International Civil Aviation Organization

Middle EastRegional Monitoring Agency Board

Thirteenth Meeting (MIDRMA Board/13)
(Bahrain, 9 –12 March 2014)

Agenda Item 5: MIDRMA Manual

MIDRMA MANUAL

(Presented by MIDRMA)

SUMMARY

This working paper presents the final version of the Draft MIDRMA Manual (1.1) for review and endorsement by the meeting.

Action by the meeting is at paragraph 3.

REFERENCES

- MIDRMA Board/12 Report

1. INTRODUCTION

1.1 The MIDRMA Manual Version 1.1 is available for review and endorsement by the MIDRMA Board members. The attached Draft Manual Version 1.1 to this working paper is considered to be the final version which was first developed by the ICAO MID Regional Office and modified by the MIDRMA.

2. DISCUSSION

2.1 The Meeting may wish to note that MIDRMA Board/11 meeting agreed that the Draft MIDRMA Manual (V0.3) be further reviewed and finalized by the MIDRMA and the ICAO MID Regional Office, with the objective to present the next version of the Manual to MIDRMA Board/12 meeting.

2.2 The MIDRMA Board/12 meeting reviewed the MIDRMA Manual version 1.0 and agreed that some amendments/fine tuning are still required. Accordingly, the meeting agreed that after final review by the MIDRMA and the ICAO MID Regional Office, taking into consideration the outcome of the MIDRMA Board/12 meeting, the final version of the MIDRMA Manual be posted on a restricted page of the MIDRMA website: www.midrma.com.

2.3 The MIDRMA amended/added the following paragraphs/appendices in version 1.1 (Some paragraphs must be amended by the MIDRMA Board meeting):

Para. 2.4: to add Libya, Qatar and Sudan.

Para. 2.9: MIDRMA Funding Mechanism.

Para. 3.15: Conclusion 13/64 added, concerning Report of Large Height Deviation (LHD).

Para. 4.2: Amended to reflect the new MIDRAS software.

Appendix K: Rearranged to add sample of the MMR Table.

Appendix L: Rearranged to add sample letters to State Authorities concerning the RVSM status of aircraft operator.

Appendix M: Rearranged to add sample letters to aircraft operator concerning observation of high ASE.

3. ACTION BY THE MEETING

3.1 The meeting is invited to review, update as necessary and endorse the MIDRMA Manual Version 1.1 at **Appendix A** to this working paper.

INTERNATIONAL CIVIL AVIATION ORGANIZATION

MANUAL OF THE MIDDLE EAST REGIONAL MONITORING AGENCY (MIDRMA)

MIDRMA MANUAL

(Version 1.1)

March 2014

DOCUMENT CHANGE RECORD

The following table records the complete history of the successive Versions/editions of the present document.

Manual Version Control

Version	Date	Author	Change Description
0.1	Oct. 2008	MIDRMA	Draft Version presented for review by the MIDRMA Board/7 meeting
0.2	May 2009	MIDRMA	Updated Draft Version presented for review by the MIDRMA Board/8 meeting
0.3	Sep. 2011	MIDRMA	Updated Draft Version presented for review by the MIDRMA Board/11 meeting
1.0	Dec 2012	MIDRMA	Released Version endorsed by MIDRMA Board 12 meeting.
1.1	March 2014	MIDRMA	Updated Version presented for review by the MIDRMA Board/13 meeting

MIDRMA MANUAL

FOREWORD

The Manual of the Middle East Regional Monitoring Agency (MIDRMA) was initially prepared by the ICAO Secretariat and updated by the MIDRMA and adopted by the MIDRMA Board and MIDANPIRG. Its purpose is to provide, for easy reference of interested parties, a consolidation of material related to the administrative management, membership, funding mechanism of the MIDRMA, as well as its activities related to the sustained RVSM safety assessment and associated requirements for the provision of data. It contains the Terms of Reference (TOR) of the MIDRMA Board and a number of other provisions approved by the MIDRMA Board and MIDANPIRG.

A Table of Contents is provided which serves also as a subject index and as a checklist for the current pages.

The MIDRMA Manual will be distributed to the Members and Observers of the MIDRMA Board and to other States and International Organizations participating in meetings, contributing to, or having interest in the work of the MIDRMA.

Contents

EXPLANATION OF TERMS

The following definitions are intended to clarify specialized terms used in this document.

Aberrant aircraft. Aircraft which exhibit measured height-keeping performance that is significantly different from the core height-keeping performance measured for the whole population of aircraft operating in RVSM airspace.

Aircraft type group. Aircraft are considered to be members of the same group if they are designed and assembled by one manufacturer and are of nominally identical design and build with respect to all details that could influence the accuracy of height-keeping performance.

Altimetry system error (ASE). The difference between the altitude indicated by the altimeter display, assuming a correct altimeter barometric setting, and the pressure altitude corresponding to the undisturbed ambient pressure.

Altimetry system error stability. Altimetry system error for an individual aircraft is considered to be stable if the statistical distribution of altimetry system error is within agreed limits over an agreed period of time.

Altitude. The vertical distance of a level, point or an object considered as a point, measured from mean sea level (MSL).

Assigned altitude deviation (AAD). The difference between the transponder Mode C altitude and the assigned altitude/flight level.

Automatic altitude-control system. A system that is designed to automatically control the aircraft to a referenced pressure altitude.

Collision risk. The expected number of mid-air aircraft accidents in a prescribed volume of airspace for a specific number of flight hours due to loss of planned separation.

Exclusionary RVSM airspace. Airspace in which flight cannot be planned by civil aircraft which do not hold a valid RVSM approval from the appropriate State authority.

Flight level. A surface of constant atmospheric pressure which is related to a specific pressure datum, 1013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

Note 1. – A pressure type altimeter calibrated in accordance with the standard atmosphere:

a) when set to a QNH altimeter setting, will indicate altitude;

b) when set to a QFE altimeter setting, will indicate height above the QFE reference datum;

c) when set to 1013.2 hPa, may be used to indicate flight levels.

Note 2.– The terms "height" and "altitude, used in Note 1 above, indicate altimetric rather than geometric heights and altitudes.

Flight technical error (FTE). The difference between the altitude indicated by the altimeter display being used to control the aircraft and the assigned altitude/flight level.

Height. The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

Height-keeping capability. Aircraft height-keeping performance that can be expected under nominal environmental operating conditions with proper aircraft operating practices and maintenance.

Height-keeping performance. The observed performance of an aircraft with respect to adherence to flight crew prescribed flight level. This includes both technical and operational errors.

Large Height deviation. A deviation of 90m (300ft) or more in magnitude from the cleared flight level.

Non-compliant aircraft. An aircraft configured to comply with the requirements of the RVSM MASPS which, through height monitoring, is found to have a total vertical error (TVE) or an assigned altitude deviation (AAD) of 90 m (300 ft) or greater, or an altimetry system error (ASE) greater than 75 m (245 ft) .

Non-exclusionary RVSM airspace. Airspace where a vertical separation of 300 m (1 000 ft) is applied between RVSM-approved aircraft, but in which flight may be planned by civil aircraft that do not hold a valid RVSM approval from the appropriate State authority. In such airspace, a vertical separation of 600 m (2 000 ft) must be applied between any non-RVSM approved aircraft and all other aircraft.

Occupancy. A parameter of the collision risk model which is twice the number of aircraft proximate pairs in a single dimension divided by the total number of aircraft flying the candidate paths in the same time interval.

Operational error. Any vertical deviation of an aircraft from the correct flight level as a result of incorrect action by ATC or the flight crew.

Overall risk. The risk of collision due to all causes, which includes the technical risk (see definition) and the risk due to operational errors and in-flight emergencies.

Passing frequency. The frequency of events in which two aircraft are in longitudinal overlap when travelling in the same or opposite direction on the same route at adjacent flight levels and at the planned vertical separation.

RVSM Airworthiness a**pproval**. The process by which the State authority ensures that aircraft meet the RVSM minimum aviation system performance specification (MASPS). Typically, this would involve an operator meeting the requirements of the aircraft manufacturer service bulletin for the aircraft and having the State authority verify the successful completion of this work.

RVSM approval. The term is used synonymously with RVSM operational approval.

RVSM Operational approval. The process by which the State authority ensures that an operator meets all the requirements for operating aircraft in RVSM airspace. RVSM Airworthiness approval is a prerequisite for Operational approval.

Target level of safety (TLS). A generic term representing the level of risk which is considered acceptable in particular circumstances.

Technical risk. The risk of collision associated with aircraft technical height-keeping performance, which specifically refers to the performance affected by the avionics of the aircraft, not the flight crew.

Total vertical error (TVE). The vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level).

Track. The projection on the earth's surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from North (true, magnetic, or grid).

Vertical separation. The spacing provided between aircraft in the vertical plane.

Vertical separation minimum (VSM). VSM is documented in the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) as being a nominal 300 m (1 000 ft) below FL 290 and 600 m (2 000 ft) above FL 290 except where, on the basis of regional agreement, a value of less than 600 m (2 000 ft) but not less than 300 m (1 000 ft) is prescribed for use by aircraft operating above FL 290 within designated portions of the airspace.

LIST OF ACRONYMS

AAD	Assigned altitude deviation
ACAS	Airborne collision avoidance system
ADR	Altitude deviation report
ACC	Area control center
ASE	Altimetry system error
ATC	Air traffic control
ATS	Air traffic services
CFL	Cleared flight level
CFR	Coordination failure report
CMA	Central Monitoring Agency
CRM	Collision risk model
FTE	Flight technical error
GMS	GPS-based monitoring system
GMU	GPS-based monitoring unit
GPS	Global positioning system
HF	High frequency
HMU	Height monitoring unit
JAA	Joint Aviation Authorities
LHD	Large Height Deviation
MASPS	Minimum aircraft system performance specification
MIDRAS	Middle East Risk Assessment Software
MIDRMA	Middle East Regional Monitoring Agency
MMR	Minimum Monitoring Requirements
RMA	Regional Monitoring Agency
RVSM	Reduced vertical separation minimum
SD	Standard deviation
SMR	Safety monitoring report
SSR	Secondary surveillance radar
TD	Traffic data
TLS	Target level of safety
TVE	Total vertical error
VSM	Vertical separation minimum

1 INTRODUCTION

1.1 Monitoring of aircraft height-keeping performance was one of the underlying assumptions of the safety studies on which RVSM was based. In all regions where RVSM has been implemented, Regional Monitoring Agencies (RMAs) have been established by the appropriate Planning and Implementation Regional Groups (PIRGs) to carry out this function.

1.2 Since the implementation of RVSM in the MID Region with effect from 27 November 2003 and until 1 June 2004, the United Arab Emirates provided full support both financial and technical to the activities of the Middle East Central Monitoring Agency (MECMA), in monitoring the height-keeping performance of aircraft operating in RVSM airspace in the MID Region. RVSM was successfully implemented in the FIRs/UIRs of eleven (11) MID States, i.e.: Bahrain, Egypt, Iran, Jordan, Kuwait, Lebanon, Oman, Saudi Arabia, Syria, UAE and Yemen.

1.3 After the closure of MECMA, MIDANPIRG/9 held in Cairo, Egypt, from 11 to 15 April 2005, under Conclusion 9/13 agreed that the Middle East Regional Monitoring Agency (MIDRMA) be established for carrying out RVSM and eventually, RNP and RNAV related duties and responsibilities in the MID Region as soon as possible and developed an Action Plan for the setup of the MIDRMA.

1.4 The MIDRMA/1 meeting held in Cairo, 14-15 June 2005, under Decision 5, agreed to the establishment of the MIDRMA Board, which agreed during its first meeting held in Cairo, 5-6 September 2005 that Bahrain hosts the MIDRMA. The meeting agreed also on the measures to be taken for the initial set up and management of the MIDRMA.

1.5 The MIDRMA/1 meeting and the MIDRMA Board/1 meeting further updated the initial action plan developed by MIDANPIRG/9 related to the establishment of the MIDRMA. All issues pertaining to the modalities, organizational structure and funding mechanism of the MIDRMA have been discussed, which lead to the establishment of the MIDRMA in Bahrain, effective 24 November 2005, with the help of Eurocontrol and based on the offer made by Bahrain to establish and host the MIDRMA, providing the required resources and ensuring the administrative management (provision and management of Staff). Bahrain offered to pay for the set-up of the MIDRMA without waiting for MID States' contributions, provided that Bahrain recover the cost through the agreed funding mechanism.

1.6 Based on the above, MIDANPIRG/10 agreed to the following Conclusion emanating from the MIDRMA Board:

CONCLUSION 10/28: INITIAL SET UP AND ADMINISTRATIVE MANAGEMENT OF THE MIDRMA

That,

a) Bahrain pays for the initial set up of the MIDRMA without waiting for MID States contributions and the cost is recovered through the agreed funding mechanism, in coordination with the ICAO Technical Cooperation Bureau; and

b) Bahrain is responsible for the administrative management of the MIDRMA.

1.7 The purpose of this Manual is to provide a set of working principles and information related to the functions and responsibilities of MIDRMA, it is not intended to provide exhaustive guidance of MIDRMA operation. Information on what is required by an RMA is to be found in ICAO Docs 9574 and 9937 along with what is required from the MIDRMA during each phase of the introduction of RVSM and thereafter.

2 MIDRMA PROJECT

2.1 MIDANPIRG/10, under Decision 10/29, agreed to the establishment of the MIDRMA Board as follows:

DECISION 10/29: ESTABLISHMENT OF THE MIDRMA BOARD

That,

a) a MIDRMA Board is established with Terms of Reference (TOR) as at Appendix 5.3J to the Report on Agenda Item 5.3; and

b) the MIDRMA Board is to be composed of a focal point nominated by each Member State.

2.2 An updated version of the Terms of Reference of the MIDRMA Board is at **Appendix A**.

2.3 With a view to resolve the legal issues related to the membership, funding, duties and responsibilities of the MIDRMA, the Memorandum of Agreement (MOA) at **Appendix B**, has been signed initially by the ten (10) participating States, i.e.: Bahrain, Egypt, Iran, Jordan, Lebanon, Kuwait, Oman, Saudi Arabia, Syria and Yemen.

2.4 Taking into consideration the tremendous efforts deployed by UAE in the preparation for the successful and safe implementation of RVSM in the MID Region, MIDANPIRG/10, under Conclusion 10/30 and based on an offer from the MIDRMA Board, invited UAE to join the MIDRMA Project being exempted from the payment of contributions for the first ten (10) years of operation of the MIDRMA. Accordingly, and further to the follow-up actions taken by the ICAO MID Regional Office, UAE joined officially the MIDRMA Project on 10 June 2008 and signed the MIDRMA Memorandum of Agreement (MOA) on 21 October 2008, as reflected at **Appendix B**, has. Accordingly, MIDANPIRG/11 agreed to the following Conclusion which replaces and supersedes MIDANPIRG/10 Conclusion 10/30:

CONCLUSION 11/17: MEMBERSHIP OF THE MIDRMA

That,

a) Bahrain, Egypt, Iran, Jordan, Kuwait, Lebanon, Oman, Saudi Arabia, Syria, Yemen and UAE committed themselves to participate in the MIDRMA project, through the signature of the Memorandum of Agreement (MOA); and

b) taking into consideration the tremendous efforts deployed by UAE in the preparation for the successful and safe implementation of RVSM in the MID Region, UAE is exempted from the payment of contributions to the MIDRMA for the first ten (10) years of operation (up-to end of 2015).

2.5 With a view to clarify and define exactly the support functions provided by ICAO in the MIDRMA Project, a Custodian Agreement between ICAO, the MIDRMA Board and Bahrain was signed by the ICAO Secretary General, the Under Secretary for Civil Aviation Affairs of Bahrain and the MIDRMA Board Chairman (on behalf of the MIDRMA participating States), as at **Appendix C**.

