) Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) to support the safe use of the reduced vertical separation minimum (RVSM) in the airspace of Fukuoka FIR in accordance with guidance published in ICAO Doc 9574, Annex 6 and Annex 11.

JASMA monitors the height keeping performance of aircraft to ensure the continued integrity of RVSM operations and to support State RVSM approval processes.

JASMA verified the monitoring data statistically in relation to the aircraft identified as below. The altimetry system error (ASE) determined for the subject aircraft is compliant with the ICAO requirement that the ASE of an approved aircraft is less than 245 ft in magnitude.

Operator	
Aircraft type/Series/Serial number	
Registration mark/Mode S address (hex)	
Monitoring Measurement(s)/date/ASE	

See attached document.

Yours faithfully,

Japan Airspace Safety Monitoring Agency (JASMA), Japan Civil Aviation Bureau

HEIGHT-KEEPING PERFORMANCE IN RVSM AIRSPACE

(Name of RMA or airframe operator)

Japan Airspace Monitoring Agency (JASMA) has been established by the International Civil Aviation Organization (ICAO) Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) to support the safe use of the reduced vertical separation minimum (RVSM) in the airspace of Fukuoka FIR in accordance with guidance published in ICAO Doc 9574, Annex 6 and Annex 11.

JASMA monitors the height keeping performance of aircraft to ensure the continued integrity of RVSM operations and to support State RVSM approval processes.

To be compliant with international standards, the absolute ASE of an aircraft must be minimized and be no greater than 245 ft. JASMA has set threshold of ASE as absolute value 200 ft for verifying the aircraft height keeping performance statistically to meet the ICAO criteria. The subject aircraft has been monitored by JASMA HMU systems and was found to exhibit ASE values in magnitude greater than 200 ft. Statistics suggest that this measurement indicates that the aircraft may not be compliant with the height-keeping accuracy requirements for RVSM airspace. It is therefore requested that an immediate investigation be undertaken into this discrepancy and that the necessary arrangements be made for a (repeat) measurement at the earliest opportunity, following any rectification or inspection of the altimetry system.

Operator	
Aircraft type/Series/Serial number	
Registration mark/Mode S address (hex)	
Monitoring Measurement(s)/date/ASE	

For a detailed explanation on the height-keeping requirements you may wish to refer to (JAA TGL 6, FAA AC91-RVSM, or other appropriate document).

See attached document.

Thank you for your continued cooperation.

Yours faithfully,

Japan Airspace Safety Monitoring Agency (JASMA), Japan Civil Aviation Bureau