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BRUNEI AIRSPACE WITHIN THE KOTA KINABALU FIR

IMPLEMENTATION OF RVSM POLICY AND PROCEDURES

1. INTRODUCTION

- 1.1 In view of the structure of the Brunei Terminal Control Area, which is situated within the Kota Kinabalu FIR, AIP Supplement 15/2001 dated 04 October issued by Malaysia for Kota Kinabalu FIR applies to Brunei Airspace. A copy is attached for ease of reference.

2. IMPLEMENTATION DATE

- 2.1 The RVSM Policy and procedures will become effective from 1930UTC on 21 February 2002.

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RVSM POLICY AND PROCEDURES IN THE KOTA KINABALU FIR

1.0 Introduction

1.1 The International Civil Aviation Organization (ICAO) Third Asia/Pacific Regional Air Navigation Meeting recommended that Reduced Vertical Separation Minimum (RVSM) should be introduced in the Pacific region after successful implementation in the North Atlantic region. This is due to the significant benefits to be gained by aircraft operators and air traffic services (ATS) providers. ICAO Document 9574, *Manual on Implementation of a 300 m [1 000 ft] Vertical Separation Minimum Between FL 290 and FL 410 Inclusive* contains an explanation of RVSM.

1.2 Benefits to be gained from RVSM include:

- (a) adoption of an ICAO endorsed navigation requirement;
- (b) improved utilization of airspace for ATC conflict resolution;
- (c) fuel savings of \approx 1% for flight closer to optimum cruise altitude; and
- (d) reduction in ground delays.

1.3 The ICAO Asia/Pacific RVSM Task Force has harmonized the basic content of this document. The following policies are addressed in the paragraphs of this document:

<u>Paragraph</u>	<u>Content</u>
2.0	Identification of RVSM Airspace
3.0	Airworthiness and Operational Approval and Monitoring
4.0	ACAS II and Transponder Equipage
5.0	In-flight Procedures Within RVSM Airspace
6.0	Weather Deviation Procedures
7.0	Flight Planning Requirements
8.0	Procedures for Operation of Non-RVSM Compliant Aircraft in RVSM Airspace
9.0	Delivery Flights for Aircraft that are RVSM Compliant on Delivery
10.0	Procedures for Suspension of RVSM

- 11.0 Guidance for Pilot and Controller for Actions in Event of Aircraft System Malfunction or Turbulence Greater than Moderate
- 12.0 Procedures for Air-Ground Communication Failure

2. Identification of RVSM Airspace

- 2.1 Effective 21 February 2002 at 1930 UTC, RVSM airspace is prescribed within the Kota-Kinabalu FIR within controlled airspace between FL310 and FL410 (inclusive). RVSM approved aircraft operating on ATS routes M768 and M754 would be assigned the eastbound levels FL330, FL370 and FL410 or westbound levels FL310, FL350 and FL390 accordingly.

3.0 Airworthiness and Operational Approval and Monitoring

- 3.1 APPROVAL DATE. Operator/aircraft approval by 1 January 2002 will enable air traffic service providers to plan for orderly RVSM implementation.

- 3.2 APPROVAL PROCESS. Operators must obtain airworthiness and operational approval from the State of Registry or State of the Operator, as appropriate, to conduct RVSM operations. On behalf of the Pacific ATS providers, the FAA is maintaining a website containing documents and policy for RVSM approval. The Internet address is: <http://www.faa.gov/ats/ato/rvsm1.htm>

- 3.3 AIRCRAFT MONITORING. Operators are required to participate in the RVSM aircraft monitoring program. This is an essential element of the RVSM implementation program in that it confirms that the aircraft altitude-keeping performance standard is being met. The Asia Pacific Approvals Registry and Monitoring Organization (APARMO) will process the results of monitoring. For further information on RVSM monitoring, the APARMO web site can be accessed by:

- (a) Accessing the "RVSM Documentation" section of the FAA RVSM website and clicking on the link to the APARMO website or
- (b) Using this Internet address: http://www.tc.faa.gov/ataab/act500/rvsm/aparmo_intro.html