2.6 Based on the above MIDANPIRG/10 agreed to the following Conclusion related to the MIDRMA Project:

CONCLUSION 10/32: MIDRMA PROJECT

That,

a) the MOA at Appendix 5.3G to the Report on Agenda Item 5.3 constitute the legal document related to the establishment, funding and management of the MIDRMA; and;

b) the Custodian Agreement between ICAO, the MIDRMA Board and Bahrain at Appendix 5.3H to the Report on Agenda Item 5.3, signed by the ICAO Secretary General, the Under Secretary for Civil Aviation Affairs of Bahrain and the MIDRMA Board Chairman on behalf of the MIDRMA participating States, represents the legal document which describes the support functions provided by ICAO in the MIDRMA project

Funding Mechanism:

2.7 The MIDRMA/1 meeting held in Cairo, from 14 to 15 June 2005 recognized that the organizational structure and funding mechanism of the MIDRMA are key issues, which must be resolved between the MID States before further progress can be made. Accordingly, the meeting agreed that it is better to start with a "simple" funding mechanism, which could be refined once the MIDRMA is established and operational, based on more up to date statistics and data. Therefore, the MIDRMA Board agreed that the funding mechanism for the first year of operation of the MIDRMA be based on contributions from the ten (10) participating States on equal share basis.

2.8 The MIDRMA Board/3 meeting held in Muscat, Oman, from 24 to 25 November 2006, noted that the directives on global approach to cost recovery of RMAs did not mention a specific funding mechanism, nevertheless the issue of RMA cost sharing arrangements was left to the PIRGs decision. Taking into consideration the characteristics of the MID Region and its areas of major flows, a new MIDRMA funding mechanism has been agreed upon and accordingly the MIDRMA participating States were divided into two categories:

- **Category 1:** Bahrain, Egypt, Iran, Oman and Saudi Arabia will be paying 15% each of the yearly total cost of operation of the MIDRMA, and

- **Category 2:** Jordan, Kuwait, Lebanon, Syria and Yemen will be paying 5% each of the yearly total cost of operation of the MIDRMA.

2.9 Based on the above, MIDANPIRG/10 agreed to Conclusion 10/33 which was superseded by the following MIDANPIRG/12 Conclusion:

CONCLUSION 12/12: MIDRMA FUNDING MECHANISM

That,

a) the activities of the MIDRMA be ensured through contributions from all MIDRMA Member States, which could be recovered in accordance with ICAO Policies on charges for Airports and Air Navigation Services (Doc 9082), in coordination with IATA;

b) the MIDRMA Member States pay their contributions on a yearly basis not later than 1 November of each year based on the invoices issued by ICAO;

c) ICAO ensure that the year of contribution is clearly indicated in the

invoices related to the MIDRMA Project;

d) the annual amounts to be paid by the MIDRMA Member States are, as follows:

i) Bahrain, Egypt, Iran, Oman and Saudi Arabia annual contribution is US$ 30,000 each; and

ii) Iraq, Jordan, Kuwait, Lebanon, Syria and Yemen annual contribution is US$ 10,000 each;

e) UAE is exempted from the payment of contributions to the MIDRMA for the first ten (10) years of operation (up-to end of 2015);

f) the MIDRMA Member States comply with the payment instructions contained in the invoices sent by ICAO HQ (Project code, fund number, invoice number, Bank information, etc);

g) the budget estimate for the MIDRMA operation for each year be prepared/approved by the MIDRMA Board before 31 May of previous year;

h) in case a MIDRMA Member State does not pay the contribution to the MIDRMA Project in a timely manner, the MIDRMA Board might consider to take penalty measures against this State (exclusion from the MID RVSM Safety Monitoring Report, review of the Membership, etc);

i) the MIDRMA Board Chairman, in compliance with the Custodian Agreement and based on the agreed funding mechanism and the estimation of the yearly operating budget of the MIDRMA, be delegated the authority to certify on behalf of the MIDRMA Member States the requests for advance payment from the MIDRMA account managed by ICAO HQ to the MIDRMA Bank account in Bahrain, as decided by the MIDRMA Board;

j) the bills related to the MIDRMA expenses be certified by the MIDRMA Board Chairman and reviewed by the MIDRMA Board at each of its meetings;

k) the MIDRMA funding mechanism be revised by the MIDRMA Board when necessary.

3 RVSM SAFETY ASSESSMENT ACTIVITY

General Requirements

3.1 Implementation of RVSM should be based on a safety assessment, demonstrating that RVSM safety objectives have been satisfied. In accordance with the guidance material contained in the ICAO Manual on implementation of RVSM (Doc 9574), the RVSM safety objectives are set for both technical risk and overall risk as follows:

Safety objective for technical risk:

3.2 Technical risk is the risk of collision associated with aircraft height-keeping performance. Risk associated with operational errors (e.g. controller/pilot errors) and in-flight contingencies is not included.

3.3 The RVSM safety objective for technical risk is a TLS of 2.5×10^{-9} fatal accidents per aircraft flight hour. This value for technical risk was used to derive the global height-keeping performance specification and the global height-keeping performance specification.

Safety objective for overall risk:

3.4 Overall risk is the risk of collision due to all causes, which includes the technical risk and all risk due to operational errors and in-flight contingencies, such as controller/pilot errors, height deviations due to emergency procedures, and turbulence.

3.5 The RVSM safety objective for overall risk should be set by regional agreement.

Standards for Establishment and Operation of an RMA

3.6 Reference is made to Annex 11 para. 3.3.5.1, "*for all airspace where a reduced vertical separation minimum of 300 m (1 000 ft) is applied between FL 290 and FL 410 inclusive, a programme shall be instituted, on a regional basis, for monitoring the height-keeping performance of aircraft operating at these levels, in order to ensure that the implementation and continued application of this vertical separation minimum meets the safety objectives. The coverage of the height-monitoring facilities provided under this programme shall be adequate to permit monitoring of the relevant aircraft types of all operators that operate in RVSM airspace*".

3.7 Recognizing the safety oversight responsibilities necessary to support the implementation and continued safe use of RVSM, the following standards apply to any organization intending to fill the role of an RMA:

a) the organization must receive authority to act as an RMA as the result of a decision by a State, a group of States or a regional planning group, or by regional agreement;
b) the organization acting as an RMA should have personnel with technical skills and experience to carry out the following main functions:
    i) establish and maintain a database of State RVSM approvals,
    ii) monitor height-keeping performance,
    iii) conduct safety and readiness assessments,
    iv) monitor operator compliance with State approval requirements after RVSM implementation, and
    v) initiate necessary remedial actions if RVSM requirements are not met.

MIDRMA Duties and Responsibilities

3.8 The duties and responsibilities of the MIDRMA are at **Appendix D.**

3.9 One of the important MIDRMA duties and responsibilities is to liaise and data exchange with other Regional Monitoring Agencies to harmonise implementation strategies, the list of all Flight Information Regions and Responsible Regional Monitoring Agency are at **Appendix E and F.**

MID Region safety assessment activity

3.10 The RVSM pre-implementation safety assessment for the MID Region was carried out in 2003 by MECMA.

3.11 The first RVSM post-implementation safety assessment was carried out by the MIDRMA in 2007. The safety assessment was based on three safety objectives endorsed by MIDANPIRG/12 , through the following Conclusion:

> ***CONCLUSION 12/16: MID RVSM SAFETY OBJECTIVES***
>
> *That, the safety assessment of RVSM operations in the MID Region be based on the following safety objectives:*
>
> *a)* ***Safety Objective 1****: The risk of collision in the MID RVSM airspace due solely to technical height-keeping performance meets the ICAO Target Level of Safety (TLS) of* $\mathbf{2.5 \times 10^{-9}}$ *fatal accidents per flight hour;*
>
> *b)* ***Safety Objective 2****: The overall risk of collision due to all causes which includes the technical risk and all risk due to operational errors and in-flight contingencies in MID RVSM airspace meets the ICAO overall TLS of* $\mathbf{5 \times 10^{-9}}$ *fatal accidents per flight hour; and*
>
> *c)* ***Safety Objective 3****: address any safety-related issues raised in the SMR by recommending improved procedures and practices; and propose safety level improvements to ensure that any identified serious or risk-bearing situations do not increase and, where possible, that they decrease. This should set the basis for a continuous assurance that the operation of RVSM will not adversely affect the risk of en-route mid-air collision over the years.*

3.12 The MIDRMA is responsible for the development of the RVSM Safety Monitoring Reports (SMR), which should be presented to MIDANPIRG at each meeting in order to assess the RVSM safety objectives and demonstrate if they have been satisfied or not and propose preventive and corrective measures in order to improve the situation.

3.13 The MIDRMA is responsible for the identification of the exact type and format of data necessary for performing collision risk calculations and the development of the appropriate forms, accordingly. States are requested to provide the required data in a timely manner. The data includes, but is not necessarily limited to:

a) approval of operators and aircraft for RVSM operations (monthly);

b) altitude deviations of 300 ft or more (monthly);

c) ATC/ATC coordination failures (monthly); and

d) traffic data (as requested by the MIDRMA);

3.14 MIDANPIRG/10, under Conclusion 10/35, agreed that States not providing the required data to the MIDRMA, in accordance with the requirements of safety monitoring agencies, should be included in the list of air navigation deficiencies. MIDANPIRG/11 re-iterated the importance of provision of required data to the MIDRMA in a timely manner and continuous basis and agreed to the following Conclusion which replaces and supersedes MIDANPIRG/10 Conclusions 10/35 and 10/40:

CONCLUSION 11/21: SUSTAINED RVSM SAFETY ASSESSMENT ACTIVITY IN THE MID REGION

That, considering the on-going requirement for RVSM safety assessment in the MID Region:

a) the MIDRMA is responsible for the development of the RVSM Safety Monitoring Reports (SMR);

b) the MIDRMA determine the exact type and format of data necessary for performing collision risk calculations and inform States accordingly;

c) States provide the required data in a timely manner. The data will include, but not necessarily be limited to:

i) approval of operators and aircraft for RVSM operations (on monthly basis);
ii) Altitude Deviation Reports (ADR) for deviations exceeding 300 ft (on monthly basis);

iii) Coordination Failure Reports (CFR) (on monthly basis); and
iv) traffic data (as requested by the MIDRMA Board);

d) Bahrain, Kuwait, Oman, Saudi Arabia, UAE and Yemen are committed to provide their radar data to the MIDRMA, as, when and where required; and

e) States not providing the required data to the MIDRMA on a regular basis and in a timely manner:

i) be included in the MIDANPIRG List of air navigation deficiencies; and
ii) might not be covered by the RVSM SMRs.

3.15 Reference to the Conclusion 11/12 above point c, ii and iii has been replaced by MIDANPIRG/13 Conclusion 13/64 below:

CONCLUSION 13/64: REPORTING OF LARGE HEIGHT DEVATIONS (LHD)

That, in order to simply and standardise the reporting of Altitude/Height Deviations and coordination failures, in accordance with ICAO Doc 9937:

a) the form at Appendix 5.2A to the Report on Agenda item 5.2 be used for the reporting of Altitude/Height Deviations and Coordination Failures; and

b) the monthly submission of LHD replaces the monthly submission of ARDs and CFRs.

3.16 The forms for reporting flight data, the Large Height Deviation, Coordination failures and the altitude deviation reports at **Appendices F, G and I**, respectively are also available on the MIDRMA website: www.midrma.com

Requirements for Height Monitoring

3.16 The ICAO Annex 6 Part 1 & 2 – Operation of Aircraft that detail global RVSM long-term monitoring requirements that became effective on 18 November 2010. these requirements as stated in Annex 6 are:

7.2.7 the State of the Operator that has issued an RVSM approval to an operator shall establish a requirement which ensures that two aeroplanes of each aircraft type grouping of the operator have their height keeping performance monitored, at least once every two years or within intervals of 1,000 flight hours per aeroplane, whichever period is longer. If an operator aircraft type grouping consists of a single aeroplane, monitoring of that aeroplane shall be accomplished within the specified period.

3.16.1 The MIDRMA has considered the new requirements for long-term height monitoring in some detail, and has agreed that the RVSM Minimum Monitoring Requirements (MMRs) that have been adopted for global application by all ICAO Regional Monitoring Agencies (RMAs) should be the basis for implementation of the Annex 6 requirements. MIDANPIRG/14 agreed that the region RVSM MMR conditions at **Appendix J** should be posted on the MIDRMA website and included in the MIDRMA Manual.

3.16.2 This activity is termed as monitoring operator compliance with State approval requirements by issuing a periodic Minimum Monitoring Requirements (MMR) for all aircraft operator that are registered in the Middle East region.

3.16.3 The MIDRMA will require two sources of information to generate the MMR tables: a listing of the operators, aircraft and registration marks conducting operations in the airspace (valid State RVSM approval list; and the database of height monitoring results and since there is no Height Monitoring Unit available in the MID region, the MIDRMA uses the HMU results from other RMAs such as Euro Control, NATCMA RMAs etc..

3.16.4 As a minimum, the MIDRMA will conduct compliance monitoring of the complete airspace for at least every six month period or whenever is required by any member State authority, sample MMR table is shown in **Appendix K.**

3.16.5 When conducting compliance monitoring, the filed RVSM approval status shown on the flight plan of each traffic movement should be compared to the database of State RVSM approvals. When a flight plan shows an RVSM approval not confirmed in the database, the

appropriate State authority should be contacted for clarification of the discrepancy. The MIDRMA should use a letter similar in form to that shown in **Appendix L** for the official notification. The State authority has the responsibility to take any action should an operator be found to have filed a false declaration of State RVSM approval.

3.16.6 The MIDRMA will immediately act if the height-keeping performance monitoring results deducted for individual aircraft (ASE in excess of the 245 ft limit), the MIDRMA should notify the aircraft operator as well as the State authority granting the aircraft's RVSM approval. **Appendix M** contains a sample of notification letter.

4 MIDRMA DATA ANLYSIS SOFTWARES

4.1 Radar Data Acquisition (RADAC)

4.1.1 Introduction

Radar Data Acquisition (RADAC) software with the option of Passing Frequency System (PFS) are Providing a comprehensive acquisition and analysis support for radar management and monitoring. Acquisitions and calculations are carried out with the aid of known radar station parameters and other recording options already residing in a database or by manually entered the required data. The results are presented geographically, facilitating monitoring, analysis and decision making.

Due to the modular architecture of the software future options are easily added making it easy to perform all radar related tasks in one dedicated piece of software. Figure 1; provide a framework and operational understanding of RADAC system overview.

The RADAC/PFS system is used for recording, analysis and local re-play of raw, recorded and processed radar data. The main applications of the system are:

- Recording and analysis of radar data.
- Evaluate the performance of a radar station.
- RVSM analysis, i.e. the PFS option.

RADAC/PFS is a flexible system, composed of several modules, which can be combined and tailored for many specific uses.

RADAC/PFS currently supports the following input message formats:

AIRCAT500 specifies all characteristics of the output standard, used by Radar Data Processors to transfer radar information to Display Processors. The content is consistent with the pattern reference DI-E-30141 defined by the DOD.

ASTERIX Cat034 and ASTERIX Cat048 are standards specified by Eurocontrol. They contain message structure for the transmission of monoradar service messages, from a radar station (conventional SSR, monopulse, Mode S, conventional primary radar or primary radar using MTD processing), to one or more SDP Systems.

RDIF is a standard specified by the Civil Aviation Authority of the United Kingdom. It defines the RDIF format devised by the CAA for the transmission of digital radar data.

