

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

February 28, 2020

Flight Data Recorder

Specialist's Factual Report

By Kyle Garner

1. EVENT SUMMARY

Location: New York, NY
Date: April 10, 2019
Aircraft: Airbus A321
Registration: N114NN
Operator: American Airlines
NTSB Number: DCA19LA134

2. FLIGHT DATA RECORDER GROUP

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

3. FDR Carriage Requirements

The event aircraft, N114NN, was manufactured by Airbus in 2014 and was operating such that it was required to be equipped with an FDR that recorded, at a minimum, 88 parameters, as cited in Title 14 CFR Part 121.344(f).

4. DETAILS OF FDR INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received an electronic file from the operator containing the FDR data downloaded from the aircraft.

4.1.1. Recording Description

The FDR recording contained approximately 113 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 30 minutes. The parameters evaluated for this report appeared to be per 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

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 = +.

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

4.1.3. Pressure Altitude

This 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 the electronic data has not been corrected for the local altimeter setting at the time of the event.

4.2. Time Correlation

Correlation of the FDR data from SRN to the event local time, EDT, was established by using the recorded Time GMT² hours, Time GMT Minutes, and Time GMT Seconds and then applying an additional -4.0 hours offset to change GMT to EDT.

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

$$\text{EDT} = \text{SRN} - 67773.$$

Therefore, for the rest of this report, all times are referenced as EDT, not SRN.

4.3. FDR Plots and Corresponding Tabular Data

Figures 1 to 4 contain FDR data recorded during the April 10, 2019 event. All the parameters listed in Table A-1 are either plotted or provided in tabular data in Attachment 1 to this report.

These plots 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.

Figure 1 is an overview of flight parameters for the entire event flight and Figures 2 and 3 contain data from the takeoff roll of the event flight for 90 and 20 seconds, respectively. Figure 4 is a map overlay created in Google Earth of the flight path for the entire event flight.

In Figure 1, the data show that the aircraft departed runway 31L at KJFK at approximately 20:40:36. After takeoff, the aircraft climbed to a pressure altitude of 20,000 feet. The aircraft then vectored back to KJFK and landed on runway 04L, 28 minutes later, at approximately 21:08:31. Sidestick inputs during the takeoff sequence were indicative of the pilot in the left seat being the pilot flying (PF) and the pilot in the right seat the pilot monitoring (PM). Sidestick inputs during the landing sequence were indicative of the pilot in the right seat being the PF and the pilot in the left seat the PM. Below approximately 30 knots, when the aircraft was on the ground, the computed airspeed parameter recorded a non-computed data (NCD) pattern which suggests that the raw data was no longer reliable or not available.

Figure 2 begins at 20:39:50 and shows 90 seconds of basic parameters during the takeoff roll on runway 31L at KJFK. Figure 3 begins at 20:40:25 and shows 20 seconds of basic parameters during the takeoff roll at KJFK.

Figure 4 is a map overlay created in Google Earth of the flight path for the entire event flight. Weather and atmospheric conditions in the overlay are not representative of conditions at the time of the flight.

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

The corresponding tabular data used to create figures 1 to 4, including Time GMT Hours, Time GMT Minutes, and Time GMT Seconds, are provided in compressed electronic comma-separated value (*.csv) format as Attachment 1 to this report.

