APENDICE "A" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

RESUMEN ESTADO FUNCIONAL INFRAESTRUCTURA AERONAUTICA EN LA ISLA DE SAN ANDRES- COLOMBIA

	SISTEMA		OBSERVACIONES
COMUNICACIONES	ATS	47	Operando Normal, en todas las posiciones APP, APP coord., FIS, FIS coord., Supervisor, TWR principal, TWR coord.
		59	Operando Normal, en todas las posiciones APP, APP coord., FIS, FIS coord., Supervisor, TWR principal, TWR coord.
	AFTN		Operando Normal
	VHF	118.1 Mhz	Operando Normal y con dualidad
		119.3 Mhz	Operando Normal y con dualidad
		128.4 Mhz	Operando Normal y con dualidad
		121.5 Mhz	Operando Normal y con dualidad
	SISTEMA SATELITAL		Operando Normal
	ENLACE MW STRATEX		Operando Normal
	MULTIPLEXORES		Operando Normal
	TELEFONOS DIRECTOS	5125386 TWR 5127316 ACC 5125384 SALA TECNICA 5122797 COM. 5125392 JEFE AERON. 5120097 SAR 5125389 ADM	Operando Normalmente al igual que los demas teléfonos directos utilizados por en el Aeropuerto
	LINEA CALIENTE TWR- BOMBEROS		Operando Normal
	RADIOS VARIABLES	TWR	Operando normal y con su sistema de baterias independientes
		ACC	Operando Normal y con su sistema de baterias independientes
RADIO AYUDAS	VOR No 1		Operando Normal
	VOR No 2		En mantenimiento por fuente de poder, repuestos en consecucion por regional Atlántico.
	DME NO 1		Operando Normal
	DME NO 2		Operando Normal
	NDB No 1		Operando Normal
	NDB No 2		Operando Normal – ventiladores en mantenimiento a cargo de la regional atlántico
	Visualización Datos Radar		Operando normal
METEOROLOGIA	EMA		Operando Normal
	RVR		Operando Normal
	CEILOMETRO		Operando Normal
SISTEMAS COMPLEMENTARIOS	GRABADORA MULTICANAL		Operando Normal

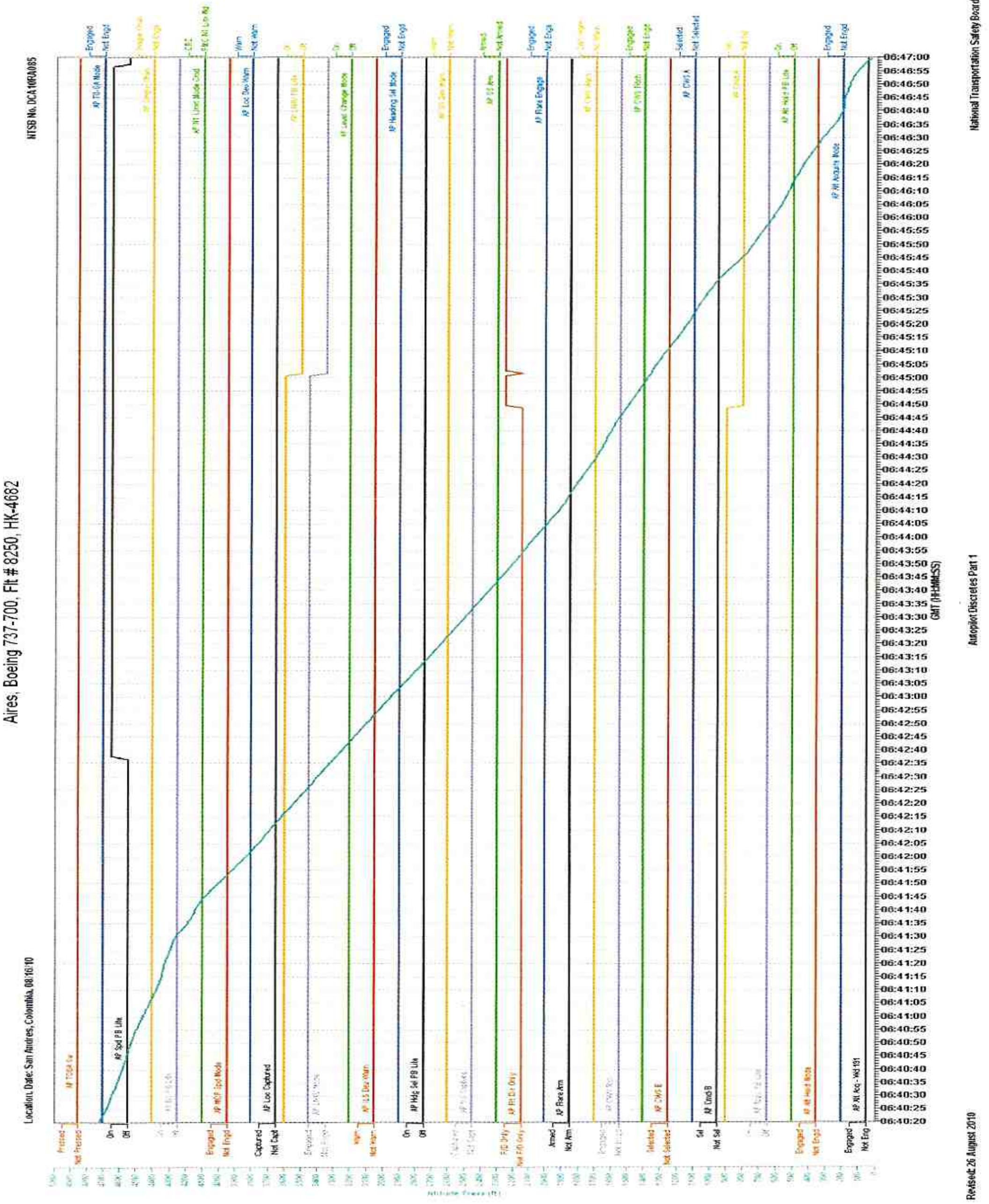
APENDICE "B" ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA

COORDENADAS UBICACIÓN DE LOS RESTOS DE LA AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA

Nombre	Comentario	Coordenada
LEFT SIDE INITIAL IMPACT	17-AGO-10 1:26:11PM	N12 34 40.3 W81 43 16.8
RIGHT SIDE INITIL IMPACT	17-AGO-10 1:26:38PM	N12 34 40.1 W81 43 16.6
Ceilometer Position	19-AGO-10 5:42:56PM	N12 34 39.2 W81 43 18.4
EMA station location	19-AGO-10 12:30:35PM	N12 34 49.0 W81 42 57.6
Forward middle section	16-AGO-10 8:54:17PM	N12 34 44.9 W81 43 10.3
Forward part rear section	17-AGO-10 1:43:21PM	N12 34 45.0 W81 43 10.0
Fuselage path 1	18-AGO-10 6:19:30PM	N12 34 40.8 W81 43 15.5
Fuselage path 2	18-AGO-10 6:35:12PM	N12 34 41.6 W81 43 14.4
Fuselage skin section	17-AGO-10 1:19:41PM	N12 34 40.4 W81 43 16.0
Gps low fuselage section	17-AGO-10 1:10:59PM	N12 34 41.3 W81 43 14.5
HMU right Engine	17-AGO-10 1:16:15PM	N12 34 40.7 W81 43 15.3
IDEAM location	19-AGO-10 11:17:20AM	N12 35 16.3 W81 42 04.0
Inboard Left Flap	17-AGO-10 12:52:29PM	N12 34 43.7 W81 43 12.1
INITIAL IMPACT FUSELAGE	17-AGO-10 1:25:06PM	N12 34 40.2 W81 43 16.7
Left Engine	16-AGO-10 9:07:17PM	N12 34 41.7 W81 43 15.1
Left flap section	17-AGO-10 1:02:02PM	N12 34 41.6 W81 43 14.4
Left main Landing gear	16-AGO-10 9:05:20PM	N12 34 41.7 W81 43 14.4
Left tail Section	17-AGO-10 1:29:15PM	N12 34 41.1 W81 43 16.0
Left tip stabilizer end	17-AGO-10 1:46:10PM	N12 34 44.7 W81 43 09.7
Left wing end	17-AGO-10 1:37:12PM	N12 34 44.7 W81 43 09.7
Left Wing tip	17-AGO-10 8:23:47AM	N12 34 41.1 W81 43 16.4
Middle part rear section	17-AGO-10 1:42:11PM	N12 34 45.0 W81 43 10.1
Nose Forward	17-AGO-10 1:35:13PM	N12 34 44.3 W81 43 09.6
Nose landing gear left door	17-AGO-10 1:14:42PM	N12 34 40.9 W81 43 15.2
Nose landing Gear right door	17-AGO-10 1:07:19PM	N12 34 41.6 W81 43 12.8
Nose rear end	16-AGO-10 8:53:23PM	N12 34 44.5 W81 43 09.8
PAPI location	18-AGO-10 6:52:09PM	N12 34 49.3 W81 43 3.86
Radon	17-AGO-10 12:56:37PM	N12 34 43.2 W81 43 12.1
Rear part empenaje	17-AGO-10 1:45:42PM	N12 34 44.8 W81 43 09.6
Right Engine	16-AGO-10 9:10:28PM	N12 34 40.4 W81 43 15.5
Right Estabilizer tip section	17-AGO-10 8:17:55AM	N12 34 40.4 W81 43 16.2
Right flap section	17-AGO-10 1:03:44PM	N12 34 41.4 W81 43 14.1
Right horizontal estab tip section	17-AGO-10 8:30:54AM	N12 34 40.8 W81 43 15.2
Right main landing gear	17-AGO-10 1:13:23PM	N12 34 40.9 W81 43 15.3
Right Tip estabilizer	17-AGO-10 1:44:39PM	N12 34 44.9 W81 43 09.5
Right tip wing	16-AGO-10 8:56:42PM	N12 34 45.5 W81 43 10.4
Right Wing tip	17-AGO-10 8:16:14AM	N12 34 39.9 W81 43 16.1
RVR 1 Location	19-AGO-10 12:26:39PM	N12 34 44.9 W81 43 04.7
RVR 2 Location	19-AGO-10 12:27:25PM	N12 34 45.4 W81 43 03.9
RWY 06 Side end	16-AGO-10 9:04:33PM	N12 34 41.6 W81 43 14.2
RWY Center line	16-AGO-10 8:49:58PM	N12 34 44.5 W81 43 09.1
RWY end left side	17-AGO-10 11:06:09AM	N12 34 41.2 W81 43 13.6
RWY end right side	17-AGO-10 11:07:20AM	N12 34 40.2 W81 43 13.4
RWY Side 1	16-AGO-10 8:49:18PM	N12 34 43.9 W81 43 08.8
RWY Side 2	16-AGO-10 8:50:37PM	N12 34 45.2 W81 43 09.5
RWY total end left side	18-AGO-10 5:52:51PM	N12 34 42.3 W81 43 14.69
RWY total end right side	18-AGO-10 5:56:22PM	N12 34 40.2 W81 43 13.4
Seats on RWY	17-AGO-10 11:03:28AM	N12 34 43.6 W81 43 10.6
Wall	17-AGO-10 8:04:55AM	N12 34 39.1 W81 43 18.8

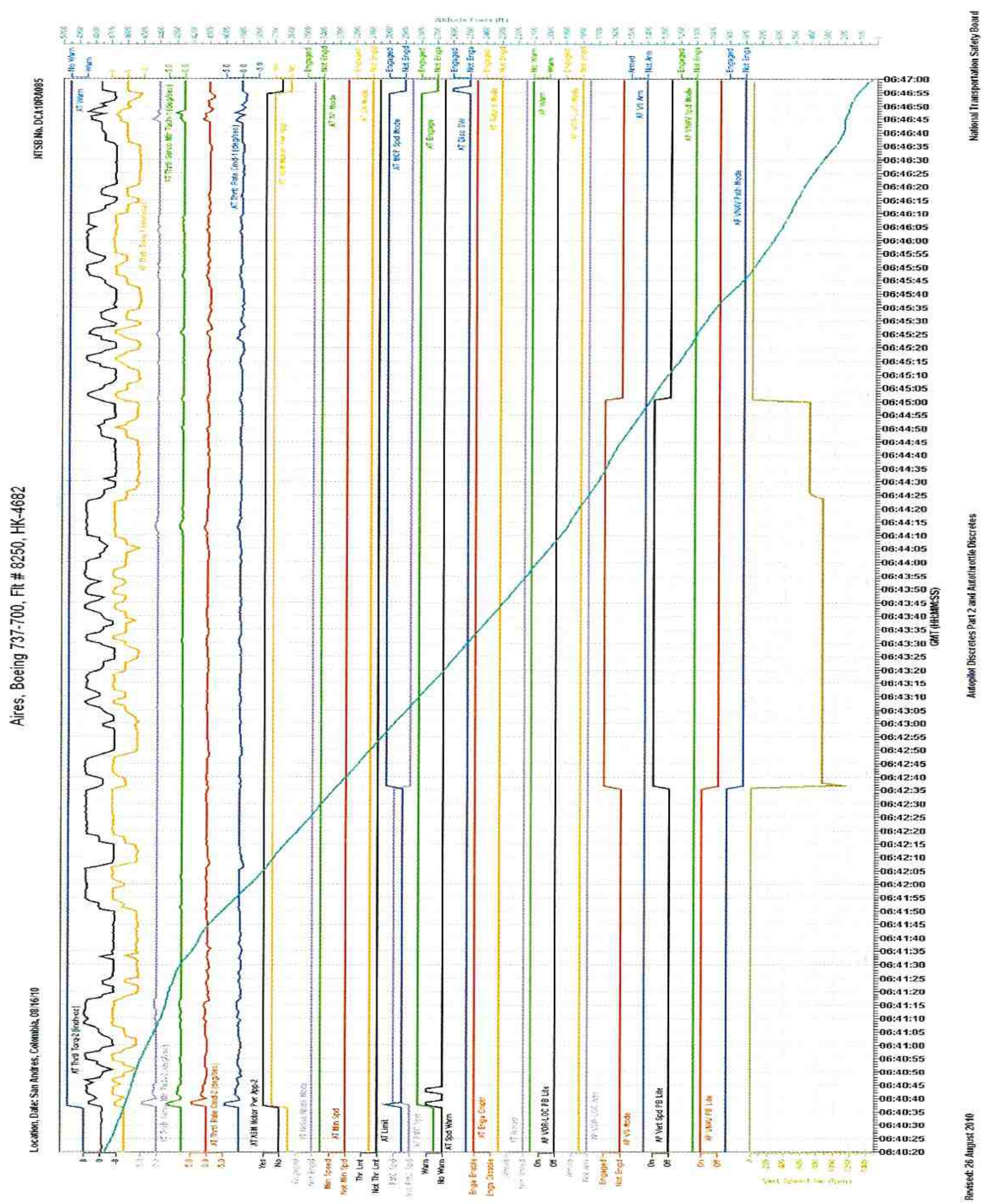
APENDICE "C" ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA

PLOTS FDR (AUTOPILOT DISCRETES PART # 1), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA



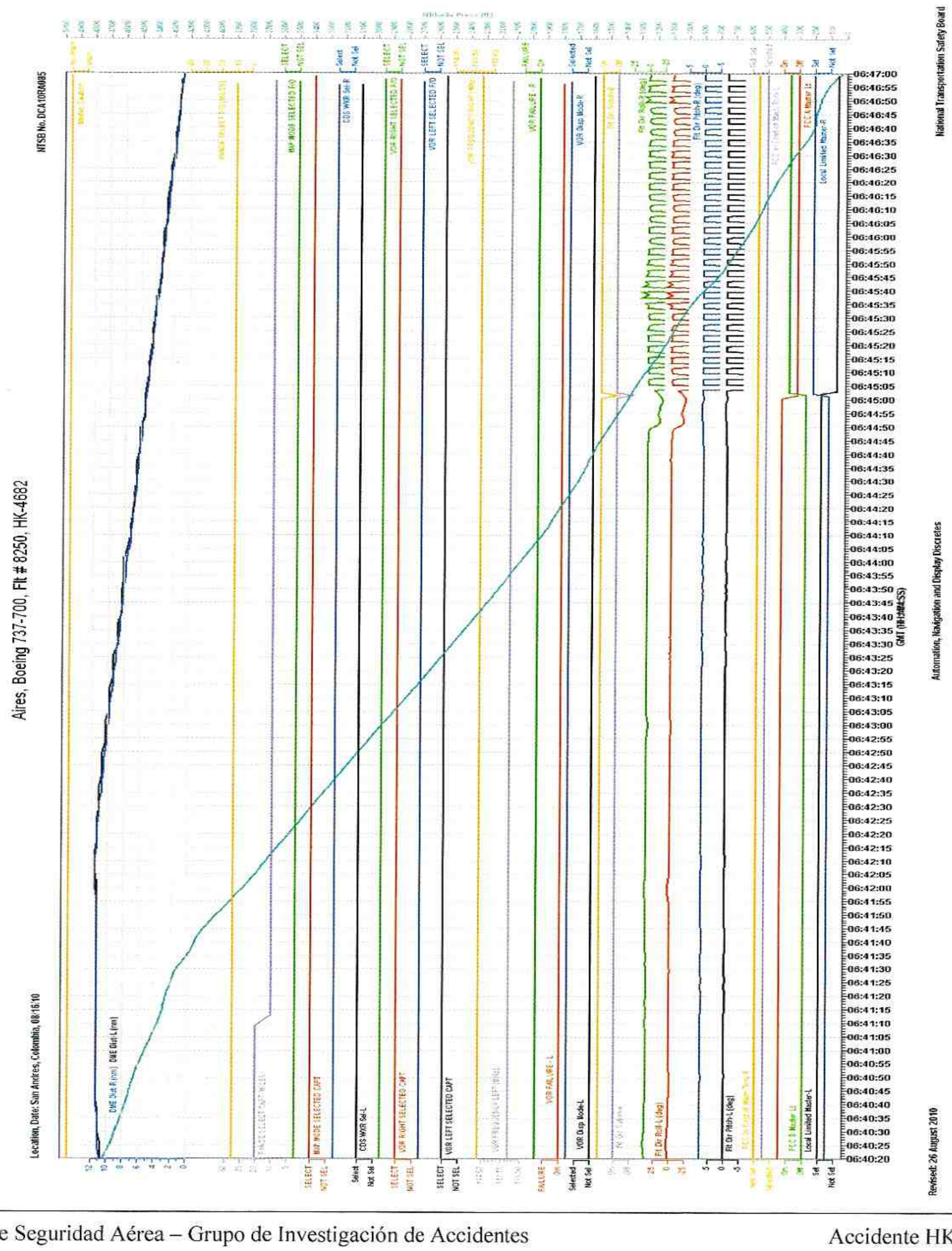
APENDICE "D" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

PLOTS FDR (AUTOPILOT DISCRETES PART # 2), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA



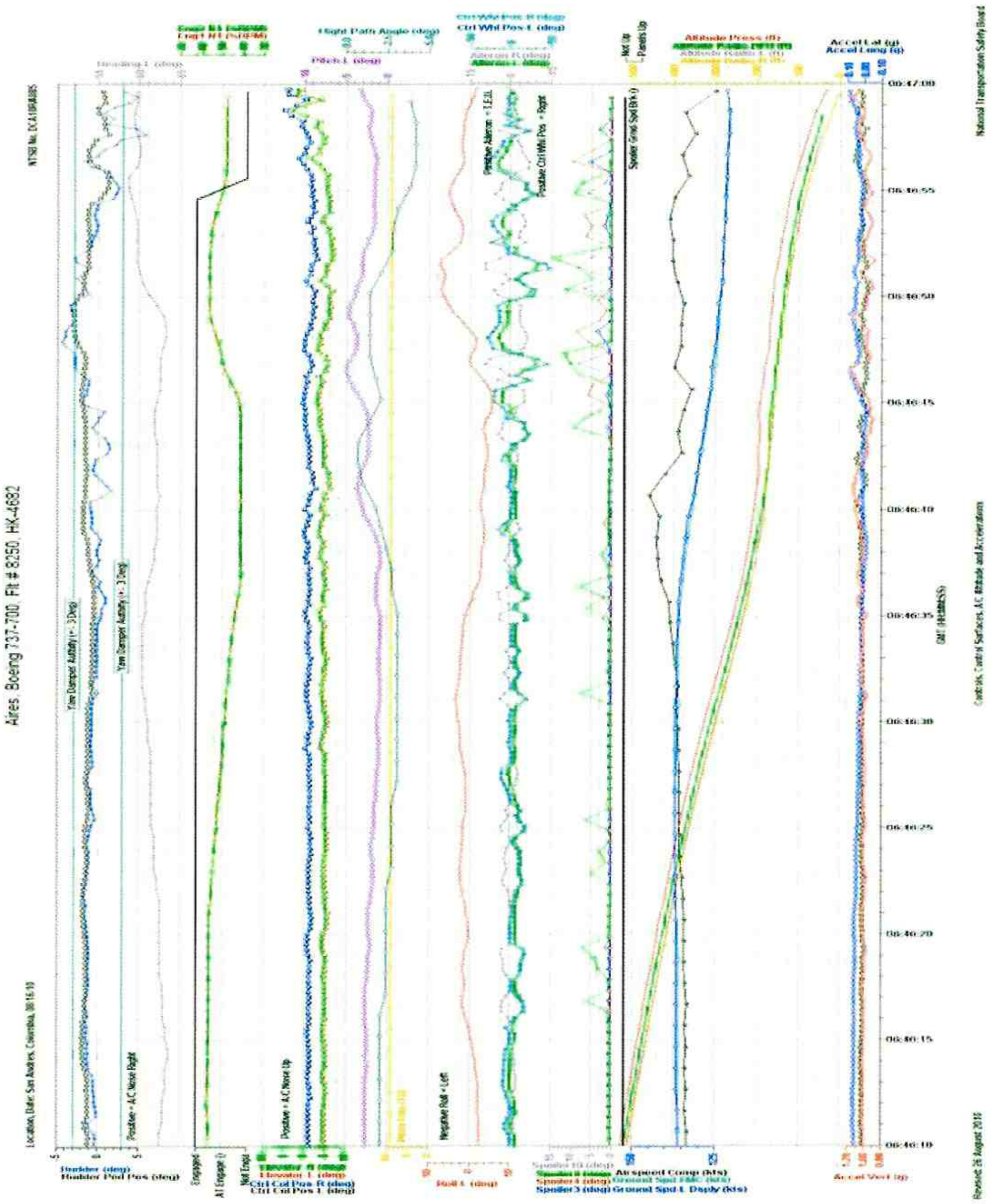
APENDICE "E" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

