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

CEN23FA125

GLOBAL POSITIONING SYSTEM DEVICE

Specialist's Factual Report

August 4, 2023

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A. ACCIDENT

Location: Port O'Connor, Texas
Date: March 6, 2023
Time: 2157 central standard time (CST)
Helicopter: Robinson Helicopter Company R-44II, private operator, N494SH

B. GLOBAL POSITIONING SYSTEM DEVICE SPECIALIST

Specialist: Gerald Kawamoto
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 aera 796
Recorder Serial Number: 2CY012759

1.0 Device Description

The Garmin Aera 796 is a battery-powered multi-function display and GPS receiver with a 7-inch diagonal high resolution touch screen. The unit includes a built-in Jeppesen database and can receive XM satellite radio for flight information including NEXRAD Radar, lightning, METARs, and TFRs. The unit can also perform and store weight and balance calculations. A built-in AOPA Airport Directory and SafeTaxi airport diagrams are included for selected airfields. With appropriate subscriptions, the unit can store and display geo-referenced VFR and IFR navigation charts, including IFR approach charts. The unit also has a "scratch pad" feature, allowing the user to hand write electronic notes.

The unit stores date, route-of-flight and flight-time information. 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. The current track log can be saved to long-term memory. Track log storage may be activated or de-activated at user discretion. All recorded data is stored in non-volatile memory.[1]

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

1.1 Data Recovery

The device sustained impact damage, as shown in figure 1, and was received without its display. The internal electronics were installed in a functional lab surrogate and data were downloaded normally using the manufacturer's procedures.

Figure 1. Garmin aera 796 as received.

1.2 Recording Description

The data extracted included sessions recorded from August 14, 2022, through March 7, 2023, universal coordinated time (UTC).[2] The accident session started at 3:52:28 UTC and ended at 3:56:30 UTC on March 7, 2023, and contained 7 data points.

[2] All dates and times are referenced to UTC.

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.

Table 1. GPS Data Parameters.

Parameter Name	Parameter Description (units)
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

Figure 2 is a graphical overlay generated using Google Earth for the accident session. Due to data buffering in the device, the end of the session may not have been recorded. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

The corresponding tabular data used to create figure 2 is 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 of the accident session recorded on the Garmin aera 796.