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

December 16, 1998

Digital Flight Data Recorder Factual

Specialist's Report of Investigation
by Cassandra Johnson

A. ACCIDENT

Location: 950 miles east southeast of New Tokyo International Airport, Narita Japan
Date: December 28, 1997
Time: 1410 Coordinated Universal Time (UTC)
Aircraft: Boeing 747-122, N4723U
NTSB#: DCA98MA015

B. GROUP

N/A

C. SUMMARY

On December 28, 1997, at 2310 Japanese Standard Time (1410 UTC), a United Airlines Boeing 747-122, N4723U, experienced an episode of severe turbulence about 950 miles east southeast of New Tokyo International Airport, Narita, Japan. The airplane was in visual flight rules (VFR) conditions at the time of the accident and was bound for Honolulu, Hawaii. 374 passengers including 5 infants and 19 crewmembers were on board. Following the turbulence, the airplane returned to New Tokyo Airport for an uneventful landing. The flight was operating under FAR part 121 at the time.

The digital flight data recorder (FDR), a Sundstrand Data Control (SDC), serial number 2348, was removed from the aircraft and sent to the Safety Board's laboratory in Washington, D.C. for readout and evaluation.

Without taking the vicalloy tape out of the digital FDR and using the Safety Board's transcription equipment and computer software, a successful FDR readout was performed. Attachments I-1 and I-2 contain the FDR parameter listing information for the accident airplane as supplied by United Airlines. Attachments II-1 to II-4 comprise selected FDR parameters for the turbulence encounter in graphical format with the total combined time of 12570 to 12945[1] seconds. Attachments III-1 to III-14 contain the tabular listing of the selected FDR parameters found in attachments II-1 to II-4.

[1] All times are FDR subframe reference number in seconds (elapsed time).

The digital FDR indicated that N4723U ascended to 31,000[2] feet (ft) above mean sea level (msl) approximately 24 minutes after take-off. Approximately 1 hour, 7 minutes and 19 seconds later (at 12853.937 seconds), while the aircraft was cruising at 31,000 ft msl with wings level at an approximate magnetic heading of 103°, the aircraft experienced a positive 1.814 G normal[3] acceleration excursion. Six seconds later at 12859.937 seconds, the aircraft sustained a negative 0.824 G normal acceleration and the aircraft subsequently rolled approximately 18° right wing down. During these events, altitude excursions were nominal.

D. DETAILS OF THE INVESTIGATION

Section I - Description of Data

This model flight data recorder records aircraft data in a digital format onto four tracks of a ¼-inch vicalloy tape. The digital FDR records 64 separate 12-bit words of digital information every second from the Digital Flight Data Acquisition Unit (DFDAU). Each grouping of 64 words is called a subframe. A group of four subframes comprise one frame. Each subframe has a unique 12-bit synchronization (synch) word identifying it as subframe 1, 2, 3, or 4. The synch words are the first word in each subframe. The data stream is "in synch" when successive synch words appear at 64-word intervals. Each data parameter (for example altitude, heading, airspeed) has a specifically assigned word and bit location within the subframe. Attachments I-1 and I-2 comprise the parameter information as supplied by United Airlines. A minimum of the last 25 hours of operational data are retained on the recording medium. This is accomplished by erasing the oldest data and replacing it with the newest.

Section II – Examination and Readout

The digital FDR was examined upon receipt and found to be in good condition. Without taking the vicalloy tape out of the digital FDR, the FDR data were transcribed directly to hard disk for further analysis using the National Transportation Safety Board's readout equipment. The transcribed data were reduced from the recorded binary values (0's and 1's) to engineering units (for example feet, knots, degrees, etc.) using conversion formulas obtained from United Airlines. The actual conversion is accomplished by an automated process that incorporates the National Transportation Safety Board's computers and associated software. The accident event was located during the transcription.

All the data examined which included the take-off through the turbulence encounter showed the data for the roll control parameter (control column position) and the yaw control parameter (rudder pedal position) to be erroneous.

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[2] The digital FDR altitude is function of 29.92 inches of mercury (in hg).

[3] Normal acceleration is the same as vertical acceleration.

Section III - Plots and Data Printout

Attachments II-1 to II-4 comprise selected FDR parameters for the turbulence encounter in graphical format with the combined total time of 12570 to 12945 seconds. Attachments III-1 to III-14 contain the tabular listing of the selected FDR parameters found in attachments II-1 to II-4.

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Mechanical Engineer

Enclosures:

Attachments I-1 and I-2:	FDR Parameter Listing
Attachments II-1 to II-4:	Selected FDR Data in Graphical Format for the Turbulence Encounter
Attachments III-1 to III-14:	Selected FDR Data in Tabular Format for Attachments II-1 to II-4

Attachments I - FDR Parameter Listing

Parameter Name	Word	Subframe	Signal Type	Comments
1. **Vertical Acceleration**	13,29,45,61	ALL		
2. **Longitudinal Acceleration**	15,31,47,63	ALL		
3. **Lateral Acceleration**	44	ALL		
4. **Altitude Coarse**	23	1		
5. **Altitude Fine**	05	ALL		
6. **IAS (Indicated Airspeed)**	19	1,3		
7. **Magnetic Heading**	03	2,4		
8. **Pitch Attitude**	51	ALL		
9. **Roll Attitude**	17	2,4		
10. **Angle of Attack**	11,43	ALL		Not Available on this aircraft
11. **GMT**	37	3		
12. **Pitch Control (Control Column Position)**	41	ALL		
13. **Roll Control (Control Wheel Position)**	9	ALL		Erroneous Data
14. **Yaw Control (Rudder Pedal Position)**	27,59	ALL		Erroneous Data
15. **Stabilizer Position**	55	1,3		
16. **Trailing Edge (T/E) Flap Position**	39	1,3	Discrete	
17. **Leading Edge (L/E) Flap Left 1**	39	1,3	Discrete	
18. **Leading Edge (L/E) Flap Left 2**	39	2,4	Discrete	
19. **Leading Edge (L/E) Flap Left 3**	39	1,3	Discrete	
20. **Leading Edge (L/E) Flap Left 4**	39	2,4	Discrete	
21. **Leading Edge (L/E) Flap Right 1**	4	1,3	Discrete	
22. **Leading Edge (L/E) Flap Right 2**	4	2,4	Discrete	
23. **Leading Edge (L/E) Flap Right 3**	4	1,3	Discrete	
24. **Leading Edge (L/E) Flap Right 4**	4	2,4	Discrete	
25. **Leading Edge (L/E) Flap In Transit**	13	ALL	Discrete	
26. **HF 1 Keying**	47	ALL	Discrete	
27. **HF 2 Keying**	47	ALL	Discrete	
28. **VHF 1 Keying**	9	ALL	Discrete	
29. **VHF 2 Keying**	9	ALL	Discrete	
30. **VHF 3 Keying**	31	ALL	Discrete	
31. **EPR Engine 1**	33	1		
32. **EPR Engine 2**	33	2		
33. **EPR Engine 3**	33	3		
34. **EPR Engine 4**	33	4		
35. **Thrust Reverser Unlock Engine 1**	30	1	Discrete	

