

**NATIONAL TRANSPORTATION SAFETY BOARD**

Vehicle Recorder Division

Washington, D.C. 20594

May 2, 2017

**Global Positioning System Device**

**Specialist's Factual Report**

**By James Cash**

**1. EVENT SUMMARY**

Location: Pottstown, Pennsylvania  
Date: March 9, 2016  
Aircraft: Mooney M20C  
Registration: N242TS  
Operator: Private  
NTSB Number: ERA16LA126

On March 9, 2016, about 1310 Eastern Standard time, a Mooney M20C, N242TS, was substantially damaged during a forced landing following a total loss of engine power during initial climb from Heritage Field Airport (PTW), Pottstown, Pennsylvania. The private pilot was seriously injured. Visual meteorological conditions prevailed and no flight plan was filed for the personal flight operated under the provisions of Title 14 Code of Federal Regulations Part 91, destined for Wing s Field Airport (LOM), Philadelphia, Pennsylvania.

**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:             | 19709343          |

**3.1. Device Description**

The Garmin GPSMAP 496 is a battery-powered portable 12-channel GPS receiver with a 256-color TFT 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

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. 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 tracklog 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 tracklog as a function of time or distance moved, depending on how the unit has been configured. Once the current tracklog memory becomes full, new information either overwrites the oldest information or recording stops, depending on how the unit is configured. The current tracklog can be saved to long-term memory and 15 saved tracklogs can be maintained in addition to the current tracklog. Tracklog 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 tracklog information to a PC via a built-in serial port using the NMEA 0183 version 2.0 protocol. The unit can also communicate with external devices such as a computer using 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**

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed that the unit had not sustained any physical damage as a result of the accident. The accident unit powered up normally and the data was extracted using the normal rear panel USB interface using the manufacturers download instructions.

### **3.3. Data Description**

The data extracted included 39 track logs from January 20, 2016, through March 9, 2016.<sup>1</sup> According to the date and time recorded in the track file, the accident flight recording started at 13:02:09 EST and ending 13:08:31 EST.

### **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.

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<sup>1</sup> All dates and times are referenced to Eastern Standard Time (EST).

**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 1 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.

The flight departed the Heritage Field Airport (PTW), Pottstown, Pennsylvania approximately 13:07:49 EST. The last recorded parameter was as at 13:08:31 EST on March 9, 2016, with a GPS altitude of 289 feet above Mean Sea Level (MSL) and a ground speed of 7 MPH.

Figure 2 is a graphical overlay generated by Google Earth looking down the takeoff runway at Heritage Field.

Figure 3 is a graphical presentation of the recorded data from the accident takeoff (altitude, groundspeed and track)

