

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR24FA238

ELECTRONIC DEVICES

Specialist's Factual Report

October 31, 2024

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A. ACCIDENT

Location: Helena, Montana
Date: July 10, 2024
Time: 1210 mountain daylight time (MDT)
1810 coordinated universal time (UTC)
Airplane: Air Tractor AT-802A, N10122

B. ELECTRONIC DEVICES SPECIALIST

Specialist: Gerald Kawamoto
Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A group was not convened. The NTSB Vehicle Recorder Division received the following electronic devices. All devices were submerged in water at Hauser Lake (Montana) during the accident event. The devices were dry upon arrival at the Vehicle Recorder Laboratory:

Recorder Manufacturer/Model: Sentry Plus ADS-B Receiver
Recorder Serial Number: 8504296

Recorder Manufacturer/Model: Garmin GTN 635
Recorder Serial Number: 1Z011095

Recorder Manufacturer/Model: Garmin GI 275 (ADI)
Recorder Serial Number: 5MZ100634

Recorder Manufacturer/Model: Garmin GI 275 (HSI)
Recorder Serial Number: 5MZ100371

Recorder Manufacturer/Model: Garmin aera 796
Recorder Serial Number: 2CY013481

Data recovered from the Sentry Plus, Garmin GTN 635 and Garmin GI 275 (ADI) and data from each device were compared. The Garmin GTN 635 contained the most extensive set of data parameters. Data recovered from the Sentry Plus and Garmin GI 275 (ADI) were found to be redundant, therefore, only Garmin GTN 635 data are included in this report. Tabular data recovered from the Sentry Plus and Garmin GI 275 (ADI) are included as attachments to this report in the public docket. No data were recovered from the Garmin GI 275 (HSI) or Garmin aera 796.

1.0 Sentry Plus Description

The Sentry Plus ADS-B receiver is a portable ADS-B and GPS receiver designed by uAvionix for ForeFlight.¹ The unit generates a Wi-Fi network allowing it to communicate and exchange data with portable electronic devices such as smartphones and tablets. Devices with ForeFlight can then receive and display inflight weather, traffic, and position data.

1.1 Sentry Plus Data Recovery

The Sentry Plus as received upon arrival at the Vehicle Recorder Division is shown in figure 1. The internal microSD card was recovered and data were extracted normally.

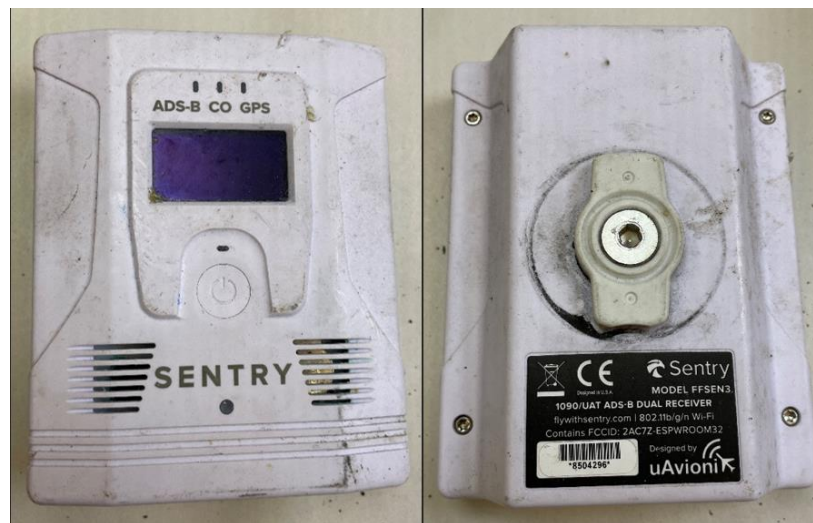


Figure 1. Front and back of Sentry Plus, as received.

1.2 Sentry Plus Recording Description

The recorded data included sessions from June 12, 2024, through July 10, 2024, MDT. The session containing the accident event started at 10:27:01 MDT and ended at 12:09:17 MDT on July 10, 2024.

