NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

September 18, 2017

Quick Access Recorder

Specialist's Factual Report
By Bill Tuccio, Ph.D.

1. EVENT SUMMARY

Location:	Orlando, Florida
Date:	April 14, 2017
Aircraft:	Embraer EMB-190
Registration:	N373JB
Operator:	JetBlue Airways
NTSB Number:	DCA17CA101

See the public docket for a description of this event.

2. QUICK ACCESS RECORDER GROUP

A quick access recorder (QAR) group was not convened.

3. DETAILS OF FDR INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received an electronic file containing data from the Sagem QAR.

3.1. Sagem QAR Description

The Sagem QAR is designed to copy flight data similar to that recorded on the FDR, but in a readily-accessible format. QAR system design and parameter metadata were documented in Embraer Report 190EBD203 Revision C, "Quick Access Recorder Database Specification." The QAR recorded data at 512 words per second.[1]

3.1.1. Recording Description

The QAR recording supplied to the NTSB contained approximately 2 hours and 40 minutes of data. Timing of the QAR data is measured in subframe reference number (SRN), where each SRN equals one elapsed second. The event flight was the only flight on the file provided.

3.1.2. Engineering Units Conversions

The engineering units conversions used for the data contained in this report are based on documentation from the operator. Where applicable, the conversions have been changed to

[1] Each word is composed of 12 bits of data.

ensure that the parameters conform to the NTSB's standard sign convention that climbing right turns are positive (CRT=+).[2]

Table A-1 lists the QAR parameters verified and provided in this report. Specifically, table A-1 lists the parameter names and units, and table A-2 describes the unit and discrete abbreviations used in this report.

3.2. Time Correlation

Correlation of the FDR data from SRN to Coordinated Universal Time (UTC) was established by using the recorded Time GMT[3] hours, Time GMT Minutes, and Time GMT.

Accordingly, the time offset for the event flight data from SRN to UTC is the following:

UTC = SRN + 80364 seconds.

Therefore, for the rest of this report, all times are referenced as UTC (or GMT), not SRN.

3.3. QAR Plots and Corresponding Tabular Data

Figures 1 to 4 contain QAR data recorded during the event on April 4, 2017. The geographic overlay was created in Google Earth. Weather and lighting conditions in the overlay are not necessarily representative of conditions during the event flight.

Collectively the figures show:

- Turbulence encounter seemed to happen at about 23:35:33 UTC, while the aircraft was descending through a pressure altitude of 7,870 feet.
- Around this time, vertical g's varied between -0.21 to +1.38 over a 2-second period.
- The autopilot was engaged during the turbulence encounter and during the flight surrounding 23:35:33 UTC.
- Roll, pitch, and airspeed fluctuated around the time of the assumed encounter.

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 figures 1 to 4, including GMT hours, minutes, seconds, are provided in electronic comma separated value (*.csv) format as attachment 1 to this report.

[2] 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 = +.

[3] GMT is Greenwich Mean Time which is also known as Coordinated Universal Time (UTC).

Figure 1. Overlay of entire flight; assumed turbulence encounter point annotated.

