

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR22FA196

GLOBAL POSITIONING SYSTEM DEVICE

Specialist's Factual Report

August 8, 2022

A. ACCIDENT

Location: Oroville, CA
Date: June 2, 2022
Time: 12:18 pacific daylight time (PDT)
Airplane: Beechcraft 19A, Private, N7641R

B. GLOBAL POSITIONING SYSTEM DEVICE SPECIALIST

Specialist: Steven Smith
Mechanical Engineer (Recorder Specialist)
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 296
Recorder Serial Number: 67017955

1.0 Device Description

The Garmin GPSMAP 296 is a hand-portable GPS unit equipped with a detachable antenna, a 256 color TFT LCD display, built in base map, and an internal Jeppesen aviation database. The unit employs a parallel 12 channel receiver and can be operated using external power, or alternatively by using an internal Li-Ion rechargeable battery. The GPSMAP 296 is capable of storing date, route of flight, and flight time information for up to 50 individual flights in the form of a flight log. A detailed track log including latitude, longitude, date, time, and groundspeed 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. Track log storage may be activated or de-activated at user discretion.

1.1 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained impact damage, as shown in Figure 1. The unit powered on, however, the display was damaged, as shown in Figure 2. The unit successfully interfaced with laboratory tools and data were downloaded normally.



Figure 1. Photo of GPS received by the Vehicle Recorder Division.



Figure 2. Photo of GPS powered on.

1.2 Recording Description

The data extracted included 117 track logs from October 14, 1999, through October 17, 2002. The accident event occurred on June 2, 2022, which is a difference of 7168 calendar days (1024 weeks). This is a phenomenon known as GPS week rollover. However, this phenomenon does not impact the time collected by the GPS, which has been corroborated with witness testimony. The accident event was recorded starting at 12:12:06 PDT and ending at 12:18:39 PDT.

1.3 Parameters Provided

Table 1 describes data parameters provided by the GPS device.

Table 1. GPS Data Parameters.

| Parameter Name | Parameter Description (Units) |
|-----------------------|---------------------------------------|
| 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 Garmin GPSMAP 296 was used to produce the following overlays and plots. Figure 3 through Figure 7 were generated using the data downloaded from this device.

The device began recording at approximately 12:08:19 PDT and ended at 12:18:43 PDT on June 2, 2022. Due to data buffering on the GPS unit, the data recording may have ended before the accident event.

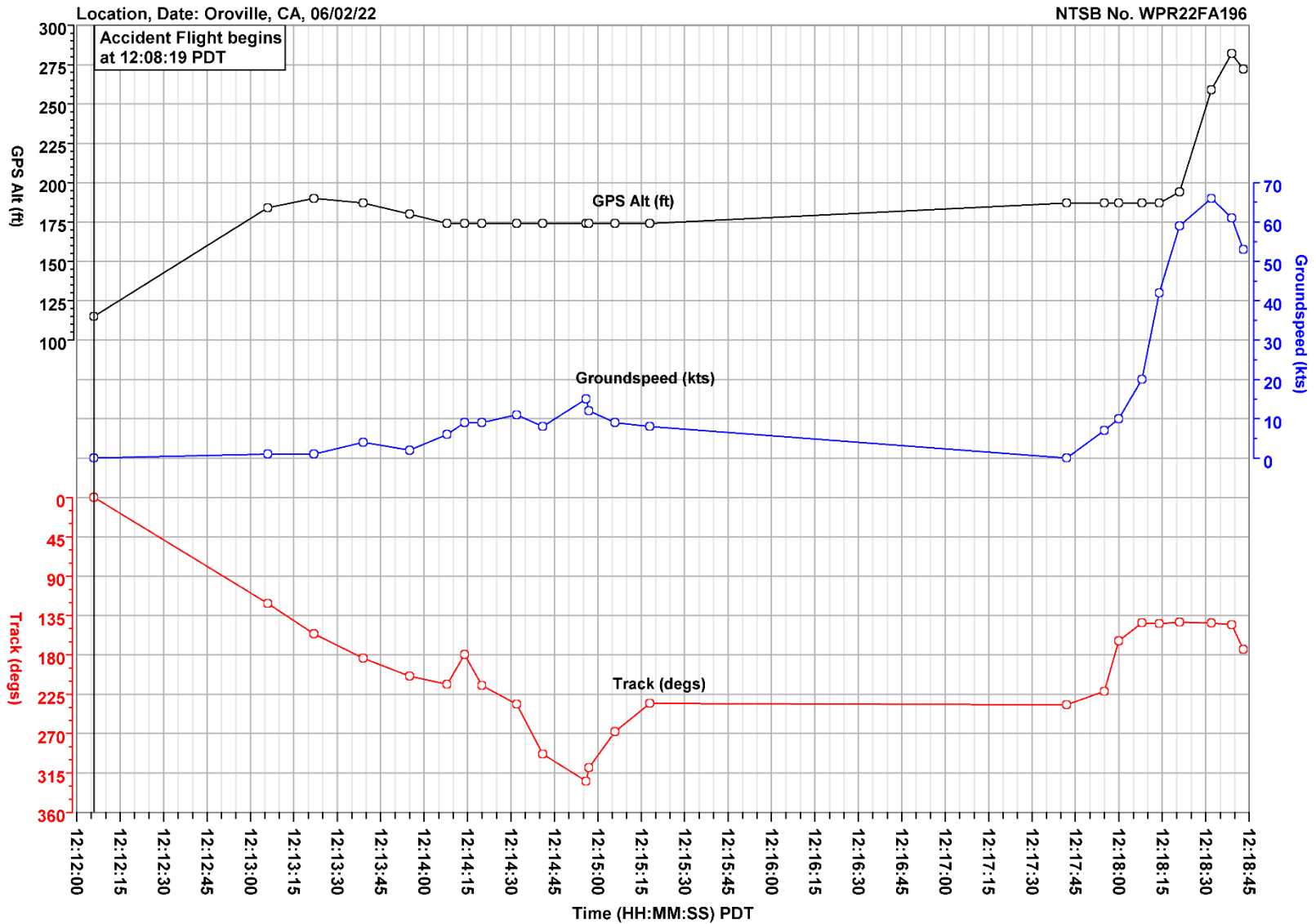
Figure 3 and Figure 4 are plots of the entire track log and the final minute of the recording, respectively. Figure 5 through Figure 7 are Google Earth overlays of the entire accident track log, takeoff roll, and the end of the recording, respectively. Note that the weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