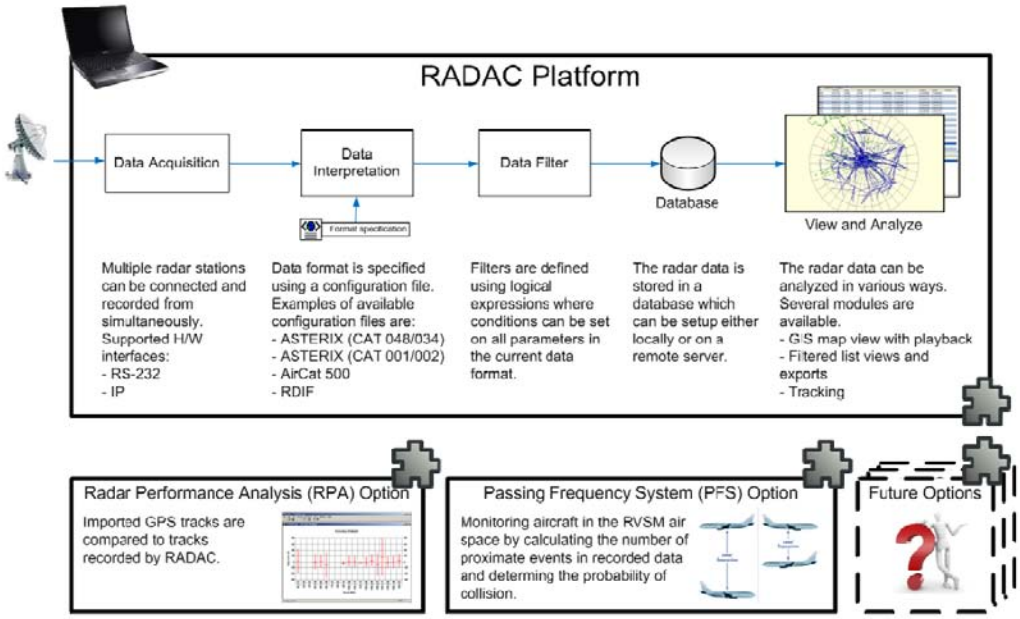


Figure 1: RADAC, System Overview.

4.1.2 RADAC Platform

The current RADAC platform consists of the following:

- Basic radar data processing and analysis functions, e.g. filtering, tracking and smoothed tracking.
- Generic list views for received data and map support.
- Calculation and analysis module: Radar Performance Analysis (**RPA**). This is the basic functionality within RADAC supporting monitoring, analysis and evaluation of radar performance, e.g. radar probability of detection and radar accuracy.
- Calculation and analysis module: Passing Frequency System (PFS). This module supports the specific purpose of monitoring and analyzing RVSM regulated air space by calculating proximate events in recorded data and providing data for subsequent determination of the probability of collision.

4.1.3 RADAC Data Acquisition

RADAC can be configured to receive data using two different interfaces: ***Figure 2***

- Synchronous RS-232 (e.g. HDLC) via a serial-to-Ethernet adapter.
- UDP/IP

Figure 2 – Data Acquisition

4.1.4 RADAC Data Interpretation

RADAC/PFS currently can be configurable to record radar data (Range, Azimuth, Elevation, SSR-Code etc…) in the following format;

- Asterix (CAT 001/002)
- Asterix (CAT 048/034)
- AirCat 500
- RDIF

4.1.5 RADAC Data Filter

The data filtering within RADAC is very generic and all parameters which are decoded by the interpretation file, i.e. defined in the xml-file, are available for filtering. Together with a universal set of operators, e.g. '>', '=' and '<=', the data filtering function within RADAC will thus automatically support any new message format or any change in an existing format. The filtering function is intended to be used to narrow down the input to the subsequent calculations and analyses, e.g. aircrafts at ranges outside the a certain air space are omitted

4.1.6 RADAC Data Viewing and Analyzing

The current RADAC platform consists of the following:

- Basic radar data processing and analysis functions, e.g. filtering, tracking and smoothed tracking. ***Figure 3***

- Generic list views for received data and map support.
- Calculation and analysis module: Radar Performance Analysis (RPA). This is the basic functionality within RADAC supporting monitoring, analysis and evaluation of radar performance, e.g. radar probability of detection and radar accuracy.
- Calculation and analysis module: Passing Frequency System (PFS). This module supports the specific purpose of monitoring and analyzing RVSM regulated air space by calculating proximate events in recorded data and providing data for subsequent determination of the probability of collision.

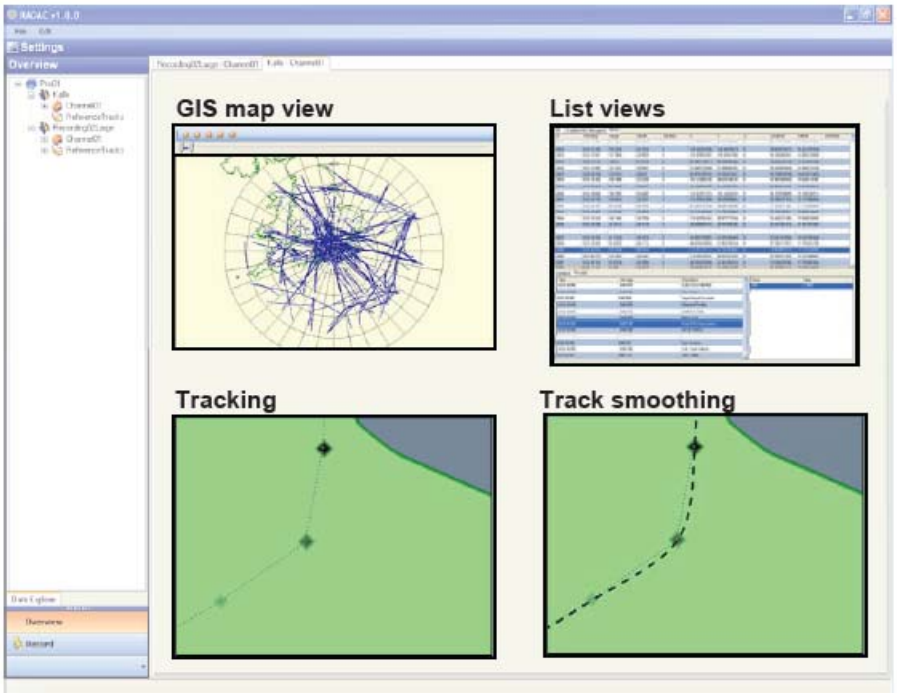


Figure 3 - RADAC, sample of screen for viewing and analysis

4.1.7 RADAC Passing Frequency System (PFS)

The PFS is designed to monitor aircraft in the RVSM air space, to determine the probability of collision between aircraft by calculating the following events and output the calculated PFS in a diagrams and Excel files; ***Figure 4***

- Number of proximate events in recorded data
- Total number of aircraft in recorded data
- Total flying time for all aircraft in recorded data Output

4.1.8 Radar Performance Analysis (RPA)

The Radar Performance Analysis (RPA) option is the basic, core component of RADAC. Radar performance can be evaluated in many ways and RADAC supports a wide range of calculations and diagrams to be used for radar performance evaluation.

The GPS reference tracks from the aircraft are imported Tracks created by the RADAC Plat form are associated with reference tracks and the accuracy analysis Displays deviation from the GPS reference values for different ranges and azimuths (***Figure 5***) and the coverage analysis displays the number of detected plots as a percentage of total number of targets. (***Figure 6***)

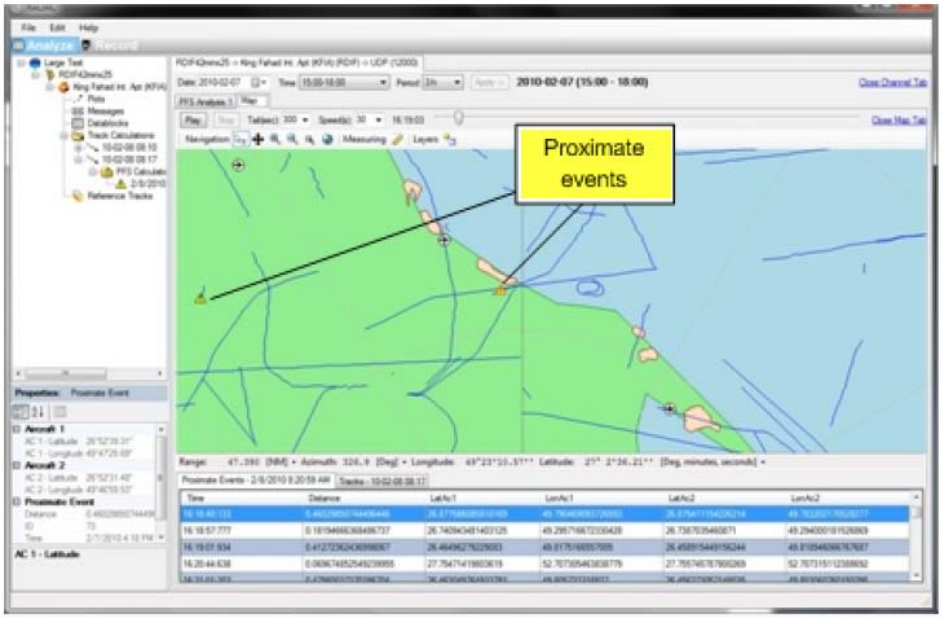


Figure 4 - A PFS Calculation result in the map.

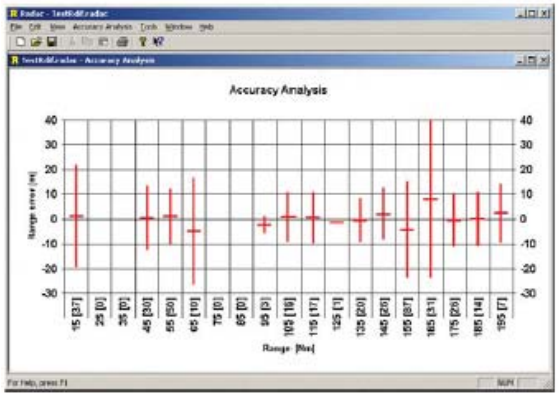


Figure 5 – The Accuracy Analysis

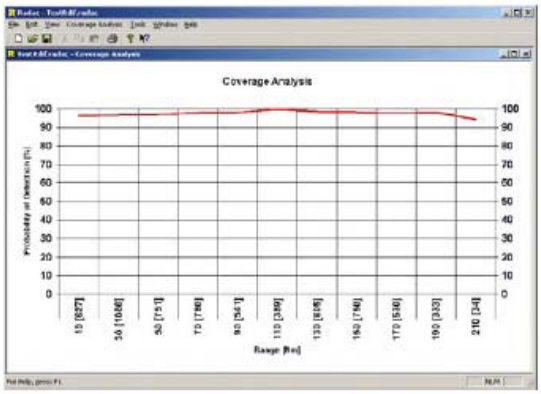


Figure 6 – The Coverage Analysis

4.1.9 RADAC/PFS Benefits

- The RADAC/PFS is small and easy-to-use equipment for A/C monitoring of the RVSM airspace.
- The RADAC/PFS laptop PC is easy to move between different sites and is quickly and easily deployed.
- The RADAC/PFS Excel reports can be used for further analyses
- Modular system architecture.
- New Future options requirements can easily be integrated.
- Configurable radar data format interpreter.

4.2 MID Risk Assessments Software (MIDRAS)

4.2.1 Introduction

The MID Risk Assessments Software (MIDRAS) Modeling is based on ICAO SASP-WG/WHL/7-WP/20 ICAO SEPARATION AND AIRSPACE SAFETY PANEL (SASP) SEVENTH MEETING OF THE WORKING GROUP OF THE WHOLE Montreal, Canada, 9 – 20 May, 2005.

The model is commonly known as Hsu model. The Hsu model assumes that aircraft are represented by circular cylinders of diameter λxy and height λz. To model collision risk, one aircraft modelled as a cylinder of radius λxy and height 2λz, denoted by C, and the other aircraft is a point particle, denoted by P. For a collision to occur P must enter C through its vertical side or through the top or bottom. Further, a horizontal overlap of the two aircraft occurs when P enters the infinite cylinder C∞ of radius λxy obtained by extending upwards and downwards the cylinder representing the first aircraft.

As illustrated in Figure 7, in the Hsu collision risk model a pair of aircraft are assumed to be at nominal distances d1 and d2 before the intersection at time t0. Their nominal speeds V1 and V2 are assumed to be constant during a time interval [t0, t1] during which the risk of collision is to be estimated.

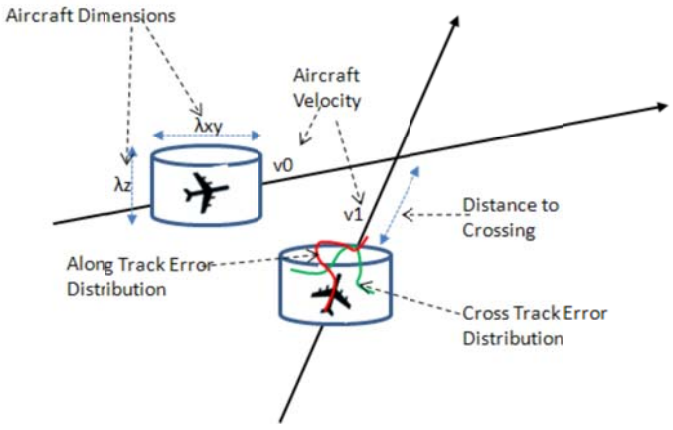


Figure 7: Hsu collision risk model for a pair of aircraft

The collision risk for given values of V1 and V2 (the true speeds of the two aircraft) is determined, and then the probability of collision during time interval [t0, t1] is calculated by multiplying by the probability density functions of V1 and V2 and integrating with respect to V1 and V2.

$$\mathrm{CR}(t_o, t_1|V_1, V_2) = \mathrm{Prob}(P\mathrm{enters}C|P\mathrm{enters}C_\infty) \times HOP(t_o, t_1|V_1, V_2) \quad (1)$$

where

$$\mathrm{Prob}(P\mathrm{enters}C|P\mathrm{enters}C_\infty) = P_z(h_z) \times (1 + \frac{|\bar{\dot{z}}|}{2\lambda_z} \times \frac{\pi\lambda_{xy}}{2V_{rel}}) \quad (2)$$

HOP (to,t1 | V1,V2) denotes the probability the pair of aircraft will have a horizontal overlap during the time interval [t0, t1] given V1 and V2. Pz (hz) is the instantaneous vertical overlap probability of the two aircraft of height _z, nominally separated vertically by distance hz when the

horizontal overlap occurs. The term |z| is the average vertical speed of an aircraft given that it has a horizontal overlap and Vrel is the relative speed of two aircraft.

The software is developed to process the MIDRMA flight data into a format that can be feed into the collision risk model for risk assessments and evaluation.

4.2.2 MIDRAS Software Components

4.2.2.1 Data Processor Module: (Data Fusion and Cleaning Algorithms and Module)

a. Algorithms to process data to read input traffic data files for MIDRMA member states.

b. Algorithms to process airspace data (waypoints, FIRs, airways and route constraints).

c. Algorithms to process for entry and exit time data.

4.2.2.2 Aerodynamic Module: (Trajectory Simulation Algorithms and Module)

d. Modeling aircraft performance parameters (ROCD, TAS, etc.)

e. Air Traffic Simulation & generation of 4D points for individual aircrafts based on processed RVSM data.

4.2.2.3 Risk Parameters Estimations

f. Computation of closest point of Approach at horizontal separation (HSCPA) between two aircraft pairs in proximity.

g. Computation of crossing frequency and Individual crossing angles.

4.2.2.4 Collision Risk Estimation using ICAO RVSM CRM

h. Computation of Collision Risk for a pair of aircraft using the estimates of the risk parameters.

i. Aggregating collision risk for a given airspace in a period of time with a given set of aircrafts.

The model generate individual aircraft 4D radar points by simulation of air traffic in MIDRMA region based on traffic entry and exit points in the FIR. The methodology use aerodynamic models to generate aircraft performance parameters and hence their 4D positions from point of activation in the airspace till the point of deactivation.