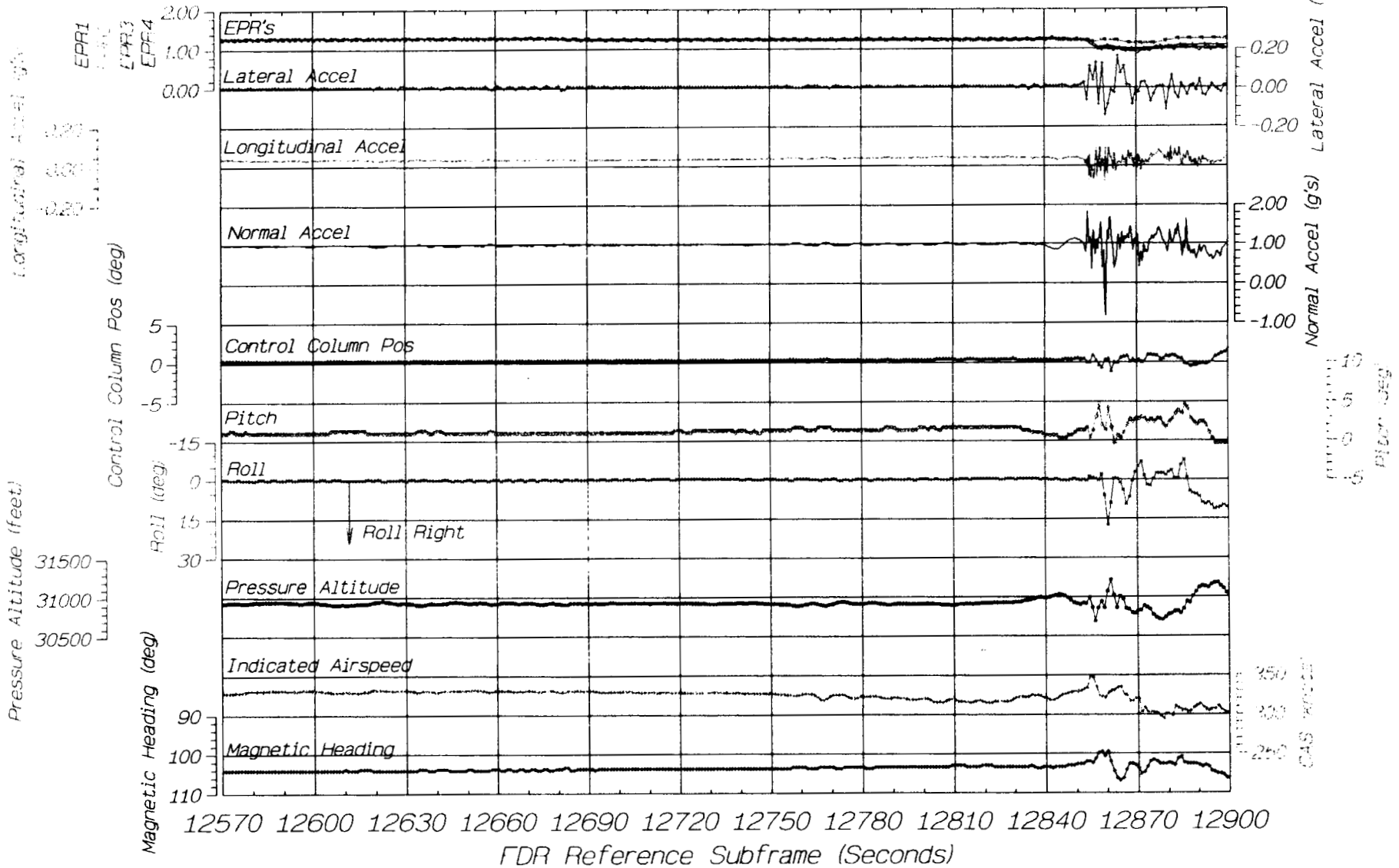
Parameter Name	Word	Subframe	Signal Type	Comments
36. **Thrust Reverser Unlock Engine 2**	30	2	Discrete	
37. **Thrust Reverser Unlock Engine 3**	30	3	Discrete	
38. **Thrust Reverser Unlock Engine 4**	30	4	Discrete	
39. **Thrust Reverser Deployed Engine 1**	7	1	Discrete	
40. **Thrust Reverser Deployed Engine 2**	7	2	Discrete	
41. **Thrust Reverser Deployed Engine 3**	7	3	Discrete	
42. **Thrust Reverser Deployed Engine 4**	7	4	Discrete	
43. **TCAS Advisories Combined Control**	8,63	ALL	Discrete	
44. **TCAS Advisories Vertical Control**	11,8	ALL	Discrete	
45. **TCAS Up Advisories**	27,43	ALL	Discrete	
46. **TCAS Down Advisories**	59,27	ALL	Discrete	
47. **Event**	13	ALL	Discrete	

Attachments II – Selected FDR Data in Graphical Format for the Turbulence Encounter

Turbulence Encounter

B747-122, 12/28/97, N4723U

NTSB# DCA97MA015



f_plot3.plt

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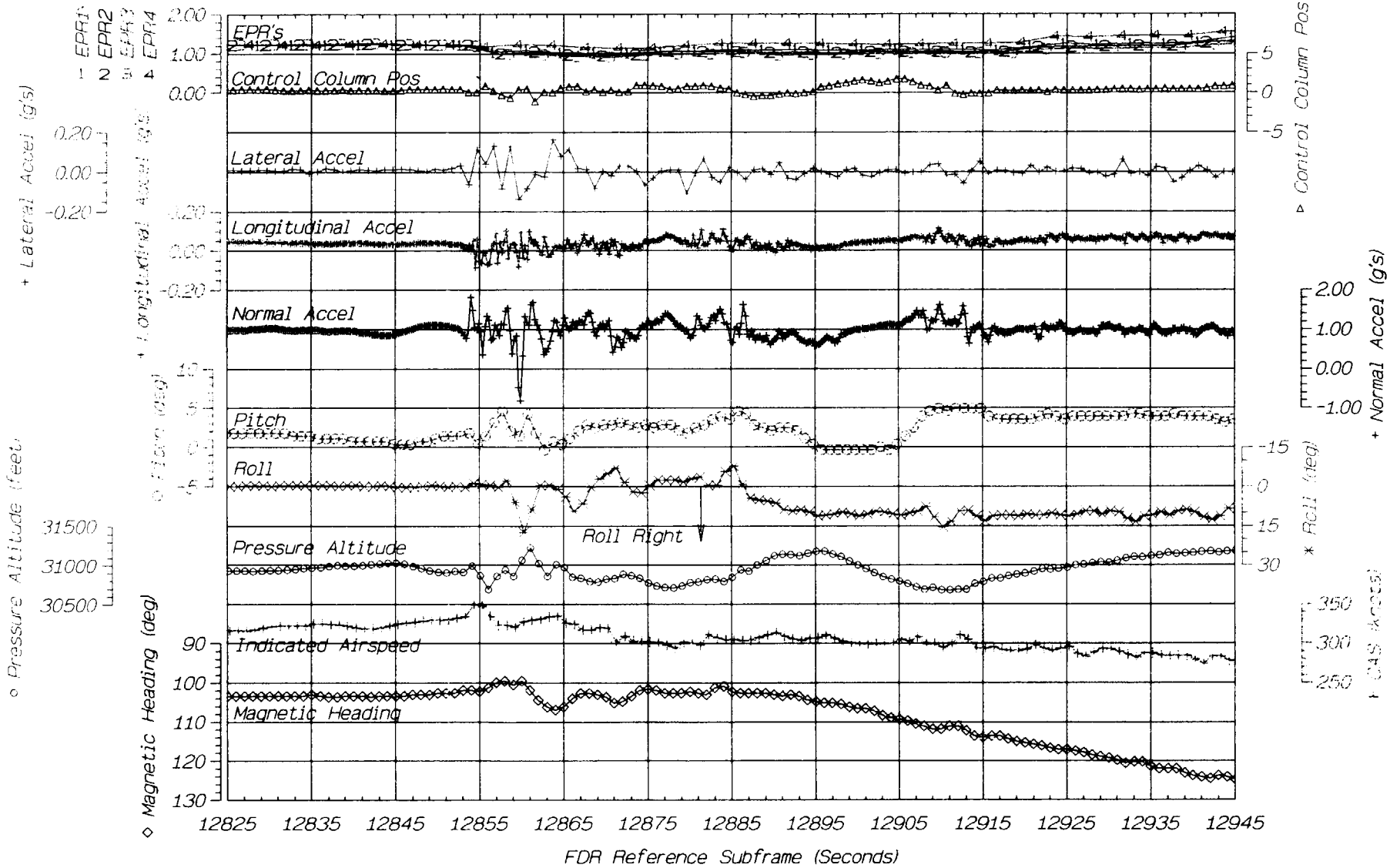
I-II

Turbulence Encounter

B747-122, 12/28/97, N4723U

NTSB# DCA98MA015



f_plot2.plt

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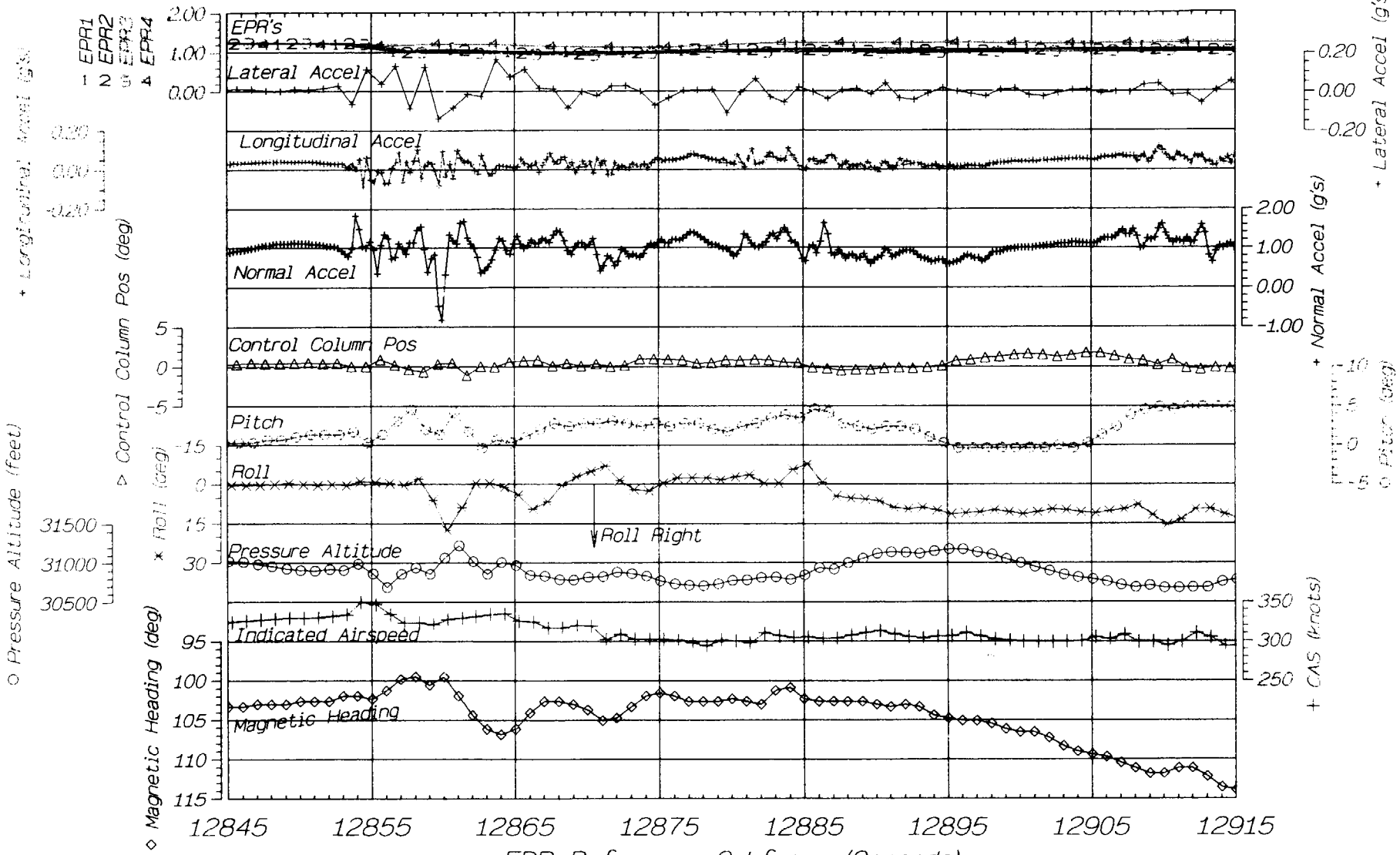
Turbulence Encounter