In summary, the aircraft began taxiing at approximately 12:08:19 PDT, and began the takeoff roll at approximately 12:18:00 PDT from Oroville Municipal Airport (KOVE). The last recorded data point collected by the Garmin GPSMAP 296 was at approximately 12:18:43 PDT.

The corresponding tabular data used to create Figure 3 through Figure 7 for the entire accident flight are provided in electronic comma separated value (CSV) format as Attachment 1 to this report.

Submitted by:

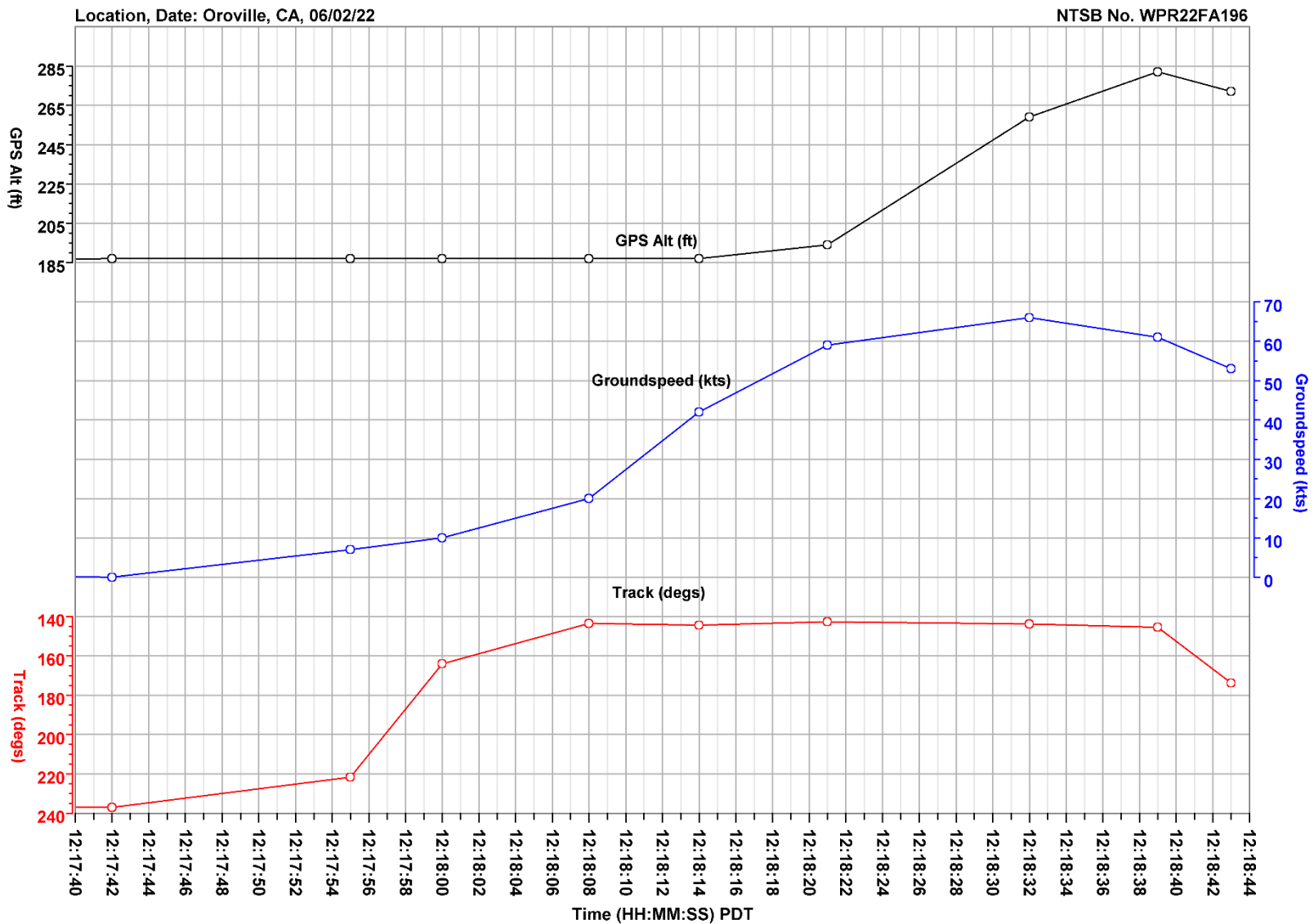
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Figure 3. Plot of GPS parameters of the entire accident flight.



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Figure 4. Plot of GPS parameters from takeoff roll to the accident time.



Figure 5. Google Earth overlay showing the entire flight overview.



Figure 6. Google Earth overlay showing takeoff and the accident location.



Figure 7. Google Earth overlay showing the accident flight path.