

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



DCA23LA462

FLIGHT DATA RECORDER

Specialist's Factual Report

April 19, 2024

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A. ACCIDENT

Location: Caribbean Sea
Date: September 25, 2023
Time: 0337 local time
0737 Coordinated Universal Time (UTC)
Airplane: Airbus A320-232, JetBlue Airways Corp, N569JB

B. FLIGHT DATA RECORDER SPECIALIST

Specialist: Cassandra Johnson
Mechanical Engineer
National Transportation Safety Board (NTSB)

C. FEDERAL CARRIAGE REQUIREMENTS

The event aircraft, N569JB, was operating under Title 14 *Code of Federal Regulations* (CFR) Part 121. The event aircraft was manufactured in 2003 and was operating such that it was required to be equipped with a flight data recorder (FDR) that recorded, at a minimum, 88 parameters, as cited in 14 CFR Part 121.344(f).

D. DETAILS OF THE INVESTIGATION

An FDR group was not convened. The NTSB Vehicle Recorder Division received an electronic file containing the FDR data from the N569JB aircraft.

1.0 Recorder Description

The FDR data in the electronic file was configured such that 256 12-bit words of digital information were recorded 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 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 (for example, pressure altitude, pitch angle, roll angle, and magnetic heading) has a specifically assigned word number within the subframe.

1.1 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 event flight was the last flight of the recording, and its

duration was approximately 4 hours. The parameters evaluated for the purpose of this report appeared to be in accordance with federal FDR carriage requirements.

1.2 Engineering Unit Conversions

The engineering unit 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

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

1.3 Time Correlation

Correlation of the FDR data from SRN to UTC was established by using the recorded UTC Hours, UTC Minutes, and UTC Seconds. Accordingly, the time offset for the event flight data from SRN to UTC is the following: UTC = SRN - 63,485. Therefore, for the rest of this report, all times are referenced as UTC, not SRN.

1.4 Non-Computed Data Pattern

Some parameters record a non-computed data (NCD) pattern. An NCD pattern is indicative that the raw data is no longer reliable or not available. An NCD pattern is typically recorded when the aircraft is on the ground.

When the aircraft was on the ground, the computed airspeed (Airspeed Comp) recorded NCD below about 30 knots (kts).

E. FIGURES AND TABULAR DATA

Figures 1 to 3 contain FDR data recorded during the event on September 25, 2023. All the parameters listed in table 1 are plotted except UTC Hours, UTC Minutes, and UTC Seconds.

Figure 1 covers the entire 4-hour flight and figure 2 has a 15-minute time span focusing on the vertical acceleration excursion. Figures 1 and 2 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.

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 = +, Left Aileron Trailing Edge Down = -, Right Aileron Trailing Edge Up = +, Pitch Up = +, Elevator Trailing Edge Up = +, Right Rudder = +.

FDR data indicated that the turbulence event occurred from about 7:36:20 UTC to about 7:37:30 UTC while at a pressure altitude of 34,416 feet. The maximum vertical acceleration deviation from 1 g was -0.69 g and was recorded at about 07:36:39 UTC while at a latitude and longitude position of N14°57'20" and W78°32'47".

Figure 3 is an overlay of the entire 4-hour flight from Aeropuerto Internacional José Joaquín de Olmedo Airport in Guayaquil, Ecuador, to Fort Lauderdale-Hollywood International Airport in Fort Lauderdale, Florida, using Google Earth. The turbulence encounter is marked with a green pin. The weather and lighting conditions in Google Earth are not necessarily representative of the weather and lighting conditions present at the time of the recording.

The corresponding tabular data used to create figures 1 to 3, including UTC Hours, UTC Minutes, and UTC Seconds, are provided in electronic comma-separated value (CSV) format as attachment 1 to this report.

Submitted by:

