

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN23FA333

GLOBAL POSITIONING SYSTEM DEVICES

Specialist's Factual Report

March 18, 2024

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A. ACCIDENT

Location: Oshkosh, Wisconsin
Date: July 29, 2023
Time: 1227 central daylight time (CDT)
1727 coordinated universal time (UTC)
Helicopter: Rotorway 162F, private operator, N193AZ
Gyroplane: ELA Eclipse 10 gyroplane, private operator, N221EL

B. GLOBAL POSITIONING SYSTEM 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 from the ELA Eclipse 10 gyroplane (N221EL):

Recorder Manufacturer/Model: iFly GPS 16GB SD card (front seat display)
Recorder Serial Number: N/A

Recorder Manufacturer/Model: iFly GPS 16GB SD card (back seat display)
Recorder Serial Number: N/A

1.0 Device Description

The Adventure Pilot iFly is a portable GPS device with features that include Synthetic Vision, Wi-Fi Connectivity, Flight Planning, and ADS-B Weather and Traffic compatibility. Historical flight data logs may be written to an SD card mounted in the device using NMEA protocol.

1.1 Data Recovery

The SD cards from the front and back seat displays arrived at the Vehicle Recorder Laboratory in good condition as shown in Figure 1 and Figure 2, respectively. Historical data were extracted normally using laboratory tools.



Figure 1. SD card from front seat display.



Figure 2. SD card from back seat display.

1.2 Recording Description

The front SD card contained 34 sessions with recorded time ranging from September 28, 2022, through July 29, 2023. The back SD card contained 39 sessions with recorded time ranging from September 28, 2022, through July 29, 2023. The accident was captured in the final session recorded on each card. Two previous sessions from July 28, 2023 (the day before the accident flight) were recorded on each card and plots from those flights are included in this report.

The timestamps from back card were in local time (CDT), while the front card appeared to have recorded timestamps 1 hour ahead of local time. Correlation of data was determined by comparing GPS location data for corresponding flights from the front and back cards. An offset of 1 hour was applied to the timestamps from the front card for plots included in this report such that all timestamps are in local time of the accident.

Data were recorded about once every second, however, there were instances when the interval between data points was greater than one second. The manufacturer indicated that if speed, altitude, or direction of flight had not changed then the data point would not be recorded.

There were several instances when the GPS coordinates from the front and back units did not align with each other. However, the position status indicator parameter did not show any change to the validity of the position status on either device.

A summary of the sessions recorded on the accident date and the day prior are shown in Table 1.

Table 1. Summary of sessions recorded on July 28, 2023, and July 29, 2023.

Date	Time Start	Time End	Data Origin
July 28, 2023	12:15:14	12:37:16	Back Display
July 28, 2023	12:15:13	12:36:34	Front Display
July 28, 2023	12:56:50	13:37:11	Back Display
July 28, 2023	13:44:27	14:07:50	Front Display
July 29, 2023	12:12:56	12:26:30	Back Display
July 29, 2023	12:17:54	12:26:42	Front Display

1.3 Parameters Provided

Table 2 describes data parameters provided by the iFly GPS.

Table 2. iFly GPS parameters.

Parameter Name (units)	Parameter Description (units)
Date (dd/mm/yyyy)	Date for recorded data point (day/month/year)
Time (hh:mm:ss)	Recorded Time for data point (hours:minutes:seconds)
lat (deg)	Recorded Latitude (degrees)
long (deg)	Recorded Longitude (degrees)
alt (ft)	Recorded GPS Altitude (feet)
speed Kn (kt)	Average derived groundspeed (knots)
track true (deg)	Average derived ground track (degrees true)

D. OVERLAYS AND TABULAR DATA

Figures 3 and 4 are graphical overlays generated using Google Earth for the accident session. Data from the front card are shown in red and data from the back card are shown in yellow. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording. Figure 3 is an overview of the entire flight and Figure 4 shows the end of the flight. Figure 5 shows the end of the flight and includes the ground track from N193AZ (shown in cyan) from available GPS data.

Figure 6 is a plot of parameters for the accident session. The time displayed is 12:12:00 to 12:27:00 CDT. Parameters for the front card are shown in red and parameters from the back card are shown in black. The session from the front card did not start until the airplane was already in flight.

Figure 7 is graphical overlay generated using Google Earth for the sessions recorded prior to the accident session on each card. Both sessions were recorded on July 28, 2023, however, they do not appear to correspond to the same flight. The back card solely appeared to record a flight, subsequently followed by a flight solely on the front card. Data from the front card are shown in red and data from the back card are shown in yellow.