- 3.3.1 Monitoring accomplished for other regions can be used to fulfill the monitoring requirements for the Asia/Pacific region. The APARMO will coordinate with other monitoring agencies to access this information. For monitoring services in the Asia/Pacific region, operators should contact the APARMO monitoring contractor as follows:

Phone : +1 202 863 2175
Fax : +1 202 862 2398
Email : monitor@cssiinc.com

(Source Document: IG 91-RVSM/TGL #6, Asia/Pacific Minimum Monitoring Requirements)

4.0 ACAS II and Transponder Equipage

- 4.1 The ICAO Asia/Pacific RVSM Implementation Task Force recommends that those aircraft equipped with ACAS and operated in RVSM airspace be equipped with ACAS II. (TCAS II systems with Version 7.0 incorporated meet ICAO ACAS II standards).
- 4.2 Operators must take action to inform themselves of ACAS II equipage requirements and plan for compliance. ICAO and individual States have established policies requiring ACAS II equipage and schedules for compliance. In addition, the APANPIRG has endorsed early ACAS II equipage in the region.

- 4.3 ICAO Annex 6, Part II, states that, starting 1 January 2000, International General Aviation (IGA) airplanes shall be equipped with a pressure altitude reporting transponder certified by the appropriate State authority as meeting the provisions of Annex 10.

5.0 In-flight Procedures within RVSM Airspace

- 5.1 Before entering RVSM airspace, the pilot should review the status of required equipment (see Appendix 4 of FAA IG 91-RVSM for pilot RVSM procedures). The following equipment should be operating normally:

- (a) two primary altimetry systems;
- (b) one automatic altitude-keeping device; and
- (c) one altitude-alerting device.

- 5.2 The pilot must notify ATC whenever the aircraft:

- (a) is no longer RVSM compliant due to equipment failure; or
- (b) experiences loss of redundancy of altimetry systems; or
- (c) encounters turbulence that affects the capability to maintain flight level.

See Attachment A to this AIP Supplement or Appendix 5 of FAA IG 91-RVSM for pilot and controller actions in contingencies.

- 5.3 **TRANSITION BETWEEN FL's.** During cleared transition between levels, the aircraft should not overshoot or undershoot the assigned FL by more than 150 ft (45 m). (Source Document: 91-RVSM/TGL #6)
- 5.4 **PILOT LEVEL CALL.** Except in an ADS or radar environment, pilots shall report reaching any altitude assigned within RVSM airspace.
- 5.5 **CONTINGENCY PROCEDURES.** The weather deviation procedures in paragraph 6.0 below contain procedures for in-flight contingencies that have been updated for RVSM operations.

6.0 Weather Deviation Procedures in the Kota Kinabalu FIR.

General procedures

- 6.1 The following procedures are intended to provide guidance. All possible circumstances cannot be covered. The pilot's judgment shall ultimately determine the sequence of actions taken and ATC shall render all possible assistance.
- 6.2 If the aircraft is required to deviate from track to avoid weather and prior clearance cannot be obtained, an air traffic control clearance shall be obtained at the earliest possible time. In the meantime, the aircraft shall follow the procedures detailed in paragraph 6.9 below.
- 6.3 The pilot shall advise ATC when weather deviation is no longer required, or when a weather deviation has been completed and the aircraft has returned to the centerline of its cleared route.

- 6.4 When the pilot initiates communications with ATC, rapid response may be obtained by stating "WEATHER DEVIATION REQUIRED" to indicate that priority is desired on the frequency and for ATC response.
- 6.5 The pilot still retains the option of initiating the communications using the urgency call "PAN PAN" to alert all listening parties to a special handling condition, which may receive ATC priority for issuance of a clearance or assistance.
- 6.6 When controller-pilot communications are established, the pilot shall notify ATC and request clearance to deviate from track, advising, when possible, the extent of the deviation expected. ATC will take one of the following actions:
- (a) if there is no conflicting traffic in the horizontal dimension, ATC will issue clearance to deviate from track; or
 - (b) if there is conflicting traffic in the horizontal dimension, ATC will separate aircraft by establishing vertical separation or, if unable to establish vertical separation, ATC shall:
 - i) advise the pilot unable to issue clearance for requested deviation
 - ii) advise pilot of conflicting traffic
 - iii) request pilot's intentions

SAMPLE PHRASEOLOGY:

"Unable (requested deviation), traffic is (call sign, position, altitude, direction), advise intentions."

