

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA25FA185

COCKPIT DISPLAY

Specialist's Factual Report

October 31, 2025

A. ACCIDENT

Location: Hampton, Virginia
Date: April 24, 2025
Time: 1131 Eastern Daylight Time (EDT)
Airplane: MX Aircraft Tech PTY LTD, MXS, N530RH

B. COCKPIT DISPLAY SPECIALIST

Specialist Sean Payne
Branch Chief - Vehicle Recorder Laboratory
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

The NTSB Vehicle Recorder Division received the following device:

Recorder Manufacturer/Model: MGL Challenger EFIS
Recorder Serial Number: IC201200169

1.0 Device Description

The MGL Challenger EFIS (Electronic Flight Instrument System) is a lightweight, multifunctional avionics display designed for experimental and light-sport aircraft. It integrates primary flight instrumentation, engine monitoring, and navigation functions into a single unit. The system features a high-resolution color LCD screen, configurable data layouts, and interfaces for GPS, AHRS (Attitude and Heading Reference System), and engine sensors. It supports customizable display pages, synthetic vision, and flight data logging. The MGL Challenger EFIS is typically installed as a primary or backup flight display, providing pilots with real-time situational awareness and system status information.

The MGL Challenger EFIS can record data internally to a non-volatile memory (NVM) chip.¹ This chip is capable of storing as much as the last two hours of flight data, and is designed to overwrite the oldest data after the two-hour interval.

1.1 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained heavy impact damage. The screen was destroyed and was not included in the shipment. The condition of the internal board is shown in

¹ Non-volatile memory (NVM) is semiconductor memory that does not require external power for data retention.

figure 1. The relevant NVM chip was identified on the EFIS's main board, removed, cleaned and read out using the appropriate socket. A binary image was created and was transformed to engineering units using the manufacturer's supplied software. The output from the manufacturer's software was multiple comma-separated value (.CSV) files which were arranged, concatenated and imported to NTSB plotting software.

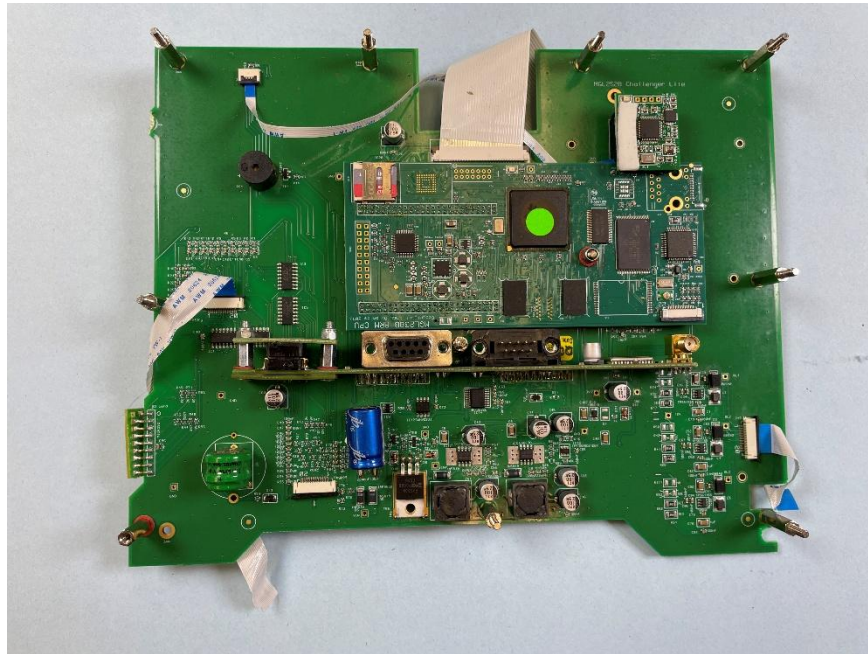


Figure 1. Photo of MGL Challenger, as received.

1.2 Recording Description

The data extracted contained approximately the last one hour and 26 minutes of data from the accident flight. The log began while the aircraft was in flight at 10:04:16 EDT on the accident day. The last record was recorded at 11:31:14 EDT, showing the aircraft in vicinity of the wreckage location, just prior to impact.

1.3 Parameters Provided

While the device recorded a multitude of data parameters, only certain parameters could be validated. Only the parameters listed in table 1 were included in this report.

Table 1. MGL Challenger EFIS validated parameters.

Parameter Name	Parameter Description (units)
AHRSBank (deg)	Roll (degrees)
AHRSPitch (deg)	Pitch (degrees)
ASI (mph)	Indicated Airspeed (miles per hour)
BAAltitude (ft)	Barometric Altitude (feet)

Parameter Name	Parameter Description (units)
CHT # (deg F)	Cylinder Head Temperature (degrees Fahrenheit)
Date	Date for recorded data point (MM/DD/YYYY)
EGT # ² (deg F)	Exhaust Gas Temperature (degrees Fahrenheit)
GForce (g)	Normal Acceleration (g)
Groundspeed (mph)	Groundspeed (miles per hour)
HeadingMAG (deg)	Magnetic Heading (degrees)
Latitude (deg)	Recorded Latitude (degrees)
Longitude (deg)	Recorded Longitude (degrees)
LRForce (g)	Lateral Acceleration (g)
MAP_Hg (Hg)	Manifold Pressure (inches of Mercury)
Oil_T_ (deg F)	Oil Temperature (degrees Fahrenheit)
Pitch Trim (unitless)	Pitch Trim (no unit available)
Time	Time (UTC) for recorded data point (HH:MM:SS)

1.3.1 Pitch Trim

The orientation of the pitch trim could not be determined based on the available data. In the absence of a previous flight record and without data indicating the aircraft was on the ground or having an aircraft performance study generated, it was not possible to assign a definitive sign (nose up or nose down) to the trim parameter.

