International Civil Aviation Organization
CAR/SAM Regional Planning and Implementation Group (GREPECAS)
Sixth Meeting of the Air Traffic Management / Communications, Navigation and Surveillance Subgroup (ATM/CNS/SG/6) - ATM Committee
Boca Chica, Dominican Republic, 30 June-4 July 2008

Agenda Item 1: Safety Assessment Post RVSM Implementation

EXAMINATION OF LARGE HEIGHT DEVIATION REPORTS RECEIVED BY THE CARIBBEAN AND SOUTH AMERICAN MONITORING AGENCY (CARSAMMA) IN CONNECTION WITH THE IMPLEMENTATION OF THE REDUCED VERTICAL SEPARATION MINIMUM (RVSM) IN THE CAR/SAM REGIONS

(Presented by CARSAMMA)

SUMMARY

This working paper presents a summary of the Large Height Deviation (LHD) reports received by CARSAMMA associated with the CAR/SAM Reduced Vertical Separation Minimum (RVSM) implementation.

References:

- Manual on Implementation of a 300m (1,000 ft) Vertical Separation Minimum Between FL290 and FL410 Inclusive, International Civil Aviation Organization, Doc 9574, Montreal, Second Edition – 2002; and
- AP/ATM/13 Final Report.

1. Introduction

1.1- The Caribbean and South American Air Navigation Planning and Implementation Regional Group (GREPECAS) established the Caribbean and South American Monitoring Agency (CARSAMMA) as a safety oversight function to support RVSM implementation and use in the Caribbean and South American Region. CARSAMMA is an agency subordinated administratively to the Air Navigation Management Center (CGNA) of the Brazilian Airspace Control System (SISCEAB).

1.2- CARSAMMA serves as a Regional Monitoring Agency (RMA) in accordance with Doc 9574. Along with maintaining a registry of State RVSM approvals of operators and aircraft using RVSM airspace, the CARSAMMA has produced readiness and safety assessments in conjunction with the Safety and Airspace Monitoring (SAM) Working Group of the RVSM Task Force.

1.3- CARSAMMA has applied the internationally accepted safety assessment process with the introduction of the Reduced Vertical Separation Minimum (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 Reduced Vertical Separation Minimum (RVSM). In order to estimate the system risk, the CRM requires many parameters which are derived from data sources supplied to CARSAMMA. One of the required parameters for the CRM is the total number of annual flying hours spent at incorrect

flight levels. As a means to accurately estimate risk, CARSAMMA requests monthly reports, called Large Height Deviation (LHD), from the various Flight Information Regions (FIR) within 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 RVSM airspace.

1.4- GREPECAS, through its Conclusion 13/62 agreed that States should continue providing CARSAMMA with monthly reports of LHD of 300 ft or more in order to facilitate the safety oversight of the RVSM airspace. The Large Height Deviation form is presented in **Appendix**.

1.5- During the meeting AP/ATM/13 (Colombia, Bogota, 09 – 13 July 2007), it was reminded that States should continue providing CARSAMMA with monthly reports of LHD in order to facilitate the safety oversight of the RVSM airspace.

1.6- During the meetings of the Scrutiny Work Groups SWG/4 (Merida, Mexico, 25- 27 September 2007) and SWG/5 (Lima, Peru, 09 – 13 March 2008), it was evidenced that States are far from doing their job correctly concerning the first phase of the collision risk assessment process, the data collection. Another achievement of extreme importance was the identification of the errors tendency as well as of the critical points where the errors occurred.

1.7- During the Third Regional Monitoring Agencies (RMA) Special Meeting (Montreal, Canada, 13 – 15 May 2008), it was evidenced that the specific problems of all RVSM Airspaces around the world are alike. The differences of efficiency during the data collection process arise when the investments and the operational structure installed in each Region are observed since they are directly connected to the economic power of the signatory States. Concerning the atypical errors, those vertical deviations of 300ft or more from the assigned FL (Large Height Deviation), it was a consensus that the problems to execute the Operational Assessment Process were common to everybody, including EUROCONTROL and FAA. No matter the economic level, the installed infrastructure, or the divulgation of how to fill in correctly the LHD forms, some signatory countries had inefficient civil aviation organizations and in the same way, there was a lack of mentality among controllers, pilots, and personnel responsible for the Process, for their first phases of the data collection.

1.8- The purpose of this paper is to present a summary of the LHD reports received by CARSAMMA, during the year of 2007, in connection with suggestions concerning the use of the RVSM in the CAR/SAM airspace.

2. Background

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

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

2.3- **Reference 1** provides a description of the CRM model used to estimate the system risk attributable to all causes. By using the CRM model, the estimation of the probability that two aircraft nominally separated by 1,000 ft are in vertical overlap, Pz(1,000), due to large height deviations requires determination of two quantities: (1) the proportion of total flying time spent at incorrect levels, Pi, and (2) the probability that two aircraft nominally flying at the same level are in vertical overlap, Pz(0).

2.4- 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 model. The amount of total flight time spent at the wrong flight levels is estimated from the LHD reports received during a specified time interval.

2.5- The proportion of flight 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.

3. Discussion

3.1- **Table 1** presents a summary of the LHD reports of 1000ft or more received by CARSAMMA from January to December 2007. The total of seconds spent at wrong flight levels are shown for each LHD report.

3.2- As part of the safety oversight functions performed by CARSAMMA, the current 12-Month interval of LHD reports is used in the estimation of the system collision risk. For each day-month-year presented in **Table 1**, the number seconds spent at wrong flight levels for the corresponding report is provided.

