NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, DC 20594

May 9, 2011

Flight Data Recorder - 10

Specialist's Factual Report
By Christopher Babcock

1. EVENT

Location:	Akron, Ohio
Date:	March 18, 2011, 0009 Eastern Daylight Time (EDT)[1]
Aircraft:	Embraer EMB-145, N11187
Operator:	ExpressJet Airlines, Flight 5916
NTSB Number:	CEN11IA234

2. GROUP

A group was not convened.

3. SUMMARY

On March 18, 2011, at approximately 0009 EDT, ExpressJet Airlines flight 5916, an Embraer EMB-145, registration N11187, veered off the left side of runway 23 while landing at the Akron Canton Regional Airport, Akron, OH. The flight was being conducted under 49 Code of Federal Regulations (CFR) Part 121 as a scheduled passenger flight between Chicago, IL, and Akron, OH.

4. DETAILS OF INVESTIGATION

On March 21, 2011, the NTSB Vehicle Recorder Division received the following FDR:

Recorder Manufacturer/Model: Honeywell SSFDR, Model 980-4700
Serial Number: 11303

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

4.1. Recorder Description

The Honeywell Solid State Flight Data Recorder (SSFDR) records airplane information in a digital format using solid-state flash memory as the recording medium.

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[1] All times refer to the local EDT of the incident

The SSFDR can receive data in the ARINC 573/717/747 configurations and records 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 is called a subframe. Each subframe has a unique 12-bit synchronization word identifying it as either subframe 1, 2, 3 or 4. The synchronization 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-C124a.

4.2. FDR Carriage Requirements

Federal regulations regarding the carriage requirements of FDRs on transport category aircraft can be found in 14 CFR Part 121.343 and Part 121.344. The incident aircraft, N11187, was manufactured in 2005 and was required to be equipped with an FDR that recorded, at a minimum, the 88 parameters found in 14 CFR 121.344(f).

4.3. Recording Description

The FDR recording contained approximately 27 hours of data. Timing of the FDR data is measured in subframe reference number (SRN), where each SRN equals one elapsed second. The incident flight was the last flight on the recording and its duration was approximately fifty minutes.

4.4. Time Correlation

The flight data from the event landing was offset from SRN to local EDT using the recorded GMT parameter on the FDR and then adjusting for EDT. The offset from SRN to EDT was accomplished by subtracting 94379 seconds.

4.5. 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, changes to the conversions have been made to ensure the parameters conform to the Safety Board's standard sign convention that climbing right turns are positive (CRT=+).[2] A table of verified and plotted parameters can be found in the Appendix.

The FDR records pressure altitude, which is based on a standard altimeter setting of 29.92 inches of mercury (inHg). The pressure altitude information presented in the FDR plots and electronic data has not been corrected for the local altimeter setting at the time of the event.

4.6. FDR Plot Description

Figure 1 shows basic flight data for the final minute of flight. The aircraft descended through 1700 feet pressure altitude at 0008 EDT while on a magnetic heading of approximately 233º. The Air/Ground Switch moved to 'Grnd' at 00:08:45

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[2] CRT=+ means that for any recorded parameter that indicates a climb or right turn, the sign is positive. Also, for any parameter recorded that indicates an action or deflection, if it induces a climb or right turn, the sign is positive. Examples: right roll=+, right aileron trailing edge up=+, elevator trailing edge up=+.

followed by symmetric spoiler and thrust reverser deployment. The data show activity on the pilot brake pedals began at this time. Four seconds later, at 00:08:49, the copilot's right brake pedal began to show activity. At 00:08:52 recorded magnetic heading began to swing to the left as indicated airspeed fell below 100 knots. At 00:08:53 the rudder reached its maximum deflection of 12.7⁰ right deflection. At 00:08:55, the left and right ailerons reached their maximum deflection of 16.5⁰ TED (trailing edge down) and 24.4⁰ TEU (trailing edge up) respectively. The aircraft came to rest at approximately 00:09:04 on a magnetic heading of 199⁰.