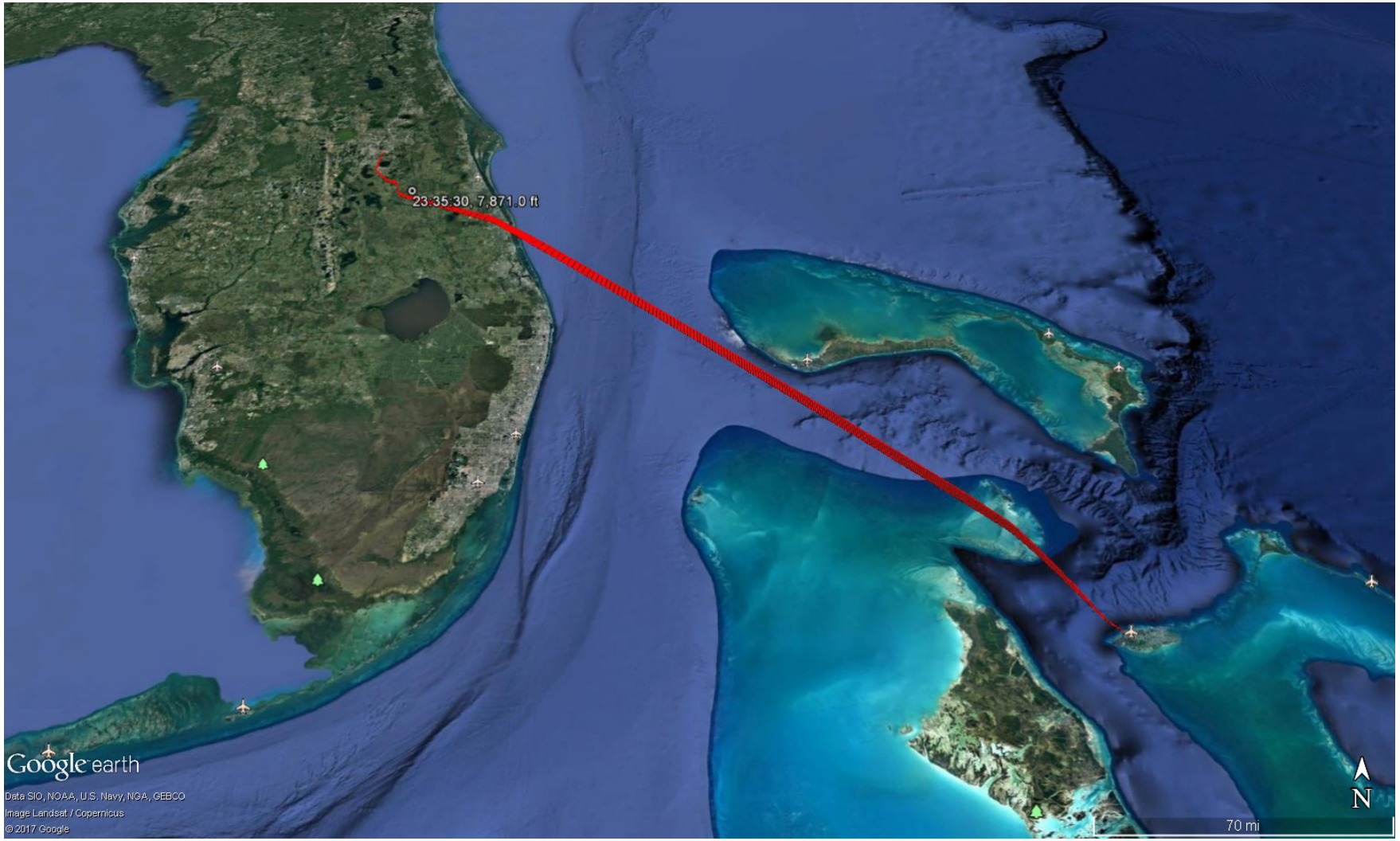


Figure 2. Plot of entire event flight.

