

# National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA23FA113

## **ELECTRONIC DEVICES**

Specialist's Factual Report

January 7, 2025

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## **A. ACCIDENT**

Location: North Castle, New York  
Date: January 19, 2023  
Time: 1729 eastern standard time (EST)  
2229 coordinated universal time (UTC)  
Airplane: Beech A36, N19MT

## **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:

Recorder Manufacturer/Model: Insight G3  
Recorder Serial Number: 1107

Recorder Manufacturer/Model: Appareo Stratus 3  
Recorder Serial Number: 001929

Recorder Manufacturer/Model: Garmin G5  
Recorder Serial Number: 4JQ043929

Recorder Manufacturer/Model: Garmin G5  
Recorder Serial Number: 4JQ044045

Recorder Manufacturer/Model: Apple iPhone 12 Pro  
Part Number: A2341  
IMEI: 353075116103263

Recorder Manufacturer/Model: Apple iPad Mini  
Part Number: A2133  
Recorder Serial Number: DMPG114BLM94

Recorder Manufacturer/Model: Samsung Galaxy S22 Ultra  
Part Number: SM-S908U1  
IMEI: 357753900215867

## 1.0 Insight G3 Description

The Insight G3 is an engine monitor capable of displaying engine parameters on a color display. Parameters may include manifold pressure, exhaust gas temperature (EGT), cylinder head temperature (CHT), turbine inlet temperature, fuel flow, RPM, oil temperature, and oil pressure. Non-volatile memory<sup>1</sup> is recorded on a front mounted SD card in comma separated value (CSV) format.

### 1.1 Insight G3 Data Recovery

Figure 1 shows the device as received. Data were extracted normally from the SD card.



**Figure 1.** Insight G3 as received.

### 1.2 Insight G3 Data Description

Data included files recorded from August 5, 2011, through January 19, 2023. An offset of 11,082 seconds was applied to the data such that it displays in UTC. The offset was determined by correlating the application of takeoff power from G3 engine parameters to GPS data from the Appareo Stratus device. Data were sampled at 1 Hz. Not all parameters recorded were validated by the recorder specialist. Table 1 describes Insight G3 parameters provided and verified in this report.

**Table 1.** Verified and provided Insight G3 parameters

| Parameter Name  | Parameter Description                                       |
|-----------------|-------------------------------------------------------------|
| EGT # (degF)    | Exhaust Gas Temperature # <sup>2</sup> (degrees Fahrenheit) |
| CHT # (degF)    | Cylinder Head Temperature # (degrees Fahrenheit)            |
| FUEL FLOW (gph) | Fuel Flow (gallons per hour)                                |
| MP (inHg)       | Manifold Pressure (inches of Mercury)                       |
| RPM (FT-LB)     | Engine Revolutions Per Minute                               |
| OIL PRESS (psi) | Oil Pressure (pounds per square inch)                       |

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

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

## 2.0 Appareo Stratus 3 Description

The Appareo Stratus 3 device is a self-contained battery-powered unit that contains an internal AHRS, GPS/WAAS receiver, and ADS-B receiver in one compact unit.<sup>3, 4, 5</sup> The unit communicates wirelessly with compatible devices to display all the acquired information. In addition to communicating with compatible devices, the Stratus device records GPS position and AHRS information internally on a non-volatile flash memory chip.

### 2.1 Appareo Stratus 3 Data Recovery

The device was in good condition upon arrival at the Vehicle Recorder Laboratory, as shown in Figure 2, and data were downloaded normally using the manufacturer's procedures.



**Figure 2.** Front and back of the Appareo Stratus 3 as received.

<sup>3</sup> The Attitude Heading Reference System (AHRS) consists of a set of 3-axis gyroscope, accelerometers, and heading reference sensors that enable the unit to compute pitch, roll, and yaw motions.

<sup>4</sup> The Wide Area Augmentation System (WAAS) is an air navigation aid to augment the Global Positioning System (GPS), by improving its accuracy, integrity, and availability.