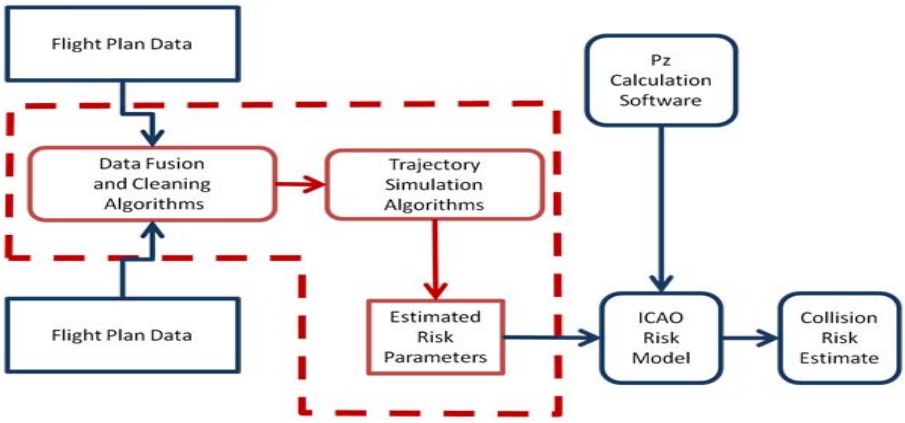


Figure 8: The Collision Risk Assessment Methodology

LIST OF APPENDICES

Appendix A - MIDDLE EAST REGIONAL MONITORING AGENCY (MIDRMA) BOARD - TERMS OF REFERENCE

The Terms of Reference of the MIDRMA Board are as follows:

1. The Board is responsible for overall supervision, direction, and management of the MIDRMA project.

2. The Board shall elect a Chairperson.

3. The elected Chairperson acts as the contact point/coordinator on behalf of the MIDRMA Board members to oversee the MIDRMA project in coordination with ICAO.

4. The Board shall review and update the MIDRMA work plan on a yearly basis and/or whenever required.

5. The Board shall meet at least once a year or when deemed necessary to review/update, consider, and approve:

   i. the MIDRMA safety reports;
   ii. matters related to funding mechanism, costs, accounting, etc; and
   iii. the duties, responsibilities and scope of the MIDRMA.

6. The MIDRMA Board meetings should be hosted by Participating States on rotation basis.

7. The Board reports its activity to MIDANPIRG through the ATM/SAR/AIS Sub Group.

Composition:

The MIDRMA Board shall consist of focal points nominated by each Participating MID Region State as signatories on their behalf with ICAO Technical Cooperation Bureau (TCB) in relation with the MIDRMA project.

The MIDRMA Board meetings will be attended by:

- The Board members.
- ICAO Regional Office, as permanent observer.
- Other Organizations (EUROCONTROL, IATA, etc) as observes on ad-hoc basis and as required.

Appendix B - MEMORANDUM OF AGREEMENT

MEMORANDUM OF AGREEMENT
on the establishment, operation and management of the
Middle East Regional Monitoring Agency (MID RMA)
and its funding by the Participating States

1. PARTIES

1.1 The Parties to this memorandum of agreement are: Bahrain, Egypt, Iran, Jordan, Kuwait, Lebanon, Oman, Saudi Arabia, Syria and Yemen.

2. AGREEMENT

CONSIDERING the urgent need to institute a programme, on a regional basis, for monitoring the height-keeping performance of aircraft operating in RVSM airspace;

CONSIDERING the Parties' earlier decision that the Middle East Regional Monitoring Agency (MID RMA) will be funded entirely by the participating States and that the budget estimate for the first year, be paid by the Parties on equal basis;

The Parties have agreed as follows:

1. The Parties to this memorandum of agreement, referred to hereunder as Participating States agree to establish the Middle East Regional Monitoring Agency (MID RMA) and undertake to become its members;

2. The MID RMA shall be managed as a Regional programme; shall have legal personality and shall act through the MID RMA Board;

3. The overall objective of the MID RMA is the promotion of safety of air navigation in the Middle East Region through the operation and management, on a sound and efficient basis, of a permanent MID Regional Monitoring Agency;

4. The MID RMA Board, in which each Participating State is entitled to appoint one member, shall retain overall direction and responsibility for the supervision and operation of the MID RMA in accordance with the relevant obligations of the Participating States under the Convention on International Civil Aviation and its Annexes. The Board shall elect its chairman. It shall inter-alia, supervise and direct the MID RMA, follow-up its activities and reports and assign its priorities. It shall also secure the commitment of Participating States for funding the MID RMA in accordance with agreed funding mechanism and for provision of necessary data for the MID RMA;

5. The MID RMA's scope, duties and responsibilities will be those agreed by the Board's first meeting and could be revised by the Board. The MID RMA will be assigned clear tasks in a step-by-step approach starting with RVSM height monitoring and RVSM post-implementation safety assessment, having in mind the end objectives, which will include RNP/RNAV and SMS. The MID RMA duties and responsibilities will include, but will not be limited to the following:

   -collecting and analysing RVSM data received from MID States as well as from Eurocontrol/FAA, IATA and airlines;

   -collecting data on aircraft approved by various States for operation within RVSM airspace in the MID Region and enter such data in the MID RMA database;

   -verification of the effectiveness of the approval process by States;

-establishing a database for reporting height deviations of aircraft;

-verification that the target level of safety on implementation of RVSM is met and maintained;

-monitoring the effectiveness of the altimetry system modifications to enable aircraft to meet the required height keeping performance criteria;

-evaluation of the stability of altimetry system error;

-undertake monitoring missions to States as required;

-determine in the light of analysis made of data received and of missions conducted, whether compliance with required safety standards is maintained and initiate corrective action as needed in each case; and

-submit a report to each Board meeting on MID RMA activities, its analysis of data and any identified departure from RVSM Safety limits, for its consideration and action as appropriate.

6. The Participating States have accepted Bahrain's offer to host the MID RMA in Bahrain to enable the early establishment and functioning of the MID RMA;

7. Bahrain will provide the offices, equipment and local personnel needed for the MID RMA operations and pay for the initial set up of the MID RMA without waiting for MID States' contributions. The advance payment made by Bahrain shall be recovered through States' contributions in compliance with the agreed funding mechanism;

8. Based on the agreed funding mechanism for the first year of operation of the MID RMA, the cost for the establishment of the MID RMA, its operation and management for the first year shall not exceed the estimated amount of US$ 300,000, which shall be borne by the Participating States on equal basis;

9. The funding mechanism and consequent contributions of Participating States may be modified in subsequent years by decision of the Board;

10. The MID RMA staff shall be composed of:

1.	MID RMA Manager/Team Leader	(Part Time)
2.	One Assistant MID RMA Officer	(Full Time)
3.	Database Specialist	(Part Time)

11. The MID RMA Manager/Team Leader shall manage the project on day-to-day basis and effect coordination with the Chairman of the MID RMA Board. He shall submit the MID RMA reports to the Board with copies to the ICAO Regional Office in Cairo;

12. Bahrain shall monitor the progress of the MID RMA, maintain financial accounting and provide general support and timely reporting;

13. Participating States authorize the MID RMA Board Chairman to negotiate on behalf of the MID RMA an agreement with ICAO and Bahrain specifying ICAO's role as the custodian of the funds collected for the purpose of this agreement, in compliance with ICAO's Financial Regulations and Rules;

14. This Memorandum of Agreement shall come into effect on the date it has been signed by the ten participating States;

15. Any amendment to this Memorandum of Agreement, shall be carried out by the parties to this agreement;

16. Any dispute arising out of or relating to this Memorandum of Agreement, shall be settled by direct consultation between the Participating States concerned;

17. Any Participating State may withdraw from this Memorandum of Agreement by giving a prior notice of **six (6) months** to other Participating States. The obligations assumed by the Participating States under this Memorandum of Agreement shall continue to exist after the withdrawal from this Memorandum of Agreement to the extent necessary to permit the orderly finalization of activities, the withdrawal of personnel, the distribution of funds and assets and the settlement of contractual obligations. Additional funds, if necessary, to cover the above mentioned expenditures shall be provided by the Participating States.

18. The hosting of the MID RMA by Bahrain may be terminated at the request of Bahrain, with two years advance written notification to the MID RMA Board to allow sufficient time for selection of an alternative location and necessary arrangements for transfer of the MID RMA.

19. All correspondence relating to the implementation of this Agreement, shall be addressed to:

MID RMA
Chairman of the MID RMA Board
C/o Ministry of Transportation
P.O. Box 586
Bahrain International Airport
Manama - Bahrain

With copy to the:

ICAO Regional Director
ICAO Middle East Regional Office
Egyptian Civil Aviation Complex, Airport Road
P.O Box 85, Airport Post office, Terminal One
11776, Cairo, Egypt

Agreed on behalf of MID RMA States

State	Signature	Title	Date
Bahrain		A/D. Director Air Navigation	27/2/06
Egypt		ATS Safety Manager	28/2/2006
Iran		CAO / N. Director Navigation	~~21, 03, 2006~~
Jordan		Director ATM	28/2/2006
Lebanon		Chief Air Nav Dept	~~27th~~ Feb 2006
Kuwait		Dy DGCA for NEA	27/2/2006
Oman		ADGCA	~~27th Feb~~ 2006
Saudi Arabia		RVSM / Manager	27 s 2006
Syria		Director General	21. March 2006
Yemen		Chairman of Cama	21.03.2006
UAE		DG. UAE GCAA	28/10/2008
IRAQ		DG Iraq CAA	11/1/2010
SUDAN		DG SUDAN	16/2/2014

MID RMA MOA dated 15 February 2006

Appendix C - CUSTODIAN AGREEMENT

Custodian Agreement
between ICAO, the Middle East Regional Monitoring Agency
(MID RMA), and Bahrain.

Whereas the Middle East Regional Monitoring Agency (MID RMA) desires to request the International Civil Aviation Organization (ICAO) to perform certain custodian functions with respect to the funds collected from the member States of the MID RMA;

Whereas the member States of the MID RMA, under the Memorandum of Agreement on the Establishment, Operation and Management of the Middle East Regional Monitoring Agency (MID RMA) and its Funding by the Participating States, have authorized the MID RMA Board Chairman to negotiate on behalf of the MID RMA an agreement with ICAO and Bahrain specifying ICAO's role as the custodian of the funds collected for the purpose of the Memorandum of Agreement;

Whereas Bahrain agrees under the Memorandum of Agreement to host the MID RMA in Bahrain and undertakes to monitor the progress of the MID RMA, maintain financial accounting and provide general support and timely reporting;

The Parties have agreed as follows:

1. The Custodian Functions of ICAO

1.1 In accordance with the apportionment provided by the MID RMA Board, ICAO shall use its best efforts to assist in collecting the funds from each of the member States of the MID RMA by issuing a request for payment to each member State.

1.2 ICAO shall act as the custodian of the funds collected under subparagraph 1.1, to the extent defined as follows:

a) Creating a fund for the MID RMA, in compliance with existing ICAO financial Rules and Regulations.

b) depositing the funds received into the MID RMA fund mentioned in subparagraph 1.1 and issuing acknowledgements of receipts to individual States when funds are received;

c) recording the funds received in the MID RMA fund and tracking accrued interest;

d) reporting on funds received and balance of funds to the RMA Board via its chairman on a quarterly basis;

e) subject to availability of funds, reimbursing Bahrain on the basis of a certified request for payment by the Chairman of the MID RMA Board on a semi-annual basis;

2. Administration Fees of ICAO

2.1 ICAO shall be entitled to receive ten per cent (10%) of the funds collected, as administration fees.

3. Exclusion of ICAO's Responsibility and Liability

3.1 ICAO has no responsibility to certify that funds spent by Bahrain are for the purpose for which they were intended. Nor shall any form of verification or audit be performed on expenditure related to the MID RMA. Any request for audit shall be commissioned by the MID RMA Board and contracted with an independent external auditor.

3.2 ICAO is under no obligation to provide an itemized statement of expenditure since it has no responsibility for the budget of the MID RMA Board.

3.3 ICAO shall not receive invoices for payment to third parties nor shall it be required to make any disbursements other than to Bahrain for reimbursement of their costs.

3.4 In no event shall ICAO be held liable for any claim or damage arising from the execution of this Agreement. Without limiting the generality of the foregoing, ICAO shall not be liable for:

a) the failure to collect from member States which are in default. Following two reminders sent to the States by ICAO, it shall be the sole responsibility of the MID RMA Board to engage in further collection action or to enforce any applicable sanctions with respect to members States which are in default;

b) the loss of the funds, such as in the course of their deposits, transmissions or transfers;

c) any deficit position of the MID RMA fund.

3.5 The MID RMA shall indemnify, hold and save harmless, and defend, at its own expense, ICAO, its officials, agents, servants and employees, from and against all suits, claims, demands and liability of any nature or kind, including their costs and expenses, arising out of the acts or omissions of the MID RMA or the MID RMA's employees, officers, agents or sub-contractors, in the performance of this Agreement. This provision shall extend, *inter alia*, to claims and liability in the nature of workmen's compensation claims, product liability and liability arising out of the use of patented inventions or devices, copyrighted material or other intellectual property by the MID RMA, its employees, officers, agents, servants, or sub-contractors. The obligations under this clause do not lapse upon termination of this Agreement.

4. Compliance with ICAO Financial Regulations and Rules

4.1 ICAO shall be bound by its Financial Regulations and Rules in all matters under this Agreement. No provision of this agreement shall be interpreted in conflict with the Financial Regulations and Rules.

5. Settlement of Disputes

5.1 Any dispute, controversy or claim arising out of or relating to this Agreement shall be settled amicably through negotiation and consultation between the Parties.

6. Immunity of ICAO

6.1 Nothing in or relating to this Agreement shall be deemed a waiver, express or implied, of any immunity from suit or legal process or any privilege, exemption or other immunity enjoyed or which may be enjoyed by ICAO, its officers and staff, either pursuant to the Convention on the Privileges and Immunities of the Specialized Agencies or other conventions, agreements, laws or decrees of an international character.

7. Language of Correspondence

7.1 All reports, correspondence and other information shall be in English.

8. Notices

8.1 All correspondence between the Parties shall be sent in writing to the following offices and addresses:

a) **ICAO:** International Civil Aviation Organization
Technical Co-operation Bureau
999 University Street
Montreal, Québec
H3C 5H7
Tel: ++ 514-954-8219 Ext. 8082
Fax: ++ 514-954-6287
E-mail: vdorofeyev@icao.int

b) **MID RMA:** Middle East Regional Monitoring Agency
(MID RMA)
C/o Civil Aviation Affairs
P.O. Box: 586
Manama, Bahrain
Tel: ++ 973 17 32 91 50
Fax: ++ 973 17 32 91 60
E-mail: midrma@batelco.com.bh

c) **Bahrain:** The Under Secretary
Civil Aviation Affairs
Bahrain International Airport
Tel: ++ 973 17 321 100
Fax: ++ 973 17 329 066
E-mail: aralgaoud@caa.gov.bh

9. Amendment to the Agreement

9.1 This Agreement may be amended by an instrument in writing signed by each of the Parties.

Termination or Renewal of the Agreement

10.1 This Agreement is concluded initially for a term of two (2) years. It shall be automatically renewed at the time of expiration, unless one Party notifies the other Parties by a prior written notice of three (3) months that it intends to terminate this Agreement at the end of the term.

10.2 ICAO may terminate this Agreement at any time by providing prior written notice of three (3) months.

11. Entry into Force

11.1 This Agreement shall come into force at the time of signature by all the Parties.

Acknowledged and agreed:

For ICAO	**For Bahrain**	**For MID RMA Member States**
Secretary General 9 May 2006	Under Secretary Civil Aviation Affairs 6/June/ 2006	Chairman of MID RMA Board 3rd June 2006

— END —

Appendix D - DUTIES AND RESPONSIBILITIES OF THE MIDRMA

The Middle East Regional Monitoring Agency (MIDRMA) has the following duties and

responsibilities:

1- To establish and maintain a central registry of State RVSM approvals of operators and aircraft using the Middle East Region airspace where RVSM is applied.

2- To initiate checks of the "approval status" of aircraft operating in the relevant RVSM airspace, identify non-approved operators and aircraft using RVSM airspace and notify the appropriate State of Registry/State of the Operator and other RMAs, accordingly.

3- To establish and maintain a database containing the results of height keeping performance monitoring and all altitude deviations of 300 ft or more within Middle East Region airspace, and to include in the database the results of MIDRMA requests to operators and States for information explaining the causes of observed large height deviations.

4- Provide timely information on changes of monitoring status of aircraft type classifications to State Authorities and operators.

5- To assume overall responsibility for assessing compliance of operators and aircraft with RVSM height keeping performance requirements in conjunction with RVSM introduction in the Middle East Region.

6- To facilitate the transfer of approval data to and from other RVSM Regional Monitoring Agencies.

7- To establish and maintain a database containing the results of navigation error monitoring.