Recorded pitch trim values from the Challenger EFIS were scaled by dividing by 100 to improve unit representation on the plot. The data shows slight variations in pitch trim readings during portions of the flight when the trim was not actively in use, thus, the 100 factor scaler exaggerates these variations. Minor fluctuations (less than 1 unit) should not be interpreted as pilot input and could be attributable to small voltage variations recorded by the system.

D. OVERLAYS AND TABULAR DATA

Figures 2 to 11 contain MGL Challenger data recorded during the event on April 24, 2025. All the parameters listed in table 1 have been plotted.

Figures 2 to 7 are time history plots of the basic parameters and the engine parameters listed in table 1. Note the discussion in section 1.3.1 of this report related

² Depending on aircraft configuration number of cylinders that are instrumented varies. In the data plots the '#' is replaced with the appropriate cylinder ID.

to pitch trim values. Care should be exercised in associating changes in pitch trim values with active pitch trim movement by the pilot.

Figure 2 covers the entire accident recording. Figure 3 covers the descent phase of flight through to the end of the data. Figure 4 covers the final approach phase of the accident flight. Figure 5 covers the final approximate 2 minutes of the accident recording. Figure 6 covers the final one minute of recorded data. Lastly, figure 7 covers the final 20 seconds of recorded data.

Figures 8 to 11 are Google Earth overlays of the flight path. 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.

Figure 8 shows the entire recorded route of flight including the departure and destination locations. The departure location and the destination are annotated with yellow pins. Figure 9 focuses on the entire recorded route of flight. These two figures are oriented so that north is up.

Figure 10 shows the final approach phase of the accident flight and figure 11 shows the final segment of flight. The approximate wreckage is annotated with a yellow pin in these two figures.

The corresponding tabular data used to create figures 2 to 11 are provided in electronic comma-separated value (CSV) format as attachment 1 to this report.

Submitted by:

Sean Payne
Branch Chief - Vehicle Recorder Laboratory

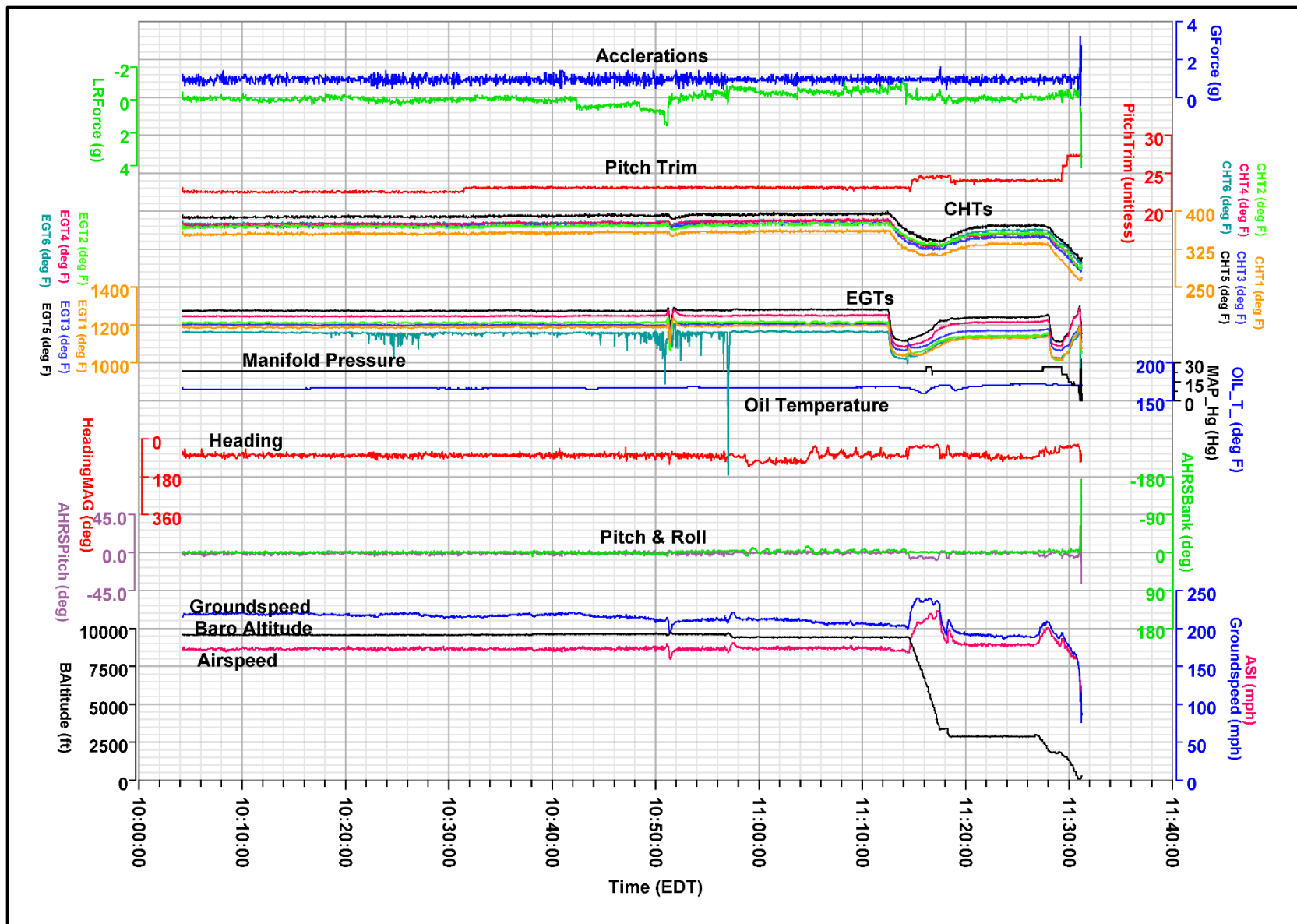


Figure 2. Plot of basic flight and engine parameters for the entire recording.