¹ Automatic Dependent Surveillance-Broadcast (ADS-B) is a surveillance technology deployed throughout the national airspace system. The ADS-B system is composed of aircraft avionics and a ground infrastructure. Onboard avionics determine the position of the aircraft by using the GPS and transmit its position along with additional information about the aircraft to ground stations for use by air traffic control (ATC) and other ADS-B services. This information is transmitted at a rate of approximately once per second. Operators equipped with ADS-B realize additional benefits from ADS-B broadcast services: Traffic Information Service - Broadcast (TIS-B) (traffic information) and Flight Information Service - Broadcast (FIS-B) (weather information).

2.0 Garmin GTN 635 Description

The Garmin GTN 635 is a panel-mounted touchscreen flight navigator featuring a 4.9-inch color liquid crystal (LCD) display. The unit has a slot on the front for purchased electronic databases containing a flight plan composed of multiple waypoints, including user-defined waypoints that can be programmed in the unit. The unit contains an internal SD card storing flight log data, which can be accessed through the slot in the side of the unit.

2.1 Garmin GTN 635 Data Recovery

The Garmin GTN 635 as received upon arrival at the Vehicle Recorder Division is shown in Figure 2. The SD card containing historical data was removed and data were extracted normally.



Figure 2. Garmin GTN 635, as received.

2.2 Garmin GTN 635 Recording Description

The recorded data included sessions from August 13, 2023, through July 10, 2024, MDT. The session containing the accident event started at 10:20:27 MDT and ended at 12:09:16 MDT on July 10, 2024.

3.0 Garmin GI 275 Description

The Garmin GI 275 is a Multi-Function Instrument (MFI) with a 2.7-inch display. The function of the device varies depending on the unit configuration. The five instrument functions are Attitude Indicator (AI/ADI), Horizontal Situation Indicator (HSI), Course Deviation Indicator (CDI), Multi-Function Display (MFD), and Engine Indication System (EIS). The instrument can relay information to and process data from compatible devices such as a Primary Flight Displays (PFDs), Air Data Computers (ADC), Attitude and Heading Reference Systems (AHRS), and more.

3.1 Garmin GI 275 Data Recovery

The Garmin GI 275 ADI and HSI as received upon arrival at the Vehicle Recorder Division are shown in Figure 3 and Figure 4 respectively. Data were recovered from the ADI unit, however, internal water damage to the HSI prevented data recovery, therefore, no data were recovered from the HSI.



Figure 3. Garmin GI 275 (ADI), as received.



Figure 4. Garmin GI 275 (HSI), as received.

3.2 Garmin GI 275 Recording Description

The recorded data from the ADI included sessions from July 15, 2022, through July 10, 2024, MDT.

4.0 Garmin aera 796 Description

The Garmin aera 796 is a battery-powered multi-function display and GPS receiver with a 7-inch diagonal high resolution touch screen. The unit includes a built-in Jeppesen database and can receive XM satellite radio for flight information including NEXRAD Radar, lightning, METARs, and TFRs. The unit can also perform and store weight and balance calculations. A built-in AOPA Airport Directory and

SafeTaxi airport diagrams are included for selected airfields. With appropriate subscriptions, the unit can store and display geo-referenced VFR and IFR navigation charts, including IFR approach charts. The unit also has a "scratch pad" feature, allowing the user to hand write electronic notes.

The unit stores date, route-of-flight and flight-time information. A detailed track log including latitude, longitude, date, time and GPS altitude information is stored within the unit whenever the receiver has a lock on the GPS navigation signal. Position is updated within the track log as a function of time or distance moved, depending on how the unit has been configured. The current track log can be saved to long-term memory. Track log storage may be activated or de-activated at user discretion. All recorded data is stored in non-volatile memory.

4.1 Garmin aera 796 Data Recovery

The Garmin aera 796 as received upon arrival at the Vehicle Recorder Division is shown in Figure 5. Internal water damage to the device prevented data recovery, therefore, no data were recovered.



Figure 5. Garmin aera 796 as received.

D. FIGURES AND TABULAR DATA

Figure 6 and Figure 7 are graphical overlays generated using Google Earth showing the accident flight. Weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording. Figure 6 is an overview of the entire session. Figure 7 shows approximately the final seven minutes of the flight and the reported wreckage location.

Figure 8 is a plot of parameters of the entire flight. The time shown is 10:15:00 MDT to 12:10:00 MDT.

