GUIDANCE MANUAL FOR POINTS OF CONTACT (POC) ACCREDITED TO CARSAMMA

First Edition - 2018

AMENDMENTS

The new amendments to this manual are regularly announced by the Monitoring Agency for the CAR/SAM Regions (CARSAMMA) and the Scrutiny Group (GTE) and are available on the CARSAMMA electronic portal so that users can perform the necessary consultations. The space below has been established to keep a record of such amendments.

Record of Amendments and Corrections

Amendments				Corrections			
No.	**Applicability Date**	**Input Date**	**Introduced by**	**No.**	**Date of Emission**	**Input Date**	**Introduced by**

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Chapter 1

Introduction

1.1 Background

1.1.1 In 1982, coordinated by ICAO's Review of the General Concept of Separation Panel (RGCSP), some countries initiated programs to comprehensively study the issue of vertical separation minimum (VSM) reduction above FL290. In December 1988, the results of these studies were considered by the RGCSP at its sixth meeting (RGCSP/6). After exhaustive studies using quantitative risk assessment methods to support operational decisions regarding the feasibility of reducing the VSM, the level of risk considered acceptable was named the Target Level of Safety (TLS). At the seventh meeting of the RGCSP in November 1990, the Panel concluded the global guidance material for the implementation of RVSM.

1.1.2 The main objective of the document "Manual on a 300 m (1,000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive" of ICAO (Doc 9574) is to provide the criteria, requirements and methodology for the Regional Planning Group (RPG) planning groups for the development of documents, procedures and programs to facilitate the introduction of RVSM in their regions.

1.1.3 CARSAMMA was established by the 10th meeting of GREPECAS held in Manaus in 2002. Brazil assumed the responsibility of providing the means for the functioning of the Agency monitoring the CAR/SAM regions' RVSM airspace and as a repository of a data base of RVSM/PBN certified aircraft by the civil aviation authorities of the States of the regions. This Agency is located in Rio de Janeiro, having as its scope, the whole region of the Caribbean and South America, which comprises a total of 34 FIRs, including 21 States, with the exception of Mexico.

1.1.4 Derived from the CARSAMMA assignments, there is a need for collection of data for the study of the level of risk of the airspace under its jurisdiction. The level of risk considered acceptable was named "Target Level of Safety" (TLS), which is expressed as 5 x 10-9 fatal accidents per flight hour in the RVSM airspace.

1.2 Purpose of the Manual

1.2.1 Establish the procedures to be applied by the Points of Contact (PoCs) of the CAR/SAM States, responsible for coordinating the filling of the forms used by CARSAMMA for RVSM airspace monitoring, as well as urging that the CAAs fill and send the forms related to the "status" of RVSM approval of aircraft to CARSAMMA. This manual also serves as a guide for the PoC for the analysis of the LHD events and their validation.

1.3 Scope

1.3. The procedures of this Manual are applied to the PoC of ATC service providers and CAA Members of GREPECAS that coordinate with CARSAMMA.

1.4 List of Acronyms

CAA	Civil Aviation Authority
ACC	Area Control Centre
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATCO	Air Traffic Controller
CARSAMMA	Caribbean and South America Monitoring Agency
CRM	Collision Risk Model
FIR	Flight Information Region
FL	Flight Level
GREPECAS	CAR/SAM Regional Planning and Implementation Group
GTE	Scrutiny Working Group
IMC	Instrument Meteorological Conditions
LHD	Large Height Deviation
ICAO	International Civil Aviation Organization
PoC	Point of Contact
RGCSP	Review of the General Concept of Separation Panel
RPG	Regional Planning Group
RVSM	Reduced Vertical Separation Minimum
SMS	Safety Management System
TELECON	"*Go To Meeting*'' Teleconferences
TLS	Target Level of Safety
VMC	Visual Meteorological Conditions

Chapter 2

Guidance for Points of Contact (PoC) Accredited to CARSAMMA

2.1 Filling and Submission of Forms

2.1.1 ATC units that provide services in the RVSM airspace must report the occurrences related to the large height deviations (LHDs) and aircraft movements, since this information serves as an important input for the risk assessment carried out by CARSAMMA.

2.1.2 The guidelines for completing these forms are contained within the forms used by CARSAMMA as indicated below. In Attachments F and G we can observe the flow process for the management of LHDs and Collision Risk Calculation and RVSM Operational Approval Record.

2.2 Forms

2.2.1 The CARSAMMA forms are the tools used by CARSAMMA and its Focal Points to exchange data and generate the expected products for RVSM airspace monitoring. The forms are available on the CARSAMMA website (www.carsamma.decea.gov.br).

2.2.2 In order to carry out the tasks efficiently, it is necessary for the Focal Points to fill in the Forms, in the appendices, as accurately as possible, following the guidelines of the models presented.

Aircraft Movement Form (F0)

2.2.3 To analyze the air traffic data in the determination of the parameters of the Vertical Collision Risk Model (CRM), the ATC service providers responsible for the upper airspace will email to CARSAMMA (using carsamma@decea.gov.br) , the information from December 1 to 31 of the movement of aircraft that occurred in its FIR using the form in Annex A. CARSAMMA will request this form in coordination with the GTE and the ICAO North American, Central American and Caribbean (NACC) and SAM Regional Offices.

2.2.4 The period that will be published will always coincide with the movement of the month of December. The ATC Service Providers, responsible for the upper airspace, must send the extracts of the air Movement to CARSAMMA before February 15 of the following year. If necessary, CARSAMMA may request the air movement in another period, prior coordination with PCs of the CAR / SAM States.

2.2.5 CAR/SAM Regions Points of Contact Form (F1)

States will notify CARSAMMA of the information regarding the Points of Contact (PoCs) of the CAR/SAM Regions using the form in Appendix B.

2.2.6 RVSM Approval Registry Form (F2).

In order to maintain a registry of the RVSM approval of the aircraft operating in the RVSM airspace of the CAR/SAM Regions, it is necessary that CARSAMMA receives the information from the relevant CAA using Form F2 of Appendix C.

2.2.7Cancelation of the RVSM Approval Form (F3)

CAAs shall send to CARSAMMA, information regarding the cancelation of the RVSM approval by filling in Form F3, Appendix D.

CAA shall send forms F2 and F3 immediately or within the 5 following days after the RVSM approval is issued or cancelled, accordingly, to maintain the updated registry of RVSM approved aircraft.

2.2.8 Large Height Deviation Form (F4)

During day-to-day operations in the RVSM airspace, air traffic controllers (ATCOs) shall report Large Height Deviations (LHDs) of 300 feet or more, above or below in relation to the aircraft's assigned flight level. For the registration of these occurrences, the LHD Form shall be used (Appendix E) and emailed to CARSAMMA (carsamma@decea.gov.br).

LHD Forms shall be sent to CARSAMMA before the 10th day of the following month of the reported period. CARSAMMA can receive the LHD Forms until the 15th day of the following month of the reported period.

Example: Data from August 01 to 31 shall be completed and sent before September 15 of the same year.

2.3 Flow of Data.

2.3.1 The aircraft movement data (F0) will be used in the Vertical CRM calculation and in the verification of RVSM non-approved aircraft operations performed in the RVSM airspace, produced every year.

2.3.2 In the first case of the CRM, after the calculations, the risk is compared with ICAO's TLS, which is 5 x 10-9 fatal accidents per flight hour. This information is presented to the GTE, the ICAO Offices and the GREPECAS.

2.3.3 From the results of the aircraft movement evaluation, CARSAMMA will send ICAO NACC and SAM Regional Offices an annual list of non-RVSM approved aircraft that operated in RVSM airspace, the State of registry and/or of the operator, which are not in CARSAMMA's database.

GTE/14

2.3.4 LHDs (F4), are validated through GTE monthly teleconferences, however, it´s been noted that some LHDs submitted by the States or ANSPs are not analyzed and validated internally before submission to CARSAMMA to achieve the desired outcome. Furthermore, sometimes field 21 of Form F4 is not submitted with the required data and information, causing an unnecessary delay of the teleconferences for the analysis and evaluation of LHDs.

