National Transportation Safety Board
Office of Research and Engineering
Washington, DC 20594

WPR22FA011

1BGLOBAL POSITIONING SYSTEM DEVICE

Specialist's Factual Report

June 23, 2023

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A. ACCIDENT

Location: Reserve, New Mexico
Date: October 15, 2021
Time: 1604 Mountain Daylight Time (MDT)
Airplane: Cessna 175, private operator, N7584M

B. GLOBAL POSITIONING SYSTEM DEVICE SPECIALIST

Specialist: Gerald Kawamoto
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National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A Global Positioning System (GPS) group was not convened. The NTSB Vehicle Recorder Division received the following GPS device:

Recorder Manufacturer/Model: Garmin GPSMAP 496
Recorder Serial Number: 19717743

1.0 Device Description

The Garmin GPSMAP 496 is a battery-powered portable 12-channel GPS receiver with a 256-color thin-film transistor (TFT) liquid-crystal display (LCD) display screen. The unit includes a built-in Jeppesen database and is capable of receiving XM satellite radio for flight information including NEXRAD radar, lightning, METARs, TAFs, and TFRs. A built-in AOPA Airport Directory and SafeTaxi Airport Diagrams are included for selected fields. The unit stores date, route-of-flight, and flight-time information for up to 50 flights. A flight record is triggered when groundspeed exceeds 30 knots and altitude exceeds 250 feet, and ends when groundspeed drops below 30 knots for 10 minutes or more. A detailed track log, including latitude, longitude, date, time, and GPS altitude information is stored within the unit whenever the receiver has a lock on the GPS navigation signal. Position is updated within the track log as a function of time or distance moved, depending on how the unit has been configured. Once the current track log memory becomes full, new information either overwrites the oldest information or recording stops, depending on how the unit is configured. The current track log can be saved to long-term memory and 15 saved track logs can be maintained in addition to the current tracklog. Track log storage may be activated or de-activated at user discretion. All recorded data is stored in non-volatile memory. The unit contains hardware and software permitting the download of recorded waypoint, route, and track log information to a PC via a

built-in serial port. An internal button-battery is used to back-up power to the internal memory and real-time clock during those periods when main power is removed.

1.1 Data Recovery

The GPS was in good condition and the data were downloaded normally using the manufacturers' procedure.

Figure 1. Photo of GPSMAP 496 as received.

1.2 Recording Description

The data extracted included 15 sessions from May 20, 2021, through October 15, 2021.[1] The accident flight was recorded starting 14:47:01 UTC and ending 16:35:03 UTC on October 15, 2021.

1.3 Parameters Provided

Table 1 describes data parameters provided by the GPS device. Date, Time, Latitude, Longitude, and GPS Altitude are recorded by the device. Groundspeed and Track are derived from the recorded parameters.

[1] All dates and times are referenced to coordinated universal time (UTC).

Table 1. GPS Data Parameters.

Parameter Name	Parameter Description
Date	Date for recorded data point (MM/DD/YYYY)
Time	Time (UTC) for recorded data point (HH:MM:SS)
Latitude	Recorded Latitude (degrees)
Longitude	Recorded Longitude (degrees)
GPS Alt	Recorded GPS Altitude (feet)
Groundspeed	Average derived groundspeed (knots)
Track	Average derived true course (degrees)

D. OVERLAYS AND TABULAR DATA

Data obtained from the GPSMAP 496 was used to produce the following overlays and tabular data. Figures 2 through 4 are a graphical overlays generated using Google Earth for the accident flight. 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 began recording at approximately 14:47:01 UTC. The last recorded parameter was as at 16:35:03 UTC on October 15, 2021. Based on the wreckage location, the final valid data point appears to be at 16:04:21 UTC. After this point, the device remained powered on, and an 18 additional data point were recorded sporadically from 16:09:09 UTC through 16:35:03 UTC.

Figures 5 and 6 are plots of parameters for the October 15, 2021, flight. Figure 5 shows the entire final session recorded, and Figure 6 shows approximately the final five minutes of valid flight track log data recorded.

The corresponding tabular data used to create Figures 2 to 6 are provided in electronic Comma Separated Value (CSV) format as attachment 1 to this report.