Cassandra Johnson
Mechanical Engineer

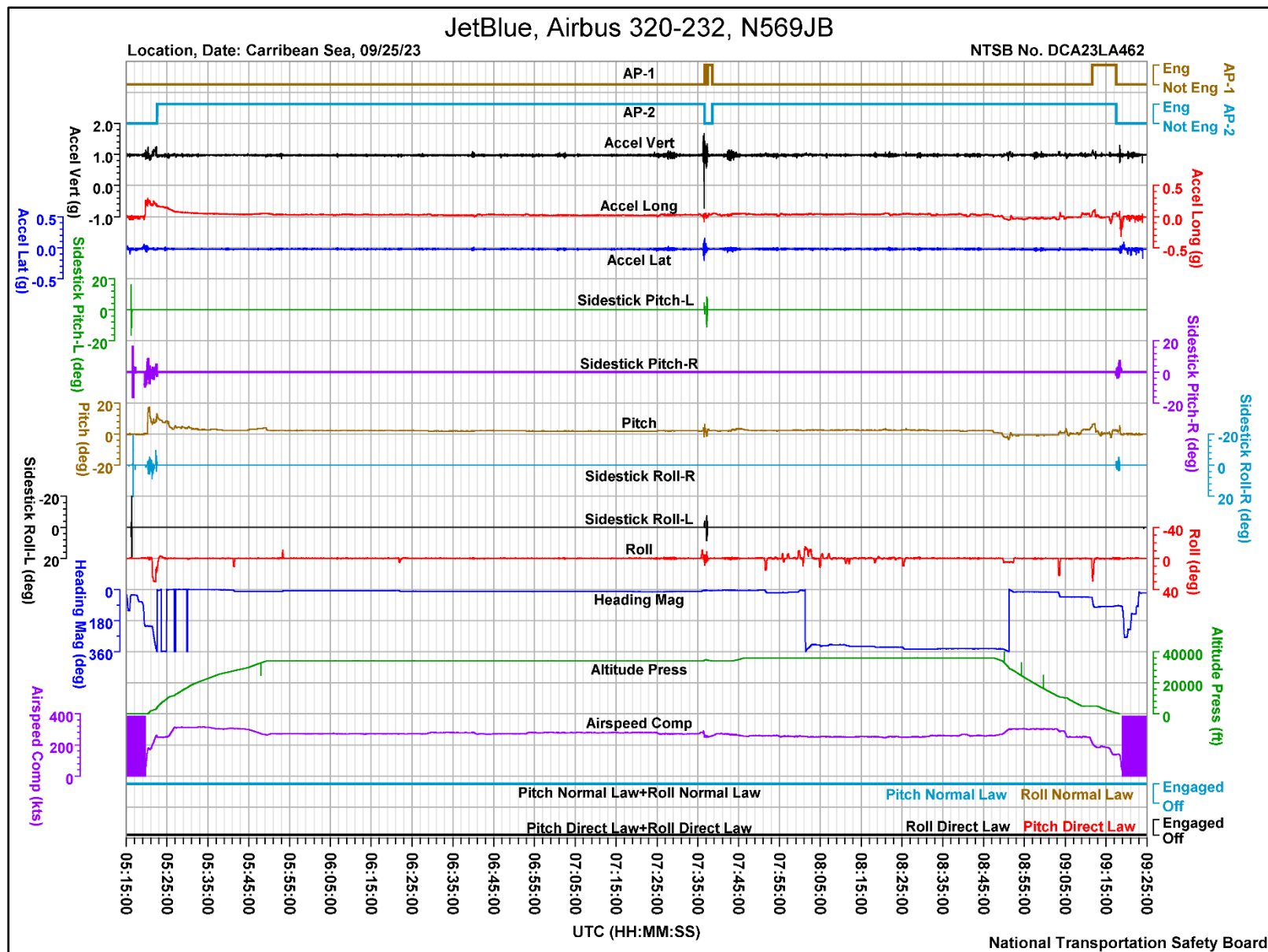


Figure 1. Plot of parameters for entire 4-hour flight.

