

# NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division  
Washington, D.C. 20594

May 15, 2013

## GPS Factual Report

by George Haralampopoulos

### 1. EVENT

Location: Pellston, Michigan  
Date: January 15, 2013  
Aircraft: Cessna 208  
Registration: N1120N  
Operator: Martinaire Aviation LLC  
NTSB Number: CEN13FA135

1. GROUP - No Group

### 2. SUMMARY

On January 15, 2013, about 1945 eastern standard time, a Cessna 208B airplane, N1120N, was substantially damaged after colliding with trees shortly after takeoff from Pellston Regional Airport of Emmet County (KPLN), Pellston, Michigan. The certificated commercial pilot, the sole occupant, was fatally injured. The air cargo flight was operated by Martinaire Aviation, L.L.C. and was conducted under the provisions of 14 Code of Federal Regulations Part 135. Night visual meteorological conditions prevailed and a flight plan was filed. The flight originated from KPLN about 1942.

### 3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Laboratory received the following device(s):

GPS Manufacturer/Model: Garmin GPSMAP 696  
Serial Number: 1H6007728

## 4. Garmin GPSMAP 696 Device Description

The Garmin GPSMAP 696 is a battery-powered portable multi-function display and GPS receiver with a 7-inch diagonal high resolution 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. 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. 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 for an unspecified number of points – 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 track log. Track log storage may be activated or de-activated at user discretion. All recorded data is stored in non-volatile<sup>1</sup> 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 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.

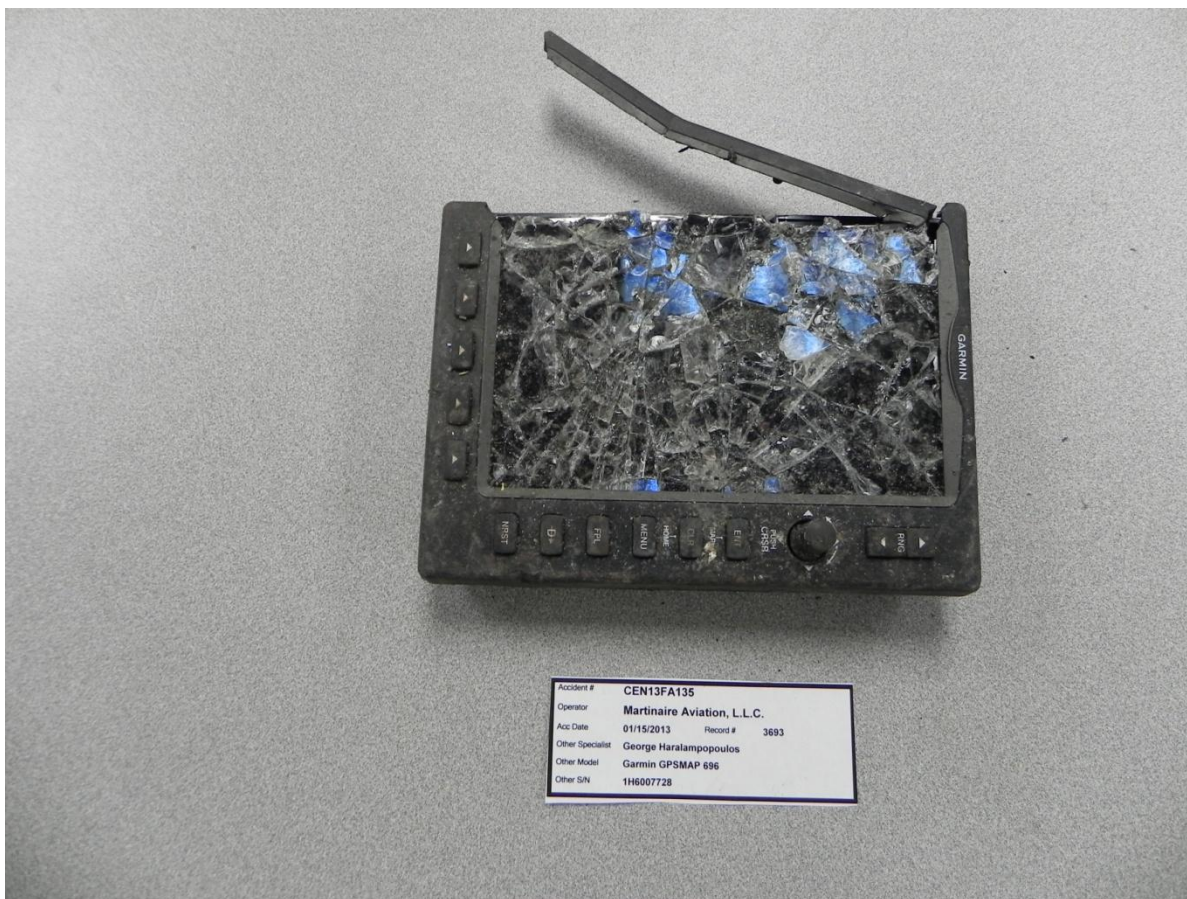
### 4.1 GPS Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit sustained major impact damage to the screen and casing (figure 1). The memory chip was located after an interior inspection and a chip level recovery was performed. The data was successfully obtained from the memory chip.

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

**Figure 1. Photo of Garmin 696 unit.**



## **4.2 GPS Data Description**

The data extracted included 157 sessions from February 24, 2012<sup>2</sup> through January 16, 2013 and consisted of 20,724 total data points. The accident flight was recorded starting 00:54:28 and ending 00:57:58 UTC on January 16, 2013, consisting of 20 data points.

## **4.3 GPS 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.

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<sup>2</sup> All dates and times are referenced to Coordinated Universal Time (UTC).

**Table 1: GPS Data Parameters**

<b>Parameter Name</b>	<b>Parameter Description</b>
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 groundspeed between current and previous data point (knots)
Track	Average course between current and previous data point (degrees)

#### **4.4 Overlays and Tabular Data**

The following overlays were created using Google Earth.

Figure 2 is an overlay from the accident flight which shows the aircraft takeoff from runway 23 from Pellston Regional Airport. The last point recorded is at 00:57:58 with a corresponding GPS altitude and Groundspeed of 883ft and 114kts respectively. Some points were omitted to remove clutter in the overlay.

Figure 3 is an isometric view of the accident flight. The overlay shows the airplane beginning to lose GPS altitude with increasing Groundspeed at 00:57:45.

Tabular data used to generate figures 2 and 3 are included as Attachment 1. This attachment is provided in electronic comma-delimited (\*.CSV) format.

Figure 2. Top view of the aircraft's track on takeoff.



Figure 3. Isometric view of the aircraft's track on takeoff.