PLOTS FDR (AUTOMATION, NAVIGATION AND DISPLAY DISCRETES), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA



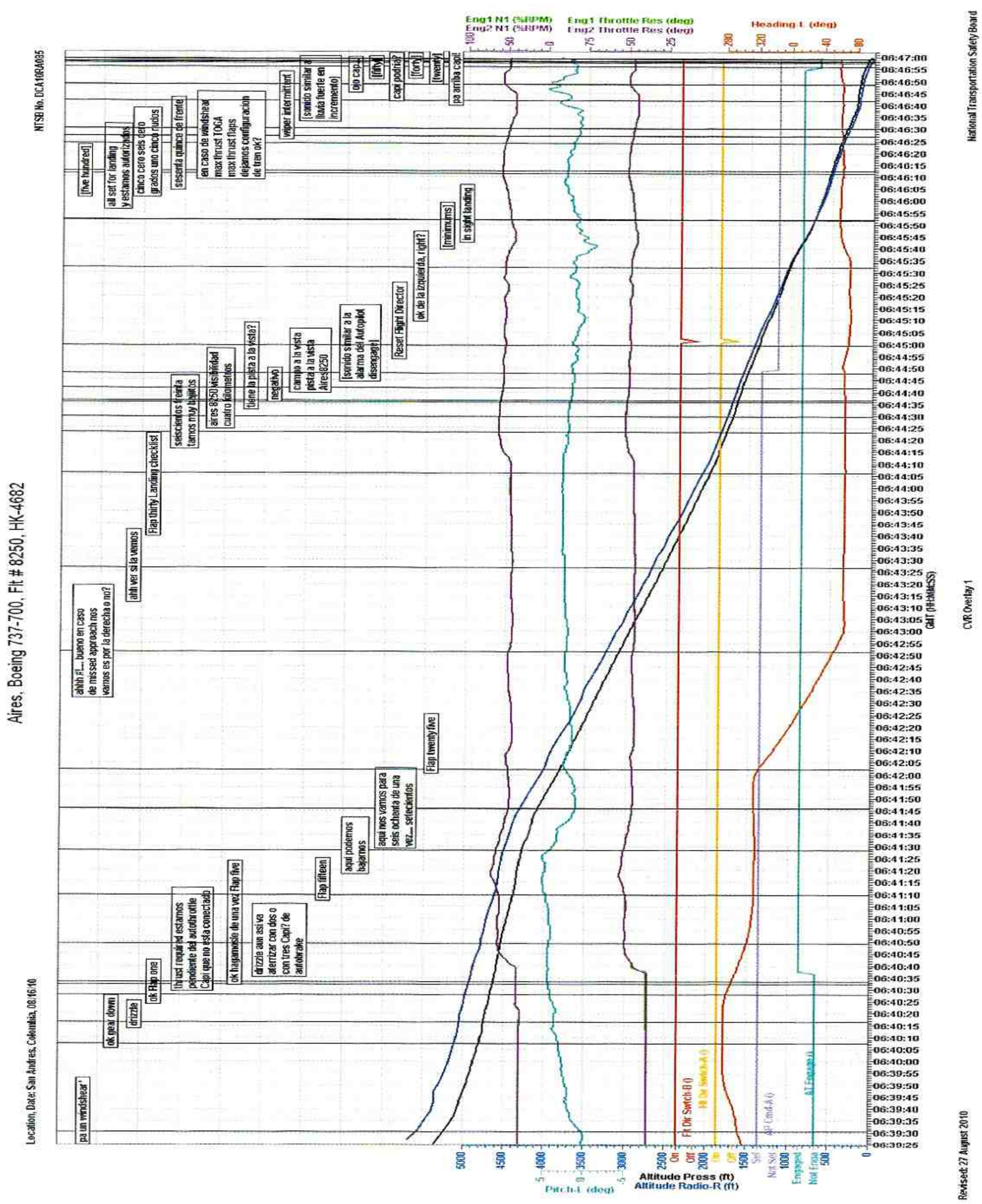
APENDICE "F" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

PLOTS FDR (CONTROLS, CONTROL SURFACES, A/C ATTITUDE AND ACCELERATIONS), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA



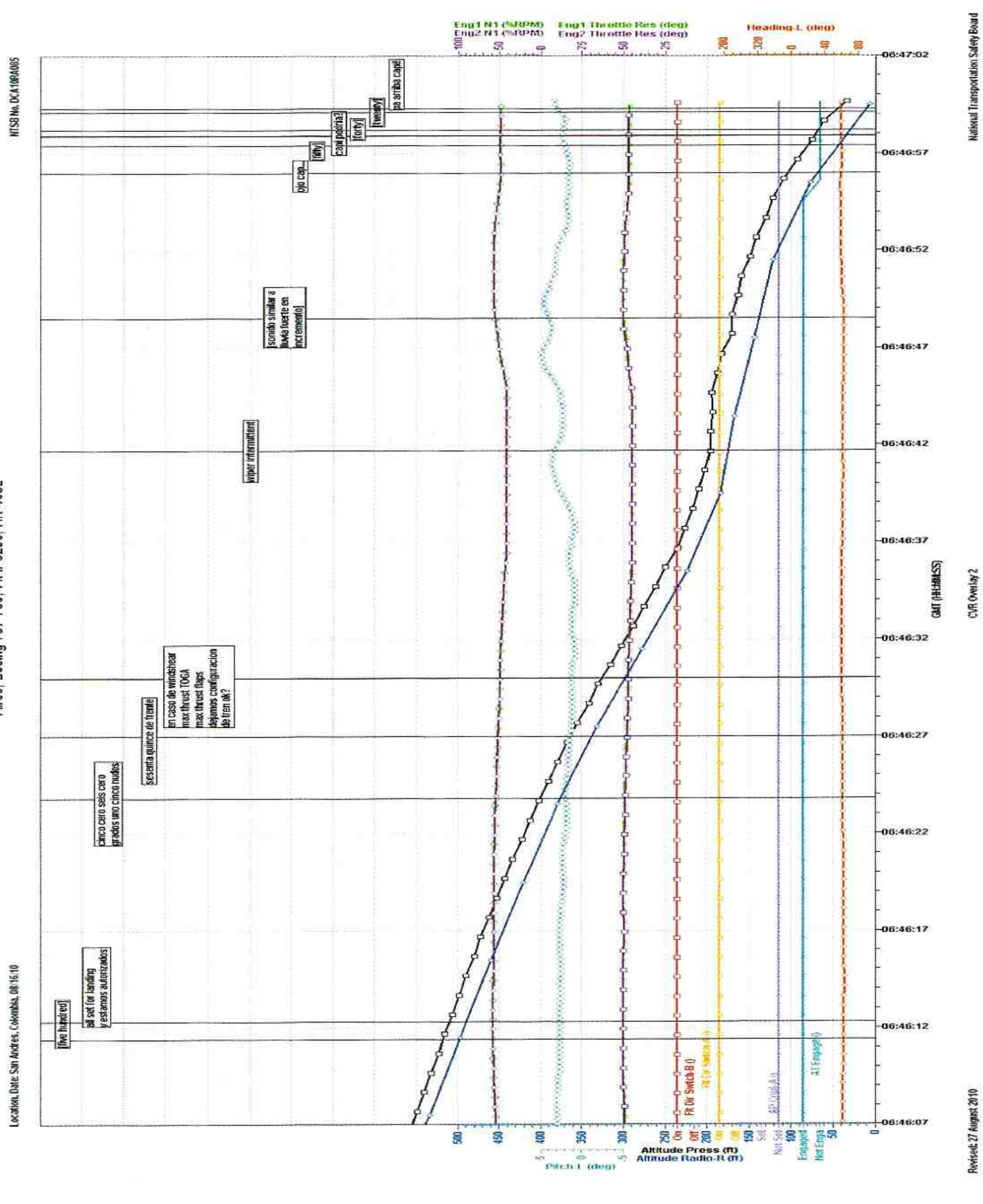
APENDICE "G" ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA

PLOTS FDR (CVR OVERLAY # 1), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA



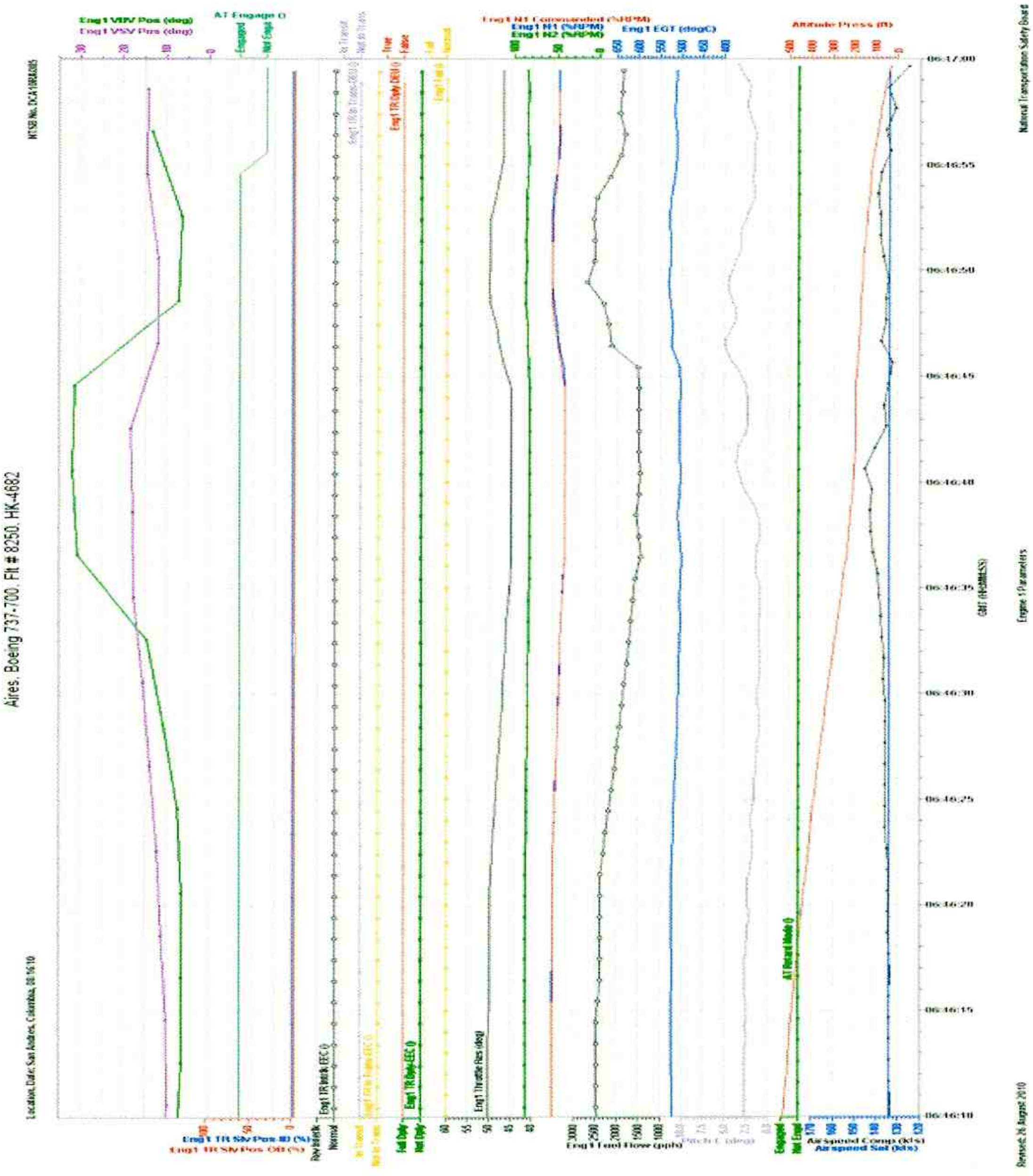
APENDICE "H" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

PLOTS FDR (CVR OVERLAY # 2), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA



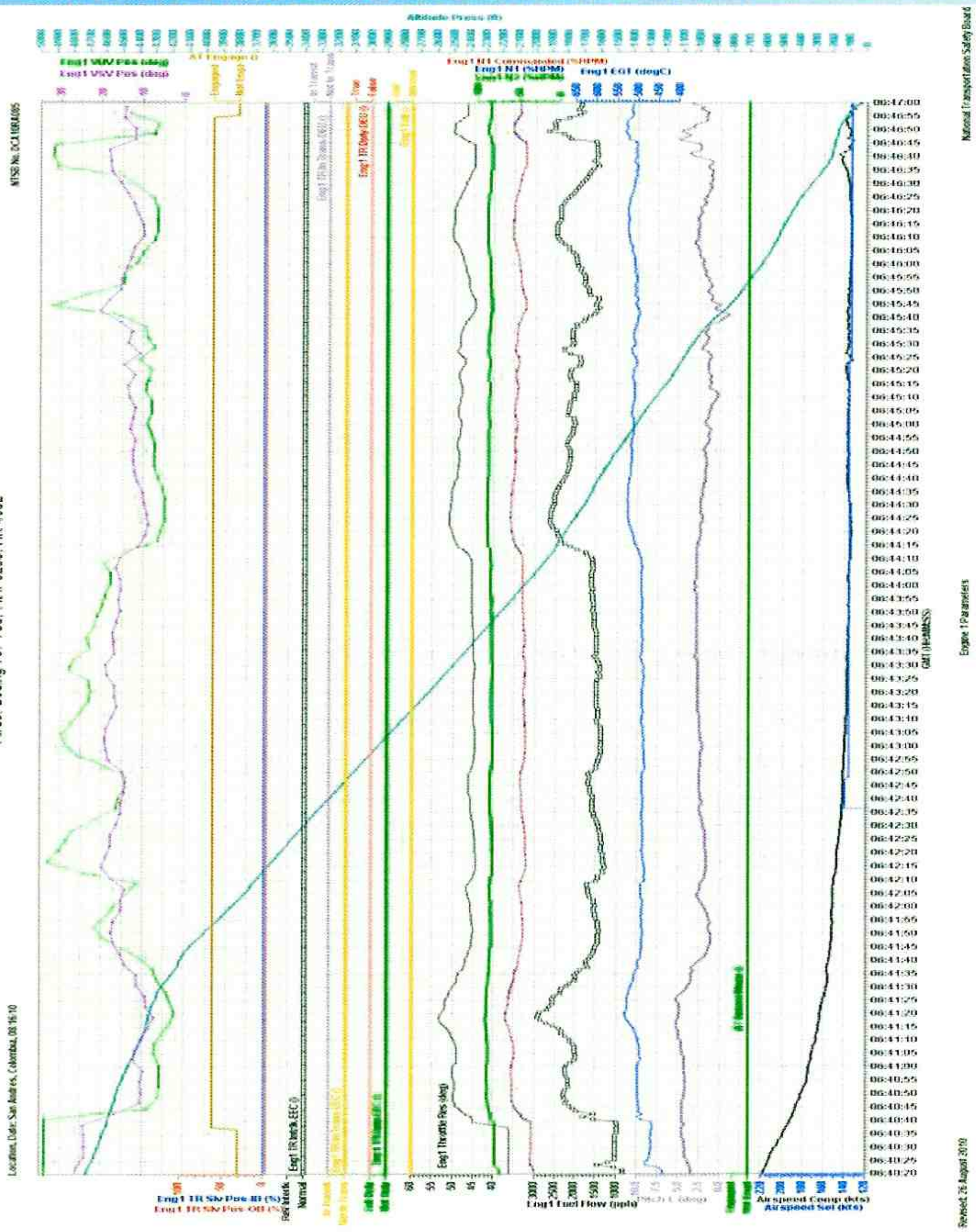
APENDICE "I" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

PLOTS FDR (ENGINE # 1 FINAL PARAMETERS), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA



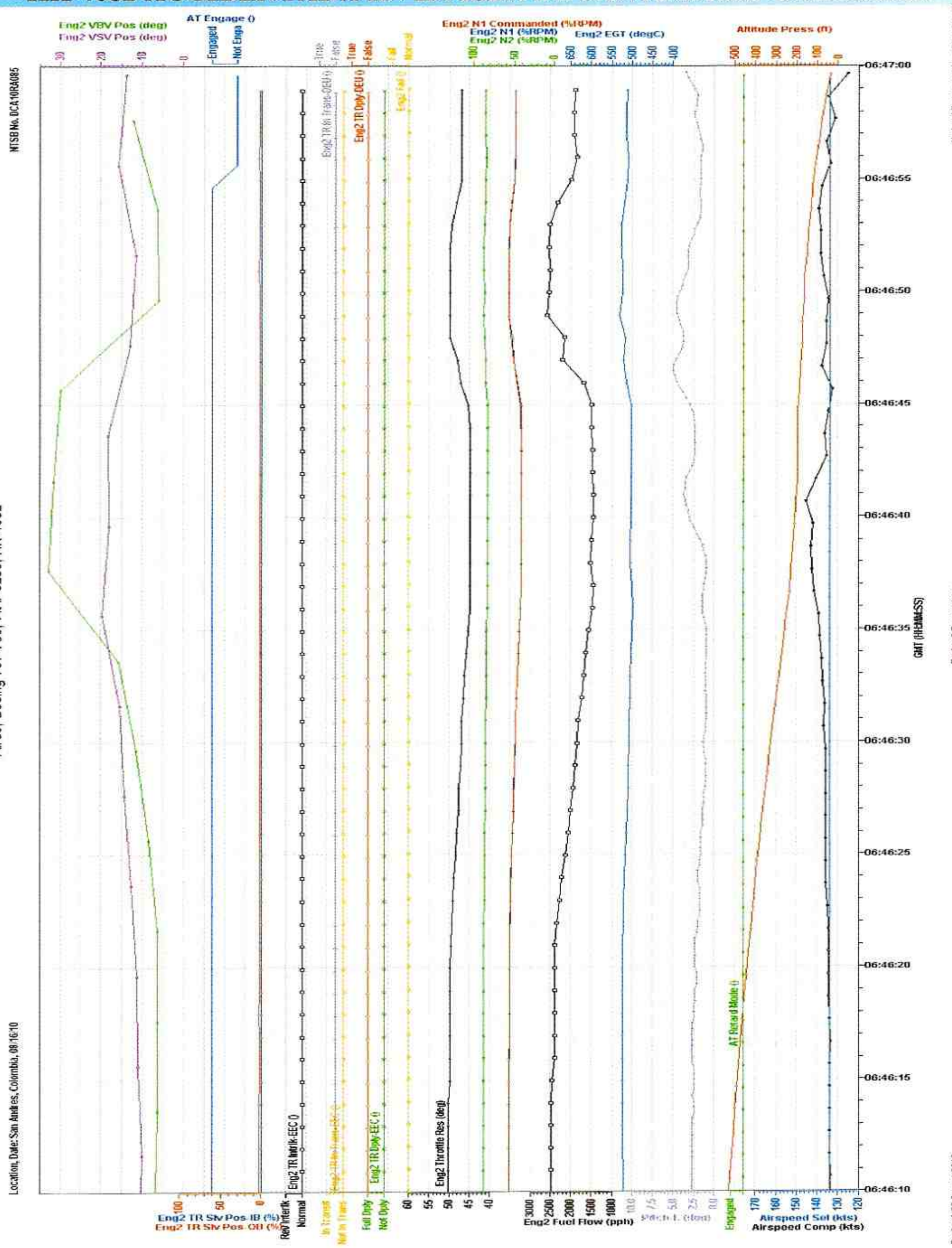
APENDICE "J" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

PLOTS FDR (ENGINE # 1 ZOOM OUT FINAL), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA



APENDICE "K" ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA

PLOTS FDR (ENGINE # 2 FINAL PARAMETERS), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA



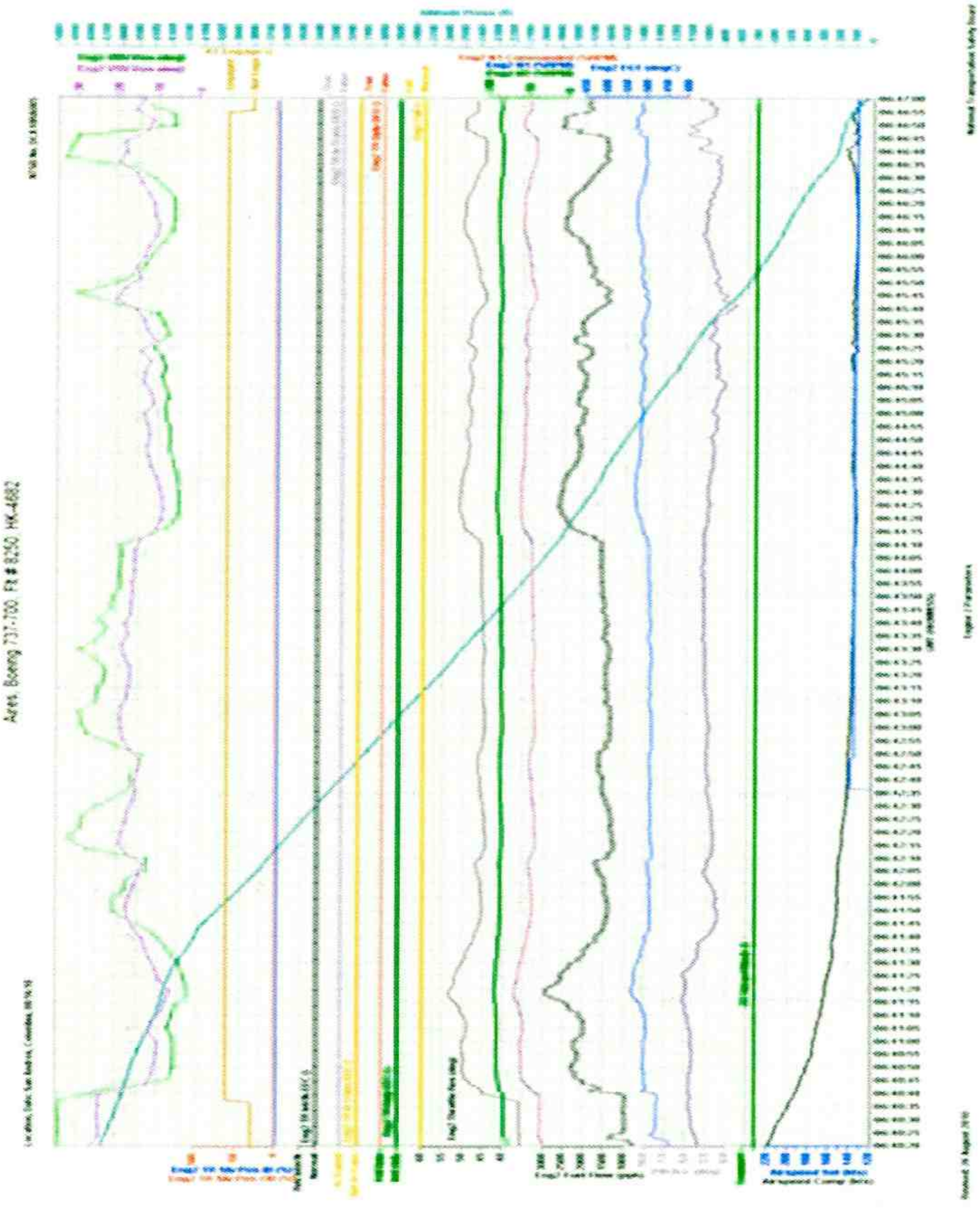
REPÚBLICA DE COLOMBIA

AERONAUTICA CIVIL

Unidad Administrativa Especial

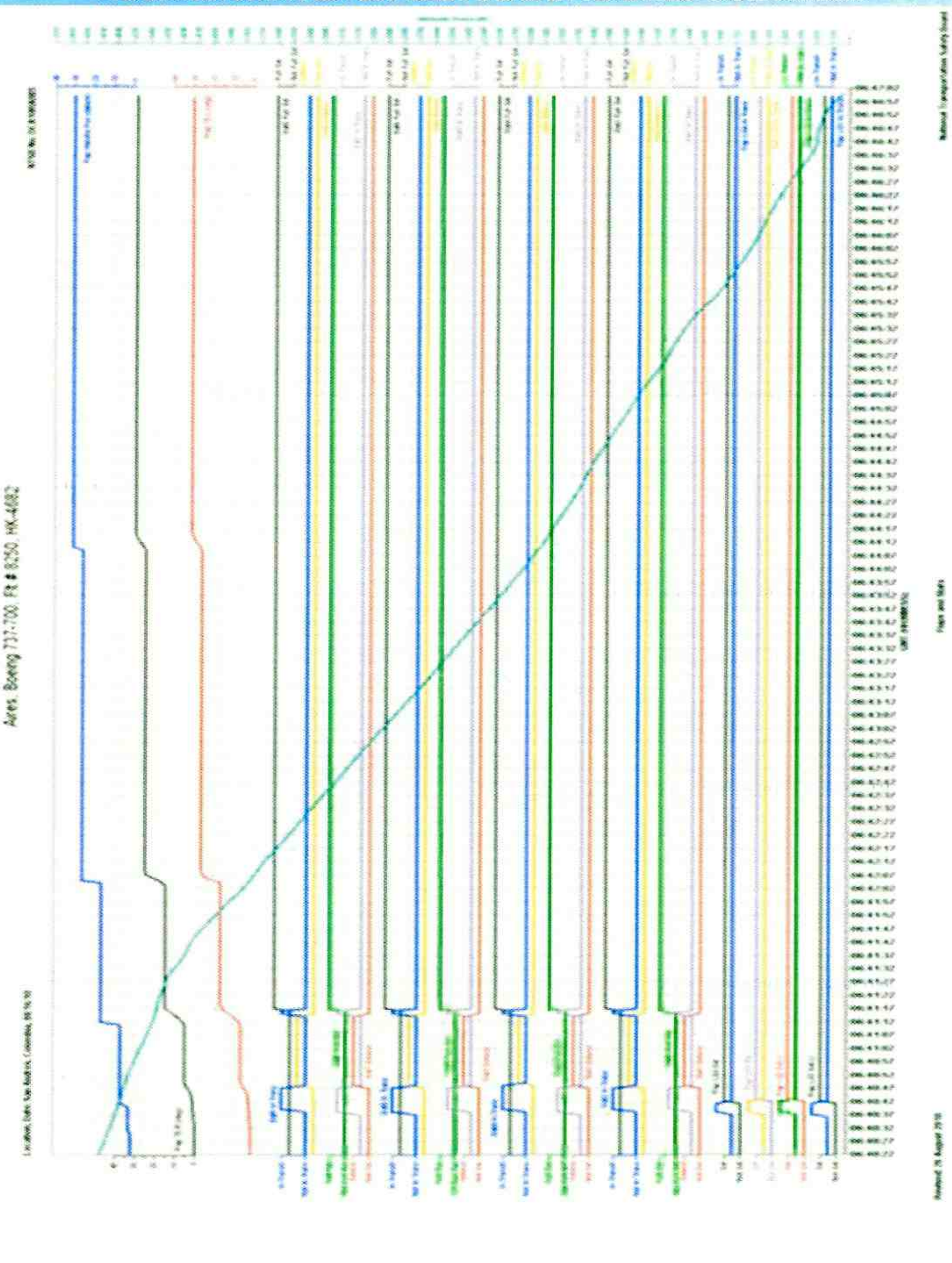
APENDICE "L" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

PLOTS FDR (ENGINE # 2 ZOOM OUT FINAL), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA



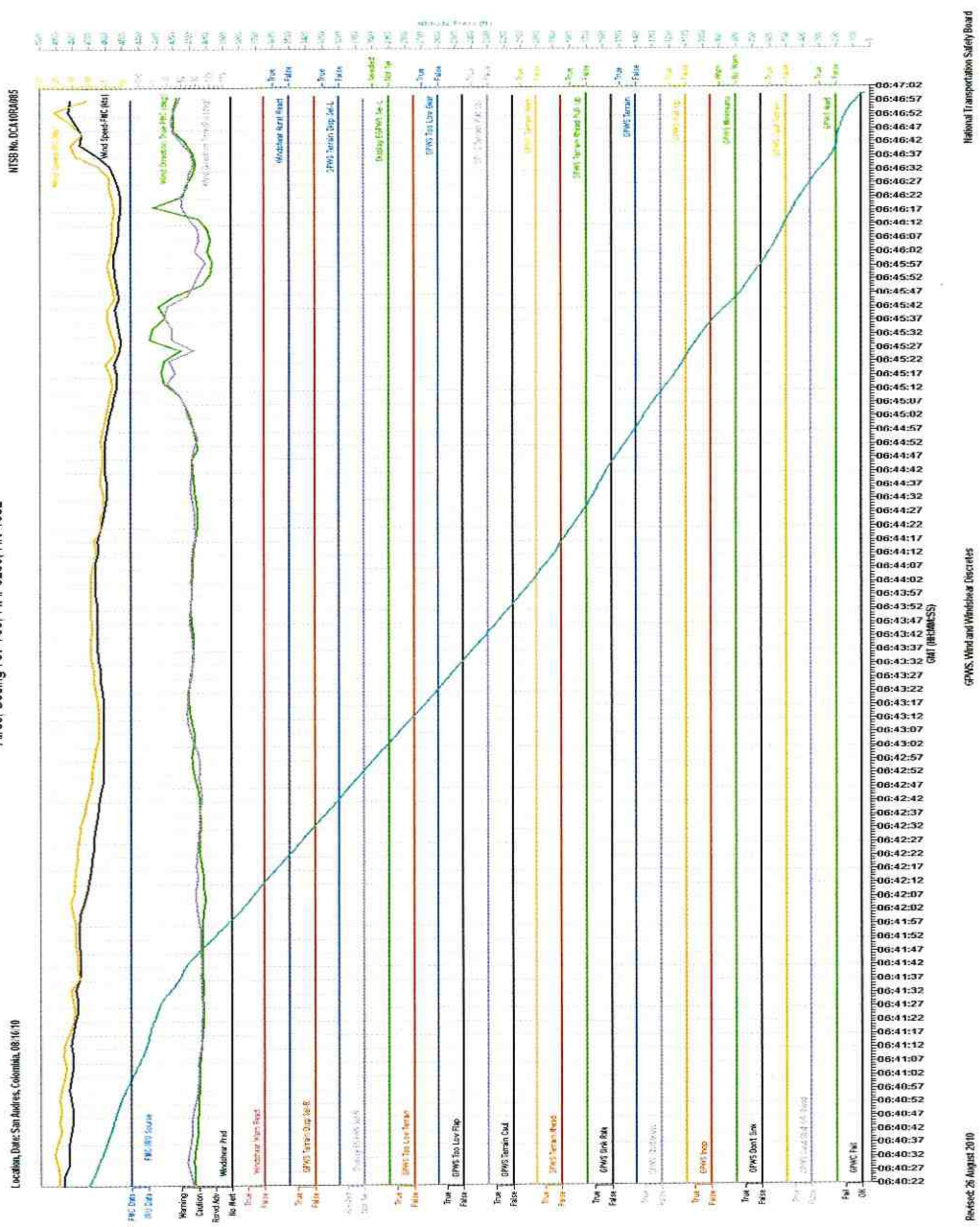
APENDICE "M" ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA

PLOTS FDR (FLAPS AND SLATS) AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA



APENDICE "N" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

PLOTS FDR (GPWS, WIND AND WINDSHEAR DISCRETES), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA



APENDICE "O" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

TRANSCRIPCIÓN CVR (COCKPIT VOICE RECORDER), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA

NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Vehicle Recorder Division
Washington, D.C. 20594

GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

DCA10RA085

By
Joseph A. Gregor

WARNING

The reader of this report is cautioned that the transcription of a cockpit voice recorder audio recording is not a precise science but is the best product possible from a Safety Board group investigative effort. The transcript or parts thereof, if taken out of context, could be misleading. The transcript should be viewed as an accident investigation tool to be used in conjunction with other evidence gathered during the investigation. Conclusions or interpretations should not be made using the transcript as the sole source of information.

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

septiembre 1, 2011

Cockpit Voice Recorder - 12

Group Chairman's Factual Report
By Joseph A. Gregor

A. EVENT

Location:	San Andres, Columbia
Date:	August 16, 2010, 0650 [UTC][36]
Aircraft:	B-737-700, HK-4682
Operator:	Aires, Flight 8240
NTSB Number:	DCA10RA008

B. GROUP

A group was convened on August 24, 2010.

Chairman:	Joe Gregor National Transportation Safety Board
Member:	Jim Hookey Powerplants Specialist National Transportation Safety Board
Member:	Camila Micolta Investigator In Charge Aeronautica Civil
Member:	Carlos Escobar Flight Safety Director Aires
Member:	Daniel Andres Fernandez

[36] All times are expressed in universal coordinated time [UTC], unless otherwise noted.

Flight Safety Assistant
Aires

Member: Gary Hudson
Senior Safety Pilot
Boeing

C. SUMMARY

On August 16, 2010, about 1:50 am local time (2:50 am EDT), an Aires B737-700, HK-4682, crashed short of the runway at San Andres Island Airport (ADZ), San Andres Island, Colombia. The CVR group meeting convened on August 24, 2010 and a transcript was prepared for the last 30-minutes of the 2-hour digital recording (see attached).

D. DETAILS OF INVESTIGATION

On August 23, 2010, the NTSB Vehicle Recorder Division's Audio Laboratory received the following CVR:

Recorder Manufacturer/Model:	**Honeywell 6020 SSCVR 120 (980-6022-001)**
Recorder Serial Number:	**5589**

Recorder Description

This model CVR, the Honeywell 6020 SSCVR 120, is a solid-state CVR that records 2 hours of digital cockpit audio. The recorded audio data is separated by the Honeywell download software into 2 sets of audio data files: a) a 2-channel recording containing the last 2 hours of recorded events and b) a 3-channel recording containing the last 30 minutes of recorded events. During the 2-hour portion of the recording, one channel contains audio information from the cockpit area microphone (CAM) and the other channel contains a mixture or two audio sources: the Captain's audio panel information and the First Officer's audio panel information. The 30-minute portion of the recording contains 3 channels of audio data; one channel for each flight crew.

Recorder Damage

Upon arrival at the audio laboratory, it was evident that the CVR had not sustained any heat or structural damage and the audio information was extracted from the recorder normally, without difficulty.

Audio Recording Description

The 2-hour recording consisted of two channels of useable audio information. The 30-minute recording consisted of three channels of useable audio information. Each channel's audio quality[37] is indicated in the table. Notably, channel number one did not contain any audio information.

Channel Number	Content/Source	Quality
1 – 30 min	Other	Excellent
2 – 30 min	Captain Hot microphone	Excellent
3 – 30 min	1st Officer Hot microphone	Excellent
1 – 2 hour	Combined HOT microphone	Excellent
2 – 2 hour	Cockpit Area microphone	Good

Timing and Correlation

Timing on the transcript was established by correlating the CVR events to common events on the flight data recorder (FDR). Specifically, the radio transmissions made by the aircraft and recorded on the CVR were correlated to the radio transmit microphone key parameter from the FDR. A linear interpolation between CVR elapsed time and FDR SRN was performed using ten radio transmissions selected from across the 30 minute CVR recording. Once a correlation between the two recorders was established, a reference to local time was determined for all events on the CVR transcript by using the GPS time parameter as recorded by the FDR:

$$\boldsymbol{SRN - 91548 = UTC}$$

Description of Audio Events

The 2-hr recording began with the aircraft on the ramp at the departure airport and included the crew change to the accident flight crew. This recording also captured the takeoff and approach briefing performed by the accident flight crew. The 30-minute recording began at 0616:34 UTC with the aircraft in cruise flight and ended at 0647:00 UTC.

Joseph A. Gregor
Vehicle Recorder

Division

[37] See attached CVR Quality Rating Scale.

CVR Quality Rating Scale

The levels of recording quality are characterized by the following traits of the cockpit voice recorder information:

Excellent Quality	Virtually all of the crew conversations could be accurately and easily understood. The transcript that was developed may indicate only one or two words that were not intelligible. Any loss in the transcript is usually attributed to simultaneous cockpit/radio transmissions that obscure each other.
Good Quality	Most of the crew conversations could be accurately and easily understood. The transcript that was developed may indicate several words or phrases that were not intelligible. Any loss in the transcript can be attributed to minor technical deficiencies or momentary dropouts in the recording system or to a large number of simultaneous cockpit/radio transmissions that obscure each other.
Fair Quality	The majority of the crew conversations were intelligible. The transcript that was developed may indicate passages where conversations were unintelligible or fragmented. This type of recording is usually caused by cockpit noise that obscures portions of the voice signals or by a minor electrical or mechanical failure of the CVR system that distorts or obscures the audio information.
Poor Quality	Extraordinary means had to be used to make some of the crew conversations intelligible. The transcript that was developed may indicate fragmented phrases and conversations and may indicate extensive passages where conversations were missing or unintelligible. This type of recording is usually caused by a combination of a high cockpit noise level with a low voice signal (poor signal-to-noise ratio) or by a mechanical or electrical failure of the CVR system that severely distorts or obscures the audio information.
Unusable	Crew conversations may be discerned, but neither ordinary nor extraordinary means made it possible to develop a meaningful transcript of the conversations. This type of recording is usually caused by an almost total mechanical or electrical failure of the CVR system.

Transcript of a Honeywell 6020 SSCVR 120 solid-state cockpit voice recorder, serial number 5589, installed on an Aires B-737-700 (HK-4682), which crashed while landing at San Andres Island Airport (ADZ), San Andres Island, Colombia.

LEGEND

CAM	Cockpit area microphone voice or sound source
HOT	Flight crew audio panel voice or sound source
RDO	Radio transmissions from HK-4682
PA	Public address system voice or sound source
CTR	Radio transmission from New York center controller
APR	Radio transmission from the Newark approach controller
TWR	Radio transmission from the Newark airport tower controller
-1	Voice identified as the captain
-2	Voice identified as the first officer
-3	Voice identified as the flight attendant
-?	Voice unidentified
*	Unintelligible word
#	Expletive
@	Non-pertinent word
( )	Questionable insertion
[ ]	Editorial insertion

Note 1: Times are expressed in universal coordinated time (UTC).

Note 2: Generally, only radio transmissions to and from the accident aircraft were transcribed.

Note 3: Words shown with excess vowels, letters, or drawn out syllables are a phonetic representation of the words as spoken.

Note 4: A non-pertinent word, where noted, refers to a word not directly related to the operation, control or condition of the aircraft.

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME and SOURCE	**CONTENT**	**Time and SOURCE**	**CONTENT**
06:16:34.3 Start of Transcript		05:58:38.7	[durante el vuelo de crucero la tripulacion efectua el briefing de aproximacion]
		06:16:35.4	[Capitan comenta las condiciones meteorologicas con la Jefe de cabina]
		06:17:01.7	[Pilotos y Jefe de cabina comentan sobre los pasajeros]
06:17:33.6 CAM	si se me mueve entonces, me llamas para poner los anuncios		
06:17:35.7 CAM-1	te los pongo, si biscocho		
06:17:38.1 CAM	bueno mi vida muchas gracias		
06:17:39.5 CAM-1	vale		
06:17:41.5 CAM-1	tengo veinte millas pa desviarme		
06:17:43.2 CAM-2	yo se los averiguo a ver quien es		
06:17:45.7 CAM-1	me dicen que hay un # tambien		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME and SOURCE	CONTENT	Time and SOURCE	CONTENT
06:17:49.6 CAM-1	pero a mi el ultimo chisme que me contaron, era que hay un comandante #		
06:17:53.6 CAM-2	si?		
06:17:54.2 CAM-1	de la vieja guardia		
06:17:55.8 CAM-2	no joda!		
06:17:58.7 CAM-1	yo les decia que que? no les creo, que si #		
06:18:03.7 CAM-2	con su permiso capi		
06:18:04.8 CAM-1	dale dale, mi negro yo vere		
06:18:19.1 CAM-1	como por lo que veo por aqui todavia no se me ha cerrado		
06:18:49.2 CAM-2	pero ajustandole eso mire que mas o menos le da *		
06:18:54.2 CAM-1	ajustale lo que da		
06:20:09.4			

CAM-1 pero pila esta que por lo menos pregunta capi y ese AT que es?.....bacano, la otra es que juh!

06:22:11.8
CAM-2 le voy solicitando descenso?

06:22:17.7
CAM-1 pa meternos aqui en esta #

06:22:20.4
CAM-2 o mas adelante?

06:22:42.8
CAM-1 claro que aqui esta el tunel pa meternos

06:22:50.0
CAM-2 papitas?

06:22:51.9
CAM-1 que es eso?

06:22:53.2
CAM-2 papa

06:22:54.3
CAM-1 ya vamos solicitando...que hijuemadre

06:22:58.0
RDO-2 AIRES 8250 request lower.

06:23:02.6
CTR AIRES 8250 descend to flight level two zero zero.

06:23:06.7
RDO-2 * flight level two zero zero.

06:23:46.2
CAM-1 vamonos yendo pa abajo aqui no muestra nada...

06:27:09.3
CTR AIRES 8250 now maintain flight level two four zero stand by for lower

06:27:14.6
RDO-2 * level two four zero, AIRES 8250

06:27:33.4
HOT-2 ***

06:27:49.1
CAM-1 este #! que no me lo muestra como la *

06:27:49.1
CAM-1 ***

06:27:53.5
HOT-2 alla se ve el avianca...si lo ve?

06:27:55.0
CAM-1 ***

06:28:03.7
CAM-1 nooo, le voy a sacar el # a esa # ! todo rojo las #, rojo ni el telefono...

