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International Civil Aviation Organization
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Transition to the CNS/ATM Systems in the CAR and SAM Regions

Sixth Meeting/Workshop of ATM authorities and planners in the CAR/SAM Regions for RVSM, RNAV routes and RNP Implementation (AP/ATM/6 RVSM-RNAV-RNP)

(San Jose, Costa Rica, 29 September to 3 October 2003)

Agenda Item 3: **Review of the issues related to RVSM Implementation in the CAR/SAM Regions**

c) Safety and Airspace Monitoring Working Group (SAM/WG)

Examination of Large Height Deviation Reports Received by The CARSAMMA in Connection with the Implementation of the Reduced Vertical Separation Minimum (RVSM) in the CAR/SAM airspace

(Presented by the CARSAMMA)

Summary

This working paper presents a summary of the large height deviation (LHD) reports received by the CARSAMMA associated with the CAR/SAM RVSM implementation.

1. Introduction

1.1. The CAR/SAM Air Navigation Planning and Implementation Regional Group (GREPECAS) established the CAR/SAM Monitoring Agency (CARSAMMA) as a safety oversight function to support RVSM implementation in the Caribbean and South American Region. The CARSAMMA is a service provided by the Brazilian Air Navigation Management (CGNA).

1.2. The CARSAMMA serves as a regional monitoring agency (RMA) as is called for in ICAO Doc 9574. Along with maintaining a registry of State RVSM approvals of operators and aircraft using RVSM airspace, the CARSAMMA is producing readiness and safety assessments in conjunction with the Safety and Airspace Monitoring (SAM) Working Group of the RVSM Task Force.

1.3. The CARSAMMA is applying the internationally accepted safety assessment process with the introduction of the RVSM into CAR/SAM airspace. The basic collision risk model (CRM) is used to estimate the overall system risk attributable to all causes prior to implementation of the RVSM. To estimate the system risk, the CRM requires many parameters that are derived from data sources supplied to the CARSAMMA. One of the required parameters for the CRM is the total number of annual flying hours spent at incorrect flight levels. To accurately estimate risk the CARSAMMA requests monthly reports, call Large Height Deviation (LHD) reports from the various Flight Information Regions (FIRs) in the target RVSM airspace. The LHD reports contain the information needed to estimate the number of annual flying hours spent at incorrect flight levels in the target RVSM airspace.

1.4. At RVSM/TF/5, the meeting agreed that States should continue to provide the CARSAMMA with monthly reports of LHDs of 300 ft or more to facilitate the safety oversight of the RVSM airspace. The Large Height Deviation form is presented in **Appendix A**.

1.5. The purpose of this paper is to, once more, request States to report LHD to the CARSAMMA in connection with the implementation of the RVSM in the CAR/SAM airspace.

2. Background

2.1. This section provides a brief description of how the LHD reports are linked to the ICAO sanctioned CRM that is applied during the safety assessment process.

2.2. The LHD report contains details of events resulting in altitude deviations of 300 ft or more occurring in target RVSM airspace. Events caused by turbulence or other weather related causes, responses to TCAS advisories, deviations due to contingency events, and operational errors are included on the LHD report. The CARSAMMA requests that if no events occur during a month, a report indicating “NIL” LHDs be submitted for completeness.

2.3. System risk is directly proportional to the amount of total flight time spent at the wrong flight levels. The estimate of these times are one of the key elements used to determine whether or not the estimated system risk will meet the Target Level of Safety (TLS), using the CRM. The amount of total flight time spent at the wrong flight levels is estimated from the LHD reports received during the current 12-month interval.

2.4. The proportion of flying time spent at incorrect levels, Pi, is determined as the ratio of the amount of time spent at incorrect levels to the total amount of flying time in CAR/SAM airspace during the period when the wrong-flight-level events occurred.

2.5. Discussion

2.6. Considering the need to provide a correct estimation of the risk of flight operations in the CAR/SAM airspace, the data used to perform this analysis must be collect in a reasonable amount.

2.7. The LHD are an important data to evaluate the risk, due to its influence in the probability of vertical overlap.

2.8. Until now no one information about Large Height Deviation has reached the CARSAMMA. This fact can lead to an underestimation of the total risk or the need to adopt criteria too constraint for the risk evaluation with results that do not reflect the reality of the CAR/SAM operations.

2.9. As part of the safety assessment/oversight functions performed by the CARSAMMA, the current 12-month interval of LHD reports must be used in the estimation of the system collision risk.

3. Summary and Conclusions

3.1. This paper provides a summary of the LHD importance to the risk estimation for an airspace where RVSM is planned to be applied.

3.2. There is a lack of LHD reports received by the CARSAMMA, including reports indicating that "NIL" events occurred during the month.

3.3. The total number of minutes spent at incorrect flight levels is a very important information for the risk evaluation.

3.4. The results of the analysis of LHD reports will be used to support proposals of remedial actions to reduce the frequency of these errors.

4. Recommendations

5.1 States are requested to note the importance of informing the LHD to the CARSAMMA to avoid underestimation of the collision risk in the CAR/SAM Region and increase their efforts to collect and to inform these errors to the CARSAMMA.

5.2 That the LHD be informed to the CARSAMMA using the correct form already available in the CARSAMMA website.

Appendix A

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 posible, according to the following types:

    3.1 For Large Height Deviations (vertical deviation).
    - a. ATC system loop error (*).
    - b. Contigency action due to engine fault.
    - c. Contigency 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 aispace at an incorrect level.
    - h. ATC FL re-clearance resulting in loss of lateral or longitudinal separation.
    - i. Deviatoin 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 a clearance ofr re-clearance. *(Doc. 9689-NA/953. Manual on airspace planning methodology for the determination of separation minima).*