Figures 5-8 show the same parameters plotted for the previous landing for comparison. Timing on these figures is in SRN.
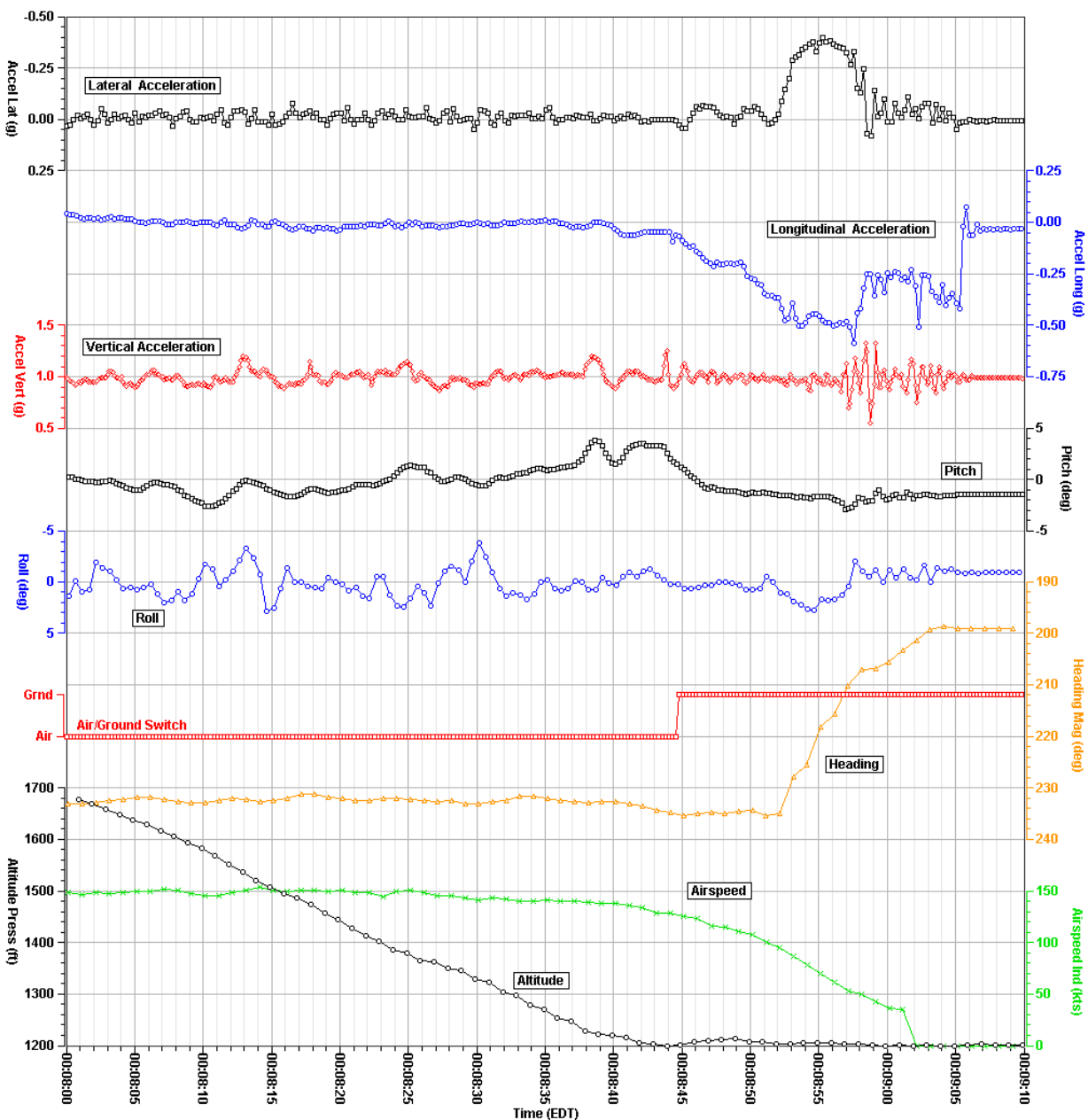
The corresponding tabular data used to create these plots are provided in electronic (.csv) format as attachments to this report.

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Vehicle Recorder Division

ExpressJet, Embraer EMB-145, Flight 5916, N11187

Revised: 15 September 2011   Basic Parameters - Accident Approach   National Transportation Safety Board
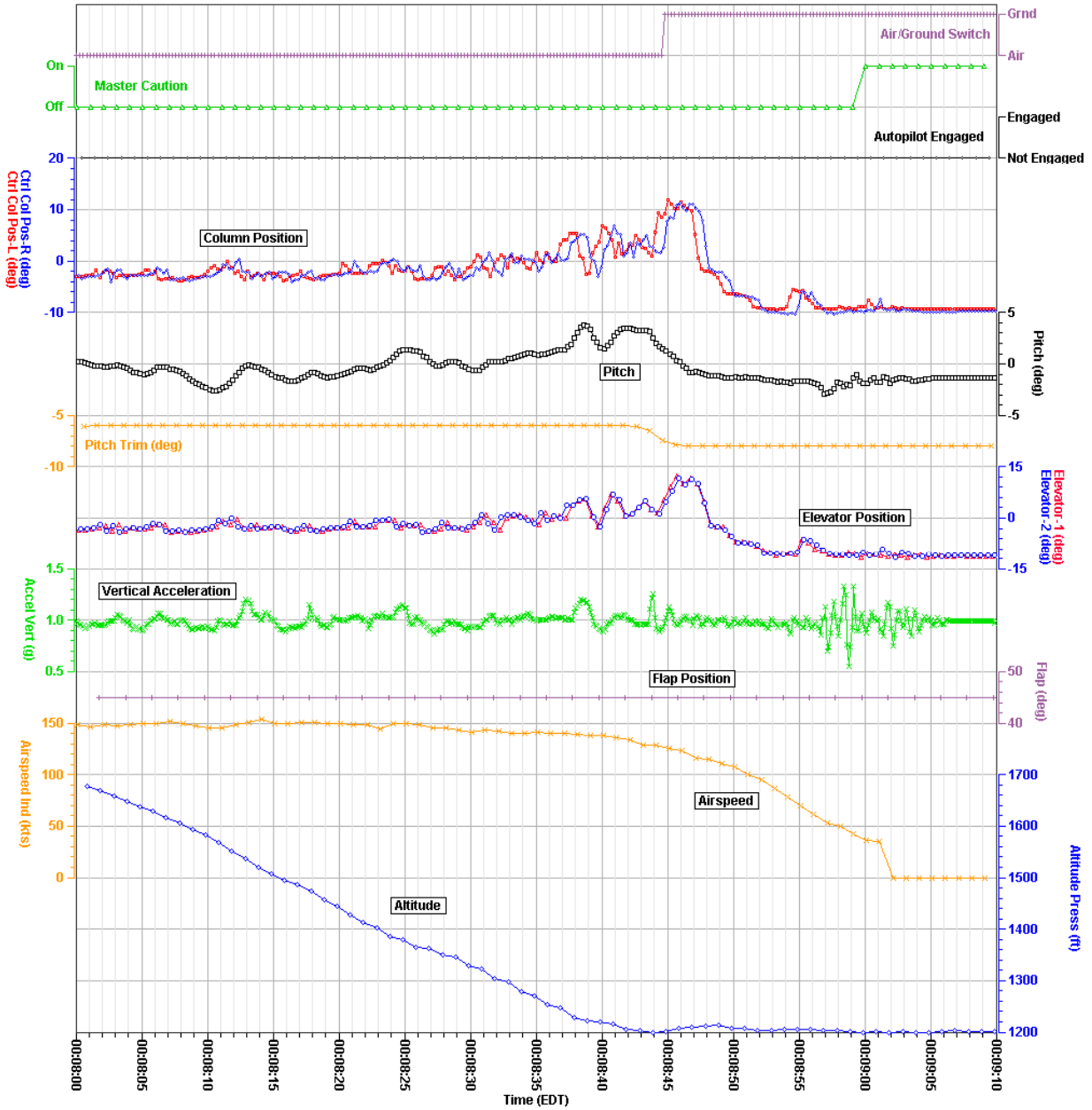
Figure 1.