<sup>5</sup> 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).

## **2.2 Appareo Stratus 3 Data Description**

The device contained sessions recorded from December 1, 2022 through January 19, 2023 Coordinated Universal Time (UTC). The accident session started at 21:48:25 UTC and ended at 22:30:12 UTC on January 19, 2023.

## **3.0 Garmin G5 Description**

The Garmin G5 is an electronic flight instrument with a 3.5-inch color display that can be installed as an attitude display indicator (ADI) and/or horizontal situation indicator (HSI). The G5 contains integrated attitude and air data sensors and can also be interfaced with external sensors. Non-volatile memory is recorded to a front mounted microSD card.

### **3.1 Garmin G5 Data Recovery**

Figure 3 shows the G5 devices as received. Neither device contained a microSD card, thus no data were recovered.



**Figure 3.** Garmin G5 devices as received.

## **4.0 Personal Electronic Devices (PEDs) Description**

PEDs are a category of devices comprised primarily of portable computing devices and mobile phones. Portable computing devices are typically capable of internet access, email, messaging services, and can run user-installed applications to perform specific tasks. Depending on the model, mobile phones can perform many of the same tasks as portable computing devices, plus have voice call and text messaging capabilities. PED user and system data is typically stored on non-volatile memory and can be accessed through manufacturer-provided interfaces.

#### **4.1 Personal Electronic Devices (PEDs) Data Recovery**

The condition of the devices upon arrival at the Vehicle Recorder Laboratory is shown in Figure 4 through Figure 6.

The iPhone 12 Pro powered on normally and was protected by a 6-digit numeric passcode. No passcode for this device was provided, thus no data were recovered.

The iPad Mini sustained impact damage rendering it inoperable. The internal logic board was removed and attempted to be powered on using surrogate laboratory parts. The device was unable to power on, thus no data were recovered.

The Samsung Galaxy S22 Ultra sustained impact damage rendering it inoperable. Damage to the internal components was revealed upon inspection. The damage sustained precluded normal recovery procedures, thus no data were recovered.



**Figure 4.** iPhone 12 Pro as received



**Figure 5.** iPad Mini as received.



**Figure 6.** Samsung Galaxy S22 Ultra as received.

## **D. FIGURES AND TABULAR DATA**

Figure 7 through Figure 9 are Google Earth overlays of the accident flight recorded on Appareo Stratus 3. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the accident flight. Figure 7 shows the entire flight. Figure 8 shows approximately the last 4 minutes of recorded data. Figure 9 shows approximately the last minute of recorded data.

Figure 10 is a plot of parameters of the entire accident flight recorded on the Insight G3. The time displayed is 21:54:00 to 22:29:00 UTC.

Figure 11 is a plot of parameters at the end of the accident flight recorded on the Insight G3. The time displayed is 22:19:00 to 22:29:00 UTC.

Figure 12 is a plot of parameters from the previous flight recorded on January 19, 2023. The time displayed is 15:35:00 to 18:05:00 UTC.

Values for EGT 4 from previous recorded data were reviewed and the values for this cylinder did not trend with the other EGT parameters, starting in January 2023. Data appeared noisy and the values were erratic and this parameter is not included in the plots. The last recorded data where EGT 4 trended with other EGT parameters was on December 13, 2022.