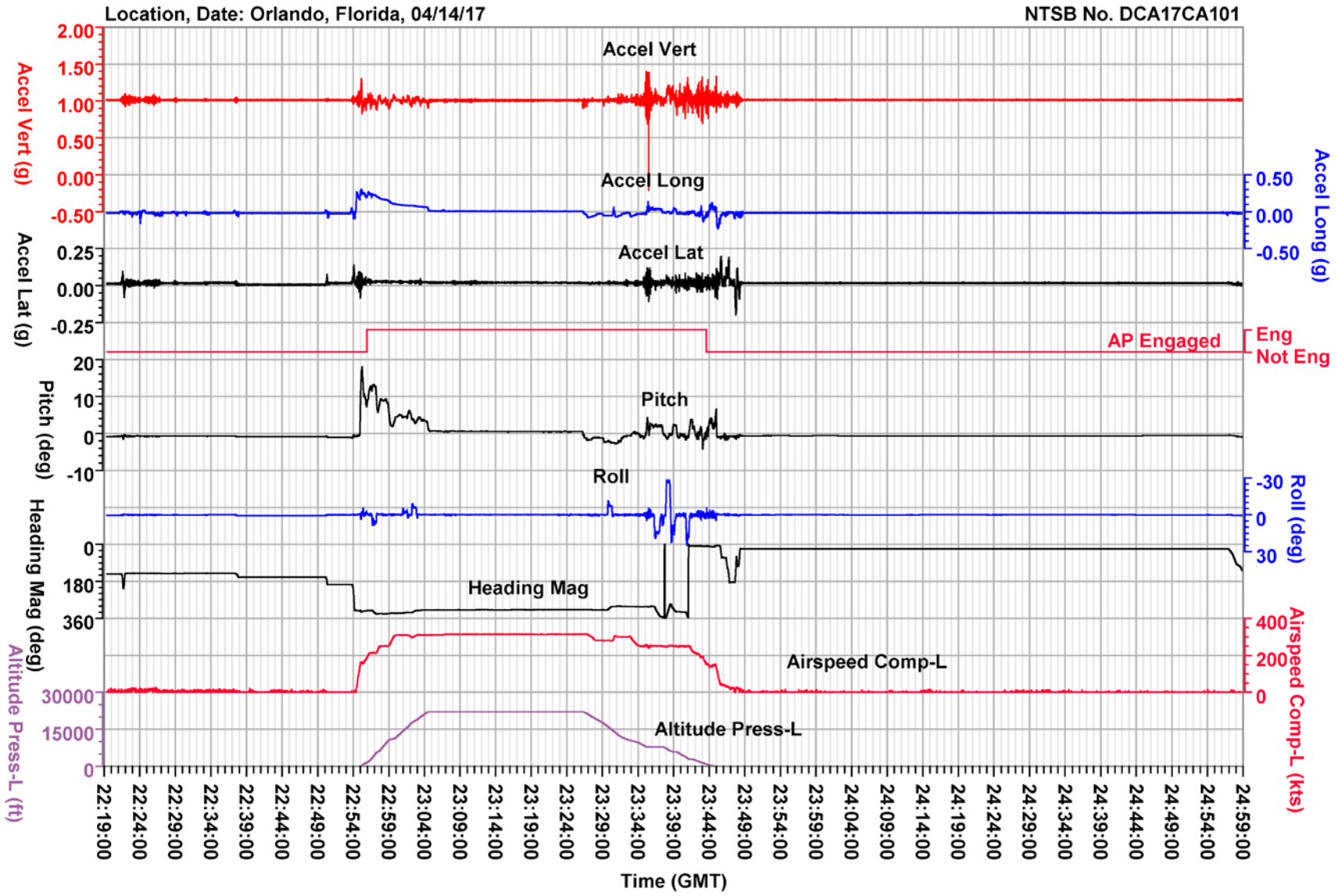


Figure 3. Plot of area surrounding large negative g (10 minutes, 30 second range).

