

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

June 27, 2006

Flight Data Recorder - 10

Specialist's Factual Report

By Sarah McComb

A. EVENT

Location: Philadelphia, Pennsylvania
Date: February 8, 2006, 01:07 EST
Aircraft: DC-8-71, N748UP
Operator: UPS
NTSB Number: DCA06MA022

B. GROUP

A group was not convened.

C. SUMMARY

On February 8, 2006 at about 0107 Eastern Standard Time (EST), a United Parcel Service DC-8 registration N748UP, landed at Philadelphia International Airport (PHL), Philadelphia, Pennsylvania after declaring an emergency due to smoke in the cockpit. The airplane was immediately engulfed in fire and the 3 flightcrew evacuated the airplane via the cockpit window and L1 door slide. The flightcrew was not injured and the airplane was destroyed. The flight was being operated under Part 121 as a supplemental cargo flight and was enroute from Atlanta Hartsfield-Jackson International Airport (ATL). A flight data recorder (FDR) was sent to the National Transportation Safety Board's Vehicle Recorder Laboratory for readout.

D. DETAILS OF INVESTIGATION

On February 8, 2006, the Safety Board's Vehicle Recorder Division received the following FDR:

Recorder Manufacturer/Model: **L-3 Communications Fairchild Model F1000, 64 Word**
Recorder Serial Number: **00224**

Examination of the FDR revealed exterior smoke and heat damage (Figure 1). However, the internal components were not damaged. The FDR memory was connected to the laboratory's F1000 chassis to download the data (Figure 2).



Figure 1

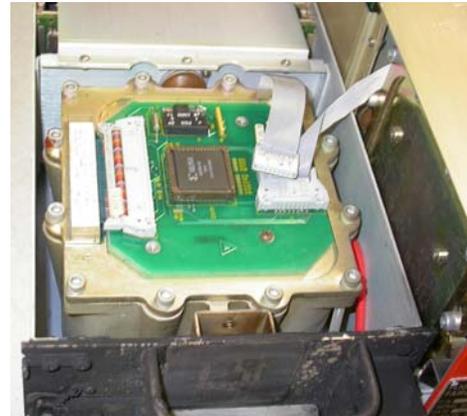


Figure 2

Recorder Description

This model FDR records airplane flight information in a digital format using solid-state flash memory as the recording medium. The F1000 can receive data in the ARINC 573/717/747/542a configurations and can record a minimum of 25 hours of flight data. It is configured to record 64 12-bit words of digital information every second. Each grouping of 64 words (each second) is called a subframe. Each subframe has a unique 12-bit synchronization (sync) word identifying it as either subframe 1, 2, 3, or 4. The sync word is the first word in each subframe. The data stream is "in sync" when successive sync words appear at proper 64-word intervals. Each data parameter (e.g. altitude, heading, airspeed) has a specifically assigned word number within the subframe. The F1000 is designed to meet the crash-survivability requirements of TSO-C124.

FDR Carriage Requirements

Federal regulations regarding the carriage requirements of FDRs on aircraft can be found in the following regulations: 14 CFR 121.343, 14 CFR 121.344, 14 CFR 121.344a and 14 CFR 135.152. In general, for turbine-powered transport category aircraft manufactured on or before October 11, 1991, an FDR must be installed on board that records a minimum of 18 parameters (17 parameters for aircraft with more than 2 engines), and for those turbine-powered aircraft that seat between 10 and 19 passengers, the minimum is 22 parameters. Newly manufactured aircraft are required to be equipped with an FDR that records a minimum of 88 parameters. Specifically, the accident aircraft, N748UP, was operating such that it was required to be equipped with an FDR that recorded 17 parameters, as cited in 14 CFR 121.344. The accident aircraft was in compliance with the Federal FDR carriage requirements.

Recording Description

The FDR recording contained approximately 94 hours of data. Timing of the FDR data is to the nearest second and referred to as FDR subframe reference number (SRN¹). The accident flight was the last flight of the recording and its duration was approximately 1 hour and 18 minutes.

Time Correlation

Correlation of the FDR data from SRN to the accident local time was established with an offset provided by the CVR Group Chairman in the Factual Report of Investigation Cockpit Voice Recorder. The accident flight data has been offset from SRN to local EST, by the following: $SRN - 253053 = EST$.

Engineering Units Conversions

The engineering units conversions used for the data contained in this report are based on documentation from the operator. Where applicable, changes to the conversions have been made to ensure the parameters conform to the Safety Board's standard sign convention, of climbing right turns are positive (CRT=+)². The parameters presented in this report decoded as expected.

Pressure Altitude

This FDR records the parameter "Altitude" as "Pressure Altitude," which is based on a standard altimeter setting of 29.92 inches of mercury (in Hg). The "Pressure Altitude" information presented in the FDR plots and in the electronic data have not been corrected for the local altimeter setting at the time of the incident.

Plots

The following plots, Plots 1 through 2, contain information describing the flight on February 8, 2006, during which the subject event occurred. Plot 1 covers approximately the last 3.5 minutes of the recording, from 23:56:20 to 24:00:00 EST. Plot 2 covers approximately the last 30 minutes of the recording, from 22:30:00 to 24:00:00 EST, and includes the descent from cruise altitude.