ExpressJet, Embraer EMB-145, Flight 5916, N11187

Location, Date: Akron, Ohio, 03/18/11

NTSB No. CEN11IA234

Revised: 16 September 2011

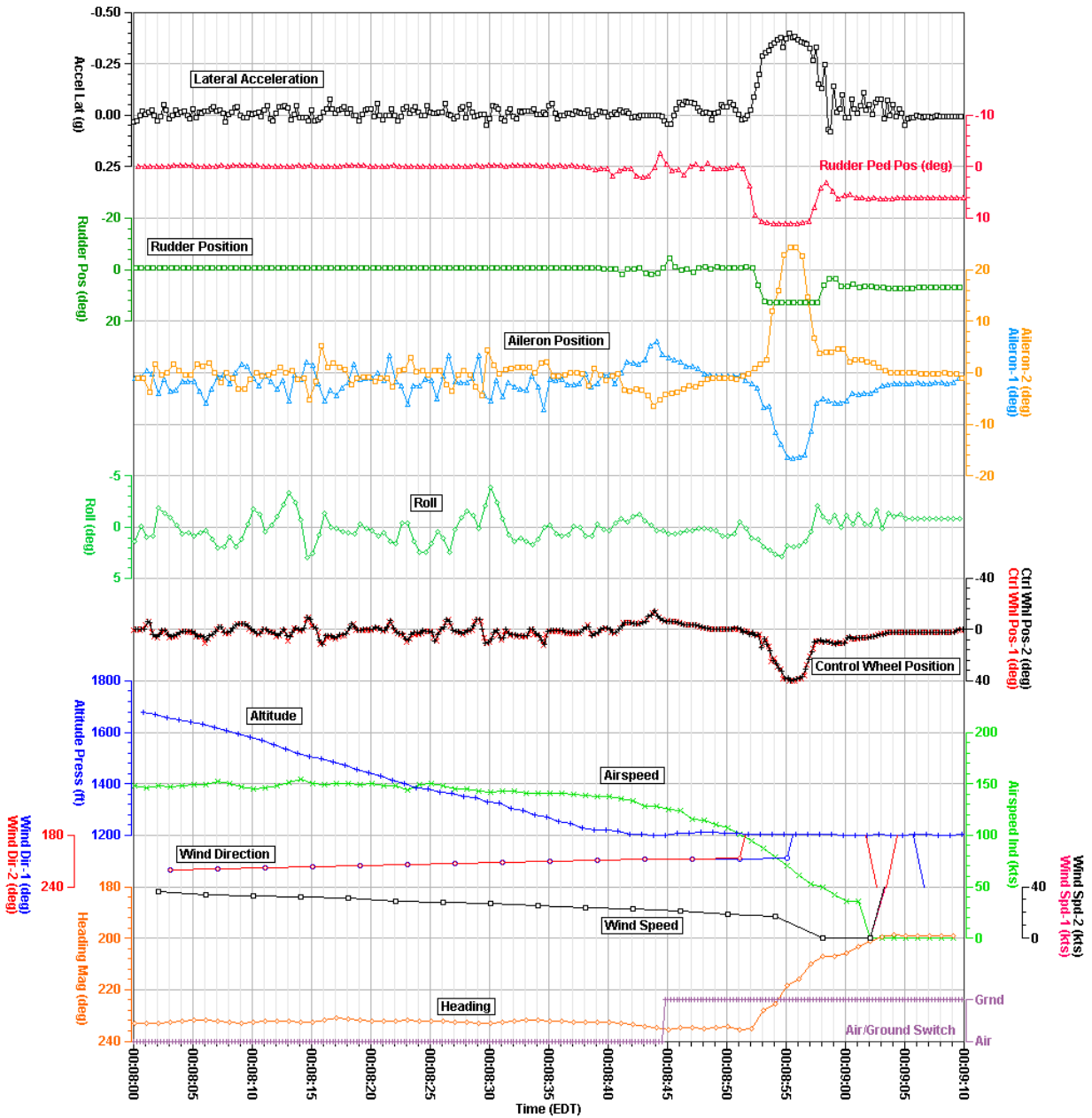Vertical Parameters - Accident Approach

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Figure 2.