- 6.7 The pilot will take the following actions:
- (a) Advise ATC of intentions by the most expeditious means available.
 - (b) Comply with air traffic control clearance issued or
 - (c) Execute the procedures detailed in 6.9 below. (ATC will issue essential traffic information to all affected aircraft).
 - (d) If necessary, establish voice communications with ATC to expedite dialogue on the situation

Actions to be taken if a revised air traffic control clearance cannot be obtained

- 6.8 The pilot shall take the actions listed below under the provision that the pilot may deviate from rules of the air (e.g., the requirement to operate on route or track center line unless otherwise directed by ATC), when it is absolutely necessary in the interests of safety to do so.
- 6.9 *If a revised air traffic control clearance cannot be obtained* and deviation from track is required to avoid weather, the pilot shall take the following actions:
- (a) if possible, deviate away from an organized track or route system;
 - (b) establish communication with and alert nearby aircraft by broadcasting, at suitable intervals: flight identification, flight level, aircraft position (including the ATS route designator or the track code) and intentions (including the magnitude of the deviation expected) on the frequency in use, as well as on frequency 121.5 MHz (or, as a back-up, the VHF inter-pilot air-to-air frequency 123.45 MHz).

- (c) watch for conflicting traffic both visually and by reference to ACAS (if equipped);
- (d) turn on *all* aircraft exterior lights (commensurate with appropriate operating limitations);
- (e) for deviations of less than 10NM, aircraft should remain at the level assigned by ATC;
- (f) *for deviations of greater than 10NM*, when the aircraft is approximately 10 NM from track, initiate a level change based on the following criteria:

Route center line track	Deviations greater than 10 NM	Level change
EAST 000-179 magnetic	LEFT RIGHT	<i>DESCEND 300 ft</i> <i>CLIMB 300 ft</i>
WEST 180-359 magnetic	LEFT RIGHT	<i>CLIMB 300 ft</i> <i>DESCEND 300 ft</i>

Note: 6.9 (b) and (c) above calls for the pilot to: broadcast aircraft position and pilot's intentions, identify conflicting traffic and communicate air-to-air with nearby aircraft. If the pilot determines that there is another aircraft at or near the same FL with which his aircraft might conflict, then the pilot is expected to adjust the path of the aircraft, as necessary, to avoid conflict.

- (g) if contact was not established prior to deviating, continue to attempt to contact ATC to obtain a clearance. If contact was established, continue to keep ATC advised of intentions and obtain essential traffic information.
- (h) when returning to track, be at its assigned flight level, when the aircraft is within approximately 10NM of centre line.

7.0 Flight Planning Requirements

7.1 Unless special arrangement is made as detailed below, RVSM approval is required for operators and aircraft to operate within designated RVSM airspace. The operator must determine that the appropriate State authority has granted them RVSM operational approval and they will meet the RVSM requirements for the filed route of flight and any planned alternate routes. The letter "W" shall be inserted in item 10 (Equipment) of the ICAO standard flight plan to indicate that both the aircraft and operator are RVSM approved.

8.0 Procedures for Operation of Non-RVSM Compliant Aircraft in RVSM Airspace

- 8.1 FLIGHT PRIORITY. It should be noted that RVSM approved aircraft will be given priority for level allocation over non-RVSM approved aircraft.
- 8.2 VERTICAL SEPARATION APPLIED. The vertical separation minimum between non-RVSM aircraft operating in the RVSM stratum and all other aircraft is 2,000 ft.
- 8.3 PHRASEOLOGY. Non-RVSM compliant aircraft operating in RVSM airspace should use the phraseology contained in Attachment B.

8.4 CONTINUOUS CLIMB/DESCENT OF NON-COMPLIANT AIRCRAFT THROUGH RVSM AIRSPACE. Non-RVSM compliant aircraft may be cleared to climb to and operate above FL310 or descend to and operate below FL410 provided that they:

- a) Do not climb or descend at less than the normal rate for the aircraft and
- b) Do not level off at an intermediate level while passing through the RVSM stratum.