Submitted by:

Gerald Kawamoto
Recorder Specialist

Figure 2. Google Earth overlay showing the entire accident flight.

Figure 3. Google Earth overlay showing the final 5 minutes of the accident flight.

Figure 4. Google Earth overlay showing the end of the accident flight and the reported wreckage location.

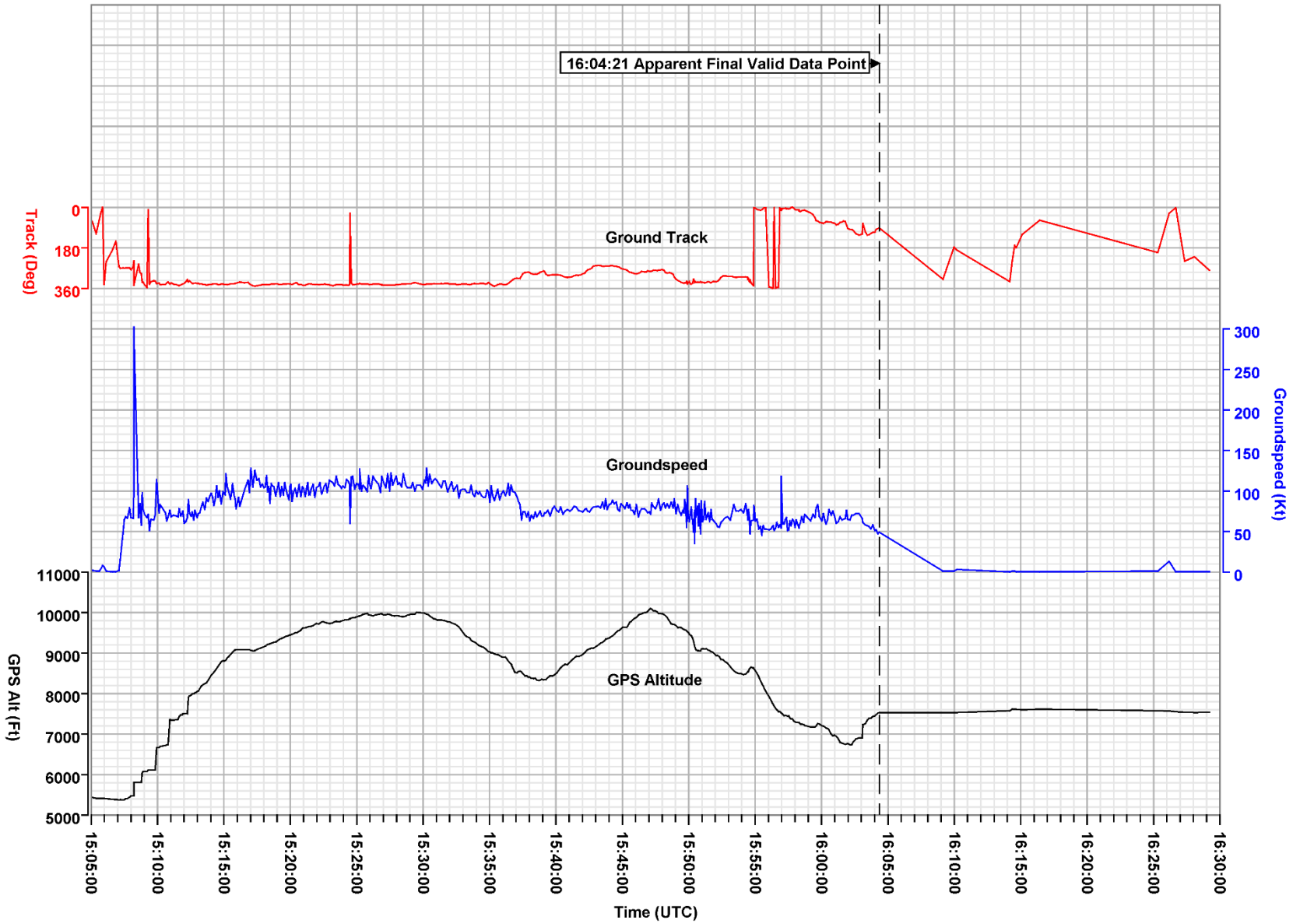

Figure 5. Plot of parameters for the entire accident flight.