B747-122, 12/28/97, N4723U NTSB# DCA98MA015



f_plot1.plt

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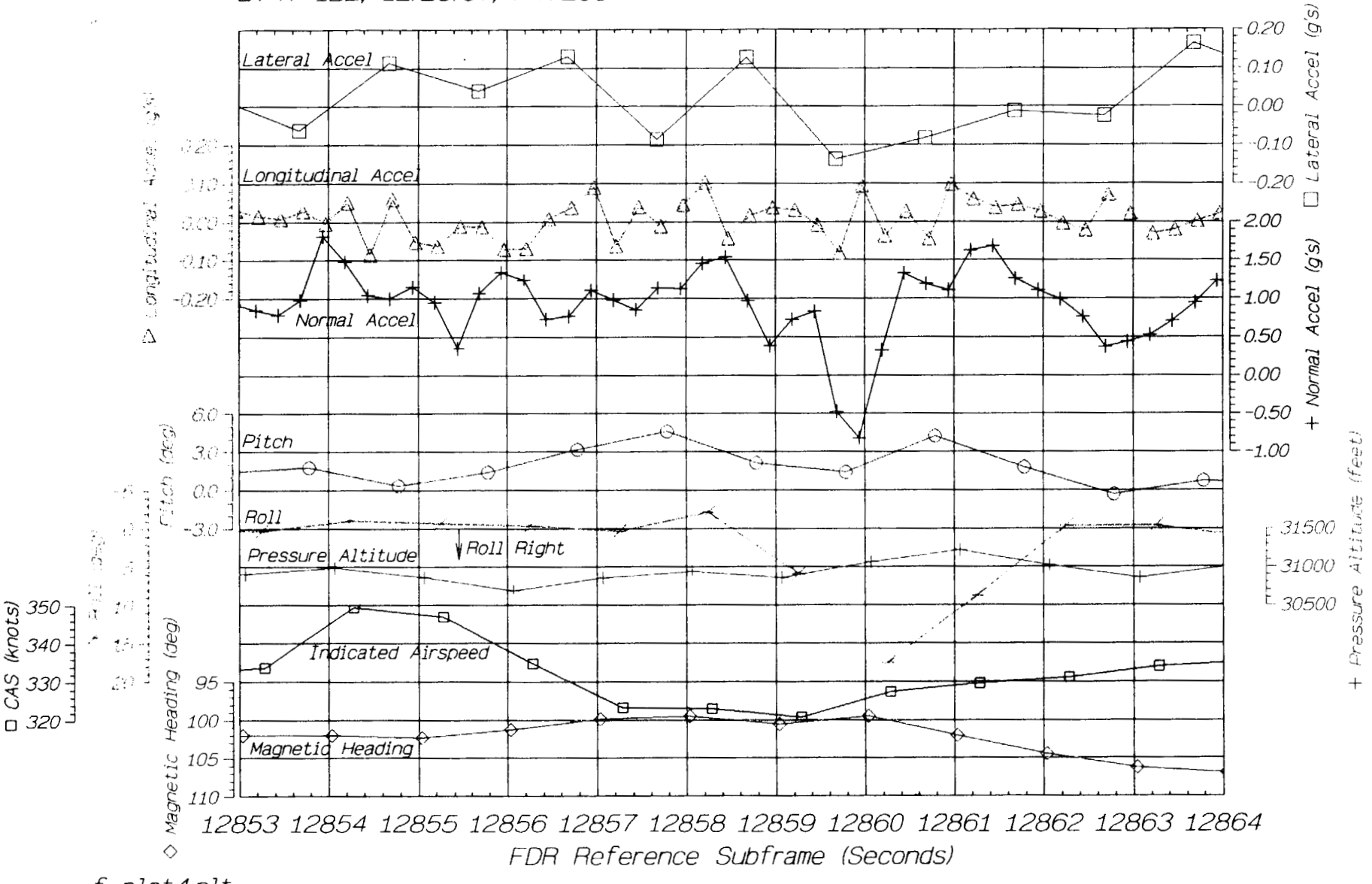
II-3

h-II

Turbulence Encounter

B747-122, 12/28/97, N4723U NTSB# DCA97MA015



f_plot4.plt

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Attachments III - Selected FDR Data in Tabular Format for Attachments II-1 to II-4

FDR Reference Subframe (Seconds)	CAS (knots)	Magnetic Heading (deg)	EPR1	EPR2	EPR3	EPR4	Normal Accel (g's)	Pitch (deg)	Roll (deg)	Control Column Pos (deg)	Pressure Altitude (feet)	Lateral Accel (g's)	Longitudinal Accel (g's)
12570	328.20	104.06			1.26		0.9984	1.05	-0.35	0.35		0.0076	0.0388
							0.9984						0.0388
							0.9984						0.0367
							0.9893						0.0388
12571	328.08	104.06				1.27	0.9893	1.05	-0.35	0.35		0.0092	0.0388
							0.9893						0.0388
							0.9893						0.0388
							0.9801						0.0388
12572	328.08	104.06	1.26				0.9893	1.41	0.00	0.35		0.0087	0.0367
							0.9893						0.0388
							0.9893						0.0388
							0.9893						0.0388
12573	327.59	104.06		1.28			0.9893	1.41	0.00	0.38	30935.52	0.0076	0.0388
							0.9984						0.0388
							0.9984						0.0388
							0.9893						0.0367
12574	328.33	104.06			1.26		0.9893	1.05	0.00	0.38	30933.08	0.0046	0.0367
							0.9893						0.0367
							0.9801						0.0367
							0.9801						0.0367
12575	328.57	104.06				1.27	0.9801	1.05	-0.35	0.38	30930.64	0.0076	0.0367
							0.9893						0.0367
							0.9893						0.0367
							0.9801						0.0367
12576	328.94	104.06	1.26				0.9801	1.05	0.00	0.35	30929.41	0.0056	0.0367
							0.9893						0.0367
							0.9984						0.0367
							0.9984						0.0367
12577	329.43	104.06		1.29			0.9984	1.41	0.00	0.35	30924.53	0.0061	0.0367
							0.9984						0.0367
							0.9984						0.0367
							0.9984						0.0367
12578	330.16	104.06			1.27		0.9984	1.05	0.00	0.38	30926.97	0.0076	0.0367
							0.9984						0.0347
							0.9984						0.0367
							0.9984						0.0347
12579	330.28	104.06				1.28	0.9893	1.05	0.00	0.32	30934.30	0.0097	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9801						0.0347
12580	330.52	104.06	1.27				0.9801	1.05	0.35	0.32	30936.74	0.0041	0.0347
							0.9801						0.0347
							0.9893						0.0347
							0.9801						0.0347
12581	330.65	104.06		1.29			0.9801	1.05	0.00	0.35	30945.29	0.0066	0.0347
							0.9801						0.0347
							0.9710						0.0347
							0.9618						0.0347
12582	330.52	104.06			1.27		0.9618	1.05	-0.35	0.32	30940.41	0.0082	0.0347
							0.9710						0.0347
							0.9801						0.0347
							0.9801						0.0347
12583	330.52	104.06				1.28	0.9801	1.05	-0.35	0.32	30944.07	0.0087	0.0347
							0.9801						0.0347
							0.9801						0.0347
							0.9801						0.0347
12584	330.89	104.06	1.27				0.9801	1.05	0.00	0.32	30946.51	0.0082	0.0347
							0.9801						0.0347
							0.9893						0.0347
							0.9801						0.0347
12585	330.77	104.06		1.29			0.9801	1.05	0.00	0.29	30945.29	0.0071	0.0347
							0.9801						0.0347
							0.9893						0.0347
							0.9893						0.0347
12586	331.38	104.06			1.27		0.9893	1.05	-0.35	0.29	30945.29	0.0076	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12587	331.26	104.06				1.28	0.9801	1.05	-0.35	0.35	30947.73	0.0097	0.0347
							0.9801						0.0347
							0.9801						0.0347
							0.9801						0.0347
12588	331.26	104.06	1.27				0.9710	1.05	0.00	0.32	30945.29	0.0087	0.0326
							0.9801						0.0347
							0.9893						0.0347
							0.9801						0.0347
12589	331.38	104.06		1.29			0.9893	1.05	0.00	0.29	30944.07	0.0056	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12590	331.14	104.06			1.27		0.9893	1.05	0.00	0.32	30942.85	0.0076	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9801						0.0347
12591	330.52	104.06				1.28	0.9893	1.05	-0.35	0.32	30937.96	0.0076	0.0347
							0.9893						0.0367
							0.9984						0.0347
							0.9984						0.0367
12592	330.65	104.06	1.27				0.9984	1.05	-0.35	0.32	30936.74	0.0082	0.0367
							0.9984						0.0367
							0.9984						0.0367
							0.9984						0.0367
12593	330.65	104.06		1.29			0.9984	1.05	0.00	0.29	30931.86	0.0076	0.0347
							1.0076						0.0367
							1.0076						0.0367
							0.9984						0.0367
12594	330.52	104.06			1.27		0.9984	1.05	0.00	0.32	30930.64	0.0076	0.0367
							0.9984						0.0367
							0.9984						0.0367
							0.9984						0.0347
12595	330.89	104.06				1.28	0.9984	1.05	-0.35	0.32	30928.19	0.0082	0.0347
							0.9984						0.0347
							0.9984						0.0347
							0.9984						0.0367
12596	331.14	104.06	1.27				0.9893	1.05	-0.35	0.32	30929.41	0.0051	0.0347
							0.9893						0.0347
							0.9984						0.0347
							0.9893						0.0347
12597	331.53	104.06		1.29			0.9893	1.05	-0.35	0.29	30934.30	0.0066	0.0347
							0.9801						0.0347
							0.9801						0.0347
							0.9710						0.0326

