

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

July 11, 2019

Electronic Devices

Specialist's Factual Report By Deven Chen

1. EVENT SUMMARY

Location: Moriarty, New Mexico
Date: July 10, 2018
Aircraft: Schempp-Hirth Flugzenbau GMBH Ventus 3F motorized glider
Registration: N753R
Operator: Private
NTSB Number: CEN18FA262

On July 10, 2018, about 1507 mountain daylight time, a Schempp-Hirth Flugzenbau GMBH Ventus 3F motorized glider, N753R, impacted terrain 1/2 mile southeast of the Moriarty Municipal Airport (0E0), Moriarty, New Mexico. The private pilot sustained fatal injuries and the glider was substantially damaged. The airplane was registered to a private individual and operated by the private pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed, and no flight plan was filed for the personal flight that originated from 0E0 about 1352.

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

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

Recorder Manufacturer/Model: **Apple iPhone 6s Plus**
Recorder Serial Number: **IMEI 353333070375751**

Recorder Manufacturer/Model: **LX 9000 Display**
Recorder Serial Number: **10435**

Recorder Manufacturer/Model: **PowerFLARM Core**
Recorder Serial Number: **FLAPFC11A-004933**

3.1. Apple iPhone 6s Plus Description

Personal Electronic Device (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)¹ and can be accessed through manufacturer-provided interfaces.

3.1.1. Apple iPhone 6s Plus Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed the device had severe damage, as shown in Figure 1. The internal circuit board was removed, and the board was severely bent in the accident, as shown in Figure 2. The circuit board could not be powered on with a surrogate due to its damage. The extent of the damage precluded normal recovery procedures and additional attempts were unsuccessful in yielding data.



