

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

September 23, 2011

Flight Data Recorder - 10

Engineering Technician Factual Report

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1. EVENT SUMMARY

Location: Longview TX
Date: June 28, 2010
Aircraft: EMB-145
Registration: N601DW
Operator: American Eagle
NTSB Number: CEN10LA363

On June 28, 2010, approximately 1800 central daylight time, N601DW, an Embraer EMB-145, d/b/a American Eagle flight 3224, encountered severe turbulence while in cruise flight at 36,000 feet approximately 10 miles east of Shreveport, Louisiana. The captain declared an emergency and landed without incident at East Texas Regional Airport (GGG), Longview, Texas, at 1824. The airline transport rated captain and the commercial rated first officer were not injured. The one flight attendant was seriously injured and, of the 42 passengers on board; one was seriously injured and three sustained minor injuries. The airplane was not damaged. The airplane was registered to and operated by American Eagle Airlines, Incorporated in Fort Worth, Texas. An instrument flight rules (IFR) flight plan was filed for the flight that departed Piedmont Triad International Airport (GSO), Greensboro, North Carolina at 1605 and was destined for Dallas/Fort Worth International Airport (DFW) in Dallas-Fort Worth, Texas. Instrument meteorological conditions prevailed for the scheduled passenger flight conducted under 14 Code of Federal Regulations Part 121.

2. FLIGHT DATA RECORDER GROUP

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

3. FDR Carriage Requirements

The event aircraft, N601DW, was manufactured on May 11, 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 121.344.

4. DETAILS OF FLIGHT DATA RECORDER INVESTIGATION

The Safety Board's Vehicle Recorder Division received the following FDR:

Recorder Manufacturer/Model: **Honeywell SSFDR, Model 980-4700, 256 Word**
Recorder Serial Number: **10453**

4.1. Honeywell SSFDR, Model 980-4700, 256 Word Description

The Honeywell Solid State Flight Data Recorder (SSFDR) records airplane flight information in a digital format using solid-state flash memory as the recording medium. The SSFDR can receive data in the ARINC 573/717/747 configurations and can record a minimum of 25 hours of flight data. It is configured to record 256 12-bit words of digital information every second. Each grouping of 256 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 256-word intervals. Each data parameter (e.g. altitude, heading, airspeed) has a specifically assigned word number within the subframe. The SSFDR is designed to meet the crash-survivability requirements of TSO-C124.

4.1.1. Recorder Condition

The recorder was in good condition and the data were extracted normally from the recorder.

4.1.2. Recording Description

The FDR recording contained approximately 55 hours of data. Timing of the FDR data is measured in subframe reference number (SRN), where each SRN equals one elapsed second. The event flight was the last flight of the recording and its duration was approximately 2 hours and 21 minutes. The parameters evaluated for the purpose of this report appeared to be in accordance with the federal FDR carriage requirements.

4.1.3. Engineering Units Conversions

The engineering units conversions used for the data contained in this report are based on documentation from Embraer. 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

Appendix A lists the FDR parameters verified and provided in this report.

4.2. FDR Plots and Corresponding Tabular Data

Figures 1 and 2 contain FDR data recorded during the June 28, 2010 event and table A-1 lists all of the parameters plotted. Both figures cover 5 minutes of data during the event from 192,940 SRN to 193,240 SRN.

Figure 1 is a plot of basic FDR parameters. This plot shows that at 193,153 SRN, the autopilot was disengaged while at a pressure altitude of approximately 36,750 feet. The plot also shows that the highest vertical acceleration during the event was approximately 1.7 g at 193,092 SRN and the lowest was approximately -.8 g at 193,091 SRN. Figure 2 is a plot of additional parameters including the flight controls. From figure 2, the master

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 = +.

caution turned on at about 193,090 SRN and remained on for 10 seconds. Additionally, the master warning turned on at about 193,074 SRN and remained on for 6 seconds.

These figures are 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.

The corresponding tabular data used to create figure 1 and 2 are provided in electronic (*.csv²) format as attachment 1 and 2, respectively, to this report.

² Comma Separated Value format.