EVENT DATE	FLIGH IDENT	ACFT TYPE	POSITION	CLRD FL	EVENT FL	HT LHD	COD GTE	FIR	SOURCE	Time (S)	Time (Op)	n (S)	n (Op)
16/02/07	TAM8075	A320	ESIPO	330	350	2000	M	MAIQUETIA	PILOT / MODE C	240	-	1	1
16/02/07	ACA091	B763	ISANI	320	340	2000	M	MAIQUETIA	PILOT / MODE C	90	-	1	1
16/02/07	N118MT	CL60	KONRI	370	330	-4000	M	ANTOFAGASTA	PILOT	90	-	2	2
17/02/07	LAN601	B763	AMERO	350	370	2000	M	LIMA	PILOT	30	-	1	1
20/02/07	COA745	B738	PENSO ENTRE MID/VOR Y BZE/VOR (182354N 0883854W)	350	370	2000	M	CENTRAL AMERICAN	MODO C	90	-	1	1
21/02/07	DAL516	B752	VESKA	340	350	1000	M	SANTO DOMINGO	PILOT / MODE C		90	-	1
25/02/07	COA30	B762	KOXAM	320	340	2000	M	GEORGETOWN	PILOT	20	-	1	1
25/02/07	AAL932	B752	TOKUT	360	340	-2000	M	PANAMA	PILOT / MODE C	90	-	1	1
25/02/07	BBR1323	B763	KONRI	360	330	-3000	H / M	ANTOFAGASTA	PILOT / MODE C	90	1	-	2
04/03/07	SNTRY82	C141	LIXAS	310	310	0	N	GUAYAQUIL	PILOT / MODE C	30	-	-	-
09/03/07	AFR406	B772	1140N 03642W	340	360	2000	N	ROCHAMBEAU	PILOT	15	-	1	1
09/03/07	PTWJS	BE40M	OPABA - ADOLF	400	406	600	B / D	RECIFE	MODO C		90		
14/03/07	TAP179	A343	NANIK	360	380	2000	M	ATLANTICO	PILOT / MODE C	90	-	1	1
15/03/07	DAL274	B764	BUXOS	300	320	2000	M	PANAMA	PILOT / MODE C	90	-	1	1
15/03/07	CMP716	E190	ESEDA	340	340	0	N	PANAMA	MODO C	90	-		
15/03/07	AER7480		SUR	300	340	4000	D / N	BOGOTA	PILOT	90	-	2	2
16/03/07	AAL956	B772	PAKON				N	MAIQUETIA	PILOT	90	-		
16/03/07	TPA733	B767	VSJ	370	390	2000	M	MAIQUETIA	PILOT	90	-	1	1
16/03/07	BBR1323	B752	KIKAS	350	370	2000	M	MAIQUETIA	PILOT	90	-	1	1
19/03/07	TSC174	A310	DUXUN	350	370	2000	M	PANAMA	PILOT	90	-	1	1
20/03/07	LPE627	B767	LIXAS	370	370	0	N	GUAYAQUIL	PILOT / MODE C	30	-	-	-
20/03/07	RPB7512	MD83	KAKOL	320	340	2000	M	PANAMA	PILOT / MODE C	90	-	1	1
21/03/07	VLO7443	MD11	POS - DEKON	320	340	2000	M	ATLANTICO	PILOT / MODE C	90	-	1	1
24/03/07	LAN584	B763	SORTA	320	300	-2000	M	LIMA	PILOT	30	-	1	1
25/03/07	CMP437	B737	ARNAL	370	330	-4000	M	PANAMA OCEANIC	PILOT	90	-	2	2
27/03/07	DAL146	B764	BUXOS	300	320	2000	M	PANAMA	MODE C	90	-	1	1
29/03/07	DAL147	B764	SORTA	330	350	2000	M	LIMA	PILOT	30	-	1	1
02/04/07	VRG8942	B767	VAGAN	360	380	2000	M	MAIQUETIA	PILOT	1200	-	1	1
02/04/07	ARG1380	A310	VAGAN	380	380	0	N	MAIQUETIA	PILOT	900	-		
05/04/07	TPU034	A320	ELAKO	340	360	2000	M	LIMA	PILOT	180	-	1	1
05/04/07	AAL930	B752	DIBOK	360	360	0	N	KINGSTON	PILOT	15	-	-	-
08/04/07	LCO11040	B763	GELIS	300	310	1000	B	LA PAZ	PILOT		30		1
08/04/07	LNE539	B763	DAGUD	350	370	2000	M	PANAMA	PILOT	90	-	1	1
09/04/07	MPD525	A343	13N 030W	360	360	0	N	ROCHAMBEAU	PILOT	15	-	-	-
11/04/07	VDA4556	IL76	INCAS	380	300	-8000	M	ANTOFAGASTA	PILOT / MODE C	90	-	4	4
11/04/07	IBE6843	A340	1330N 03730W	340	340	0	N	ROCHAMBEAU	PILOT	15	-	-	-
11/04/07	LAN705	A343	10N 036W	320	340	2000	M	ROCHAMBEAU	PILOT	15	-	1	1
11/04/07	TAM8099	A342	NANIK	380	400	2000	M	ATLANTICO	PILOT	90	-	1	1
11/04/07	IBE6865	A343	1330N 03730W	340	340	0	N	ROCHAMBEAU	PILOT	15	-		
11/04/07	AVA025	B762	PULTU	360	380	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
11/04/07	MXA1695	B763	LIXAS	390	390	0	N	GUAYAQUIL	PILOT / MODE C	90	-	-	-
11/04/07	AVA025	B763	TERAS	360	380	2000	M	ASUNCION	PILOT	30	-	1	1
15/04/07	CMP437	B737	VAKUD	370	390	2000	M	LIMA	PILOT	60	-	1	1
15/04/07	IBE6805	A343	RDL242, 125NM SVD	360	364	400	B / D	RECIFE	MODE C	90	-		

EVENT DATE	FLIGH IDENT	ACFT TYPE	POSITION	CLRD FL	EVENT FL	HT LHD	COD GTE	FIR	SOURCE	Time (S)	Time (Op)	n (S)	n (Op)
18/04/07	CMP266	B737	AGUJA	380	400	2000	M	PANAMA	MODE C	90	-	1	1
19/04/07	CIU329	DC10	ENSOL	410	410	0	M	GUAYAQUIL	PILOT / MODE C	90	-	0	0
21/04/07	N5VS	GLF5	VSJ	450	450	0	M	MAIQUETIA	PILOT	90	-	-	-
22/04/07	ARG1364	B735	MIBAS	340	300	-4000	M	SANTIAGO	PILOT / MODE C	90	-	2	2

EVENT DATE	FLIGH IDENT	ACFT TYPE	POSITION	CLRD FL	EVENT FL	HT LHD	COD GTE	FIR	SOURCE	Time (S)	Time (Op)	n (S)	n (Op)
23/04/07	TPU035	A320	ILMUX	340	360	2000	M	LIMA	PILOT	90	-	1	1
26/04/07	COA590	B763	ARNEL	370	390	2000	M	LIMA	PILOT	30	-	1	1
26/04/07	LAP707	F100	UMKAL	280	300	1000	M	SANTIAGO	PILOT / MODE C	-	90	-	1
01/05/07	RCH633	K35R	PAPIN	360	360	0	N	PANAMA OCEANIC	PILOTO	90	-	-	-
03/05/07	GLG600	B732	BOKAN	350	350	0	N	GUAYAQUIL	PILOT / MODE C	90	-	-	-
04/05/07	AAL952	A306	BUXOS	320	340	2000	M	PANAMA OCEANIC	PILOT / MODE C	90	-	1	1
06/05/07	LAN622	B763	ESDIN	320	320	0	M	ANTOFAGASTA	PILOT	90	-		
09/05/07	COA654	B752	TILSO	360	380	2000	M	PANAMA OCEANIC	PILOT	90	-	1	1
09/05/07	CMP300	E190	UKLOS	340	380	4000	M	PANAMA OCEANIC	MODE C	90	-	2	2
09/05/07	VEC201	B727	20 NM ANTES DE VSJ	310	330	2000	M	MAIQUETIA	PILOT / MODE C	90	-	1	1
10/05/07	COA882	B737	ARORO	340	380	4000	M	PANAMA OCEANIC	PILOT / MODE C	90	-	2	2
11/05/07	DAL061	B767	ILKIT	330	350	2000	M	MAIQUETIA	PILOT / MODE C	90	-	1	1
11/05/07	SAM113	F100	BOKAN	320	340	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
14/05/07	LAN501	B763	UGUPI	330	350	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
14/05/07	AAL915	A306	2008N 07820W	310	313	300	F	KINGSTON	PILOT / MODE C	-	30	-	1
14/05/07	DAL742		2008N 07820W	320	300	-1000	I	KINGSTON	PILOT / MODE C	-	60	-	1
15/05/07	IBE6652	A346	DIMAS	350	370	2000	M	ROCHAMBEAU	PILOTO		-	1	1
16/05/07	VPBON			360	380	2000	M	SANTO DOMINGO	PILOT / MODE C	90	-	1	1
17/05/07	IBE6843	A346	05N 041W	340	370	3000	N	ROCHAMBEAU	PILOT		15	1	2
17/05/07	MPD975	A332	IRELA	360	0	0	N	ROCHAMBEAU	PILOT	15	-	-	-
17/05/07	MPD525	A343	10N 036W	340	340	0	N	ROCHAMBEAU	PILOT	15	-	-	-
17/05/07	MXA1695	B763	LIXAS	390	390	0	N	GUAYAQUIL	PILOT / MODE C	90	-	-	-
17/05/07	VEC201	B727	ALCOT	330	330	0	N	MAIQUETIA	PILOT / MODE C	90	-	-	-
20/05/07	DAL335	B764	UGUPI	330	330	0	N	GUAYAQUIL	PILOT / MODE C	90	-	-	-
21/05/07	DLH502	B744	1130N 036W	360	360	0	N	ROCHAMBEAU	PILOT	15	-	-	-
24/05/07	SOO112	B742	1548N 07706W	360	360	500	F	KINGSTON	PILOT / MODE C	-	15	-	-
25/05/07	LNE7604	B763	ENSOL	360	340	-2000	M	GUAYAQUIL	PILOT / MODE C	90	-	-	-
26/05/07	AAL1089	B738	VODIN	350	370	2000	M	MAIQUETIA	PILOT / MODE C	90	-	1	1
29/05/07	KLM753	MD11	TERAS	400	400	0	N	GUAYAQUIL	PILOT / MODE C	90	-	-	-
30/05/07	TAM9537	MD11	DEKON	380	400	2000	M	ATLANTICO	PILOT / MODE C	90	-	1	1
30/05/07	LAN621	B763	ESDIN	350	370	2000	M	ANTOFAGASTA	PILOT	90	-	1	1
30/05/07	RPB7540	MD81	KAKOL	320	340	2000	M	PANAMA OCEANIC	PILOT / MODE C	90	-	1	1
31/05/07	LPE769	B763	LOPES	350	370	2000	M	ANTOFAGASTA	PILOTO	90	-	1	1
08/06/07	IBE6831	A343	1140N 03642W	340	360	2000	I / M	ROCHAMBEAU	PILOT	15	-	1	1