8.5 SPECIAL COORDINATION PROCEDURES FOR CRUISE OPERATION OF NON-RVSM COMPLIANT AIRCRAFT IN RVSM AIRSPACE. Non-RVSM compliant aircraft may not flight plan between FL310 and FL410 inclusive within RVSM airspace. After special coordination as detailed in 8.5.1 below, the following non-RVSM aircraft may flight plan at RVSM flight levels in the RVSM stratum:

- (a) Is being initially delivered to the State of Registry or Operator (see Paragraph 9.0 for additional details and information); or
- (b) was formally RVSM approved but has experienced an equipment failure and is being flown to a maintenance facility for repair in order to meet RVSM requirements and/or obtain approval; or
- (c) is transporting a spare engine mounted under the wing; or
- (d) is being utilized for mercy or humanitarian purposes; or
- (e) State aircraft (those aircraft used in military, custom and police services shall be deemed state aircraft)

8.5.1 Aircraft operators requesting approval as above shall:

- (a) if departing within Kota Kinabalu FIR, obtain approval from Kota Kinabalu Area Control Centre normally not more than 72 hours and not less than 4 hours prior to intended departure time. The Kota Kinabalu Area Control Centre will provide notification of approval via Telephone, AFTN, FAX or email as appropriate; or
- (b) if transiting Kota Kinabalu FIR, obtain approval from the first RVSM affected Centre. (Note: the first Centre will coordinate with next Centre.)
- (c) Included the "STS/APVD NONRVSM" in Field 18 of the ICAO Flight Plan.

(NOTE: APPROVAL MEANS ABLE TO OPERATE IN THE RVSM STRATUM. AIRCRAFT CRUISING LEVELS WILL BE SUBJECT TO AIR TRAFFIC CONTROL.)

8.5.2 Contact details for approval request are as follows:

Kota Kinabalu Area Control Centre

Telephone : 60088 - 224404
AFTN : WBFCZQZX
FAX : 60088 - 219170

8.5.3 This approval process is intended exclusively for the purposes indicated above and not as a means to circumvent the normal RVSM approval process.

9.0 Delivery Flights for Aircraft that are RVSM Compliant on Delivery.

9.1 An aircraft that is RVSM compliant on delivery may operate in RVSM airspace provided that the crew is trained on RVSM policies and procedures applicable in the airspace and the responsible State issues the operator a letter of authorization approving the operation. State notification to the APARMO should be in the form of a letter, e-mail or fax documenting the one-time flight. The planned date of the flight, flight identification, registration number and aircraft type/series should be included.

10.0 Procedures for Suspension of RVSM

10.1 Air traffic services will consider suspending RVSM procedures within affected areas of the Kota Kinabalu FIR when there are pilot reports of greater than moderate turbulence. Within areas where RVSM procedures are suspended, the vertical separation minimum between all aircraft will be 2,000 ft.

11.0 Guidance for Pilots and Controllers for Actions in the Event of Aircraft System Malfunction or Turbulence Greater than Moderate.

11.1 See Attachment A for guidance in these circumstances.

12.0 Procedures for Air-Ground Communication Failure.

12.1 The air-ground communication failure procedures specified in AIP ENR 1.6 - 3 in conjunction with ICAO PANS-RAC Doc 4444.

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ATTACHMENT A

CONTINGENCY SCENARIOS. The following paragraphs summarize pilot actions to mitigate the potential for conflict with other aircraft in certain contingency situations. They should be reviewed in conjunction with the expanded contingency scenarios detailed on pages (i) to (iv) of this attachment which contain additional technical and operational detail.

Scenario 1: The pilot is: a) unsure of the vertical position of the aircraft due to the loss or degradation of all primary altimetry systems, or b) unsure of the capability to maintain cleared flight level (CFL) due to turbulence or loss of all automatic altitude control systems.