06:28:56.7
CAM-1 treinta y una de san andres, treinta, sesenta, ese mal tiempo esta en san andres #

06:29:59.8
CAM-1 solicitemos un reporte de san andres

06:30:08.9

CAM	[sonido del compensador]		
06:30:47.7			
CAM-2	se lo pido *** o se lo pido a san andres ahorita que ya nos cambien?		
06:30:51.8			
CAM-1	cambie con san andres y soliticitelo		
		06:31:09.0	
		RDO-2	san andres good morning AIRES 8250
06:31:14.8			
CAM-2	capi entonces usted queda con panama y si		
		06:31:15.0	
		RDO-2	AIRES 8250 good morning go ahead
		06:31:17.8	
		RDO-2	ok. ehh good morning sir we're still with Panama we only want to know how's the weather over your station please
		06:31:26.2	
		APR	ok AIRES 8250 san andres reports runwy in use zero six wind calm wind zero nine zero degrees zero correction wind calm visibility more than ten kilometers scattered one thousand five hundred feet temperature three zero degrees and qnh two niner eight six the tower the tower said ahh there is a bad weather over station but right now there is no rain over station
		06:31:26.9	

		CTR	aires 8250 say DME from san andres and altitude leaving
		06:31:43.0 RDO-1	AIRES 8250 now leaving flight leve two five zero fifty four miles out
06:31:46.7 HOT	[sonido similar al altitude alerter]		
06:32:01.2 CAM-2	si escucho capi?		
		06:32:02.0 RDO-2	aires 8250 please say again distance from san andres
		06:32:06.4 RDO-1	fifty two miles out level off two four zero now
		06:32:11.1 CTR	ilegible su transmision aires 8250
		06:32:15.7 RDO-1	cinco uno cinco uno millas fuera
06:32:20.1 HOT-2	ahora si		
		06:32:22.1 RDO-1	uno dos tres cuatro me copia?
		06:32:26.8 RDO-1	aires 8250 now fourty nine miles out level off two four zero
		06:32:34.9 CTR	cuarenta y ocho two four zero continue descenso

ahora para dos cero cero y llame a san andres uno uno nueve tres aires 8250

06:32:45.5
HOT-1 que dijo? continue descenso para cuanto?

06:32:46.5
HOT-2 para dos dos veintemil

06:32:48.8
HOT-1 ok

06:32:49.6
HOT-2 diecinueve tres

06:33:40.0
RDO-2 san andres now with you aires 8250 leaving two two zero for two zero zero

06:33:48.2
APR aires 8250 descend three thousand feet qnh two niner eight six clear for VOR Y approach runway zero six report leaving san andres VOR and thee thousand

06:33:57.6
HOT-2 le solicito GEGAR? si

06:33:59.5
HOT-1 si directo a GEGAR

06:34:00.5
RDO-2 ok roger continue descending to three thousand and request VOR Z and flight direct GEGAR intersection

06:34:09.7
APR clear flight direct to GEGAR intersection clear for

					VOR Y Z approach runway zero six
			06:34:16.0	RDO-2	ok call GEGAR three thousand aires 8250
			06:34:20.2	APR	that is correct at this moment there is a thunder storm over station
06:34:25.0	HOT-1	thunderstorm			
			06:34:26.0	RDO-2	ok roger thank-you
06:34:31.5	CAM-1	ok con esa con esa vaina nos podriamos quedar en GEGAR			
06:34:36.4	CAM	[sonido del compensador]			
06:34:38.2	CAM-1	altimeter setting			
			06:34:40.3	RDO-2	ahhh can you say altimeter setting for aires 8250 please
06:34:48.3	HOT-2	dos nueve ocho seis			
			06:34:52.5	APR	aires 8250 go ahead
			06:34:55.5	RDO-2	yeah just checking the altimeter is two niner eight

06:35:02.1
CAM-1 eight seven

06:35:03.9
HOT-1 ok transition

06:35:35.0
HOT-2 aqui nos pusieron alterno barranquilla

06:35:37.5
HOT-1 si

06:35:39.4
HOT-1 hay tormenta ahi hermano, pa aproximar las #!

06:35:41.0
HOT-2 si

06:37:00.9
HOT-1 esta en todo san andres #! esa #!

06:37:22.2
CAM [sonido del compensador]

06:37:32.7
HOT-1 ejem #!

06:37:37.6
HOT-2 le vuelvo. a... le selecciono GEGAR

six, sir

06:34:60.0
APR two niner eight seven

06:35:02.2
RDO-2 eight seven thank you

06:37:41.0
HOT-1 GEGAR?

06:37:41.6
HOT-2 volar directo

06:37:43.9
HOT-1 no pero aqui no puedo #!

06:37:46.8
HOT-2 nop ahh bueno sip

06:38:31.7
HOT-1 quedemonos con cuatro mil pa desacelerarlo

06:38:40.1
HOT-2 pero ahi ya capturamos el path capi

06:38:42.5
HOT-1 ahh? ahi ya

06:38:45.0
HOT-2 y supuestamente le puede ya le puede poner VNAV y se le desacelera solo no?

06:38:50.2
HOT-1 si

06:38:52.1
HOT-2 y ponerle tres mil y ya, con cuanto le puso llegar GEGAR con ciento ochenta y cuatro nudos uy #! de la risa

06:39:01.1
HOT-1 siguio pa arriba y siguio pa abajo quieto

06:39:09.5

HOT-1	uy #! esta bueno eso alla afuera		
06:39:23.8 HOT-2	no mire que si se ve toda la esta pero si #! hay un cumulo encima del aeropuerto		
06:39:29.4 HOT-1	encima?		
06:39:30.7 HOT-1	pa un windshear*		
06:39:31.2 HOT-2	si ve que se ve toda la isla?		
06:39:50.5 HOT-2	Capi yo me voy en weather tambien con Ud bueno?		
06:39:52.8 HOT-1	listo		
06:39:54.5 HOT-2	y si quiere me voy en raw data		
06:40:07.3 HOT-1	ok gear down		
06:40:010.0 CAM	[sound of increasing background noise]		
		06:40:10.4 APR	aires 8250 there is a little drizzle over the station
		06:40:14.9 RDO-2	ok roger thank you
06:40:15.9 HOT-1	a little que?		

06:40:16.2	
CAM	[sonido smiliar a chime]
06:40:16.5	
HOT-2	drizzle
06:40:17.4	
HOT-3	Angelly? Angelly L2 angelly regalame este anuncio y regalame el de ehhh bienvenida? bienvenida los dos ok
06:40:17.5	
HOT-1	ohh
06:40:17.6	
PA	tripulacion de cabina a sus estaciones proximos a aterrizar
06:40:25.3	
HOT-2	le puse los engine start en * Capi
06:40:27.8	
HOT-1	ok Flap one
06:40:30.6	
HOT-2	one
06:40:32.3	
HOT-2	thrust required estamos pendiente del autothrottle Capi que no esta conectado
06:40:33.5	
HOT-1	ok hagamosle de una vez Flap five
06:40:40.7	
CAM	[sonido similar a la palanca de los flaps en

	movimiento]		
06:40:40.9 HOT-2	five		
06:40:49.4 HOT-2	drizzle aun asi va aterrizar con dos o con tres Capi? de autobrake		
06:40:53.7 HOT-1	no dos dejemoslo en dos		
06:41:05.8 CAM	[sonido similar al del compensador]		
06:41:09.5 HOT-1	Flap fifteen		
06:41:12.2 HOT-2	fifteen		
06:41:18.1 CAM	[sonido similar al del compensador]		
06:41:28.4 HOT-1	aqui podemos bajarnos		
		06:41:29.7 APR	aires 8250 contact one two one one eight decimal one
		06:41:34.4 RDO-2	ok eighteen* have a good day
06:41:41.9 HOT-1	aqui para tres mil y luego nos vamos para seis ochenta right?		
06:41:45.1			

HOT-2	de acuerdo si senor		
06:41:45.8			
HOT-1	aqui nos vamos para seis ochenta de una vez.... setecientos		
06:42:02.3			
HOT-1	Flap twenty five		
06:42:05.5			
HOT-2	twenty five		
06:42:09.3			
HOT-1	one two three		
06:42:17.1			
HOT-1	ya cambio con torre?		
06:42:18.6			
HOT-2	ehh ya		
06:42:20.5			
HOT-2	a este le hablo en ingles o en espanol?		
06:42:21.9			
HOT-1	en espanol		
		06:42:25.5	
		RDO-2	Pinilla buenos dias Aires 8250 GEGAR tres mil pies
		06:42:29.9	
		TWR	aires 8250 autorizado aterrizar pista cero seis viento cero nueve cero grados uno cero nudos qnh dos nueve ocho siete
		06:42:37.5	
		TWR	lluvia fuerte sobre la eatacion visibilidad reducida

cinco kilometros

06:42:42.2
RDO-2 dos nueve ocho siete y enterado de la informacion autorizado aterrizar aires 8250

06:42:47.9
HOT-2 cero noventa con diez y reducida con diez y reducida cinco kilometros

06:42:51.1
HOT-1 ahhh #!.... bueno en caso de missed approach nos vamos es por la derecha o no?

06:42:55.6
HOT-2 correcto si senor nuestra categoria charlie minima son tres mil seicientos metros o sea estamos bien Capi

06:43:11.2
HOT-1 aqui esta la pista runway cero seis setecientos ochenta ochocientos

06:43:26.6
HOT-1 ahh ver si la vemos

06:43:33.6
HOT-1 y el missed approach se haria hasta punto nue... hasta punto uno. a una milla final fix... Wet runway estamos a siete millas fuera

06:43:54.6
HOT-1 a seis millas seis ochenta

06:44:06.2

HOT-1	Flap thirty Landing checklist		
06:44:09.8			
HOT-2	thirty engine start switches continues, speed brakes		
06:44:12.1			
HOT-1	armed		
06:44:12.3			
HOT-2	landing gear		
06:44:12.8			
HOT-1	down		
06:44:13.4			
HOT-2	flaps		
06:44:13.6			
HOT-1	thirty thirty green lights		
06:44:14.6			
HOT-2	checklist complete y estamos autorizados, prendo todas las luces?		
06:44:16.7			
HOT-1	yes		
06:44:23.4			
HOT-1	seiscientos treinta tamos muy bajiitos		
06:44:29.3			
HOT-1	*		
		06:44:29.7	
		TWR	aires 8250 visibilidad cuatro kilometros
		06:44:33.0	
		RDO-2	ok enterado 8250

06:44:34.5			
HOT-2	cuatro kilometros....		
		06:44:35.9	
		TWR	tiene la pista a la vista?
06:44:36.7			
HOT-1	negativo		
		06:44:37.1	
		RDO-2	Aun no
		06:44:41.8	
		RDO-2	campo a la vista pista a la vista Aires8250
		06:44:44.3	
		TWR	recibido pista encharcada viento cero cuatro cero grados cero ocho nudos
06:44:47.8			
CAM	[sonido similar a la alarma del Autopilot disengage]		
		06:44:48.7	
		RDO-2	cuarenta con ocho gracias
06:44:53.2			
HOT-1	ehh autopilot disengage		
06:44:54.4			
HOT-2	check		
06:44:55.3			
HOT-1	Preselector missed approach		
06:44:59.5			
HOT-1	Reset Flight Director		
06:45:02.0			

HOT-2 Set

06:45:19.3
CAM [sonido similiar al ajuste de compensador]

06:45:30.2
HOT-2 viento de los cero cuarenta capi... ahora

06:45:32.0
HOT-1 ok de la izquierda, right?

06:45:33.8
HOT-2 correcto si senor

06:45:45.5
HOT-2 y la pista ahora ya esta encharcada volvio a oir?... ehh comentarle Capi

06:45:45.7
GPWS [approaching minimums]

06:45:51.8
GPWS [minimums]

06:45:52.1
HOT-1 in sight landing

06:45:52.9
HOT-2 check

06:46:11.4
GPWS [five hundred]

06:46:12.1
HOT-1 checked

06:46:12.3
HOT-2 all set for landing y estamos autorizados

		06:46:23.8	
		TWR	cinco cero seis cero grados uno cinco nudos
06:46:27.0			
HOT-2	sesenta con quince... de frente con quince		
06:46:27.0			
HOT-1	sesenta quince de frente		
06:46:30.0			
HOT-1	en caso de windshear max thrust TOGA max thrust flaps dejamos configuracion de tren ok?		
06:46:35.6			
HOT-2	de acuerdo si senor, flaps y tren igual		
06:46:38.4			
HOT-1	roger		
06:46:41.7			
HOT-1	wiper intermittent		
06:46:43.7			
CAM	[sonido similiar al limpiaparabrisas]		
06:46:44.5			
CAM	[sonido similar a los motores incrementando su potencia]		
06:46:48.1			
CAM	[sonido similar al del limpiaparabrisas, continua hasta el final]		
06:46:48.5			
CAM	[sonido similar a lluvia fuerte en incremento]		
06:46:54.3			

HOT-1 #
06:46:56.1
HOT-2 ojo cap...
06:46:57.5
GPWS [fifty]
06:46:57.9
HOT-2 capi podria?
06:46:58.2
GPWS [forty]
06:46:59.1
GPWS [twenty]
06:46:59.4
HOT-2 pa arriba capi!
06:47:00.2
End of Transcript

APENDICE "P" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

(TRANSCRIPCIÓN COMUNICACIONES DE COORDINACION ENTRE LAS DEPENDENCIAS DE TIERRA), AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA

Se transcriben a continuación las comunicaciones de coordinación entre los controladores de Aproximación y Torre de San Andrés, y las comunicaciones de la torre de control con los bomberos aeroportuarios de San Andrés

Asunto: Transcripción referente accidente de aeronave
Registro HK4682
Tipo de aeronave B737-700
Vuelo ARE8250
Sitio: Aeropuerto Gustavo Rojas Pinilla – San Andrés Isla, Colombia
Fecha: Agosto 16, 2010

Todas las horas están expresadas en Tiempo Universal Coordinado, UTC

1.1.1. Esta transcripción cubre las comunicaciones de coordinación entre el controlador de Aproximación San Andrés y la controladora de aeródromo de San Andrés. Los textos en letra cursiva y entre paréntesis, son notas del transcriptor.

Agencia transmisora	Abreviatura
CONTROLADOR DE APROXIMACIÓN SAN ANDRÉS	APPSPP
CONTROLADOR DE TORRE SAN ANDRÉS	TWRSPP

HORA UTC	AGENCIA TRANSMISORA	TRANSCRIPCION
05:40:32		*Timbre llamada del Controlador de Aproximación al controlador de torre*
05:40:41	TWRSPP	Síguelo
	APPSPP	Nena cópiate el Avianca Nueve ocho Cero Cuatro de Cali
	TWRSPP	Ajá
	APPSPP	Cero cinco cinco siete
	TWRSPP	Cero cinco cinco siete
	APPSPP	Y el Aires Ocho dos cinco cero de Bogotá cero seis tres cuatro

	TWRSPP	Cero seis tres cuatro listo
05:32:00		*Timbre llamada del Controlador de Aproximación al controlador de torre*
05:32:08	TWRSPP	Go Ahead
	APPSPP	Suge el nueve ocho cero cuatro estima cero cuatro
	TWRSPP	Ok
	APPSPP	Y va directo a GEGAR oíste?
	TWRSPP	Bueno
06:16:15		*Timbre llamada del Controlador de Torre al controlador de Aproximación*
06:16:17	APPSPP	Mike
06:16:19	TWRSPP	Edgardo Avianca Nueve Ocho Cero tres a Rionegro
	APPSPP	Si
	TWRSPP	Pista dos cuatro a las uno nueve
	APPSPP	Uno nueve uno dos
06:16:26	TWRSPP	Hay tormenta eléctrica sobre la estación
	APPSPP	Pero no está lloviendo?
	TWRSPP	No no está lloviendo todavía
	APPSPP	Bueno Nueve Ocho Cero Tres Rionegro
	TWRSPP	Ajá
	APPSPP	OK Chao
06:32:15		*Timbre llamada del Controlador de Aproximación al controlador de torre*
06:32:21	TWRSPP	Síguelo
	APPSPP	Nena no está lloviendo?
	TWRSPP	Uh umh[38], pero hay tormenta eléctrica
	APPSPP	OK el Aires reestima a las cuarenta y dos oíste?
	TWRSPP	Cuarenta y dos
	APPSPP	Ajá
	TWRSPP	Listo
06:38:50		*Timbre llamada del Controlador de Torre al controlador de Aproximación*
06:38:54	APPSPP	Si Suge cuéntame
	TWRSPP	*(grosería suprimida)* lo Escuchaste?
	APPSPP	Si

[38] Expresión cuyo sonido literal se transcribe como "Uh umh", que se usa regular y coloquialmente para significar "no".

	TWRSPP	Bueno cayó aquí al lado de la torre
	APPSPP	Si?
	TWRSPP	Si
	APPSPP	*(grosería suprimida)*
	TWRSPP	Está lloviendo ahora sí
	APPSPP	Y se fue la luz no?
	TWRSPP	No nada
	APPSPP	Ah ya
	TWRSPP	Nada estamos aquí todavía
	APPSPP	Aja bue.. Es pa deci.. si está llovien… bueno pero la Visibilidad..
	TWRSPP	Si se va la luz se cerró el negocito este
	APPSPP	Ve este…eh.. todavía la visibilidad está mayor a diez?
	TWRSPP	Sii
	APPSPP	Ah bue..
06:39:19	TWRSPP	Apenas empezó a llover
	APPSPP	Ah bueno
	TWRSPP	Bueno pues
	TWRSPP	Si se reduce yo te llamo
	APPSPP	Bien
	TWRSPP	Bueno

06:46:00		*Timbre llamada del Controlador de Torre al controlador de Aproximación*
06:45:48	APPSPP	Cuéntame Suge
06:45:50	TWRSPP	Yo no creo que el Aires alcance a aterrizar Edgardo
06:45:53	APPSPP	Se cerró
06:45:55	TWRSPP	Ahorita estamos como con cuatro kilómetros pero… pero está lloviendo bien fuerte
06:45:59	APPSPP	El no.. no ve la pista no
06:46:01	TWRSPP	Yo lo veo pero jummm.. la lucecita se ve por allá… y está ya en final corta
06:46:06	APPSPP	Si aquí lo veo
	TWRSPP	El me dice que está… el me dice que tiene la pista a la vista
	APPSPP	Ah bueno
	TWRSPP	Se está tratando de meter
06:46:12	APPSPP	Si.. si la tiene… el viento.. ah.. pero el viento está… bueno pero está de frente..
	TWRSPP	Ajá si si está de frente
	APPSPP	Bueno me avisa cualquiera cosa
	TWRSPP	Listo pues
	APPSPP	Bueno

06:47:09		*Timbre llamada del Controlador de Torre al controlador de Aproximación*
06:47:11	APPSPP	Mike
	TWRSPP	Edgardo
	APPSPP	Dime
	TWRSPP	Se cayó el Aires
06:47:14	APPSPP	Se cayó? cómo así?..
	TWRSPP	Se cayó en la cabecera
06:47:16	APPSPP	Seguro?
	TWRSPP	Hubo una explosión si *(grosería suprimida)*
06:47:18	APPSPP	Lla… llama a bomberos de rapidez
06:47:20		*Timbre llamada del Controlador de Torre a Bomberos*
06:47:25	TWRSPP	Bomberos…
06:47:34		*(Se escucha tono de pérdida de la llamada y se corta la llamada)*
06:47:38		*Timbres llamada del Controlador de Torre a Bomberos; suceden siete timbres sin respuesta de bomberos a la línea telefónica de coordinación y estos timbres suceden simultáneamente con la llamada que se transcribe a continuación, del controlador de aproximación a la controladora de torre. La llamada se interrumpe al establecer comunicación en frecuencia 118.1 entre la controladora de torre y la máquina 027 de bomberos.*

06:47:41		*Timbre llamada del Controlador de Aproximación al controlador de torre*
06:47:42	APPSPP	Alo
06:47:43	TWRSPP	En la cabecera
06:47:45	APPSPP	Ya.. ya le timbraste a bomberos?
06:47:47	TWRSPP	Si pero no salen no me llaman
06:47:49	APPSPP	Lo.. los tres timbres le diste a bomberos?
06:47:50	TWRSPP	Si.. No me están hablando… no me están hablando
06:47:52	APPSPP	Espérate yo les marco aquí por.. por el interno
06:47:54	TWRSPP	Bueno

1.1.2. Frecuencia 118.1 MHZ Torre San Andrés – Posterior al accidente.

Esta transcripción cubre las comunicaciones de la frecuencia de torre, 118.1, sucedidas entre la controladora de torre San Andrés y la Máquina 027 de Bomberos aeronáuticos de dicho aeropuerto

Agencia transmisora	Abreviatura
CONTROLADOR DE APROXIMACIÓN SAN ANDRÉS	APPSPP
MÁQUINA 027 DE BOMBEROS AEROPORTUARIOS	BOMB-027

Todas las horas están expresadas en Tiempo Universal Coordinado, UTC

HORA UTC	AGENCIA TRANSMISORA	TRANSCRIPCION
06:48:02	TWRSPP	India Romeo Tango Whiskey[39]
06:48:03	BOMB-027	Torre máquina cero veintisiete
06:48:05	TWRSPP	Cero veintisiete en la cabecera el Aires
06:48:09	BOMB-027	Cuál cabecera me puede indicar?
06:48:11	TWRSPP	La cabecera cero seis en el aterrizaje… se cayó el Aires

[39] India Romeo (IR), es el código para radiotelefonía del vehículo de Seguridad Aeroportuaria (Inspector de Rampa)
Tango Whiskey (TW), es el código en radiotelefonía para Torre (TWR), en comunicaciones aeroportuarias internas.
Ésta era una llamada de Torre al Inspector de Rampa en la frecuencia de torre.