8- To conduct safety analysis for RVSM operations in the MID Region and prepare RVSM Safety Monitoring Reports (SMR) as instructed by MIDANPIRG and the MIDRMA Board.

9- To conduct readiness and safety assessments to aid decision-making in preparation for RVSM implementation in those FIRs where RVSM is not yet implemented.

10- To carry out post-implementation safety assessments, as appropriate.

11- Based on information provided by States related to planned changes to the ATS routes structure, advise States and MIDANPIRG on the effects of such changes on the safe RVSM operations in the MID Region.

12- To liaise with other Regional Monitoring Agencies and organizations to harmonise implementation strategies.

Appendix E – FLIGHT INFORMATION REGIONS AND RESPONSIBLE REGIONAL MONITORING AGENCY

Responsible RMA	FIR	Responsible RMA	FIR
AAMA	Brisbane	CARSAMMA	Bogota
AAMA	Honiara	CARSAMMA	Brasilia
AAMA	Jakarta	CARSAMMA	Central American
AAMA	Melbourne	CARSAMMA	Comodoro Rivadavia
AAMA	Nauru	CARSAMMA	Cordoba
AAMA	Port Moresby	CARSAMMA	Curacao
AAMA	Ujung Pandang	CARSAMMA	Curitiba
ARMA	Accra	CARSAMMA	Easter Island
ARMA	Algiers	CARSAMMA	Ezeiza
ARMA	Addis Ababa	CARSAMMA	Georgetown
ARMA	Antananarivo	CARSAMMA	Guayaquil
ARMA	ASMARA	CARSAMMA	Havana
ARMA	Beira	CARSAMMA	Kingston
ARMA	Brazzaville	CARSAMMA	La Paz
ARMA	Cape Town	CARSAMMA	Lima
ARMA	Dakar	CARSAMMA	Maiquetia
ARMA	Dar-Es-Salaam	CARSAMMA	Mendoza
ARMA	Entebbe	CARSAMMA	Montevideo
ARMA	Gaborone	CARSAMMA	Panama
ARMA	Harare	CARSAMMA	Paramaribo
ARMA	Johannesburg	CARSAMMA	Piarco
ARMA	Kano	CARSAMMA	Port-au-Prince
ARMA	Kinshasa	CARSAMMA	Puerto Montt
ARMA	Lilongwe	CARSAMMA	Punta Arenas
ARMA	Luanda	CARSAMMA	Recife
ARMA	Lusaka	CARSAMMA	Resistencia
ARMA	Mauritius	CARSAMMA	Rochambeau
ARMA	Mogadishu	CARSAMMA	Santiago
ARMA	N’Djamena	CARSAMMA	Santo Domingo
ARMA	Nairobi	China RMA	Beijing
ARMA	Niamey	China RMA	Guangzhou
ARMA	Roberts	China RMA	Kunming
ARMA	Seychelles	China RMA	Lanzhou
ARMA	Tripoli	China RMA	Pyongyang
ARMA	Windhoek	China RMA	Sanya

Responsible RMA	FIR	Responsible RMA	FIR
CARSAMMA	Amazonica	China RMA	Shenyang
CARSAMMA	Antofagasta	China RMA	Urumqi
CARSAMMA	Asuncion	China RMA	Wuhan
CARSAMMA	Barranquilla	CMA	Bodo Oceanic
CMA	Gander	EURASIA RMA	Nikolayevsk-na-Amure
CMA	New York Oceanic	EURASIA RMA	Norilsk
CMA	Reykjavik	EURASIA RMA	Novokuznetsk
CMA	Santa Maria	EURASIA RMA	Nukus
CMA Shan	Shanwick	EURASIA RMA	Nyurba
EURASIA RMA	Aktau	EURASIA RMA	Okha
EURASIA RMA	Aktyubinsk	EURASIA RMA	Olekminsk
EURASIA RMA	Aldan	EURASIA RMA	Omolon
EURASIA RMA	Almaty	EURASIA RMA	Omsk
EURASIA RMA	Anadyr	EURASIA RMA	Orenburg
EURASIA RMA	Ashgabat	EURASIA RMA	Orsk
EURASIA RMA	Astana	EURASIA RMA	Osh
EURASIA RMA	Barnaul	EURASIA RMA	Ossora
EURASIA RMA	Batagay	EURASIA RMA	Petropavlovsk-Kamchatsky
EURASIA RMA	Beryozovo	EURASIA RMA	Pevek
EURASIA RMA	Blagoveshchensk	EURASIA RMA	Polyarny
EURASIA RMA	Bishkek	EURASIA RMA	Salekhard
EURASIA RMA	Chelyabinsk	EURASIA RMA	Samarkand
EURASIA RMA	Chersky	EURASIA RMA	Shmidta Mys
EURASIA RMA	Chita	EURASIA RMA	Shymkent
EURASIA RMA	Chokurdakh	EURASIA RMA	Surgut
EURASIA RMA	Chulman	EURASIA RMA	Tarko-Sale
EURASIA RMA	Dashoguz	EURASIA RMA	Tashkent
EURASIA RMA	Dushanbe	EURASIA RMA	Teply Klyuch
EURASIA RMA	Irkutsk	EURASIA RMA	Tiksi
EURASIA RMA	Kaliningrad	EURASIA RMA	Tura
EURASIA RMA	Kamenny Mys	EURASIA RMA	Turkmenabat
EURASIA RMA	Keperveyem	EURASIA RMA	Turkmenbashi
EURASIA RMA	Khabarovsk	EURASIA RMA	Turukhansk
EURASIA RMA	Khanty-Mansiysk	EURASIA RMA	Tyumen
China RMA	Shanghai	EURASIA RMA	Kirensk

Responsible RMA	FIR	Responsible RMA	FIR
EURASIA RMA	Krasnoyarsk	EURASIA RMA	Ust-Kamchatsk
EURASIA RMA	Kurgan	EURASIA RMA	Ust-Khairyuzovo
EURASIA RMA	Kyzylorda	EURASIA RMA	Vladivostok
EURASIA RMA	Magadan	EURASIA RMA	Yakutsk
EURASIA RMA	Magadan Oceanic	EURASIA RMA	Yuzhno-Sakhalinsk
EURASIA RMA	Magnitogorsk	EURASIA RMA	Zhigansk
EURASIA RMA	Markovo	EUR RMA	Ankara
EURASIA RMA	Milkovo	EUR RMA	Athinai
EURASIA RMA	Mirny	EUR RMA	Barcelona
EUR RMA	Beograd	EUR RMA	Scottish
EUR RMA	Berlin	EUR RMA	Shannon
EUR RMA	Bodo	EUR RMA	Simferopol
EUR RMA	Bratislava	EUR RMA	Skopje
EUR RMA	Bremen	EUR RMA	Sofia
EUR RMA	Brest	EUR RMA	Stavanger
EUR RMA	Brindisi	EUR RMA	Stockholm
EUR RMA	Bruxelles	EUR RMA	Sundsvall
EUR RMA	Bucuresti	EUR RMA	Switzerland
EUR RMA	Budapest	EUR RMA	Tallinn
EUR RMA	Casablanca	EUR RMA	Tampere
EUR RMA	Chisinau	EUR RMA	Tirana
EUR RMA	Dusseldorf	EUR RMA	Trondheim
EUR RMA	France	EUR RMA	Tunis
EUR RMA	Frankfurt	EUR RMA	Varna
EUR RMA	Hannover	EUR RMA	Vilnius
EUR RMA	Istanbul	EUR RMA	Warszawa
EUR RMA	Kaliningrad	EUR RMA	Wien
EUR RMA	Kharkiv	EUR RMA	Zagreb
EUR RMA	Kobenhavn	EUR RMA	Amsterdam
EUR RMA	Kyiv	JAPAN RMA	Fukuoka
EUR RMA	Lisboa	MAAR	Bangkok
EUR RMA	Ljubljana	MAAR	Calcutta
EUR RMA	London	MAAR	Chennai
EUR RMA	L'viv	MAAR	Colombo
EUR RMA	Madrid	MAAR	Delhi
EURASIA RMA	Ulan Bator	EUR RMA	Malmo

Responsible RMA	FIR	Responsible RMA	FIR
EUR RMA	Malta	MAAR	Hanoi
EUR RMA	Milano	MAAR	Ho-Chi-Minh
EUR RMA	Minsk	MAAR	Hong Kong
EUR RMA	Munchen	MAAR	Karachi
EUR RMA	Nicosia	MAAR	Kathmandu
EUR RMA	Odesa	MAAR	Kota Kinabalu
EUR RMA	Oslo	MAAR	Kuala Lumpur
EUR RMA	Praha	MAAR	Lahore
EUR RMA	Rhein	MAAR	Male
EUR RMA	Riga	MAAR	Manila
EUR RMA	Roma	MAAR	Mumbai
EUR RMA	Rovaniemi	MAAR	Phnom Penh
EUR RMA	Sarajevo	MAAR	Singapore
MAAR	Taipei	NAARMO	Miami
MAAR	Ulaanbaatar	NAARMO	Miami Oceanic
MAAR	Vientiane	NAARMO	Minneapolis
MAAR	Yangon	NAARMO	Moncton
MIDRMA	Amman	NAARMO	Monterrey
MIDRMA	Bahrain	NAARMO	Montreal
MIDRMA	Baghdad	NAARMO	New York
MIDRMA	Beirut	NAARMO	Oakland
MIDRMA	Cairo	NAARMO	Salt Lake
MIDRMA	Jeddah	NAARMO	San Juan
MIDRMA	Damascus	NAARMO	Seattle
MIDRMA	Khartoum	NAARMO	Toronto
MIDRMA	Kuwait	NAARMO	Vancouver
MIDRMA	Muscat	NAARMO	Washington
MIDRMA	Sanaa	NAARMO	Winnipeg
MIDRMA	Tehran	PARMO	Anchorage Oceanic
MIDRMA	Emirates	PARMO	Auckland Oceanic
MIDRMA	Tripoli	PARMO	New Zealand Domestic
NAARMO	Albuquerque	PARMO	Bermuda
NAARMO	Anchorage Oceanic	PARMO	Incheon
NAARMO	Anchorage Arctic	PARMO	Nadi
NAARMO	Anchorage Continental	PARMO	Oakland Oceanic
NAARMO	Atlanta	PARMO	Tahiti
MAAR	Dhaka	NAARMO	Boston

Responsible RMA	FIR	Responsible RMA	FIR
NAARMO	Chicago	SATMA	Canarias South
NAARMO	Cleveland	SATMA	Dakar Oceanic
NAARMO	Denver	SATMA	Sal Oceanic
NAARMO	Edmonton		
NAARMO	Fort Worth		
NAARMO	Gander Domestic		
NAARMO	Houston		
NAARMO	Houston Oceanic		
NAARMO	Indianapolis		
NAARMO	Jacksonville		
NAARMO	Kansas City		
NAARMO	Los Angeles		
NAARMO	Mazatlan		
NAARMO	Mazatlan Oceanic		
NAARMO	Memphis		
NAARMO	Merida		
NAARMO	Mexico		
SATMA	Atlantic		

Appendix F – FORMAT OF RVSM APPROVALS DATA EXCHANGED BETWEEN RMAS

Column	Field	Example	Notes
1	**State of Registry**	CP	ICAO State code
2	**Operator**	RYA	ICAO operator code
3	**State of Operator**	WA	ICAO State code
4	**Aircraft Type**	B744	ICAO type
5	**Aircraft Monitoring Type**	B744-10	MMR type
6	**Series**	100	Generic from manufacturer
7	**Serial No**	525B-0196	Manufacturer's number
8	**Registration**	VHZOO	No dashes or spaces
9	**Hex Mode S**	AB420F	Six hexadecimal digits 0..9A..F
10	**Full RVSM Approval**	Y	Y or N (operational approval)
11	**Date Full RVSM Approval Issued**	22/12/05	dd/mm/yy
12	**RVSM Approval Expired/Withdrawn**	Y	Y or N
13	**Date RVSM Approval Expired/Withdrawn**	23/12/05	dd/mm/yy
14	**Deregistered**	N	Y or N
15	**Date of Deregistration**		dd/mm/yy (blank if not deregistered)
16	**Operator Name**	RUDIMENTARY AIRLINES	Avoid commas and accented characters where possible
17	**Date of Last Successful Local Monitoring**	22/12/05	(Optional) Height-keeping monitoring only within this RMA
18	**Remarks**		(Optional free text)

Appendix G – MIDRMA FORMS FOR USE IN OBTAINING RECORD OF RVSM FROM A STATE AUTHORITY

NOTES TO AID COMPLETION OF MIDRMA FORMS F1, F2, AND F3

1. Please read these notes before attempting to complete forms MIDRMA F1, F2, and F3.

2. It is important that the MID Region Approvals have an accurate record of a point of contact for any queries that might arise. Recipients are therefore requested to include a completed MIDRMA F1 with their first reply to the MIDRMA. Thereafter, there is no further requirement unless there has been a change to the information requested on the form.

3. If recipients are unable to pass the information requested in the MIDRMA F2 to the MIDRMA through the Internet, by direct electronic transfer, a hard copy of MIDRMA F2 must be completed for each aircraft granted RVSM approval and fax it to the MIDRMA office on +97317329160. The numbers below refer to the superscript numbers on the blank MIDRMA F2.

    1. Enter the 1 or 2 letter ICAO identifier as contained in ICAO Doc 7910, Index to Nationality Letters for Location Indicators. In the case of there being more than one identifier designated for the State, use the identifier that appears first.

    2. Enter the operator's 3 letter ICAO identifier as contained in ICAO Doc 8585. For International General Aviation, enter "IGA". For military aircraft, enter "MIL". If none, place an X in this field and write the name of the operator/owner in the Remarks row.

    3. Enter the ICAO designator as contained in ICAO Doc 8643, e.g., for Airbus A320-211, enter A320; for Boeing B747-438 enter B744.

    4. Enter series of aircraft type or manufacturer's customer designation, e.g., for Airbus A320-211, enter 211; for Boeing B747-438, enter 400 or 438.

    5. Enter ICAO allocated Aircraft Mode S address code.

    6. Enter yes or no.

    7. Example: For August 27, 2011 write 27/08/2011.

    8. Use a separate sheet of paper if insufficient space available.

4. The above numbers also refer to those superscript numbers used in the MIDRMA F3 - "Withdrawal of Approval to Operate in MID Region RVSM Airspace." **MIDRMA F3 must be completed and forwarded to the MIDRMA immediately when the state of registry has cause to withdraw the approval of an operator/aircraft for operations within the MID Region RVSM Airspace.**

MIDRMA
MIDDLE EAST REGIONAL MONITORING AGENCY

Tel: +973 17 329150
Fax: +973 17 329160
Email - midrma@midrma.com
P.O. Box 50468
Kingdom of Bahrain

MIDRMA F1 FORM

POINT OF CONTACT DETAILS/CHANGE OF POINT OF CONTACT DETAILS FOR MATTERS RELATING TO MID APPROVALS

This form should be completed and returned to the address above on the first reply to the MIDRMA or when there is a change to any of the details requested on the form ***(PLEASE USE BLOCK CAPITALS)****.*

STATE OF REGISTRY: _____

STATE OF REGISTRY (ICAO 2 LETTER IDENTIFIER): _____
Enter the 1- or 2-letter ICAO identifier as contained in ICAO Doc 7910. In the event of there being more than one identifier for the same State, the one that appears first in the list should be used.

ADDRESS: _____

CONTACT PERSON:

Full Name: _____

Title: _____ Surname: _____ Initials: _____

Post/Position: _____

Telephone #: _____ Fax #: _____

E-mail: _____

Initial Reply*/Change of Details* (**Delete as appropriate)*

MIDRMA
MIDDLE EAST REGIONAL MONITORING AGENCY

Tel: +973 17 329150
Fax: +973 17 329160
Email - midrma@midrma.com
P.O. Box 50468
Kingdom of Bahrain

MIDRMA F2 FORM

RECORD OF APPROVAL TO OPERATE IN MID RVSM AIRSPACE

1. When a State of Registry approves or amends the approval of an operator/aircraft for operations within the MID airspace, details of that approval must be recorded and sent to the Middle East Regional Monitoring Agency (MIDRAM) as soon as possible.