Figure 1. Front and back of Apple iPhone 6s Plus as received

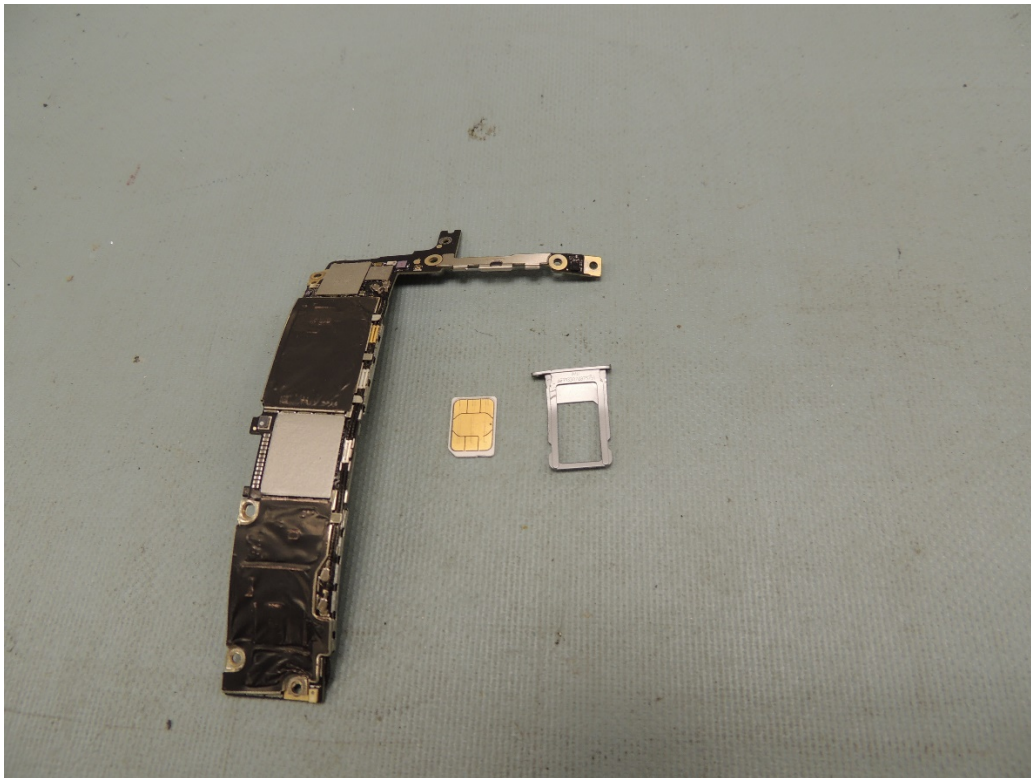


Figure 2. Circuit Board and SIM Card

3.2. LX 9000 Display Description

The LX 9000 is an aircraft navigation system. The system consists of two units: the main display unit and the vario unit. Within the main display unit an integral 50-channel GPS receiver is fitted. An integrated SD card or USB interface is used for user friendly data exchange. The display unit is equipped with a built-in flight recorder according to the most recent IGC specification for all flights. Optionally, the FLARM collision avoidance system can be integrated into the main display unit.

The flight recorder functions include an integral pressure transducer based on 1013 mbar level for altitude recording, engine noise level sensor, memory to store more than 1000 hours of flights and digital and mechanical security devices to ensure a high level of security.

3.2.1. LX 9000 Display Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed severe damage to the unit, as shown in Figure 3. No internal SD memory card was received and no non-volatile memory¹ chip was found on the circuit board. The extent of the damage precluded normal recovery procedures and additional attempts were unsuccessful in yielding data.

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



Figure 3. Front and back of LX 9000 Display as received

3.3. PowerFLARM Core Description

The PowerFLARM Core is both the heart and the brain of the FLARM system which is an electronic system used to selectively alert pilots to potential collisions between aircraft. 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.

3.3.1. PowerFLARM Core Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed damage to the unit, as shown in Figure 4. The non-volatile memory chip as shown in Figure 5, was removed and imaged using laboratory hardware and software. The data was 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 4. Front and Side of PowerFLARM Core as received