The data indicate:

¹ Duration of FDR recording was measured in subframe reference number (SRN), where each SRN equals one elapsed second.

² CRT=+ means that for any parameter recorded that indicates a climb or a right turn, the sign for that value is positive. Also, any parameter recorded that is indicating an action or deflection, if it induces a climb or right turn, the value is positive. Examples: Right Roll = +, Left Aileron Trailing Edge Down = +, Right Aileron Trailing Edge Up = +, Pitch Up = +, Elevator Trailing Edge Up = +.

- Autopilot appears to be disconnected at 23:55:41 (3 min. 17 sec. prior to touchdown) at an altitude of 1858'.
- The only parameters that appear to work throughout the recording are vertical acceleration, longitudinal acceleration, heading, keying, and autopilot.
- Based on vertical acceleration, touchdown occurs at 23:58:58. The end of the recording is at 23:59:42, with bad data recorded in the last second.

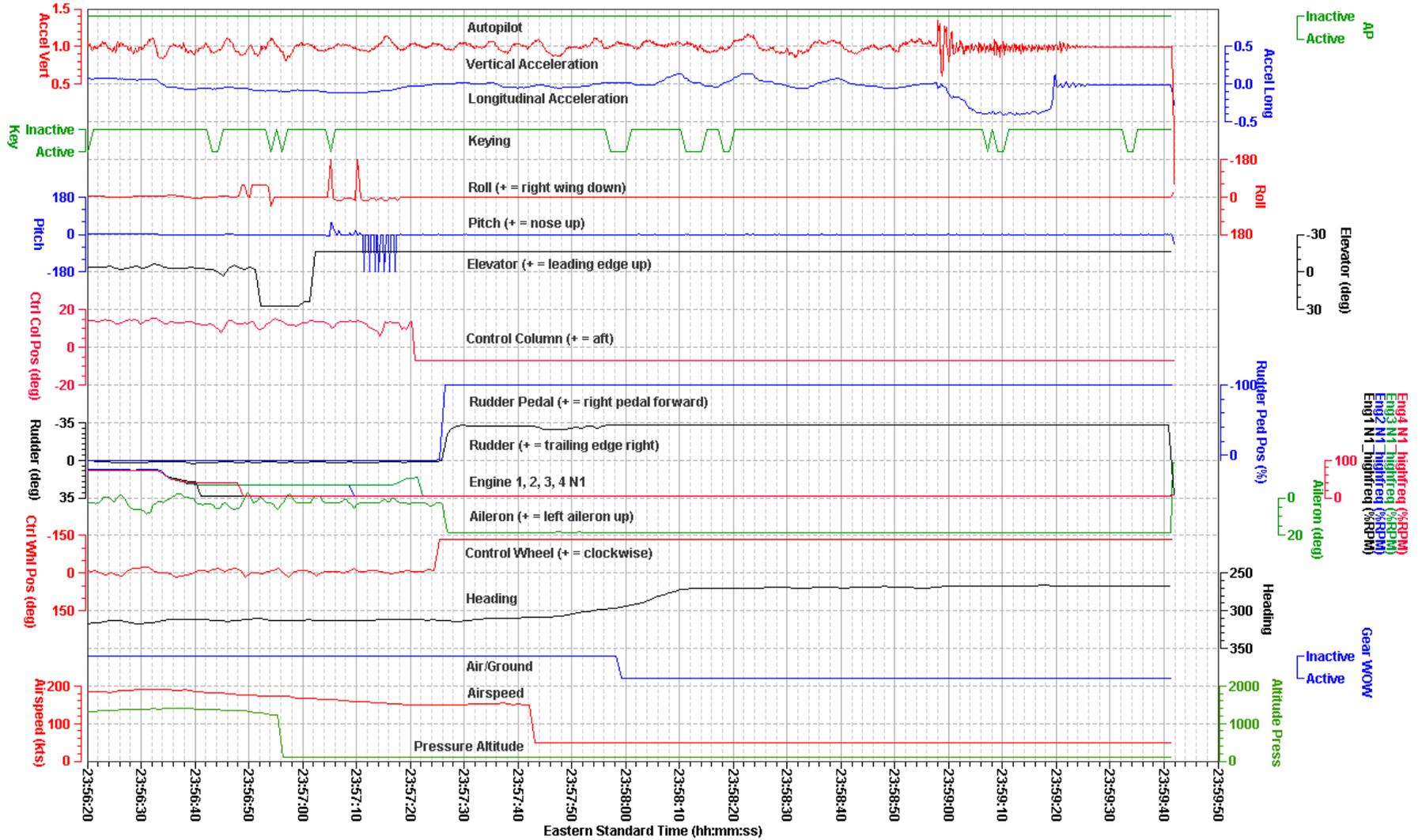
Below is a table summarizing when bad data begins to be recorded for individual parameters and the time relative to touchdown.