Figure 8 is a plot of parameters for the sessions recorded prior to the accident session on each card. The time displayed is 12:55:00 to 14:10:00 CDT on July 28, 2023. Parameters for the front card are shown in red and parameters from the back card are shown in black.

Figure 9 is graphical overlay generated using Google Earth for the first session recorded on July 28, 2023. Data from the front card are shown in red and data from the back card are shown in yellow.

Figure 10 is a plot of parameters for the first session recorded on July 28, 2023. The time displayed is 12:15:00 to 12:38:00 CDT. Parameters for the front card are shown in red and parameters from the back card are shown in black.

The corresponding tabular data used to create figures 3 through 6 are provided in electronic comma-separated value (CSV) format as attachments 1 and 2 to this report. The corresponding tabular data used to create figures 7 and 8 are provided in electronic comma-separated value (CSV) format as attachments 3 and 4 to this report. The corresponding tabular data used to create figures 9 and 10 are provided in electronic comma-separated value (CSV) format as attachments 4 and 5 to this report. Not all parameters recorded were validated by the recorder specialist.

Submitted by:
Gerald Kawamoto
Recorder Specialist

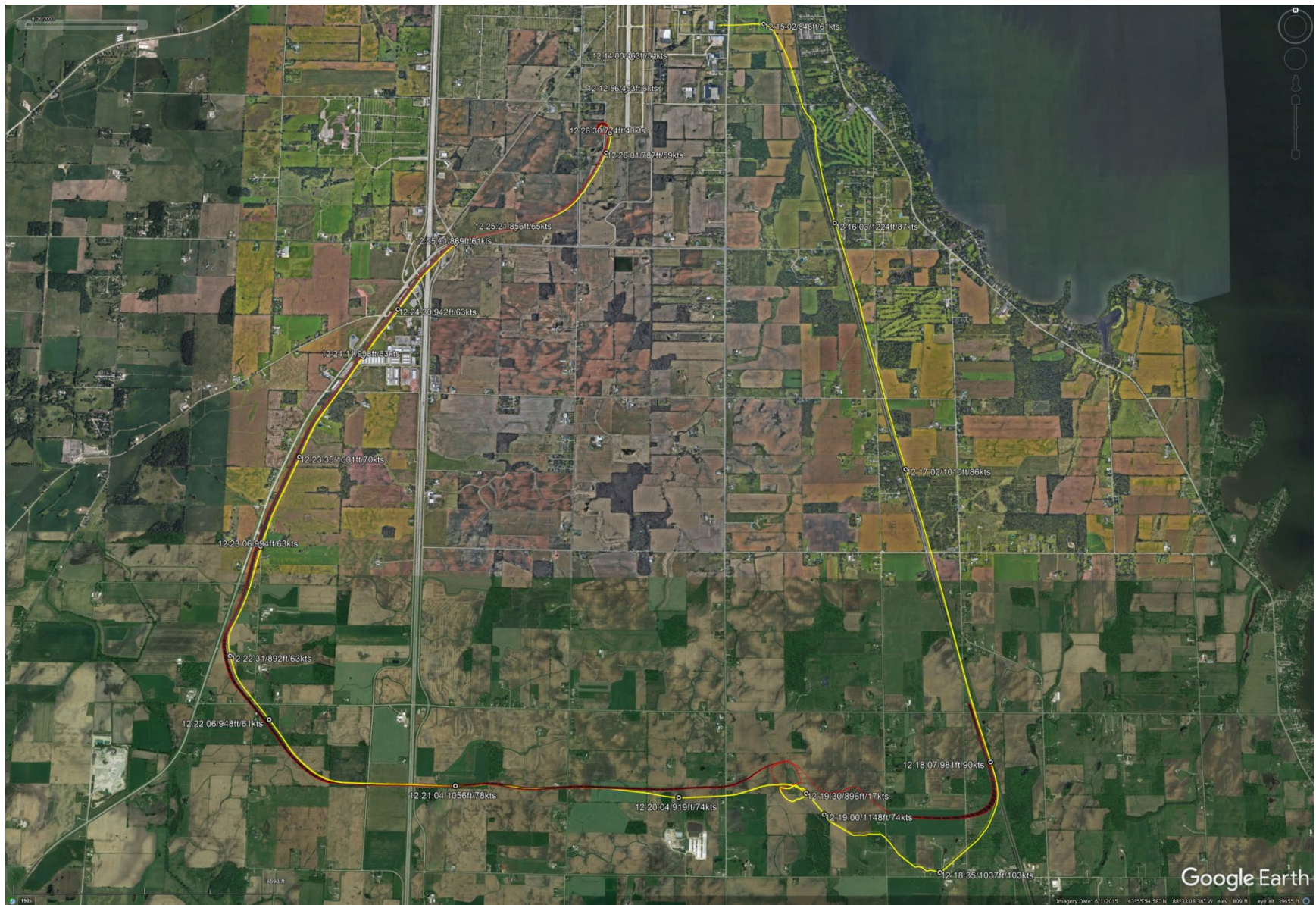


Figure 3. Google Earth overlay of the entire accident session recorded on the front (red track) and back (yellow track) displays.



Figure 4. Google Earth overlay of the end of the accident flight recorded on the front (red track) and back (yellow track) displays.



Figure 5. Google Earth overlay of the end of the accident flight that includes available GPS data from N193AZ shown in cyan.

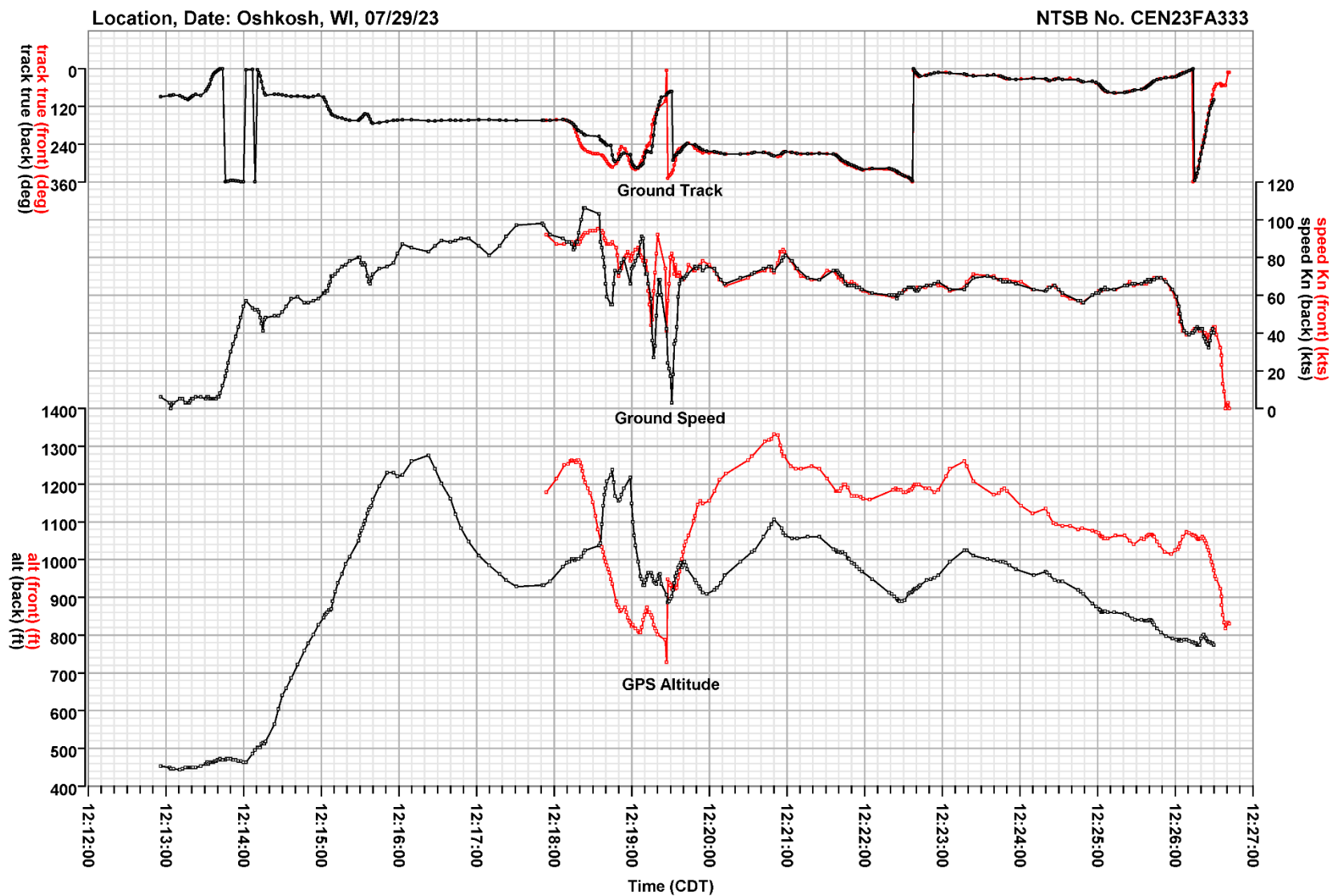


Figure 6. Plot of parameters from the accident flight. Back parameters are shown in black and front parameters are shown in red.