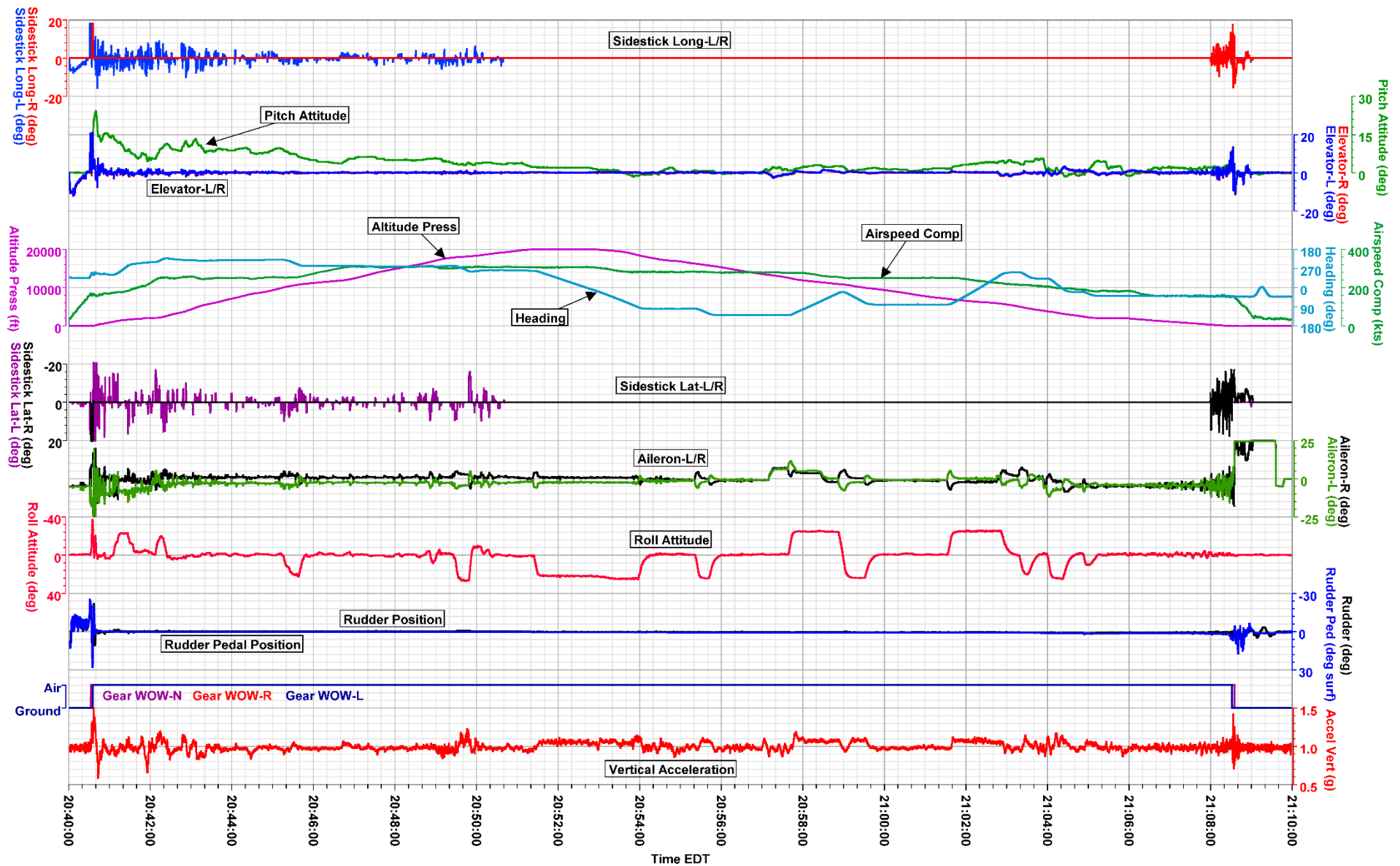


Figure 1. Plot of Selected Parameters for Full Event Flight