EVENT DATE	FLIGH IDENT	ACFT TYPE	POSITION	CLRD FL	EVENT FL	HT LHD	COD GTE	FIR	SOURCE	Time (S)	Time (Op)	n (S)	n (Op)
08/06/07	LAN705	A343	1140N 03642W	340	340	0	N	ROCHAMBEAU	PILOT	15	-		
12/06/07	AMX010	B762	ESDIN	330	390	6000	M	LIMA	PILOT	420	-	3	3
13/06/07	AMX010	B762	KARAZ	390	330	-6000	M	GUAYAQUIL	PILOT / MODE C	90	-	3	3
13/06/07	LAU355	B722	BOKAN	320	360	4000	M	GUAYAQUIL	PILOT / MODE C	90	-	2	2
16/06/07	AFR442	B744	TASIL	340	360	2000	M	ATLANTICO	PILOT	2560	-	1	1
17/06/07	CMP829	B737	ENSOL	390	410	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
18/06/07	CMP307	B737	UGUPI	370	390	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
19/06/07	TPU025	A320	GELIS	330	330	0	N	ANTOFAGASTA	PILOT	90	-		
20/06/07	LNE517	B763	ENSOL	350	370	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
24/06/07	LRC651	A320	LIXAS	330	350	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1

EVENT DATE	FLIGH IDENT	ACFT TYPE	POSITION	CLRD FL	EVENT FL	HT LHD	COD GTE	FIR	SOURCE	Time (S)	Time (Op)	n (S)	n (Op)
25/06/07	AFR6810	B744	DIKEB	340	360	2000	M	ATLANTICO	PILOTO	960	-	1	1
26/06/07	UPS383	B752	UKLOS	360	380	2000	M	PANAMA	MODE C	90	-	1	1
27/06/07	CMP874	E190	BOGAL	340	300	-4000	M	PANAMA	MODE C	90	-	2	2
27/06/07	MXA381	A319	ISEBA	350	370	2000	M	PANAMA	MODE C	90	-	1	1
29/06/07	AVA060	MD83	DAKMO	340	340		N	PANAMA		90	-	-	-
01/07/07	LRC661	A320	PAPIN	370	350	-2000	M	PANAMA	PILOT	90	-	1	1
01/07/07	CCCWK	G150	AGUJA	360	400	4000	M	PANAMA	MODE C	90	-	2	2
03/07/07	MXA1694	B763	KONRI	360	340	-2000	M	ANTOFAGASTA	PILOT / MODE C	30	-	1	1
04/07/07	LPE581	A319	VAKUD	350	350	0	M	GUAYAQUIL	PILOT / MODE C	90	-	-	-
04/07/07	LPE581	B767	VAKUD	390	350	-4000	M	LIMA	PILOT	30	-	2	2
07/07/07	AAL931	B752	ENSOL	370	370	0	N	GUAYAQUIL	PILOT / MODE C	90	-	-	-
10/07/07	ALV502	A315		340	300	-4000	M	SANTO DOMINGO	PILOT	90		2	2
12/07/07	N245MU	C510	20NM AL SUR DEL PUNTO DE NOTIFICACION MAVAL. AERONAVE DESVIADA AL SW DE LA RUTA UG765 ENTRE CTM VBOR Y RAB VOR.	360	357	-300	A	CENTRAL AMERICAN	PILOT / MODE C	90	-	-	-
13/07/07	LAN503	B763	SORTA	350	370	2000	M	LIMA	PILOT	30	-	1	1
13/07/07	LAN503	B763	SORTA	350	370	2000	M	ANTOFAGASTA	PILOT	90	-	1	1
13/07/07	MXA1691	B763	GELIS	350	370	2000	M	ANTOFAGASTA	PILOT	30	-	1	1
14/07/07	LAN501	B763	SORTA	330	350	2000	M	ANTOFAGASTA	PILOT	90	-	1	1
16/07/07	AVA075	B762	PULTU	360	360	0	N	GUAYAQUIL	PILOT / MODE C	90	-	-	-
16/07/07	COA810	B738	LIXAS	370	370	0	N	GUAYAQUIL	PILOT / MODE C	90	-	-	-
16/07/07	ARG1384	A310	GEKAL	300	320	2000	M	ANTOFAGASTA	PILOT / MODE C	10	-	1	1
18/07/07	AVA060	MD80	DAKMO	320	340	2000	M	PANAMA	MODE C	90	-	1	1
18/07/07	N270KA	H25B	BUFEO	350	330	-2000	M	PANAMA	PILOT	90	-	1	1
21/07/07	MPD525	A343	0843N 03527W	340	340	0	N	ROCHAMBEAU	PILOT	15	-	-	-
21/07/07	CMP750	B737	SORTA	360	380	2000	M	LIMA	PILOT	30	-	1	1
21/07/07	CMP750	B738	SORTA	360	380	2000	M	ANTOFAGASTA	PILOT	90	-	1	1
22/07/07	DAL199	B752	ENSOL	330	370	4000	M	GUAYAQUIL	PILOT / MODE C	90	-	2	2

22/07/07	ACA092	B763	SISEL	330	350	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
22/07/07	CMP231	B737	1525N 08040W	410	406	-400	D	KINGSTON	PILOT		90		
22/07/07	LAN573	B763	PULTU	340	360	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
22/07/07	LAN573	B767	TERAS	340	360	2000	M	LIMA	PILOT	30	-	1	1
22/07/07	CMP750	B737	SORTA	360	380	2000	M	LIMA	PILOT	30	-	1	1
22/07/07	CWC463	DC10	BOKAN	360	300	-6000	M	GUAYAQUIL	PILOT / MODE C	90	-	3	3
23/07/07	GLG603	B732	BOKAN	340	320	-2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
27/07/07	COA653	B752	VAMOS	350	370	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
27/07/07	TPU029	A319	MIRLO	360	380	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
28/07/07	CMP489	B732	UGUPI	390	390	0	N	GUAYAQUIL	PILOT / MODE C	90	-	-	-
31/07/07	LNE539	B763	DAGUD	350	370	2000	M	PANAMA	PILOT	90	-	1	1
03/08/07	TAM3282	A319	CARDO	350	370	2000	M	RECIFE	MODE C	90	-	1	1
05/08/07	AAL2111	A306	UGUPI	290	310	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
07/08/07	IBE6842	A346	MAGNO	370	350	-2000	M	ATLANTICO	PILOT	120	-	1	1
08/08/07	SAM112	F100	BOKAN	320	340	2000	M	GUAYAQUIL	PILOT / MODE C	60	-	1	1