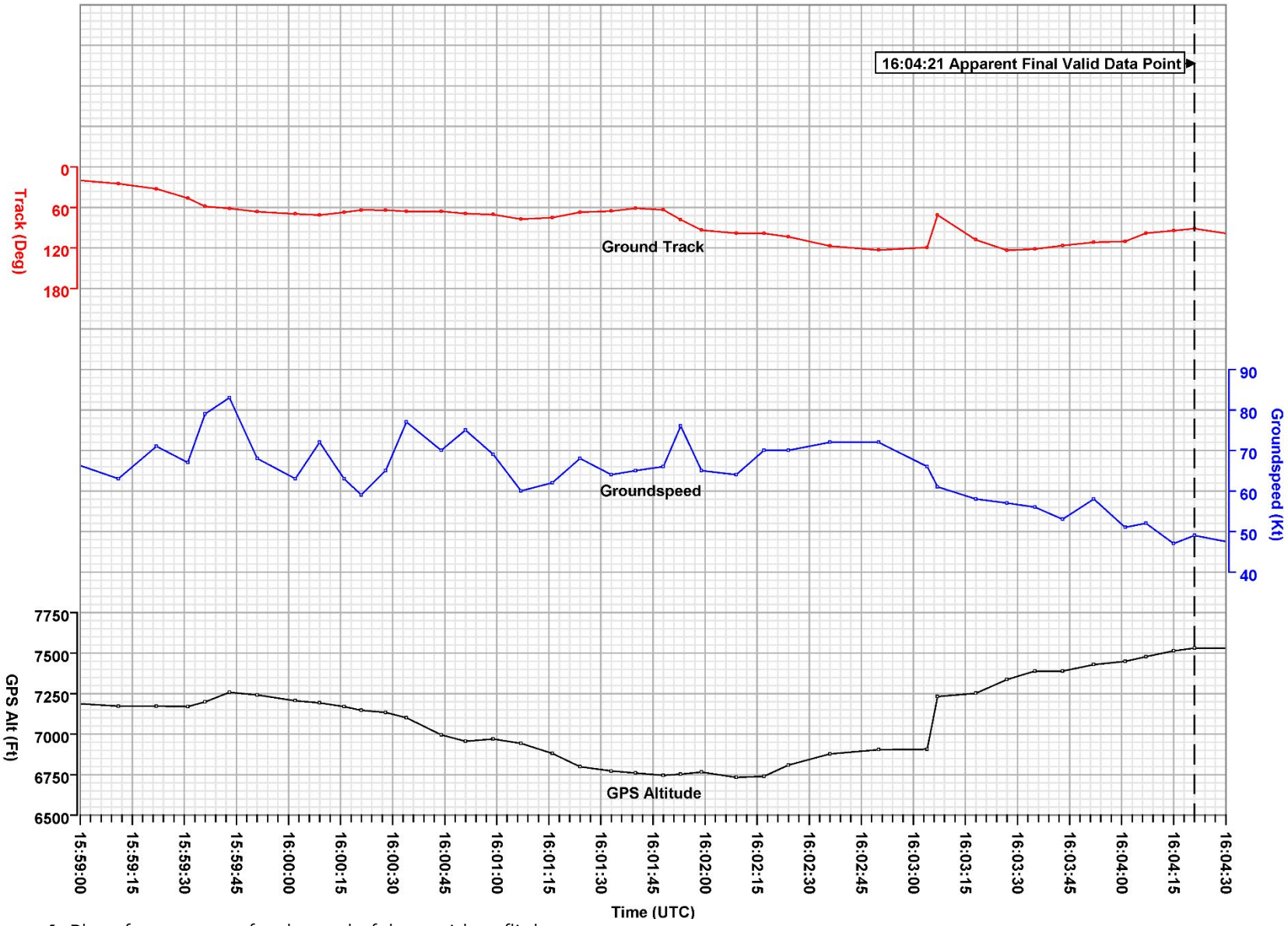

Figure 6. Plot of parameters for the end of the accident flight.