

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, D.C. 20594

August 6, 2015

Flight Data Recorder

Specialist's Factual Report By Erin Gormley

1. EVENT SUMMARY

Location: Atlanta, Georgia
Date: January 10, 2014
Aircraft: Boeing 757-200
Registration: N687DL
Operator: Delta Air Lines
NTSB Number: DCA14CA036

On January 10, 2014, at 0646 local time, a Boeing 757-200, registration N687DL, operated by Delta Air Lines as flight 732 from Jacksonville International Airport (JAX), Jacksonville, Florida to Hartsfield – Jackson Atlanta International Airport (ATL), Atlanta, Georgia, encountered turbulence during descent into ATL. During the encounter, a flight attendant was seriously injured. The aircraft was being operated under the provisions of Title 14 *Code of Federal Regulations* Part 121 as a regularly scheduled domestic passenger flight. There were no injuries to the other 6 crewmembers or the 134 passengers and the aircraft was not damaged.

2. FLIGHT DATA RECORDER GROUP

A flight data recorder (FDR) group was not convened.

3. FDR CARRIAGE REQUIREMENTS

The event aircraft, N687DL, was manufactured in 1998, and was operating such that it was required to be equipped with an FDR that recorded, at a minimum, 34 parameters, as cited in 14 CFR Part 121.344.

4. DETAILS OF FDR INVESTIGATION

The National Transportation Safety Board Vehicle Recorder Division received an electronic file containing the FDR data from the event aircraft.

4.1. FDR Data File 64 wps Description

The FDR data in the electronic file was configured such that 64 12-bit words of digital information every second was recorded. Each grouping of 64 words (each second) is called a subframe. Each subframe has a unique 12-bit synchronization (sync) word identifying it as 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 (for example, pressure altitude, magnetic heading, vertical acceleration) has a specifically assigned word number within the subframe.

4.1.1. Recording Description

The FDR recording contained approximately 57 hours of data. Timing of the FDR data is measured in subframe reference number (SRN), where each SRN equals one elapsed second. The duration of the event flight was approximately 46 minutes and there were 4 additional flights recorded afterwards. The parameters evaluated for the purpose of this report appeared to be in accordance with the federal FDR carriage requirements.

4.1.2. Engineering Units Conversions

The engineering units conversions used for the data contained in this report are based on documentation from the aircraft manufacturer. Where applicable, the conversions have been changed to ensure that the parameters conform to the NTSB's standard sign convention that climbing right turns are positive (CRT=+).¹

Table A-1 lists the FDR parameters verified and provided in this report. Additionally, table A-2 describes the unit abbreviations used in this report.

4.2. Time Correlation

Correlation of the FDR data from SRN to the event local time, eastern standard time (EST), was established by using the recorded Time GMT² Hours, Time GMT Minutes, and Time GMT Seconds and then applying an additional -4 hours offset to change GMT to EST.

Accordingly, the time offset for the event flight data from SRN to local time is the following: EST = SRN – 158,685. Therefore, for the rest of this report, all times are referenced as EST.

4.3. FDR Plots and Corresponding Tabular Data

Figure 1 contains FDR data recorded during the entire event flight. The time covered is from 06:19:00 EST to 07:09:00 EST. All the parameters listed in table A-1 are plotted except Time GMT Hours, Time GMT Minutes, and Time GMT Seconds. Figure 1 is configured such that right turns are indicated by the trace moving toward the bottom of the page, left turns towards the top of the page, and nose up attitudes towards the top of the page.

In brief, the FDR data indicated the aircraft took off at 06:20 EST and climbed to a cruising pressure altitude of about 29,000 feet. The pressure altitude decreased to 28,000 feet about 3 minutes before beginning a gradual descent at 06:41 EST. Over the next few minutes there were some perturbations in the acceleration parameters. At 06:46:33 EST, there was a more pronounced set of fluctuations in the acceleration parameters which

¹ CRT=+ means that for any parameter recorded that indicates a climb or a right turn, the sign for that value is positive. Also, for any parameter recorded that indicates an action or deflection, if it induces a climb or right turn, the value is positive. Examples: Right Roll = +, Pitch Up = +, Elevator Trailing Edge Up = +, Right Rudder = +.

² GMT is Greenwich Mean Time which is also known as Coordinated Universal Time (UTC).

lasted about 10 seconds. The lateral acceleration during this time went from 0.18 g's to -0.12 g within 1 second and the vertical acceleration hit a peak of 1.67 g's and a low of 0.51 g's in just over a second. There was also a slight roll excursion during this period from about +2.5 degrees right to -6.7 degrees left. The aircraft continued to descend and landed at 07:06 EST.

The corresponding tabular data used to create figure 1 are provided in electronic comma separated value (*.csv) format as attachment 1 to this report.