ExpressJet, Embraer EMB-145, Flight 5916, N11187

Location, Date: Akron, Ohio, 03/18/11

NTSB No. CEN11IA234

Revised: 16 September 2011

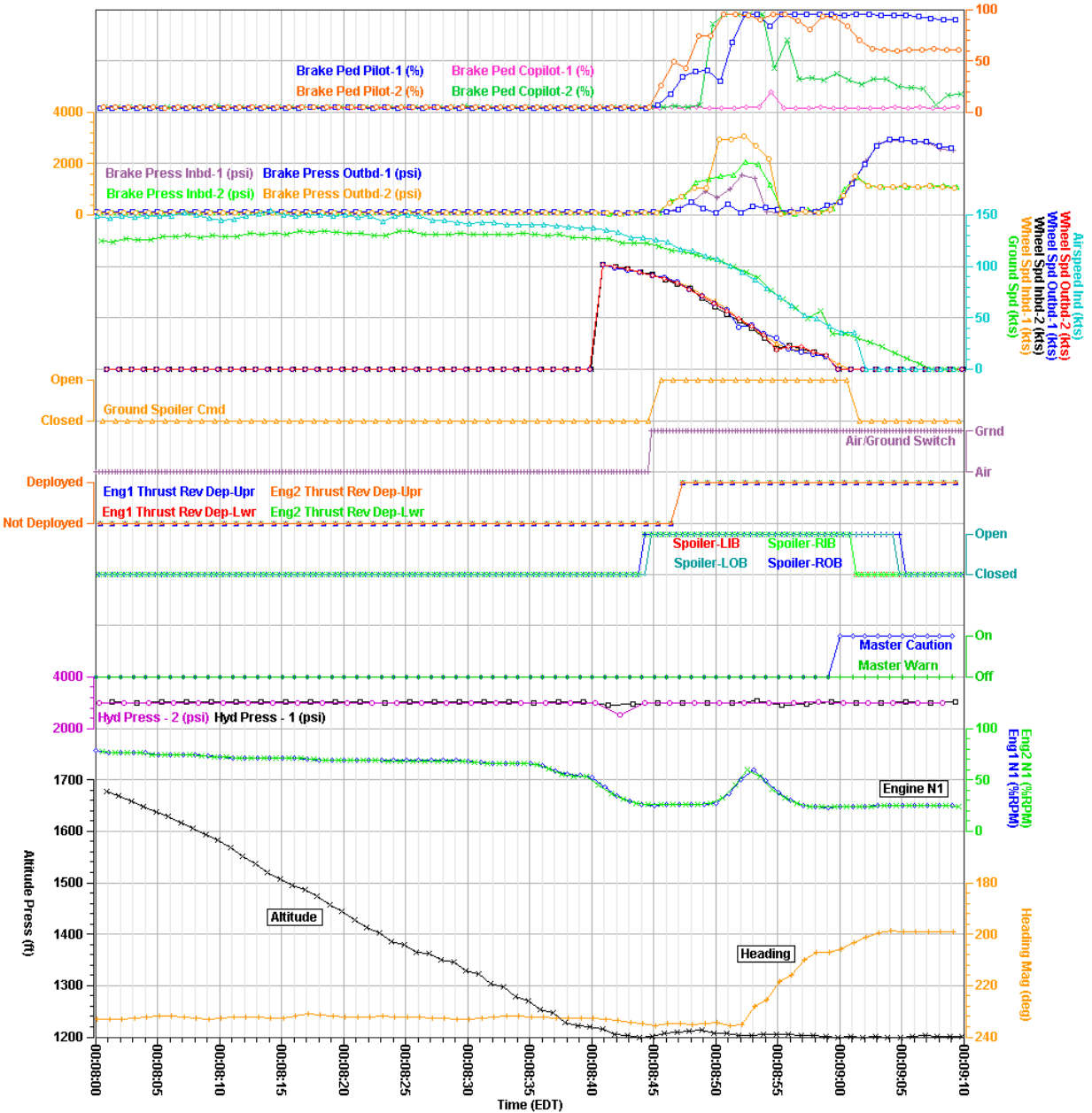Lateral/Directional Parameters - Accident Approach

National Transportation Safety Board

Figure 3.