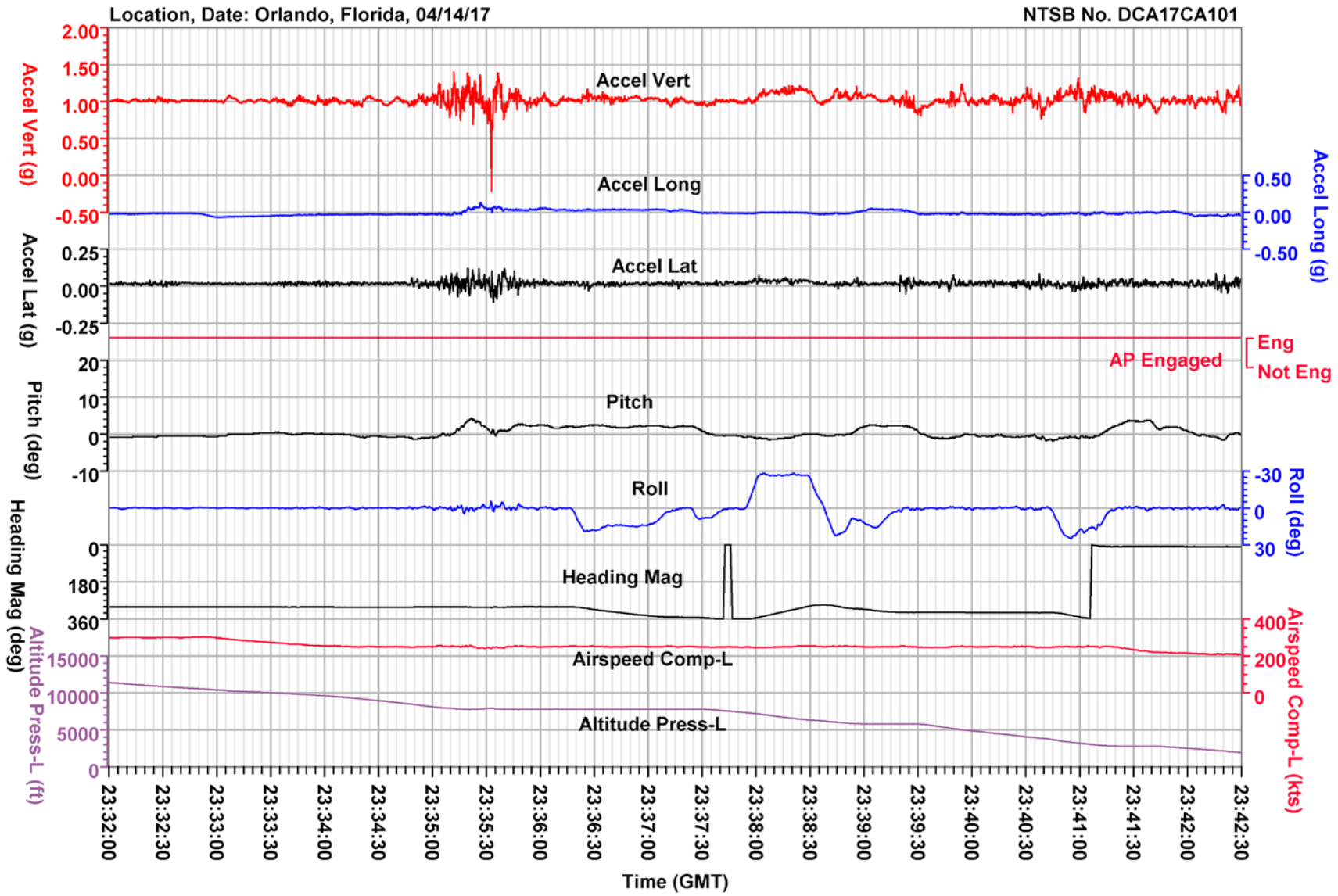
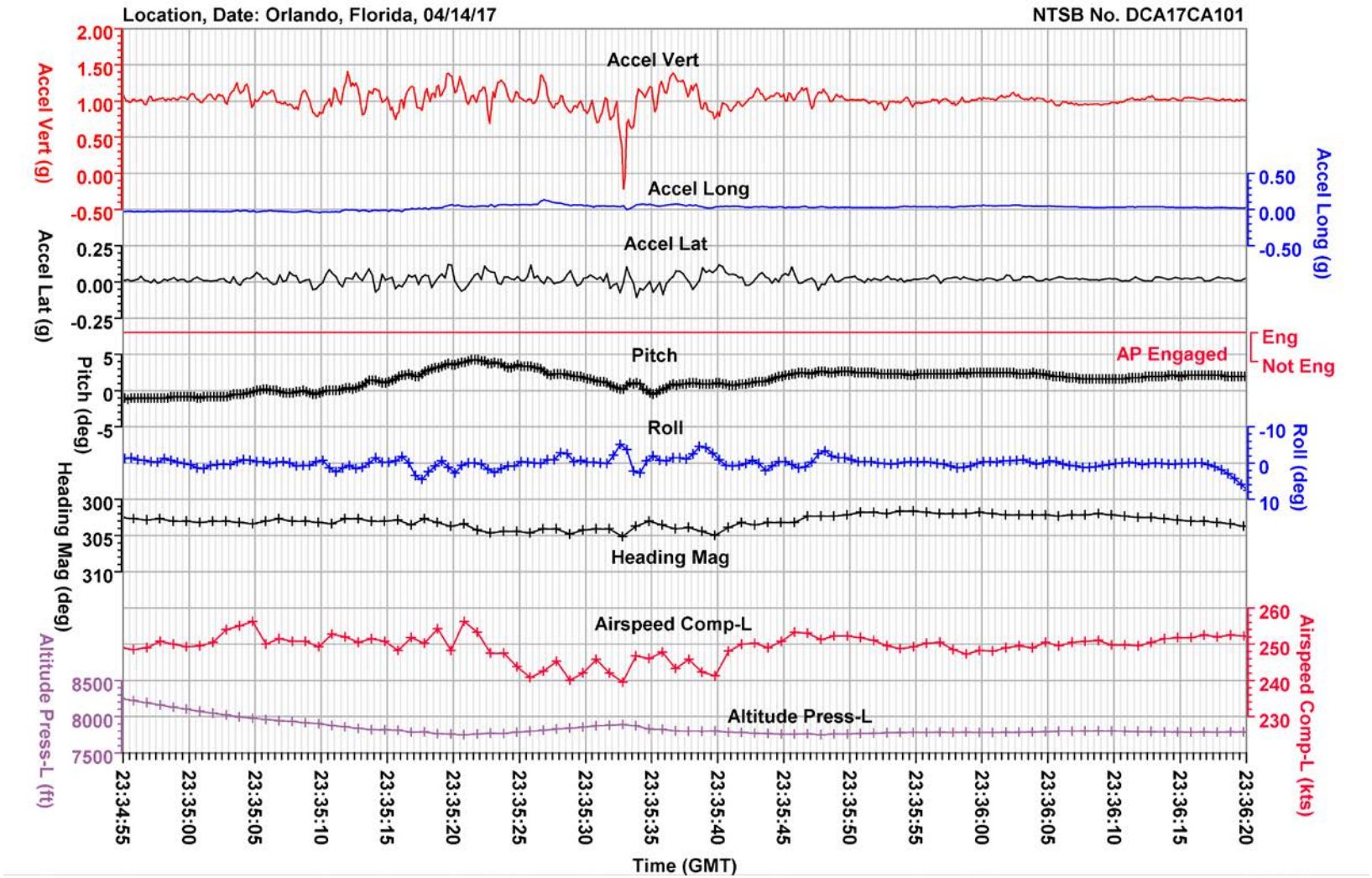


Figure 4. Plot of area surrounding large negative g (2 minutes, 25 second range).



APPENDIX A

This appendix describes the parameters provided and verified in this report. Table A-1 lists the parameter names and units. Additionally, table A-2 describes the unit and discrete abbreviations used in this report.

Table A-1. Verified and provided QAR 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 Comp-L (kts)	Computed Airspeed
5. Altitude Press (ft)	Pressure Altitude
6. AP Engaged (discrete)	Autopilot Engaged status
7. GMT Hours (hr)	UTC Hours
8. GMT Minutes (min)	UTC Minutes
9. GMT Seconds (sec)	UTC Seconds
10. Heading Mag (deg)	Magnetic Heading
11. Latitude (deg)	Latitude Position
12. Longitude (deg)	Longitude Position
13. Pitch (deg)	Pitch Angle
14. Roll (deg)	Roll Angle

NOTE: This QAR 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 QAR 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 and discrete abbreviations.

Unit and discrete Abbreviations	Descriptions
deg	degrees
kts	knots
g	g
Eng	engaged
Not Eng	not engaged
ft	feet
hrs	hours
min	minutes
sec	seconds