

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, D.C. 20594

April 8, 2020

Electronic Devices

Specialist's Factual Report
by Michael Portman

1. EVENT

Location: Tamaqua, PA
Date: October 18, 2019
Aircraft: Sportine Aviacija Lak-17B
Registration: N830DK
Operator: Private
NTSB Number: ERA20FA013

On October 18, 2019, about 1542 eastern daylight time, a Sportine Aviacija Lak-17B motorized glider, N830DK, was substantially damaged when it impacted terrain near Tamaqua, Pennsylvania. The commercial pilot was fatally injured. Visual meteorological conditions prevailed, and no flight plan was filed for the personal local flight that departed Blairstown Airport (1N7), Blairstown, New Jersey about 0945. The glider was owned and operated by the commercial pilot, under the provisions of Title 14 *Code of Federal Regulations* Part 91.

2. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following devices:

Device 1: Power FLARM
Device 1 Serial Number: Unknown
Device 2: LxNav v9 Variometer
Device 2 Serial Number: 00017
Device 3: Asus Nexus 7 Tablet (2013)
Device 3 Serial Number: Unknown

2.1. Power FLARM Device Description

The FLARM system is an electronic system used to selectively alert pilots to potential collisions between aircraft. The FLARM obtains its position and altitude readings from an internal GPS and a barometric sensor and then broadcasts this together with forecast data about the future 3D flight track.

FLARM is equipped with a receiver which listens for other FLARM devices within range and processes the information received. FLARM is also equipped with engine noise level sensor that monitors engine noise.

2.1.1. Power FLARM Data Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed the unit had sustained significant impact damage, as shown in Figure 1. The Non-Volatile Memory (NVM)¹ chip was identified and removed from the device, and information was extracted using the laboratory techniques. The data was then decoded with technical assistance from the government of France's *Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile* (Bureau of Enquiry and Analysis for Civil Aviation Safety, or BEA).

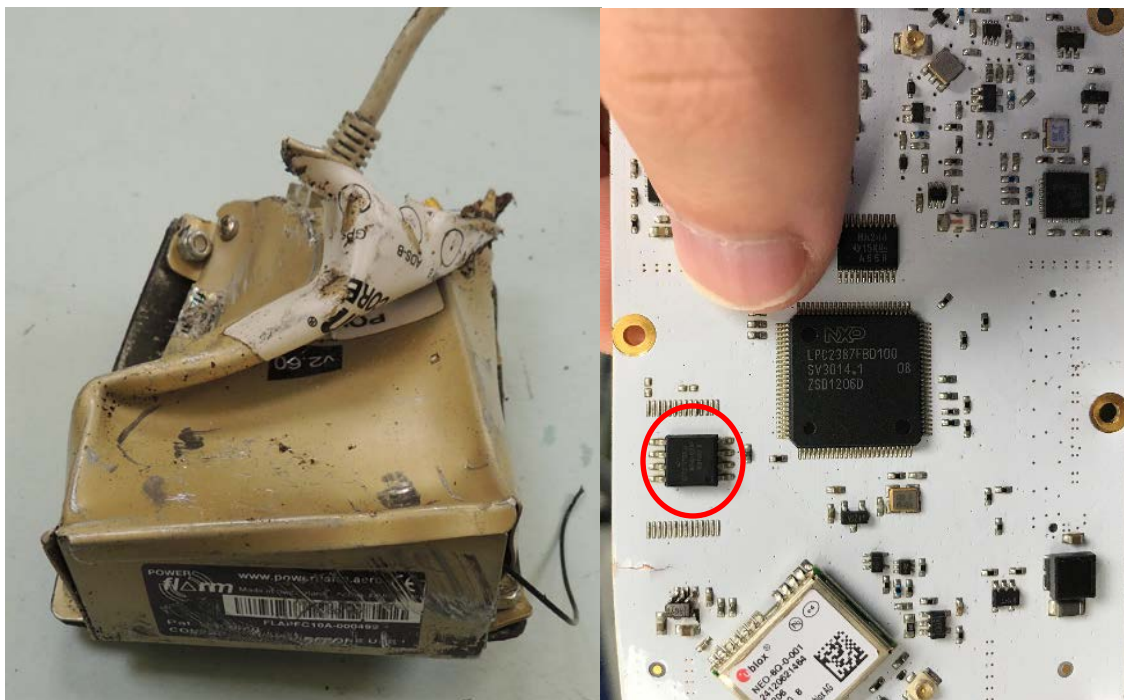


Figure 1. Photos of FLARM device showing impact damage and internal circuitry showing memory chip, highlighted in red.