ExpressJet, Embraer EMB-145, Flight 5916, N11187

Location, Date: Akron, Ohio, 03/18/11

NTSB No. CEN11IA234

Revised: 16 September 2011

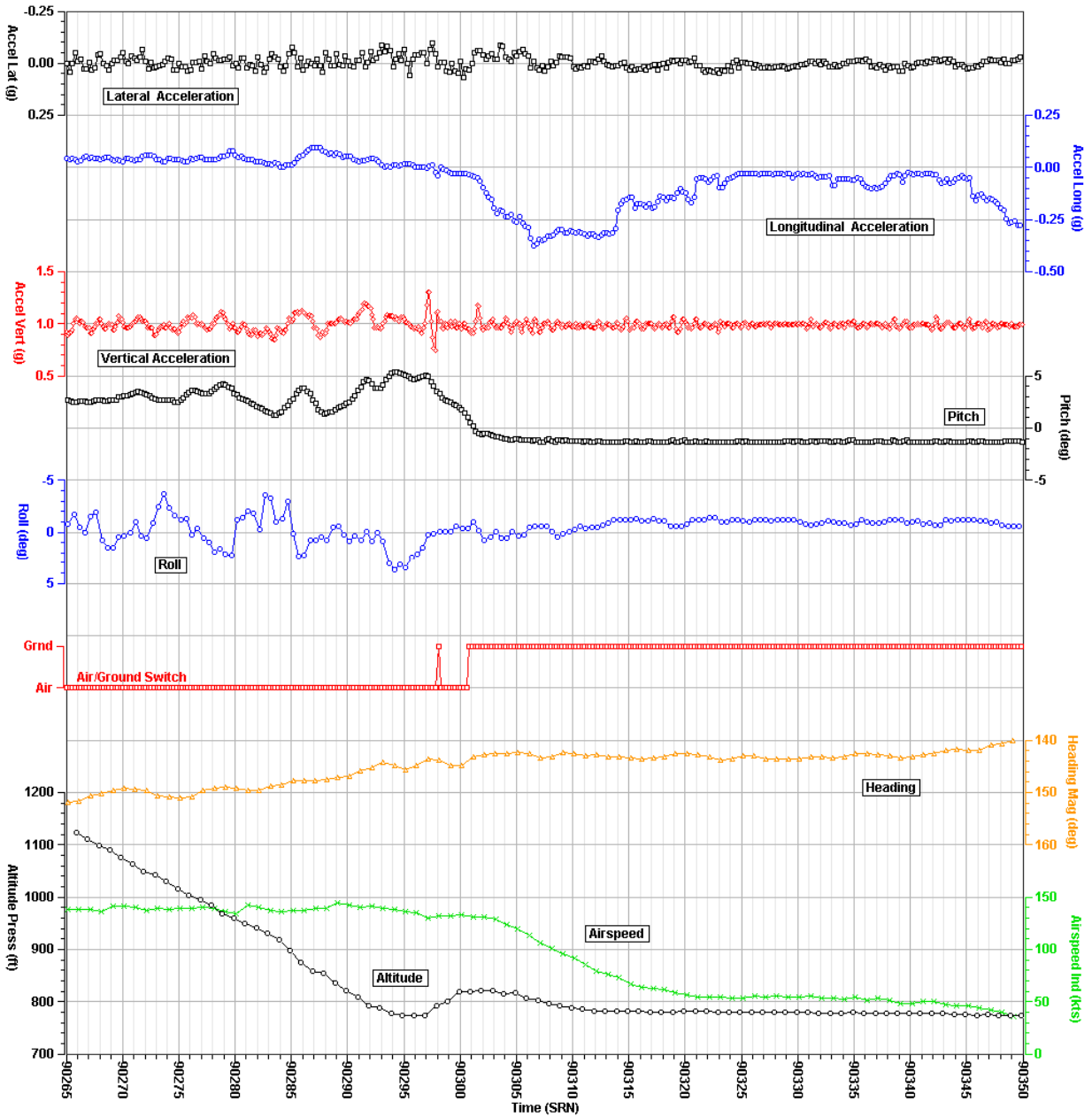Brakes, Engine, Gear, Hydraulics - Accident Approach

National Transportation Safety Board

Figure 4.