Figure 9 is a plot of parameters for the final seven minutes of the flight. The time shown is 12:03:00 MDT to 12:09:30 MDT.

The corresponding tabular data used to create figures Figure 6 through Figure 9 are provided in electronic comma-separated value (CSV) format as attachment 1 to this report. The corresponding tabular data for the Sentry Plus are provided as attachment 2 and the corresponding tabular data for the Garmin GI 275 (ADI) are provided as attachment 3.

Submitted by:

Gerald Kawamoto
Recorder Specialist

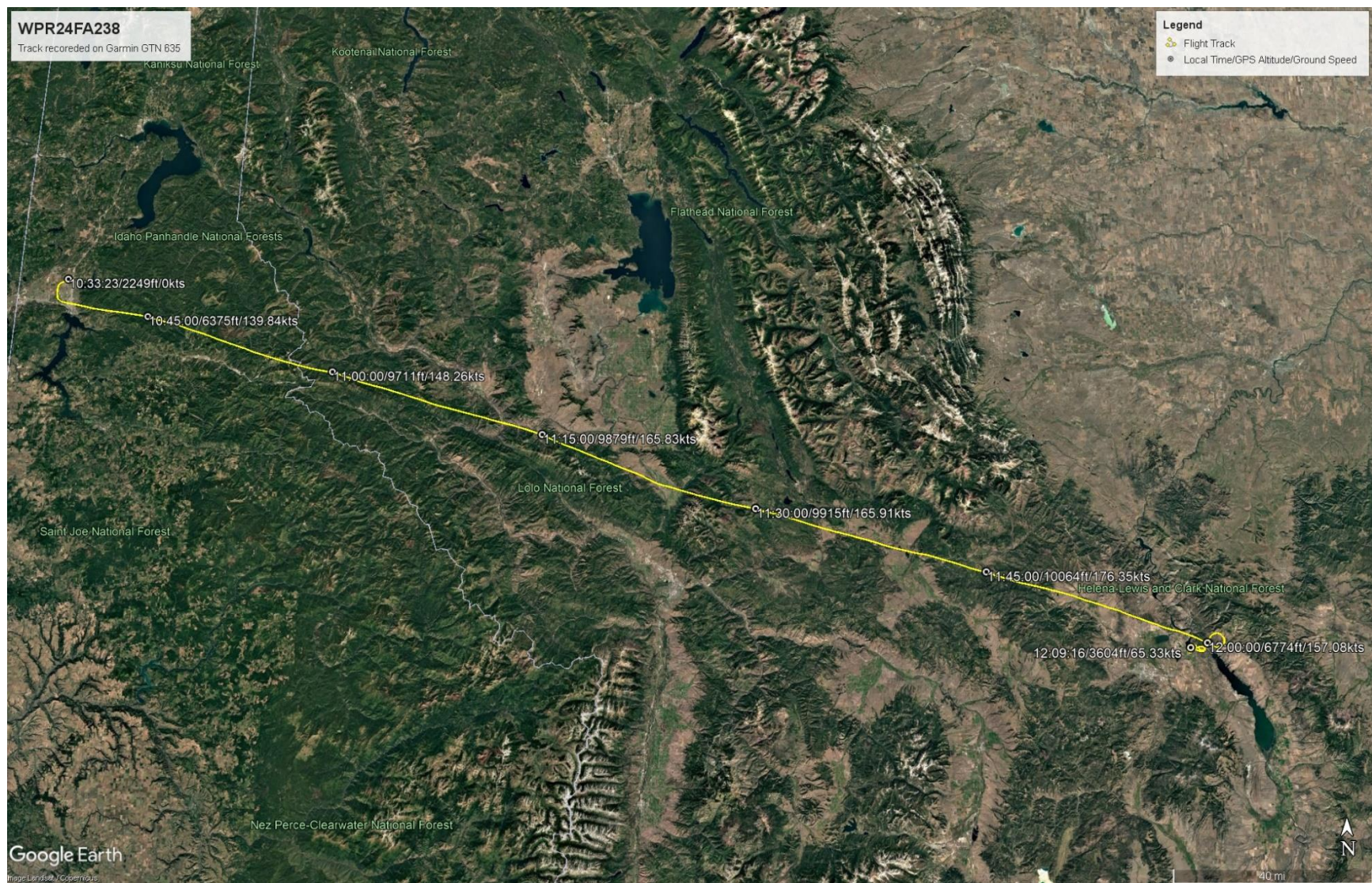


Figure 6. Google Earth overlay of the entire accident flight.