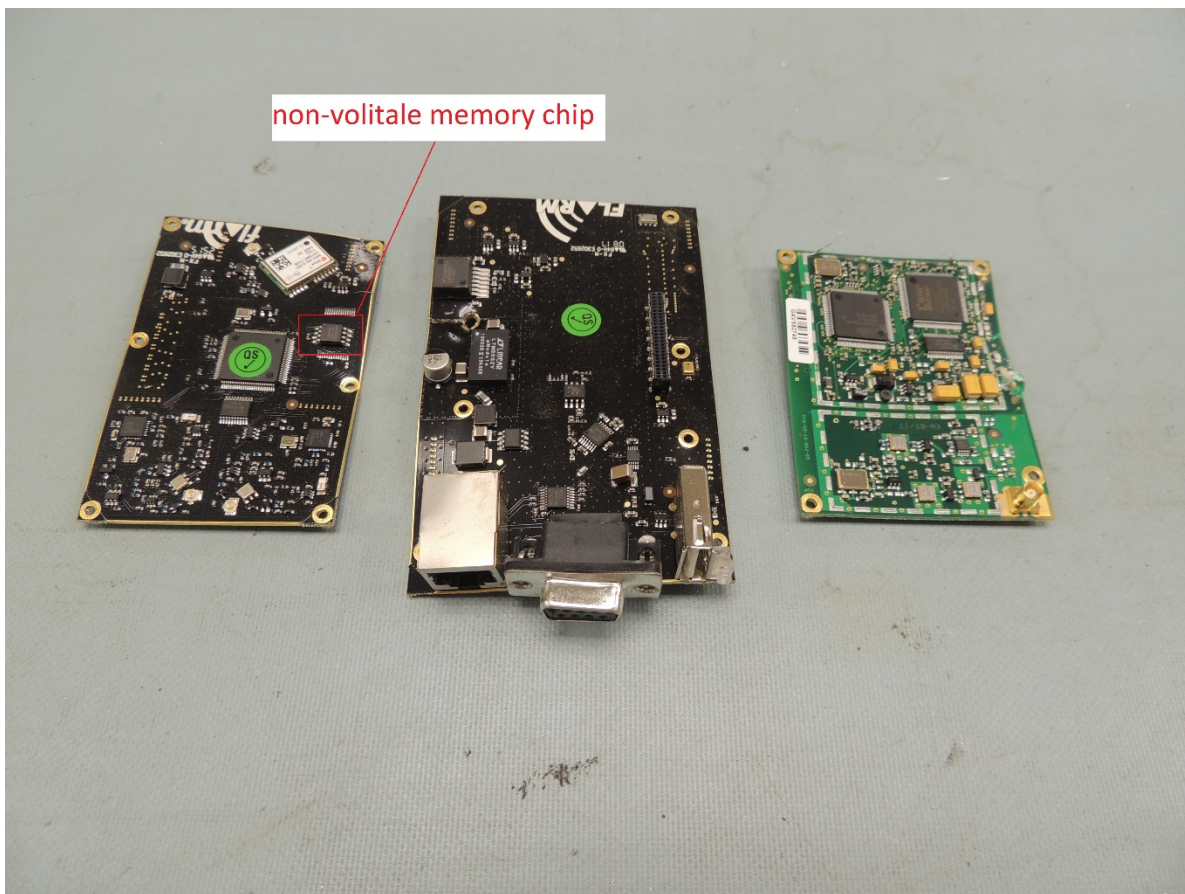


Figure 5. Damaged circuitry inside PowerFLARM Core

3.3.2. PowerFLARM Core Data Description

The data extracted included three sessions from May 6th 2018 through July 10th 2018. The session on July 10th from 19:12:31 to 21:07:39 UTC² was determined to be relevant to the accident event.

3.3.2.1. Parameters Provided

Table 1 describes data parameters provided by the PowerFLARM Core. Time, Latitude, Longitude, GPS Altitude, Pressure Altitude and ENL(Engine Noise Level) are recorded by the device. Groundspeed is derived from the recorded parameters.

Table 1. GPS Data Parameters

Parameter Name	Parameter Description
Time	Time (UTC) for recorded data point (HH:MM:SS)
Latitude	Recorded Latitude (degrees)
Longitude	Recorded Longitude (degrees)
GPS Altitude	Recorded GPS Altitude (meters)
Pressure Altitude	Recorded Pressure Altitude (meters)
Engine Noise Level	Recorded Engine Noise Level (N/A)
Groundspeed	Average groundspeed between current and previous data point (knots)

3.4. Plots and Corresponding Tabular Data

Figures 6-7 are graphical overlays generated using Google Earth showing the entire accident flight. The altitude for the first and last recorded points is GPS altitude. Data from the PowerFLARM Core was used to create the flight track. 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 19:12:31 UTC. The flight took off from Moriarty Municipal Airport (0E0) and the last recorded parameter was at 21:07:39 UTC.

Figure 8 is a plot of Groundspeed, GPS Altitude and Pressure Altitude. The time interval is from 19:12:31 to 21:07:39.

Figure 9 is a plot of parameter on Engine Noise Level from the PowerFLARM Core for the entire accident flight. The time interval is from 19:12:31 to 21:07:39.

The corresponding tabular data used to create Figures 6 through 9 are provided in electronic comma separated value (.CSV) format as Attachment 1 to this report.