FDR Reference Subframe (Seconds)	CAS (knots)	Magnetic Heading (deg)	EPR1	EPR2	EPR3	EPR4	Normal Accel (g's)	Pitch (deg)	Roll (deg)	Control Column Pos (deg)	Pressure Altitude (feet)	Lateral Accel (g's)	Longitudinal Accel (g's)
12598	331.38	104.06			1.27		0.9618	1.05	-0.35	0.32	30936.74	0.0092	0.0326
							0.9618						0.0326
							0.9618						0.0326
							0.9618						0.0347
12599	330.89	104.06				1.28	0.9618	1.05	-0.35	0.32	30940.41	0.0168	0.0326
							0.9710						0.0347
							0.9801						0.0347
							0.9710						0.0347
12600	331.01	104.06	1.27				0.9710	1.05	0.00	0.32	30937.96	0.0082	0.0347
							0.9801						0.0347
							0.9801						0.0347
							0.9801						0.0347
12601	330.77	104.06		1.29			0.9893	1.05	0.00	0.32	30934.30	0.0041	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12602	330.40	104.06			1.27		0.9893	1.05	-0.35	0.32	30929.41	0.0082	0.0367
							0.9893						0.0367
							0.9893						0.0367
							0.9893						0.0367
12603	330.04	104.06				1.28	0.9893	1.05	-0.35	0.32	30923.31	0.0097	0.0367
							0.9984						0.0367
							0.9984						0.0367
							0.9984						0.0367
12604	329.67	104.06	1.27				0.9893	1.05	0.00	0.38	30919.64	0.0082	0.0367
							0.9893						0.0367
							0.9984						0.0367
							0.9984						0.0367
12605	329.18	104.06		1.29			0.9984	1.41	0.00	0.38	30913.64	0.0051	0.0367
							0.9984						0.0367
							1.0076						0.0367
							0.9984						0.0388
12606	328.82	104.06			1.27		0.9984	1.41	-0.35	0.35	30909.87	0.0066	0.0367
							1.0076						0.0388
							1.0076						0.0388
							1.0076						0.0388
12607	328.57	104.06				1.28	1.0076	1.41	-0.35	0.35	30908.65	0.0082	0.0389
							1.0076						0.0389
							1.0076						0.0388
							1.0076						0.0388
12608	328.69	104.06	1.27				0.9984	1.41	-0.35	0.35	30909.87	0.0076	0.0388
							0.9984						0.0388
							0.9984						0.0367
							0.9984						0.0388
12609	328.94	104.06		1.29			0.9984	1.41	0.00	0.35	30911.10	0.0076	0.0367
							0.9984						0.0388
							1.0076						0.0367
							0.9984						0.0367
12610	328.94	103.71			1.27		0.9984	1.41	0.00	0.38	30911.43	0.0076	0.0367
							0.9984						0.0388
							0.9893						0.0367
							0.9893						0.0367
12611	329.06	104.06				1.28	0.9893	1.41	0.00	0.32	30909.87	0.0066	0.0367
							0.9984						0.0367
							0.9984						0.0367
							0.9893						0.0367
12612	329.06	104.06	1.27				0.9893	1.41	0.00	0.32	30911.10	0.0071	0.0367
							0.9893						0.0367
							0.9893						0.0367
							0.9801						0.0367
12613	328.69	104.06		1.29			0.9801	1.41	0.00	0.32	30914.76	0.0087	0.0367
							0.9801						0.0367
							0.9893						0.0367
							0.9893						0.0388
12614	328.57	104.06			1.27		0.9893	1.41	0.00	0.38	30918.42	0.0087	0.0367
							0.9893						0.0388
							0.9984						0.0388
							0.9984						0.0388
12615	329.06	103.71				1.28	0.9984	1.41	0.00	0.38	30918.42	0.0056	0.0367
							0.9893						0.0367
							0.9984						0.0367
							0.9984						0.0367
12616	329.67	103.71	1.27				0.9984	1.41	0.00	0.35	30918.42	0.0051	0.0367
							0.9893						0.0367
							0.9893						0.0347
							0.9893						0.0347
12617	329.91	103.71		1.29			0.9893	1.05	-0.35	0.38	30919.64	0.0076	0.0367
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12618	330.77	103.71			1.27		0.9801	1.05	-0.35	0.32	30928.19	0.0071	0.0347
							0.9801						0.0347
							0.9801						0.0326
							0.9710						0.0326
12619	332.11	104.06				1.28	0.9710	1.05	0.00	0.26	30941.63	0.0010	0.0326
							0.9710						0.0347
							0.9618						0.0326
							0.9526						0.0326
12620	331.75	104.06	1.27				0.9526	1.05	-0.35	0.32	30944.27	0.0092	0.0326
							0.9435						0.0306
							0.9435						0.0306
							0.9526						0.0326
12621	331.50	104.06		1.29			0.9526	1.05	-0.35	0.29	30950.18	0.0138	0.0306
							0.9526						0.0326
							0.9618						0.0326
							0.9618						0.0326
12622	331.50	104.06			1.28		0.9710	1.05	0.35	0.32	30956.28	0.0066	0.0326
							0.9710						0.0326
							0.9526						0.0326
							0.9618						0.0326
12623	331.87	104.06				1.28	0.9710	1.05	0.35	0.32	30948.96	0.0051	0.0326
							0.9710						0.0326
							0.9801						0.0347
							0.9801						0.0347
12624	331.14	104.06	1.27				0.9801	1.05	0.00	0.32	30944.27	0.0082	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12625	331.14	104.06		1.29			0.9893	1.05	0.00	0.32	30939.19	0.0082	0.0347
							0.9893						0.0347
							0.9984						0.0367
							0.9984						0.0367