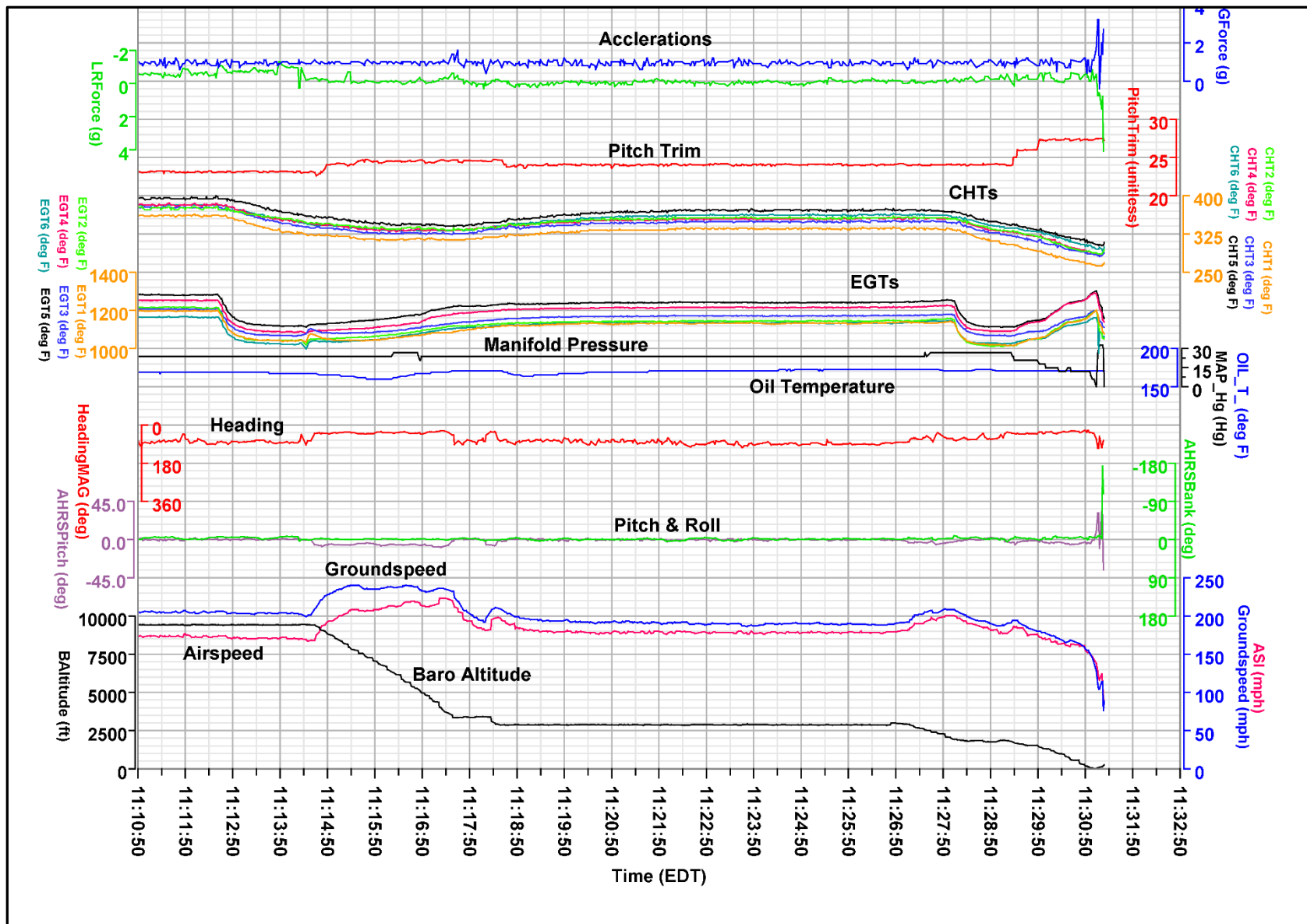


Figure 3. Plot of basic flight and engine parameters for descent phase through the final recorded data points.