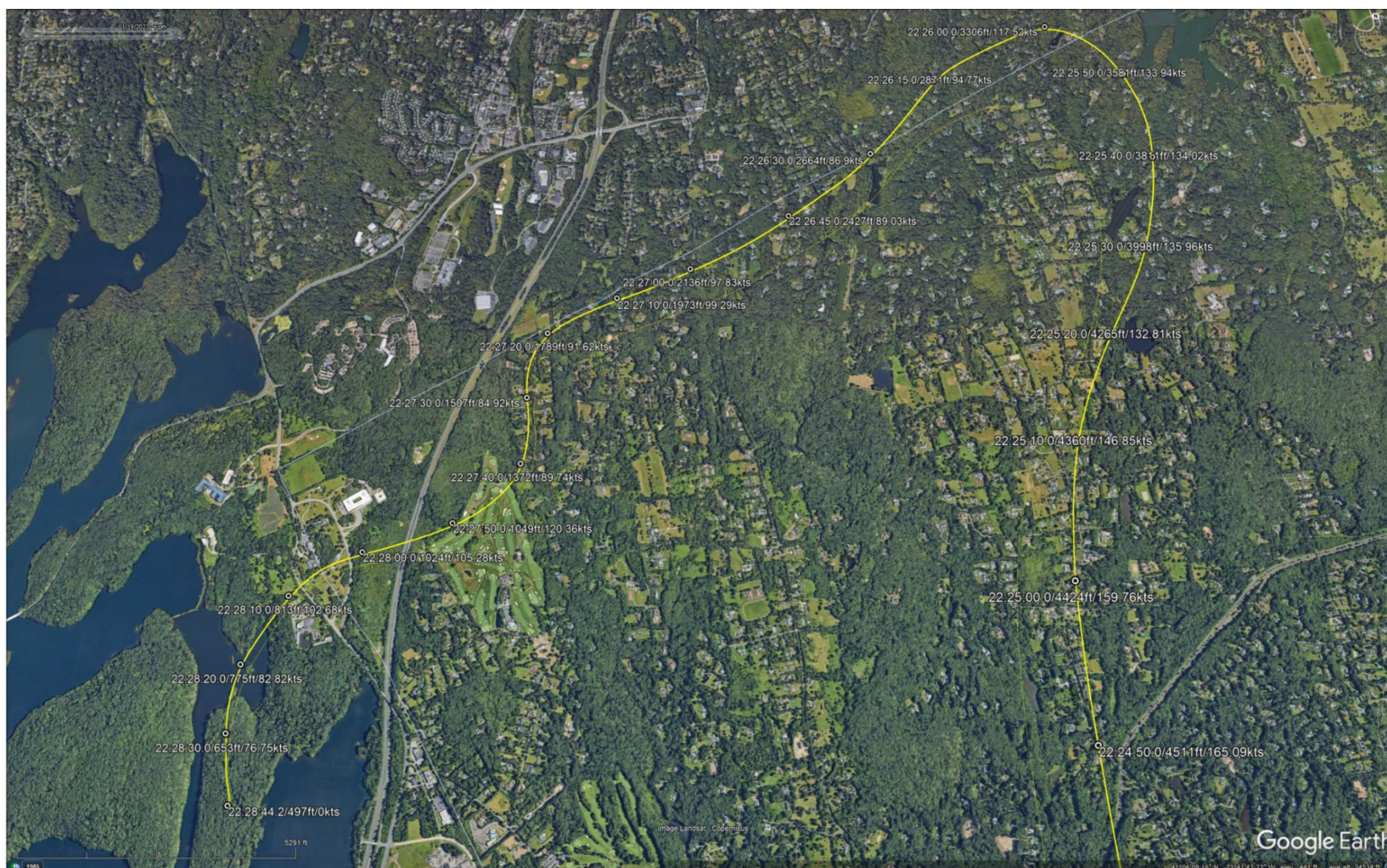
The corresponding tabular data used to create Figure 7 through Figure 9 are provided in CSV format as attachment 1 to this report. Data used to create Figure 10 and Figure 11 are provided in CSV format as attachment 2 to this report. Data used to create Figure 12 are provided in CSV format as attachment 3 to this report.