Figure 1: Plot of basic parameters

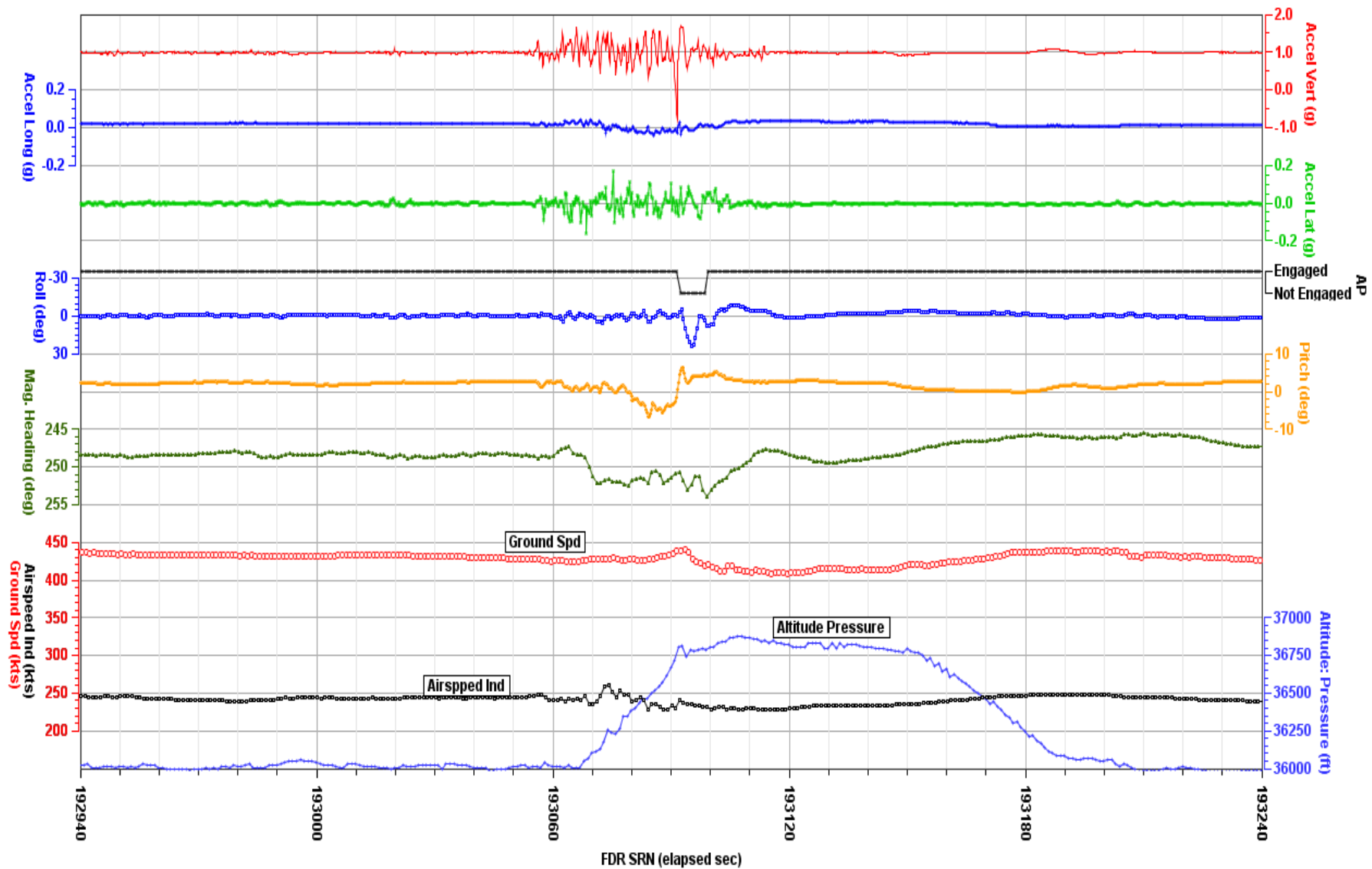
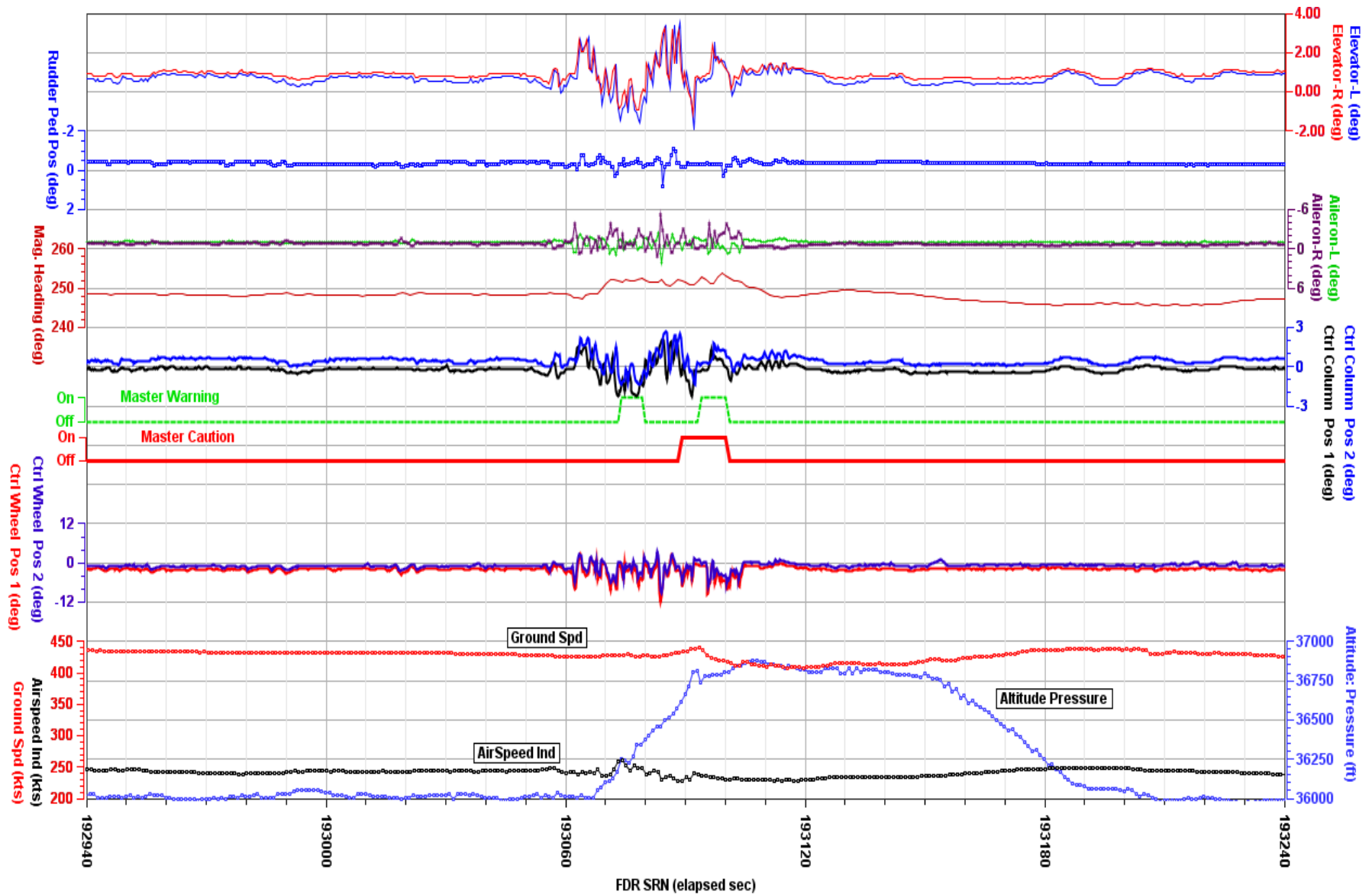


Figure 2: Plot of controls and speed



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. Aileron-L (deg)	Left Aileron Position
5. Aileron-R (deg)	Right Aileron Position
6. Airspeed Ind (kts)	Indicated Airspeed
7. Altitude Press (ft)	Pressure Altitude
8. AP	Autopilot
9. Ctrl Column Pos 1 (deg)	Left Control Column Position
10. Ctrl Column Pos 2 (deg)	Right Control Column Position
11. Ctrl Wheel Pos 1 (deg)	Left Control Wheel Position
12. Ctrl Wheel Pos 2 (deg)	Right Control Wheel Position
13. Elevator-L (deg)	Left Elevator Position
14. Elevator-R (deg)	Right Elevator Position
15. Ground Spd (kts)	Ground Speed
16. Mag. Heading (deg)	Magnetic Heading
17. Master Caution	Master Caution
18. Master Warning	Master Warning
19. Pitch (deg)	Pitch Angle
20. Roll (deg)	Roll Angle
21. Rudder Ped Pos (deg)	Rudder Pedal Position

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
kts	knots
g	g
discrete	discrete
degC	degrees Celsius
in	inches
ft	feet
hrs	hours
min	minutes
sec	seconds
%rpm	percent revolutions per minute

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.