Figure 7. Google Earth overlay of the final seven minutes of the accident flight.

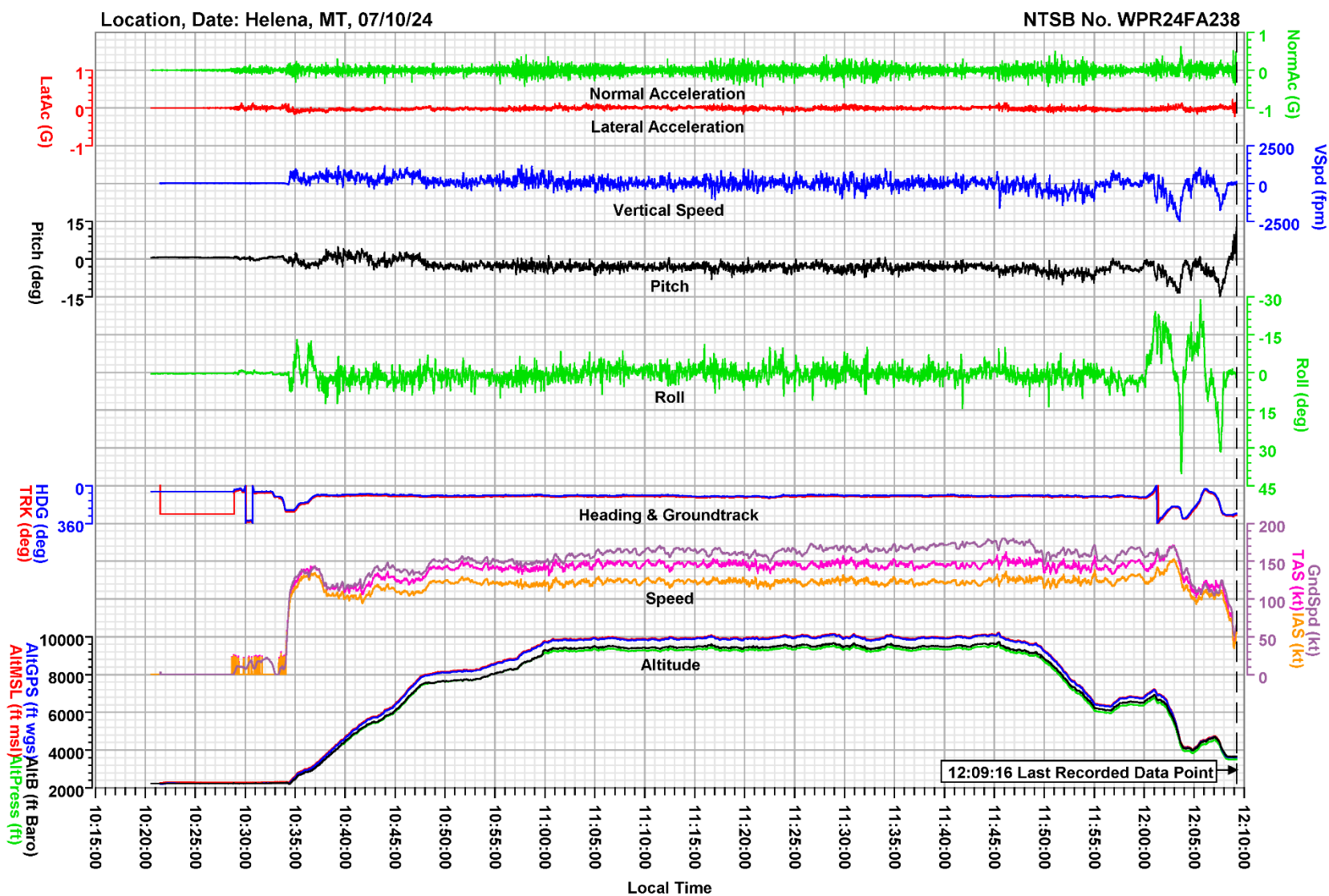


Figure 8. Plot of Garmin GTN 635 parameters of the entire accident flight.