2. *Before providing the information as requested below, reference should be made to the accompanying notes* **(PLEASE USE BLOCK CAPITALS)**.

State of Registry[1]*:*

Name of Operator[2]*:*

State of Operator[1]*:*

Aircraft Type[3]*:*

Aircraft Series[4]*:*

Manufacturers Serial No:

Registration No:

Mode S Address Code[5]*:*

Airworthiness Approval[6]*:*

Date Issued[7]*:*

RVSM Approval[6]*:*

Date Issued[7]*:*

Date of Expiry[7] *(If Applicable):*

Remarks[8]:

MIDRMA
MIDDLE EAST REGIONAL
MONITORING AGENCY

Tel: +973 17 329150
Fax: +973 17 329160
Email - midrma@midrma.com
P.O. Box 50468
Kingdom of Bahrain

MIDRMA F3 FORM

WITHDRAWAL OF APPROVAL TO OPERATE IN MID REGION RVSM AIRSPACE

1. When a State of Registry has cause to withdraw the approval of an operator/aircraft for operations within the MID RVSM airspace, details as requested below, must be submitted to the Middle East Regional Monitoring Agency (MIDRAM) by the most appropriate method.

2. *Before providing the information as requested below, reference below, reference should be made to the accompanying notes* **(PLEASE USE BLOCK CAPITALS)**.

State of Registry[1]:

Name of Operator[2]:

State of Operator[1]:

Aircraft Type[3]:

Aircraft Series[4]:

Manufacturers Serial No:

Registration No:

Mode S Address Code[5]:

Date of Withdrawal of RVSM Approval[7]:

Reason of Withdrawal of RVSM Approval[8]:

Remarks[8]:

Appendix H – REPORT OF LARGE HEIGHT DEVIATION OF 300 FT OT MORE BETWEEN FL 290 AND FL 410

NOTES TO AID COMPLETION OF MIDRMA FORM F4

SPECIFICATION OF THE FIELDS:

1. Enter today´s date.
2. Enter the 4 (four) letter ICAO identifier for the fir or enter the name of the reporting unit.
3. Enter the operator´s 3 (three) letter ICAO identifier. For international general aviation, enter “IGA”.
4. Enter the call sign and the ACFT registration number.
5. Enter the ICAO designator as contained in ICAO doc 8643, e.g., for airbus a320-211, enter a320; for Boeing b 747-438, enter b744.
6. Enter “yes” or “no”. If “yes”, inform the flight level.
7. Enter the date of occurrence.
8. Enter the time UTC of occurrence.
9. Enter the occurrence position (fix, Lat/Long or radial and nautical miles).
10. Enter the cleared route of flight (in case of direct or Aleatoric flights, enter “DCT”).
11. Enter the cleared flight level.
12. Enter the estimated duration at incorrect flight level (in seconds).
13. Enter the observed deviation in feet (for upwards deviations, write “+”, for downwards deviations, write “-“).
14. Enter the other traffic involved, if any (call sign, registration number, flight level, aircraft type and route).
15. Enter the cause of deviation according to the **LHD taxonomy** table below:
16. Enter the observed/reported final flight level, providing the source of information (mode c and/or pilot).
17. And 18. Select one of the options: if the aircraft was above or below the cleared level.
18. Select one of the options: if the FL complied with the ICAO annex 2 tables of cruising levels.
19. Write a brief description of deviation.
20. Write the crew comments, if any.

LHD TAXONOMY

Code	LHD Cause
	Operational Errors
A	Flight crew failing to climb/descend the aircraft as cleared *Example: Aircraft A was at FL300 and assigned FL360. A CLAM alert was seen as the aircraft passed FL364. The Mode C level reached FL365 before descending back to FL360.*
B	Flight crew climbing/descending without ATC Clearance *Example: At 0648, Aircraft A reported leaving cruise level FL340. The last level clearance was coincident with STAR issue at 0623, when the flight was instructed to maintain FL340. ATC was applying vertical separation between Aircraft A and two other flights. The timing of the descent was such that Aircraft A had become clear of the first conflicting aircraft and there was sufficient time to apply positive separation with the other.*
C	Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance etc) *Example: The aircraft was maintaining a flight level below the assigned altitude. The altimeters had not been reset at transition. The FL assigned was 350. The aircraft was maintaining FL346 for in excess of 4 minutes.*
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message. Includes situations where ATC delivery of operational information, including as the result of hear back and/or read back errors, is absent, delayed, incorrect or incomplete, and may result in a loss of separation.) *Example: All communications between ATC and aircraft are by HF third party voice relay. Aircraft 1 was maintaining FL360 and requested FL380. A clearance to FL370 was issued, with an expectation for higher levels at a later point. A clearance was then issued to Aircraft 2 to climb to FL390, this was correctly read back by the HF operator, but was issued to Aircraft 1.* *The error was detected when Aircraft 1 reported maintaining FL390.*
E	Coordination errors in the ATC to ATC transfer or control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters) *Example 1: Sector A coordinated Aircraft 1 to Sector B at FL380. The aircraft was actually at FL400.* *Example 2: The Sector A controller received coordination on Aircraft 1 for Waypoint X at FL370 from Sector B. At 0504 Aircraft 1 was at Waypoint X at FL350 requesting FL370.*
F	Coordination errors in the ATC to ATC transfer or control responsibility as a result of equipment outage or technical issues *Example: Controller in FIR A attempts to send AIDC message to coordinate transfer of aircraft at FL320. Messaging unsuccessful and attempts to contact adjacent FIR by telephone fail. Aircraft contacts adjacent FIR without coordination being completed.*
	Aircraft Contingency Events

G	Deviation due to aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure) *Example: Aircraft 1 descended from F400 to F300 with a pressurisation issue.*
H	Deviation due to airborne equipment failure leading to unintentional or undetected change of flight level *Example: Aircraft 1 cruising at FL380. ATC receives alert indicating aircraft climbing through FL383. Flight crew advises attempting to regain cleared level with autopilot and navigation system failure.*
Deviation due to Meteorological Condition	
I	Deviation due to turbulence or other weather related cause *Example: During the cruise at F400, the aircraft encountered severe turbulence, resulting the aircraft descending 1,000 ft without a clearance.*
Deviation due to TCAS RA	
J	Deviation due to TCAS resolution advisory, flight crew correctly following the resolution advisory *Example: Aircraft 1 was cruising at FL350. Flight crew received "Traffic Alert" from TCAS and almost immediately after an "RA Climb" instruction. Flight crew responded and climbed Aircraft 1 to approx FL353 to comply with TCAS instruction. TCAS display indicated that opposite direction Aircraft 2 descended to approx FL345 and passed below Aircraft 1.*
K	Deviation due to TCAS resolution advisory, flight crew incorrectly following the resolution advisory.
Other	
L	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC misinterpretation of flight plan) *Example 1: Original flight plan details submitted by FIR A for outbound leg showed Aircraft 1 as negative RVSM. Subsequent flight plan submitted by FIR B showed Aircraft 1 as RVSM approved. FIR A controller checked with aircraft shortly after entering FIR A and pilot confirmed negative RVSM.* *Example 2: Aircraft 2 cruising FL310 was handed off to the Sector X controller who noticed the label of Aircraft 2 indicated RVSM approval. The Sector X controller had controlled the aircraft the day before. It was then a non-RVSM aircraft. The controller queried the status of Aircraft 2 with the pilot who advised the aircraft was negative RVSM.*
M	*Other – this includes situations where:* *i) There has been a failure to establish or maintain a separation standard between aircraft; or* *ii) Where flights are operating (including climbing/descending) in airspace where flight crews are unable to establish normal air-ground communications with the responsible ATS unit.* *Example 1: Aircraft 1 cruising at FL350. At time xxxx Aircraft 1 advised "Negative RVSM" due equipment failure. At that time Aircraft 2 on converging reciprocal track FL360 less than 10 minutes prior to time of passing.*

MIDRMA
MIDDLE EAST REGIONAL MONITORING AGENCY

The information contained in this form is confidential and will be used for statistical safety analysis purposes only.

MIDRMA F4
LARGE HEIGHT DEVIATION FORM (LHD)

Report to the MIDRMA of an altitude deviation of 300ft or more, including those due to TCAS, Turbulence and Contingency Events			
1. Today's date:	2. Reporting Unit:		
DEVIATION DETAILS			
3. Operator Name:	4. Call Sign: ACFT Registration Number:	5. Aircraft Type:	6. Mode C Displayed: ❑ Yes. Which FL? _____ ❑ No.
7. Date of Occurrence:	8. Time UTC:	9. Occurrence Position (lat/long or Fix):	
10. Cleared Route of Flight:			
11. Cleared Flight Level:	12. Estimated Duration at Incorrect Flight Level (seconds):		13. Observed Deviation (+/- ft):
14. Other Traffic Involved:			
15. Cause of Deviation (*brief title*): (Examples: ATC Loop Error, Turbulence, Weather, Equipment Failure)			
AFTER DEVIATION IS RESTORED			
16. Observed/Reported Final Flight Level*: *Please indicate the source of information: ❑ Mode C ❑ Pilot	Mark the appropriate Box 17. Is the FL above the cleared level: ❑ 18. Is the FL below the cleared level: ❑	19. Did this FL comply with the ICAO Annex 2 Tables of Cruising Levels? ❑ Yes ❑ No	
NARRATIVE			
20. Detailed Description of Deviation (*Please give your assessment of the actual track flown by the aircraft and the cause of the deviation.*)			
21 - CREW COMMENTS (IF ANY)			

When complete please forward the report(s) to:
MIDRMA
Tel: +973 17 329054
Fax: +973 17 329956
Email – midrma@midrma.com
P.O.BOX 50468

Appendix I – ACTUAL FLIGHT PLAN DATA FORM

The formulated excel sheet available in the MIDRMA website www.midrma.com that sheet has been prepared in order to collect all necessary actual/current flight plan data of traffic operating between FL 290 and FL 410 inclusive. The data to be reflected in the Excel sheet includes the following elements:

COLUMN	NAME	DESCRIPTION
A	DATE	Date of Flight – in the form of yymmdd - 140115
B	ACFT REG	Aircraft registration
C	ACFT TYPE	Aircraft type according to ICAO Doc. 8643 (attached to this email)
D	ACFT C/S	Aircraft call sign used during the flight
E	DEP ADM	Departure aerodrome of the flight
F	DEST ADM	Destination aerodrome of the flight
G	ENTRY POINT	The point at which the aircraft has entered the FIR boundary, (in case of an aircraft departed from an aerodrome within the same FIR, **the departure aerodrome** must be inserted in this field - same as "E").
H	ENTRY LEVEL	The Flight level to which the aircraft has entered the relevant FIR , the flight level must correspond to the RVSM flight level only between FL 290 & FL 410 inclusive, (in case of an aircraft departed from an aerodrome within the same FIR, **the exit flight level** must be inserted in this field - same as "K").
I	ENTRY TIME	The actual time at which the aircraft has entered the FIR (the time must be in UTC four figures time group without any space or dots in between, in case of an aircraft departed from an aerodrome within the same FIR, the **ATD** - Actual time of departure of the flight must be inserted in this field).
J	EXIT POINT	The point at which the aircraft has left the FIR boundary (in case of an aircraft is landing in an aerodrome within the same FIR, **the destination aerodrome** must be inserted in this field - same as "F")
K	EXIT LEVL	The Flight level to which the aircraft has exited the relevant FIR (the level must correspond to the RVSM level only -between FL 290 & FL 410 inclusive), for ACFT landing within the same FIR, the flight level at which the ACFT entered the RVSM airspace must be inserted in this field - same as "H".
L	EXIT TIME	The actual time at which the aircraft has exited the FIR or the RVSM airspace (the time must be in UTC four figures time group without any space or dots in between, for ACFT landing within the FIR, **insert the ATA** - Actual time of Arrival).
M	TOTAL FLYING TIME	This column has to be left blank, as special formulas shall automatically calculate the flying time, however, the responsibility of filling this field shall solely rely on office.
N	EQUIPMENT	Letter W must be inserted in this field as extracted from the flight plan, if non-RVSM aircraft was permitted to operate within the RVSM airspace letter N must be inserted.
O	REMARKS	Any other additional remarks or points related to the flight.

ACTUAL FLIGHT PLAN DATA FORM EXCEL SHEET FORM (DATA SAMPLE)

DATE	ACFT REG	ACFT C/S	ICAO ACFT TYPE	DEP ADM	DEST ADM	ENRTY POINT	ENTRY LEVEL	ENTRY TIME	EXIT POINT	EXIT LEVEL	EXIT TIME	Equipment	Remarks
140115	A6ECF	UAE343	B77W	WMKK	OMDB	PARAR	320	2253	PASOV	200	2351		
140115	A7ADH	QTR1132	A320	OTBD	OOMS	RETAS	290	2325	MCT	160	2349		
140115	A6ENK	UAE318	B77W	OMDB	RJAA	LALDO	261	2328	ALPOR	330	2356		
140115	A6ENL	UAE650	B77W	OMDB	VCBI	TARDI	261	2318	LOTAV	350	2357		
140115	A6EFH	UAE544	B772	OMDB	VOMM	LALDO	254	2314	PARAR	370	2357		
140115	A6ENI	UAE432	B77W	OMDB	WSSS	LALDO	279	2317	PARAR	350	2359		
140115	HZAKM	SVA754	B772	OEJN	VOHS	TOKRA	370	2315	RASKI	390	2357		
140115	A6EYS	ETD871	A332	RJAA	OMAA	DENDA	380	2319	ITRAX	160	2357		
140115	A6ERR	UAE705	A345	OMDB	FSIA	TARDI	244	2307	KIVEL	380	2349		

Appendix J – MINIMUM MONITORING REQUIREMENTS – ACFT GROUP

1. UPDATE OF MONITORING REQUIREMENTS TABLE AND WEBSITE. As significant data is obtained, monitoring requirements for specific aircraft types may change. When Table 1 below, is updated, The MIDRMA will advise all State members. The updated table will be posted on the MIDRMA website.

2. MONITORING PROGRAM. All operators that operate or intend to operate in the Middle East Region airspace where RVSM is applied are required to participate in the regional RVSM monitoring programme. Table 1 addresses requirements for monitoring the height-keeping performance of aircraft in order to meet regional safety objectives. In their application to the appropriate State authority for RVSM approval, operators must show a plan for meeting the applicable monitoring requirements. Initial monitoring should be completed as soon as possible but not later than 6 months after the issue of RVSM approval, the State of Registry that had issued an RVSM approval to an operator would be required to establish a requirement which ensures that a minimum of two aeroplanes of each aircraft type grouping of the operator have their height-keeping performance monitored, at least once every two years or within intervals of 1000 flight hours per aeroplane, whichever period is longer.

3. AIRCRAFT STATUS FOR MONITORING. Aircraft engineering work that is required for the aircraft to receive RVSM airworthiness approval must be completed prior to the aircraft being monitored. Any exception to this rule will be coordinated with the State authority.

4. APPLICABILITY OF MONITORING FROM OTHER REGIONS. Monitoring data obtained in conjunction with RVSM monitoring programmes from other Regions can be used to meet regional monitoring requirements. The RMAs, which are responsible for administering the monitoring programme, have access to monitoring data from other Regions and will coordinate with States and operators to inform them on the status of individual operator monitoring requirements.

5. MONITORING PRIOR TO THE ISSUE OF RVSM OPERATIONAL APPROVAL IS NOT A REQUIREMENT. Operators should submit monitoring plans to the responsible civil aviation authority and to the MIDRMA that show how they intend to meet the requirements specified in Table1. Monitoring will be carried out in accordance with this table.

6. AIRCRAFT GROUPS NOT LISTED IN TABLE 1. Contact the MIDRMA for clarification if an aircraft group is not listed in Table 1 or for clarification of other monitoring related issues. An aircraft group not listed in Table 1 will probably be subject to Category 2 or Category 3 monitoring requirements.

7. TABLE OF MONITORING GROUPS. Table 2 shows the aircraft types and series that are grouped together for operator monitoring purposes.

