

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, D.C. 20594

May 4, 2021

Global Positioning System Device

Specialist's Factual Report
By Gerald Kawamoto

1. EVENT SUMMARY

Location: Berwyn, Nebraska
Date: March 6, 2021
Aircraft: Aviat A-1B
Registration: N166WW
Operator: Private
NTSB Number: CEN21FA150

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 GPSMAP 496**
Serial Number: **19720688**

3.1. 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.

3.2. Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an external examination revealed the device had sustained impact damage, as shown in Figure 1, rendering it inoperable. An internal examination revealed damage to the circuit board, which included flexion to the area of the non-volatile memory chip, as shown in Figure 2.¹ The chip was removed and was attempted to be read out using laboratory tools. Continuity checks performed revealed the chip had sustained internal damage. It was then sent to the Integrated Electronics Engineering Center (IEEC) at Binghamton University for further evaluation. The IEEC determined that the internal damage sustained was beyond repair, thus, no data were recovered. The chip evaluation report is included as Attachment 1 to this report.



Figure 1. Garmin GPSMAP 496 as received.

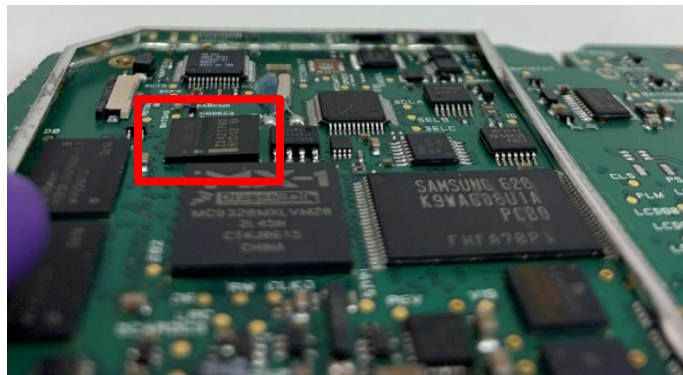


Figure 2. Garmin GPSMAP 496 circuit board showing flexion to the area of the NVM chip.

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