III-2

FDR Reference Subframe (Seconds)	CAS (knots)	Magnetic Heading (deg)	EPR1	EPR2	EPR3	EPR4	Normal Accel (g's)	Pitch (deg)	Roll (deg)	Control Column Pos (deg)	Pressure Altitude (feet)	Lateral Accel (g's)	Longitudinal Accel (g's)
12626	331.14	104.06			1.27		1.0076	1.05	0.00	0.32	30931.86	0.0051	0.0347
							1.0076						0.0367
							1.0168						0.0367
							1.0168						0.0347
12627	331.62	104.06				1.28	1.0076	1.05	0.00	0.38	30928.19	0.0015	0.0367
							1.0076						0.0347
							1.0076						0.0347
							0.9984						0.0347
12628	331.99	104.06	1.27				0.9893	1.05	-0.35	0.32	30928.19	0.0122	0.0347
							0.9893						0.0347
							0.9984						0.0326
							0.9801						0.0326
12629	331.87	104.06		1.29			0.9893	1.05	0.00	0.29	30931.86	0.0148	0.0347
							0.9984						0.0347
							0.9893						0.0347
							0.9710						0.0347
12630	331.26	104.06			1.27		0.9801	1.05	0.35	0.32	30925.75	0.0076	0.0367
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12631	331.14	104.06				1.28	0.9893	1.05	-0.35	0.32	30925.75	0.0082	0.0347
							0.9984						0.0347
							0.9984						0.0367
							0.9984						0.0367
12632	330.40	104.06	1.27				0.9984	1.05	-0.35	0.38	30922.09	0.0107	0.0347
							0.9984						0.0367
							0.9893						0.0367
							0.9893						0.0367
12633	329.43	104.06		1.29			0.9893	1.41	0.00	0.35	30909.87	0.0061	0.0367
							0.9984						0.0367
							1.0076						0.0367
							1.0168						0.0388
12634	329.91	103.71			1.28		1.0168	1.41	0.00	0.38	30909.67	0.0010	0.0388
							1.0259						0.0388
							1.0259						0.0388
							1.0168						0.0367
12635	330.40	103.71				1.28	1.0076	1.41	-0.35	0.35	30904.99	0.0066	0.0367
							1.0076						0.0367
							1.0076						0.0367
							0.9984						0.0347
12636	330.89	103.71	1.27				0.9893	1.41	-0.35	0.35	30915.98	0.0082	0.0347
							0.9893						0.0347
							0.9984						0.0347
							0.9893						0.0347
12637	330.77	104.06		1.29			0.9893	1.05	0.00	0.38	30919.64	0.0087	0.0347
							0.9801						0.0347
							0.9710						0.0347
							0.9710						0.0347
12638	330.28	104.06			1.28		0.9710	1.05	0.00	0.29	30923.31	0.0102	0.0347
							0.9710						0.0347
							0.9801						0.0347
							0.9710						0.0367
12639	329.30	104.06				1.28	0.9710	1.41	0.00	0.32	30919.64	0.0066	0.0367
							0.9801						0.0367
							0.9801						0.0367
							0.9893						0.0367
12640	329.19	103.71	1.27				0.9984	1.41	0.00	0.32	30917.23	0.0046	0.0367
							1.0076						0.0367
							1.0076						0.0367
							1.0076						0.0367
12641	330.16	103.71		1.29			1.0076	1.41	0.00	0.29	30917.23	0.0010	0.0367
							1.0076						0.0367
							1.0076						0.0347
							1.0076						0.0347
12642	330.89	103.71			1.28		0.9984	1.05	-0.35	0.29	30924.53	0.0041	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9710						0.0347
12643	330.89	103.71				1.28	0.9710	1.05	-0.35	0.32	30926.97	0.0102	0.0347
							0.9710						0.0347
							0.9710						0.0326
							0.9710						0.0326
12644	331.14	104.06	1.27				0.9618	1.05	0.00	0.35	30935.74	0.0097	0.0326
							0.9710						0.0326
							0.9710						0.0326
							0.9618						0.0347
12645	331.14	104.06		1.29			0.9618	1.05	0.35	0.38	30940.41	0.0036	0.0326
							0.9618						0.0326
							0.9710						0.0326
							0.9618						0.0326
12646	330.89	104.06			1.28		0.9710	1.05	0.00	0.35	30945.29	0.0051	0.0326
							0.9618						0.0326
							0.9526						0.0326
							0.9526						0.0326
12647	330.65	104.06				1.29	0.9618	1.05	0.00	0.32	30940.41	0.0097	0.0326
							0.9618						0.0347
							0.9710						0.0347
							0.9801						0.0347
12648	330.77	104.06	1.28				0.9801	1.05	0.35	0.32	30940.41	0.0097	0.0347
							0.9893						0.0347
							0.9984						0.0367
							0.9984						0.0367
12649	330.89	104.06		1.29			0.9984	1.05	0.00	0.32	30935.52	0.0025	0.0367
							0.9984						0.0367
							1.0076						0.0367
							1.0076						0.0347
12650	331.01	103.71			1.28		1.0076	1.05	-0.35	0.38	30929.41	0.0061	0.0347
							1.0076						0.0367
							0.9984						0.0367
							0.9893						0.0367
12651	331.38	103.71				1.29	0.9893	1.05	-0.35	0.35	30925.75	0.0097	0.0347
							0.9984						0.0347
							0.9984						0.0326
							0.9984						0.0347
12652	331.62	104.06	1.27				0.9984	1.05	0.35	0.32	30933.08	0.0066	0.0367
							0.9984						0.0367
							0.9984						0.0367
							0.9801						0.0326
12653	331.26	104.06		1.29			0.9801	1.05	0.00	0.32	30929.41	0.0087	0.0347
							0.9893						0.0326
							0.9893						0.0326
							0.9801						0.0347

FDR Reference Subframe (Seconds)	CAS (knots)	Magnetic Heading (deg)	EPR1	EPR2	EPR3	EPR4	Normal Accel (g's)	Pitch (deg)	Roll (deg)	Control Column Pos (deg)	Pressure Altitude (feet)	Lateral Accel (g's)	Longitudinal Accel (g's)
12654	331.87	104.06			1.27		0.9801 0.9893 0.9984 0.9893	1.05	0.00	0.32	30937.95	0.0076	0.0326 0.0347 0.0326 0.0326
12655	331.14	104.06				1.29	0.9710 0.9618 0.9710 0.9710	1.05	0.00	0.32	30935.52	0.0092	0.0326 0.0347 0.0347 0.0347
12656	330.28	104.06	1.27				0.9801 0.9893 0.9984 0.9984	1.05	0.00	0.32	30930.64	0.0153	0.0367 0.0367 0.0388 0.0388
12657	329.18	104.06		1.29			1.0076 1.0168 1.0259 1.0168	1.41	0.35	0.35	30918.42	0.0020	0.0388 0.0388 0.0367 0.0388
12658	330.04	103.71			1.28		1.0259 1.0259 1.0259 1.0168	1.41	0.00	0.38	30914.76	0.0046	0.0388 0.0367 0.0367 0.0367
12659	331.14	103.71				1.29	1.0168 1.0076 0.9984 0.9893	1.05	-0.35	0.32	30917.20	0.0107	0.0347 0.0367 0.0347 0.0347
12660	330.77	103.71	1.27				0.9801 0.9710 0.9618 0.9618	1.05	-0.35	0.32	30922.09	0.0183	0.0347 0.0347 0.0347 0.0347
12661	330.89	104.06		1.29			0.9710 0.9801 0.9801 0.9801	1.05	0.35	0.32	30933.08	0.0076	0.0347 0.0347 0.0326 0.0326
12662	330.89	104.06			1.28		0.9710 0.9618 0.9710 0.9710	1.05	0.00	0.35	30936.74	0.0107	0.0347 0.0347 0.0347 0.0347
12663	331.01	103.71				1.29	0.9710 0.9618 0.9618 0.9618	1.05	-0.35	0.29	30935.52	0.0082	0.0326 0.0347 0.0326 0.0347
12664	330.65	103.71	1.28				0.9618 0.9710 0.9801 0.9710	1.05	-0.35	0.32	30937.95	0.0122	0.0347 0.0347 0.0347 0.0347
12665	329.67	104.06		1.29			0.9801 0.9801 0.9893 0.9984	1.05	0.35	0.32	30931.86	0.0082	0.0367 0.0367 0.0367 0.0367
12666	329.91	104.06			1.28		1.0076 1.0076 0.9984 0.9984	1.05	0.00	0.38	30924.53	0.0320	0.0367 0.0367 0.0367 0.0367
12667	330.16	103.71				1.29	1.0076 0.9984 0.9893 0.9893	1.05	-0.35	0.35	30918.42	0.0102	0.0367 0.0367 0.0347 0.0347
12668	330.52	103.71	1.28				0.9801 0.9801 0.9801 0.9893	1.05	-0.35	0.38	30923.31	0.0143	0.0347 0.0347 0.0347 0.0347
12669	331.01	104.06		1.29			0.9893 0.9801 0.9801 0.9893	1.05	0.35	0.32	30934.31	0.0076	0.0347 0.0347 0.0347 0.0347
12670	330.77	104.06			1.28		0.9801 0.9710 0.9801 0.9893	1.05	0.00	0.35	30934.31	0.0110	0.0347 0.0367 0.0347 0.0347
12671	330.77	103.71				1.29	0.9893 0.9801 0.9710 0.9710	1.05	-0.35	0.29	30933.08	0.0071	0.0347 0.0347 0.0347 0.0347
12672	329.91	103.71	1.28				0.9710 0.9801 0.9893 0.9984	1.05	-0.35	0.32	30924.53	0.0153	0.0347 0.5590 0.0367 0.0367
12673	329.67	104.06		1.29			0.9984 0.9984 1.0076 0.9984	1.05	0.35	0.35	30922.09	0.0046	0.0388 0.0367 0.0367 0.0388
12674	329.79	104.06			1.28		0.9984 1.0076 1.0168 1.0076	1.05	0.00	0.38	30915.98	0.0020	0.0367 0.0388 0.0367 0.0367
12675	330.52	103.71				1.28	0.9984 1.0076 0.9984 0.9893	1.05	-0.35	0.35	30915.98	0.0082	0.0347 0.0347 0.0347 0.0367
12676	330.28	103.71	1.27				0.9893 0.9893 0.9710 0.9710	1.05	-0.35	0.35	30917.80	0.0178	0.0367 0.0367 0.0347 0.0326
12677	330.89	104.06		1.29			0.9801 0.9893 0.9801 0.9801	1.05	0.00	0.32	30925.75	0.0076	0.0347 0.0347 0.0367 0.0347
12678	330.65	104.06			1.28		0.9801 0.9801 0.9893 0.9710	1.05	0.00	0.32	30930.64	0.0051	0.0347 0.0347 0.0347 0.0347
12679	330.28	103.71				1.27	0.9526 0.9710 0.9893 0.9801	1.05	-0.35	0.32	30922.09	0.0087	0.0347 0.0347 0.0347 0.0367
12680	328.82	103.71	1.26				0.9893 0.9984 0.9984 0.9984	1.05	0.00	0.32	30919.64	0.0148	0.0367 0.0388 0.0367 0.0367
12681	329.18	103.71		1.29			0.9984 1.0076 1.0168 1.0168	1.05	0.35	0.38	30914.76	0.0102	0.0367 0.0367 0.0367 0.0367