APENDICE "Q" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

ANALISIS DEL VIENTO EFECTUADO POR LA NTSB, AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA

Reactive Windshear

Shear Intensity

Reactive windshear warnings are issued by the Enhanced Ground Proximity Warning System (EGPWS). Requirements for reactive windshear are defined in TSO-C117a. Windshear effects are quantified by calculating "shear intensity" as follows. Negative values of shear intensity indicate decreasing performance (e.g. tailwind increase, headwind decrease or downdraft).

$$f(t) = \frac{\dot{w}_x}{g} - \frac{w_h}{V}$$

where $\dot{w}_x$ is rate of change of horizontal wind velocity

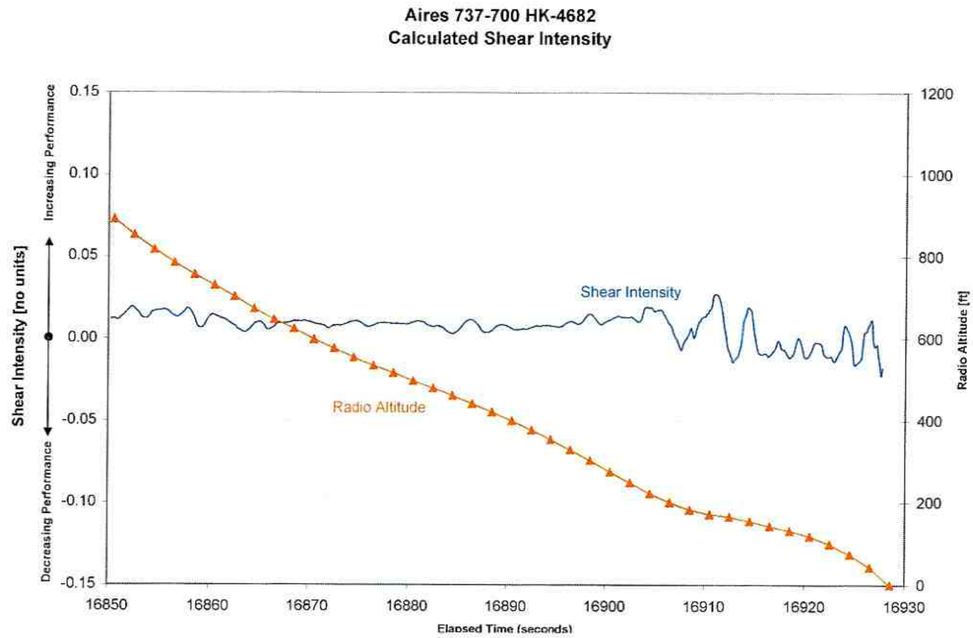
w_h is vertical wind velocity

g is gravity

V is true airspeed

(ref: TSO-C117a Appendix 3, page 47)

Values of instantaneous shear intensity are shown on the plot below. The positive values of f(t) above 200 ft indicate increasing performance windshear. The negative values experience below 200 ft indicate decreasing performance windshear.


Aires 737-700 HK-4682
Calculated Shear Intensity
Shear Intensity [no units]
Increasing Performance
Decreasing Performance
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
Radio Altitude [ft]
1200
1000
800
600
400
200
0
Shear Intensity
Radio Altitude
16850
16860
16870
16880
16890
16900
16910
16920
16930
Elapsed Time (seconds)

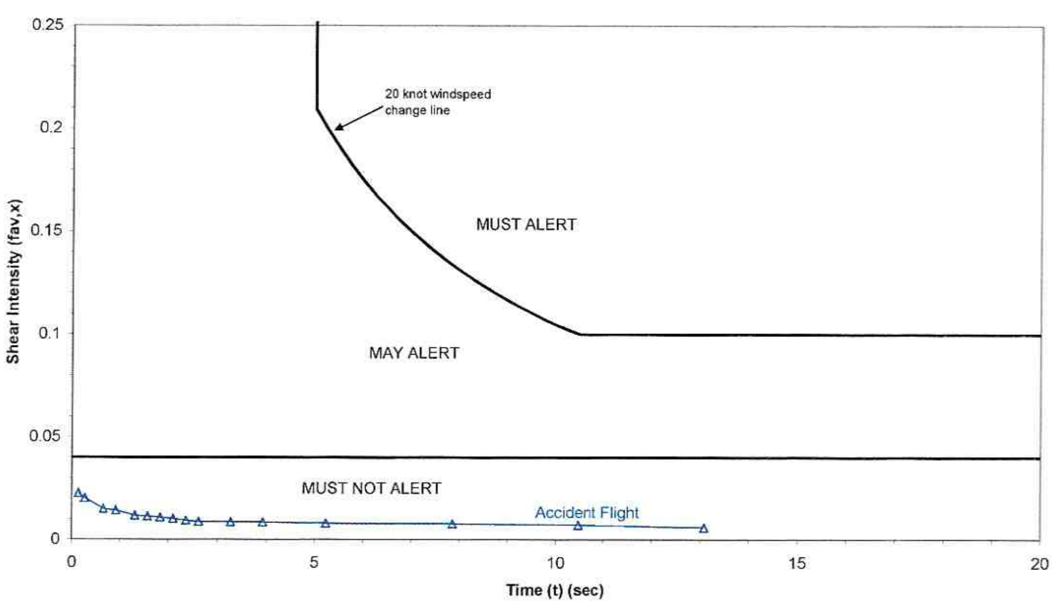
Alert Threshold

Reactive windshear warning levels are defined in terms of time-average shear intensity $f_{av,x}$.

$$f_{av,x} = -\frac{\int_0^{t_x} f(t)dt}{t_x}$$

Positive values of $f_{av,x}$ indicate decreasing performance. The numerical threshold for a warning depends of the duration. Higher shear intensity are tolerated for shorter periods of time than lower shear intensities.

Reactive Windshear
Shear Intensity Curve
(Ref: TSO-C117 Page 8 Figure 1)



Calculated values of $f_{av,x}$ are shown for the accident flight in blue on the above plot. The results show that some decreasing performance windshear was present, but it was well below the alert threshold. Specifically, the values of average shear intensity are below the "must not alert" threshold defined in the TSO.

The above analysis is based on the requirements contained in TSO-C117a. In is important to note that the actual calculations performed by the EGPWS computer are different, but have been demonstrated to produce results which meet the TSO requirements. Analysis of the accident flight data based the calculation method actually used by the EGPWS confirmed that no reactive windshear alert was expected.

Predictive Windshear

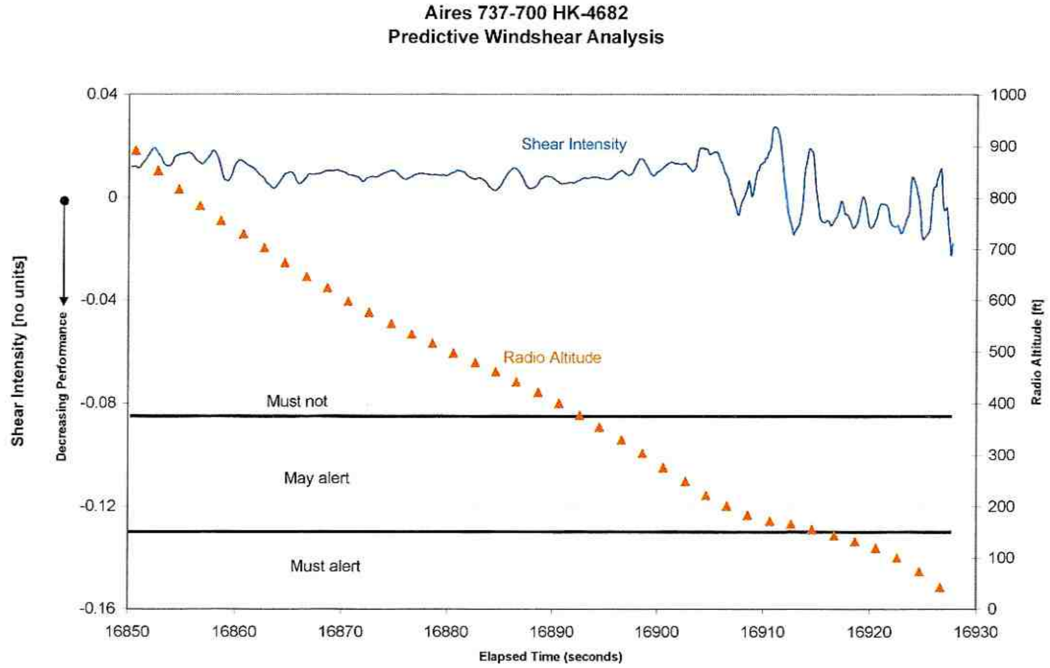
Shear Intensity

Predictive windshear cautions and warnings are issued by the weather radar (WXR). The WXR uses Doppler radar to sense motion of reflective particles in the air mass in front of the airplane. The same shear intensity factor f(t) used for reactive windshear calculations is also used for predictive windshear calculations. In the case of predictive windshear, shear intensity is averaged over a spherical volume with radius of 1 km. Alert thresholds for volume-averaged shear intensity are as follows:

Threshold	Shear Intensity (volumetric average)
Must Not Alert	-0.085
Must Alert	-0.130

(ref: RTCA DO-220 section 2.2.2.7.2)
(see also ARINC 708 section 3.1.3)

The WXR does not record actual radar returns, thus the raw data to confirm whether a predictive windshear condition existed is not available. However, based on the observed values of shear intensity which remained below 25% of the "must not alert" threshold, no predictive windshear alert (either caution or warning) was expected.



During approach, predictive windshear alerts are inhibited as follows. Any alert already in progress will continue below the inhibit altitude

Alert	Inhibit Altitude for New Alerts
Caution	200 ft
Warning	50 ft

ANALISIS NATIONAL TRANSPORTATION SAFETY BOARD (NTSB) PERFIL DEL VUELO AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA

Aires Flight 8250
Vehicle Performance Study

DCA10RA085

December 10, 2010

D.A. Crider

A. ACCIDENT: DCA10RA085

Location: San Andrés, Colombia
Date: August 16, 2010
Time: Approximately 1:49 local
Airplane: Boeing 737-700

B. GROUP IDENTIFICATION:

No group was formed for this activity.

C. SUMMARY

On August 16, 2010, at approximately 1:49 local time, a B-737-700, registration HK-4682 operated by Aires, crashed short of runway 06 at Gustavo Rojas Pinilla Airport (SKSP/ADZ), San Andrés, Columbia. The accident is being investigated by the Columbian Aeronauticá Civil. The NTSB is participating under provision of ICAO Annex 13.

D. DETAILS OF INVESTIGATION

Flight Data Recorder

Flight data recorder (FDR) data was available for the accident aircraft. Selected FDR data are plotted in figures 1 to 7 for the approach. Pitch, roll and heading are plotted with their associated control inputs in figures 3 to 5. The aircraft was responsive to control inputs.

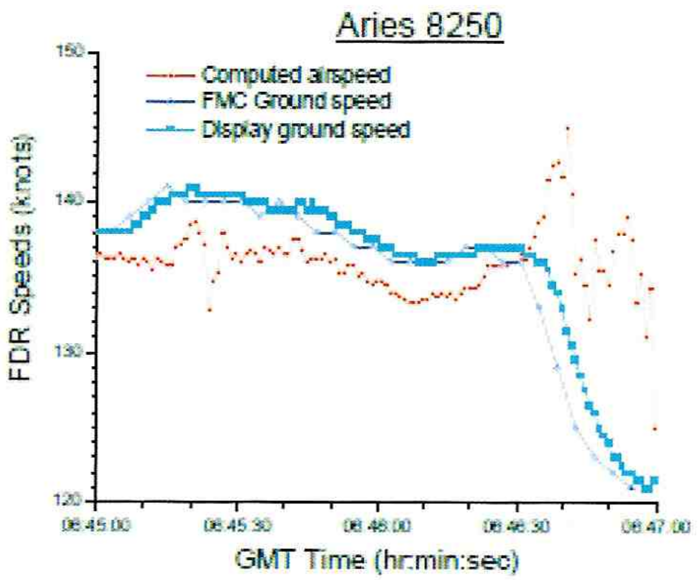


Figure 1 Airspeed and ground speed

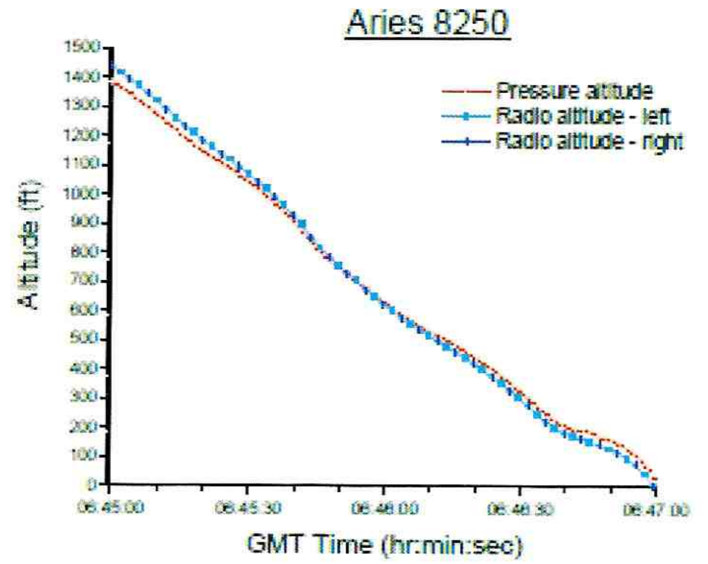


Figure 2 Pressure and radio altitude

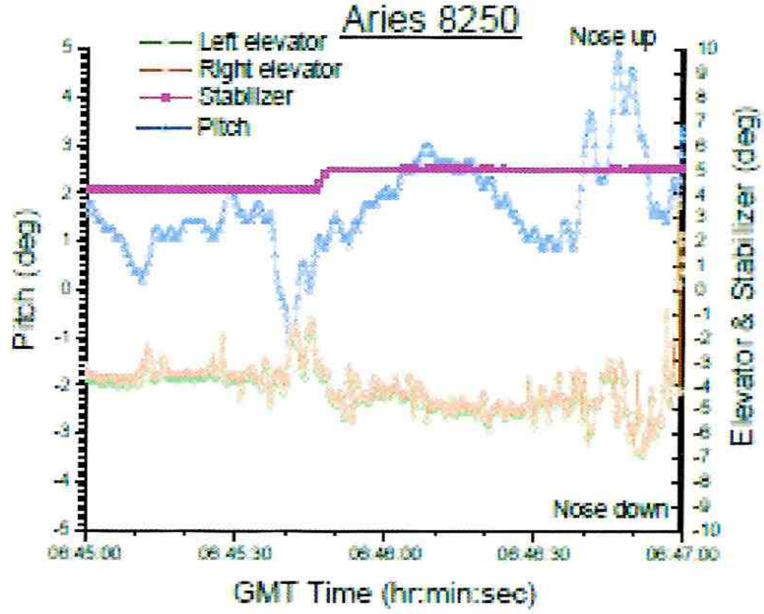


Figure 3 Pitch and pitch control

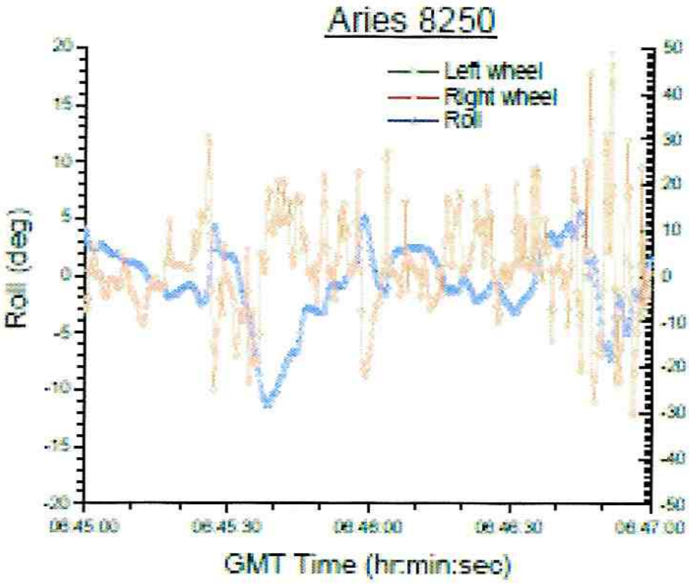


Figure 4 Roll and roll control

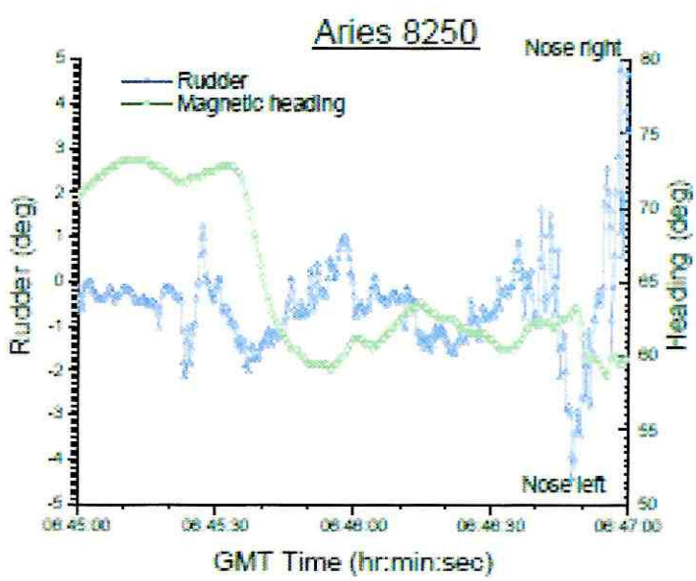


Figure 5 Rudder and heading

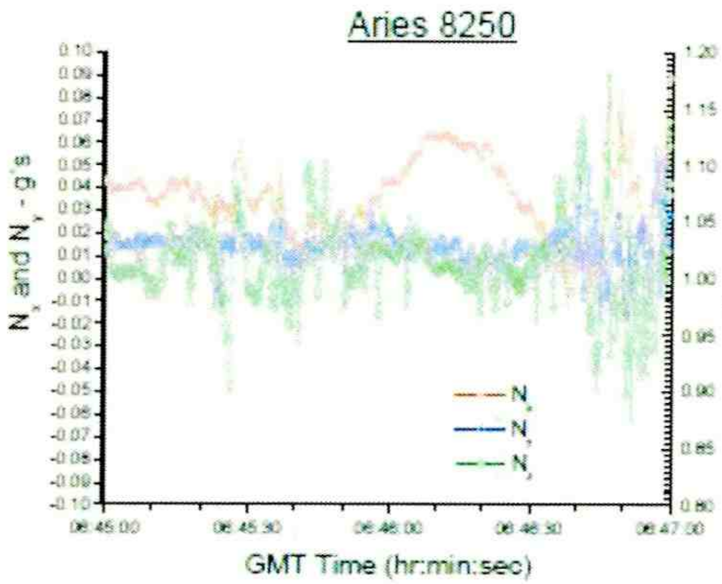


Figure 6 Load factors

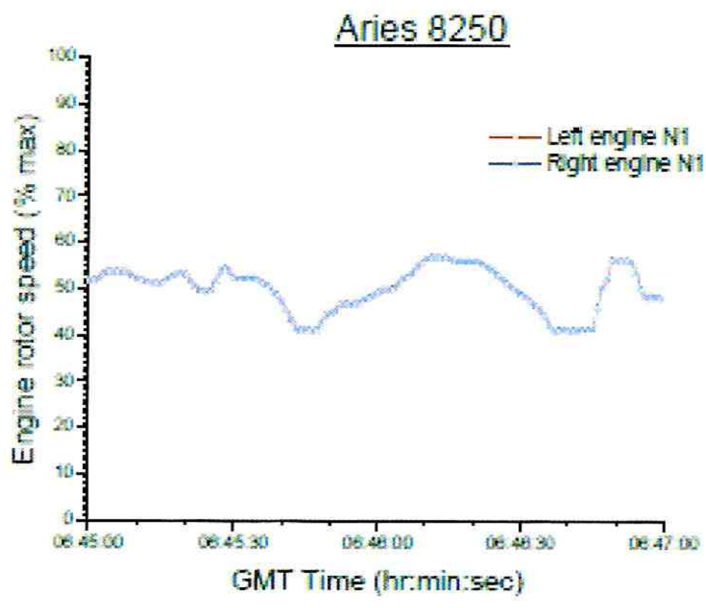


Figure 7 Engine rotor speed

Altitude and true airspeed

FDR data included both pressure and radar altimeter data. The pressure altitude recorded on the FDR is based on a standard day temperature and pressure. Pressure altimeter was converted to mean sea level altitude and calibrated airspeed converted to true airspeed using the following conditions at the airport.

Airport elevation 24 ft
Airport pressure 29.86 in Hg
Airport temperature 23 deg C

The mean sea level altitude is plotted with radio and pressure altitudes from the FDR in figure 8. An additional correction of 33 ft was added to this altitude to align the data with ground elevation to produce above ground level (AGL) altitude. The resulting altitude is labeled "AGL altitude" in figure 8.