ExpressJet, Embraer EMB-145, N11187

Revised: 15 September 2011

Basic Parameters - Previous Approach
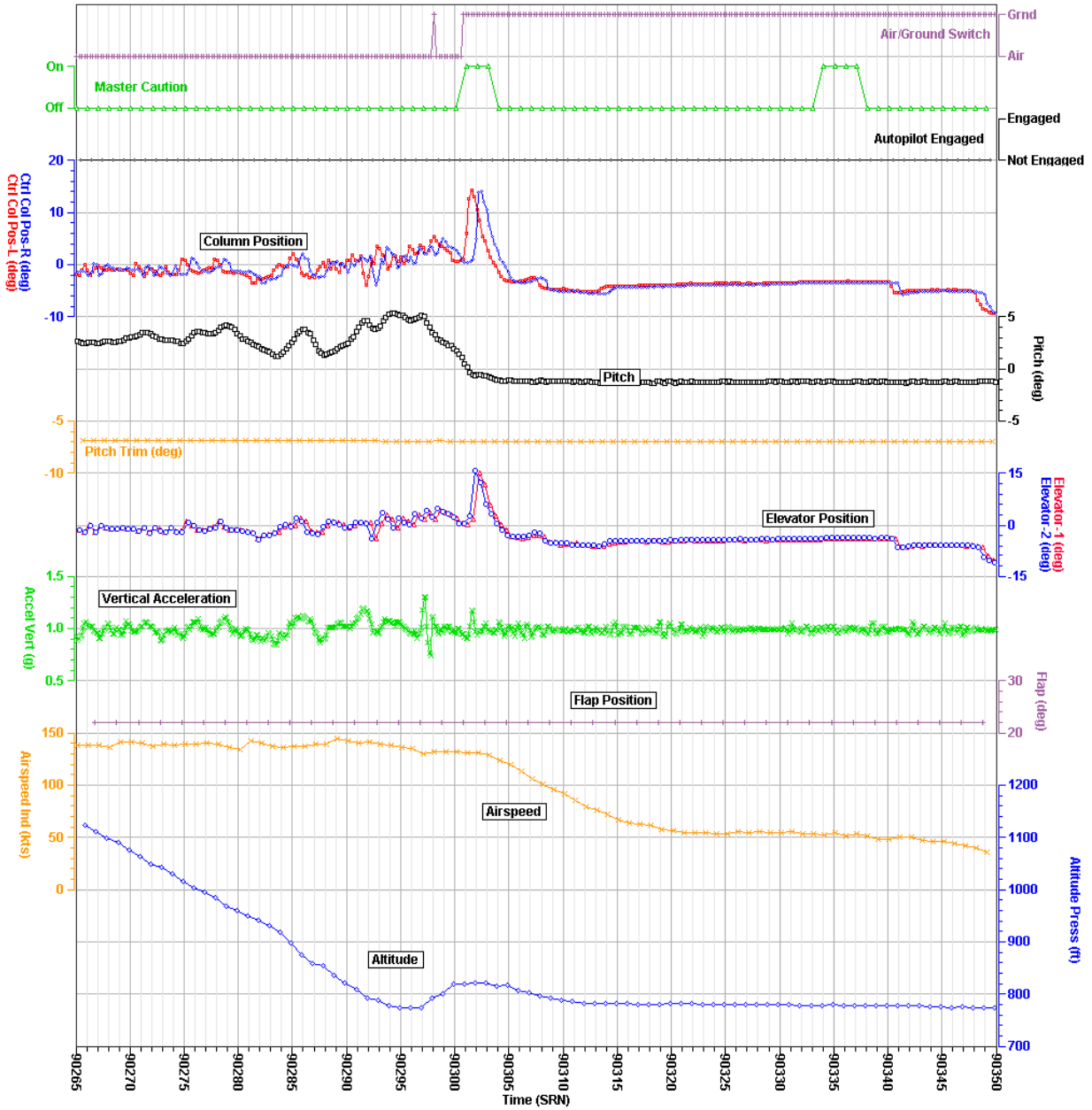
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Figure 5.

ExpressJet, Embraer EMB-145, N11187

Location, Date: Chicago, IL, 3/17/11

NTSB No. CEN11IA234

Revised: 16 September 2011

Vertical Parameters - Previous Approach

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Figure 6.