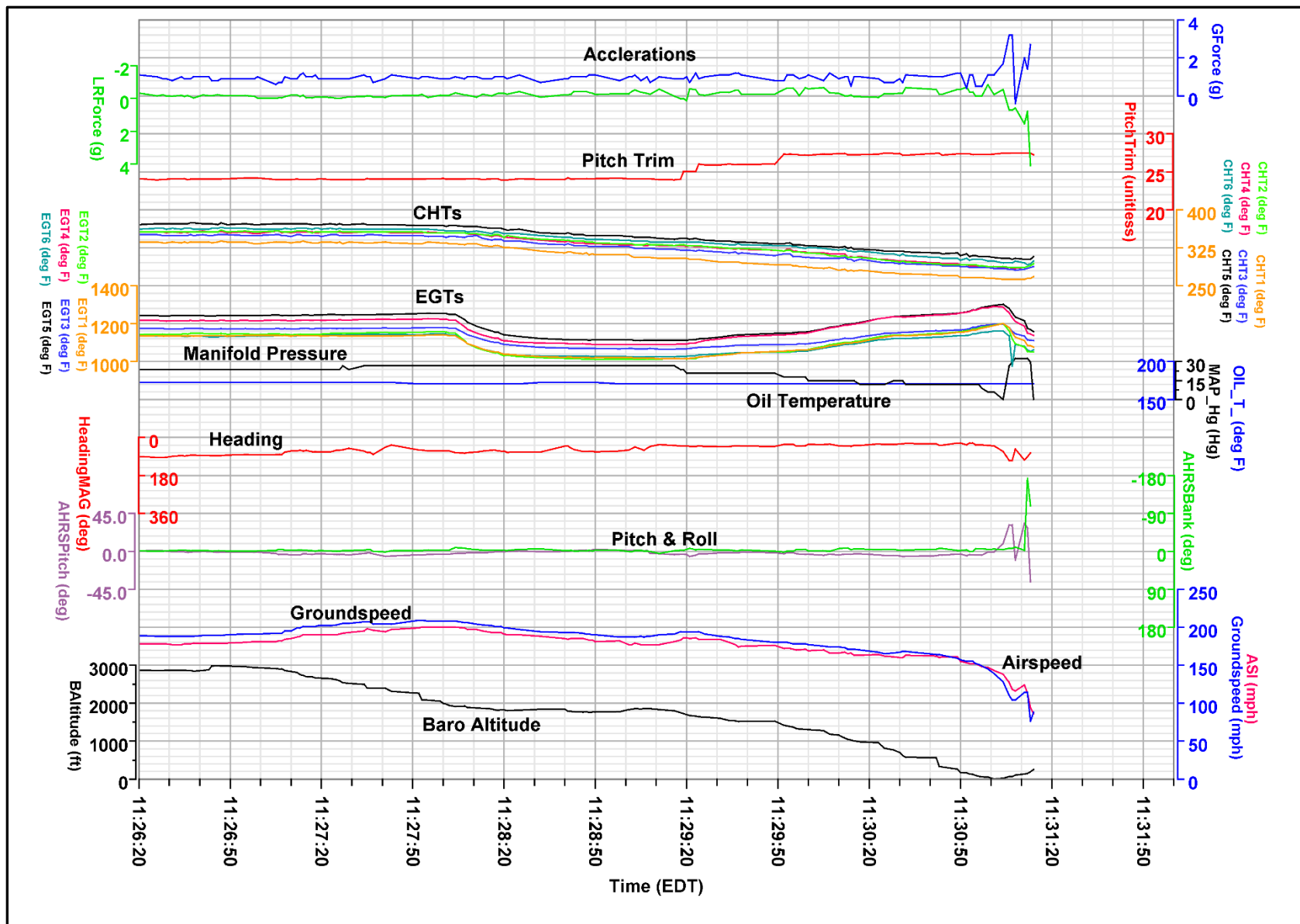


Figure 4. Plot of basic flight and engine parameters for final approach phase of the accident recording.

