

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

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Global Positioning System Device

Specialist's Factual Report

By Alice Park

1. EVENT SUMMARY

Location: Tehachapi, California
Date: November 19, 2017
Aircraft: Beech 35-C33
Registration: N24987
Operator: Private
NTSB Number: WPR18FA035

On November 19, 2017, about 1756 Pacific standard time, a Cessna 152, N24987, was destroyed when it impacted terrain shortly after takeoff from Tehachapi Municipal Airport (TSP), Tehachapi, California. The private pilot received fatal injuries. The personal flight was conducted under the provisions of Title 14 *Code of Federal Regulations* Part 91. The accident flight departed from TSP runway 29 about 1755. Night visual meteorological conditions prevailed.

2. DETAILS OF INVESTIGATION

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

Device Manufacturer/Model: Garmin GPS II Plus
Serial Number: 41329661

2.1. Garmin GPS II Plus Device Description

The Garmin GPS II Plus is a battery operated, portable 12-channel GPS receiver equipped with LCD display. An external antenna, attached via a BNC-style connector, is required for reliable satellite reception. The GPS II Plus can store position and altitude information for up to 768 waypoints in *non-volatile* memory.¹ Twenty routes, each representing a linked list of up to 30 waypoints, may also be stored in memory. A detailed tracklog - composed of latitude, longitude, date, time, and altitude information sampled at

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

intervals while the unit is powered up and receiving satellite signals - can also be stored. The unit contains hardware and software permitting the download of recorded waypoint, route, and track log information via a Garmin proprietary interface. The unit communicates with other electronic devices via a serial port employing the NMEA 0183 protocol and RS-232 DGPS correction. The GPS II Plus has 16-33 ft position accuracy with DGPS correction. An internal lithium battery is used to back-up power to the internal memory and real-time clock during those periods when main power is removed.

2.2. Garmin GPS II Plus Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed that the unit experienced severe impact damage during the accident and would not power on. It was disassembled for further examination. Figures 1 and 2 show the device as received. The GPS II Plus stores recorded data in *non-volatile* memory (FLASH).² This model stores recorded data on an AM29LV 800BT FLASH memory device mounted to the main printed circuit board (PCB) (see figure 3 in red circle). Due to the damage, data could not be recovered.

²FLASH memory is a form of re-writable, non-volatile memory that can retain data without external power.

Figure 1. Damaged exterior of Garmin GPS II Plus (front side)



Figure 2. Damaged exterior of Garmin GPS II Plus (back side)



Figure 3. Inside of Garmin GPS II Plus