ExpressJet, Embraer EMB-145, N11187

Location, Date: Chicago, IL, 3/17/11

NTSB No. CEN11IA234

Revised: 16 September 2011

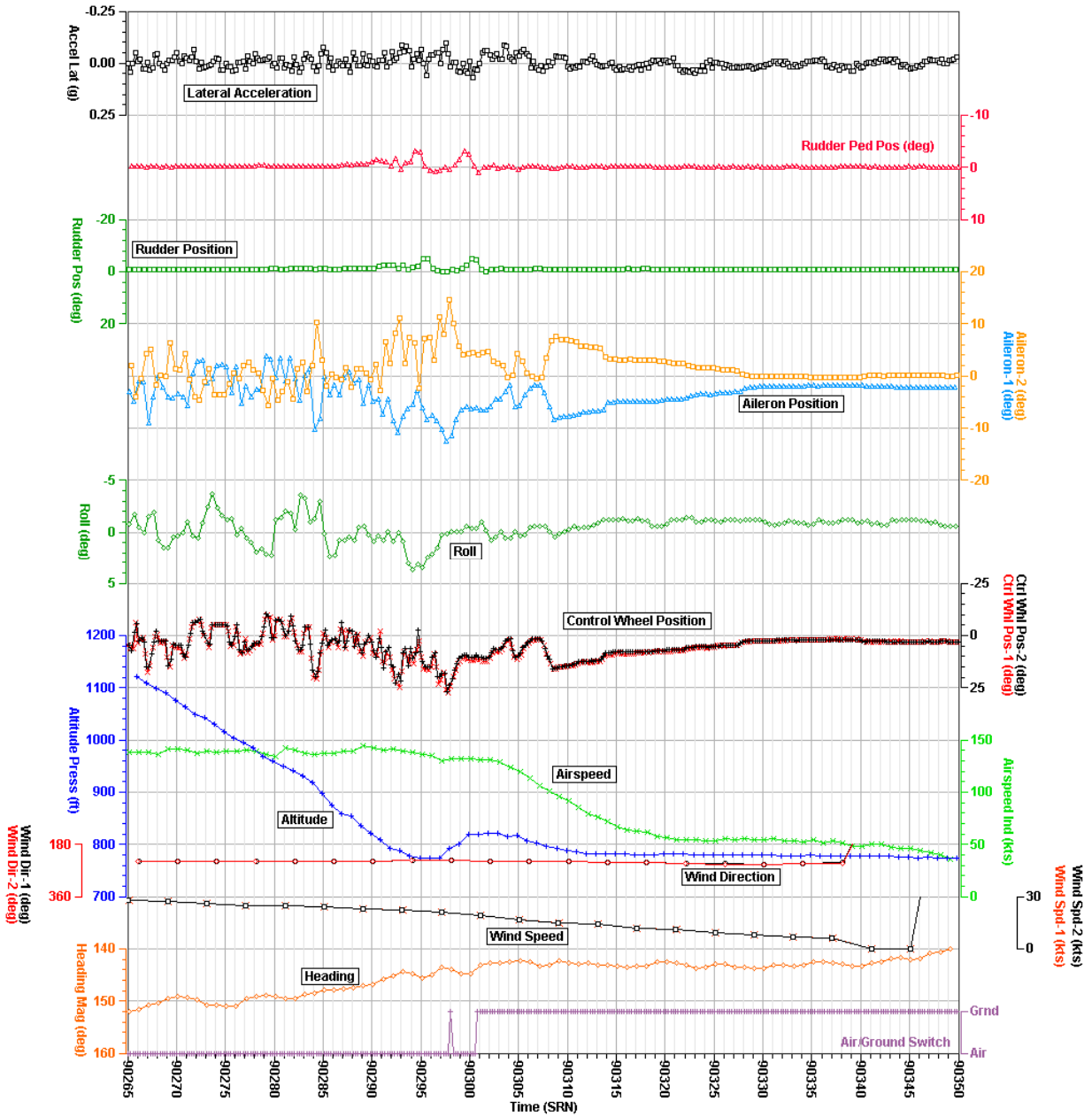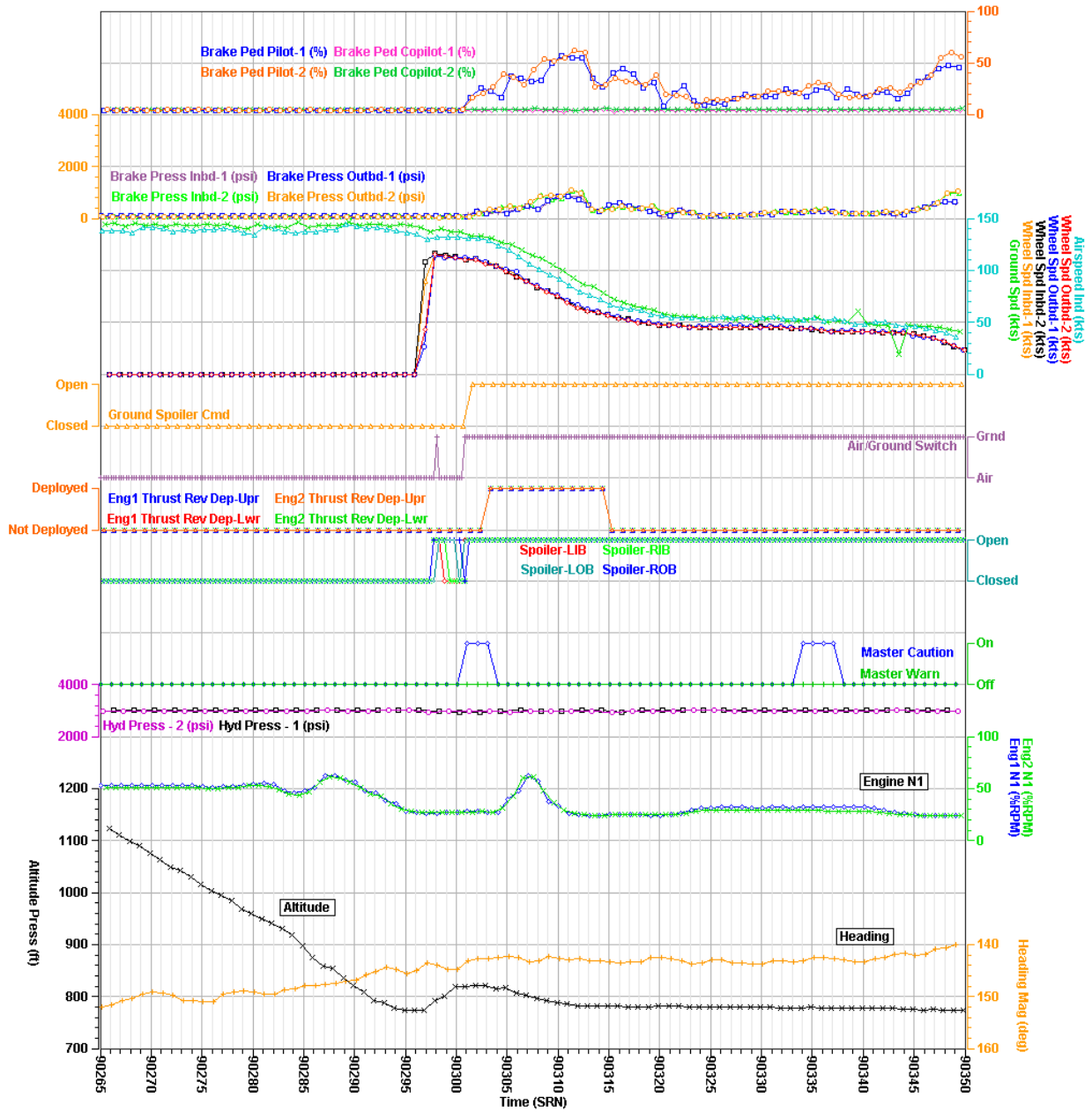Lateral/Directional Parameters - Previous Approach