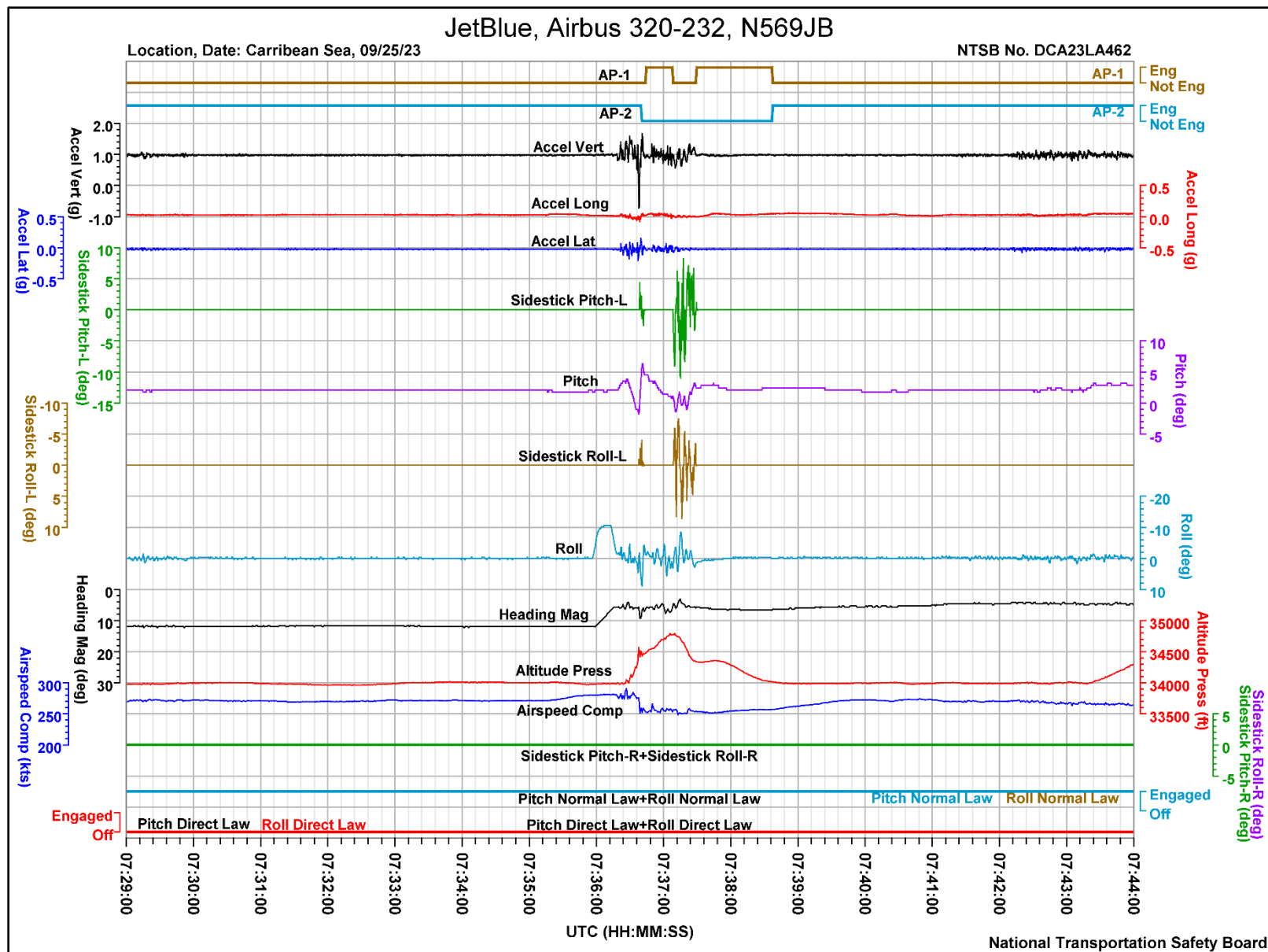


Figure 2. Plot of parameters with a 15-minute time span focusing on turbulence encounter.



Figure 3. Google overlay of aircraft's entire flightpath with the turbulence encounter marked with a green pin.

APPENDIX A. VERIFIED AND PROVIDED PARAMETERS

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

Table 1. Verified and provided FDR parameters.

Plot/Table Labels	Parameter Names	Units
Accel Lat	Lateral Acceleration	g
Accel Long	Longitudinal Acceleration	g
Accel Vert	Normal Acceleration	g
Airspeed Comp	Computed Airspeed	kts
Altitude Press	Pressure Altitude	ft
AP-1	Autopilot 1 Engaged status	
AP-2	Autopilot 2 Engaged status	
Heading Mag	Magnetic Heading	deg
Latitude-Capt	Latitude Coordinate-Captain	deg
Longitude-Capt	Longitude Coordinate-Captain	deg
Pitch	Pitch Attitude	deg
Pitch Direct Law	Pitch Direct Law status	
Pitch Normal Law	Pitch Normal Law status	
Roll	Roll Attitude	deg
Roll Direct Law	Roll Direct Law status	
Roll Normal Law	Roll Normal Law status	
Sidestick Pitch-L	Pitch Command Position-Left	deg
Sidestick Pitch-R	Pitch Command Position-Right	deg
Sidestick Roll-L	Roll Command Position-Left	deg
Sidestick Roll-R	Roll Command Position-Right	deg
Time UTC Hrs	Coordinated Universal Time Hours	hrs
Time UTC-Min	Coordinated Universal Time Minutes	min
Time UTC-Sec	Coordinated Universal Time Seconds	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 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 2. Unit and discrete state abbreviations.

Unit and Discrete State Abbreviations	Descriptions
deg	degrees
eng	engaged
ft	feet
g	unit of gravitation acceleration
hrs	hours
kts	knots
min	minutes
sec	seconds