EVENT DATE	FLIGH IDENT	ACFT TYPE	POSITION	CLRD FL	EVENT FL	HT LHD	COD GTE	FIR	SOURCE	Time (S)	Time (Op)	n (S)	n (Op)
11/08/07	AVA069	MD83	BOKAN	320	340	2000	M	GUAYAQUIL	PILOT / MODE C	180	-	1	1
12/08/07	AFR406	B772	1140N 03642W	340	340	0	M	ROCHAMBEAU	PILOT	15	-	-	-
12/08/07	COA810	B738	LIXAS	350	370	2000	M	GUAYAQUIL	PILOT / MODE C	180	-	1	1
14/08/07	ARG1364	A310	GEKAL	320	330	1000	B	ANTOFAGASTA	PILOT / MODE C	-	30	-	1
15/08/07	LPE707	B763	KENOX	340	340	0	N	ROCHAMBEAU	SBAO ACC	15	-	-	-
16/08/07	AMX011	B763	KARAZ	380	340	-4000	M	GUAYAQUIL	PILOT / MODE C	180	-	1	1
17/08/07	LPE511	B763	UGUPI	330	350	2000	M	GUAYAQUIL	PILOT / MODE C	120	-	1	1
17/08/07	XAFLY	LJ60	ILTUR	400	430	1000	M	PANAMA	MODE C	-	90	-	1
17/08/07	KRE2185	B722	ALCOT	320	320	0	N	MAIQUETIA	MODE C	90	-	-	-
17/08/07	HCCEZ	E190	NOREX	360	360	0	M	MAIQUETIA	MODE C	90	-	-	-
17/08/07	AVA091	MD83	NOREX	320	320	0	M	MAIQUETIA	MODE C	90	-	-	-
20/08/07	AMX019	B737	ARNEL	340	360	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
20/08/07	VPBOZ	F900	NANIK	400	430	1000	M	ATLANTICO	PILOT	-	90	-	1
21/08/07	IBE6845	A346	NANIK	360	380	2000	M	ATLANTICO	PILOT	60	-	1	1
22/08/07	RPB7372	MD83	AGUJA	360	360	0	N	PANAMA	MODE C	90	-	-	-
22/08/07	LPE429	B763	GELIS	370	390	2000	M	LIMA		30	-	1	1
23/08/07	LPE582	A319	TERAS	350	370	2000	M	GUAYAQUIL	PILOT / MODE C	120	-	1	1
28/08/07	ARG1136	B744	POS - FOZ	330	310	-2000	P	ASUNCION	PILOT	90	-	1	1
30/08/07	DLH502	B744	1100N 03630W	340	340	0	M	ROCHAMBEAU	PILOT	15	-	-	-
30/08/07	LAN705	A343	0912N 03540W	340	340	0	N	ROCHAMBEAU	PILOT	15			
30/08/07	CMP273	E190	SISEL	350	370	2000	M	GUAYAQUIL	PILOT / MODE C	60	-	1	1
01/09/07	ARG1134	B744	NEURA	330	350	2000	M	ATLANTICO	PILOT	80	-	1	1
01/09/07	LNE1447	A320	GELIS	330	350	2000	M	ANTOFAGASTA	PILOT / MODE C	30	-	1	1
03/09/07	TAP156	A332	INTOL	370	390	2000	M	ATLANTICO	PILOT	90	-	1	1
05/09/07	RPB7540	MD81	KAKOL	320	340	2000	M	PANAMA	PILOT / MODE C	90	-	1	1
06/09/07	LCO1100	B763	UKLOS	320	340	2000	M	PANAMA	PILOT / MODE C	90	-	1	1
07/09/07	UPS382	B752	ARNAL	370	370	0	N	PANAMA	PILOT	90	-	-	-

11/09/07	FAB2123	H25A	274527S 0492151W	290	294	400	E	CURITIBA	MODE C	110	-	-	-
13/09/07	UPS383	B752	UKLOS	320	340	2000	M	PANAMA	PILOT / MODE C	90	-	1	1
14/09/07	MXA1692	B763	KONRI	360	340	-2000	M	ANTOFAGASTA	PILOT / MODE C	30	-	1	1
15/09/07	BW491	B738	EGEMA	410	390	-2000	M	GEORGETOWN	PILOT	90	-	1	1
16/09/07	TPA601	B763	PUERTO LEGIZANO	380	360	-2000	M	LIMA	PILOT	48	-	1	1
22/09/07	DLH504	A343	REGIS	310	350	4000	B	ATLANTICO	PILOT	90	-	2	2
27/09/07	N800EL	H25B	BUFEO	410	410	0	N	PANAMA	PILOT / MODE C	-	-	-	-
28/09/07	FDX44	MD11	ILKUT RUTA RNAV	310	330	2000	M	MAIQUETIA	PILOT / MODE C	90	-	1	1
28/09/07	LAU335	B721	NOREX			0	N	MAIQUETIA	PILOT	90	-	-	-
29/09/07	CMP273	E190	SISEL	350	390	4000	M	GUAYAQUIL		90	-	2	2
30/09/07	MXA380	A319	104920N 0845554W - 20 NM SE DE ULAPO (UA502)	360	360	400	E	CENTRAL AMERICAN	PILOT / MODE C	0	-	-	-
01/10/07	CMP279	B738	PLG	330	350	2000	M	LIMA	PILOT	30	-	1	1
02/10/07	TPU023	A320	GELIS	350	330	-2000	M	ANTOFAGASTA	MODE C	30	-	1	1
02/10/07	MAA6871	B763	URIBI	310	330	2000	M	MAIQUETIA	PILOT	180	-	1	1
02/10/07	LCO1731	B767	ESIPO	350	310	-4000	M	MAIQUETIA	PILOT	720	-	2	2
03/10/07	COA882	B737	ARORO	360	380	2000	M	PANAMA	MODE C	90	-	1	1
03/10/07	MXA374	A320	15NM south of KASOR (1500n 07940W)	360	360	0	D / N	KINGSTON	MODE C	90	-	-	-
06/10/07	LAN621	B763	KARAZ	330	350	2000	M	LIMA	PILOT	30	-	1	1
09/10/07	COA653	B752	MOXAS	390	410	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
10/10/07	CMP418	B737	1444N 07747W	380	390	1000	B	KINGSTON	MODE C		90	-	1
11/10/07	MPD525	A343	0752N 03505W	320	320	0	N	ROCHAMBEAU	SBAO ACC	180	-	-	-

EVENT DATE	FLIGH IDENT	ACFT TYPE	POSITION	CLRD FL	EVENT FL	HT LHD	COD GTE	FIR	SOURCE	Time (S)	Time (Op)	n (S)	n (Op)
12/10/07	LAN531	B763	UGUPI	350	350	0	N	GUAYAQUIL	PILOT / MODE C	600	-	1	1
13/10/07	AAL2111	B763	SISEL	350	370	2000	M	GUAYAQUIL	PILOT / MODE C	300	-	1	1
14/10/07	AAL917	A306	UGUPI	270	310	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
15/10/07	FDX55	A310	15 NM NORTE DEL VOR/DME VSJ	330	350	2000	M	MAIQUETIA	MODE C	240	-	1	1
20/10/07	LRC631	A320	AKNIL	350	370	2000	M	MAIQUETIA	PILOT	90	-	1	1
23/10/07	AAL912	B752	BUXOS	360	360	0	N	PANAMA	MODE C	90	-	-	-
26/10/07	UAL842	B763	LOGON	340	340	0	N	MAIQUETIA	PILOT	90	-	-	-
26/10/07	GTI074	B744	IREMI	400	400	0	N	ANTOFAGASTA	MODE C	90	-		
27/10/07	UPS382	B752	ENSOL	370	390	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
27/10/07	AFR443	B744	INTOL	310	330	2000	M	ATLANTICO	PILOTO	90	-	1	1
28/10/07	LAN570	B763	ARI	320	340	2000	M	ANTOFAGASTA		30	-	1	1
30/10/07	LAN603	B767	KARAZ	330	350	2000	M	LIMA	PILOTO	30	-	1	1
11/11/07	LXP338	B732	50NM NORTH FROM VTN VOR	320	340	2000	B	SANTIAGO	MODE C	30	-	1	1
16/11/07	AMX010	B762	OSELO	330	370	4000	M	GUAYAQUIL	PILOT / MODE C	90	-	2	2
16/11/07	LNE443	B763	GELIS	330	350	2000	M	ANTOFAGASTA	PILOT / MODE C	30	-	1	1
17/11/07	MPH061	MD11	PULTU	320	340	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
18/11/07	LAN621	B767	ARNEL	330	350	2000	M	LIMA	PILOT	30	-	1	1
18/11/07	AAL957	B767	VAKUD	350	330	-2000	M	LIMA	PILOT	30	-	1	1
19/11/07	ARG1364	B735	MIBAS	300	320	2000	B	SANTIAGO	MODE C	10	-	1	1
20/11/07	TPU033	A320	LIXAS	350	350	0	N	GUAYAQUIL	PILOT / MODE C	90	-	-	-
23/11/07	COA 654	B752	TILSO	360	380	2000	M	PANAMA	MODE C	90	-	1	1
24/11/07	MPD924	A332	BOKAN	350	350	0	N	GUAYAQUIL	PILOT / MODE C	90	-	-	-