The Pilot should:	ATC can be expected to:
Maintain CFL while evaluating the situation;	
Watch for conflicting traffic both visually and by reference to ACAS, if equipped;	
If considered necessary, alert nearby aircraft by a) making maximum use of exterior lights; b) broadcasting position, FL, and intentions on 121.5 MHz (as a back-up, the VHF inter-pilot air-to-air frequency, 123.45MHz, may be used).	
Notify ATC of the situation and intended course of action. Possible courses of action include:	Obtain the pilot's intentions and pass essential traffic information.
a) maintaining the CFL and route provided that ATC can provide lateral, longitudinal or conventional vertical separation.	a) If the pilot intends to continue in RVSM airspace, assess traffic situation to determine if the aircraft can be accommodated through the provision of lateral, longitudinal, or conventional vertical separation, and if so, apply the appropriate minimum.
b) requesting ATC clearance to climb above or descend below RVSM airspace if the aircraft cannot maintain CFL and ATC cannot establish adequate separation from other aircraft.	b) If the pilot requests clearance to exit RVSM airspace, accommodate expeditiously, if possible. c) If adequate separation cannot be established and it is not possible to comply with the pilot's request for clearance to exit RVSM airspace, advise the pilot of essential traffic information, notify other aircraft in the vicinity and continue to monitor the situation. Notify adjoining ATC facilities/sectors of the situation.

Scenario 2: There is a failure or loss of accuracy of one primary altimetry system (e.g., greater than 200 feet difference between primary altimeters)

The Pilot should
Cross check standby altimeter, confirm the accuracy of a primary altimeter system and notify ATC of the loss of redundancy. If unable to confirm primary altimeter system accuracy, follow pilot actions listed in the preceding scenario.

EXPANDED EQUIPMENT FAILURE AND TURBULENCE ENCOUNTER SCENARIOS.

Operators may consider this material for use in training programs.

Scenario 1: All automatic altitude control systems fail (e.g., Automatic Altitude Hold).

The Pilot should	ATC can be expected to
Initially	
Maintain CFL	
Evaluate the aircraft's capability to maintain altitude through manual control.	
Subsequently	
Watch for conflicting traffic both visually and by reference to ACAS, if equipped.	
If considered necessary, alert nearby aircraft by a) making maximum use of exterior lights; b) broadcasting position, FL, and intentions on 121.5MHz (as a back-up, the VHF inter-pilot air-to-air frequency, 123.45MHz, may be used.)	
Notify ATC of the failure and intended course of action. Possible courses of action include:	
a) maintaining the CFL and route, provided that the aircraft can maintain level.	a) If the pilot intends to continue in RVSM airspace, assess traffic situation to determine if the aircraft can be accommodated through the provision of lateral, longitudinal, or conventional vertical separation, and if so, apply the appropriate minimum.
b) requesting ATC clearance to climb above or descend below RVSM airspace if the aircraft cannot maintain CFL and ATC cannot establish lateral, longitudinal or conventional vertical separation.	b) If the pilot requests clearance to exit RVSM airspace, accommodate expeditiously, if possible. c) If adequate separation cannot be established and it is not possible to comply with the pilot's request for clearance to exit RVSM airspace, advise the pilot of essential traffic information, notify other aircraft in the vicinity and continue to monitor the situation. Notify adjoining ATC facilities/ sectors of the situation.

Scenario 2: Loss of redundancy in primary altimetry systems

The Pilot should	ATC can be expected to
If the remaining altimetry system is functioning normally, couple that system to the automatic altitude control system, notify ATC of the loss of redundancy and maintain vigilance of altitude keeping.	Acknowledge the situation and continue to monitor progress