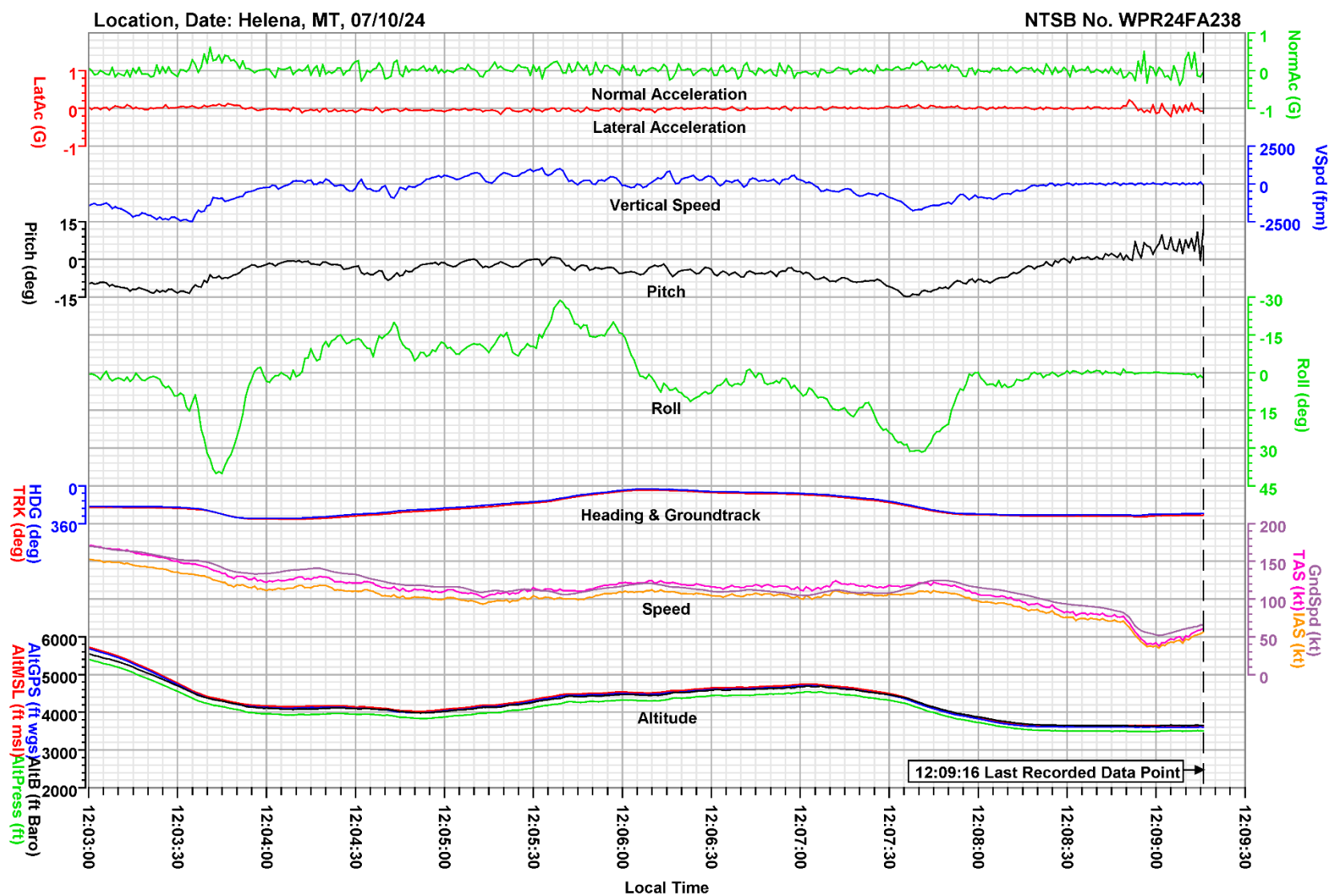


Figure 9. Plot of Garmin GTN 635 parameters of the final seven minutes of the accident flight.