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

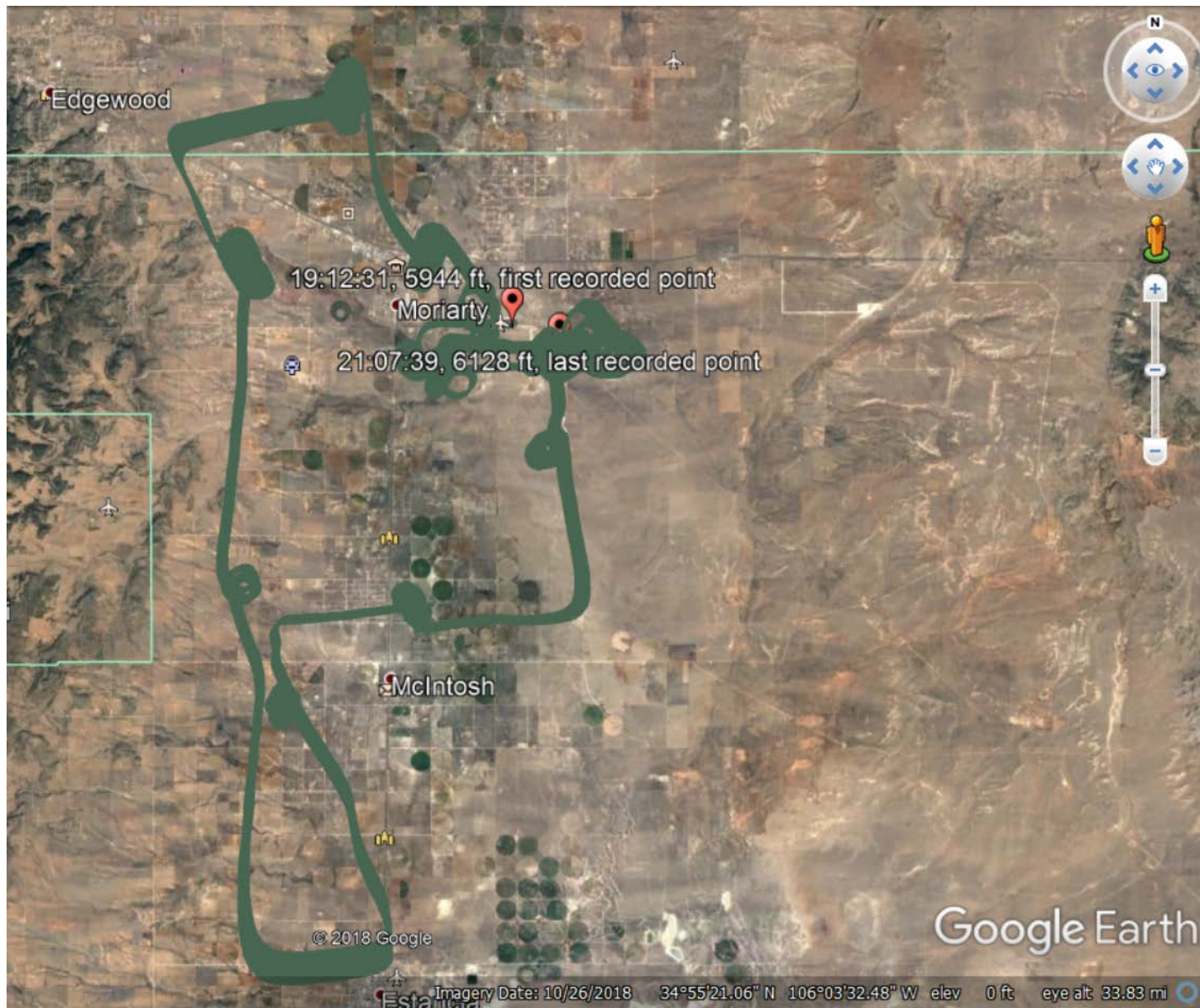
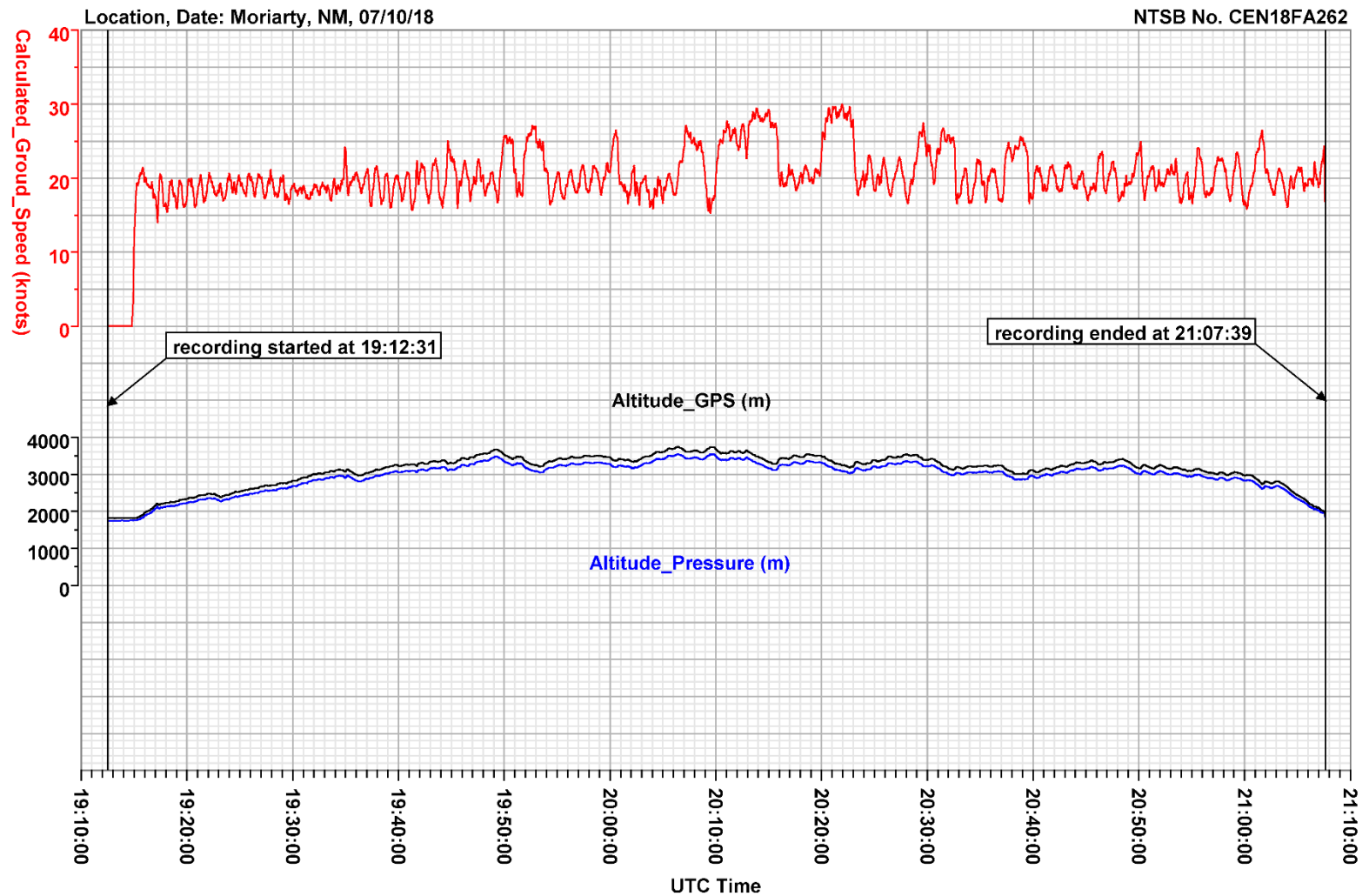