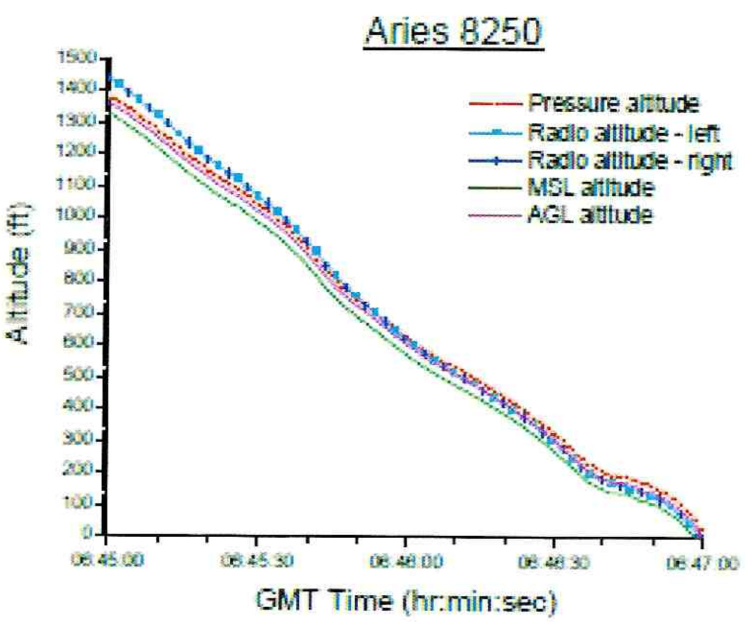


Figure 8 Altitude

The calculated true airspeed is plotted with FDR computed airspeed and ground speed in figure 9. A comparison of true airspeed with ground speed in figure 9 reveals slight winds (generally one to three knots) for most of the approach followed by a moderate headwind for the last 30 seconds of the flight (winds will be discussed in detail in a following section).

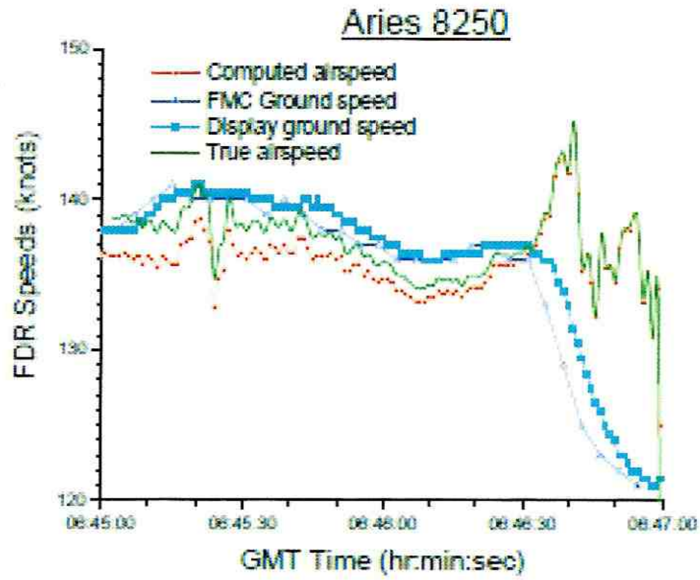


Figure 9 True airspeed

Angle of Attack

The FDR records vane angle of attack. Vane angle of attack was converted to body angle of attack using the conversion Boeing provided. The resulting body angle of attack is shown in figure 10.

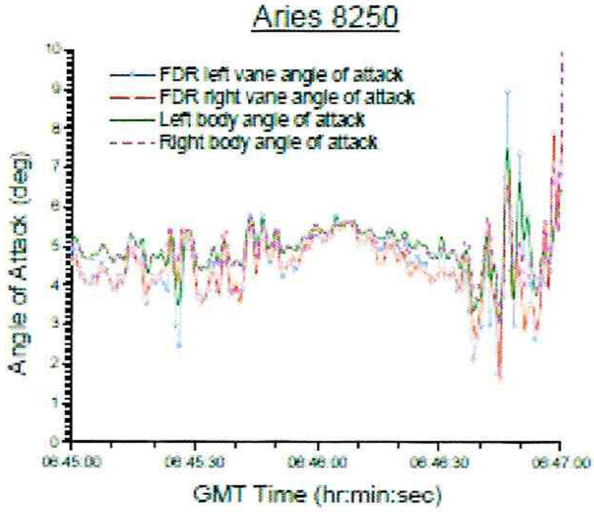


Figure 10: Angle of attack

Offset Determination/Flight Path Integration

Accelerations from the FDR were integrated to derive the flight path. This process also identified offsets in the data that are required for the kinematics extraction later in this study.
Many FDR sensors use an intercept slope form to define the data. Experience has shown that these intercepts may vary a bit from design. For example, a sensor may not have been precisely aligned when it was installed. However, the sensor slopes are not as vulnerable to imprecise installation or maintenance as sensor intercepts are. Accordingly, data offsets are used to account for any intercept errors. For this accident, the offsets were found by matching altitude groundspeed, and recorded latitude/longitude with an acceleration integration. This also provided a position time history. The integration started from the impact location at the following initial conditions and proceeded backwards in time from that point.

Altitude = 0 ft
East position = -272.016 ft
North position = -126.302 ft
Latitude = 12.5782
Longitude = -81.7207
Velocity = 122.0 kts
Angle of attack = 7.1 deg
Sideslip angle = 0.0 deg

The following offsets were obtained by manual iteration to match the recorded altitude, ground speed and position data. The resulting match with the FDR data is shown in figure 8 through figure 11. The position time history was also derived with a ground speed integration which will be shown for comparison in the position plots that follow.

$\Delta N_x = -0.01325$
$\Delta N_y = -0.02$
$\Delta N_z = -0.014$
$\Delta\theta = 0.0$
$\Delta\psi = -2.0$ (magnetic variation is 2 deg W)
$\Delta\phi = 0.25$

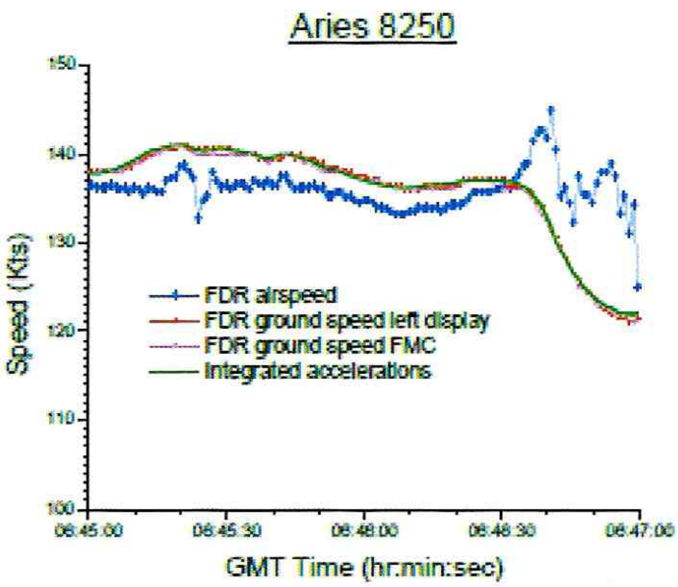


Figure 11 speed comparison

Figure 12 shows the match between the altitude from the acceleration integration and the FDR radio and pressure altitude. Figures 13 and 14 show that both the acceleration and velocity integrated flight paths go through the longitude and latitude from the FDR at the proper times.

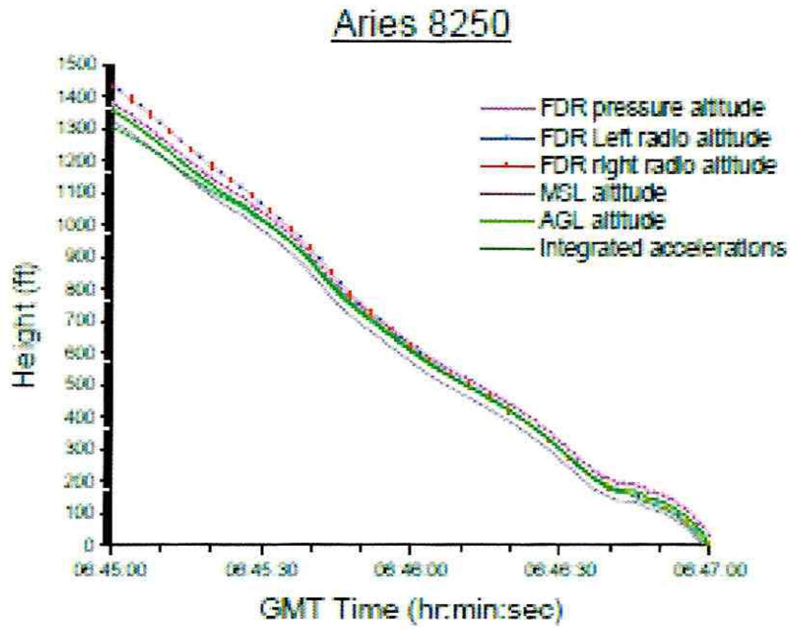


Figure 12 Altitude comparison

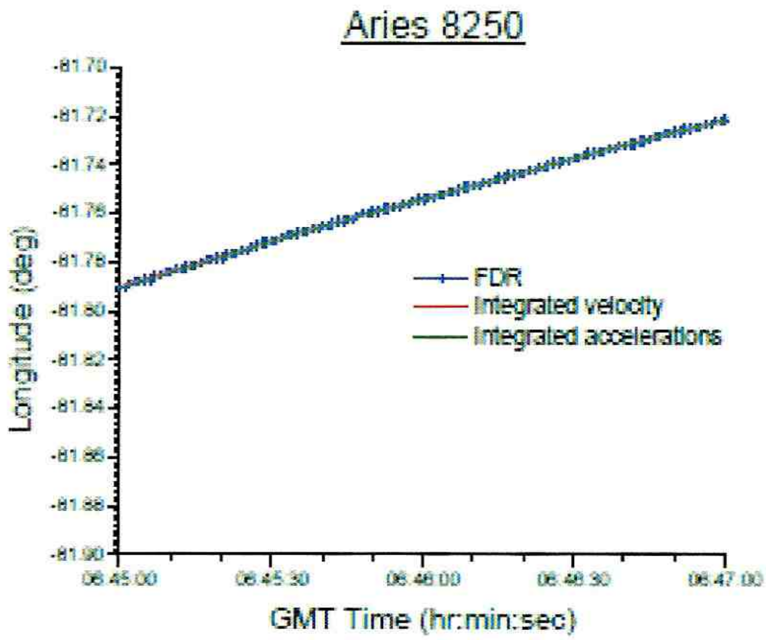
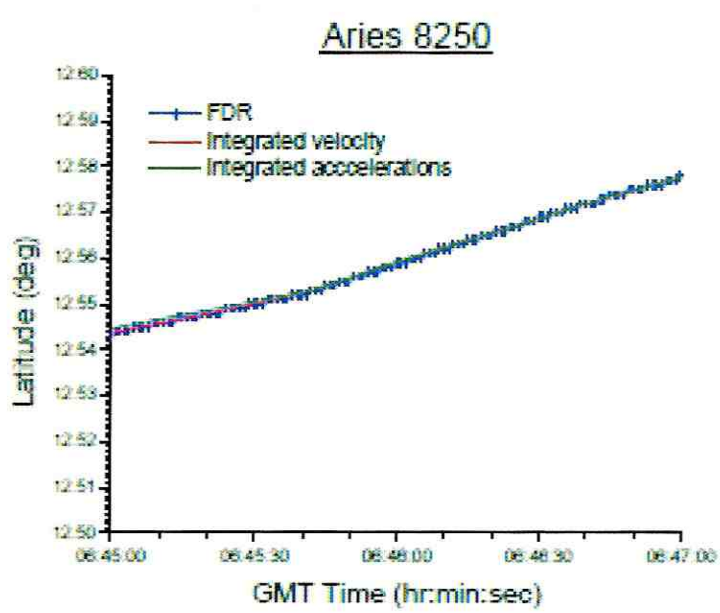


Figure 13 Longitude comparison



The resulting integrated paths are shown in map view in figure 15. The integrated velocity position, which is the better position time history match to recorded position compared to the acceleration integration, is shown as a Google Earth perspective view in figure 16.

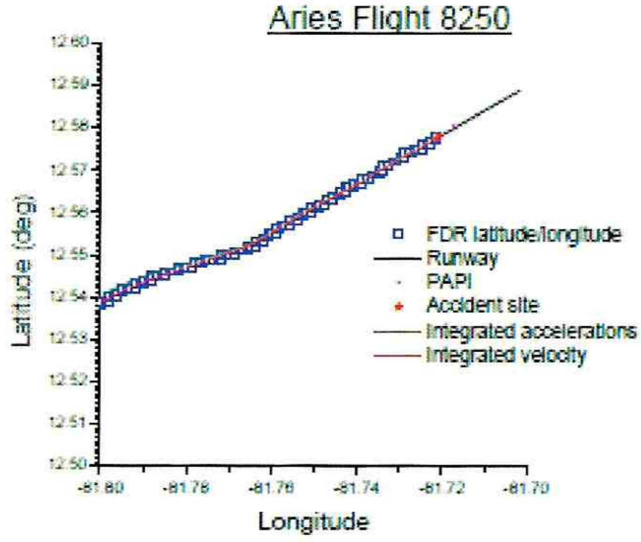


Figure 15 Map view of flight path.

Figure 16 Perspective view of flight path.

Flight Profile

Runway 6 at Gustavo Rojas Pinilla was equipped with a PAPI visual approach system. It was desired to determine the position of the flight path relative to the PAPI light signal zones. To accomplish this, the position time history from the velocity integration was rotated to the runway axis and eye height elevation plotted against distance from the end of the runway. Eye height elevation was obtained by adjusting the AGL altitude determined above for pitch angle using the distance between the center of gravity and the pilot's station. The resulting plot is shown in figure 17. As can be seen, the flight path was below the glide slope in the 4 red light PAPI altitude zone until the aircraft was about 1/3 Nautical miles out when the aircraft briefly entered the 3 red and one white PAPI signal altitude zone.

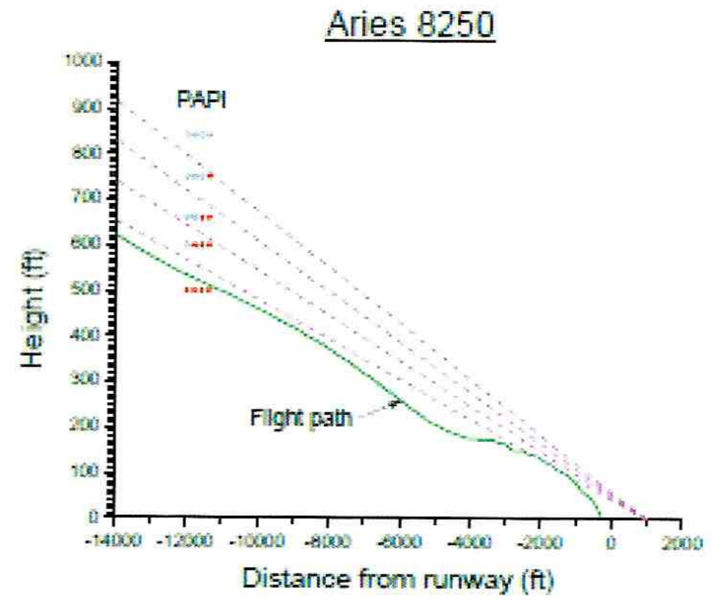


Figure 17 flight path profile comparison to PAPI.

Winds

Wind direction and speed was calculated from the time histories of aircraft position determined above and from FDR data (altitude, calibrated airspeed, pitch angle, bank angle & heading). The resulting wind speed is compared to recorded FMC and IRU wind speeds in figure 18. Wind direction is given in figure 19. Wind speed was very light until an approximately 15 kt head wind developed in the last 30 seconds of flight. Note that with light winds, the calculation of wind direction is very sensitive and slight differences in temperature and pressure used in the calculations can make a difference in the result.

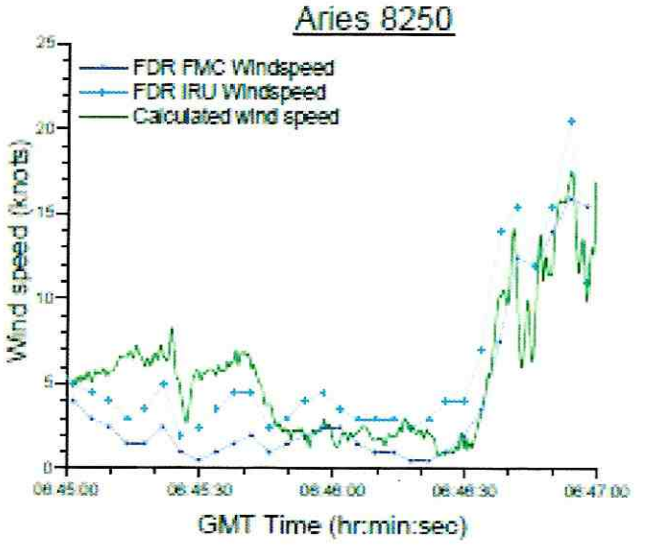


Figure 18 Wind speed

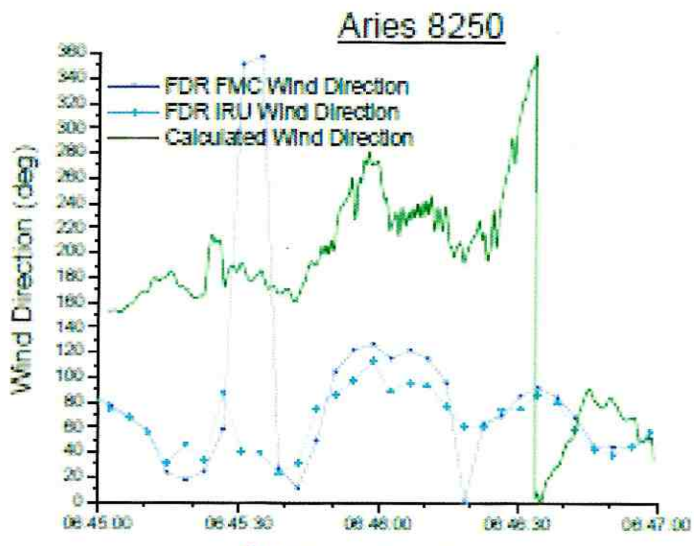


Figure 19 Wind direction

Vertical wind was calculated using sensed angle of attack and recorded aircraft state and Euler angles and is shown in figure 20. Vertical wind is very light throughout the approach.

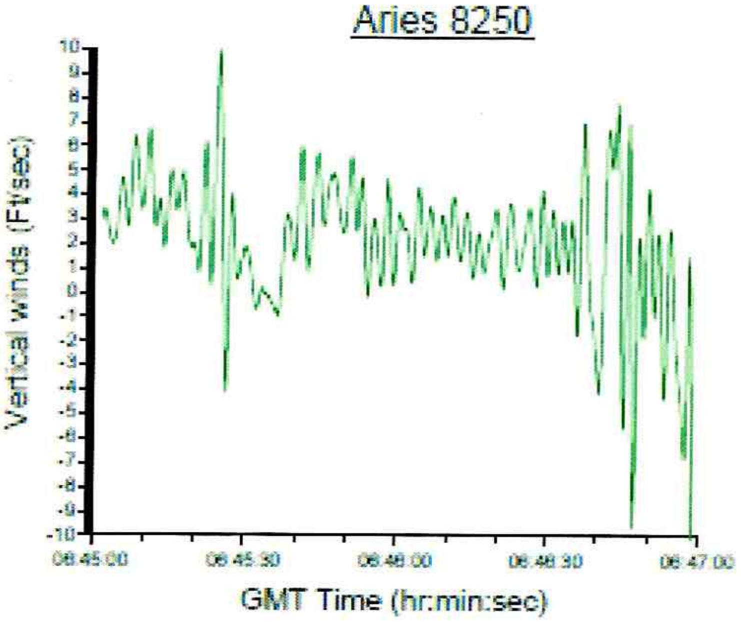


Figure 20 Vertical wind

Kinematics

A kinematics extraction was performed to investigate whether a rotation wind (that is a vortex) or a wind shear could have contributed to the accident. While horizontal wind direction and velocity can be derived directly, rotational winds can be seen indirectly as a change in pitch, yaw and roll aerodynamic moment coefficients (C_m, C_n and C_{roll}) required for the aircraft's motion. For the purpose of this study, the accident aircraft was approximated with a 737-300 flight model with 737-700 geometry. Thus some care is required in interpreting the results. This extraction used the FDR offsets identified through the flight path integration match previously discussed. Sideslip is shown in figure 21. As can be seen, sideslip remains small and there is no evidence of any significant external disturbance.