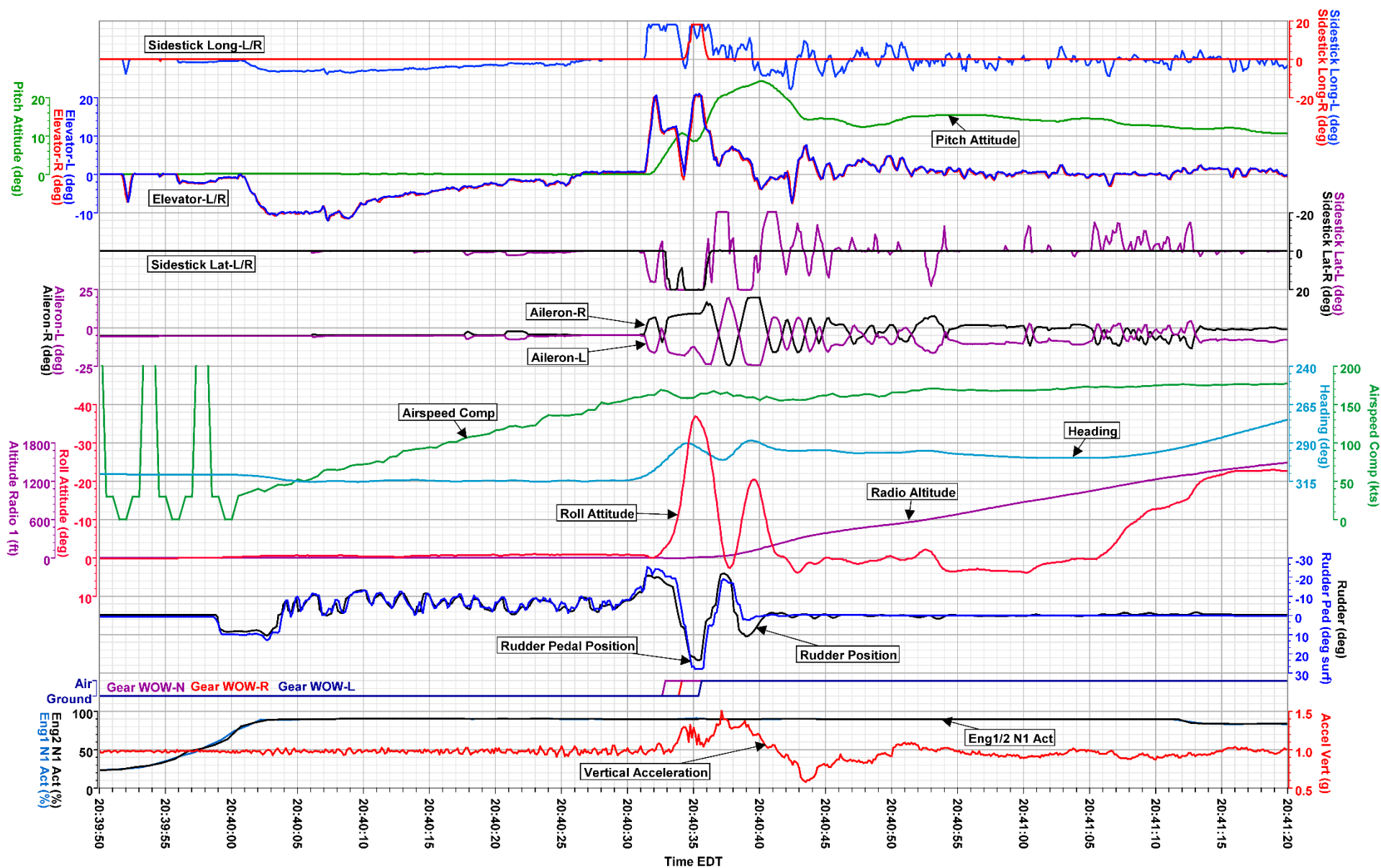


Figure 2. Plot of Selected Parameters During Takeoff of Event Flight - 90 seconds