Figure 7. Google Earth overlay second session recorded on July 28, 2023, on the front (red track) and back (yellow track) displays.

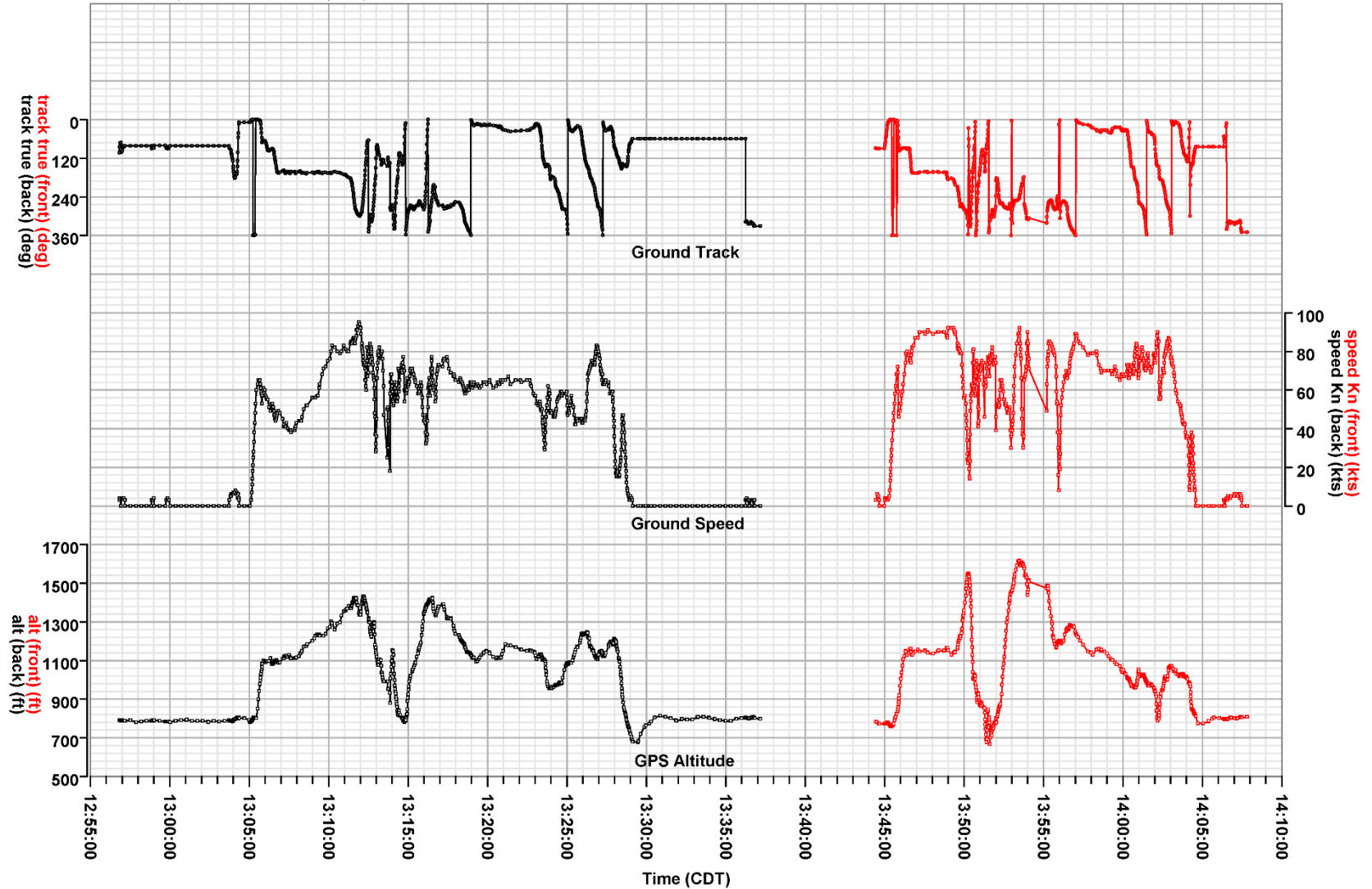


Figure 8. Plot of parameters from the second flight recorded on July 28, 2023. Back parameters are shown in black and front parameters are shown in red.