2.3.5 Some States and ANSPs report LHDs to CARSAMMA, but lack information regarding the Air Traffic Services (ATS) Unit or CAA involved in the LHD. This hinders CARSAMMA from correlating the LHD report with previous reports for those ATC Units, thereby affecting the proper investigation of the event. This results in CARSAMMA being obligated to complete the process with incomplete data. This impedes the identification of latent conditions by the concerned FIR and hinders the competent authority from taking the appropriate mitigating actions. Taking in to account all the aforementioned situations, for the optimization of the CARSAMMA procedures, the following actions are established:

2.4 Responsibilities of the States and International Organizations Points of Contact (POC)

a. Provide in coordination with the CAAs and/or ANSPs the training to traffic controllers (ATCOs), supervisors and ATM operational staff in general, in the correct filling of Forms and raise awareness of the importance of the data sent to CARSAMMA; Monitor and guarantee the quality of the data sent to CARSAMMA;

b) Maintain close contact with the CAA, in order to guarantee the submission of Forms F2 and F3, and solve any doubts regarding the RVSM approval of aircraft and operators; Provide in coordination with CARSAMMA the information to the CAA regarding operators and pilots who falsify the approval status of aircraft;

c) Periodically verify other means of data gathering for the filling of the LHD Form (especially those that do not have "E" type errors);

d) Upon receiving the notification from the ATCO of the sector where the LHD occurred, immediately contact his counterpart from the adjacent FIR and provide the relevant information, so that ATS Units are made aware of the occurrence and can begin an analysis process with the data and evidence gathered from both FIRs;

e) After this, if as a result of the previous analysis, it is observed that the event can be attributed to the aircraft operator, then the information gathered, will be sent as soon as possible to the relevant CAA so that the operator can be notified and can perform the LHD investigation with the pilots involved, using the data of the aircraft systems or their records;

f) When appropriate, include the IATA representative, as the recipient of notifications made to air operators, so that there is a second means to disseminate information to the appropriate party and achieve effectiveness in the proposed objective;

g) Maintain a registry with the information of the PoCs of the adjacent FIRs for the information exchange;

h) Coordinate with the ANSP the corresponding mitigating measures of the validated LHDs that have a risk value higher than 20, and present in the GTE a summary of the adopted mitigating measures.

i) Send in the established times and the appropriate format the information requested by CARSAMMA including the LHD data and the aircraft movement information.

2.5 Responsibilities of CARSAMMA Assigned by GREPECAS

A. Maintain a central registry of RVSM approvals for aircrafts and air operators for each State/Territory that uses CAR/SAM RVSM Airspace;
B. Facilitate the transfer of data to and from other Regional Monitoring Agencies (RMA);
C. Establish and maintain a data base that contains;
D. Disseminate timely information for States CAAs on changes regarding monitoring status of aircraft type ratings;
E. Disseminate the results of monitoring flight using the GPS Global Monitoring System (GMS);Provide means to identify aircraft without RVSM approval operating in the RVSM airspace of the CAR / SAM Regions and notify the facts to the State CAA.;Develop the means to summarize and communicate the content of the relevant databases to the RVSM Scrutiny Group (GTE) for the corresponding safety assessment; y
F. Perform the collision risk model (CRM) evaluation in the RVSM airspace of the CAR/SAM Regions, according with the ICAO Docs9574 and 9937Coordinate in advance with the GTE rapporteur the dates of the teleconferences until the first week of the year. The invitation to teleconferences will be made via the "Go To Meeting" tool, ensuring that it is delivered at least one week before the date, to all the POCs involved.
G. Will present the F4 in the teleconferences, making sure that the sending of the data to be validated is sent in adequate time, for the previous analysis of the participants. After validation in teleconferences, LHDs with a risk value greater than 20 must be sent to the focal points responsible for the FIRs involved, via email, so that the corresponding mitigating measures are taken as soon as possible. The States must present in a Study Note in the following GTE, including a summary of the mitigating measures adopted to mitigate the risk of LHDs with a risk value greater than 20.
H. Will present for analysis the horizontal deviation events in the RVSM airspace .

Chapter 3

Guide to the Evaluation of Large Height Deviations (LHDs) based on a Safety Management System (SMS)

3.1 Scope

3.1.1 The GTE and CARSAMMA have developed a methodology for the LHD analysis and assessment, based on SMS, aiming to increase the safety level in the RVSM air space of the CAR/SAM Regions.

3.1.2 This methodology allows making a risk level assessment of each event in an individual manner and helps to identify the tendencies and the critical points of occurrence.

3.1.3 CARSAMMA will continue calculating the risk value using the CRM established in ICAO Doc 9574 - Manual on a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive, taking as reference a TLS of 5 X 10-9 fatal accidents per flight hour. The objective is to make a quantitative (CRM) and a qualitative (SMS) assessment of the operations in the RVSM airspace and increase the safety level in the CAR/SAM regions.

3.1.4 The GTE acknowledged the necessity to analyze the LHD using an approach based on SMS, because the collision risk model is carried out through the use of a mathematic formula to calculate the risk level in the Regions without showing a detail of the analyzed events.

3.1.5 The GTE has been using the SMS methodology for the analysis and LHD assessment since 2011. This methodology allows States and International Organizations in the CAR/SAM Regions, to analyze the LHDs of its FIRs, adopt and implement the corresponding mitigation measures.

3.2 Analysis and Evaluation of LHDs

3.2.1 During the analysis, the cause of the event is identified, for which the LHD codes table is used. This table can be found at Appendix B of this manual.

3.2.2 After the identification of the causes (LHD code) by CARSAMMA, the GTE must perform the risk analysis associated with each one of the LHD codes identified, assessing the severity and probability of the occurrence.

3.2.3 For the severity analysis, the experience of the	Severity (LHD)

GTE team members is taken into consideration, using the severity table, as follows: Effects					
ATC	**Catastrophic 5**	**Dangerous 4**	**Major 3**	**Minor 2**	**Insignificant 1**
	Collision with an aircraft, the terrain or obstacle warning, and TCAS (RA)	**Important reduction of the prescribed separation or the total loss of ATC provision (ATC Zero)**	**Significant reduction of the prescribed separation or ATC capacity**	**Reduction in the ATC capacity or significant increase of the ATC workload**	**Minor increase of the ATC workload**

Table 1: LHD Severity Table

3.2.4 Each code will have a LHD severity that is associated according to the safety impact: 5	4	3	2	1
J, K	B, D, F, G, H, I	A,C, E2, L	E1	M

Table 2: LHD Codes Table

3.2.5 After determining the severity, the probability is established, based on the statistical data, which shows the points of the highest occurrence index in the CAR/SAM Regions, considering the worst-case scenario. The following table is used for this purpose:

Probability	Level of Services /ATC System	Operational
Frequent 5	Continuously experienced in the system	It is expected to occur each 1-2 days
Occasional	It is expected to occur frequently in the system	It is expected to occur several times in a

4		month
Remote 3	It is expected to occur several times in the lifetime of the system	Occur close to once every few months
Improbable 2	Unlikely, but can reasonably be expected to occur in the system life cycle	It is expected to occur once every 3 years
Extremely Improbable 1	Unlikely, but possible in the system's life cycle	It is expected to occur at least once each 30 years

Table 3: LHD Probability Table

3.2.6 After the probability is determined, the duration of the event is calculated using the following table:

1 Short	**d ≤60 seconds**
2 Medium	**60 seconds < d ≤ 120 seconds**
3 Long	**d > 121 seconds**

Table 1: Event Duration

3.2.7 Accordingly, the following matrix can be used:

Probability (P)	Duration (D)	Severity (G)
5 Frequent		**5 Catastrophic**
4 Occasional		**4 Dangerous**
3 Remote	**3 Long**	**3 Major**
2 Improbable	**2 Medium**	**2 Minor**
1 Extremely Improbable	**1 Short**	**1 Insignificant**

Table 2: LHD Risk Matrix

3.2.8 Once the previous values are obtained the GTE Team proceeds to determine if the FIR in risk has or does not have an ATS Surveillance System, if the meteorological conditions were Visual Meteorological Conditions (VMC) or Instrument Meteorological Conditions (IMC) and if there were other air traffic that resulted in a conflict, granting the following values:

Surveillance System	Meteorological Conditions	Other transit
Yes = 5	VMC = 0	With Surveillance 5
No = 10	IMC = 5	Without surveillance 10

Table 3: Values associated with specific parameters

3.3 Risk Value Calculation

3.3.1 To calculate the risk value, once the previous data is obtained, the following formula is used:

$$VR = (PxDxG)+R+W+T,$$

Parameter	Description	Value
VR	**Risk value**	**To be calculated**
P	**Position probability**	**Varies from 1 to 5**
D	**Event duration**	**Varies from 1 to 3**
G	**Event severity**	**Varies from 1 to 5**
R	**With or without ATS surveillance**	**With = 5 or Without = 10**

W	**Weather conditions**	**VMC=0 or IMC=5**
T	**Other traffic (if there would be)**	**With surveillance = 5 or Without surveillance = 10**
	TOTAL	**Maximum of 100 points**

Table 7: Description and value of parameters

3.4 Target Level of Safety (TLS)

3.4.1 Once the LHD analysis and evaluation process has been completed individually, the Risk Value resulting from each LHD is inserted into the Risk Matrix, designed to determine if the Risk Level of each event is equal to or below the established TLS for the CAR/SAM Regions, an acceptable level of which is 20 points.