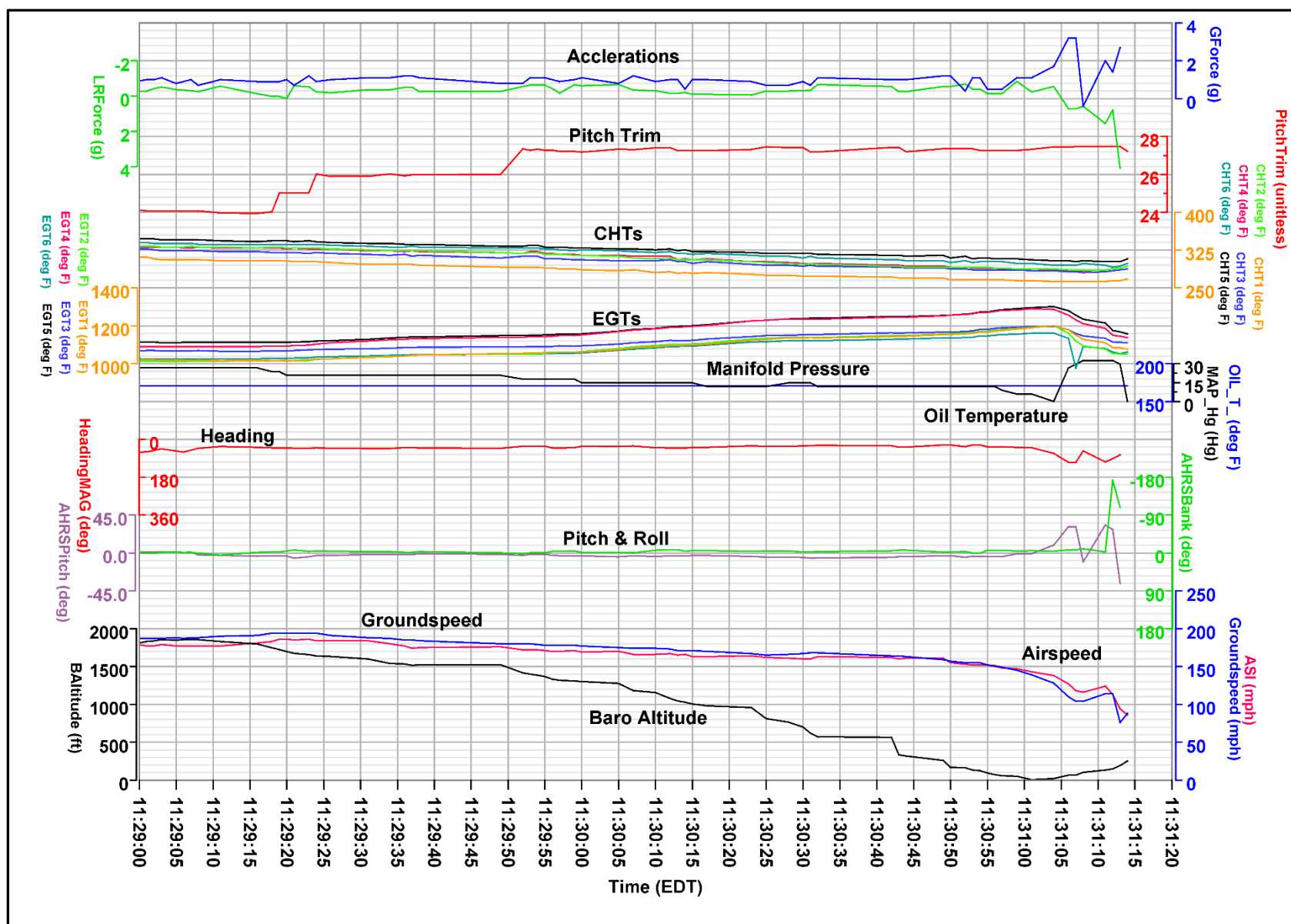


Figure 5. Plot of basic flight and engine parameters for approximately the final 2 minutes of the accident recording.

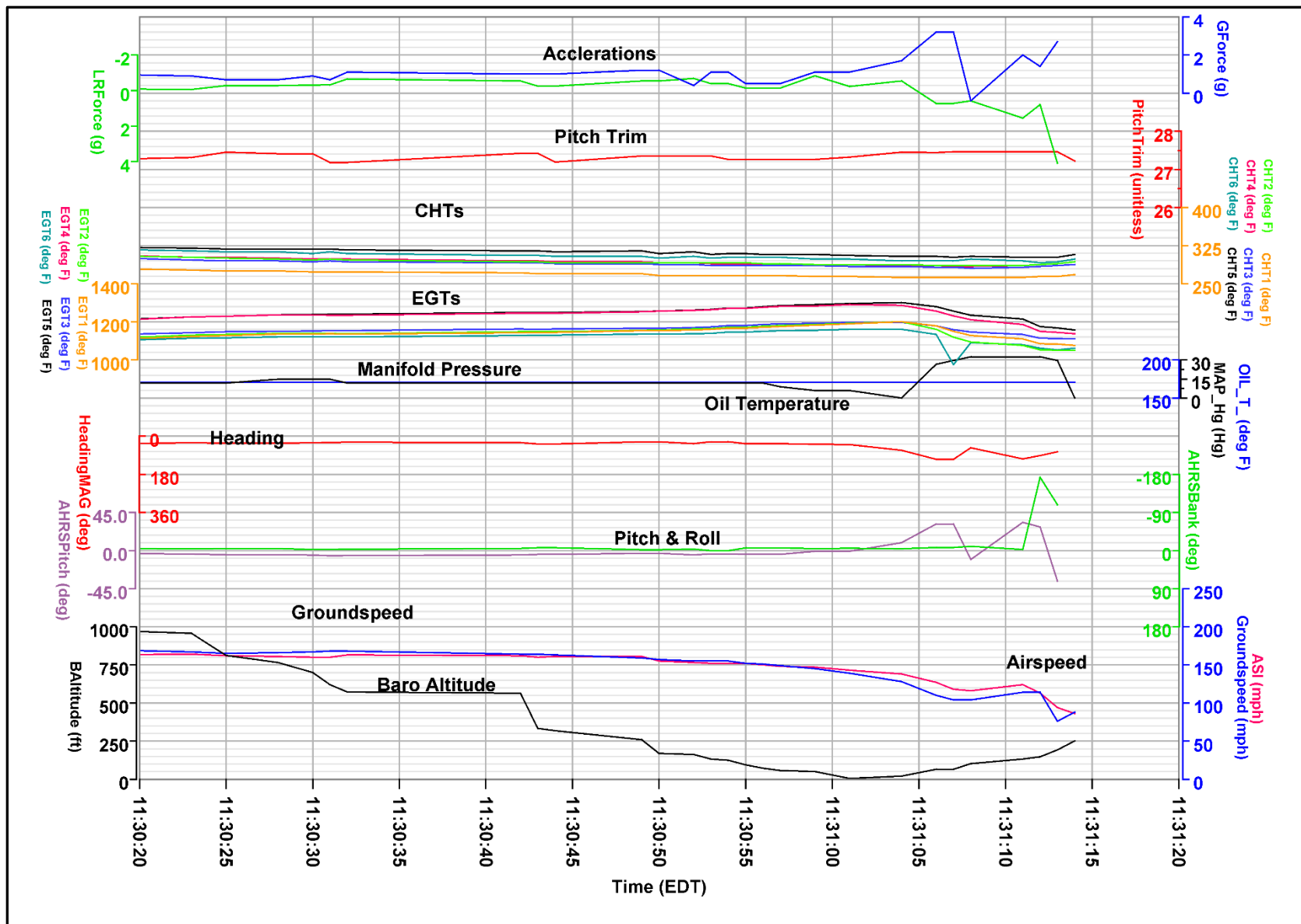


Figure 6. Plot of basic flight and engine parameters for approximately the final 1 minute of the accident recording.