24/11/07	LAN584	B763	BUXOS	340	340	0	N	PANAMA	MODE C	90	-	-	-
24/11/07	CMP436	E190	PADOX	340	360	2000	M	GUAYAQUIL	PILOT / MODE C	90	-	1	1
24/11/07	TPU053	A320	LIXAS	350	350	0	M	GUAYAQUIL	PILOT / MODE C	90	-	-	-
29/11/07	VLO7441	DC10	JOBER	350	350	0	M	ATLANTICO	MODE C	3600	-	-	-
30/11/07	LPE707	B763	BISUK at FIR boundary	320	340	2000	M	ROCHAMBEAU			-	-	-
30/11/07	IBE6651	A346	1018N 04706W at FIR boundary	340	360	2000	M	ROCHAMBEAU	PILOT	15	-	1	1
01/12/07	MXA1692	B763	ARNEL	340	360	2000	M	GUAYAQUIL	PILOT / MODE C	30	-	1	1
03/12/07	ARG1141	A342	TASIL	340	360	2000	M	ATLANTICO	PILOT	180	-	1	1
03/12/07	TAP176	A332	MAGNO	370	390	2000	M	ATLANTICO	PILOT	120	-	1	1
05/12/07	SAM181	F100	BOKAN	320	340	2000	M	GUAYAQUIL	PILOT / MODE C	20	-	1	1
09/12/07	AAL945	B763	LIXAS	310	330	2000	M	GUAYAQUIL	PILOT / MODE C	20	-	1	1
10/12/07	SOO575	B742	SORTA	330	310	-2000	M	ANTOFAGASTA	PILOT / MODE C	90	-	1	1
12/12/07	PROPP	H25A	OTONI	400	400	0	N	ROCHAMBEAU	PILOT	15	-	-	-
14/12/07	MXA1692	B763	KONRI	320	340	2000	N	ANTOFAGASTA	PILOT / MODE C	30	-	1	1
15/12/07	N270KA	HS54	SISEL	350	350	0	N	GUAYAQUIL	PILOT / MODE C	30	-	-	-
16/12/07	CMP435	B737	UGUPI	370	390	2000	M	GUAYAQUIL	PILOT / MODE C	20	-	1	1
17/12/07	TPU041	A321	LIXAS	330	330	0	N	GUAYAQUIL	PILOT / MODE C	20	-	-	-
18/12/07	AFR459	A342	EPODE	350	370	2000	M	ATLANTICO	PILOT	1320	-	1	1
18/12/07	DMJ1005	B737	NANIK	330	320	-1000	M	ATLANTICO	PILOT		90		1
19/12/07	LNE1448	A320	PADOX	320	340	2000	M	GUAYAQUIL	PILOT / MODE C	15	-	1	1
19/12/07	MAA6323	B763	MOXAS	350	330	-2000	M	GUAYAQUIL	PILOT / MODE C	15	-	1	1
20/12/07	LAN531	B763	UGUPI	330	330	0	N	GUAYAQUIL	PILOT / MODE C	10	-	-	-

EVENT DATE	FLIGH IDENT	ACFT TYPE	POSITION	CLRD FL	EVENT FL	HT LHD	COD GTE	FIR	SOURCE	Time (S)	Time (Op)	n (S)	n (Op)
20/12/07	KLM753	MD11	PULTU	340	360	2000	M	GUAYAQUIL	PILOT / MODE C	30	-	1	1
20/12/07	VEC202	B722	PYGBY	320	340	2000	M	PORT AU PRINCE	PILOT	30	-	1	1
21/12/07	IBE6821	A343	NANIK	340	350	1000	M	ATLANTICO	PILOT		90	-	1
23/12/07	TAM8080	A332	KOXAM	360	380	2000	M	GEORGETOWN	PILOT	90	-	1	1
23/12/07	TAP177	A332	NANIK	360	360	0	M	ATLANTICO	PILOT	90	-	-	-
24/12/07	MPH664	B763	08N 054W	370	370	0	N	ROCHAMBEAU	PILOT	15	-	-	-
25/12/07	AAL939	B738	JOSES	310	390	8000	M	PORT AU PRINCE	PILOT	30	-	4	4
25/12/07	PTU024	A320	KONRI	320	340	2000	M	ANTOFAGASTA	PILOT / MODE C	30	-	1	1
26/12/07	CMP273	E190	SISEL	350	330	-2000	M	GUAYAQUIL	PILOT / MODE C	15	-	1	1
27/12/07	LAN531	B763	IREMI	370	370	0	N	ANTOFAGASTA	PILOT	90	-		
27/12/07	AVA075	B762	PULTU	360	400	4000	M	GUAYAQUIL	PILOT / MODE C	20	-	2	2
27/12/07	LNE1447	A320	KONRI	340	360	2000	M	ANTOFAGASTA	PILOT / MODE C	30	-	1	1

TOTAL Time (s)		31463	-	-	-
TOTAL Time (op)		-	1260	-	-
	TOTAL n(s)	-	-	224	
	TOTAL n(op)	-	-	-	239

Table 1. Reports of LHD of 1000 ft or more received by CARSAMMA by Month-Year for the CAR/SAM airspace

3.3- **Table 3** summarizes the details of the LHD reports shown in **Table 1** including the LHD of less than 1000ft. The cause of each deviation is represented by a letter code. The letter codes shown in **Table 3** are defined in **Table 2**. **Table 2** provides the cause of the LHD by assigned letter code.

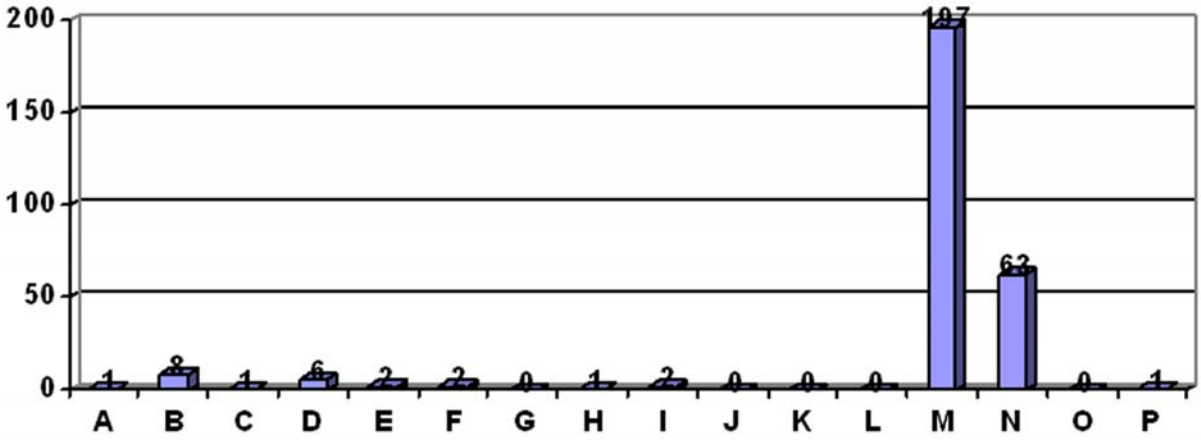
Code	Large Height Deviations Causes (LHD)
A	Failure to climb/descend as cleared
B	Climb/descend without ATC clearance
C	Entry into airspace at an incorrect flight level
D	Deviation due to turbulence or other weather related cause
E	Deviation due to equipment failure
F	Deviation due to collision avoidance system (ACAS/TCAS) advisory
G	Deviation due to contingency event
H	Aircraft not approved for operation in RVSM restricted airspace
I	ATC system loop error; (e.g. pilot misunderstands clearance message or ATC issues incorrect clearance)
J	Equipment control error encompassing incorrect operation of fully functional FMS or navigation system (e.g. by mistake the pilot incorrectly operates INS equipment)
K	Incorrect transcription of ATC clearance or re-clearance into the FMS
L	Wrong information faithfully transcribed into the FMS (e.g. flight plan followed rather than ATC clearance or original clearance followed instead of re-clearance)
M	Error in ATC-unit-to-ATC-unit transition message
N	Negative transfer received from transitioning ATC-unit
O	Other
P	Unknown

Table 2. Codes Used to Define the Cause of Each Reported LHD.

