

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, D.C. 20594

October 23, 2015

Global Positioning System (GPS) Device

Specialist's Factual Report
By Sean Payne

1. EVENT SUMMARY

Location: Bedminster, New Jersey
Date: September 08, 2015
Aircraft: Lake LA-4-250
Registration: N1401P
Operator: Private
NTSB Number: ERA15FA348

On September 8, 2015, about 2048 eastern daylight time, an Aerofab Lake LA-4-250, N1401P, was destroyed when it impacted trees and terrain during shortly after takeoff from Somerset Airport (SMQ), Bedminster, New Jersey. The private pilot was fatally injured. Night visual meteorological conditions prevailed, and no flight plan was filed for the local personal flight, which was conducted under the provisions of Title 14 *Code of Federal Regulations* Part 91.

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

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

Device Manufacturer/Model:	Garmin GPS III Pilot
Serial Number:	40909932

3.1. Device Description

The Garmin GPS III Pilot is a battery operated, portable 12-channel GPS receiver equipped with a 16 color LCD display. An external antenna, attached via a BNC-style connector, is required for reliable satellite reception. The GPS III Pilot is capable of storing position and altitude information for up to 500 waypoints in volatile¹ memory.

¹ Volatile memory – Memory that requires a power source to retain electronic records.

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 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. 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. Device Condition

Upon arrival at the Vehicle Recorder Laboratory, an examination revealed the unit had sustained only minor impact damage which affected the device's battery door. The device's battery door was removed and the battery area was found to have traces of corrosion. The 4 AA batteries included also exhibited corrosion. The device is shown in figure 1 and the corrosion to the unit's battery power area is shown in figure 2.



Figure 1. Photo of the Garmin GPS III Pilot.



Figure 2. Photo of the device's battery housing area with corrosion present on the "AA" style batteries.

3.3. Data Description

The device was powered on a laboratory bench using a power supply set to 12 volts DC and the manufacture's appropriate model power connector for this device. Upon start up, the device displayed the following message: "Message. Stored Data Lost. Press Enter to Continue." Figure 3 shows the displayed message upon power up.

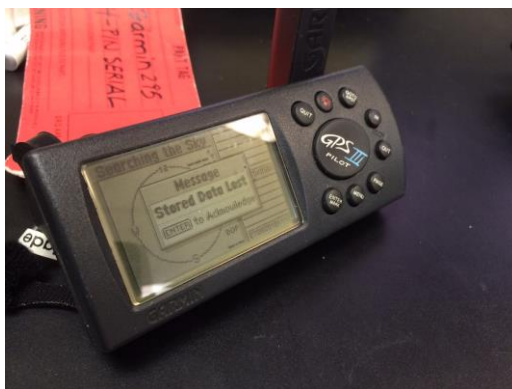


Figure 3. The displayed Stored Data Lost message shown on power up.

The user's manual for the Garmin GPS III Pilot was accessed and a definition of the error message displayed stated, "All waypoints, routes, time and almanac data have been lost due to battery failure, or the receiver's memory has been cleared." Figure 4 shows the definition of the message as defined in the Garmin GPS III Pilot user's manual.

Stored Data Lost—All waypoints, routes, time, and almanac data have been lost due to battery failure, or the receiver's memory has been cleared.

Figure 4. The Stored Data Lost message as defined by the device's user manual.

The voltage of the 1.5 volt Energcell "AA" batteries that were dislodged from the device in the accident were measured using a power meter. The meter revealed that no individual cell retained voltage higher than half a volt.

Another message in the user's manual warned of the repercussions of low battery power to the device's internal memory battery power. The internal memory battery is an internal watch style battery that provides power to the volatile memory device in the event of the loss of primary battery power. The warning acknowledged that low battery power to the memory battery may result in a loss of stored data. Figure 5 shows the definition of the Memory Battery Power Low according the device's user's manual.

Memory Battery Power Low—The battery that sustains user memory is low and should be replaced by an authorized service center as soon as possible. Failure to do so may result in loss of stored data, including all user waypoints and routes.

Figure 5. The Memory Battery Power Low message as defined by the device's user manual.

Finally, the device was opened and the internal memory battery was identified. The 3 volt internal memory battery was measured to output just under 0.40 volts. Figure 6 shows the DC voltage reading of the internal memory battery when read with a voltmeter.

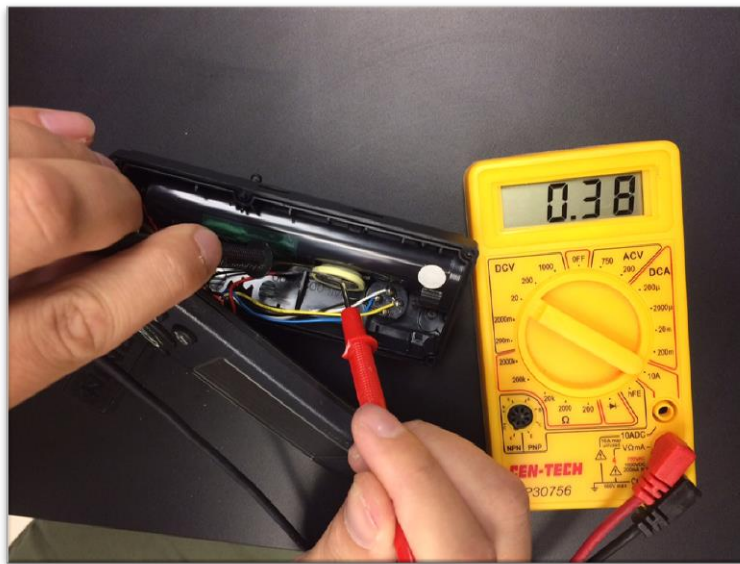


Figure 6. The internal memory battery's output voltage as read in the laboratory.