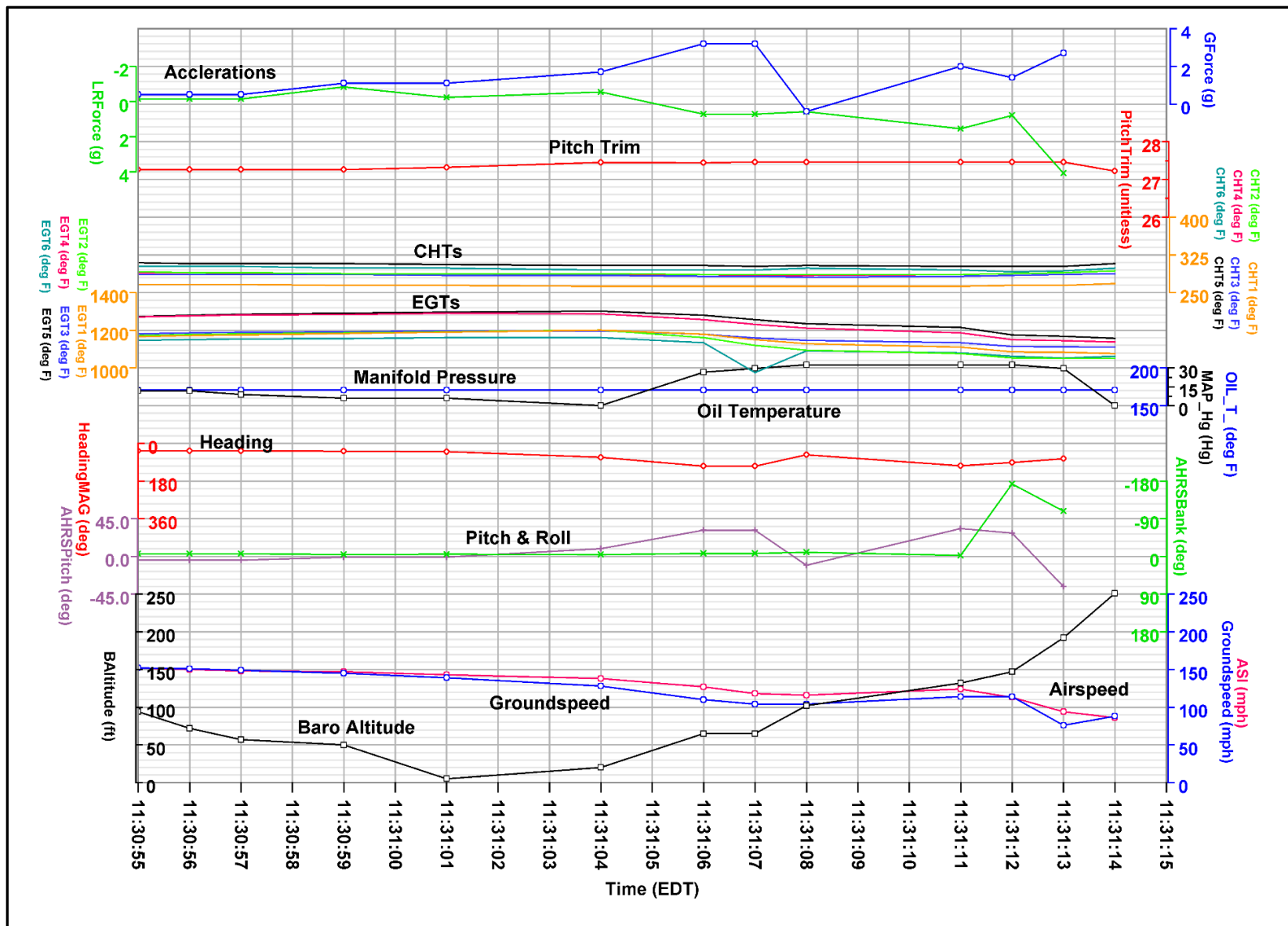


Figure 7. Plot of basic flight and engine parameters for final 20 seconds of the accident recording. Individual data sampling points are annotated as dots.