2.1.2. Power FLARM Data Description

The data extracted included 11 sessions (102,729 total data points) from July 16, 2019,² through October 18, 2019. The accident flight was the last session, recorded starting at 13:43:28 UTC and ending at 16:26:25 UTC on October 18, 2019 (35,287 total data points).

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

² All dates and times are referenced to Coordinated Universal Time (UTC) unless otherwise specified.

2.1.2.1. Parameters Provided

Table 1 describes data parameters provided by the FLARM.

Table 1. FLARM Data Parameters.

Parameter Name	Parameter Description
Engine Noise Level (ENL)	Recorded Engine Noise Level (N/A)
Estimated Position Error (EPE)	Estimated GPS Position Error (N/A)
GNSS Altitude	Recorded Global Navigation Satellite System Altitude (feet)
Latitude	Recorded Latitude (degrees)
Longitude	Recorded Longitude (degrees)
Number of Satellites (Nb_Sat)	Number of Satellites detected
Pressure Altitude	Recorded Pressure Altitude (feet)
Time	Time (UTC) for recorded data point (HH:MM:SS)

2.2. LxNav v9 Variometer Device Description

The LxNav v9 is a digital variometer with an inertial platform which measures, displays, and enunciates vertical speed information using a combination of inputs including accelerometers and pressure data. Data is stored on a microSD memory card.

2.2.1. LxNav v9 Variometer Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained significant impact damage as shown in Figure 2. Upon internal inspection, the microSD memory card was located and identified, however, the card had sustained significant impact damage and had cracked in half, as shown in Figure 2. Thus, it was determined that recovery of data was not possible.

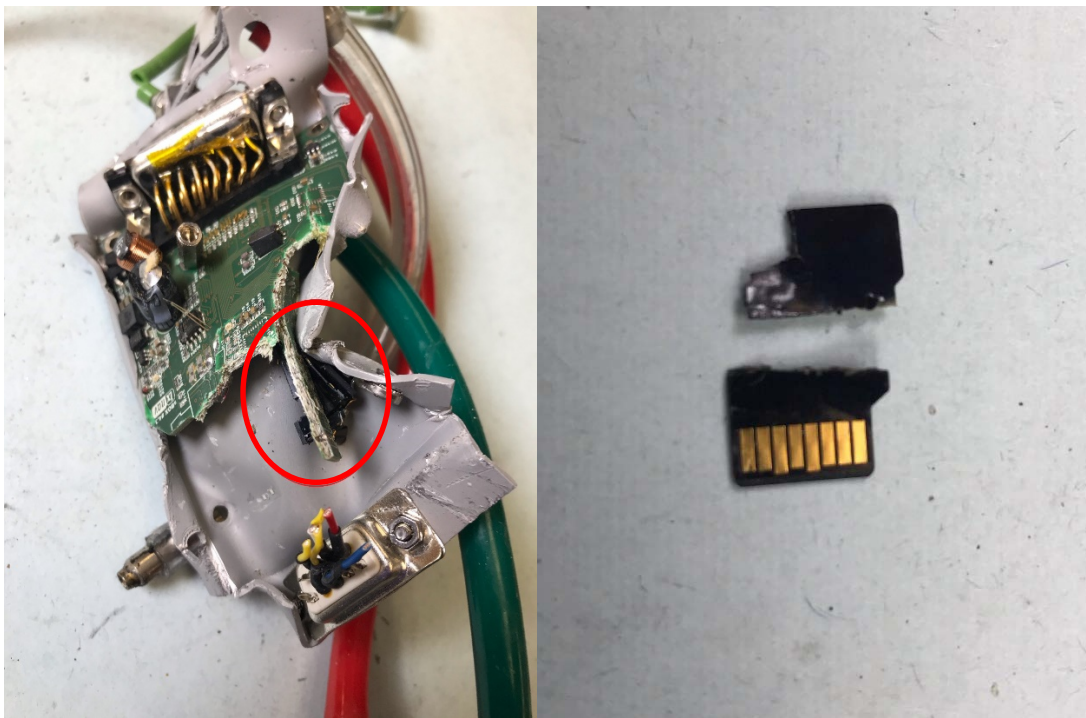


Figure 2. Photos showing damaged LxNav v9 variometer, with location of microSD card highlighted in red, and recovered cracked microSD card.

2.3. Asus Nexus 7 (2013) Tablet Device Description

Personal Electronic Devices (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 (NVM) and can be accessed through manufacturer-provided interfaces.

2.3.1. Asus Nexus 7 (2013) Tablet Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained significant impact damage, as shown in Figure 3. The memory chip was identified and appeared intact, however, upon discussion with the Investigator In Charge, it was determined that data recovery would not be attempted, as unique data pertinent to the investigation is unlikely to have been recorded.