VR	Risk Level	Control
76 – 100	**High**	Unacceptable risk, the RVSM space must be cancelled until the danger is mitigated and the risk is reduced to the medium or low level
21 - 75	**Medium**	Acceptable risk, but the follow-up and risk-management are mandatory
01 - 20	**Low**	Acceptable without restriction or limitation, hazards do not require an active risk-management, but must be documented

Table 8: Risk values and associated risk levels and control measures

3.4.2 After determining the Risk Level of each LHD, the States and International Organizations will have to develop and implement the necessary mitigation plans. These will be presented in the GTE meetings. The analysis performed by CARSAMMA and the GTE in the virtual meetings, as well as in the face to face meetings will be documented in a final report to the ICAO Regional Offices in Mexico and Lima, and in the GREPECAS meetings.

Chapter 4

Terms of Reference

4.1 Introduction

4.1.1 The Terms of Reference (TOR) of the Regional RVSM CAR/SAM GTE were established with the purpose to review the problems affecting the TLS based on the LHD information provided by States and International Organizations

4.1.2 Terms of Reference of the GTE

A) Gather safety experts in safety management, air traffic control, aircraft flight operations, regulation and certification, data and risk models analysis;
B) Analyse and review the large height deviations of 300 feet or more, as defined in ICAO Doc 9574, Manual on a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive;
C) Coordinate with CARSAMMA the collection and review of data on LHDs;
D) Determine and validate an estimate of the flight time out of the cleared flight level used to calculate the CRM by CARSAMMA;
E) Identify the safety trends based on the reports of the LHDs and recommend mitigation actions associated with the LHDs in accordance with the ICAO SMS provisions. Send annual reports on the results of safety assessments to GREPECAS to improve safety in the CAR/SAM RVSM space; and;
F) Perform other duties as indicated by GREPECAS.

4.1.3 Composition:

CAR and SAM States, CARSAMMA, COCESNA, IATA, IFALPA, IFATCA, and Rapporteur:

4.2 CARSAMMA Terms of Reference (ToR)

4.2.1 CARSAMMA Functions:

A) Maintain a central registry of RVSM approvals from operators and aircraft from each State/Territory using the CAR/SAM RVSM airspace;
B) Facilitate the transfer of the approved data to and from other RVSM Regional Monitoring Agencies (RMAs);
C) Establish and maintain a data base containing altimetry altitude system errors and deviations of 300 feet or more within the CAR/SAM RVSM airspace;
D) Disseminate timely information to the CAAs the changes or monitoring status of the aircraft type classifications;
E) Disseminate the results of the monitoring flights using the GPS-based Monitoring System (GMS);
F) Provide the means to identify aircraft without RVSM approval operating in CAR/SAM RVSM airspace and report it to the State of Registry CAA;

G) Develop the means to summarize and communicate the content of the data bases relevant to the RVSM GTE for the corresponding safety evaluation; and
H) Review the Collision Risk Level assessment in the RVSM airspace in the CAR/SAM Regions, in accordance with ICAO Doc 9574 and Doc 9937.

Chapter 5

Reference Guide for Validation of LHD events

5.1. Introduction

5.1.1 This reference guide is a consolidation of materials describing the construction, purpose and methodology of the CAR/SAM RVSM Scrutiny Group (GTE). It is intended to be used as a basic reference for anyone interested in Scrutiny Group activity.

5.1.2 It is essential that regional authorities consider all possible means of ascertaining and reducing the level of risk of collision resulting from operational errors that cause large height deviations (LHD). The CAR/SAM RVSM GTE is the primary group to evaluate and assess the operational aspects of large height deviations.

5.2 System Performance Monitoring.

5.2.1 Experience has shown that large height deviations, a deviation in the vertical dimension from the cleared flight level whereby established margins of separation may be eroded, of 90 m (300 ft) or greater in magnitude have a significant impact on operational and technical risk in RVSM airspace. The causes of such deviations have been found to be, but are not limited to:

a. An error in the altimetry or automatic altitude control system of an aircraft;
b) Turbulence and other weather-related phenomena;
c) An emergency descent by an aircraft without the crew following established contingency procedures;
d) Response to airborne collision avoidance system (ACAS) resolution advisories;
e) Not following an ATC clearance, resulting in flight at an incorrect flight level;
f) An error in issuing an ATC clearance, resulting in flight at an incorrect flight level; and
g) Errors in coordination of the transfer of control responsibility for an aircraft between adjacent ATC units, resulting in flight at an incorrect flight level.

5.2.2 The additional risk associated with operational errors and in-flight contingencies influence the outcome of RVSM safety assessments. Appendix H includes a diagram illustrating the LHD contribution to the overall risk assessment.

5.2.3 System performance monitoring, as outlined in ICAO doc 9574, is necessary to ensure the continued safe use of reduced vertical separation minimum (RVSM) and that established safety goals are met. This activity includes monitoring the minimum risk of collision associated with operational errors and in-flight contingencies. The monitoring process is divided into two main categories:

A) Risk associated with the aircraft technical height-keeping performance (technical risk), and
B) The overall risk, i.e. risk due to all causes.

5.2.4 The monitoring process involves the collection and evaluation of operational data. Appropriate methodologies will need to be in place to process this data in order to enable comparison with regionally agreed overall safety objectives.

5.3 Identifying Large Height Deviations

5.3.1 The GTE will evaluate all reports of interest and, based upon established GTE methodology, identify any altitude variation of 90m (300ft) or greater from the assigned or planned altitude. If a qualified deviation is identified, the event is categorized as a large height deviation.

5.3.2 When evaluating altitude variation events of 90m (300ft) or greater, it is not always clear that the event qualifies as a large height deviation. CARSAMMA, and the GTE, have developed policies for LHD validation, which are explained in this section.

5.4 Parameter Values

Cleared Flight Level

5.4.1 The flight level at which the pilot was cleared or currently operating. For example, aircrew accepts a clearance intended for another aircraft and ATC fails to capture the read back error or aircrew conforms to a flawed clearance delivered by ATC.

5.4.2 This parameter, in some cases, will require expert judgment and operational experience to assign a value. The Scrutiny Group must take into consideration the controller's plan versus the cleared flight level.

Event Flight Level

5.4.3 The event flight level is the flight level of error or the incorrect altitude of operation for an identifiable period of time without having received an ATC clearance.

Duration at Unplanned Flight Level

5.4.4 The greatest exposure to risk is the time spent level at a flight level other than the cleared level. This parameter value contributes significantly to the calculation of operational risk.

5.4.5 The duration at unplanned flight level is the length of time that an aircraft was level at an altitude (flight level) that was not cleared, or planned, by air traffic control. Duration is recorded in one second increments.

5.4.6 The calculation of duration begins once the aircraft is level at a flight level other than the cleared level or planned level by ATC, and terminates once ATC initiates remedial action.

5.4.7 Figure 1 illustrates a large height deviation that has a duration value larger than zero. The duration calculation begins and point A and terminates and point B.

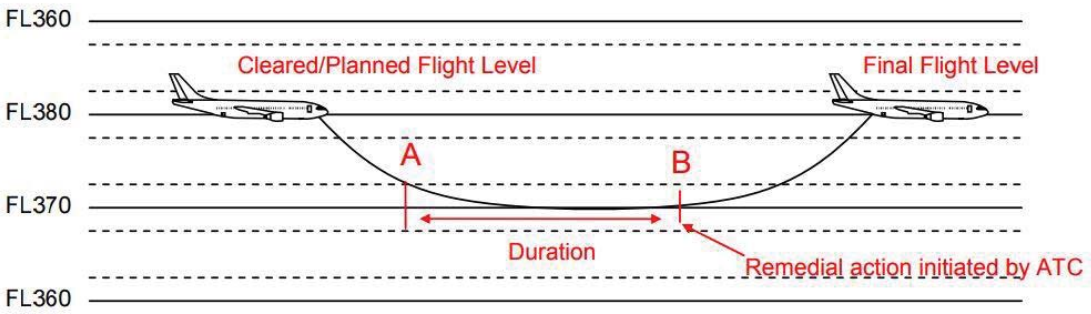


Figure 1.

5.4.8 It is important to note that not all large height deviations result in the aircraft being level at a flight level other than that cleared or planned by ATC; therefore, some events are assigned a duration value of zero.

5.4.9 It is also important to note the duration value determined or assigned by the GTE of LHDs that occur in a radar environment will vary significantly from that of a nonradar environment.

5.4.10 If the Scrutiny Group is unable to determine the time spent at incorrect flight level, a default value is assigned.

5.4.11 The GTE identified the need to establish a default duration value to assign to those events where there is not enough information included in the report to determine the time spent at incorrect flight level. Two default values were established, one for a radar Environment 60 seconds and one for a non-radar Environment 90minues.

Total Vertical Deviation

5.4.12 Total vertical deviation is the distance in feet between the altitude of current operation prior to the deviation and the point at which the aircraft is once again under ATC supervision. A deviation that resulted in an increase of altitude will be recorded as a positive number and a deviation that resulted in a decrease of altitude will be recorded as a negative number

5.4.13 Figures 2 and 3 illustrate two large height deviations of different magnitudes. The first example, Figure 2, illustrates a large height deviation with a magnitude of 1000ft. The second example, Figure 3, illustrates a large height deviation with a magnitude of 1300 ft.