Month – Year	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	TOTAL
Jan													18	4			**22**
Feb			1	1				1					20	8			**31**
Mar		1		2									11	5			**19**
Apr		2		1									16	6			**25**
May						2			1				17	10			**30**
Jun									1				13	3			**17**
Jul	1			1									25	5			**32**
Aug		1											19	4		1	**25**
Sep		1			2								11	3			**17**
Oct		1		1									15	5			**22**
Nov		2											11	3			**16**
Dec													21	7			**28**
TOTAL	**1**	**8**	**1**	**6**	**2**	**2**	**0**	**1**	**2**	**0**	**0**	**0**	**197**	**63**	**0**	**1**	**284**

Table 3 - Sumary of the Total Number of LHD Reports by Month and Cause of Deviation within CAR/SAM airspace.

3.4- **Graphic 1** demonstrates the frequency of each deviation and its reported cause for all the LHD reports received by CARSAMMA. From January until December 2007, the most frequent cause of LHD, save "negative transfer received from transitioning ATC-unit", was due to "error in ATC-unit to ATC-unit transition message.



Graphic 1: The frequency of LHD reports/2007 and their respective causes.

3.5- **Table 4** demonstrates the evolution of LHD reports since the verification phase until the Phase III of the RVSM post-implementation in the CAR/SAM Regions.

YEARS	PHASES	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	TOTAL
2004	**VP**	2	3											16				**21**
2005	**IOP**	2	6											4				**12**
2006	**MP-I**	2					1			6				56			3	**68**
2007	**MP-II**		1							31				76	2	1	2	**113**
2008	**MP-III**	1	7	1	5	2	2		1	3				198	63		1	**284**

Table 4 – Evolution of the LHD reports.

(Follows in next page)

3.6- **Tables 5A and 5B** presents the LHD reports received by CARSAMMA, during 2007, divided into semesters.

FIRST SEMESTER							
STATES	**FIR**	January	**February**	**March**	**April**	**May**	**June**
Dutch Antilles	Curacao - **TNCF**	-	-	-	-	-	-
Argentina	Cordoba - **SACU**	15/11 - NIL	15/11 - NIL	15/11 - NIL	09/05 - NIL	05/06 - NIL	15/11 - NIL
	Ezeiza - **SAEU**	15/11 - NIL	15/11 - NIL	15/11 - NIL	09/05 - NIL	05/06 - NIL	15/11 - NIL
	Mendoza - **SAMV**	15/11 - NIL	15/11 - NIL	15/11 - NIL	09/05 - NIL	05/06 - NIL	15/11 - NIL
	Resistencia - **SARU**	15/11 - NIL	15/11 - NIL	15/11 - NIL	09/05 - NIL	05/06 - NIL	15/11 - NIL
	C. Rivadavia - **SAVU**	15/11 - NIL	15/11 - NIL	15/11 - NIL	09/05 - NIL	05/06 - NIL	15/11 - NIL
Bolivia	La Paz - **SLLF**	29/11 - NIL	29/11 - NIL	29/11 - NIL	29/11 - NIL	29/11 - NIL	29/11 - NIL
Brazil	Atlantico - **SBAO**	01/02 - 03	04/03 - 02	04/04 - 02	01/05 - 01	02/06 - 01	25/10 - 02
	Amazonica - **SBAZ**	25/02 - NIL	16/11 - NIL	16/11 - NIL	16/11 - NIL	16/11 - NIL	16/11 - NIL
	Brasilia - **SBBS**	31/01 - NIL	31/01 - NIL	31/01 - NIL	31/01 - NIL	31/01 - NIL	31/01 - NIL
	Curitiba - **SBCW**	27/03 - NIL	27/03 - NIL	08/04 - NIL	21/05 - NIL	16/07 - NIL	16/07 - NIL
	Recife - **SBRE**	08/02 - NIL	02/03 - 01	09/04 - 01	21/05 - 01	19/06 - NIL	16/08 - NIL
Chile	Punta Arena - **SCCZ**	22/01 - NIL	18/03 - NIL	01/04 - NIL	03/05 - NIL	01/06 - NIL	09/07 - NIL
	Santiago - **SCEZ**	22/01 - 02	18/03 - NIL	04/04 - NIL	07/05 - 02	05/06 - NIL	09/07 - NIL
	Antofagasta - **SCFZ**	22/01 - NIL	18/03 - 05	04/04 - NIL	07/05 - 01	05/06 - 03	09/07 - 01
	Islã de Pascua - **SCIZ**	22/01 - NIL	18/03 - NIL	04/04 - NIL	07/05 - NIL	05/06 - NIL	09/07 - NIL
	Puerto Montt - **SCTZ**	11/02 - NIL	18/03 - NIL	09/01 - NIL	03/05 -NIL	05/06 - NIL	09/07 - NIL
COCESNA	Central American - **MHTG**	08/02 - 01	13/03 - 01	12/04 - NIL	28/05 - NIL	15/06 - NIL	12/07 - 01
Colombia	Barranquilla – **SKEC**	09/01 - NIL	09/01 - NIL	09/01 - NIL	09/01 - NIL	09/01 - NIL	09/01 - NIL
	Bogota – **SKED**	-	-	09/01 - 01	-	-	-
Cuba	Havana - **MUFH**	11/02 - 01	11/03 - NIL	10/04 - NIL	04/05 - NIL	28/11 - NIL	06/07 - NIL
Ecuador	Guayaquil - **SEGU**	25/02 - NIL	22/11 - NIL	22/11 - 02	22/11 - 04	22/11 - 15	22/11 - 07
Guyana	Georgetown- **SYGC**	08/03 - NIL	07/03 - 01	-	-	-	-
French Guiana	Rochambeau - **SOOO**	12/02 - NIL	12/03 - 02	19/07 - NIL	19/07 - 04	16/07 - 05	19/07 - 03
Haiti	Port Au Prince - **MTEG**	12/02 - 01	04/06 - NIL	04/06 - NIL	06/06 - NIL	06/06 - NIL	02/08 - NIL
Jamaica	Kingston - **MKJK**	13/08 - NIL	13/08 - NIL	13/08 - NIL	13/08 - 02	11/06 - 02	13/08 - NIL
Panama	Panama - **MPZL**	25/02 - 12	21/11 - 04	25/04 - 06	18/09 - 02	05/06 - 06	18/09 - 04
Paraguay	Asuncion - **SGFA**	11/02 - NIL	08/03 - 12	12/04 - 10	11/05 - 14	11/06 - 04	10/07 - 11
Peru	Lima - **SPIM**	22/02 - 01	12/03 - 03	24/04 - 02	11/05 - 06	14/01 - NIL	12/07 - 01
Dominican Republic	Santo Domingo - **MDCS**	08/02 - 01	12/03 - 01	08/04 - NIL	30/04 - NIL	06/06 - 01	10/07 - NIL
Suriname	Paramaribo - **SMPM**	27/03 - NIL	27/03 - NIL	27/03 - NIL	23/05 - NIL	23/05 - NIL	20/11 - NIL
Trinidad & Tobago	Piarco - **TTZP**	-	-	-	-	-	-
Uruguay	Montevideo - **SUEO**	04/09 - NIL	04/09 - NIL	04/09 - NIL	09/05 - NIL	04/09 - NIL	04/09 - NIL
Venezuela	Maiquetia - **SVZM**	14/01 - 02; 21/01 - 08; 13/02 - 01	13/02 - 12	21/01 - 05	29/01 - 03	03/07 - 04	03/07 - NIL