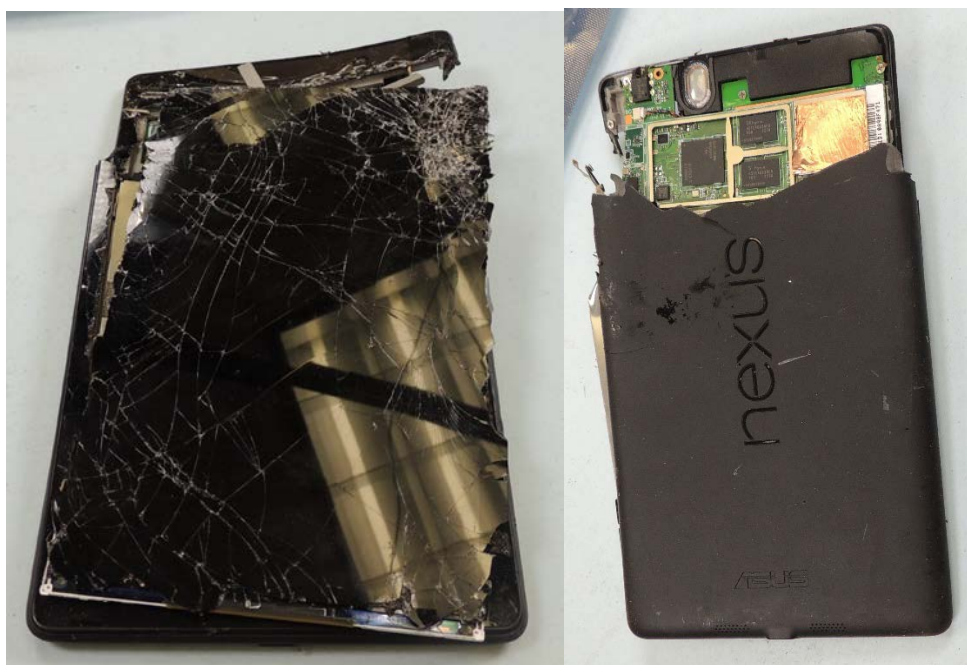


Figure 3. Photos of damaged Asus Nexus 7 (2013) tablet front and rear.

2.4. Plots and Corresponding Data

Figures 4 through 6 are graphical overlays generated using Google Earth showing the accident flight. The altitudes plotted are GPS altitudes. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

The device started recording data at 13:43:28 UTC. Shortly thereafter, the flight took off from 1N7. The last recorded parameter was at 19:37:34 UTC.

Examination of the data recovered from the FLARM indicated some form of sampling error or data dropout. Notably, many of the parameters have large triangular sawtooth patterns, as shown below in the overview plot, Figure 8. The time interval is from 13:43:00 to 19:43:00.

Figure 9 is an overview plot of recorded parameters, but with the sawtooth pattern clipped to show the recorded data (specifically Nb_Sat, EPE, and ENL) in finer detail. The time interval is from 13:43:00 to 19:43:00.

Figure 10 is a plot of recorded parameters for the last 10 minutes of flight. The time interval is from 19:28:00 to 19:38:00.

Figure 11 is a plot of recorded parameters for the last 10 minutes of flight, but with the sawtooth pattern clipped to show the recorded data (specifically Nb_Sat, EPE, and ENL) in finer detail. The time interval is from 19:28:00 to 19:38:00.

The corresponding tabular data used to create Figures 4 through 11 are provided in electronic comma separated value (.CSV) format as Attachment 1 to this report.