Submitted by:

Gerald Kawamoto  
Recorder Specialist



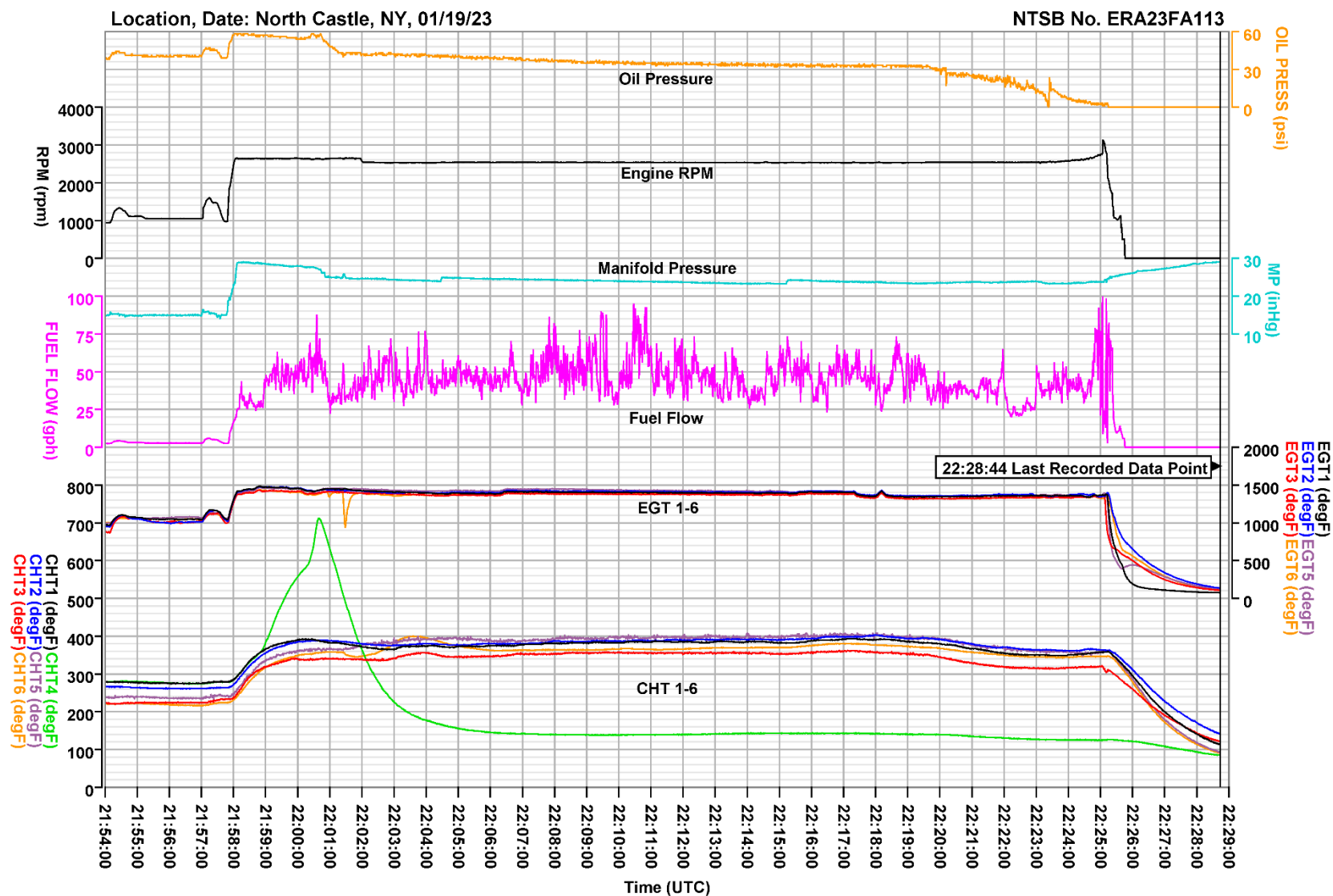
**Figure 7.** Google Earth overlay of the entire accident flight recorded on the Appareo Stratus 3.