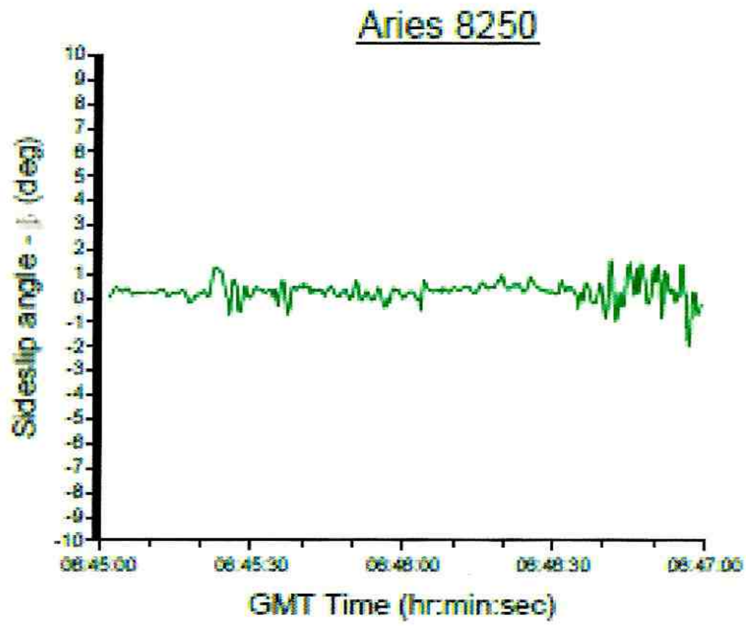


Figure 21 Sideslip angle

The effect of rotational winds (or lack thereof) can be seen in the extracted difference in yawing, rolling and pitching moment coefficients. These differences are shown in figures 22 and 23 and represent the difference between the aerodynamic coefficients required for the aircraft's motion and the aerodynamic coefficients from the simulation for the recorded aircraft state and control inputs. Since the difference also includes modeling differences due to the use of the 737-300 model with 737-700 geometry in lieu of a complete 737-700 model, the coefficients differences are plotted with variables that would impact these modeling differences. As can be seen in figure 22 the differences in yawing and rolling coefficients between the model and the accident flight are small and correlate with control movement (where modeling differences are likely). This indicates that any rotational winds in the yaw and roll axis are small. Further, the small fraction of roll and yaw control used indicates that any rotational winds in the yaw and roll axis were easily within controllable limits.

Larger differences due to modeling are to be expected in the pitch axis where pitch trim and controls as well as center of gravity play a role, but, with approximate modeling, incremental changes, not absolute magnitudes are of interest. Differences in pitching moment from the simulator math model are plotted with stabilizer, elevator and angle of attack in figure 23. As can be seen, there are no changes in pitching moment difference that can be separated from changes in these controlling parameters. Accordingly any rotational wind in pitch is at a low level below the detection threshold for this method. Again, the small changes in pitch control input indicate that there were no controllability issues in the pitch axis.

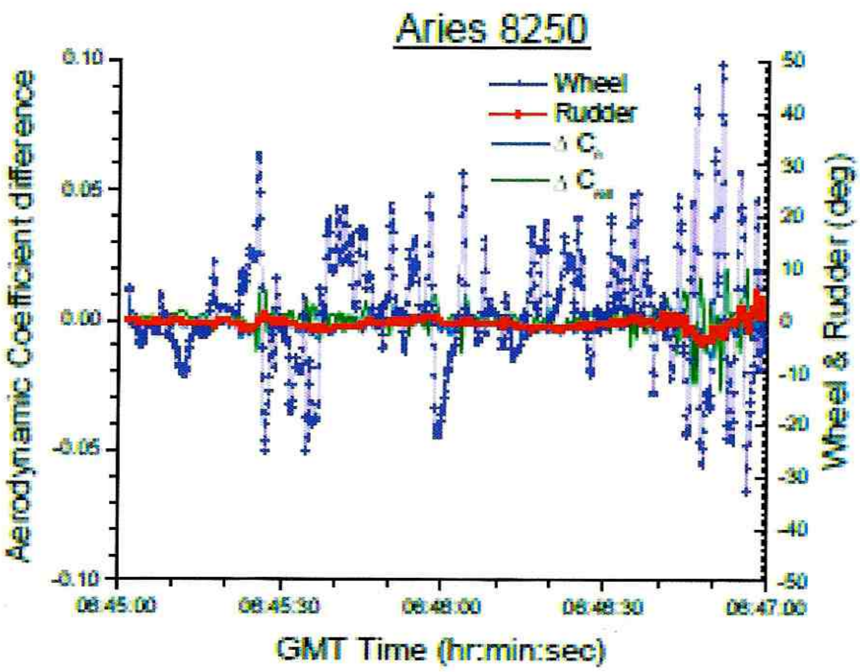


Figure 22 Yaw & roll coefficient differences

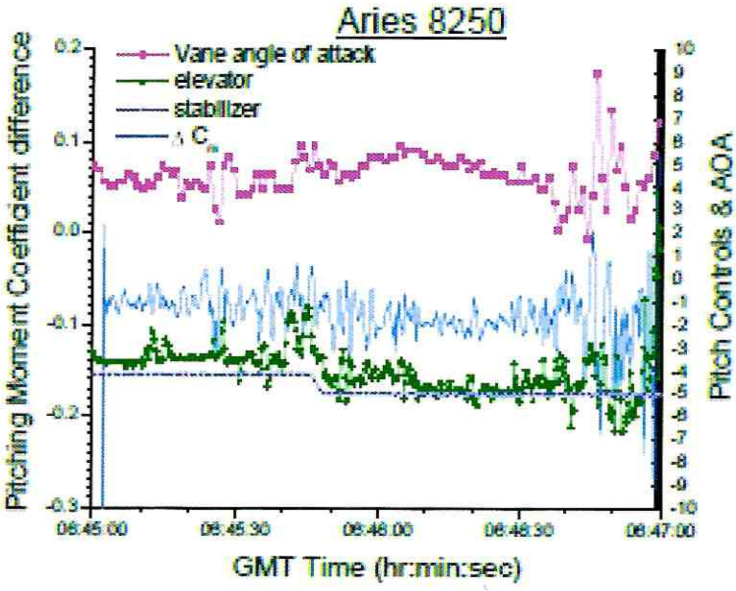


Figure 23 Pitching moment coefficient differences

Boeing Simulation

Boeing derived the winds from the recorded data. Crosswind relative to the runway is shown in figure 24 while headwind component is shown in figure 25. Vertical wind is shown in figure 26.

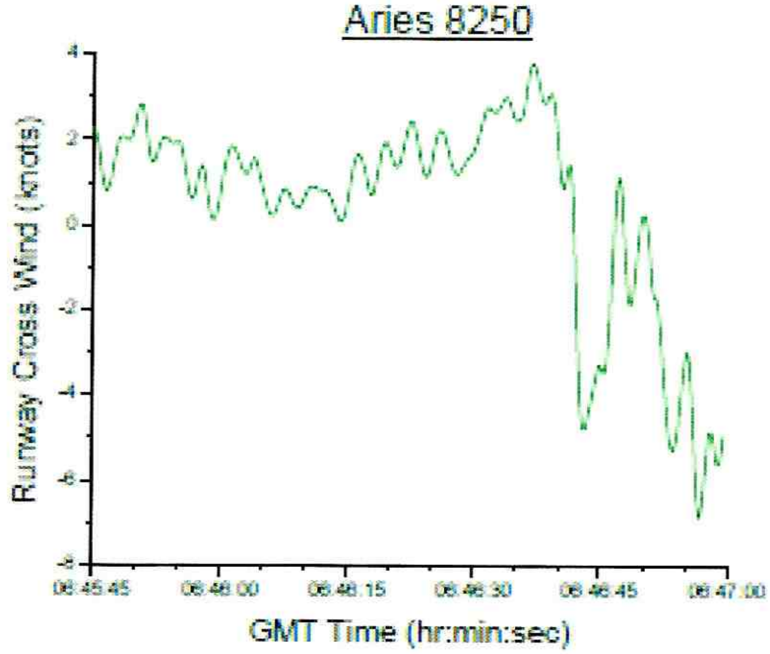


Figure 24: Crosswind component (relative to runway)

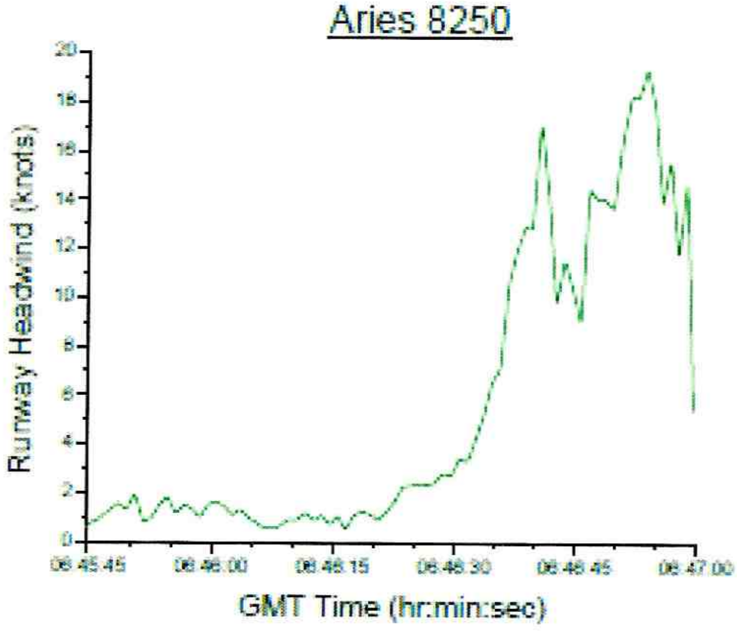


Figure 25: Headwind component (relative to runway)

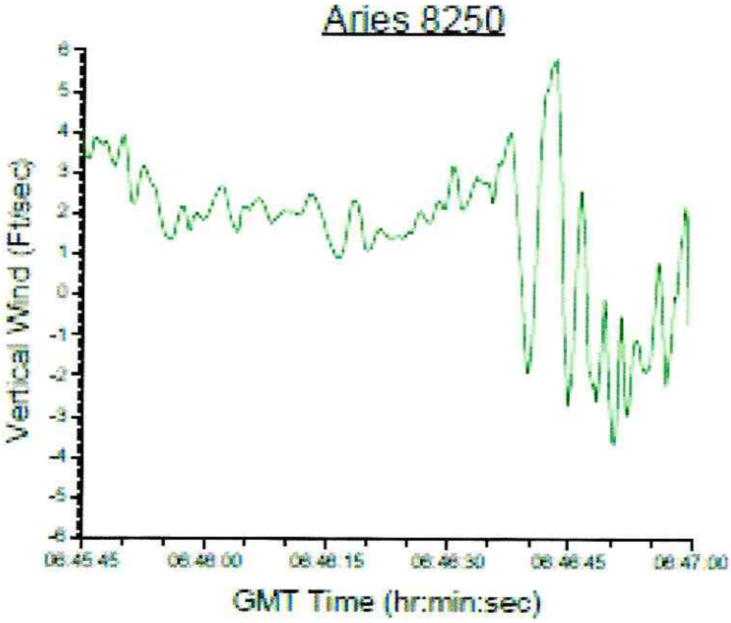


Figure 26: Vertical wind component

Boeing input the winds in figures 24, 25 and 26 into their 737-700 desktop engineering simulation model to study the cause of the motion for the accident flight and to determine whether the airplane behaved as expected for a normal 737-700. Boeing used mathematical pilots[1] to command column and control wheel to match the recorded FDR pitch and roll respectively. The resulting match of radio altitude, groundspeed and airspeed is shown in figures 27, 28 and 29.

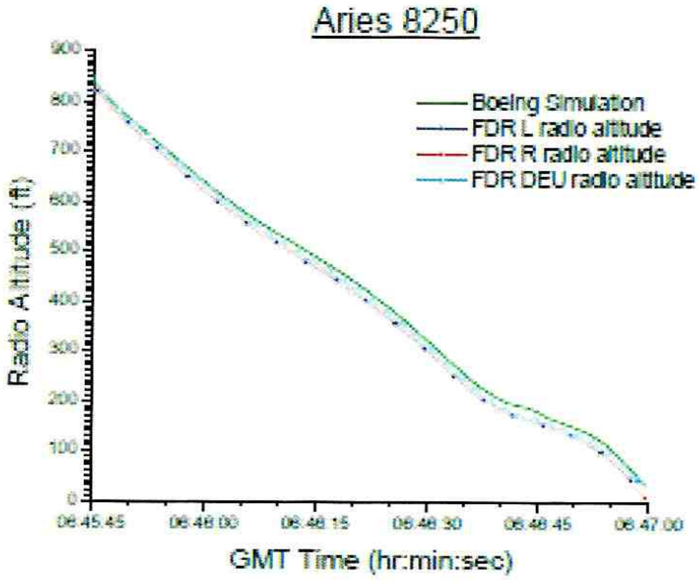


Figure 27 Altitude match

[3] A math pilot is a set of computer code that generates control inputs to minimize the difference between a desired value of a flight parameter and the current value of that parameter (in this case, the simulation parameter).

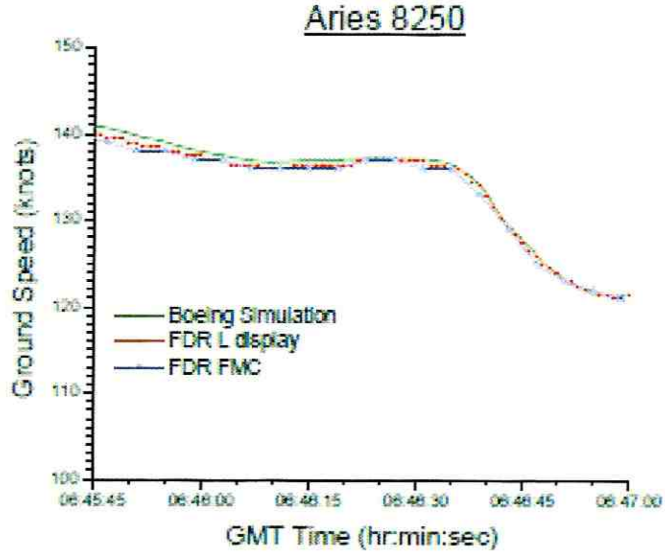


Figure 28: Ground speed match

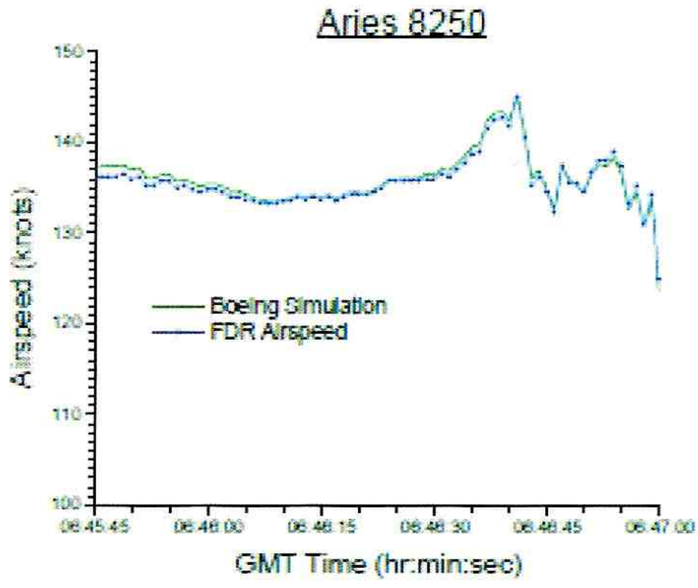


Figure 29 Airspeed match

With a match of the airplane motion to the recorded motion obtained, the controls generated by the math pilots could then be compared to the controls from the FDR. Differences between the control positions calculated by the math pilots to match pitch and roll and the controls recorded by the FDR would represent unaccounted for forces and moments acting on the aircraft. As can be seen in figures 30 and 31, the control column and power level required to match the airplanes recorded motion (which was essentially in the longitudinal plane for the approach) with the simulation matches the recorded longitudinal controls. Accordingly, the Boeing simulation verifies that the airplane performed as expected in the calculated wind field.

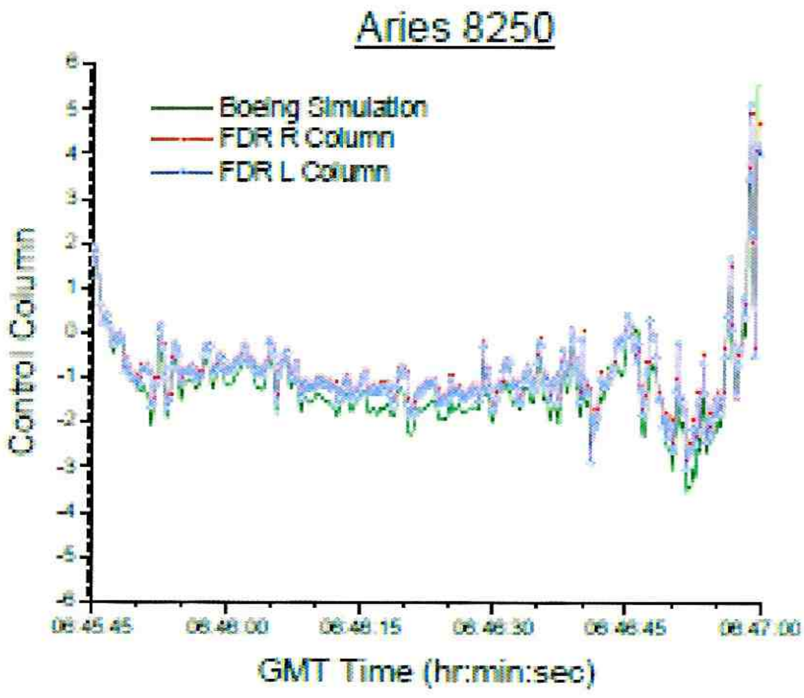


Figure 30: Control column comparison

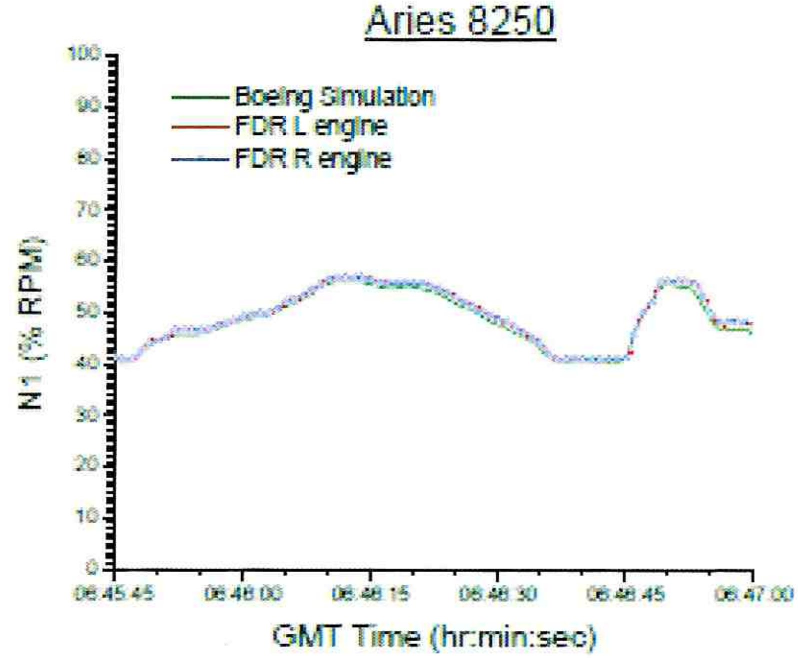


Figure 31 Engine N1 comparison

Conclusions

The flight path remained below the 3 degree glideslope PAPI guidance throughout the approach and began a more rapid decent near the end of the flight. Winds were light for most of the approach till a moderate headwind developed about 30 seconds prior to ground impact. There were no indications of rotational winds and the airplane followed the path expected with the recorded control inputs and the derived light to moderate winds. Power was increased from about 40% N1 to about 56% N1 about the time of the headwind but was decreased again after about 5 seconds. The aircraft's power and pitch capabilities were not utilized to raise the flight path except possibly for a brief nose up column spike just before impact.

APENDICE "S" **ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA**

NOTAS DE CAMPO DEL EXAMEN A LAS UNIDADES DE SERVICIO DE PASAJEROS EFECTUADAS POR LA NATIONAL TRANSPORTATION SAFETY BOARD (NTSB), FEDERAL AVIATION ADMINISTRATION (FAA) Y BOEING DE LA AERONAVE BOEING 737-700 HK-4682 ACCIDENTADA EN LA ISLA DE SAN ANDRES-COLOMBIA

NATIONAL TRANSPORTATION SAFETY BOARD

OFFICE OF AVIATION SAFETY
WASHINGTON, D.C.

May 10, 2011

PASSENGER SERVICE UNITS EXAMINATION FIELD NOTES

A.	**Incident**	:	**DCA10RA085**
	LOCATION	:	San Andres, Colombia
	DATE	:	August 16, 2010
	TIME	:	2222 0149 Central Daylight Time (CDT)
	AIRCRAFT	:	Boeing 737-700, Flight 8250, HK-4682
	OPERATOR	:	Aires Airline

B. **PSU Exam Group** :

Courtney Liedler
National Transportation Safety Board
Washington, DC

Lorenda Ward
National Transportation Safety Board
Washington, DC

Greg Dahl
Boeing Commercial Airplanes
Renton, Washington

John Hagman
Boeing Commercial Airplanes
Renton, Washington

Simon Lie
Boeing Commercial Airplanes
Everett, Washington

Susan McCormick
Federal Aviation Administration
Denver, Colorado

Rick Schiefelbein
Boeing Commercial Airplanes
Everett, Washington

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C. Summary

On August 16, 2010, about 0149 local time (0249 eastern daylight time), an Aires B737-700, HK-4682, crashed short of the runway at San Andreas Island Airport (ADZ), San Andres Island, Colombia. There were 121 passengers and 6 crew on board. The airplane was severely damaged and there were 2 fatalities, 15 serious injuries and 66 minor injuries.

During the initial on-scene investigation, it was noted that all but three of the PSUs had dislodged. In an effort to further study the dynamics of the PSU release, the PSU examination team composed of NTSB, FAA and Boeing technical staff traveled to San Andres Island Airport in San Andres, Colombia (where the wreckage is located) to conduct the exam of the Aires flight 8250 wreckage on May 9-10, 2011.