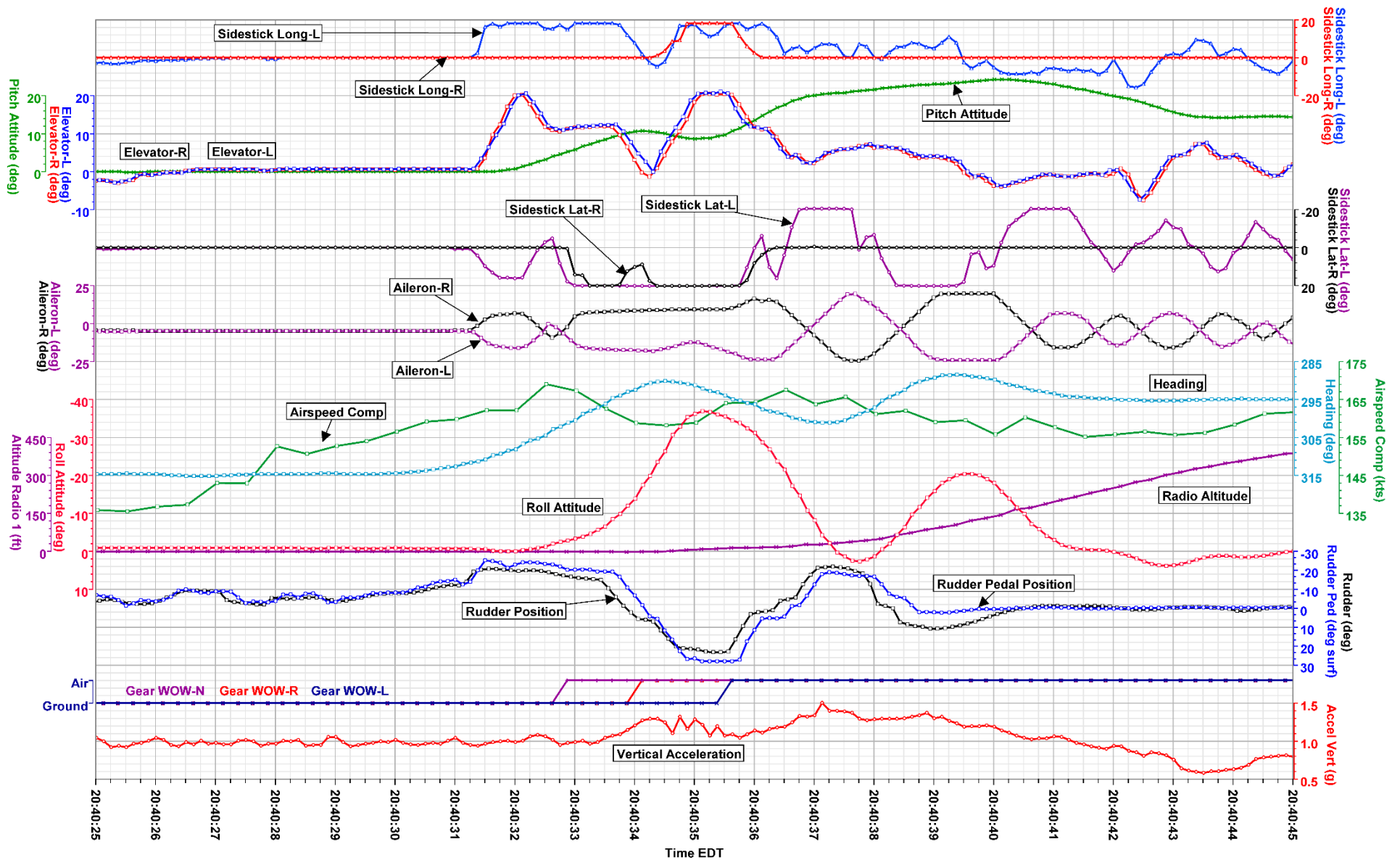


Figure 3. Plot of Selected Parameters During Takeoff of Event Flight - 20 seconds