FDR Reference Subframe (Seconds)	CAS (knots)	Magnetic Heading (deg)	EPR1	EPR2	EPR3	EPR4	Normal Accel (g's)	Pitch (deg)	Roll (deg)	Control Column Pos (deg)	Pressure Altitude (feet)	Lateral Accel (g's)	Longitudinal Accel (g's)
12682	330.04	103.36			1.28		1.0168	1.05	-0.35	0.35	30909.87	-0.0051	0.0367
							1.0259						0.0367
							1.0259						0.0367
							1.0076						0.0347
12683	330.89	103.36				1.24	0.9893	1.05	-0.35	0.38	30907.43	0.0138	0.0347
							0.9893						0.0326
							0.9893						0.0326
							0.9984						0.0306
12684	331.01	104.06	1.25				0.9801	1.05	0.00	0.32	30923.31	0.0092	0.0306
							0.9710						0.0347
							0.9801						0.0347
							0.9893						0.0326
12685	330.40	104.06		1.29			0.9801	1.05	0.00	0.32	30928.19	0.0082	0.0306
							0.9618						0.0347
							0.9801						0.0326
							0.9801						0.0326
12686	330.89	103.71			1.26		0.9801	1.05	-0.35	0.32	30928.19	0.0092	0.0347
							0.9801						0.0306
							0.9893						0.0326
							0.9893						0.0326
12687	330.28	103.71				1.23	0.9893	1.05	0.00	0.32	30929.41	0.0112	0.0326
							0.9801						0.0326
							0.9801						0.0326
							0.9893						0.0347
12688	330.52	103.71	1.24				0.9893	1.05	0.00	0.38	30922.09	0.0076	0.0326
							0.9893						0.0347
							0.9984						0.0306
							0.9984						0.0326
12689	330.65	103.71		1.27			0.9984	1.05	0.00	0.32	30928.19	0.0061	0.0326
							0.9984						0.0326
							0.9893						0.0347
							0.9801						0.0326
12690	330.28	103.71			1.25		0.9801	1.05	-0.35	0.35	30920.87	0.0122	0.0326
							0.9893						0.0326
							0.9893						0.0306
							0.9710						0.0347
12691	330.40	103.71				1.23	0.9801	1.05	-0.35	0.38	30918.42	0.0133	0.0306
							1.0076						0.0326
							0.9984						0.0326
							0.9893						0.0326
12692	329.55	104.06	1.24				0.9893	1.05	0.00	0.38	30923.31	0.0082	0.0326
							0.9801						0.0326
							0.9801						0.0326
							0.9893						0.0326
12693	329.30	103.71		1.26			0.9984	1.05	0.00	0.35	30919.64	0.0087	0.0347
							0.9893						0.0347
							0.9893						0.0347
							1.0076						0.0326
12694	329.30	103.71			1.24		0.9893	1.05	-0.35	0.38	30919.64	0.0056	0.0347
							0.9801						0.0326
							0.9893						0.0326
							0.9893						0.0326
12695	329.06	103.71				1.22	0.9801	1.05	-0.35	0.38	30920.87	0.0127	0.0326
							0.9710						0.0326
							0.9801						0.0306
							0.9801						0.0326
12696	329.43	103.71	1.24				0.9801	1.05	0.00	0.29	30929.41	0.0117	0.0306
							0.9801						0.0326
							0.9893						0.0326
							0.9893						0.0347
12697	329.30	103.71		1.26			0.9801	1.05	0.00	0.32	30930.64	0.0051	0.0326
							0.9710						0.0306
							0.9710						0.0306
							0.9801						0.0326
12698	329.18	103.71			1.24		0.9710	1.05	-0.35	0.32	30931.86	0.0078	0.0326
							0.9801						0.0326
							0.9801						0.0326
							0.9801						0.0326
12699	329.18	103.71				1.22	0.9710	1.05	-0.35	0.38	30926.97	0.0117	0.0326
							0.9710						0.0326
							0.9893						0.0326
							0.9893						0.0326
12700	328.57	103.71	1.24				0.9801	1.05	0.00	0.35	30928.19	0.0082	0.0326
							0.9710						0.0326
							0.9801						0.0326
							0.9893						0.0326
12701	329.18	103.71		1.25			0.9893	1.05	0.00	0.35	30928.19	0.0066	0.0347
							0.9984						0.0347
							0.9984						0.0326
							0.9984						0.0326
12702	328.94	103.71			1.24		0.9893	1.05	-0.35	0.35	30924.53	0.0102	0.0326
							0.9893						0.0326
							0.9893						0.0326
							0.9801						0.0347
12703	329.18	103.71				1.22	0.9801	1.05	-0.35	0.38	30924.53	0.0112	0.0326
							0.9893						0.0326
							0.9893						0.0326
							0.9893						0.0326
12704	328.82	103.71	1.24				0.9893	1.05	0.00	0.38	30925.75	0.0061	0.0326
							0.9893						0.0347
							0.9801						0.0326
							0.9801						0.0326
12705	328.57	103.71		1.25			0.9801	1.05	0.00	0.35	30925.75	0.0076	0.0326
							0.9893						0.0326
							0.9893						0.0347
							0.9893						0.0347
12706	328.57	103.71			1.24		0.9984	1.05	-0.35	0.38	30925.75	0.0076	0.0347
							0.9984						0.0347
							0.9893						0.0347
							0.9893						0.0347
12707	328.57	103.71				1.22	0.9893	1.05	-0.35	0.38	30924.53	0.0097	0.0347
							0.9893						0.0347
							0.9893						0.0326
							0.9893						0.0347
12708	328.69	103.71	1.23				0.9801	1.05	-0.35	0.35	30924.53	0.0097	0.0326
							0.9893						0.0347
							0.9984						0.0347
							0.9893						0.0326
12709	328.69	103.71		1.25			0.9893	1.05	0.00	0.38	30923.31	0.0076	0.0326
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0326

FDR Reference Subframe (Seconds)	CAS (knots)	Magnetic Heading (deg)	EPR1	EPR2	EPR3	EPR4	Normal Accel (g's)	Pitch (deg)	Roll (deg)	Control Column Pos (deg)	Pressure Altitude (feet)	Lateral Accel (g's)	Longitudinal Accel (g's)
12710	328.57	103.71			1.24		0.9893	1.05	0.00	0.35	30922.09	0.0076	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12711	328.33	103.71				1.22	0.9801	1.05	-0.35	0.29	30924.53	0.0082	0.0347
							0.9801						0.0347
							0.9893						0.0347
							0.9893						0.0347
12712	328.08	103.71	1.23				0.9801	1.05	-0.35	0.32	30926.97	0.0087	0.0347
							0.9801						0.0347
							0.9893						0.0347
							0.9801						0.0326
12713	328.08	103.71		1.25			0.9801	1.05	-0.35	0.35	30929.41	0.0087	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12714	328.57	103.71			1.24		0.9893	1.05	-0.35	0.38	30929.41	0.0076	0.0326
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12715	328.57	103.71				1.22	0.9801	1.05	-0.35	0.38	30924.53	0.0092	0.0326
							0.9893						0.0326
							0.9893						0.0326
							0.9893						0.0326
12716	328.45	103.71	1.23				0.9893	1.05	-0.35	0.38	30922.09	0.0087	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12717	328.33	103.71		1.25			0.9893	1.05	0.00	0.38	30923.31	0.0092	0.0326
							0.9801						0.0326
							0.9801						0.0326
							0.9893						0.0326
12718	328.45	103.71			1.24		0.9893	1.41	0.00	0.32	30924.53	0.0082	0.0326
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12719	328.08	103.71				1.22	0.9893	1.41	-0.35	0.35	30922.09	0.0076	0.0347
							0.9801						0.0347
							0.9893						0.0347
							0.9893						0.0347
12720	328.20	103.71	1.23				0.9893	1.41	-0.35	0.32	30923.31	0.0092	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12721	327.84	103.71		1.24			0.9893	1.05	-0.35	0.32	30923.31	0.0087	0.0347
							0.9893						0.0367
							0.9893						0.0347
							0.9801						0.0347
12722	327.96	103.71			1.24		0.9801	1.05	-0.35	0.32	30923.31	0.0076	0.0326
							0.9801						0.0347
							0.9893						0.0326
							0.9893						0.0347
12723	328.08	103.71				1.22	0.9893	1.05	-0.35	0.35	30923.31	0.0117	0.0347
							0.9893						0.0347
							0.9801						0.0347
							0.9710						0.0326
12724	328.08	103.71	1.23				0.9801	1.41	-0.35	0.38	30922.09	0.0076	0.0326
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12725	328.20	103.71		1.24			0.9984	1.41	-0.35	0.35	30919.64	0.0082	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9984						0.0347
12726	328.08	103.71			1.24		0.9801	1.41	-0.35	0.32	30919.64	0.0076	0.0347
							0.9893						0.0347
							0.9984						0.0347
							0.9984						0.0347
12727	328.08	103.71				1.22	0.9984	1.41	-0.35	0.38	30918.42	0.0092	0.0347
							0.9893						0.0347
							0.9984						0.0367
							0.9893						0.0347
12728	343.83	103.71	1.23				0.9893	1.41	-0.35	0.35	30917.22	0.0097	0.0347
							0.9893						0.0347
							0.9984						0.0347
							0.9984						0.0347
12729	328.20	103.71		1.24			0.9984	1.41	-0.35	0.38	30915.98	0.0082	0.0347
							0.9984						0.0347
							0.9984						0.0347
							0.9984						0.0347
12730	328.45	103.71			1.24		0.9984	1.41	-0.35	0.38	30914.76	0.0076	0.0347
							0.9984						0.0347
							0.9984						0.0347
							0.9984						0.0347
12731	328.45	103.71				1.22	0.9893	1.41	-0.35	0.38	30914.76	0.0082	0.0347
							0.9984						0.0347
							0.9984						0.0347
							0.9893						0.0347
12732	328.33	103.71	1.23				0.9893	1.41	-0.35	0.35	30914.76	0.0087	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12733	328.08	103.71		1.24			0.9893	1.41	-0.35	0.35	30918.42	0.0087	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0347
12734	327.72	103.71			1.24		0.9801	1.41	-0.35	0.38	30919.64	0.0087	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9801						0.0347
12735	327.84	103.71				1.22	0.9801	1.41	-0.35	0.32	30920.87	0.0076	0.0347
							0.9801						0.0347
							0.9801						0.0347
							0.9801						0.0326
12736	327.72	103.71	1.23				0.9801	1.41	-0.35	0.32	30922.09	0.0076	0.0347
							0.9801						0.0347
							0.9893						0.0347
							0.9893						0.0347
12737	327.96	103.71		1.24			0.9893	1.41	-0.35	0.32	30922.09	0.0082	0.0347
							0.9893						0.0347
							0.9893						0.0347
							0.9801						0.0347