8. TRAILING CONE DATA. Altimetry System Error estimations developed using Trailing Cone data collected during RVSM certification flights can be used to fulfill monitoring requirements. It must be documented, however, that aircraft RVSM systems were in the approved RVSM configuration for the flight.

9. MONITORING OF AIRFRAMES THAT ARE RVSM COMPLIANT ON DELIVERY. If an operator adds new RVSM compliant airframes of a type for which it already has RVSM operational approval and has completed monitoring requirements for the type in accordance with the attached table, the new airframes are not required to be monitored. If an operator adds new RVSM compliant airframes of an aircraft type for which it has NOT previously received RVSM operational approval, then the operator should complete monitoring in accordance with the attached table.

Table 1: MONITORING REQUIREMENTS TABLE

Note: The above table represents the minimum monitoring requirements; but RMAs may increase these requirements at their discretion.

MONITORING IS REQUIRED IN ACCORDANCE WITH THIS TABLE NOTE: MONITORING PRIOR TO THE ISSUE OF RVSM APPROVAL IS **NOT** A REQUIREMENT			
CATEGORY		**AIRCRAFT GROUP**	**MINIMUM OPERATOR MONITORING FOR EACH AIRCRAFT GROUP**
1	GROUP APPROVED: DATA INDICATES COMPLIANCE WITH THE RVSM MASPS	A124, A300, A306, A310-GE, A310-PW, A318, A320, A330, A340, A345, A346, A3ST, AVRO, B712, B727, B737CL, B737C, B737NX, B747CL, B74S, B744-5, B744-10, B752, B753, B767, B764, B772, B773, BD100, CL600, CL604, CL605, C17, C525, C560, C56X, C650, C680, C750, CARJ, CRJ7, CRJ9, DC10, E135-145, E170-190, F100, F900, FA10, GALX, GLEX, GLF4, GLF5, H25B-800, J328, KC135, LJ40, LJ45, LJ60, MD10, MD11, MD80, MD90, PRM1, T154	Two airframes from each fleet of an operator to be monitored
2	GROUP APPROVED: INSUFFICIENT DATA ON APPROVED AIRCRAFT	Other group aircraft other than those listed above including: A148,**A158**, A380, **A400**,**AC90,**AC95, AN72, ASTR, ASTR-SPX, B701, B703, B703-E3, B731, B732, **B787,**BD700, BE20, BE30, BE40, B744-LCF, B748, C130, C500, C25A, C25B, C25C, C441, C5, C510, C550-552, C550-B, C550-II, C550-SII, **CRJ10,** D328, DC85, DC86-87, DC93, DC95, E120, E50P, **E55P**, EA50, F2TH, F70, FA20, FA50**,** FA7X, G150**,** GLF2, GLF2B, GLF3, **GLF6,**H25B-700, H25B-750, H25C, HA4T, IL62, IL76, IL86, IL96, L101, **LJ23, LJ24,LJ25,LJ28,**L29B-2, L29B-731, LJ31, LJ35-36, LJ55, MU30, P180, PC12, SB20, SBR1, SBR2, T134, T204, T334, TBM, WW24, YK42	60% of airframes (round up if fractional) from each fleet of an operator **or** individual monitoring
3	Non-Group	**Aircraft types for which no generic compliance method exists;** **BA11, R722, SJ30, STAR, B720, A225, GLEX-ASTOR, GLF5-AEW, VC-10 GPSN, B74S-SOFIA**	100% of aircraft shall be monitored

Table 2: MONITORING GROUPS FOR AIRCRAFT CERTIFIED UNDER GROUP APPROVAL REQUIREMENTS

Monitoring Group	A/C ICAO	A/C Type	A/C Series
A124	A124	AN-124 RUSLAN	ALL SERIES
A148	A148	AN-148	100
A300	A30B	A300	B2-100, B2-200, B4-100, B4-100F, B4-120, B4-200, B4-200F, B4-220, B4-220F, C4-200
A306	A306	A300	600, 600F, 600R, 620, 620R, 620RF
A310-GE	A310	A310	200, 200F, 300, 300F
A310-PW	A310	A310	220, 220F,320
A318	A318	A318	ALL SERIES
A320	A319 A320 A321	A319 A320 A321	CJ , 110, 130 110, 210, 230 110, 130, 210, 230
A330	A332 A333	A330 A330	200, 220, 240 300, 320, 340
A340	A342 A343	A340 A340	210 310
A345	A345	A340	500, 540
A346	A346	A340	600, 640
A380	A388	A380	800, 840, 860
A3ST	A3ST	A300	600R ST BELUGA
AC95	AC95	AERO COMMANDER 695	A
A400	**A400**	**A400M**	
AC90	**AC90**	**COMMANDER 690** **COMMANDER 840** **COMMANDER 900**	
AC95	AC95	AERO COMMANDER 695	
AN72	AN72	AN-72 AN-74	ALL SERIES
ASTR	ASTR	1125 ASTRA	ALL SERIES
ASTR-SPX	ASTR	1125 ASTR SPX, G100	ALL SERIES
AVRO	RJ1H RJ70 RJ85	AVRO AVRO AVRO	RJ100 RJ70 RJ85
B701	B701	B707	100, 120B
B703	B703	B707	320, 320B, 320C
B703-E3	**E3TF**	B707	E-3
B712	B712	B717	200
B727	B721 B722	B727 B727	100, 100C, 100F,100QF 200, 200F
B731	B731	B737	100
B732	B732	B737	200, 200C
B737CL	B733 B734 B735	B737 B737 B737	300 400 500

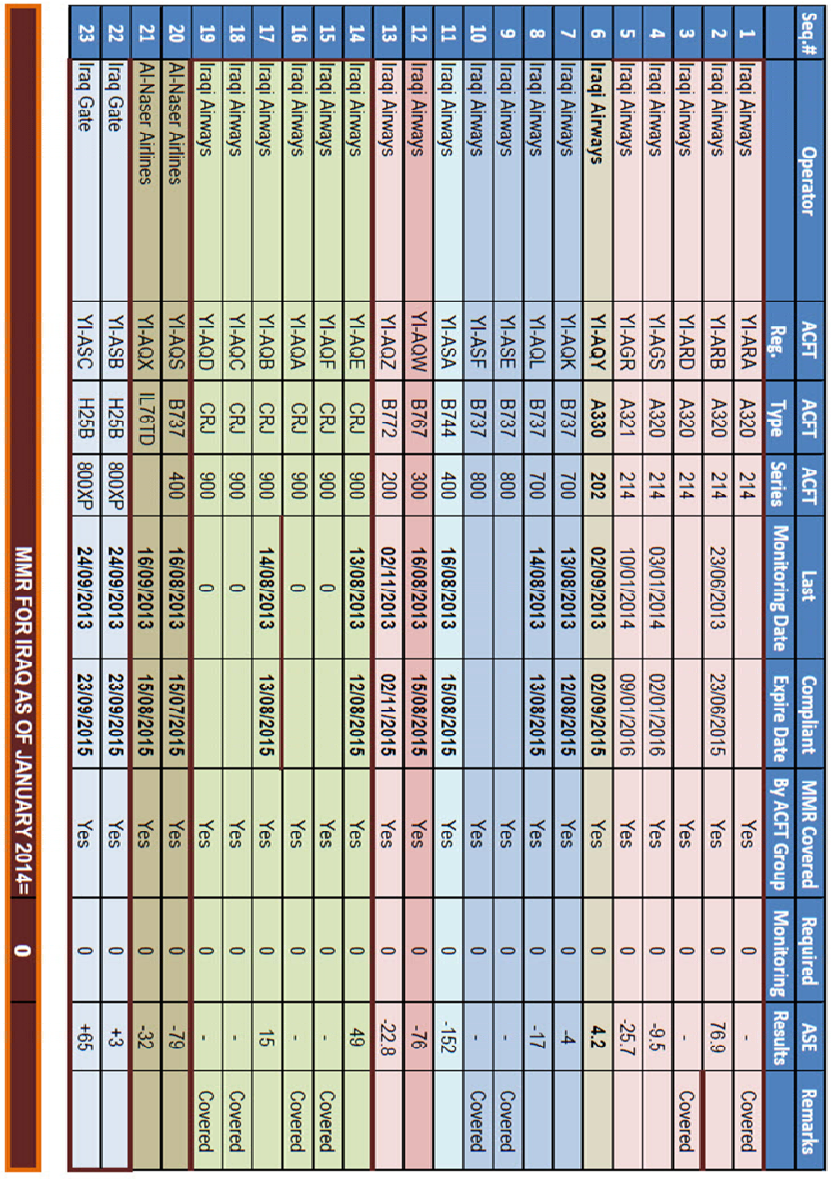
Monitoring Group	A/C ICAO	A/C Type	A/C Series
B737NX	B736 B737 B738 B739	B737 B737 B737 B737	600 700, BBJ 800, BBJ2 900
B737C	B737	B737	700C
B747CL	B741 B742 B743	B747 B747 B747	100, 100B, 100F 200B, 200C, 200F, 200SF 300
B74S	B74S **B74R**	B747	SR, SP
B744-5	B744 **B74D**	B747	400, 400D, 400F (With 5 inch Probes up to SN 25350)
B744-10	B744	B747	400, 400D, 400F (With 10 inch Probes from SN 25351)
B744-LCF	B744	B747	LCF
B748	B748	B747	8F, 81
B752	B752	B757	200, 200PF, 200SF
B753	B753	B757	300
B767	B762 B763	B767 B767	200, 200EM, 200ER, 200ERM, 300, 300ER, 300ERF
B764	B764	B767	400ER
B772	B772 **B77L**	B777	200, 200ER, 200LR, 200LRF
B773	B773 **B77W**	B777	300, 300ER
B787	**B788** **B789**	**B787-8** **B787-9**	
BD100	CL30	CHALLENGER 300	ALL SERIES
BD700	GL5T	GLOBAL 5000	ALL SERIES
BE20	BE20	200 KINGAIR	ALL SERIES
BE30	BE30 **B350**	B300 SUPER KINGAIR B300 SUPER KINGAIR 350	ALL SERIES
BE40	BE40	BEECHJET 400 BEECHJET 400A BEECHJET 400XP HAWKER 400XP	ALL SERIES
C130	C130	HERCULES	H, J
C17	C17	C-17 GLOBEMASTER 3	ALL SERIES
C441	C441	CONQUEST II	ALL SERIES
C5	C5	C5	ALL SERIES
C500	C500	500 CITATION 500 CITATION I 501 CITATION I SINGLE PILOT	ALL SERIES
C510	C510	MUSTANG	ALL SERIES
C525	C525	525 CITATIONJET 525 CITATIONJET I 525 CITATIONJET PLUS	ALL SERIES

Monitoring Group	A/C ICAO	A/C Type	A/C Series
C25A	C25A	525A CITATIONJET II	ALL SERIES
C25B	C25B	CITATIONJET III 525B CITATIONJET III	ALL SERIES
C25C	C25C	525C CITATIONJET IV	ALL SERIES
C550-552	C550	552 CITATION II (USN)	ALL SERIES
C550-B	C550	550 CITATION BRAVO	ALL SERIES
C550-II	C550	550 CITATION II 551 CITATION II SINGLE PILOT	ALL SERIES
C550-SII	C550	S550 CITATION SUPER II	ALL SERIES
C560	C560	560 CITATION V 560 CITATION V ULTRA 560 CITATION V ENCORE	ALL SERIES
C56X	C56X	560 CITATION EXCEL	ALL SERIES
C650	C650	650 CITATION III 650 CITATION VI 650 CITATION VII	ALL SERIES
C680	C680	680 CITATION SOVEREIGN	
C750	C750	750 CITATION X	ALL SERIES
CARJ	CRJ1 CRJ2 CRJ2 CRJ2	REGIONALJET REGIONALJET CHALLENGER 800 CHALLENGER 850	100, 100ER, 200, 200ER, 200LR ALL SERIES ALL SERIES
CRJ7	CRJ7	REGIONALJET	700, 700ER, 700LR
CRJ9	CRJ9	REGIONALJET	900, 900ER, 900LR
CRJ10	**CRJ10**	**REGIONALJET**	**1000ER**
CL600	CL60	CL-600 CL-601	CL-600-ALL SERIES CL-601- ALL SERIES,
CL604	CL60	CL-604	CL-604- ALL SERIES
CL605	CL60	CL-605	CL-605- ALL SERIES
DC10	DC10	DC-10	10, 10F, 15, 30, 30F, 40, 40F
D328	D328	328 TURBOPROP	100
DC85	DC85	DC-8	50, 50F
DC86-87	DC86 DC87	DC-8 DC-8	61, 62, 63 71, 72, 73
DC91	**DC91**	**DC-9**	**10,15**
DC93	DC93	DC-9	30, 30F
DC94	**DC94**	**DC-9**	**40**
DC95	DC95	DC-9	51
E135-145	E135 E145	EMB-135 EMB-145	ALL SERIES
E170-190	E170 E170 E190 E190	EMB-170 EMB-175 EMB-190 EMB-195	ALL SERIES
E120	E120	EMB-120 BRASILIA	ALL SERIES
E50P	W50P	PHENOM 100	ALL SERIES

Monitoring Group	A/C ICAO	A/C Type	A/C Series
E55P	**E55P**	**PHENOM300**	**E55P**
EA50	EA50	ECLIPSE	ALL SERIES
F100	F100	FOKKER 100	ALL SERIES
F2TH	F2TH	FALCON 2000 FALCON 2000-EX FALSON 2000LX	ALL SERIES
F70	F70	FOKKER 70	ALL SERIES
F900	F900	FALCON 900 FALCON 900DX FALCON 900EX	ALL SERIES
FA10	FA10	FALCON 10	ALL SERIES
FA20	FA20	FALCON 20 FALCON 200	ALL SERIES
FA50	FA50	FALCON 50 FALCON 50EX	ALL SERIES
FA7X	FA7X	FALCON 7X	ALL SERIES
G150	G150	G150	ALL SERIES
G250	**G250**	**G250**	
GALX	GALX	1126 GALAXY G200	ALL SERIES
GLEX	GLEX	BD-700 GLOBAL EXPRESS	ALL SERIES
GLF2	GLF2	GULFSTREAM II (G-1159)	ALL SERIES
GLF2B	GLF2	GULFSTREAM IIB (G-1159B)	ALL SERIES
GLF3	GLF3	GULFSTREAM III (G-1159A)	ALL SERIES
GLF4	GLF4	GULFSTREAM IV (G-1159C) G300 G350 G400 G450	ALL SERIES
GLF5	GLF5	GULFSTREAM V (G-1159D) G500 G550	ALL SERIES
GLF6	**GLF6**	**G650**	
H25B-700	H25B	BAE 125 / HS125	700A, 700B
H25B-750	H25B	HAWKER 750	ALL SERIES
H25B-800	H25B	BAE 125 / HS125 HAWKER 800XP HAWKER 800XPI HAWKER 800 HAWKER 850XP HAWKER 900XP HAWKER 950XP	800A, 800B ALL SERIES
H25C	H25C	HAWKER 1000	ALL SERIES
HA4T	HA4T	HAWKER 4000	ALL SERIES
IL62	IL62	ILYUSHIN-62	ALL SERIES