Figure 6. Google Earth overlay showing the entire accident flight -- 1



Figure 7. Google Earth overlay showing the accident flight -- 2

private, Schempp-Hirth Ventus 3F motorized glider, N753R



Revised: 9 July 2019

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Figure 8. Plot of altitude and calculated groundspeed data

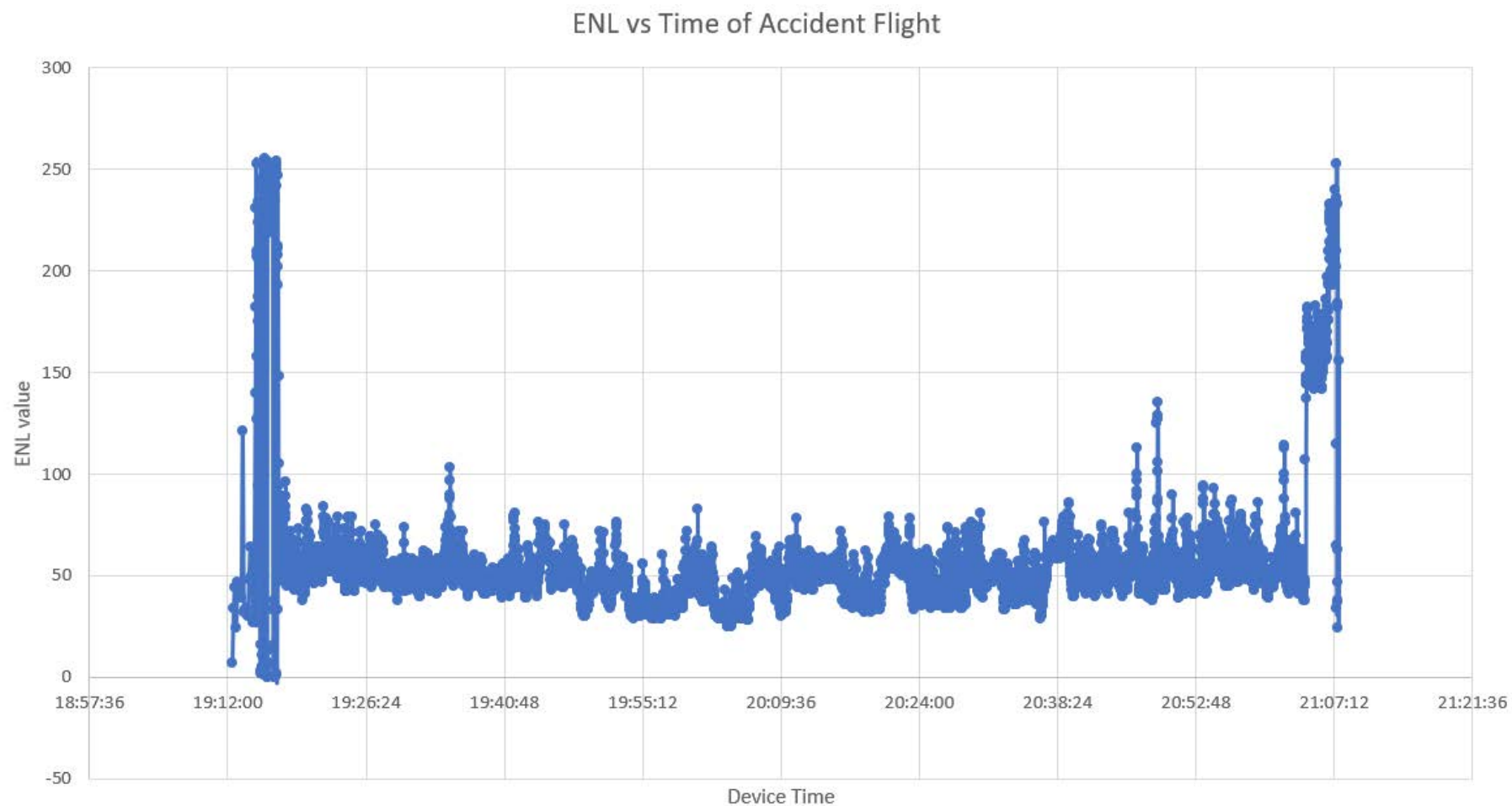


Figure 9. Plot of Engine Noise Level for the entire accident flight