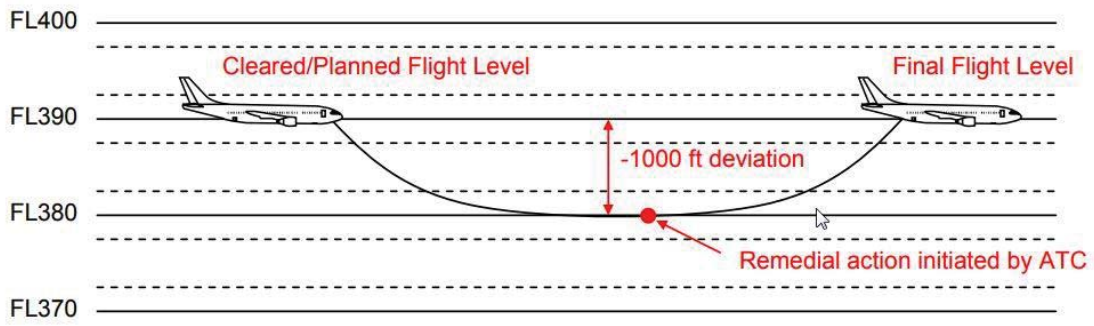


Figure 2.

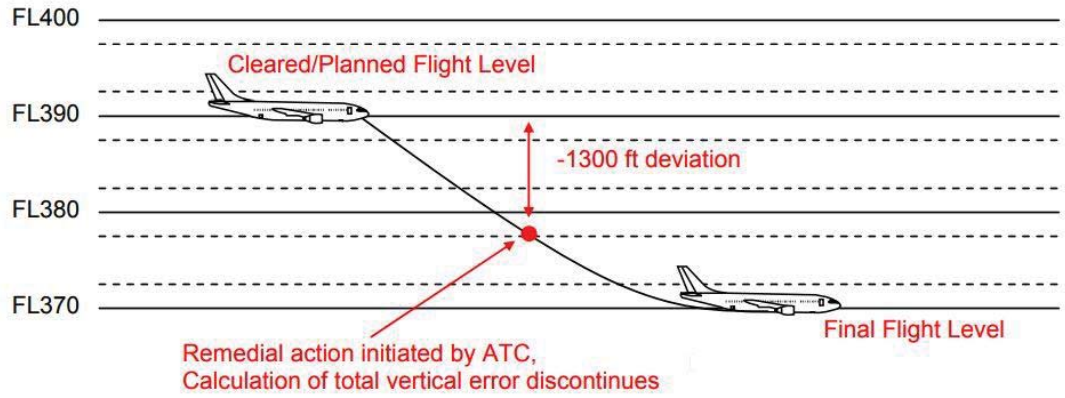


Figure 3.

Levels Crossed

5.4.14 The total number of flight levels between the point that the aircraft exits the cleared flight level and is once again under ATC supervision is calculated to determine the number of levels crossed. For example, in the examples provided in figures 2 and 3 in section 7.2.4.2, one level was crossed.

5.4.15 The Scrutiny Group must consider the hazard zone when calculating the number levels crossed. The hazard zone is also referred to as the buffer zone.

5.4.16 The hazard zone is the minimum physical distance of defined dimensions to accommodate:

A) Variations in an aircraft's flight path due to air movements, etc.;

B) The size of the aircraft;

C) An additional "miss" distance

5.4.17 The value of the hazard zone was determined to be ± 90 m (300ft). A brief explanation of the considerations underlying this value is included in paragraph 2.3.6.7 in the Air Traffic Services Planning Manual (Doc 9426).

5.4.18 This buffer zone criterion shall be used to determine that a specific level is occupied by an aircraft. In the LHD illustrated in figure 4, the aircraft penetrates the buffer zone but does not reach the next flight level. Applying the criterion described in paragraph 7.2.5.4, the total number of levels crossed in this example is 1.

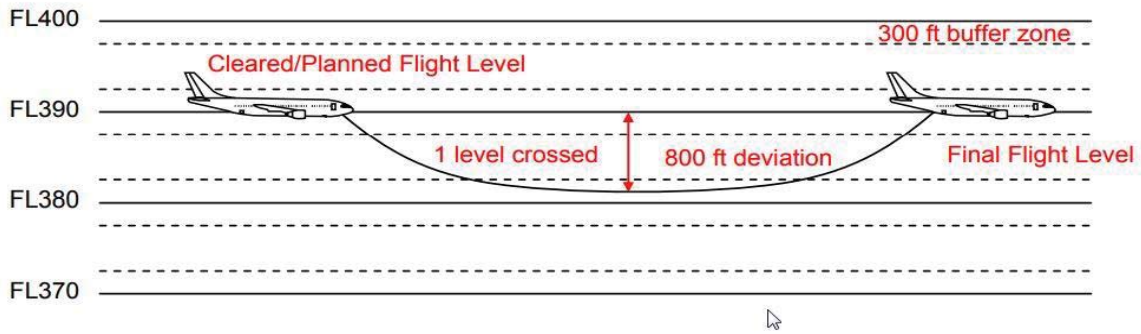


Figure 4

Final flight level

5.4.19 The final flight level is the cleared flight level after the error/deviation.

5.4.20 Some reports of large height deviations do not contain the final flight level. When this information is not available in the LHD report, the Scrutiny Group relies on operational expert judgment to determine the final flight level. The final flight level of the large height deviation illustrated in figure 5 is FL370.

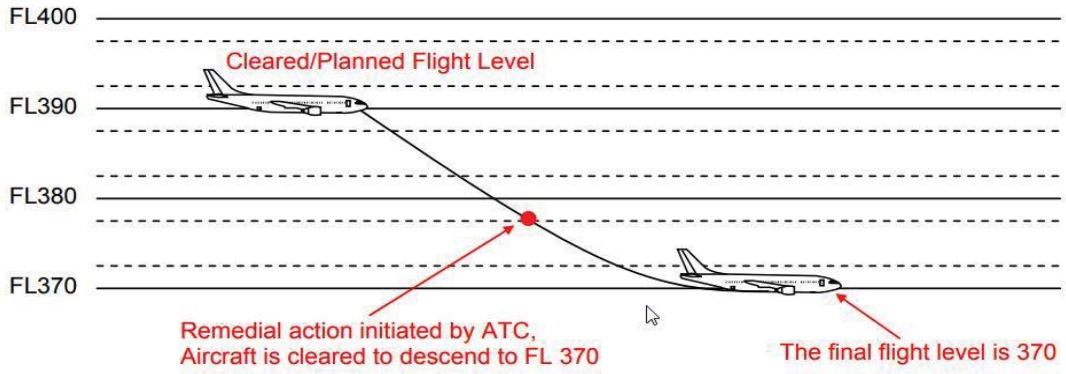


Figure 5.

Vertical speed of ascent or descent

5.4.21 The rate of climb or descent of an aircraft crossing through an uncleared level also contributes to the estimate of operational risk. In most cases, this parameter value is not included in reports of large height deviations. The GTE must rely on operational expert judgment to determine the rate of climb or descent.

5.4.22 The GTE established climb and descent rate default values.

Rate of Descent		**Rate of Climb**	
Drift	1000 ft per minute	Minimum	500
Normal	1500+ ft per minute	Normal	750
Rapid	2500+ ft per minute	Expedite	1250

Figure 6

Buffer zone between facilities

5.4.23 A period of time used to determine whether a facility-to-facility coordination error should be considered a large height deviation. The current value established by the GTE is 5 minutes or 40nm. In other words, if the boundary crossing estimate is provided before the agreed "buffer" duration/distance then the event is not considered to be an LHD; if the estimate is received equal to or less then the established buffer value than the event is an LHD.

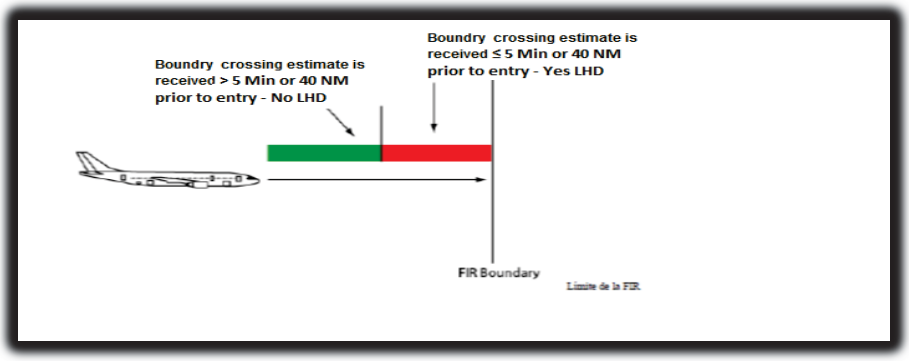


Figure 7

5.5 Event Category

5.5.1 Classification of each LHD event is necessary for risk assessment purposes and for the identification of adverse trends. Each LHD event is assigned an error type code that identifies the type of event that caused the deviation. The error codes are categorized as operational or technical for consideration in the Collision Risk Model (CRM). A complete list of the error codes is included in table 1.

