International Civil Aviation Organization
UNDP/ICAO Regional Project RLA/98/003
Transition to the CNS/ATM Systems in the CAR and SAM Regions

Third Meeting/Workshop of Air Traffic Management (ATM) Authorities and Planners
(Lima, Peru, 20.24 May 2002)

Agenda Item 4: Analysis of the Action Plan for RVSM Implementation in the CAR/SAM Regions

Programme for the collection of statistical data and information on navigation deviations

(Presented by the Secretariat)

Summary

This working paper provides the meeting with background information about the collection of statistical data and information on navigation deviations and requests service providers that have not yet done so to institute programmes in the relevant ATC units for the collection of statistical data and information on navigation deviations.

References:

- Report of the CAR/SAM RAN /3 meeting
- Report of the GREPECAS/10 meeting
- Report of the AP/ATM/2 meeting

1 Introduction

1.1 During GREPECAS/10, the following Conclusions and Decisions were formulated: Conclusion 10/11, approving RVSM implementation in the Flight Information Regions (FIR) of CAR/SAM States/Territories and COCESNA; Decision 10/17 requesting Project RLA/98/003 to start an RNP-10 trial and demonstration programme on UL 780 and its parallel route; and Conclusion 10/14 asking CAR/SAM States, Territories and International Organisations to start collecting information about navigation deviations on both the lateral and vertical planes, to be used for making the relevant safety assessments for RNP and RVSM implementation, as requested previously through Conclusion 2/4 of the AP/ATM/2 meeting.

1.2 **Analysis**

1.2.1 The importance should be stressed of having the largest possible amount of statistical data and of its accuracy, in order to create a database for use in safety assessments.

1.2.2 For that reason, it is essential for States/Territories/International Organisations to institute programmes for the collection of statistical data and information on navigation deviations in the relevant ATC units.

1.2.3 Appendices A and B to this working paper describe in detail the information required and Appendix C contains the form to be sent in monthly to CAR/SAM MA (ref. Recommendation 5/28 CAR/SAM RAN/3) with a copy to the respective ICAO NACC and SAM Offices.

1.2.4 If no deviations are detected, information should be sent monthly indicating that no deviations were detected in the airspace in question during the evaluation period.

1.3 **Suggested action**

1.3.1 The meeting is invited to take note of the information provided in this working paper, consider what information is needed to carry out the respective safety assessments and, if appropriate, approve the following conclusion:

Draft Conclusion AP ATM3 - XX **Programme for the collection of statistical data and information on navigation deviations**

That:

a) the States/Territories/International Organisations that have not yet done so, establish programmes in the appropriate ATC units for the collection of statistical data and information on navigation deviations needed to conduct airspace safety assessments, using as a basis Appendices XX, XX and XX to this part of the report; and

b) send that information to the CAR/SAMMA agency and to the respective ICAO NACC or SAM Regional Office.

APPENDIX A

PROPOSAL FOR THE IMPLEMENTATION OF RVSM DATABASES THAT SHOULD BE UNDER STATES' RESPONSIBILITY

1. All CAR/SAM States who participate directly or indirectly on the RVSM Programme are to supply whoever is making the safety assessment and to the regional monitoring agency all necessary information in order to carry out their corresponding tasks.

1.1 Considering the aforementioned, two areas have been identified, within the normal States' organization, to be organized in a way to respond future data requirements that might be necessary in order to complete a safety assessment of RVSM scenarios and to carry out a monitoring of the maintenance of RVSM specifications by all members of the programme in order to compare with the agreed regional TLS.

2. Area: Airworthiness

2.1 To keep a record of all aircraft who comply with the related requirements and functional characteristics in order to ensure the maintenance capacity of RVSM space altitude, as indicated in the Manuals and Guides detailed in Note 1C.

2.2 To keep a record of aircraft that complies with maintenance requirements, training of crews and calendars of approved and adapted service as well as operational manuals and checklists.

2.3 To keep a record of aircraft inspected and classified as eligible for operational approval.

2.4 To keep a record of reported and investigated altitude maintenance errors occurrences, such as:

a) TVE equal or larger than 300 ft (90m)
b) ASE equal or larger than 245 ft (75m)
c) AAD equal or larger than 300 ft (90m)

2.5 To establish a specific programme for flight inspections.

2.6 To transmit all the aforementioned information to a central database (CDB).

3. Area: Air Traffic Control

3.1 To keep a record of data related to:

a) aircraft that do not comply with the requirements of the Flight Plan;
b) aircraft that do not comply with the RVSM airspace requirements;
c) non authorized diversions, observed or reported, lateral and vertical;

d) diversions caused by emergencies, contingencies or unexpected weather causes (e.g. volcanic ashes, severe turbulence);
e) reported failures of on board equipment that have to be mandatory notified to the ATC by aircrews and that are detailed in the Manual Doc. 9574 or others that the ATC observes;
f) failure of elements or functions of the CNS/ATM that are critical for the monitoring of the RVSM scenario;
g) ATC and/or aircrew errors registry;
h) registry of visual perceptions with opposite traffic reported by aircrews;
i) registry of resolution notices due to the ACAS/TCAS,
j) registry of all Flight Plans and older Flight Progress Strips that might be or that are related with the RVSM scenario flows that might be RVSM spaces;
k) FPL and CPL registries with all the flight projection in case of automated systems; and
l) expected growth based on the statistical analysis projected for a 10 year future period.