National Transportation Safety Board

Figure 7.

ExpressJet, Embraer EMB-145, N11187

Location, Date: Chicago, IL, 3/17/11

NTSB No. CEN11IA234

Revised: 15 September 2011

Systems Parameters - Previous Approach

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Figure 8.

Appendix

Table 1. Provided and verified parameters.

Plot Label	Parameter Description
Accel Lat (g)	Vertical Acceleration
Accel Long (g)	Longitudinal Acceleration
Accel Vert (g)	Lateral Acceleration
Aileron-1 (deg)	Left Aileron Position
Aileron-2 (deg)	Right Aileron Position
Air/Ground Switch	Air Ground Discrete
Airspeed Ind (kts)	Indicated Airspeed
Altitude Press (ft)	Pressure Altitude
Autopilot Engaged	Autopilot Engaged Discrete
Brake Ped Copilot-1 (%)	Copilot Left Brake Pedal Position
Brake Ped Copilot-2 (%)	Copilot Right Brake Pedal Position
Brake Ped Pilot-1 (%)	Pilot Left Brake Pedal Position
Brake Ped Pilot-2 (%)	Pilot Right Brake Pedal Position
Brake Press Inbd-1 (psi)	Left Inboard Brake Pressure
Brake Press Inbd-2 (psi)	Right Inboard Brake Pressure
Brake Press Outbd-1 (psi)	Left Outboard Brake Pressure
Brake Press Outbd-2 (psi)	Right Outboard Brake Pressure
Ctrl Col Pos-L (deg)	Pilot Control Column Position
Ctrl Col Pos-R (deg)	Copilot Control Column Position
Ctrl Whl Pos-1 (deg)	Pilot Control Wheel Position
Ctrl Whl Pos-2 (deg)	Copilot Control Wheel Position
Elevator-1 (deg)	Left Elevator Position
Elevator-2 (deg)	Right Elevator Position
Eng1 N1 (%)	Left Engine N1
Eng1 Thrust Rev Dep-Lwr	Left Lower Thrust Reverser Deployed Discrete
Eng1 Thrust Rev Dep-Upr	Left Upper Thrust Reverser Deployed Discrete
Eng2 N1 (%)	Right Engine N1
Eng2 Thrust Rev Dep-Lwr	Right Lower Thrust Reverser Deployed Discrete
Eng2 Thrust Rev Dep-Upr	Right Upper Thrust Reverser Deployed Discrete
Flap (deg)	Flap Position
Ground Spd (kts)	Ground Speed
Ground Spoiler Cmd	Ground Spoiler Command Discrete
Heading Mag (deg)	Magnetic Heading
Hyd Press – 1 (psi)	Hydraulic System #1 Pressure
Hyd Press – 2 (psi)	Hydraulic System #2 Pressure
Key PTT	VHF Push-to-Talk Discrete
Master Caution	Master Caution Discrete
Master Warn	Master Warning Discrete
Pitch (deg)	Pitch Attitude
Pitch Trim (deg)	Pitch Trim Setting
Roll (deg)	Roll Attitude
Rudder Ped Pos (deg)	Rudder Pedal Position
Rudder Pos (deg)	Rudder Deflection
Spoiler-LIB	Left Inboard Spoiler Deployed Discrete
Spoiler-LOB	Left Outboard Spoiler Deployed Discrete
Spoiler-RIB	Right Inboard Spoiler Deployed Discrete
Spoiler-ROB	Right Outboard Spoiler Deployed Discrete
Time GMT Hrs	UTC Hours
Time GMT Min	UTC Minutes

Plot Label	Parameter Description
Time GMT Sec	UTC Seconds
Wheel Spd Inbd-1 (kts)	Left Inboard Wheel Speed
Wheel Spd Inbd-2 (kts)	Right Inboard Wheel Speed
Wheel Spd Outbd-1 (kts)	Left Outboard Wheel Speed
Wheel Spd Outbd-2 (kts)	Right Outboard Wheel Speed
Wind Dir-1 (deg)	Air Data Computer 1 Wind Direction
Wind Dir-2 (deg)	Air Data Computer 2 Wind Direction
Wind Spd-1 (kts)	Air Data Computer 1 Wind Speed
Wind Spd-2 (kts)	Air Data Computer 2 Wind Speed