A – Failure to climb/descend as cleared	**H** – Deviation due to in flight equipment failure causing an unintentional or undetected in flight level.
B – Climb/descend without ATC clearance.	**I** – Deviation due to turbulence or other weather-related cause.
C – incorrect operation or interpretation of on aboard systems (for example: incorrect FMS functioning, incorrect ATC clearance transcription or new ATC clearance, following flight plan instead of ATC clearance, follow initial ATC clearance instead of amended ATC clearance, etc)	**J** – Deviation due to collision avoidance system (TCAS) advisory; crew follows correctly TCAS RA.
D – ATC system loop error; (e.g. pilot misunderstands clearance message or ATC issues incorrect clearance)	**K** – Deviation due to collision avoidance system (TCAS) advisory; Crew follows incorrectly TCAS RA.
E – Coordination errors between ATC transfer units or control responsibility, as a consequence of human factors (for example: late or non-existent coordination; incorrect estimate or real time; flight level, ATS route, not adjusted to agreed parameters).	**L** – an aircraft not RVSM approved for which RVSM separation is provided (for example: flight plan indicating RVSM approval but aircraft not RVSM approved; wrong interpretation of flight plan from ATC)
F – Coordination errors between ATC transfer units as a result of equipment or technical failures.	**M** – Others. This includes flights that operate in airspace where normal air ground communication between crew and ATC unites can´t be established.
G – Deviation due to contingency event that leads to the sudden incapacity to keep the assigned flight lever (for example: pressurization failure, engine failure)	

Table 1

5.6 Identify trends

5.6.1 The cumulative LHD summary is also used to identify adverse trends. The Scrutiny Group will evaluate grouped event categories and determine whether one particular event type occurs more often than another. This particular analysis can also be applied to geographic regions.

5.6.2 The Scrutiny Group will also identify operational trends that may be revealed in the data. If any exist, the Group may make recommendations for reducing the effect of those trends.

Remedial Recommendations

5.6.3 If adverse trends are identified, the Scrutiny Group will submit recommendations for remedial actions to ensure that operational errors are kept to a minimum and that the airspace being examined continues to satisfy the requirements of the target level of safety, which is necessary to support continued RVSM operations.

5.6.4 It is important to bear in mind that height deviations, as a consequence of operational errors and in-flight contingencies, occur in all airspace irrespective of the separation minimum. The purpose of this monitoring activity is to ensure that operations in RVSM airspace do not induce an increase in the risk of collision from these events and that the total vertical risk does not exceed the agreed overall safety objectives. The actions and measures proposed to reduce risk should not be exclusive to RVSM airspace.

5.7 Events that qualify as LHDs and events that do not

5.7.1 Radar coverage in the adjacent area

When the receiving FIR has a radar coverage in the airspace of the transferring FIR and it is observed that the aircraft has a flight level different to the one previously coordinated, which was not revised, it is considered LHD, and the duration is considered zero (0). In the case that the transferring unit revises the estimate before crossing the TCP then it is not considered a LHD.

5.7.2 Without a radar coverage in the adjacent area

When the receiving FIR has contact with the aircraft before it enters its airspace, and it is made aware of the aircraft´s change of flight level with respect to a level previously coordinated, we consider there is a LHD, and the duration is considered zero (0). In case the transferring unit revised the estimate before crossing the TCP then it is not considered a LHD.

5.7.3 Transfer time error

When an aircraft notifies over a position deviated in terms of time, 5 minutes or more ahead of the previously coordinated time due to a Coordination error or lack of revision of the time, this is considered a LHD. If the aircraft calls the receiver unit in the buffer zone established margins, then this is not considered a LHD. If the aircraft is delayed referenced to the previously coordinated time the this is not a LHD.

5.7.4 Lateral deviation

When an aircraft reports a laterally deviated position of the original point of transfer, either through another route or because of a deviation requested by the crew for operational convenience, we do not consider there is a LHD given that the initial philosophy of the reports of large height deviations exclusively corresponds to vertical deviations and not to lateral ones; however, for safety purposes in the RVSM airspace, these event should be reported to CARSAMMA.

5.7.5 Lateral deviation with radar coverage in the adjacent area

When an aircraft flies into an airspace that was not included in its route due to an operational deviation, this is not considered an LHD. Since this is an operation error made by the ACC that is

aware of the deviation and that failed to report it to the affected ACC, this event should be considered a coordination incident between adjacent FIRs.

5.7.6 Without radar coverage

When an aircraft flies into a receiving FIR and reports a flight level different from the one previously coordinated, this is considered an LHD. We must take into account the time when the aircraft passes the FIR border and the corresponding ACC becomes aware of the traffic and takes an action regarding the deviation whether this action means leaving the aircraft at the level it is reporting or move the aircraft to a level at which it does not conflict with the FIR's traffic plan.

Chapter 6

Training Programme for POC to the CAR/SAM Monitoring Agency CARSAMMA

6.1 General Purpose:

6.1.1 At the end of this training, the States Points of Contact to the CAR / SAM Regions Monitoring Agency (CARSAMMA) will be able to perform the tasks according to their functions in an optimal manner, sending to CARSAMMA the data corresponding to the movement of aircraft in RVSM airspace, as well as the LHD forms, with the expected quality and within the established deadlines.

Specific objectives:

A) Train the POC for the proper completion of the Aircraft Movement Form (F0).

B) Train the POC for the proper completion of the LHD report Form (F4).

C) Train the Focal Points to carry out the proper LHD analysis using the methodology based on the Safety Management Systems..

D) Train Focal Points in the use of the LHD Reference Guide for the identification of a LHD event.

E) Train the Focal Points to interpret the result of safety measurements using the Collision Risk Model (CRM).

6.2 Lessons Plan

Module 0 Introduction
Provide guidance to staff about the background in the implementation of Reduced Vertical Separation, the need for constant monitoring, the creation of CARSAMMA, as well as current regulations.

Explain personnel the functions of CARSAMMA and the GTE, the work methodology including Teleconferences.

Module 1 Filling of the aircraft movement form (F0)
Provide guidance to staff about the information required to complete the F0 form of CARSAMMA, complying with the required data format as well as the deadlines for the delivery of this information.

Module 2 Filling of the LHD Report Form (F4)
Provide guidance to staff about the information required to complete the F4 form of the CARSAMMA, complying with the required data format as well as the deadlines for the delivery of this information.

Module 3 LHD Analysis using the SMS based Methodology
Provide guidance to staff about the LHD analysis using the methodology based on the Safety Management System, using the Manual Guide on LHD Evaluation based on a Safety Management System (SMS) for the CAR / SAM Regions.

Module 4 Use of the LHD Reference Guide

Provide guidance to staff to validate the LHD events using the LHD reference guide.

Module 5 Interpretation of the CRM evaluation
Induce staff in the correct interpretation of the results of the CRM assessment carried out by CARSAMMA in order to provide feedback to their organization with respect to the level of Operational Safety of their Flight Information Region (FIR) or their State..

Module 6 Use of the Excel Template for the calculation of the Average Risk level
Provide guidance to the POCs in the use of the Excel Template for the Calculation of the Average Risk Level of their Flight Information Region.

Appendix A

CARSAMMA F0 Form – Aircraft Movements

1 Introduction

1.1 This guidance is to standardize the fulfillment of data collection template, aiming to obtain an air traffic movement sample for safety assessment of operations in CAR/SAM airspace.

MANDATORY FIELDS													OPTIONAL FIELDS							
FIR IDENTIFICATION:													PROGRESSING IN RVSM AIRSPACE							
DATE	AIRCRAFT CALL SIGN	AIRCRAFT REGISTRATION	AIRCRAFT TYPE	ORIGIN AERODROME	DESTINATION AERODROME	ENTRY FIX INTO RVSM AIRSPACE	TIME AT ENTRY FIX	FL AT ENTRY FIX	AIRWAY AT ENTRY FIX	EXIT FIX FROM RVSM AIRSPACE	TIME AT EXIT FIX	FL AT EXIT FIX	FIX 1	TIME AT FIX 1	FL AT FIX 1	FIX 2	TIME AT FIX 2	FL AT FIX 2	CONTINUE IF NECESSARY	
01/09/03	...	PTLPN	C550	SBBH	SBBR	VURKI	12:20	310	UW12	IMEDI	12:29	310								annex: example 1
01/09/03	GLO1713	PRGFT	B737	SBRF	SBGL	NUQ	19:30	390	UW60	PONGA	20:12	390								annex: example 2
01/09/03	ARG1303	LVSDE	B747	KMIA	SAEZ	ELAKA	09:45	370	UT410/UA30	ISOPO	10:47	370	CERES	10:40	370					annex: example 4
02/09/03	TAM8097	PRMDF	A332	LFPG	SBGR	KAKUD	07:29	390	UG741	MENDS	08:33	390	MCL	07:35	390					
...	...	...	...	...	...	...	...	...	...	...	...	...								
...	....	....	...	...	...	...	...	...	...	...	...	...								
18/09/03	IBE6824	EC1944	A340	SBGR	LEMD	BGC	20:06	290	UW13	RIGEL	21:10	370	COTON	20:40	330	CNF	20:54	370		annex: example 4
...	...	...	...	...	...	...	...	...	...	...	...	...								
...	...	...	...	...	...	...	...	...	...	...	...	...								
30/09/03	PTSAC	PTSAC	E135	SBCG	SBEG	TOSAR	10:57	350	UW28	RAPAT	11:41	390								annex: example 3

1.2 An "EXCEL" electronic form should be used and all events (air traffic movements) of every day of whole requested period, should be shown in chronological sequence in only one form without any interposed blank line or heading.