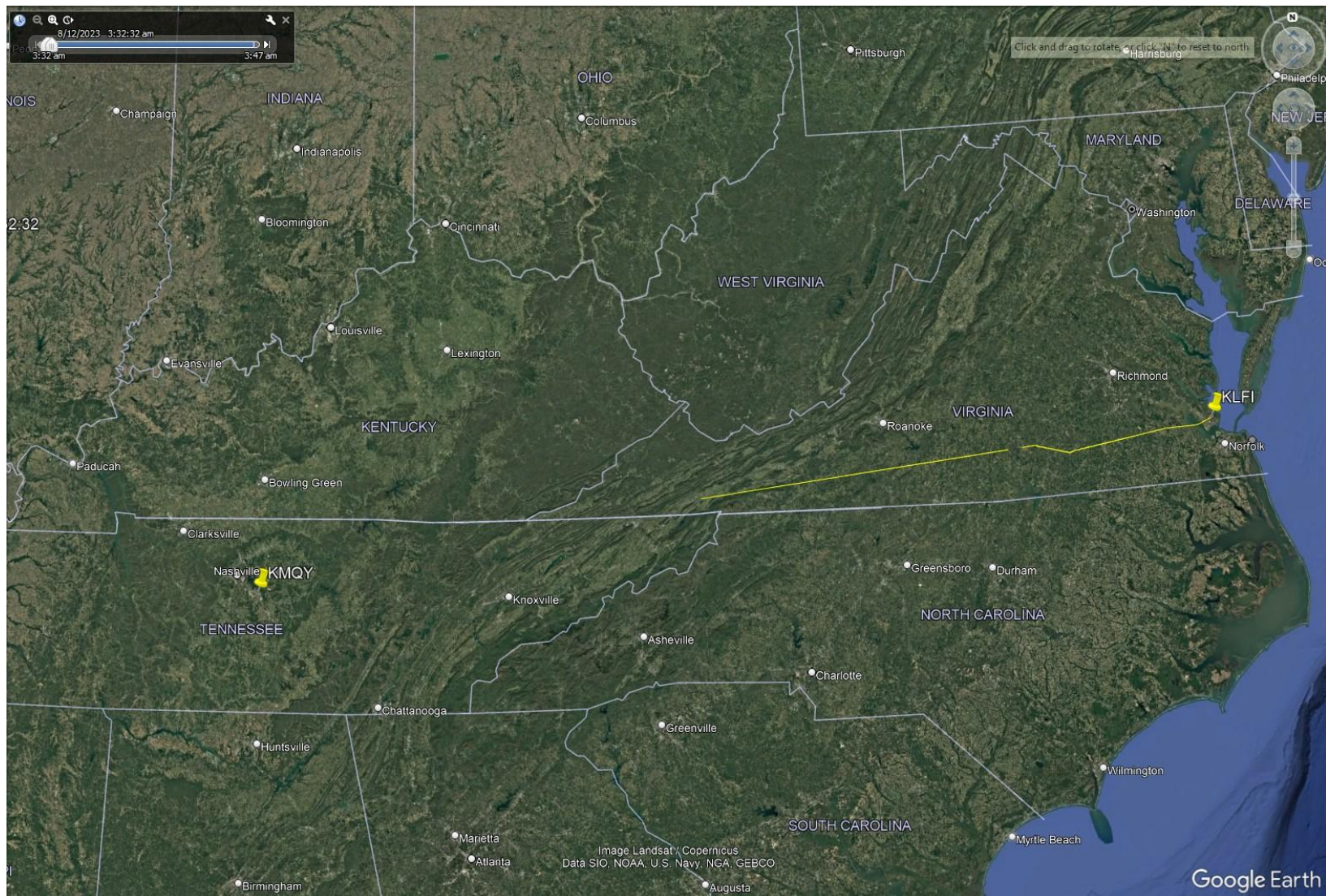


Figure 8. Google Earth overlay showing the entire accident recorded route of flight, the departure and destination locations are annotated with yellow pins.