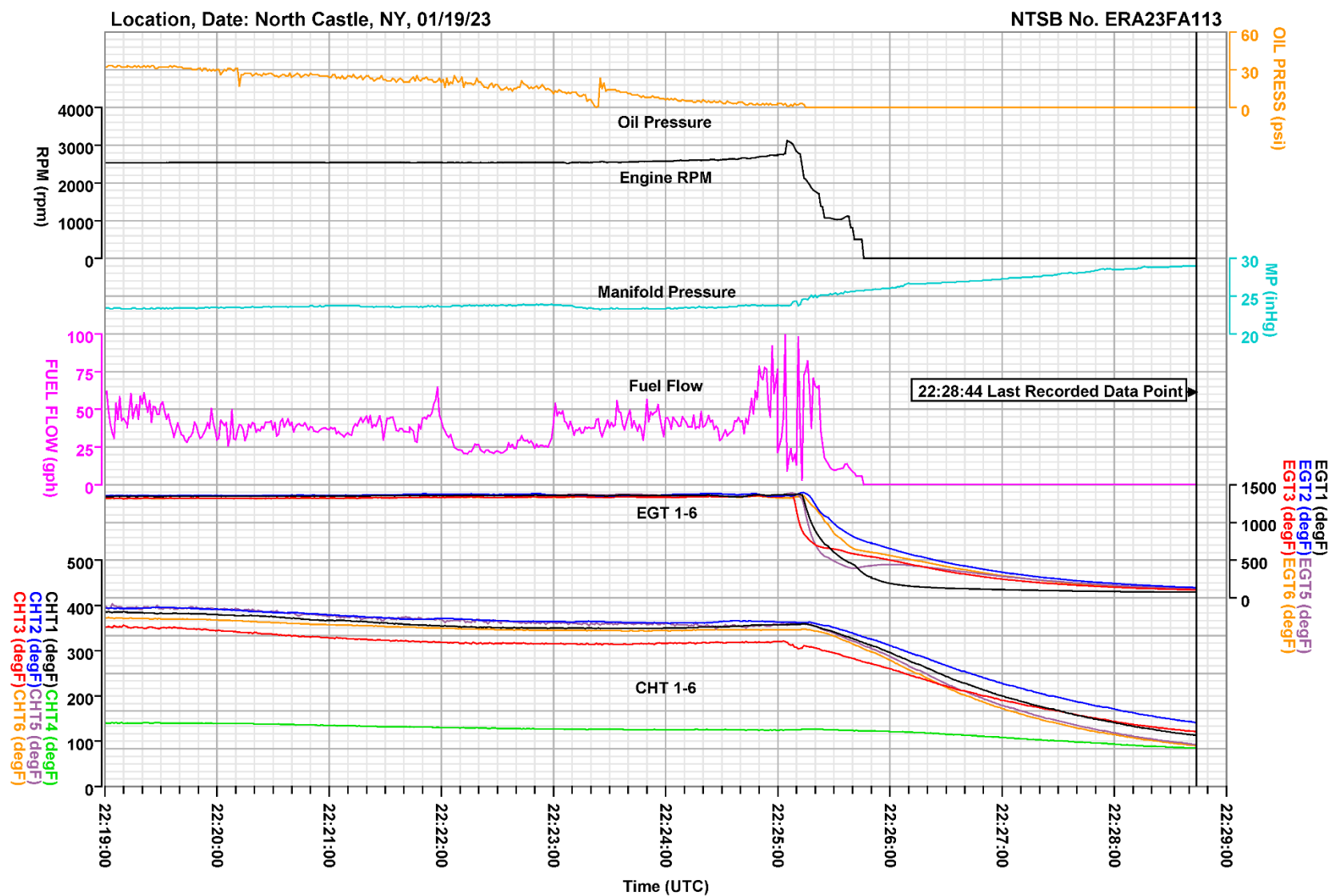
**Figure 8.** Google Earth overlay of the final four minutes of the accident flight recorded on the Appareo Stratus 3.