1.3 The fulfillment of all fields is mandatory, except the fields contained in the entitled interval "Optional Fields" that should only be filled out if there is any change of flight level and/or airway.

1.4 Data Sample should describe daily air traffic movement between FL290 and FL410 included, in requested period, by FIR and in all air routes of the FIR.

2 - Mandatory Fields

• Line 16: FIR Identification
It shall be filled out according to ICAO designators contained in Doc. 7910.
Examples: SBBS, SLLF, SAEU.

• Column A: Date
It shall be filled just with numeric characters in the following way: dd/mm/yy
Examples: February 01, 2003 enter 01/02/03.

• Column B: Aircraft Call Sign
It shall be filled with seven alphanumeric characters at most, with no blank space or hyphen.
Examples: AAL906, PTLCN, VRG8764.

• Column C: Aircraft Registration
It shall be filled (if knowed) with alphanumeric characters.
Examples: N758T, YV1920, CUT3457

• Column D: Aircraft Type
It shall be filled out according to ICAO designators contained in Doc. 8643.
Examples: for Airbus A320-211 enter A320;

• Column E: Origin Aerodrome
It shall be filled out according to ICAO designators contained in Doc. 7910.
Examples: SBGR, SCEL, SAEZ.

• Column F: Destination Aerodrome
It shall be filled out according to ICAO designators contained in Doc. 7910.

Examples: SKBO, MPTO, SEQU.

• Column G: Entry Fix into RVSM Airspace
It shall be filled with five alphabetical characters at most, according to the name of the fix of entrance in corresponding airspace.
Examples: UGADI, ILURI, BAQ
RMK: For flights climbing into the RVSM airspace, without crossing FIR boundary, the entry fix will be the fix before the first fix that the aircraft pass leveled.

• Column H: Time at Entry Fix
It shall be filled with numeric characters in the following way: hh:mm
Examples: for 01 hour and 09 minutes enter 01:09;

• Column I: Flight Level at Entry Fix
It shall be filled with three numeric characters corresponding to the flight level at entry fix of RVSM airspace.
Examples: for FL290 enter 290; for FL310 enter 310.

• Column J: Airway at Entry Fix
It shall be filled with five alphanumeric characters at most, without space or hyphen.
Examples: UA301; UB689; UW20; UW7.
RMK: When aircraft change airway during the flight in RVSM airspace, the new airway must be reported after the first one separated by the character "/ ".
Example: UL302/UW650.

• Column K: Exit Fix from RVSM Airspace
It shall be filled with five alphabetic characters at most, according to the name of the fix of exit from corresponding airspace.
RMK: This fix will normally be the FIR limit, or the last one crossed by aircraft while in leveled flight.
Examples: INTOL, NIKON, CARPA

• Column L: Time at Exit Fix
It shall be filled with numeric characters in the following way: hh:mm
Examples: for 08 hours and 07 minutes enter 08:07;

• Column M: Flight Level at Exit Fix
It shall be filled with three numeric characters, corresponding to the flight level at exit fix of RVSM airspace.
Examples: for FL330 enter 330; for FL350 enter 350.

3 – Optional Fields (“Progressing of the flight in Airspace”)
• Column N: Fix 1
It shall be filled with five alphabetical characters at most, according to the name of fix where flight level and/or airways changes have been made.
Note: This fix will be the last one the aircraft has crossed in leveled flight.
Examples: BAQ, KUBEK

• Column O: Time at Fix 1
It shall be filled with numeric characters in the following way: hh:mm.
Examples: for 10 hours and 05 minutes enter 10:05;

• Column P: Flight Level at Fix 1
It shall be filled with three numeric characters corresponding to the flight level in the fix 1.
Examples: for FL370 enter 370;

Note: Fill out "Fix/Time/Flight-Level" fields as many as they are required to describe every change occurred.

Appendix B

CARSAMMA F1 – Point of Contact

CARSAMMA FORM F1
POINT OF CONTACT
DETAILS/CHANGE OF POINT OF CONTACT

This form should be completed and returned to the address below on the first reply to the CARSAMMA 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 2-letter ICAO identifier as contained in ICAO Doc 7910. In the event that there is more than one identifier for the same State, the one that appears first in the list should be used.

ADRESS:
Digite aqui o endereço completo do contato

CONTACT

Full Name:

Title: Surname: Initials:

Post/Position:

Telephone: # Fax:

E-mail:

*Initial Reply *Change of Details (**Mark as appropriate)*

When complete, please return to the following address:
Caribbean and South American Monitoring Agency - CARSAMMA
AV. GENERAL JUSTO, 160/Térreo - CENTRO
22295-090 - RIO DE JANEIRO - RJ
Telefone: (55-21) 2101-6358 Fax: (55-21) 2101-6293
E-Mail: carsamma@decea.gov.br

NOTE TO AID COMPLETION OF CARSAMMA FORM F1

1. It is important for the RMAs to have an accurate record of a point of contact for any queries that might arise from on-going height monitoring. Recipients are therefore requested to include a completed form CARSAMMA F1 with their first reply to CARSAMMA. Thereafter, there is no further requirement unless there has been a change to the information requested on the form.

Appendix C

CARSAMMA F2 – RVSM Approval

CARSAMMA F2 FORM
RECORD OF APPROVAL TO OPERATE IN CAR/SAM AIRSPACE

1. When a State of Registry approves or amends the approval of an operator/aircraft for operations within the CAR/SAM airspace, details of that approval must be recorded and sent to CARSAMMA to reach it by the tenth day of the month following the month that the approval was issued.

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[3]: ____

Aircraft Type[4]: ____

Aircraft Series[5]: ____

Manufacturer's Serial Number[6]: ____

Registration Number[7]: ____

Mode S Address Code[8] (if applicable): ____

Airworthiness Approval[9]: ____

Date Issued[10]: ____

RVSM Approval[11]: ____

Date Issued[12]: ____

Date of Expiry[13] (If applicable): ____

Remarks[14]: Fill in if necessary.

When complete, please return to the following address by the next business day:
CARIBBEAN AND SOUTH AMERICA MONITORING AGENCY - CARSAMMA
AV. GENERAL JUSTO, 160/Térreo - CENTRO
22295-090 - RIO DE JANEIRO - RJ
Telefone: (55-21) 2101-6358 Fax: (55-21) 2101-6293
E-Mail: carsamma@decea.gov.br

Responsible inspector for the above information: Name and signature.

NOTES TO AID COMPLETION OF CARSAMMA FORM F2

1. Enter the two letter ICAO identifier as contained in ICAO Doc 7910.

2. Enter the operator's 3 letter ICAO identifier as contained in ICAO Doc 8585. For International General Aviation, enter "IGA" (write the name of the operator/ owner in the Remarks 14 field). For military aircraft, enter "MIL".

3. Enter the two letter ICAO identifier as contained in ICAO Doc 7910.

4. Enter the ICAO designator as contained in ICAO Doc 8643, e.g., for Airbus A320-211, enter A322; for Boeing B747-438 enter B744.

5. 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.

6. Enter aircraft serial number as given by manufacturer.

7. Enter aircraft's current registration number.

8. Enter ICAO allocated Aircraft Mode S address code (*if applicable*).

9. Enter yes or no indication of airworthiness approval.

10. Enter date of airworthiness approval. Example: For October 26, 2008 write 10/26/08.

11. Enter yes or no indication of RVSM approval.

12. Enter date of RVSM approval. Example: For November 26, 2008 write 11/26/08.

13. Enter date of expiry for RVSM approval. Example: For November 26, 2010 write 11/26/10.

14. Fill in if necessary. Use a separate sheet of paper if insufficient space available.

Appendix D

CARSAMMA F3 – RVSM Withdrawal

CARSAMMA FORM F3
WITHDRAWAL OF APPROVAL TO OPERATE
IN CAR/SAM RVSM AIRSPACE

1. When a State of Registry has cause to withdraw the approval of an operator/aircraft for operations within the CAR/SAM airspace, details as requested below, must be submitted to CARSAMMA by the most appropriate method.
2. *Before providing the information as requested below, reference below, reference should be mode to the accompanying notes* **(PLEASE USE BLOCK CAPITALS).**

State of Registry[1]:	
Name of Operator[2]:	
State of Operator[3]:	
Aircraft Type[4]:	
Aircraft Series[5]:	
Manufacturers Serial No[6]:	
Registration[7]:	
Aircraft Mode S Address Code[8]:	
Date of Withdrawal of RVSM Approval[9]:	
Reason of Withdrawal of RVSM Approval[10]:	
Remarks[11]:	Fill in if necessary.