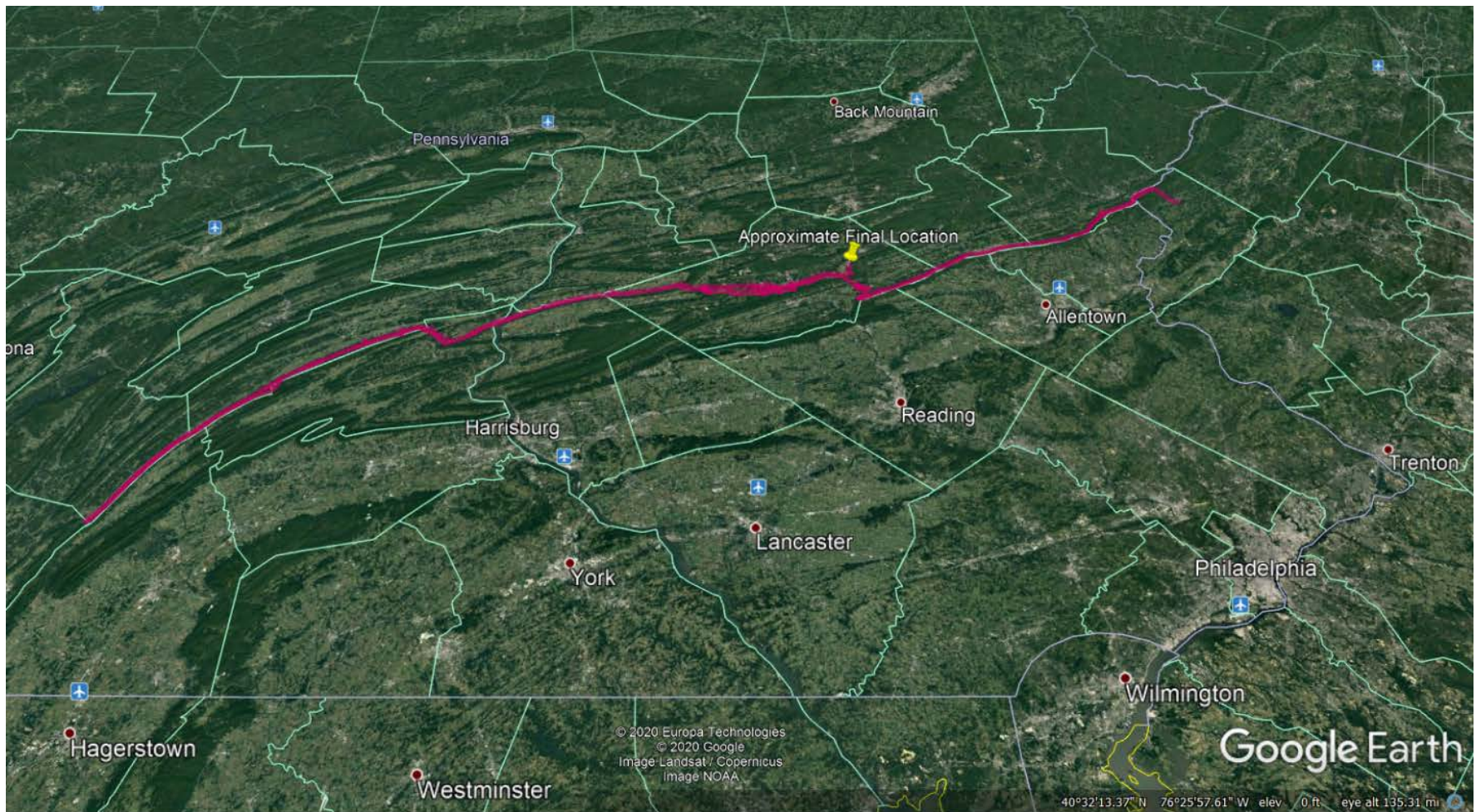


Figure 4. Google Earth overlay of the entire flight.



Figure 5. Google Earth overlay of latter portion of the flight.



Figure 6. Google Earth overlay of final moments of the flight, including approximate wreckage location denoted by the yellow pin.