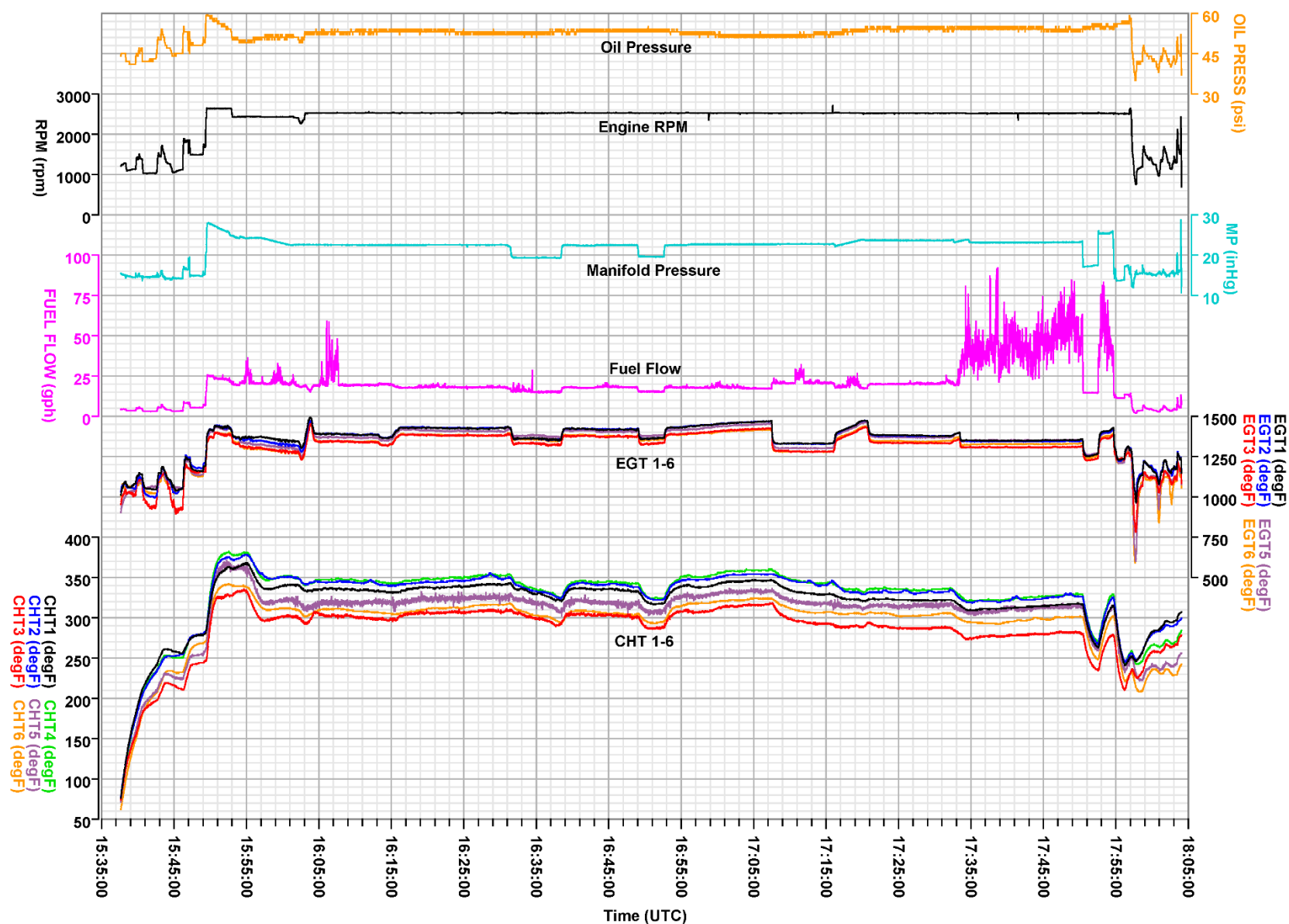
**Figure 9.** Google Earth overlay of the final minute of the accident flight recorded on the Appareo Stratus 3.



**Figure 10.** Plot of Insight G3 parameters of the entire accident flight.



**Figure 11.** Plot of Insight G3 parameters at the end of the accident flight.



**Figure 12.** Plot of Insight G3 parameters from the previous flight recorded on January 19, 2023.