Note 1 C: - *Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 ICAO Doc. 9574.*
- *JAA Temporary Guidance Leaflet)TGL6 REV.1 of 01/10/99*
- *FAA Interim Guidance 91-RVSM.*

ATTACHMENT B

BASIC INFORMATION FOR SAFETY ASSESSMENT

- States should assess their own system of routes or to compare it with a reference system;

- It is necessary to make an evaluation in order to confirm that the proposed parallel route system can be accomplished with the necessary safety level (TLS) of $5x\ 10^{-9}$ mortal accidents by flight hour by dimension.

- When comparing airspace with the reference system the following has to be included:

1. The collected information, regarding traffic and operation conditions for the particular configuration, in order to compare the specified parameters in the Collision Risk Model (CRM - Reich Model).

Note 1 Examples of CRMs are indicated in the Air Traffic Services Planning Manual (ICAO Doc. 9426), for the Minimum Navigation Performance Specifications (MNPS) in airspace and in the Manual on Airspace Planning Methodology for the Determination of Separation Minima. (ICAO Doc. 9689), for the longitudinal separation of 50 NM.

2. The data will include, among others:

a) Lateral occupation Index;
b) Traffic flying in the same direction;
c) Traffic nominally flying in separated tracks by the minimum distance of lateral separation;
d) Traffic nominally flying at the same flight level; and
e) Aircraft within a longitudinal segment defined for another aircraft;

3. A group of similar criteria to the aforementioned in order to define the occupation in the opposite direction;

4. Reasons of annual growth for a ten-year period;

Note 2 The required parameters should be specified in detail and a form should be given for the collection of data that will be used in the CRM to compare the reference system.

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ATTACHMENT C

NAVIGATION DEVIATION INVESTIGATION FORM				
Type of Report: PILOT – Flight CONTROLLER – ATC Unit				
Date/Time (UTC):	Type of Deviation: LATERAL Type (3.2 a - g) (*) VERTICAL Type (3.1 a - k)			
Causes: WEATHER (See 3.2-g) OTHERS (Specify)				
Conflict Alert Systems:				
DETAILS OF AIRCRAFT	**First Aircraft**		**Second Aircraft (for vertical)**	
Aircraft Identification:				
Name of Owner/Operator:				
Aircraft Type:				
Departure Point:				
Destination:				
Route Segment:				
Flight Level:	Cleared	Actual	Cleared	Actual
Cleared Track:				
Extent of deviation - magnitude and direction: (NM for lateral; feet for vertical)				
Amount of time at incorrect Flight Level/Track:				
Position where deviation was observed: (BRG/DIST from fixed point or LAT/LONG)				
WAS ATC Clearance obtained: YES NO	**If ATC clearance NOT obtained** WERE Contingency procedures Followed: YES NO			
Action Taken by ATC/Pilot:				
Other comments:				

(*) See deviation classification

EXPLANATION OF THE NAVIGATION DEVIATION INVESTIGATION FORM

1. The ATCO/Pilot should fill as many items as possible.
2. Complementary data can be attached.
3. The notification of any deviation (vertical or lateral) has to be classified, when possible, according to the following types:

1.1 For Large Height Deviations (vertical deviation) *(See Attachment A, paragraph 2.4)*

a. ATC system loop error (*)
b. Contingency action due to engine fault
c. Contingency action due to pressurisation failure
d. Contingency action due to OTHER CAUSE
e. Failure to climb/descend as cleared
f. Climb/descend without ATC clearance
g. Entry airspace at an incorrect level
h. ATC FL re-clearance resulting in loss of lateral or longitudinal separation.
i. Deviation due to ACAS/TCAS
j. Aircraft unable to maintain level
k. Other

3.2 For lateral deviations

a. ATC system loop error (*)
b. Equipment control error including inadvertent waypoint error
c. Waypoint insertion error due to the correct entry of incorrect position
d. Other with failure notified to ATC in time for action
e. Other with failure notified to ATC too late for action
f. Other with failure notified/received by ATC
g. Lateral deviations due to weather when unable to obtain prior ATC clearance

Notes:

1. There are data that have to be notified by pilot.
2. As contingency procedures have to be followed, if a NO is included in “WERE the contingency Procedures followed”, an explanation (WHY) have to be included in “Other comments”.
3. (*) ATC system loop error: Any error caused by a misunderstanding between the pilot and controller regarding the assigned flight level, Mach number or route to be followed. Such errors can be caused by errors in coordination between ATC units or by misinterpretation by pilots of an clearance or re-clearance. *(Doc. 9689 – AN/953, Manual on airspace planning methodology for the determination of separation minima).*

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