When complete, please return to the following address by the next business day:
CARIBBEAN AND SOUTH AMERICAN MONITORING AGENCY - CARSAMMA
AV. GENERAL JUSTO, 160/Térreo - CENTRO
22295-090 - RIO DE JANEIRO - RJ
Telefone: (55-21) 2101-6358 Fax: (55-21) 2101-6293
E-Mail: carsamma@decea.gov.br

Responsible inspector for the above information:: Name and Signature.

NOTES TO AID COMPLETION OF CARSAMMA FORM F3

1. Enter the two letter ICAO identifier as contained in ICAO Doc 7910.
2. Enter the operator's 3 letter ICAO identifier as contained in ICAO Doc 8585. For International General Aviation, enter "IGA" (write the name of the operator/ owner in the Remarks 11 field). For military aircraft, enter "MIL".
3. Enter the two letter ICAO identifier as contained in ICAO Doc 7910.
4. Enter the ICAO designator as contained in ICAO Doc 8643, e.g., for Airbus A320-211, enter A322; for Boeing B747-438 enter B744.

5. 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.

6. Enter aircraft serial number as given by manufacturer.

7. Enter aircraft's current registration number.

8. Enter ICAO allocated Aircraft Mode S address code.

9. Enter date of withdrawal of RVSM approval. Example: For October 26, 2008 write 10/26/08.

10. Enter the reason of withdrawal of RVSM approval.

11. Fill in if necessary. Use a separate sheet of paper if insufficient space available.

CARSAMMA form F3 must be completed and forwarded to CARSAMMA immediately when the state of registry has cause to withdraw the approval of an operator/aircraft for operations with CARSAMMA RVSM Airspace.

Appendix E

CARSAMMA F4 – Large Height Deviation

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

Report to the Caribbean and South American Monitoring Agency (CARSAMMA) of a height deviation of 300ft or more, including:

1) Those due to TCAS/ACAS;
2) Turbulence and contingency events; and
3) Operational errors resulting in flight at an incorrect level or coordinated by ATC units.

NOTE: The ATC Units are requested to inform CARSAMMA the LHD reports by the 10th day of the following month even if **NO** deviation occurs.

Name of FIR _____ .

Please complete Section I or II as appropriate.

SECTION I:

There were NO reports of large altitude deviation for the month/year _____ .

SECTION II:

There was (were) ____ report(s) of a height deviation of 300ft or more between FL 290 and FL410. Details of the height deviation are attached (Large Deviation Report Form).

(Please use a separate form for each report of height deviation).

SECTION III:

When complete, please return to the following address by the next business day:
CARIBBEAN AND SOUTH AMERICA MONITORING AGENCY - CARSAMMA
AV. GENERAL JUSTO, 160/Térreo - CENTRO
22295-090 - RIO DE JANEIRO - RJ
Telefone: (55-21) 2101-6358 Fax: (55-21) 2101-6293
E-Mail: carsamma@decea.gov.br

NOTES TO AID COMPLETION OF CARSAMMA F4 FORM

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 B747-438, 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. Select one option if: **IMC** - instrument condition, **VMC** – visual condition.
11. Enter the cleared route of flight (in case of direct or aleatoric flights, enter "DCT").
12. Enter the cleared flight level.
13. Enter the estimated duration at incorrect flight level (in seconds).
14. Enter the observed deviation in feet (for upwards deviations, write "+", for downwards deviations, write "-").
15. Enter the other traffic involved, if any (call sign, registration number, flight level, aircraft type, route and distance).
16. Enter the cause of deviation according to the table below:

A – Flight crew failing to climb / descend the aircraft as cleared.	**H –** Deviation due to airborne equipment failure leading to unintentional or undetected change of flight level.
B – Flight crew climbing / descending without ATC cleared.	**I –** Deviation due to turbulence or other weather-related cause.
C – Incorrect operation or interpretation of airborne equipment (e.g.: incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearence, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearence, etc…).	**J -** Deviation due to TCAS RA; flight crew correctly following the RA.
D - ATC system loop error (e.g.: ATC issues incorrect clearance or flight crew misunderstands clearance message).	**K -** Deviation due to TCAS RA; flight crew incorrectly following the RA.
E – Coordination errors in the ATC-to-ATC transfer or control responsibility as a result of Human Factors (e.g.: late or non-existent coordination; incorrect time estimate / actual; flight level, ATS route, etc… Not in accordance with agreed parameters)	**L –** An aircraft that is not RVSM approved being provided with RVSM separation (e.g.: flight plan indicating RVSM approval, but aircraft not approved; ATC misinterpretation of flight plan).
F – Coordination errors in the ATC-to-ATC transfer or control responsibility as a result of Equipment outage or technical issues.	**M –** Other – this includes flights operating (including climbing / descending) in airspace where flight crews are unable to establish normal air-ground communications with the responsible ATS unit.
G - Deviation due to aircraft contingency event leading to sudden inability to maintain assigned flight (e.g.: pressurization failure, engine failure, etc…).	

17. Enter the observed/reported final flight level, providing the source of information (mode c and/or pilot).
18. Select this option if the aircraft was above the cleared level.
19. Select this option if the aircraft was below the cleared level.
20. Select one of the options: if the fl complied with the ICAO annex 2 tables of cruising levels.
21. Write a brief description of deviation.
22. Write the crew comments, if any.

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

CARSAMMA F4 FORM
LARGE HEIGHT DEVIATION

Report to the CARSAMMA 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/ADS Displayed: ☐ Yes. Which FL? _____ ☐ No.
7. Date of Occurrence:	8. Time UTC:	9. Occurrence Position (lat/long or Fix):	10. Weather Conditions: ☐ VMC ☐ IMC
11. Cleared Route of Flight:			
12. Cleared Flight Level:	13. Estimated Duration at Incorrect Flight Level (seconds):		14. Observed Deviation (+/- ft):
15. Other Traffic Involved and Distance:			
16. Cause of Deviation (*brief title*): (Examples: ATC Loop Error, Turbulence, Weather, Equipment Failure)			
AFTER DEVIATION IS RESTORED			
17. Observed/Reported Final Flight Level*: *Please indicate the source of information: ☐ Mode C ☐ ADS ☐ Pilot ☐ Other	Mark the appropriate Box 18. Is the FL above the cleared level: ☐ 19. Is the FL below the cleared level: ☐		20. Did this FL comply with the ICAO Annex 2 Tables of Cruising Levels? ☐ Yes ☐ No