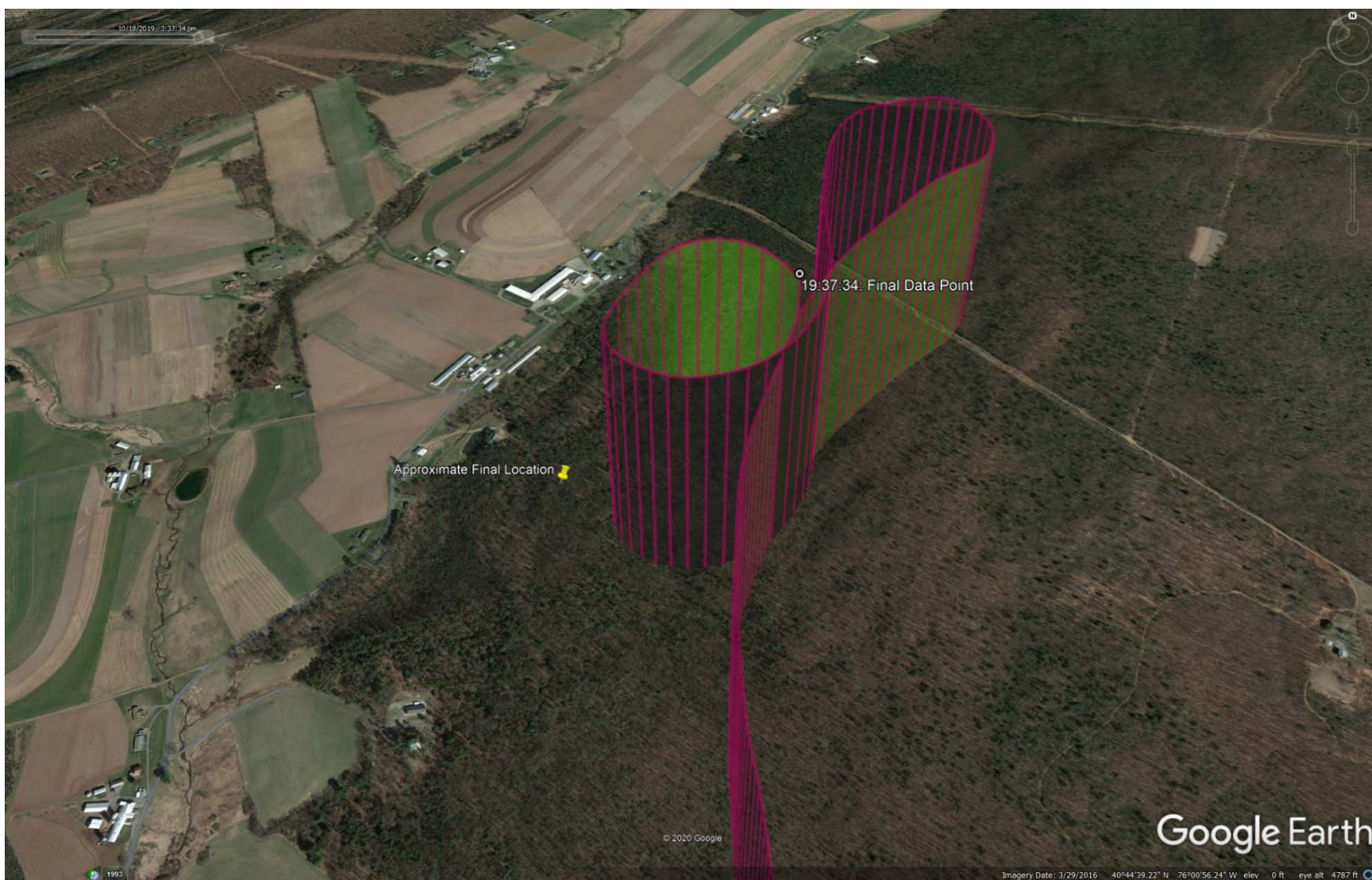
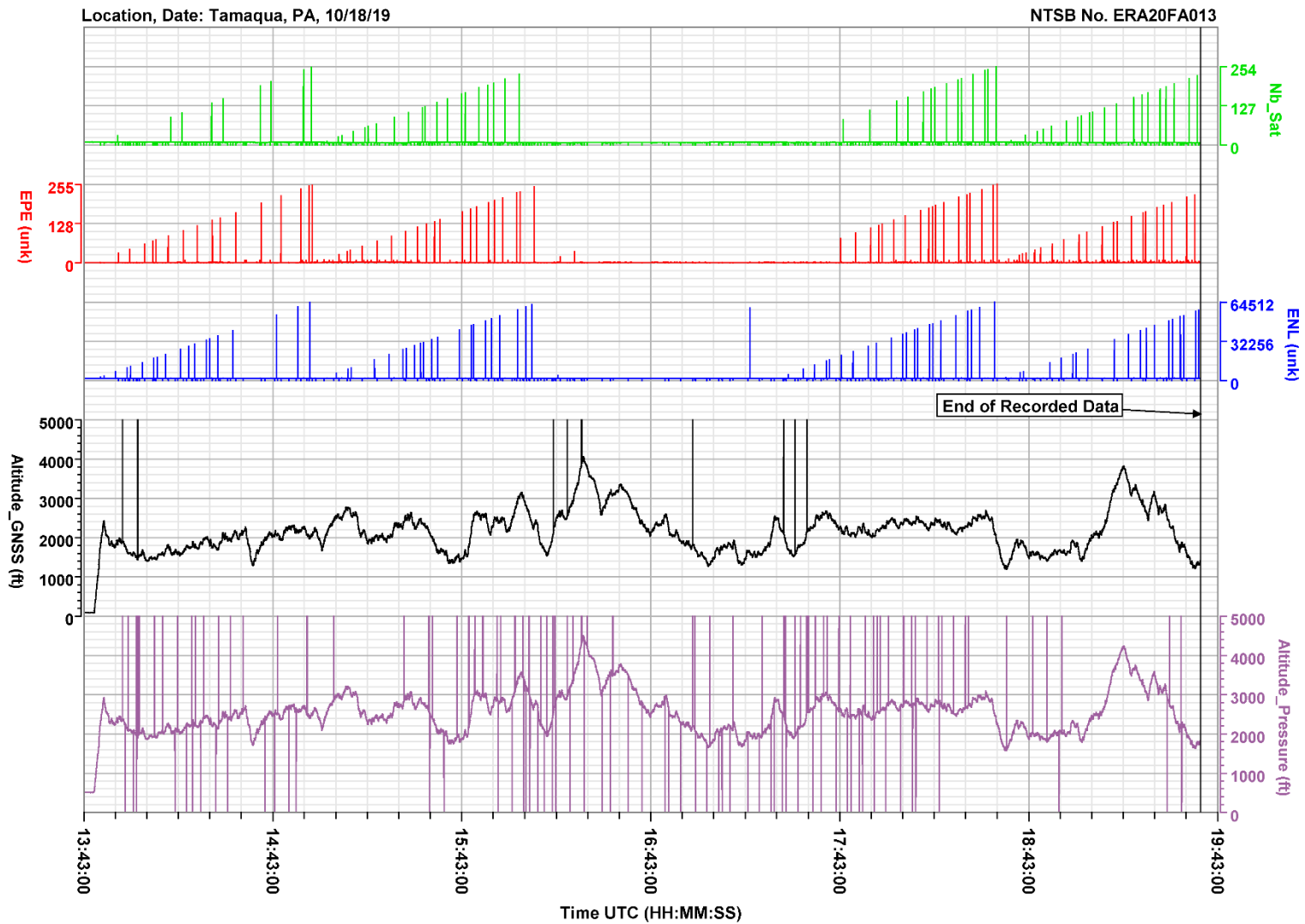