Parameter(s)	Time (EST - hh:mm:ss)	Time Prior to Touchdown (m:ss)
Eng 1 N1	23:56:41	2:17
Roll Eng 4 N1	23:56:48	2:10
Elevator	23:56:52	2:06
Altitude	23:56:56	2:02
Pitch	23:57:05	1:53
Eng 2 N1	23:57:09	1:49
Control Column	23:57:20	1:38
Eng 3 N1	23:57:22	1:36
Control Wheel	23:57:25	1:33
Rudder Pedal Rudder Aileron	23:57:26	1:32
Airspeed	23:57:43	1:15
Air/Ground	23:57:59	0:59

UPS, DC-8-71, N748UP

Location, Date: Philadelphia, PA, 02/08/06

NTSB No. DCA06MA022



Revised: 27 June 2006

Plot 1: Last 3.5 minutes

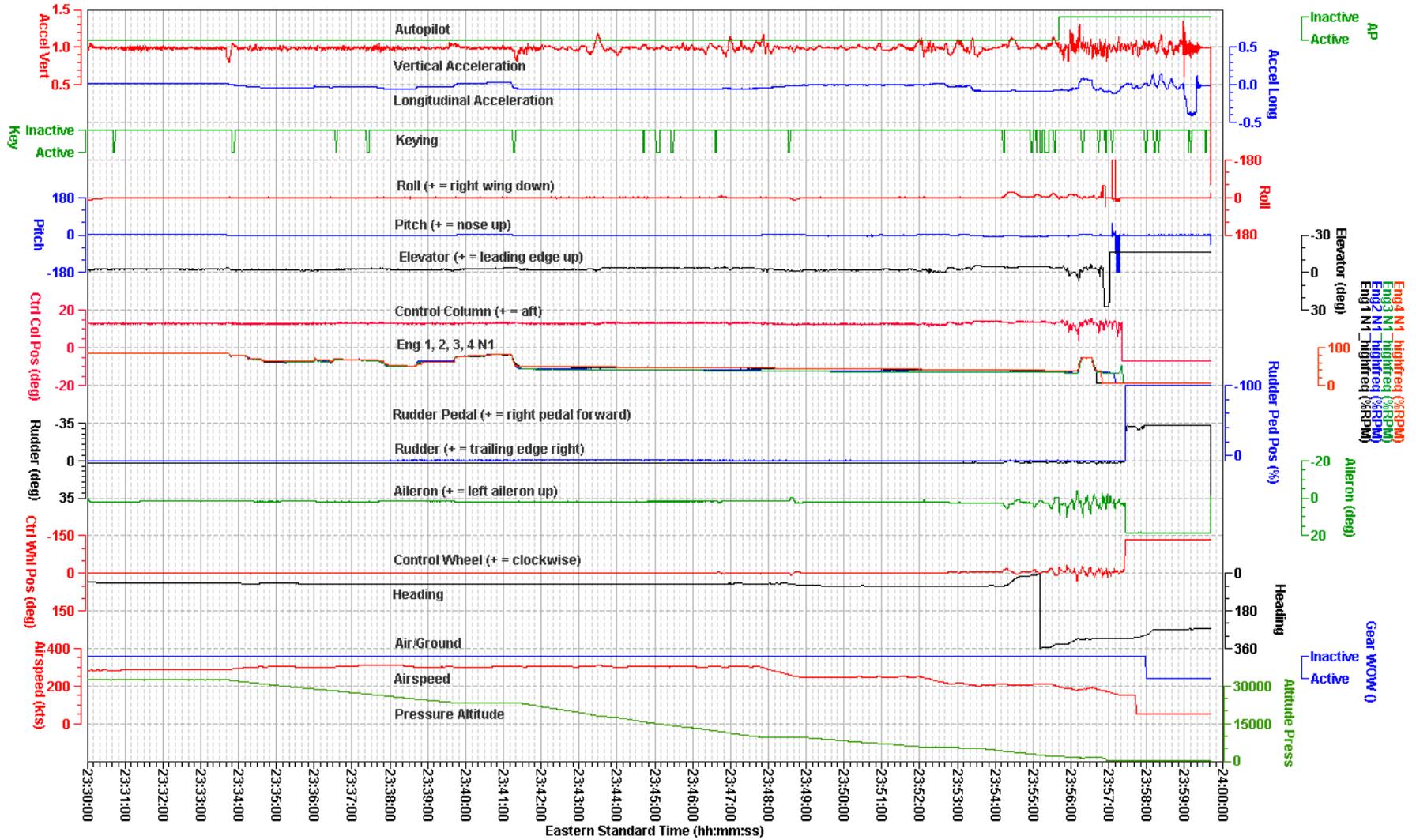
National Transportation Safety Board

Factual Report Plot 1

UPS, DC-8-71, N748UP

Location, Date: Philadelphia, PA, 02/08/06

NTSB No. DCA06MA022



Revised: 27 June 2006

Plot 2: Last 30 minutes

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Factual Report Plot 2

Tabular Data

A tabular listing of the data used to create Plots 1 through 2 can be found as Attachment 1 to this report. The bad data in the last second of the recording is indicated by “*”. Attachment 1 is a comma separated value (.CSV) format file and is only available in electronic format.

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Vehicle Recorder Division