D. Details of the Exam

1.0 Original PSU Exam Plan

The initial proposed PSU examination plan proposed by Boeing, included documentation of:

1. PSU outboard rail ("AC" rail) alignment, signs of motion
2. PSU rails for witness marks, deformation, wear marks, etc.
3. Measure PSU rail's location relative to the bin rail – at various locations in the fuselage. Also measure distance from floor to A/C rail and bin rail.
4. Overhead bin attachment integrity – signs of stress, deformation, fracture
5. PSU panel, maintenance lanyard and latch condition
6. Spacer panel condition
7. PSU latches/hinges related to the impact sequence

Upon arrival, in May 2011, the wreckage was located in three temporary hanger structures (metal frame with fabric cover) located to the right of approach end of runway 06 ADZ. The hangers were located in a fenced enclosure with chain link fence approx 8 ft high. Each of the three hangers contained one of the major fuselage sections of the airplane (forward, mid, aft). The forward section was in the middle hanger, the aft body in the southern hanger, and the mid section in the northern hanger. The wings were cut outboard of the engine pylon locations during transfer to its current storage location and were sitting inside the fenced area on the ground, but were not in hangers. Inside the fence there were also two 20-foot and one 40-foot shipping containers. The 40-foot container was empty except for some wooden pallets. Both 20-foot shipping containers were quite full. Through the open doors, engine cowls were visible in one container and seat cushions in the other. No parts were removed from the shipping containers. Miscellaneous small debris was located in and around the hangers, both inside and outside the fence.

The PSU examination plan was based on reports that the condition of the wreckage remained similar to that documented during the on-scene investigation in August 2010 (see Cabin Safety Group Field Notes, August 21, 2010). However, due to the condition of the aircraft being severely stripped of interior furnishings, the examination plan could not be used. The following provides a detailed overview of the remaining items relevant to the PSU exam that were documented.

2.0 Actual PSU Examination Activities

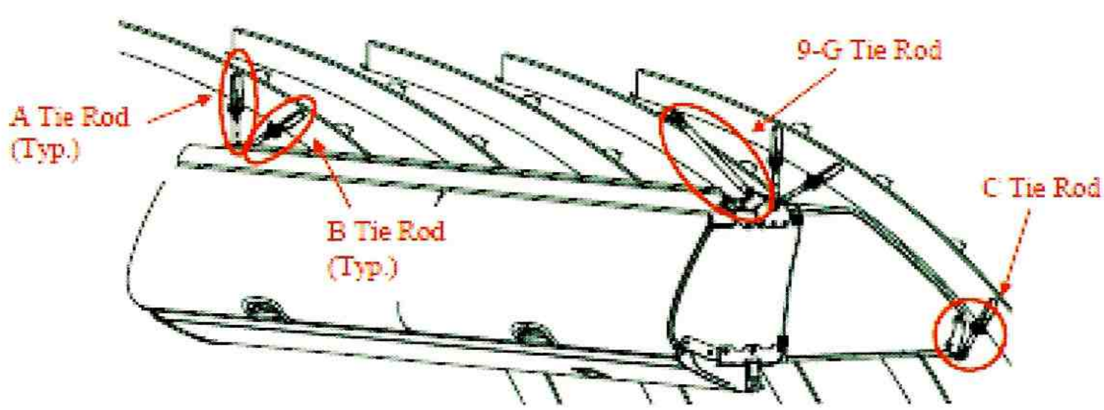
Examination of overhead bin (bins) support structure consisted of documenting the hardware remaining attached to the fuselage structure and to the three bins that remained installed in the aft section of the airplane.

2.1 Tie Rod Exam

The overhead bin support structure consists of four types of supports, as defined below:

- 'A' tie rod – a nearly vertical tie rod connecting the top of the bin structure to a fuselage frame (or intercostals between frames), typically about 4 inches long
- 'B' tie rod – a diagonal tie rod connecting the top of the bin structure outward and upwards to the fuselage frame (or intercostals), typically about 4 inches long. The 'A' and 'B' tie rods attach to the overhead bins at a common bolt.
- 'C' tie rod – tie rod attaching the outboard lower corner of the bin structure to intercostals between fuselage frames (or frames themselves), typically about 3 inches long.
- '9-G' tie rod – a tie rod running longitudinally from the top of the overhead bin where the 'A' and 'B' tie rods attach aft and upwards to a fuselage frame or intercostal location, typically about 20" long.

Note: Overhead bin support hardware is identified by the closest fuselage station location. Actual hardware location may be slightly forward or aft of the referenced location.



2.1.1 Forward Section

Within the forward section of the fuselage, the nose to approximately fuselage station 500B, the entire interior was practically stripped. This included the overhead bins, sidewalls, ceiling panels, carpet, and partition aft of door 1 right. Portions of the lavatory at door 1 right and the G1 galley were removed. The entire flight deck also had all of the avionics, circuit breaker panels, flight deck furnishings, and seats removed. The passenger seat frames were piled up on the right hand side of the airplane and all of the fabric and cushions had been removed. Most of the thermal/acoustic blankets were still in place.

The left Air Conditioning (AC) rail was intact from station 360 to 500B at which point it was deformed due to the fuselage break. The right AC rail was intact with a slight bend at the joint at approximately station 500.

At station 360 left, the A tie rod was cut at the bin side, the B tie rod body was cut in the middle, and the C tie rod was cut at the bin side. Per design, there is not a 9-G tie rod at this location.

At station 360 right, the rod ends of both the A and B tie rods were cut at the structure side. The rod end of the C tie rod was intact and the lower bolt was removed. Per design, there is not a 9-G tie rod at this location.

At station 400 left, both the A and B tie rod end were cut at the structure side. The forward C tie rod fractured at the structure side rod end. The fracture occurred at the rod end threads. The aft C tie rod fractured at the structure side rod end. The fracture occurred at the rod end threads. The 9-G tie rod was buckled and the bin side rod end was cut.

At station 400 right, the rod ends of both the A and B tie rods were cut at the structure side. The forward C tie rod was fractured at the structure side rod end. The fracture occurred at the threads. The 9-G tie rod end was bent and cut in middle of rod.

At station 460 left, the rod ends of both the A and B tie rods were cut at the structure side. The forward C tie rod was cut at the bin side and the aft C tie rod was fractured at the bin side rod end. The fracture occurred at threads. The 9-G tie rod was straight and cut at the bin side.

At station 460 right, the bin side rod ends were bent and the bolts were missing from both the A and B tie rod ends. The forward C tie rod was cut at the bin side, and the aft C tie rod had the bin side bolt missing. The 9-G tie rod was straight and cut in the body of the rod.

At station 500B left, this station was missing due to the forward break in the fuselage.

At station 500B right, the rod ends of both the A and B tie rods were cut at the structure side. The C tie rod was fractured at the bin side rod end. The fracture occurred at the threads. The 9-G tie rod was fractured at bin side rod end. The fractured occurred at the threads.

2.1.2 Mid Section

Many interior components in the mid section had been removed, to include the overhead bins, ceiling panels, the seat upholstery, sidewalls and carpets. In some locations the floorboards were removed as well. The metallic portions of the one triple seat remained inside the fuselage but had been removed from the seat tracks. Tarps and repositioned portions of interior partitions, overhead bin floors and other composite panels had been wired in place to partially close off the open ends of the fuselage.

The left hand AC rail appears intact and relatively undisturbed between station 639 and 727, possibly as far aft as 727A. The right hand AC rail appears intact and relatively undisturbed between station 639 and 706.

At station 540, on the left hand side, the A tie rod was fractured at the bin side rod end. The fracture occurred at the threads. The remaining portion of the threaded section was bent. The B tie rod was fractured at structure side rod end. The fracture occurred at the threads. The remaining portion of the threaded section was bent. The C tie rod was fractured at the structure side rod end. The fracture occurred at the threads. The 9-G tie rod was found with the bin side rod end missing. The structure side rod end was loose and the threaded connection could be turned with finger pressure. On the right hand side of station 540, the A tie rod was found with only the structure side rod end remaining. The jam nut was still present and the threads below the jam nut were corroded. A bend was evident near the rod end lug. A partial saw cut was visible above the jam nut, but had not severed the rod end. The B tie rod was found with only the structure side rod end remaining. The jam nut was still present and the threads below the jam nut were corroded. A bend was evident near the rod end lug. The C tie rod was found with the bin side rod end fractured. This fracture occurred at the lug and the bushing was missing. The 9-G tie rod was missing except for the structure side rod end bushing which remained pinned in the clevis.

At station 616, on the left hand side, the A tie rod was found cut at the bin side. The B tie rod was found cut near the bin side. The C tie rod was found with only the structure side rod end remaining. The jam nut was still present. The 9-G tie rod was missing except for the structure side rod end bushing which remained pinned in the clevis. On the right hand side of station 616, the A tie rod was found with only the structure side rod end remaining. The jam nut was still present. The B tie rod was found with only the structure side rod end remaining. The jam nut was still present. The rod end was bent near the rod end lug. The C tie rod was missing. The intercostal to which it would attach was fractured and the forward portion to which the tie rod would attach was missing. The forward intercostal support fitting had been pulled out of the frame. The 9-G tie rod was cut at the bin side.

At station 706, the A tie rod was found cut at the bin side. The B tie rod was found cut at the bin side. The C tie rod was fractured at the bin side rod end. The fracture occurred at the threads. The 9-G tie rod was fractured at the structure side rod end. The fracture occurred at the threads. On the right hand side of station 706, the A tie rod was fractured at the bin side rod end. The fracture occurred at the threads. The remaining threaded portion of the bin side rod end was bent and the threads were damaged adjacent to the fracture on the outside radius of the bend. The B tie rod was fractured at the bin side rod end. The fracture occurred at the threads. The remaining threaded portion of the bin side rod end was bent. The C tie rod was found with only the structure side rod end remaining. The intercostal to which it attached was fractured with the tie rod remaining attached to the aft portion which itself remained attached to the station 706 frame. The forward portion of the intercostal was missing. The forward intercostal support fitting remained attached to the station 685 frame; however, the clevis lugs were fractured and the intercostal attach fastener was missing. The 9-G tie rod was cut at the bin side. The body of the tie rod was bent.

At station 727C, on the left hand side, the structure to which the A tie rod would attach was missing. The structure to which the B tie rod would attach was also missing. The C tie rod was fractured at the bin side rod end. The fracture occurred at the threads. This tie rod is attached to an intercostal between two frames. The forward end of the intercostal remained attached to the 727B frame. The aft end of the intercostal was attached to a small fragment of the station 727C frame. The structure to which the 9-G tie rod would attach was missing.

2.1.3 Aft Section

Within the aft section of the fuselage, approximately station 727C to station 927, almost the entire interior was removed. This included the sidewalls, ceiling panels, carpet, passenger service units, the partition forward of the aft door on the right hand side, part of the aft galley, and all the overhead bins on the left hand side. The 3 most aft overhead bins on the left hand side remained, along with portions of the aft lavatory. A big hole was cut at the aft bulkhead to access the tail cone/jackscrew. The passenger seat frames were piled up within the aft section of the airplane and all of the fabric and cushions had been removed. Most of the thermal/acoustic blankets were still in place.

The left AC rail was intact from station 727C to station 942 on the right hand side. Forward of station 727C the AC rail had a slight bend and was deformed inboard due to fuselage break. The right AC rail was intact from station 787 to station 910. Forward of station 787 the AC rail was fractured and missing due to fuselage break.

At station 727C, due to the fuselage break forward of this section, the only remaining part on the left hand side to be inspected was the 9-G tie rod connection. This 9-G tie rod was fractured on the structure side. The fracture occurred at the threads. On the right hand side of station 727C, the 9-G tie rod was buckled and was cut on the bin side. The A and B tie rods were cut on the bin side. The C tie rod was fractured on the bin side rod end. The fracture occurred at the threads.

At station 767, on the left hand side, the 9-G tie rod was found in tact and buckled. The A tie rod was intact and bent on the bin side rod end. The B tie rod was intact. The C tie rod was fractured on the bin side rod end. This fracture occurred at the threads. On the right hand side of station 767, the 9-G tie rod was buckled and was cut on the bin side. The A tie rod was cut on the structure side. The only portion of the B tie rod that remained was

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the structure side rod end, which was bent. The C tie rod was fractured on the bin side. The fracture occurred at the threads.

At station 827 (this station is the constant to aft transition), on the left hand side, the 9-G tie rod was found intact and buckled. The A tie rod was intact and bent on the structure side rod end. The B tie rod was intact. Both the forward and aft C tie rods were fractured on the bin side rod ends. The fracture for the forward rod occurred at the threads, the fracture at the aft rod occurred at the threads. On the right had side of station 827, the only portion remaining of the 9-G tie rod was the structure side rod end. The A tie rod was cut on the structure side. The B tie rod was cut on the bin side. Both the forward and aft C tie rods were fractured. The forward was fractured at the threads on the bin side rod end. The aft fractured at the lug of the bin side rod end.

At station 887, on the left hand side, the 9-G tie rod was found intact and buckled. The A tie rod was intact. The B tie rod was intact. The C tie rod was intact and bent at the bin side rod end. On the right hand side of station 887, the 9-G tie rod was buckled and was cut on the bin side. The A tie rod was cut on the bin side. The B tie rod was cut on the bin side. The C tie rod was fractured on the bin side rod end. The fracture occurred at the threads.

At station 927, on the right hand side, the A tie rod was cut on the bin side. The B tie rod was cut on the structure side. The C tie rod was fractured on the bin side rod end. This fracture occurred at the threads. This station had no 9-G tie rod installed per design.

The below table is a summary of the tie rods and 9-G tie rods for all three sections of the fuselage.

Overhead Bin Tie Rod Documentation					
STATION	**L/R**	**A**	**B**	**C**	**9-G**
360	L	Upper tie rod end cut at threads	Tie rod cut	Tie rod cut at bin side end	N/A
360	R	Cut at rod end	Cut at rod end	Rod end intact lower bolt missing	N/A
400	L	Cut at upper threads	Cut at upper threads	Both fwd and aft fractured at upper rod end threads	Buckled and bin side end cut
400	R	Cut at upper threads	Cut at upper threads	Fwd: fractured at rod end Aft: cut at rod end	Rod end bent cut in middle of rod

Secreta

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460	L	Cut at rod end	Cut at rod end	Fwd: cut at bin side end Aft: fractured at bin side rod end	Straight, cut at bin side end
460	R	Bin side rod end bent bolt removed	Bin side rod end bent bolt removed	Fwd: cut at bin side end Aft: lower bolt missing	Straight, cut in middle
500B	L	Missing	Missing	Missing	Missing
500B	R	Cut at structure side	Cut at structure side	Fractured at bin side rod end	Fractured at bin side rod end
Break					
540	L	Fractured at bin side rod end thread bent	Fractured at bin side rod end threads bent	Structure side rod end fractured	Bin side rod end unthreaded and straight
540	R	Unthreaded at structure side rod end	Unthreaded at structure side rod end	Bin side tie rod lug fractured	Fractured at structure side rod end lug (bushing and bolt installed)
616	L	Bin side rod end thread cut	Bin side rod end thread cut	Structure side unthreaded	Fractured at structure side rod end lug, missing lug fragment on floor, bushing and bolt still installed, tie rod missing
616	R	Unthreaded at structure side rod end	Unthreaded at structure side rod end	Missing. Intercostal fractured at bin side	Straight, cut at bin side
706	L	Cut at bin side	Cut at bin side	Fractured at bin side	Fractured at structure side threads
706	R	Fractured and damaged at bin side threads	Fractured at bin side	Intercostal fractured. Unthreaded at structure side rod end	Bent, cut at bin side

Secreta

727C	L	Clevis fitting missing from frame	Clevis fitting missing from frame	Intercostal intact but fuselage frames separated. Rod end fractured at bin side threads.	(see below)
Break					
727C	L	(see above)	(see above)	(see above)	Fractured
767	L	Intact/Bent	Intact	Fractured on Bin Side/Rod Side Unthreaded	Intact/Buckled
767	R	Cut	Unthreaded and bent	Fractured	Buckled and Cut on Bin Side
827	L	Intact/Bent	Intact	Fractured (both bin and structure)	Intact/Buckled
827	R	Cut	Cut	Fractured	Unthreaded at structure
887	R	Cut	Cut	Fractured	Buckled and Cut on Bin Side
887	L	Intact	Intact	Intact	Intact/Buckled
927	R	Cut	Cut	Cut or Broken	N/A

2.2 PSU Component Documentation

Due to the condition of the wreckage upon arrival, the PSU examination team was only able to recover 5 PSUs out of 50. All 5 PSUs were photographed and documented for broken outboard and inboard latches, inboard latch lip fractures and PSU frame fractures from inboard maintenance lanyard. The findings are included in the below table.

PSU Damage Documentation				
P/N 417N3011-	**L/R**	**Outboard**	**Inboard**	**Lanyard**
-1402B	R	2 Broken	No damage	Broken frame
-1401B	L	2 Broken	Fwd latch - no damage Aft latch - missing (broken frame)	Broken frame
-1401B	L	2 Broken	No damage	Broken frame
-1414B	R	2 Broken	Fwd latch – no damage Aft latch – missing (broken	Broken frame

			frame)	
-1414B	R	2 broken	Fwd latch – broken lip Aft latch – no damage	Broken frame

APENDICE "T" ACCIDENTE HK-4682, SAN ANDRES-COLOMBIA

Circular AIC C08 A03 14 - SEP - 05 PROCEDIMIENTOS APLICABLES PARA EL CIERRE Y MINIMOS DE UTILIZACON DE AERODROMOS

1. OBJETIVO

Por medio de la presente Circular de Información Aeronáutica (AIC), La Unidad Administrativa Especial de Aeronáutica Civil notifica a los usuarios de la aviación en Colombia que a partir de las 0000 UTC del 15 de septiembre de 2005 se modifican las normas y disposiciones aplicables para el cierre y mínimos de utilización de aeródromos

2. GENERALIDADES

2.1. La expresión "AERÓDROMO CERRADO" se empleará para indicar que no se permite ninguna operación de despegue, aproximación, ni aterrizaje en el aeródromo. Se declara "CERRADO" un aeródromo controlado, cuando se presenten y persistan cualquiera de las circunstancias descritas en los numerales 3, 4, 5 y 6

2.2. Cuando se proporcione Servicio de Control de Aproximación, a un vuelo IFR, el piloto de la aeronave es el UNICO RESPONSABLE en determinar si las condiciones meteorológicas observadas y/o reportadas son favorables para aterrizar la maniobra de aterrizaje.

2.8. La Dependencia de Control de Tránsito Aéreo correspondiente, informará oportunamente al piloto de la aeronave las condiciones meteorológicas, de visibilidad o RVR, techo de nubes y viento reinante en el aeródromo y sus inmediaciones.

3. CIERRE DE AERÓDROMOS POR CONDICIONES METEOROLÓGICAS

3.1. Cuando la visibilidad y/o techo de nubes sean inferiores a los mínimos prescritos para el aeródromo, en aquellos aeródromos donde no existen procedimientos de aproximación por instrumentos de NO Precisión o donde se efectúen operaciones VFR únicamente.

3.2. Cuando la visibilidad sea inferior a la mínima VMC prescrita, en aquellos aeródromos donde no existen salidas normalizadas por instrumentos.

3.3. Cuando existiendo salidas normalizadas por instrumentos, la visibilidad observada por el controlador de Aeródromo sea inferior a 500 metros, y no se cuente con transmisómetros RVR.

3.4. Cuando existiendo salidas normalizadas por instrumentos, uno de los valores RVR de la pista asignada para el despegue se encuentre por debajo de 350 metros.

6. CIERRE DE AERÓDROMOS POR CIRCUNSTANCIAS ADVERSAS QUE PUEDAN AFECTAR LA SEGURIDAD DE VUELO.

6.1. Se podrá declarar "CERRADO" un aeródromo cuando se presenten circunstancias meteorológicas adversas, o de otra índole, que a juicio del Control de Tránsito Aéreo, o de las tripulaciones, puedan afectar la seguridad o perjudicar seriamente el desarrollo de las operaciones de las aeronaves en el aeródromo o de sus inmediaciones. Tales circunstancias pueden ser:

6.1.1. Presencia de tormentas, con o sin granizo, en cercanía a las áreas de aproximación y/o de despegue, siempre que éstas sean visibles por el Controlador, entendiendo como cercanía una distancia menos o igual a 5 Millas Náuticas, bien sea del umbral de la pista utilizada para el aterrizaje, bien sea del final de la pista utilizada para el despegue.

NOTA: En virtud de que la componente transversal máxima de viento permitida para una aeronave, durante el aterrizaje o despegue, depende de diferentes factores tales como limitaciones propias de la misma, coeficiente de fricción y ancho de pista, así como el relieve circundante, etc., el ATC no declarará en aeródromo "CERRADO" por condiciones de viento. No obstante, será RESPONSABILIDAD ABSOLUTA del piloto determinar si la dirección e intensidad del viento permiten la operación segura del despegue o aterrizaje. De igual manera, el ATC es RESPONSABLE de informar al piloto la dirección e intensidad del viento, así como su evolución y presencia de ráfagas, si es que ellas existen.

REPÚBLICA DE COLOMBIA
AERONAUTICA CIVIL
Unidad Administrativa Especial

Unidad Administrativa Especial de Aeronáutica Civil
Grupo de Investigación de Accidentes