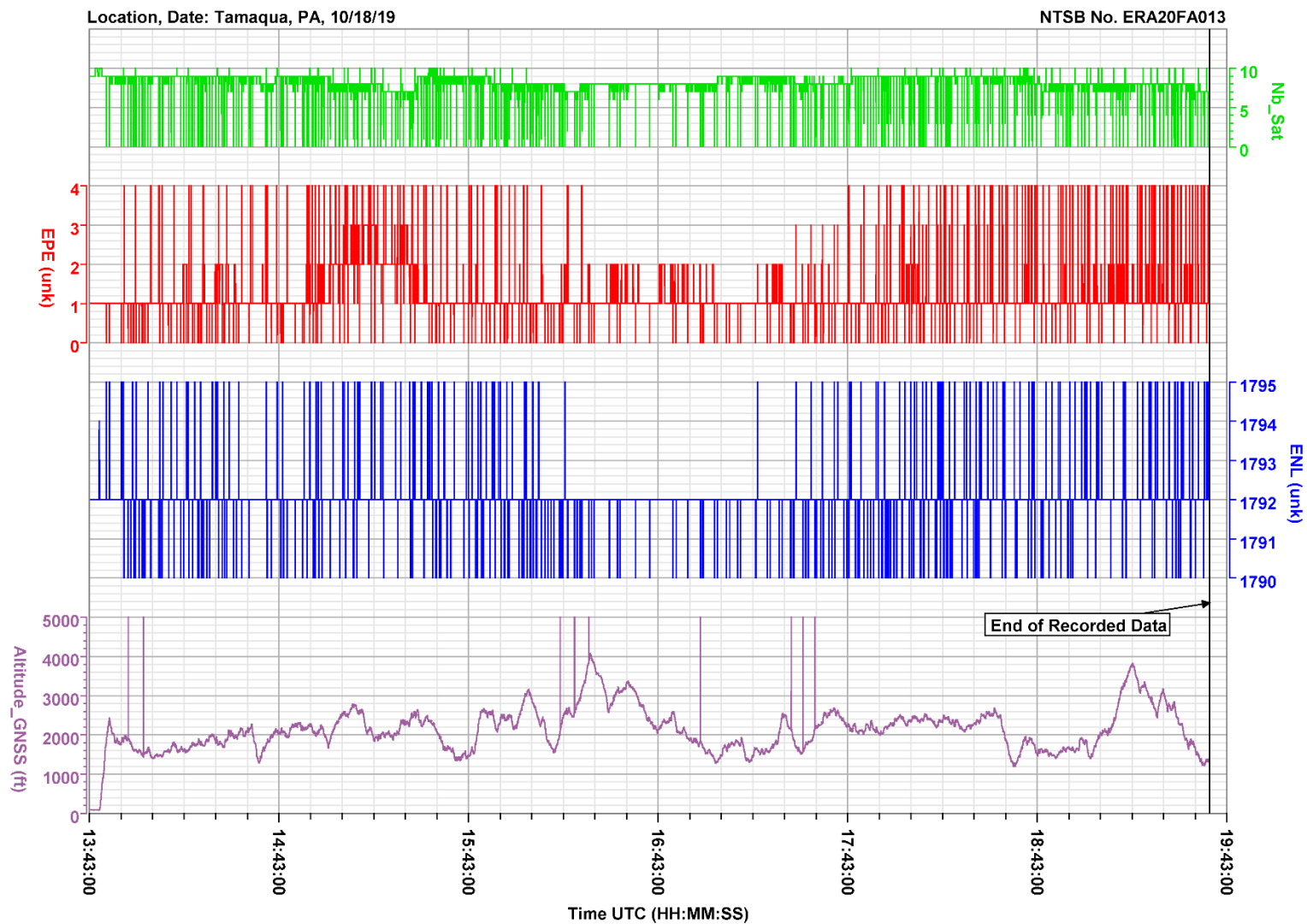