FDR Reference Subframe (Seconds)	CAS (knots)	Magnetic Heading (deg)	EPR1	EPR2	EPR3	EPR4	Normal Accel (g's)	Pitch (deg)	Roll (deg)	Control Column Pos (deg)	Pressure Altitude (feet)	Lateral Accel (g's)	Longitudinal Accel (g's)
12738	327.96	103.71			1.24		0.9801	1.05	-0.35	0.38	30922.09	0.0082	0.0347
							0.9801						0.0347
							0.9893						0.0326
12739	327.96	103.71				1.22	0.9801	1.41	-0.35	0.35	30924.53	0.0097	0.0347
							0.9801						0.0347
							0.9801						0.0347
							0.9801						0.0347
12740	327.35	103.71	1.23				0.9801	1.41	0.00	0.38	30924.53	0.0071	0.0347
							0.9801						0.0347
							0.9801						0.0347
12741	326.86	103.71		1.24			0.9801	1.41	0.00	0.38	30922.09	0.0087	0.0347
							0.9801						0.0347
							0.9801						0.0347
							0.9710						0.0347
12742	326.62	103.71			1.25		0.9710	1.05	-0.35	0.38	30920.87	0.0097	0.0367
							0.9710						0.0347
							0.9801						0.0347
12743	326.74	103.71				1.22	0.9710	1.05	-0.35	0.38	30923.31	0.0082	0.0347
							0.9801						0.0347
							0.9801						0.0347
							0.9801						0.0347
12744	326.74	103.71	1.23				0.9801	1.41	0.00	0.38	30924.53	0.0082	0.0347
							0.9801						0.0347
							0.9801						0.0347
12745	326.74	103.71		1.24			0.9801	1.05	0.00	0.35	30923.31	0.0097	0.0347
							0.9801						0.0347
							0.9893						0.0347
							0.9801						0.0367
12746	326.86	103.71			1.25		0.9801	1.05	0.00	0.35	30920.87	0.0076	0.0367
							0.9893						0.0347
							0.9893						0.0347
12747	326.98	103.71				1.22	0.9893	1.41	0.00	0.38	30918.42	0.0066	0.0347
							0.9893						0.0367
							0.9984						0.0367
							0.9984						0.0367
12748	326.74	103.71	1.23				0.9893	1.41	-0.35	0.38	30914.76	0.0071	0.0367
							0.9893						0.0347
							0.9984						0.0347
12749	326.74	103.71		1.24			0.9984						0.0367
							0.9893	1.41	-0.35	0.35	30913.54	0.0051	0.0367
							0.9984						0.0367
							0.9984						0.0367
							0.9984						0.0347
12750	326.74	103.71			1.24		0.9984	1.41	-0.35	0.38	30911.11	0.0092	0.0347
							0.9893						0.0347
							0.9984						0.0367
12751	326.62	103.71				1.22	0.9893						0.0367
							0.9893	1.41	-0.35	0.35	30911.10	0.0102	0.0367
							0.9893						0.0347
							0.9893						0.0347
							0.9893						0.0367
12752	326.01	103.71	1.23				0.9893	1.41	0.00	0.38	30911.10	0.0102	0.0367
							0.9984						0.0367
							0.9893						0.0388
12753	326.25	103.71		1.23			0.9801						0.0388
							0.9801	1.41	0.00	0.38	30909.87	0.0056	0.0367
							0.9801						0.0347
							0.9801						0.0347
							0.9801						0.0367
12754	325.64	103.71			1.25		0.9801	1.41	0.00	0.38	30909.87	0.0092	0.0367
							0.9801						0.0367
							0.9801						0.0367
12755	325.03	103.71				1.22	0.9801						0.0367
							0.9801	1.41	-0.35	0.35	30906.21	0.0143	0.0367
							0.9893						0.0388
							0.9893						0.0367
							0.9893						0.0388
12756	324.42	103.71	1.23				0.9893	1.41	0.35	0.41	30902.55	0.0092	0.0388
							0.9893						0.0388
							0.9984						0.0408
12757	323.57	103.36		1.23			1.0076						0.0388
							1.0076	1.76	0.35	0.41	30895.22	0.0020	0.0388
							1.0168						0.0408
							1.0351						0.0408
							1.0351						0.0408
12758	324.18	103.36			1.24		1.0351	1.76	-0.35	0.35	30887.89	0.0036	0.0408
							1.0351						0.0408
							1.0442						0.0408
							1.0351						0.0408
12759	324.91	103.36				1.21	1.0259	1.76	-0.35	0.35	30887.89	0.0025	0.0388
							1.0259						0.0388
							1.0259						0.0388
							1.0168						0.0388
12760	325.89	103.36	1.23				1.0076	1.76	-0.35	0.38	30894.30	0.0020	0.0367
							1.0076						0.0367
							1.0076						0.0367
12761	326.01	103.36		1.23			0.9984						0.0367
							0.9893	1.41	-0.35	0.35	30901.32	0.0087	0.0367
							0.9801						0.0367
							0.9801						0.0347
							0.9710						0.0347
12762	326.13	103.71			1.24		0.9618	1.41	-0.35	0.35	30907.43	0.0148	0.0347
							0.9618						0.0326
							0.9618						0.0347
12763	326.01	103.71				1.21	0.9618						0.0347
							0.9710	1.41	0.00	0.32	30918.42	0.0082	0.0347
							0.9618						0.0347
							0.9618						0.0347
							0.9618						0.0347
12764	324.66	103.71	1.23				0.9618	1.41	0.00	0.35	30919.64	0.0127	0.0347
							0.9526						0.0367
							0.9618						0.0367
							0.9526						0.0388
12765	321.61	103.71		1.24			0.9526	1.76	0.00	0.38	30912.32	0.0127	0.0367
							0.9526						0.0388
							0.9526						0.0367
							0.9526						0.0388
							0.9526						0.0388