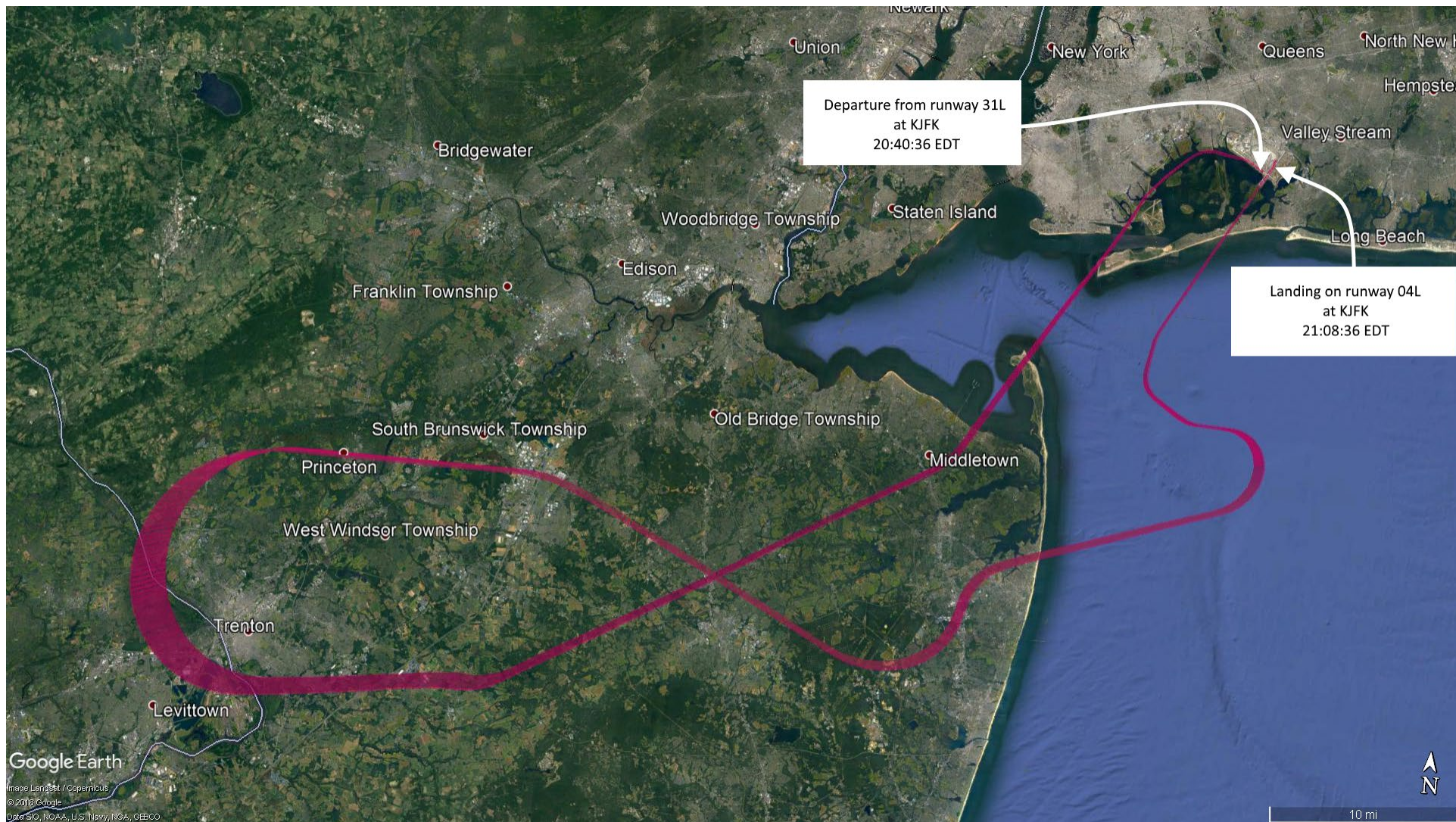


Figure 4. Google Earth Overview of Full Event Flight

APPENDIX A

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

Table A-1. Verified and provided FDR parameters.

Parameter Names	Plot/Table Labels	Units
Vertical Acceleration	Accel Vert	g
Left Aileron Position	Aileron-L	deg
Right Aileron Position	Aileron-R	deg
Computed Airspeed	Airspeed Comp	kts
Pressure Altitude	Altitude Press	ft
Radio Altitude	Altitude Radio 1	ft
Left Elevator Position	Elevator-L	deg
Right Elevator Position	Elevator-R	deg
Engine #1 (L/H) N1	Eng1 N1 Act	%
Engine #2 (R/H) N1	Eng2 N1 Act	%
Landing Gear Weight-on-Wheels – Left Main	Gear WOW-L	-
Landing Gear Weight-on-Wheels – Nose	Gear WOW-N	-
Landing Gear Weight-on-Wheels – Right Main	Gear WOW-R	-
Magnetic Heading	Heading	deg
Pitch Attitude	Pitch Attitude	deg
Roll Attitude	Roll Attitude	deg
Rudder Position	Rudder	deg
Rudder Pedal Position	Rudder Ped	deg surf
Lateral Sidestick Position – Left	Sidestick Lat-L	deg
Lateral Sidestick Position – Right	Sidestick Lat-R	deg
Longitudinal Sidestick Position – Left	Sidestick Long-L	deg
Longitudinal Sidestick Position – Right	Sidestick Long-R	deg
Time GMT Hours	Time Hrs	hrs
Time GMT Minutes	Time Min	min
Time GMT Seconds	Time Sec	sec

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.

NOTE: Parameters with a blank unit description in table A-1 are discretes. 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.

Table A-2. Unit and discrete abbreviations.

Unit and discrete abbreviations	Descriptions
deg	degrees
kts	knots
deg surf	degrees surface
in	inches
ft	feet
hrs	hours
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.