

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

April 13, 2022

Global Positioning System Device

Specialist's Factual Report

By Nick Swann

1. EVENT SUMMARY

Location: Spirit Lake, Idaho
Date: October 6, 2020
Aircraft: Rans S-7
Registration: N55893
Operator: Private
NTSB Number: WPR21LA011

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following global positioning system (GPS) device:

Device Manufacturer/Model:	Garmin Aera 660
Serial Number:	Unknown

3.1. Device Description

The Garmin Aera 660 is a battery-powered portable multi-function display and GPS receiver with a sunlight-readable 5-inch diagonal touch screen operation display. The unit includes a built-in Jeppesen database and can receive XM satellite radio for flight information including NEXRAD radar, lightning, METARs, TAFs, and TFRs. The unit can also perform and store weight and balance calculations. A built-in AOPA Airport Directory and Safe Taxi Airport Diagrams are included for selected fields. The unit stores date, route-of-flight, and flight-time information for up to 50 flights. The unit has 23 different map ranges available, from 200 feet to 800 nm.

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 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 track log. Track log storage may be activated or de-activated at user discretion.

All recorded data is stored in non-volatile memory.¹ The unit contains hardware and software permitting the download of recorded waypoint, route, and track log information to a PC via a built-in USB 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.

3.2. Data Recovery

The device arrived at the NTSB lab in good condition as shown in Figure 1. There was no evidence of any impact damage.



Figure 1. Photo of Garmin Aera 660.

3.3. Data Description

The data extracted included track logs from October 11, 2019, through the accident flight on October 6, 2020.² The accident flight began recording at 22:27:39 UTC, ended at 22:33:28 UTC, and consisted of 19 data points.

3.4. 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 Non-volatile memory (NVM) – Semi-conductor memory that does not need power applied to retain data.

² 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)

3.5. Overlays and Tabular Data

Figure 2 is a graphical overlay 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. Accompanying every data point is the time the data point was recorded as well as the groundspeed at that time in knots.

Tabular data used to generate figure 2 are included as Attachment 1. This attachment is provided in electronic comma-delimited (.CSV) format.



Figure 2. Google Earth overlay showing the accident flight and recorded groundspeed.