Figure 9. Google Earth overlay first session recorded on July 28, 2023, on the front (red track) and back (yellow track) displays.

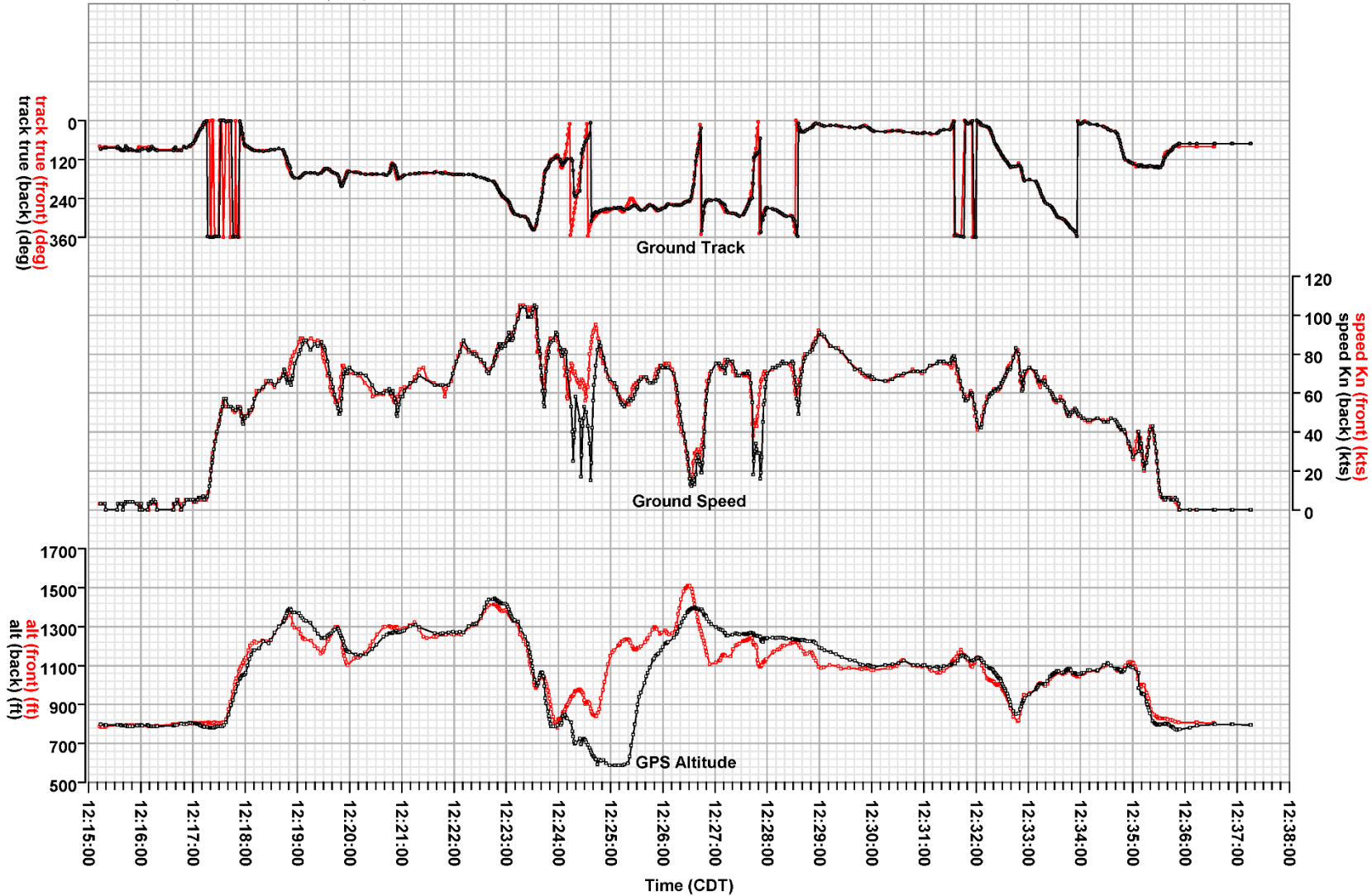


Figure 10. Plot of parameters from the first flight recorded on July 28, 2023. Back parameters are shown in black and front parameters are shown in red.