Figure 7. Google Earth overlay detail of final moments of the flight, including approximate wreckage location denoted by the yellow pin.



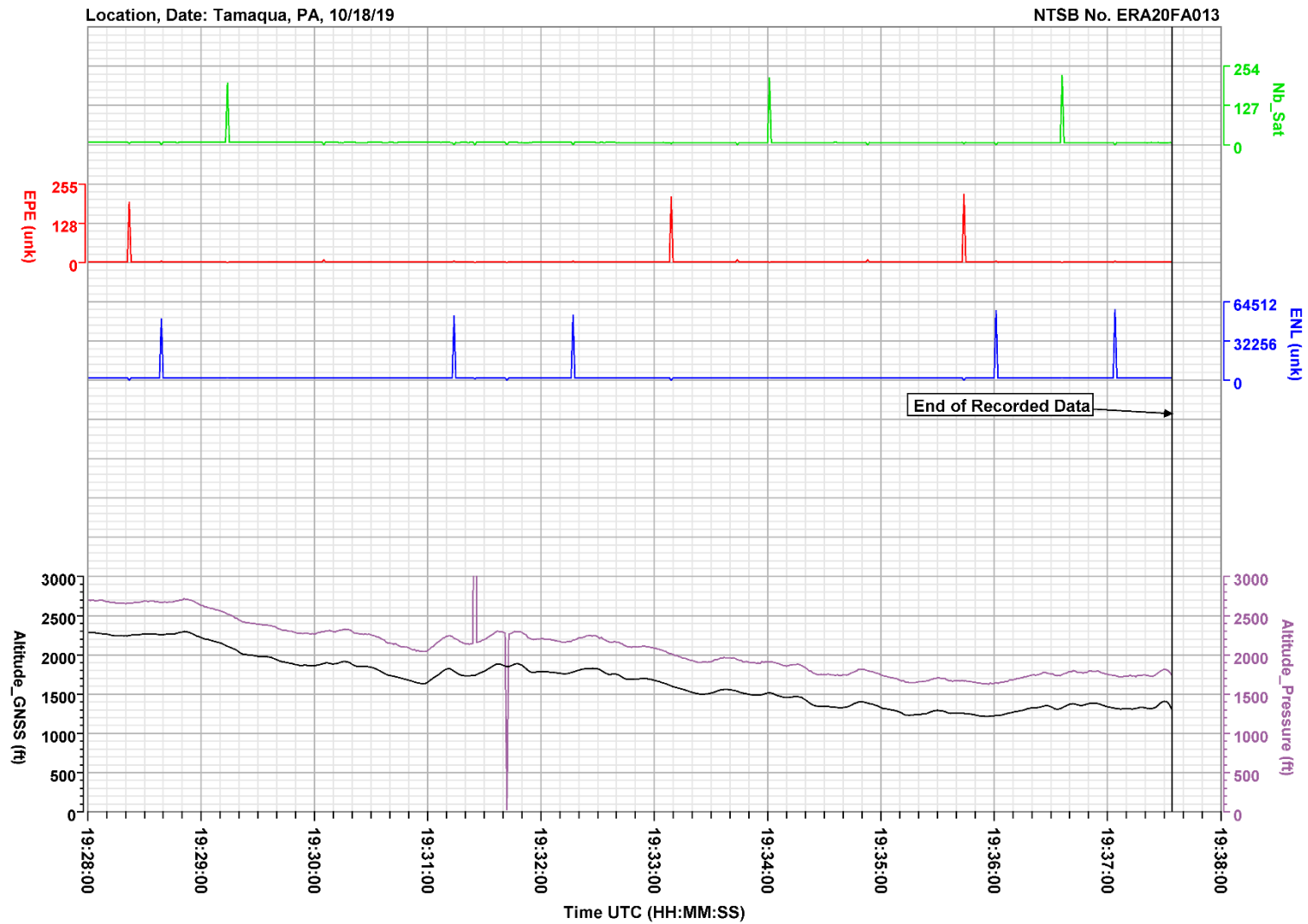
Private, Sportline Aviacija Lak 17, N830DK

Figure 8. Overview of parameters for entire flight, showing triangular sawtooth data pattern.