FDR Reference Subframe (Seconds)	CAS (knots)	Magnetic Heading (deg)	EPR1	EPR2	EPR3	EPR4	Normal Accel (g's)	Pitch (deg)	Roll (deg)	Control Column Pos (deg)	Pressure Altitude (feet)	Lateral Accel (g s)	Longitudinal Accel (g's)
12766	318.44	103.36			1.24		0.9710	1.76	0.35	0.45	30898.88	0.0046	0.0408
							0.9801						0.0408
							0.9984						0.0428
12767	318.31	103.36				1.22	1.0076						0.0428
							1.0076	1.76	0.00	0.45	30892.78	0.0051	0.0428
							1.0259						0.0428
							1.0351						0.0428
							1.0351						0.0428
12768	320.51	103.36	1.23				1.0351	1.76	-0.35	0.48	30887.89	0.0087	0.0428
							1.0442						0.0449
							1.0442						0.0428
12769	323.08	103.36		1.23			1.0442						0.0428
							1.0351	1.76	0.00	0.35	30901.32	-0.0020	0.0388
							1.0351						0.0388
							1.0259						0.0388
							1.0076						0.0389
12770	324.66	103.36			1.24		0.9893	1.41	-0.35	0.38	30907.43	0.0071	0.0388
							0.9801						0.0367
							0.9801						0.0367
12771	324.91	103.71				1.21	0.9710						0.0347
							0.9618	1.41	-0.35	0.35	30917.20	0.0153	0.0347
							0.9526						0.0347
							0.9526						0.0347
							0.9526						0.0347
12772	324.79	103.71	1.23				0.9526	1.41	0.35	0.38	30931.64	0.0102	0.0347
							0.9526						0.0347
							0.9526						0.0347
12773	324.54	103.71		1.23			0.9526						0.0347
							0.9526	1.41	0.35	0.38	30936.74	0.0082	0.0347
							0.9526						0.0347
							0.9526						0.0347
							0.9526						0.0367
12774	324.18	103.36			1.24		0.9526	1.41	0.00	0.38	30936.74	0.0082	0.0347
							0.9526						0.0367
							0.9526						0.0367
12775	321.86	103.36				1.22	0.9526						0.0367
							0.9526	1.41	0.00	0.38	30933.08	0.0117	0.0367
							0.9526						0.0388
							0.9618						0.0389
							0.9618						0.0388
12776	320.27	103.36	1.23				0.9618	1.41	0.35	0.38	30923.87	0.0036	0.0388
							0.9710						0.0408
							0.9893						0.0408
12777	320.27	103.36		1.23			0.9984						0.0408
							0.9984	1.41	0.00	0.38	30915.98	0.0036	0.0408
							1.0168						0.0428
							1.0168						0.0408
							1.0168						0.0428
12778	320.76	103.36			1.24		1.0076	1.41	-0.35	0.45	30911.10	0.0061	0.0408
							1.0076						0.0408
							1.0168						0.0408
12779	322.95	103.36				1.21	1.0168						0.0408
							1.0168	1.41	-0.35	0.32	30914.76	0.0025	0.0408
							1.0168						0.0408
							1.0168						0.0389
							1.0076						0.0389
12780	323.20	103.36	1.23				0.9893	1.41	-0.35	0.32	30914.76	0.0082	0.0388
							0.9893						0.0388
							0.9801						0.0388
12781	323.20	103.71		1.23			0.9710						0.0389
							0.9710	1.41	-0.35	0.35	30919.64	0.0133	0.0367
							0.9710						0.0367
							0.9710						0.0389
							0.9710						0.0367
12782	323.20	103.71			1.24		0.9710	1.41	0.35	0.38	30925.75	0.0133	0.0367
							0.9710						0.0388
							0.9710						0.0367
12783	322.95	103.71				1.21	0.9710						0.0388
							0.9801	1.41	0.35	0.32	30925.75	0.0066	0.0367
							0.9801						0.0388
							0.9801						0.0389
							0.9801						0.0388
12784	322.83	103.36	1.23				0.9801	1.41	0.00	0.32	30924.53	0.0051	0.0389
							0.9893						0.0388
							0.9893						0.0388
12785	322.34	103.36		1.23			0.9801						0.0388
							0.9801	1.41	-0.35	0.32	30922.09	0.0107	0.0389
							0.9801						0.0388
							0.9801						0.0408
							0.9801						0.0408
12786	320.76	103.36			1.24		0.9801	1.41	0.00	0.38	30912.32	0.0092	0.0408
							0.9801						0.0408
							0.9893						0.0408
12787	319.78	103.36				1.22	0.9984						0.0408
							0.9984	1.76	0.00	0.35	30909.87	0.0066	0.0408
							1.0076						0.0408
							1.0076						0.0428
							1.0076						0.0428
12788	319.66	103.36	1.23				1.0168	1.76	0.00	0.41	30903.77	0.0076	0.0428
							1.0168						0.0428
							1.0168						0.0428
12789	320.51	103.36		1.23			1.0168						0.0428
							1.0168	1.76	-0.35	0.38	30903.77	0.0066	0.0408
							1.0168						0.0428
							1.0076						0.0408
							1.0076						0.0408
12790	321.37	103.36			1.24		1.0076	1.76	0.00	0.32	30907.43	0.0046	0.0408
							0.9984						0.0408
							0.9984						0.0408
12791	321.86	103.36				1.22	0.9984						0.0408
							0.9893	1.41	0.00	0.32	30912.32	0.0097	0.0408
							0.9893						0.0408
							0.9801						0.0408
							0.9710						0.0388
12792	320.51	103.36	1.23				0.9618	1.41	0.00	0.32	30913.54	0.0117	0.0388
							0.9618						0.0388
							0.9618						0.0388
12793	319.90	103.36		1.23			0.9618						0.0388
							0.9618	1.41	0.00	0.38	30914.76	0.0076	0.0388
							0.9710						0.0408
							0.9710						0.0408
							0.9801						0.0408

FDR Reference Subframe (Seconds)	CAS (knots)	Magnetic Heading (deg)	EPR1	EPR2	EPR3	EPR4	Normal Accel (g's)	Pitch (deg)	Roll (deg)	Control Column Pos (deg)	Pressure Altitude (feet)	Lateral Accel (g's)	Longitudinal Accel (g's)
12794	319.54	103.36			1.24		0.9801	1.41	0.00	0.35	30915.98	0.0056	0.0408
							0.9801						0.0408
							0.9801						0.0408
							0.9710						0.0408
12795	318.93	103.36				1.22	0.9710	1.41	-0.35	0.38	30909.87	0.0087	0.0408
							0.9710						0.0408
							0.9801						0.0408
							0.9801						0.0408
12796	318.44	103.36	1.23				0.9801	1.41	0.00	0.38	30909.87	0.0097	0.0408
							0.9893						0.0408
							0.9984						0.0408
							0.9893						0.0408
12797	318.68	103.36		1.23			0.9893	1.41	0.35	0.38	30909.87	0.0076	0.0408
							0.9893						0.0428
							0.9984						0.0408
							0.9984						0.0428
12798	319.05	103.36			1.24		0.9984	1.76	0.00	0.35	30907.43	0.0051	0.0428
							1.0076						0.0428
							1.0076						0.0428
							1.0076						0.0428
12799	319.78	103.36				1.22	0.9984	1.76	-0.35	0.35	30907.43	0.0061	0.0408
							0.9984						0.0408
							0.9984						0.0408
							0.9893						0.0408
12800	320.15	103.36	1.23				0.9893	1.76	-0.35	0.32	30908.65	0.0092	0.0408
							0.9801						0.0408
							0.9801						0.0408
							0.9710						0.0408
12801	319.54	103.36		1.23			0.9710	1.41	-0.35	0.35	30911.10	0.0107	0.0408
							0.9710						0.0408
							0.9710						0.0408
							0.9710						0.0408
12802	318.19	103.36			1.24		0.9618	1.76	0.00	0.35	30909.87	0.0076	0.0408
							0.9618						0.0408
							0.9710						0.0408
							0.9710						0.0408
12803	316.24	103.36				1.22	0.9710	1.76	0.00	0.35	30912.32	0.0076	0.0428
							0.9801						0.0428
							0.9801						0.0428
							0.9801						0.0428
12804	315.63	103.36	1.23				0.9710	1.41	-0.35	0.48	30904.99	0.0082	0.0428
							0.9801						0.0428
							0.9801						0.0408
							0.9801						0.0428
12805	315.99	103.36		1.22			0.9893	1.41	0.00	0.51	30904.99	0.0112	0.0428
							0.9984						0.0428
							1.0076						0.0428
							1.0076						0.0449
12806	315.51	103.36			1.24		1.0076	1.76	0.00	0.48	30901.32	0.0076	0.0449
							1.0076						0.0449
							1.0168						0.0449
							1.0168						0.0449
12807	317.09	103.36				1.22	1.0168	1.76	0.00	0.51	30898.65	0.0082	0.0449
							1.0259						0.0449
							1.0351						0.0449
							1.0351						0.0428
12808	318.93	103.36	1.22				1.0351	1.76	0.00	0.48	30895.65	0.0092	0.0449
							1.0259						0.0428
							1.0259						0.0428
							1.0168						0.0428
12809	319.05	103.01		1.23			1.0168	1.76	-0.35	0.48	30895.22	0.0097	0.0428
							1.0168						0.0428
							1.0168						0.0428
							1.0076						0.0428
12810	318.56	103.01			1.23		0.9984	1.76	0.00	0.41	30895.22	0.0076	0.0428
							0.9984						0.0428
							0.9893						0.0428
							0.9801						0.0428
12811	315.75	103.01				1.22	0.9618	1.76	0.00	0.32	30902.65	0.0071	0.0428
							0.9618						0.0408
							0.9618						0.0408
							0.9710						0.0408
12812	315.75	103.01	1.22				0.9710	1.76	-0.35	0.35	30904.99	0.0082	0.0408
							0.9618						0.0408
							0.9710						0.0408
							0.9618						0.0408
12813	315.87	103.01		1.22			0.9710	1.76	-0.35	0.45	30909.87	0.0122	0.0408
							0.9710						0.0428
							0.9801						0.0408
							0.9801						0.0428
12814	315.51	103.36			1.23		0.9801	1.76	-0.35	0.51	30911.10	0.0102	0.0408
							0.9893						0.0428
							0.9893						0.0428
							0.9893						0.0428
12815	315.02	103.36				1.22	0.9893	1.76	0.00	0.48	30911.10	0.0076	0.0428
							0.9984						0.0428
							0.9984						0.0428
							0.9984						0.0449
12816	315.87	103.36	1.22				1.0076	1.76	-0.35	0.48	30909.87	0.0071	0.0428
							1.0076						0.0449
							1.0168						0.0428
							1.0076						0.0428
12817	317.46	103.36		1.22			1.0076	1.76	-0.35	0.45	30912.32	0.0092	0.0428
							1.0076						0.0428
							1.0076						0.0428
							0.9893						0.0428
12818	317.39	103.36			1.23		0.9801	1.76	-0.35	0.38	30914.76	0.0102	0.0428
							0.9801						0.0408
							0.9801						0.0408
							0.9801						0.0428
12819	315.75	103.01				1.22	0.9801	1.76	-0.35	0.38	30918.42	0.0076	0.0428
							0.9801						0.0428
							0.9801						0.0428
							0.9801						0.0428
12820	315.02	103.01	1.23				0.9710	1.76	-0.35	0.45	30917.20	0.0076	0.0428
							0.9710						0.0428
							0.9801						0.0428
							0.9710						0.0428
12821	314.77	103.01		1.23			0.9801	1.76	-0.35	0.45	30919.64	0.0076	0.0428
							0.9801						0.0428
							0.9801						0.0428
							0.9801						0.0428

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							1.1473						0.0408
							1.1267						0.0408