

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

September 9, 2019

Flight Data Recorder Ancillary

Specialist's Factual Report
By Cassandra Johnson

1. EVENT SUMMARY

Location: Baytown, Texas
Date: February 23, 2019
Aircraft: Boeing 767-300
Registration: N1217A
Operator: Atlas Air Cargo
NTSB Number: DCA19MA086

2. ANCILLARY SUMMARY

In support of the investigation, the flight data recorder (FDR) from United Airlines Boeing 737-MAX-9, registration N47505, was obtained to provide pertinent weather parameters. The N47505 airplane landed at George Bush Intercontinental Airport (KIAH), Houston, Texas at about 18:57 Coordinated Universal Time (UTC)¹.

3. DETAILS OF FDR INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following FDR from the N47505 aircraft:

Recorder Manufacturer/Model: **Honeywell HFR5-D 4750**
Recorder Serial Number: **FDR-06802**

3.1. Honeywell HFR5-D 4750 Description

The Honeywell HFR5-D FDR records airplane flight information in a digital format using solid-state flash memory as the recording medium. The Honeywell HFR5-D FDR 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 1024 12-bit words of digital information every second. Each grouping of 1024 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 128-word intervals. Each data parameter (for example, altitude, heading, and airspeed) has a specifically assigned word number within the subframe. The HFR5-D is designed to meet the crash-survivability requirements of TSO-C124b.

¹ 18:57 UTC converts to 12:57 p.m. central standard time (CST).

3.1.1. Recorder Condition

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

3.1.2. 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 FDR data was reviewed and the 3rd recorded landing was identified to be the landing at KIAH on February 23, 2019.

3.1.3. Engineering Units 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=+).²

3.1.4. Parameters

Table 1 lists the parameters that were verified and provided in this report as tabular data. Pressure altitude is based on a standard altimeter setting of 29.92 inches of mercury (in Hg) and has not been corrected for the local altimeter setting at the time of the event. The nose gear weight on wheels (Gear WOW-N) parameter has a blank unit because it is a 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. Table 2 contains the unit and discrete state abbreviations for the parameters.

Table 1. Verified and provided FDR parameters.

Table Labels	Parameter Name	Units
Accel Lat	Lateral Acceleration	g
Accel Long	Longitudinal Acceleration	g
Accel Vert	Vertical Acceleration	g
Airspeed Comp-L	Left Computed Airspeed	kts
Airspeed Comp-R	Right Computed Airspeed	kts
Altitude Press-L	Left Pressure Altitude	ft
Altitude Press-R	Right Pressure Altitude	ft
Gear WOW-N	Nose Gear Weight on Wheels	
Heading Disp	Displayed Magnetic Heading	deg
Latitude-IR	Latitude Position - Source Inertial Reference Unit	deg
Longitude-IR	Longitude Position - Source Inertial Reference Unit	deg
Pitch Attitude Disp	Displayed Pitch Attitude	deg
Roll Attitude Disp	Displayed Roll Attitude	deg
Temp TAT-L	Left Total Air Temperature	degC
Temp TAT-R	Right Total Air Temperature	degC
Time UTC-Hr	Coordinated Universal Time Hours	hrs
Time UTC-Min	Coordinated Universal Time Minutes	min
Time UTC-Sec	Coordinated Universal Time Seconds	sec
Wind Direction True-FMC	Wind Direction True - Source Flight Management Computer	deg

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 = +.

Table Labels	Parameter Name	Units
Wind Direction True-IR	Wind Direction True - Source Inertial Reference Unit	deg
Wind Speed-FMC	Wind Speed Source - Source Flight Management Computer	kts
Wind Speed-IR	Wind Speed - Source Inertial Reference Unit	kts

Table 2. Unit and discrete state abbreviations.

Unit and discrete Abbreviations	Descriptions
deg	degrees
degC	degrees Celsius
ft	feet
g	acceleration
gnd	ground
hrs	hours
kts	knots
min	minutes
sec	seconds

3.2. 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 from SRN to UTC is the following: UTC = SRN – 49,297.

3.3. Tabular Data

The tabular data from the final descent starting at about 36,000 ft (18:15:00 UTC) to 39 seconds after landing at KIAH (18:58:00 UTC) for all the parameters listed in table 1 are provided in electronic comma separated value (*.csv) format as attachment 1 to this factual report.