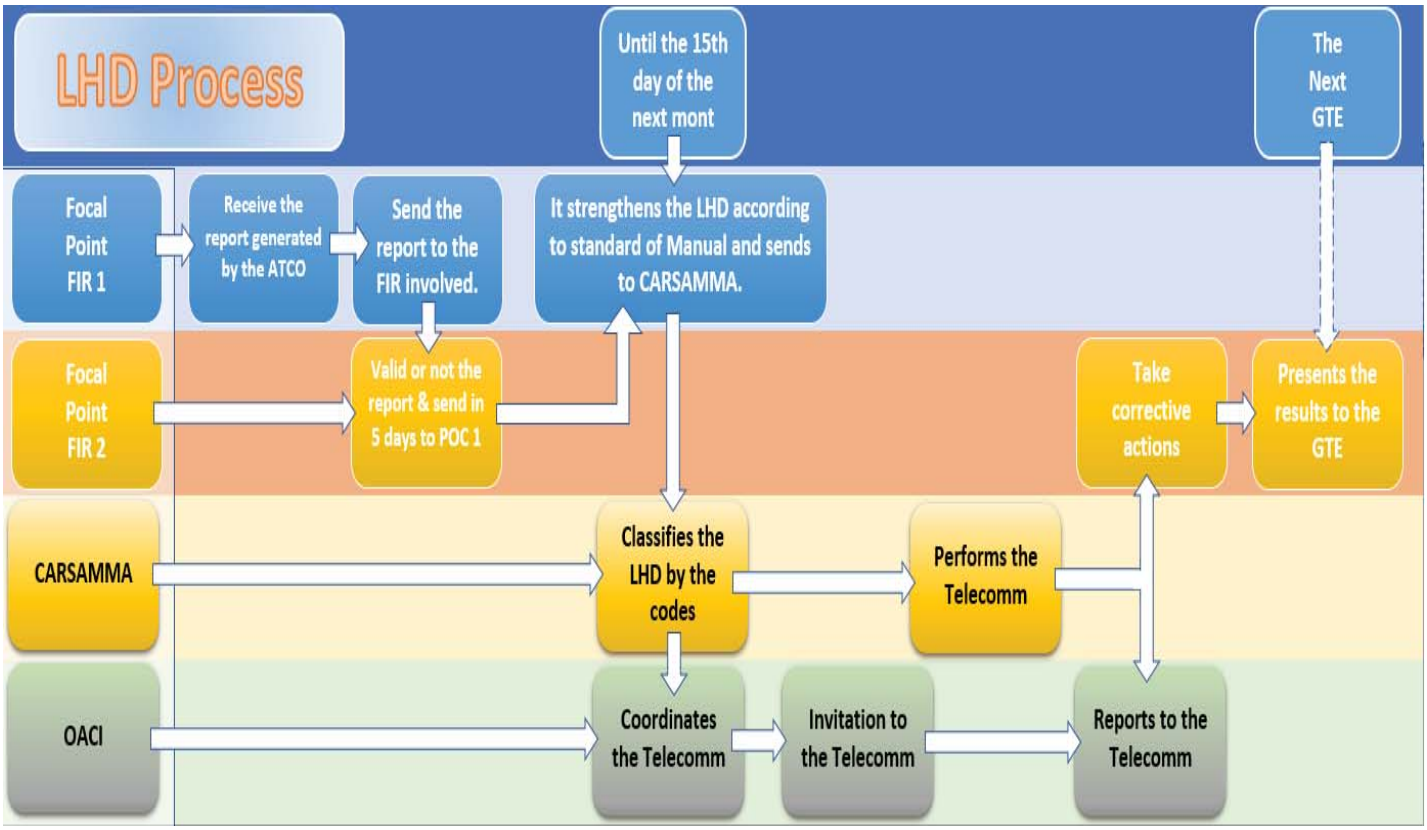
NARRATIVE
21. Detailed Description of Deviation *(Please give your assessment of the actual track flown by the aircraft and the cause of the deviation.)*

22 - CREW COMMENTS (IF ANY)

When complete, please return to the following address by the next business day:
CARIBBEAN AND SOUTH AMERICA MONITORING AGENCY - CARSAMMA
AV. GENERAL JUSTO, 160/Térreo - CENTRO
22295-090 - RIO DE JANEIRO - RJ
Telefone: (55-21) 2101-6358 Fax: (55-21) 2101-6293
E-Mail: carsamma@decea.gov.br

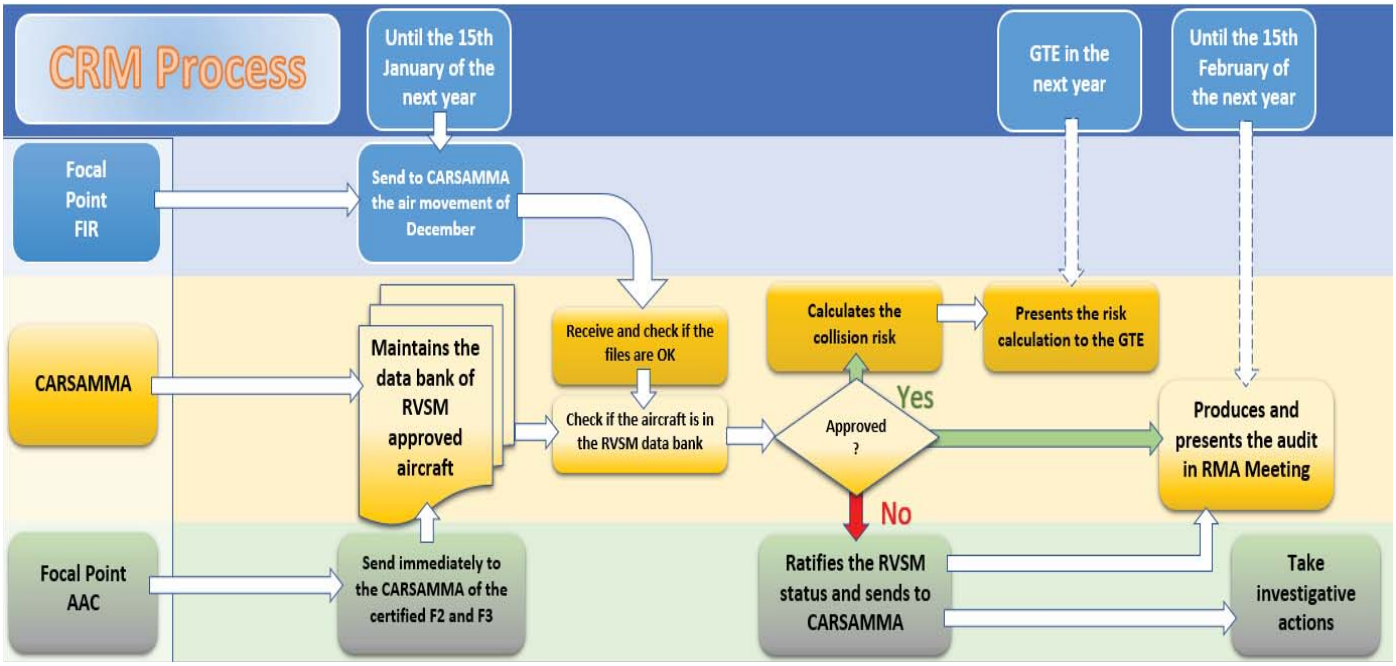
Appendix F

Flowchart of the process of reporting and validation of the LHD



Appendix G

Flowchart of the CRM Analysis Process of the LHD



Appendix H

Precision of SSR Data Mode C

When using SSR mode C data, the following errors that affect accuracy must be taken into account:

A. Correspondence Error, which reflects discrepancies between the level information used and the encrypted level information for automatic transmission. The maximum value of this error f ± 38 m (125 ft) (95 percent probability) has been accepted (see annex 10, Volume I, Part I, 3.8.7.12.2.5, ICAO);

B. Technical Flight Error, which reflects inevitable deviations from the aircraft with respect to the planned level, in response to flight control operations, turbulence, etc. This error, when related to manual flight aircraft, tends to be greater than that of an aircraft controlled by autopilot. The maximum value of this error that has been used to date, based on a probability of 95 percent, is ± 60 m (200 ft) (see the report of the Departmental Meeting COM/OPS (1966), question 9, page 9-35, 4.2). However, it should be noted that since then there have been improvements in several factors contributing to this value.

The mathematical combination of the unrelated errors indicated in the headings a) and b) above results in a value of ± 72 m (235 ft) (based on a probability of 95 percent), so it is believed that a value of f ± 90 m (300 ft) represents a valid criterion of decision to be applied in practice at the time of:

a) Verify the accuracy of SSR mode C data;
b) Determine the rate of occupancy of the levels.

Appendix I

Functional duties of the contact points of the Fir's CAR/SAM

Introduction

In addition to the provisions of Chapter 2, 2.4 Responsibilities of the Points of Contact (POC), these are responsible for:

a) Collect reports on LHD events.
b) Collect and protect data on LHD events.
c) Conduct the investigation of the LHD events.
d) Exchange information about the LHD events with the FIR´s involved, as well as with the operator (s) involved, where appropriate.
e) Develop form F4.
f) Send form F4 to CARSAMMA through the channels and within the established deadline.
g) Participate in teleconferencing and validate the LHD events.
h) Collect data on aircraft movements in airspace RVSM.
i) To debug the data on aircraft movements and to elaborate the form F0.
j) Send the form F0 to CARSAMMA through the channels and within the established deadline.
k) Participate in the annual meetings of the Working Group and Scrutiny.
l) Participate in the training or meeting actions on the LHD issue that ICAO convenes.

Appendix J

REFERENCE DOCUMENTS

List of reference documents

CANADÁ. International Civil Aviation Organization. *Manual on Implementation of a 300m (1000ft) Vertical Separation Minimum Between FL290 and FL410 Inclusive*: **Doc 9574**. Montreal, 2012.

CANADÁ. International Civil Aviation Organization. *Manual of Operating Procedures and Practices for Regional Monitoring Agencies in Relation to the Use of a 300 m (1000ft) Vertical Separation Minimum above FL 290:* **Doc 9937-AN477.** Montreal, 2012.

CANADÁ. International Civil Aviation Organization. *Location Indicators*: **Doc. 7910.**Montreal, 2012.

CANADÁ. International Civil Aviation Organization. *Aircraft Type Designators*: **Doc 8643**. Montreal, 2012.

CANADÁ. International Civil Aviation Organization. *Performance-Based Manual*: **Doc 9613-AN 937.** Montreal, 2012.

CUBA. Working Paper *Mejores Prácticas para Validación:* **GTE 14**. México, 2014.