Monitoring Group	A/C ICAO	A/C Type	A/C Series
IL76	IL76	ILYUSHU-76	ALL SERIES
IL86	IL86	ILYUSHIN-86	ALL SERIES
IL96	IL96	ILYUSHIN-96	ALL SERIES
J328	J328	328JET	ALL SERIES
KC135	B703	KC-135	ALL SERIES
L101	L101	L-1011 TRISTAR	ALL SERIES
L29B-2	L29B	L-1329 JETSTAR 2	ALL SERIES
L29B-731	L29B	L-1329 JETSTAR 731	ALL SERIES
LJ23	**LJ23**	**LEARJET 23**	
LJ24	**LJ24**	**LEARJET 24**	
LJ25	**LJ25**	**LEARJET 25**	
LJ28	**LJ28**	**LEARJET 28** **LEARJET 29**	
LJ31	LJ31	LEARJET 31	ALL SERIES
LJ35-36	LJ35 LJ36	LEARJET 35 LEARJET 36	ALL SERIES ALL SERIES
LJ40	LJ40	LEARJET 40	ALL SERIES
LJ45	LJ45	LEARJET 45	ALL SERIES
LJ55	LJ55	LEARJET 55	ALL SERIES
LJ60	LJ60	LEARJET 60	ALL SERIES
MD10	MD10	MD-10	ALL SERIES
MD11	MD11	MD-11	COMBI, ER, FREIGHTER, PASSENGER
MD80	MD81 MD82 MD83 MD87 MD88	MD-80 MD-80 MD-80 MD-80 MD-80	81 82 83 87 88
MD90	MD90	MD-90	30, 30ER
MU30	MU30	MU-300 DIAMOND	1A
P180	P180	P-180 AVANTI	ALL SERIES
PAY4	**PAY4**	**PA-42**	**1000 CHEYENNE**
PC12	PC12	PC-12	ALL SERIES
PRM1	PRM1	PREMIER 1	ALL SERIES
SB20	SB20	SAAB 2000	ALL SERIES
SBR1	SBR1	SABRELINER 40 SABRELINER 60 SABRELINER 65	ALL SERIES
SBR2	SBR2	SABRELINER 80	ALL SERIES
T134	T134	TU-134	A, B
T154	T154	TU-154	A, B, M, S
T204	T204 T224 T234	TU-204 TU-224 TU-234	100, 100C, 120RR 200, 214, C
T334	T334	TU-334	ALL SERIES
TBM	TBM7 TBM8	TBM-700 TBM-850	ALL SERIES
WW24	WW24	1124 WESTWIND	ALL SERIES
YK42	YK42	YAK-42	ALL SERIES

Appendix K – SAMPLE OF MIDRMA STATE MMR TABLE



IRAQ - APPROVED RVSM ACFT MINIMUM MONITORING REQUIREMENTS AS OF JANUARY 2014

Seq.#	Operator	ACFT Reg.	ACFT Type	ACFT Series	Last Monitoring Date	Compliant Expire Date	MMR Covered By ACFT Group	Required Monitoring	ASE Results	Remarks
1	Iraqi Airways	YI-ARA	A320	214			Yes	0	-	Covered
2	Iraqi Airways	YI-ARB	A320	214	23/06/2013	23/06/2015	Yes	0	76.9	
3	Iraqi Airways	YI-ARD	A320	214			Yes	0	-	Covered
4	Iraqi Airways	YI-AGS	A320	214	03/01/2014	02/01/2016	Yes	0	-9.5	
5	Iraqi Airways	YI-AGR	A321	214	10/01/2014	09/01/2016	Yes	0	-25.7	
6	**Iraqi Airways**	**YI-AQY**	**A330**	**202**	**02/09/2013**	**02/09/2015**	Yes	0	**4.2**	
7	Iraqi Airways	YI-AQK	B737	700	**13/08/2013**	**12/08/2015**	Yes	0	-4	
8	Iraqi Airways	YI-AQL	B737	700	**14/08/2013**	**13/08/2015**	Yes	0	-17	
9	Iraqi Airways	YI-ASE	B737	800			Yes	0	-	Covered
10	Iraqi Airways	YI-ASF	B737	800			Yes	0	-	Covered
11	Iraqi Airways	YI-ASA	B744	400	**16/08/2013**	**15/08/2015**	Yes	0	-152	
12	Iraqi Airways	YI-AQW	B767	300	**16/08/2013**	**15/08/2015**	Yes	0	-76	
13	Iraqi Airways	YI-AQZ	B772	200	**02/11/2013**	**02/11/2015**	Yes	0	-22.8	
14	Iraqi Airways	YI-AQE	CRJ	900	**13/08/2013**	**12/08/2015**	Yes	0	49	
15	Iraqi Airways	YI-AQF	CRJ	900	0		Yes	0	-	Covered
16	Iraqi Airways	YI-AQA	CRJ	900	0		Yes	0	-	Covered
17	Iraqi Airways	YI-AQB	CRJ	900	**14/08/2013**	**13/08/2015**	Yes	0	15	
18	Iraqi Airways	YI-AQC	CRJ	900	0		Yes	0	-	Covered
19	Iraqi Airways	YI-AQD	CRJ	900	0		Yes	0	-	Covered
20	Al-Naser Airlines	YI-AQS	B737	400	**16/08/2013**	**15/07/2015**	Yes	0	-79	
21	Al-Naser Airlines	YI-AQX	IL76TD		**16/09/2013**	**15/08/2015**	Yes	0	-32	
22	Iraq Gate	YI-ASB	H25B	800XP	**24/09/2013**	**23/09/2015**	Yes	0	+3	
23	Iraq Gate	YI-ASC	H25B	800XP	**24/09/2013**	**23/09/2015**	Yes	0	+65	

MMR FOR IRAQ AS OF JANUARY 2014= **0**

Appendix L - SAMPLE LETTER TO STATE AUTHORITY REQUESTING CLARIFICATION OF THE APPROVAL STATE RVSM APPROVAL STATUS OF AN OPERATOR

Note: When the RVSM approval status shown in filed flight plan is not confirmed in the MIDRMA's database of State approvals, a letter similar to the following should be sent to the relevant State authority:

<STATE AUTHORITY ADDRESS>

1. The MIDRMA has been established to support safe implementation and use of the Reduced Vertical Separation Minimum (RVSM) in Middle East in accordance with guidance published by the International Civil Aviation Organization.

2. Among the other activities, the MIDRMA conducts a comparison of the State RVSM approval status notified by an operator to an air traffic control unit to the records of State RVSM approvals available to us. This comparison is considered vital to ensuring the continued integrity of RVSM use.

3. This letter is to advise that an operator which we believe is on your State registry provided notice of State RVSM approval which is not confirmed by our records. The details of the occurrence are as follows:

Date:

Operator name:
Aircraft flight identification:
Aircraft type:
Registration mark:
ATC unit receiving notification:

4. We request that you advise this office of the RVSM approval status of this operator. In the event that you have not granted RVSM approval to this operator, we request that you advise this office of any action which you propose to take.

Sincerely,

(MIDRMA official)

F1

Appendix M - SAMPLE LETTER TO AN OPERATOR OF AN AIRCRAFT OBSERVED TO HAVE EXHIBITED AN ALTIMETRY SYSTEM ERROR IN EXCESS OF 245 FT IN MAGNITUDE

Operator

HEIGHT KEEPING PERFORMANCE IN RVSM AIRSPACE

Dear Mr,

On (date), a 1000ft Reduced Vertical Separation Minimum (RVSM) was introduced in X Airspace. The introduction and continued operation of RVSM is conditional on the risk of collision as a consequence of the loss of vertical separation is less that the agreed Target Level of Safety (TLS) of 5 x 10^{-9} fatal accidents per flight hour.

As part of the process to verify that the TLS is being achieved, the height keeping performance of aircraft holding RVSM MASPS approval have and are being monitored in accordance with ICAO requirements.

On date a flight, aircraft registration xyz, Modes S Code xyz, which we believe to be operated by you and notified as being RVSM MASPS compliant by operator, was monitored by the Monitoring unit as having an Altimetry System Error (ASE) = x.

For a detailed explanation on the height keeping requirements you may wish to refer to JAA TGL 6.

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 the necessary arrangements are made for a repeat measurement at the earliest opportunity following any rectification or inspection of the altimetry system.

The findings of your investigation should be summarised on the enclosed “Height keeping Investigation Form” and returned to MIDRMA at the address given.

We would ask that you acknowledge receipt of this communication as soon as possible by email or telephone to

MIDRMA Contact details

Thank you for your continued co-operation.

Yours Faithfully,

CC: *State authority of aircraft registration/operation*

F2

Part 1 – General Information

State of Registry	
Operator	
State of Operator	
Aircraft Type & Series	
Registration	
Serial Number	
Mode S Address	

Part 2 – Details of Height Keeping Error

A shaded box with bold figures indicates an excess of the JAA TGJ6 REV1 requirements (taking into account measurement error)

Date & Time of Measurement	Assigned Flight Level	Altimetry System Error (feet)	Assigned Altitude Deviation (feet)	Total Vertical Error (feet)

Provide details below of the fault found (if any) plus date and nature of the rectification work. Please also include a estimate of the number of flight the aircraft has performed in European airspace between the date of measurement and rectification

When complete, please return (scan copy) to; midrma@midrma.com

Appendix N – PROCEDURE TO BE FOLLOWED FOR CONDUCTING GMU MONITORING REQUEST:

1. The operators will fill out and submit an RVSM Monitoring Application at **Appendix O** (Available in the MIDRMA website www.midrma.com)

2. The MIDRMA will request the State CAA for Airworthiness Approval of the aircraft.

3. Upon the receipt of the Airworthiness Approval of the aircraft the MIDRMA is going to forward this certificate to monitoring unit/body as soon as possible with the RVSM Monitoring Application form filled by the operator.

4. The monitoring unit/body will submit a confirmation receipt back to the MIDRMA and will forward the application to their Monitoring Service Team.

5. The Monitoring Service Team will contact the MIDRM and the operator to discuss options and arrange for the Monitoring Services.

6. Operator accepts and agrees on the Monitoring Service proposed working program.

7. The Monitoring Service Team conducts the monitoring flight.

8. The monitoring unit/body will obtain the results from their Monitoring Service Team and shall forward the results to the MIDRMA and the operator.

9. The MIDRMA will issue an official letter to the State CAA and the operator.

10. The State shall issue the appropriate F2 form and send it to the MIDRMA or update all the state's RVSM approvals.

11. The MIDRMA will update the RVSM database accordingly.

Appendix O – REDUCED VERTICAL SEPARATION MINIMUM (RVSM) MONITORING APPLICATION

MIDRMA
MIDDLE EAST REGIONAL MONITORING AGENCY

REDUCED VERTICAL SEPARATION MINIMUM (RVSM) MONITORING APPLICATION

Operator Name: _____

Address: _____

_____

Operator Primary Point of Contact Details

Name: _____ Title: _____

Telephone Number: _____ Fax Number: _____

Email Address: _____

Secondary Point of Contact Details

Name: _____ Title: _____

Telephone Number: _____ Fax Number: _____

Email Address: _____

Civil Aviation Authority Contact Details

Name: _____ Title: _____

Telephone Number: _____ Fax Number: _____

Email Address: _____

AIRCRAFT INFORMATION
(Please be sure to include data for the ENTIRE fleet)

Registration Number	Aircraft Type/version no.	Serial Number

Return completed form to the MIDRMA by Email via midrma@midrma.com or midrma@batelco.com.bh

Appendix P – ICAO STATE CODES

ICAO State Code	***State***
OA	Afghanistan
LA	Albania
DA	Algeria
NS	American Samoa
FN	Angola
TQ	Anguilla
TA	Antigua and Barbuda
LV	Areas Under The Control Of The Palestinian Authority
SA	Argentina
UD	Armenia
TN	Aruba
FH	Ascension I.
Y	Australia
LO	Austria
UB	Azerbaijan
MY	Bahamas
OB	Bahrain
VG	Bangladesh
TB	Barbados
UM	Belarus
EB	Belgium
MZ	Belize
DB	Benin
TX	Bermuda
VQ	Bhutan
SL	Bolivia
LQ	Bosnia and Herzegovina
FB	Botswana
SB	Brazil
FJ	British Indian Ocean Territory
TU	British Virgin Islands
WB	Brunei Darussalam
LB	Bulgaria
DF	Burkina Faso
HB	Burundi
VD	Cambodia
FK	Cameroon
C	Canada
GC	Canary Islands
GV	Cape Verde

ICAO State Code	***State***
MW	Cayman Islands
FE	Central African Republic
FT	Chad
SC	Chile

ZB	China
SK	Colombia
FM	Comoros
FC	Congo
NC	Cook Islands
MR	Costa Rica
DI	Côte d'Ivoire
LD	Croatia
MU	Cuba
LC	Cyprus
LK	Czech Republic
ZK	Democratic People's Republic of Korea
FZ	Democratic Republic of the Congo
EK	Denmark
HD	Djibouti
TD	Dominica
MD	Dominican Republic
SE	Ecuador
HE	Egypt
MS	El Salvador
FG	Equatorial Guinea
HH	Eritrea
EE	Estonia
HA	Ethiopia
SF	Falkland Islands (Malvinas)
NF	Fiji
EF	Finland
LF	France
TF	French Antilles
SO	French Guyana
NT	French Polynesia
FO	Gabon
GB	Gambia
ED	Germany
DG	Ghana
LX	Gibraltar
LG	Greece
BG	Greenland
TG	Grenada
ICAO State Code	***State***
MG	Guatemala
GU	Guinea
GG	Guinea-Bissau
SY	Guyana
MT	Haiti
MH	Honduras
VH	Hong Kong, China
LH	Hungary
BI	Iceland

VA	India
WA	Indonesia
OI	Iran (Islamic Republic of)
OR	Iraq
EI	Ireland
LL	Israel
LI	Italy
MK	Jamaica
RJ	Japan
PJ	Johnston Island
OJ	Jordan
UA	Kazakhstan
HK	Kenya
NG	Kiribati
OK	Kuwait
UA	Kyrgyzstan
VL	Lao People's Democratic Republic
EV	Latvia
OL	Lebanon
FX	Lesotho
GL	Liberia
HL	Libyan Arab Jamahiriya
PL	Line Islands
EY	Lithuania
EL	Luxembourg
VM	Macao, China
FM	Madagascar
FW	Malawi
WB	Malaysia
WM	Malaysia (Peninsular)
VR	Maldives
GA	Mali
LM	Malta
PK	Marshall Islands
ICAO State Code	***State***
GQ	Mauritania
FI	Mauritius
MM	Mexico
PT	Micronesia (Federated States of)
PM	Midway
LN	Monaco
ZM	Mongolia
TR	Montserrat
GM	Morocco
FQ	Mozambique
VY	Myanmar
FY	Namibia
AU	Nauru
VN	Nepal

EH	Netherlands
TN	Netherlands Antilles
NW	New Caledonia
NZ	New Zealand
MN	Nicaragua
DR	Niger
DN	Nigeria
NI	Niue
PG	Northern Mariana Islands
EN	Norway
OO	Oman
OP	Pakistan
PT	Palau
MP	Panama
AY	Papua New Guinea
SG	Paraguay
SP	Peru
RP	Philippines
EP	Poland
LP	Portugal (Madeira and Azores)
TJ	Puerto Rico
OT	Qatar
RK	Republic of Korea
LU	Republic of Moldova
FM	Réunion
LR	Romania
U	Russian Federation
HR	Rwanda
TL	Saint Lucia
ICAO State Code	***State***
TV	Saint Vincent and the Grenadines
NS	Samoa
FP	Sao Tome and Principe
OE	Saudi Arabia
GO	Senegal
LY	Serbia and Montenegro
FS	Seychelles
GF	Sierra Leone
WS	Singapore
LZ	Slovakia
LJ	Slovenia
AG	Solomon Islands
HC	Somalia
FA	South Africa
GE	Spain
VC	Sri Lanka
TK	St. Kitts and Nevis
HS	Sudan
SM	Suriname

FD	Swaziland
ES	Sweden
LS	Switzerland
OS	Syrian Arab Republic
UT	Tajikistan
VT	Thailand
LW	The Former Yugoslav Republic of Macedonia
WP	Timor-Leste
DX	Togo
NF	Tonga
TT	Trinidad and Tobago
DT	Tunisia
LT	Turkey
UT	Turkmenistan
MB	Turks and Caicos Islands
NG	Tuvalu
HU	Uganda
UK	Ukraine
OM	United Arab Emirates
EG	United Kingdom
BK	United Nations Interim Administration Mission in Kosovo (UNMIK)
HT	United Republic of Tanzania
K	United States
SU	Uruguay
ICAO State Code	***State***
UT	Uzbekistan
NV	Vanuatu
SV	Venezuela
VV	Viet Nam
TI	Virgin Islands
PW	Wake Island
NL	Wallis and Futuna Islands
GS	Western Sahara
OY	Yemen
FL	Zambia
FV	Zimbabwe

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