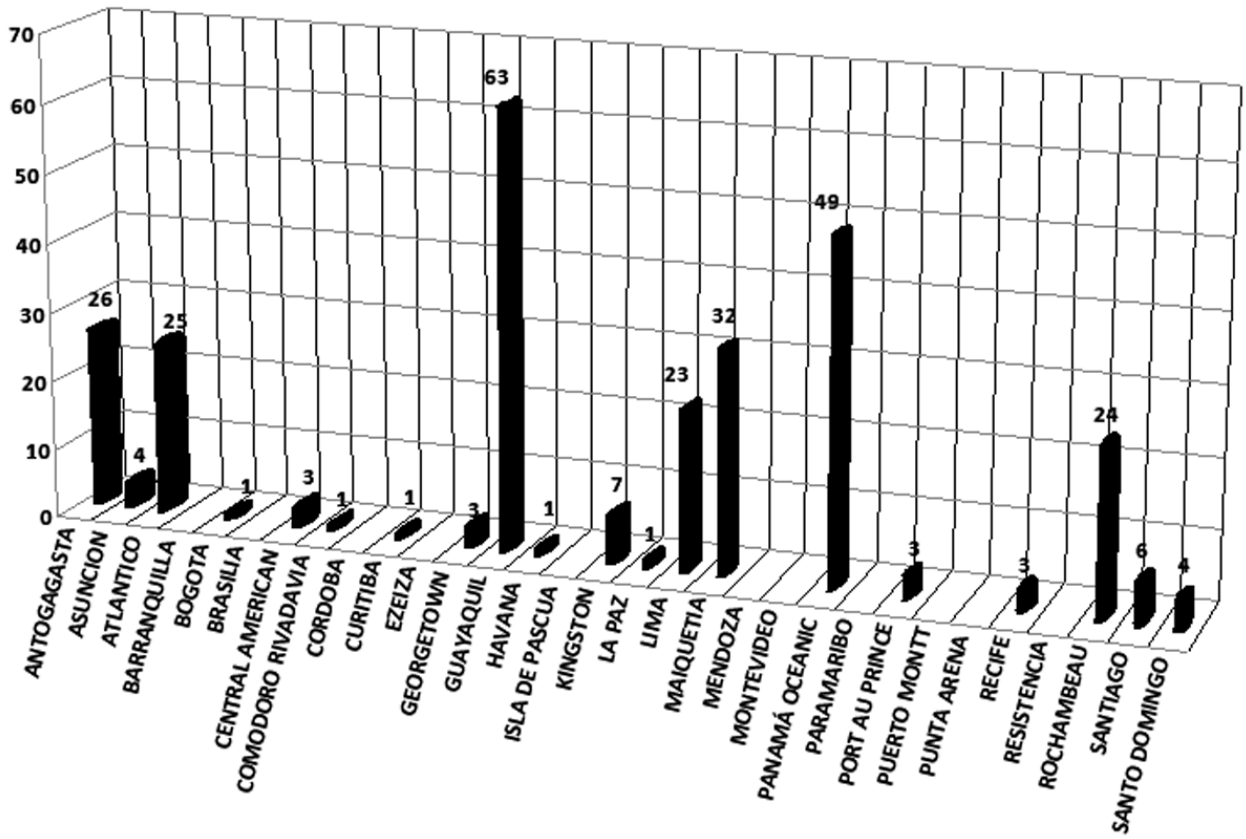
Table 5A- Large Height Deviations Reports Received by CARSAMMA

(Follows in next page)

SECOND SEMESTER							
STATES	**FIR**	**January**	**February**	**March**	**April**	**May**	**June**
Dutch Antilles	Curacao - **TNCF**	-	-	-	-	-	-
Argentina	Cordoba - **SACU**	07/08 - NIL	07/09 - NIL	05/10 - NIL	06/11 - NIL	05/12 - NIL	04/01 - NIL
	Ezeiza - **SAEU**	07/08 - NIL	07/09 - NIL	05/10 - NIL	06/11 - NIL	05/12 -NIL	04/01 - NIL
	Mendoza - **SAMV**	07/08 - NIL	07/09 - NIL	05/10 - NIL	06/11 - NIL	05/12 -NIL	04/01 - NIL
	Resistencia - **SARU**	07/08 - NIL	07/09 - NIL	05/10 - NIL	06/11 - NIL	05/12 -NIL	04/01 - NIL
	Comodoro Rivadavia - **SAVU**	07/08 - NIL	07/09 - NIL	05/10 - NIL	06/11 - NIL	05/12 - NIL	04/01 - NIL
Bolivia	La Paz - **SLLF**	29/11 - NIL	29/11 - NIL	29/11 - NIL	29/11- NIL	27/12 - NIL	04/01 - NIL
Brazil	Atlantico - **SBAO**	07/08 - 01	01/09 - 03	10/10 - 03	05/11 - 01	05/12 - 01	08/01 - 06
	Amazonica - **SBAZ**	16/11 - NIL	16/11 - NIL	16/11 - NIL	16/11 - NIL	03/12 - NIL	16/01 - NIL
	Brasilia - **SBBS**	31/01 - NIL	31/01 - NIL	31/01 - NIL	31/01 - NIL	31/01 - NIL	31/01 - NIL
	Curitiba - **SBCW**	17/09 - NIL	17/09 - NIL	17/09 - 01	15/11 - NIL	03/12 - NIL	07/01 - NIL
	Recife - **SBRE**	16/08 - NIL	17/09 - 01	17/11 - NIL	17/11 - NIL	05/12 - 01	25/01 - NIL
Chile	Punta Arena - **SCCZ**	06/08 - NIL	09/01 - NIL	04/10 - NIL	05/11 - NIL	09/01 - NIL	09/01 - NIL
	Santiago - **SCEZ**	03/08 - NIL	04/09 - NIL	05/10 - NIL	07/11 - NIL	26/12 - 02	03/01 - NIL
	Antofagasta - **SCFZ**	03/08 - 06	04/09 - 02	05/10 - 02	07/11 - 03	26/12 - 01	03/01 - 05
	Isla de Pascua - **SCIZ**	03/08 - NIL	04/09 - NIL	05/10 - NIL	07/11 - NIL	26/12 - NIL	03/01 - NIL
	Puerto Montt - **SCTZ**	03/08 - NIL	14/09 - NIL	05/10 - NIL	27/11 - NIL	09/01 - NIL	02/01 - NIL
COCESNA	Central American - **MHTG**	15/08 - NIL	13/09 - NIL	05/10 - 01	13/11 - NIL	08/01 - NIL	08/01 - NIL
Colombia	Barranquilla – **SKEC**	09/01 - NIL	05/12 -NIL	05/12 - NIL	05/12 - NIL	05/12 - NIL	09/01 - NIL
	Bogota – **SKED**	-	-	-	-	-	-
Cuba	Havana - **MUFH**	09/08 - NIL	28/11 -NIL	28/11 - NIL	28/11 - NIL	07/12 - NIL	11/01 - NIL
Ecuador	Guayaquil - **SEGU**	26/11 - 19	26/11 - 09	22/11 - 03	22/11 - 09	07/12 - NIL	09/01 - 12
Guyana	Georgetown- **SYGC**	-	12/09 - NIL	04/10 - 01	-	-	11/01 - 01
French Guiana	Rochambeau - **SOOO**	07/08 - 01	04/10 - 04	04/10 - NIL	08/11 - 03	06/12 - 02	03/01 - 02
Haiti	Port Au Prince - **MTEG**	02/08 - NIL	11/10 - NIL	09/10 - NIL	07/12 - NIL	07/12 - NIL	10/01 - 02
Jamaica	Kingston - **MKJK**	13/08 - 01	26/11 - NIL	26/11 - NIL	26/11 - 02	-	-
Panama	Panama - **MPZL**	18/09 - 06	18/09 - 02	21/11 - 05	10/12 - 02	10/12 - 02	
Paraguay	Asuncion - **SGFA**	14/08 -13	11/09 - 07	09/10 - 10	22/11 - 05	11/12 - 08	09/01 - 06
Peru	Lima - **SPIM**	03/08 - 05; 22/08 - 02	12/09 - 01	19/10 - 01	22/11 - 03	19/12 - 02	14/01 - 01
Dominican Republic	Santo Domingo - **MDCS**	14/08 - 01	10/09 -NIL	15/10 - NIL	22/11 - NIL	09/01 - NIL	09/01 - NIL
Suriname	Paramaribo - **SMPM**	20/11 - NIL	20/11 - NIL	20/11 - NIL	20/11 - NIL	20/11 - NIL	14/01 - NIL
Trinidad & Tobago	Piarco - **TTZP**	-	-	-	-	-	-
Uruguay	Montevideo - **SUEO**	04/09 - NIL	04/09 - NIL	02/10 - NIL	06/11 - NIL	07/01 - NIL	04/01 - NIL
Venezuela	Maiquetia - **SVZM**	-	13/10 - 03	21/01 - 03	28/01 - 05	28/01 - 01	-