Scenario 3: All primary altimetry systems are considered unreliable or fail

The Pilot should	ATC can be expected to
Maintain CFL by reference to the standby altimeter (if the aircraft is so equipped).	
Alert nearby aircraft by a) making maximum use of exterior lights; b) broadcasting position, FL, and intentions on 121.5 MHz (as a back-up, the VHF inter-pilot air-to-air frequency, 123.45MHz, may be used).	
Consider declaring an emergency. Notify ATC of the failure and intended course of action. Possible courses of action include:	Obtain pilot's intentions, and pass essential traffic information.
a) maintaining CFL and route provided that ATC can provide lateral, longitudinal or conventional vertical separation.	a) If the pilot intends to continue in RVSM airspace, assess traffic situation to determine if the aircraft can be accommodated through the provision of lateral, longitudinal, or conventional vertical separation, and if so, apply the appropriate minimum.
b) requesting ATC clearance to climb above or descend below RVSM airspace if ATC cannot establish adequate separation from other aircraft.	b) If the pilot requests clearance to exit RVSM airspace, accommodate expeditiously, if possible. c) If adequate separation cannot be established and it is not possible to comply with the pilot's request for clearance to exit RVSM airspace, advise the pilot of essential traffic information, notify other aircraft in the vicinity and continue to monitor the situation. Notify adjoining ATC facilities/sectors of the situation.

Scenario 4: The primary altimeters diverge by more than 200ft (60m)

The Pilot should
Attempt to determine the defective system through established trouble-shooting procedures and/or comparing the primary altimeter display to the standby altimeter (as corrected by the correction cards, if required).
If the defective system can be determined, couple the functioning altimeter system to the altitude-keeping device.
If the defective system cannot be determined, follow the guidance in Scenario 3 for failure or unreliable altimeter indications of all primary altimeters.

Scenario 5: Turbulence (greater than moderate) which the pilot believes will impact the aircraft's capability to maintain flight level.

The Pilot should	ATC can be expected to
Watch for conflicting traffic both visually and by reference to ACAS, if equipped.	
If considered necessary, alert nearby aircraft by: a) making maximum use of exterior lights; b) broadcasting position, FL, and intentions on 121.5 MHz (as a back-up, the VHF inter-pilot air-to-air frequency, 123.45MHz, may be used).	
Notify ATC of intended course of action as soon as possible. Possible courses of action include:	
a) maintaining CFL and route provided ATC can provide lateral, longitudinal or conventional vertical separation.	a) Assess traffic situation to determine if this aircraft can be accommodated through the provision of lateral, longitudinal, or conventional vertical separation, and if so, apply the appropriate minimum.
b) requesting flight level change, if necessary.	b) If unable to provide adequate separation, advise the pilot of essential traffic information and request pilot's intentions. c) Notify other aircraft in the vicinity and monitor the situation Notify adjoining ATC facilities/ sectors of the situation.

ATTACHMENT B

Controller / Pilot Phraseology:

Phraseology	Purpose
(call sign) CONFIRM RVSM APPROVED	Used by the controller to ascertain the RVSM approval status of an aircraft.
NEGATIVE RVSM*	Used by the pilot to report non-RVSM approval status: a) On the initial call on any frequency within the RVSM airspace (controllers shall provide a read-back with this same phrase), and b) In all requests for flight level changes pertaining to flight levels within the RVSM airspace; and c) In all read-backs of flight level clearances pertaining to flight levels within the RVSM airspace. Additionally, except for State aircraft, pilots shall include this RTF phrase to read-back flight level clearances involving the vertical transit through FL 310 or FL 410.
AFFIRM RVSM*	Used by the pilot to report RVSM approval status.
NEGATIVE RVSM STATE AIRCRAFT*	Used by the pilot of a non-RVSM approved State aircraft to report non-RVSM approval status in response to the RTF phrase (call sign) CONFIRM RVSM APPROVED .
(call sign) UNABLE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN [or DESCEND TO, or CLIMB TO] FLIGHT LEVEL (number)	Used by Deny ATC clearance into the RVSM airspace.
UNABLE RVSM DUE TURBULENCE*	Used by the pilot to report when severe turbulence affects the aircraft's capability to maintain the height-keeping requirements for RVSM.
UNABLE RVSM DUE EQUIPMENT*	Used by the pilot to report that the aircraft's equipment has degraded below the Minimum Aircraft System Performance Specification (MASPS) required for flight within the RVSM airspace.
READY TO RESUME RVSM*	Used by the pilot to report the ability to resume operations within the RVSM airspace after an equipment or weather-related contingency.
REPORT ABLE TO RESUME RVSM	Used by the controller to confirm that an aircraft has regained its RVSM approval status or to confirm that the pilot is ready to resume RVSM operations.

* indicates a pilot transmission