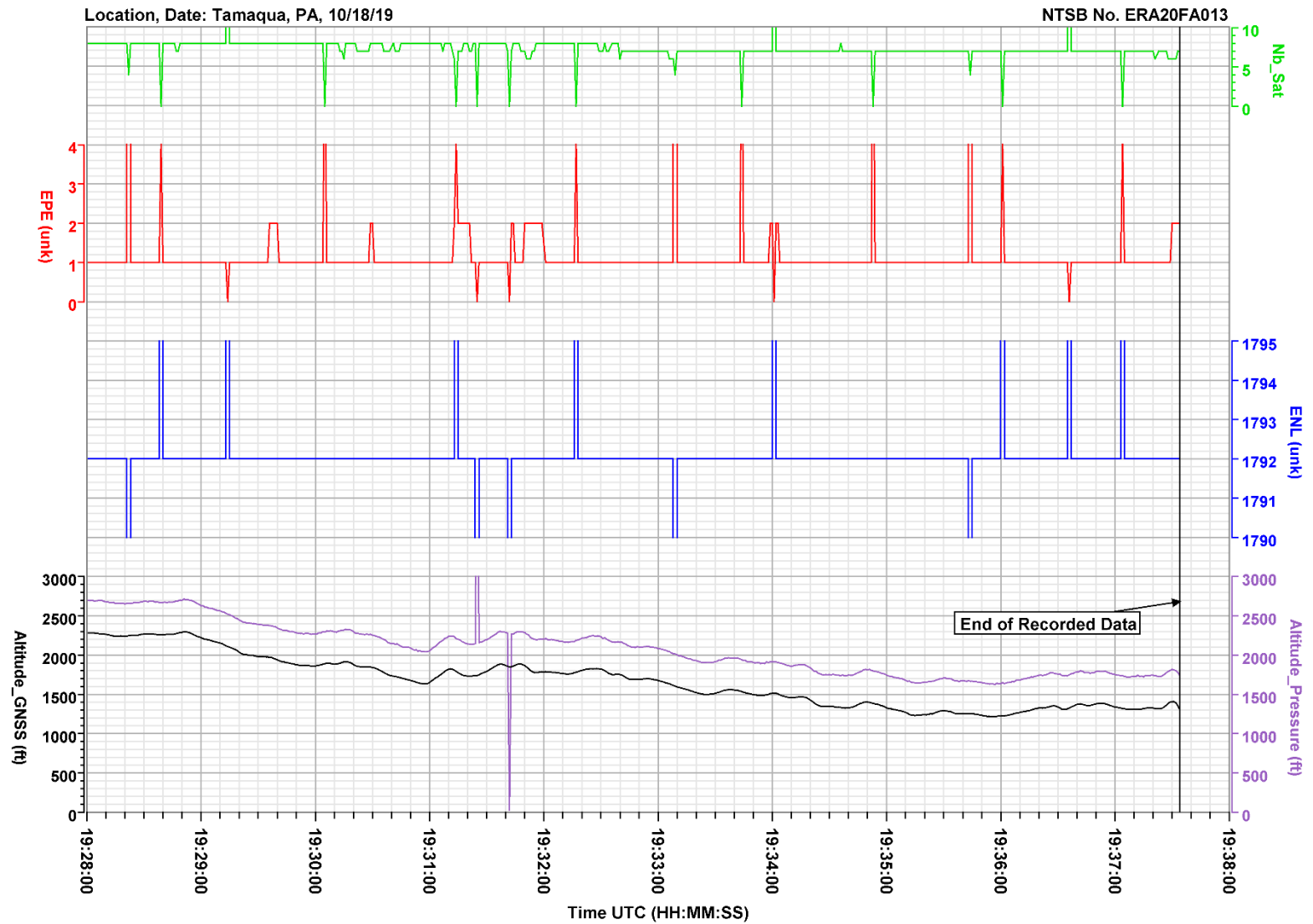
Private, Sportline Aviacija Lak 17, N830DK

Figure 9. Overview of parameters for entire flight with sawtooth pattern clipped for detail.



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Figure 10. Plot of parameters for the final 10 minutes of flight.



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Figure 11. Plot of parameters for final 10 minutes of flight, with sawtooth pattern clipped for detail.