Table 5B - Large Height Deviations Reports Received by CARSAMMA

3.7- **Graphic 2** presents the LHD reports informed by the FIR of the CAR/SAM Regions. It is important to say that the identification of the error as well as filling the LHD form in, show the Fir's sense of responsibility towards the Operational Safety. It goes without saying that the FIR which reports the LHD, generally is the one that identifies the error in the limit of the adjacent FIR.



Graphic 2: The frequency of LHD reports/2007 CAR/SAM FIR.

(Follows in next page)

4. Summary and Conclusions

4.1- This paper provides a summary of the LHD reports received by CARSAMMA concerning the implementation of the RVSM in CAR/SAM airspace.

4.2- The LHD reports received by CARSAMMA, from January to August 2007, were validated during the Fourth Meeting of the Scrutiny Work Group, which took place in Merida, Mexico. The ones received between September and December 2007 were validated during the Fifth Meeting of the Scrutiny Work Group, which took place in Lima, Peru.

4.3- The Scrutiny Work Groups were extremely important since for the first time the LHD reports were evaluated and validated by experts that had the purpose of identifying the tendencies of the errors and indicating points of conflict between the limits of the Flight Information Regions of the Caribbean and South American States.

4.4- The total number of seconds spent at incorrect flight levels, the number of flight levels passed without any clearance were presented along with the reported cause of each LHD event.

4.5- From January until December 2007, the most frequent causes of the LHD reports were due to "error in ATC-unit to ATC-unit transition message" (Code: M) and "negative transfer received from transitioning ATC-unit" (Code: N), evidencing the tendencies that are becoming worse period after period of the Operational Safety Assessment of the CAR/SAM Regions.

4.6- The points of conflict identified by the higher frequency of LHD reports were : LIXAS, UGUPI, BOKON, GELIS, KONRI, NANIK, SORTA, 11N036W, BUXOS, DAKMO, ENSOL, MOXAS, SISEL, PULTU, TERAS, VSJ, ALCOT, KARAZ, AGUJA, ARNEL, UKLOS, 05N041W, ARORO, BOGAL, DAGUD, ESDIN, ESIPO, IREMI, JOBER, KAKOL, MIBAS, NOREX, PADOX, PAKON e VAKUD, being necessary that the States make immediate arrangements in order to eliminate the tendencies of the occurred LHD.

4.7- After a detailed analysis, CARSAMMA realized that the errors had possibly been caused by the deficient ATC-ATC communication-radio between the ATC Unit and the aircraft due to the lack of or disobedience to the operational agreements between the adjacent Flight Information Regions (FIR), as well as, the ATCO's ignorance of the operational agreements previously signed between the States.

5. Recommended Actions

5.1- States are requested to take note of the importance of the LHD reports in the safety assessement process.

5.2- States are requested to continue informing CARSAMMA the LHD reports by the 10th of each month even if no deviation occurs.

5.3- Attention should be given to the Form A in order to fill it in correctly, with regard to its obligatoriness and coherence among the fields (e.g. Coherence among "Cleared Flight Level", "Observed-Reported Final Flight Level" and "Observed Deviation").

5.4- In order to obtain a better control of the frequency of LHD events by aircraft, it is indispensable to add the information of aircraft registration number in the Field 04 ("Call Sign").

5.5- States must remember that aircraft flying in wrong flight levels without ATC clearance or due to mistakes in coordination of traffic must be reported to CARSAMMA, so that the proportion of flight hours spent at incorret flight levels can be calculated.

5.6- Controllers must be trained to avoid the errors in ATC-unit to ATC-unit transition message in order to reduce the time spent in wrong flight levels and the number of flight levels passed without any clearance.

5.7- Controllers must be trained to avoid the occurrence of the Code N ("negative transfer received from transitioning ATC-unit") in order to reduce the time spent in wrong flight levels as well as to avoid passing unauthorized flight levels.

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APPENDIX

CARIBBEAN AND SOUTH AMERICAN
MONITORING AGENCY (CARSAMMA)

Report of Large Altitude Deviation for aircraft cleared at or above FL290

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

1) those due to ACAS/TCAS
2) turbulence and contingency events and
3) operational errors resulting in operation at flight levels other than cleared by ATC or coordinated
by ATC units.

Name of FIR: _____

Please complete Section I or II as appropriate

SECTION I:

There were no reports of large altitude deviation for the month of _____

SECTION II:

There was/were _____ report(s) of an altitude deviation of 300 ft or more for aircraft cleared at or above FL290. Details of the altitude deviation are attached (Form A).

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

SECTION III:

When complete please forward the report(s) to:

Air Navigation Management Center (CGNA)
Caribbean and South American Monitoring Agency (CARSAMMA)
Av. General Justo, 160
Rio de Janeiro, RJ
Cep: 20.021-130
Brazil
Phone: (55-21) 2101-6358
Fax: (55-21)2101-6490
E-mail: carsamma@cgna.gov.br

CARSAMMA
Caribbean and South American Monitoring Agency

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

CMA 4
ALTITUDE DEVIATION FORM

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: 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 – ❑ Pilot ❑ Mode C	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.*)

CREW COMMENTS (IF ANY)

When complete please forward the report(s) to:

Air Navigation Management Center (CGNA)
Caribbean and South American Monitoring Agency (CARSAMMA)
Av. General Justo, 160
Rio de Janeiro, RJ
Cep: 20.021-130 Brazil
Phone: (55-21) 2101-6358 Fax: (55-21) 2101-6490
E-Mail: carsamma@cgna.gov.br

SPECIFICATION OF THE FIELDS
ALTITUDE DEVIATION FORM – CMA F4

(1) - Today's date (mandatory)
(2) - Reporting unit-FIR (mandatory)
(3) - Operator Name (mandatory)
(4) - Call Sign and Registration Number (mandatory)
(5) - Aircraft Type (mandatory)
(6) - Mode C Displayed (YES or NO) /Which FL? (mandatory)
(7) - Date of Occurrence (mandatory)
(8) - Time UTC (mandatory)
(9) - Occurrence Position (lat/long or fix) (mandatory)
(10) - Cleared Route of Flight (mandatory)
(11) - Cleared Flight Level (mandatory)
(12) - Estimated Duration at Incorrect Flight Level (seconds) (mandatory)
(13) - Observed Deviation (+/- ft) (mandatory)
(14) - Other Traffic Involved (mandatory)
(15) - Cause of Deviation (brief title) (mandatory)
(16) - Observed/reported Final Flight Level / MODE C or PILOT? (mandatory)
(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? (Y/N)
(20) - Detailed Description of Deviation (mandatory)
(21) - Crew Comments (if any)