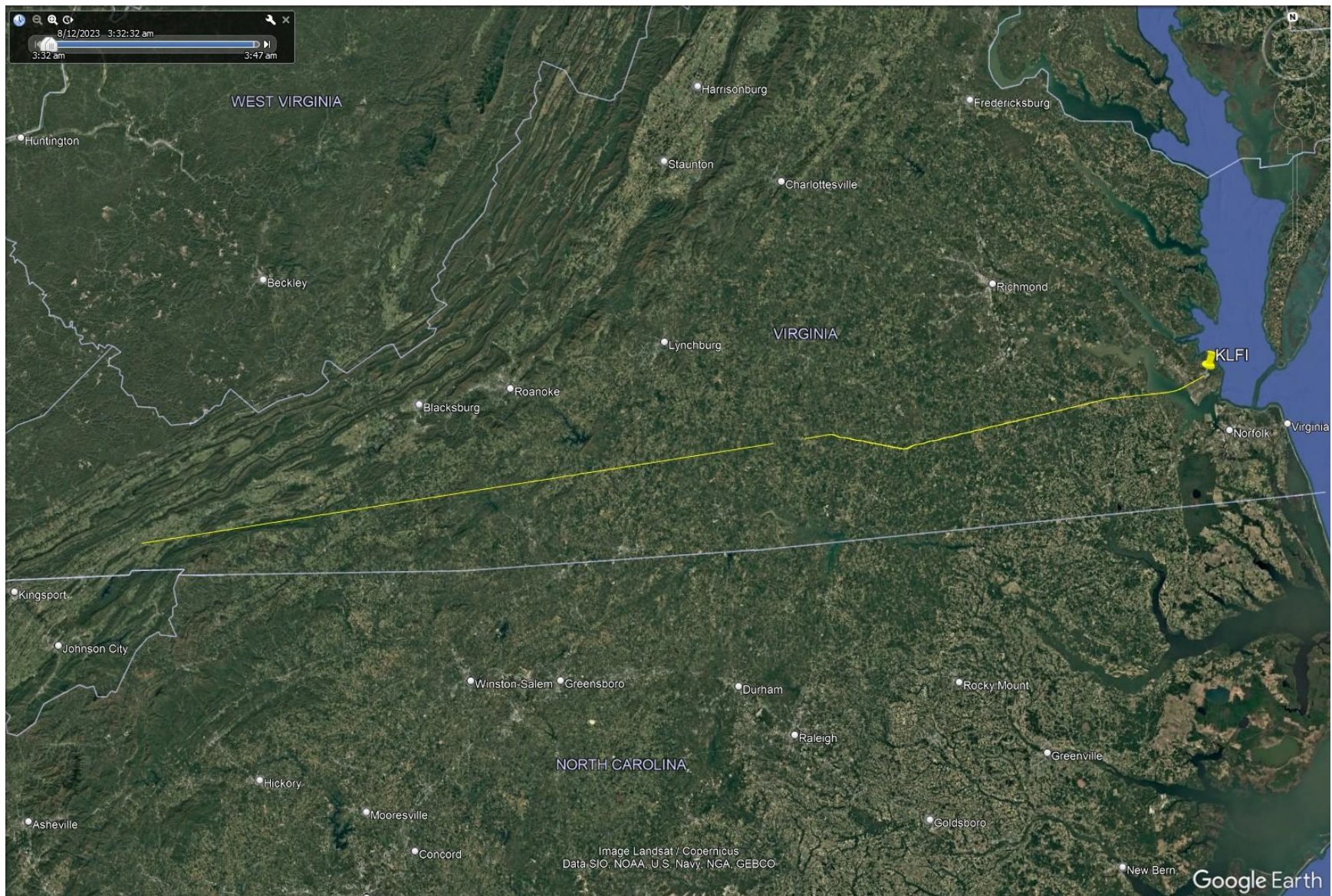


Figure 9. Google Earth overlay showing the entire accident recording.

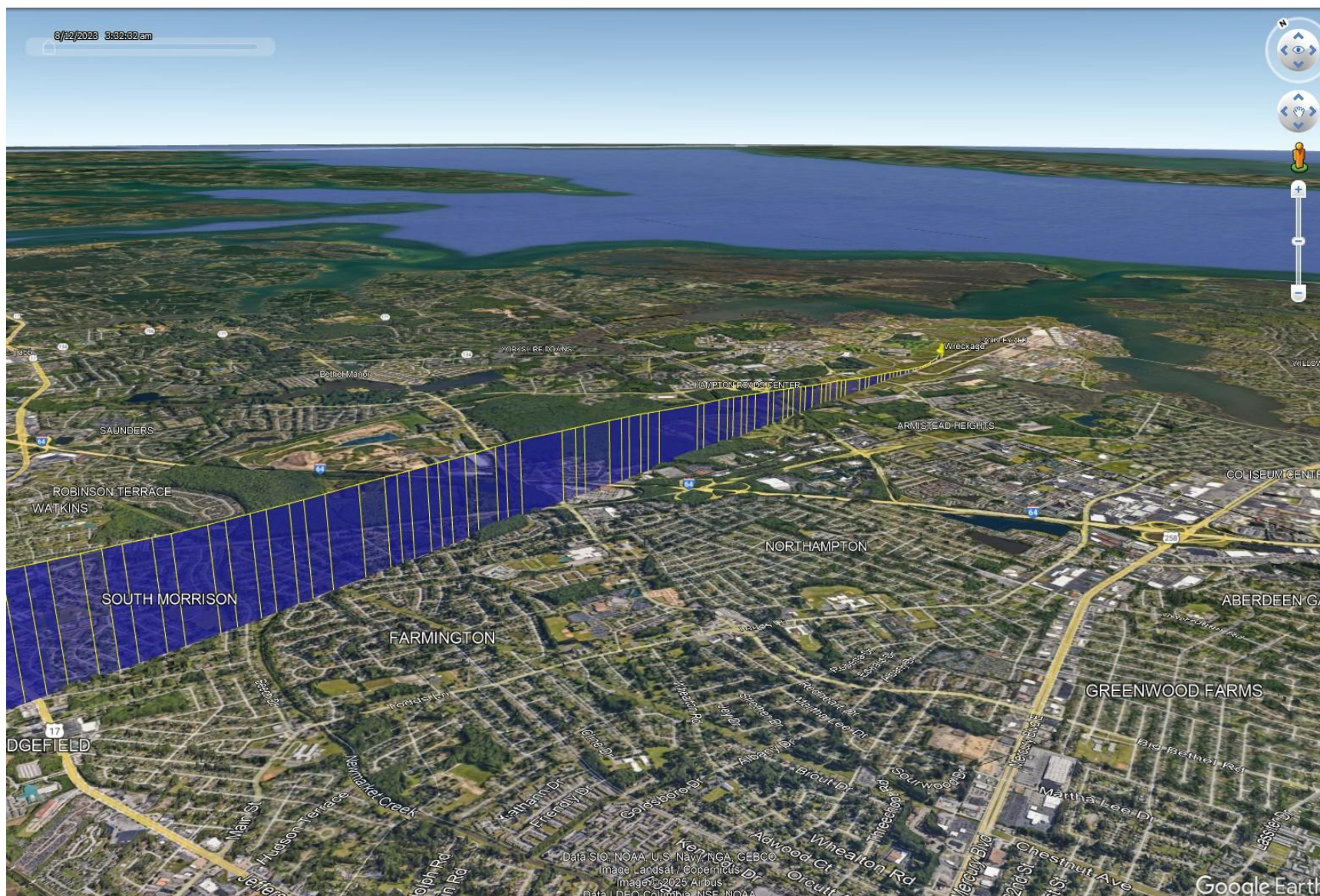


Figure 10. Google Earth overlay showing the final approach phase of flight.



Figure 11. Google Earth overlay showing the final portion of recorded data and the approximate wreckage location.