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Delta Air Lines, Boeing B757-200, N687DL

Location, Date: Atlanta, Georgia, 01/10/14

NTSB No. DCA14CA036

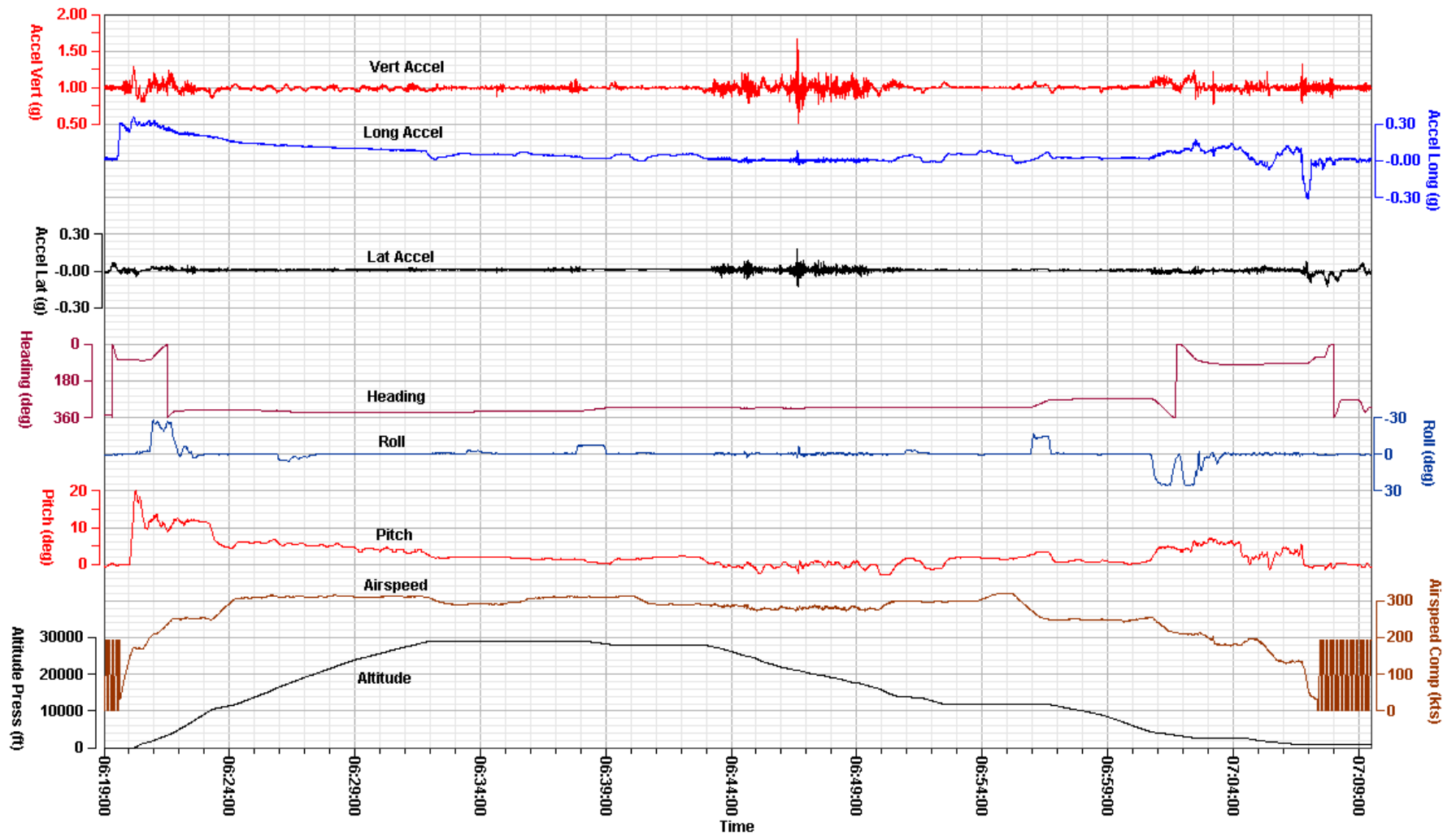


Figure 1. Plot of basic parameters during entire flight.

APPENDIX A

This appendix describes the parameters provided and verified in this report. Table A-1 lists the parameters and table A-2 describes the unit abbreviations used in this report.

Table A-1. Verified and provided FDR parameters.

Parameter Name	Parameter Description
1. Accel Lat (g)	Lateral Acceleration
2. Accel Long (g)	Longitudinal Acceleration
3. Accel Vert (g)	Vertical Acceleration
4. Airspeed Ind (kts)	Indicated Airspeed
5. Altitude Press (ft)	Pressure Altitude
6. Heading Mag (deg)	Magnetic Heading
7. Pitch (deg)	Pitch Angle
8. Roll (deg)	Roll Angle
9. GMT Time Hrs	GMT Time Hours
10. GMT Time Min	GMT Time Minutes
11. GMT Time Sec	GMT Time Seconds

NOTE: This FDR records 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 has not been corrected for the local altimeter setting at the time of the event.

Table A-2. Unit abbreviations.

Units Abbreviation	Description
deg	degrees
ft	feet
g	g
hrs	hours
kts	knots
min	minutes
sec	seconds

NOTE: For parameters with a unit description of discrete, a discrete is typically a 1-bit parameter that is either a 0 state or a 1 state where each state is uniquely defined for each parameter.