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



Figure 1. Google Earth overlay showing the accident flight track

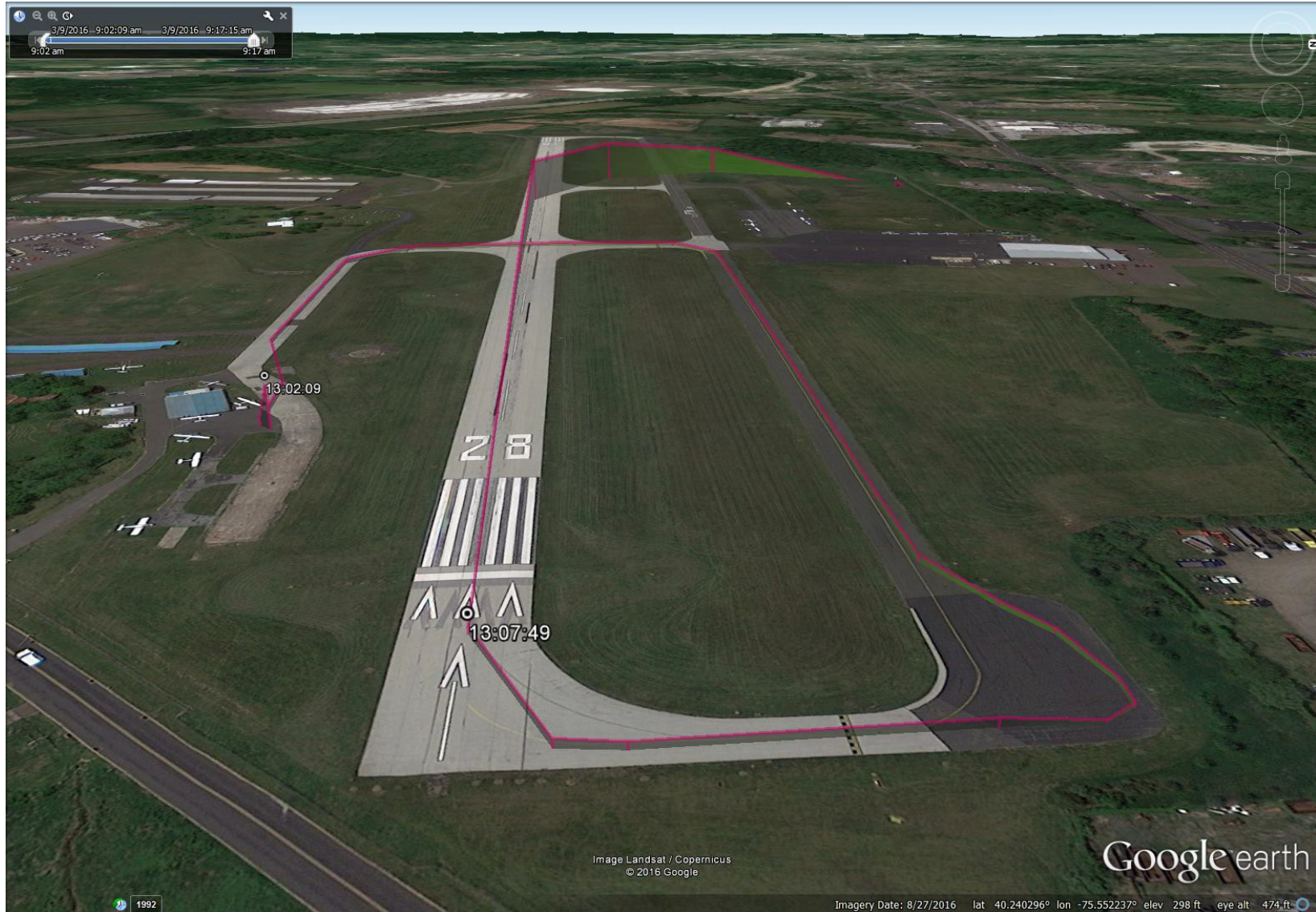


Figure 2. Google Earth overlay looking down the takeoff runway

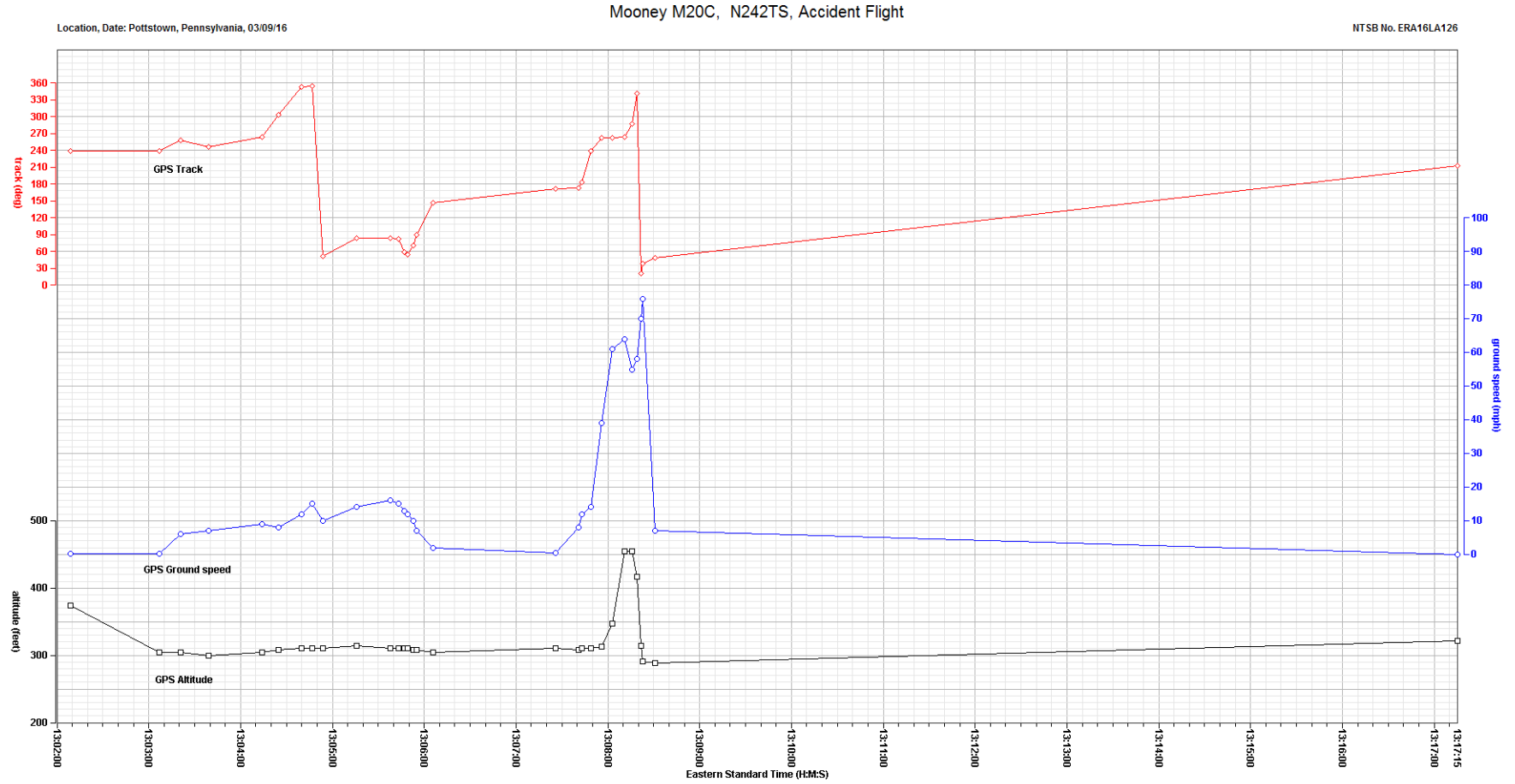


Figure 3. Graphical depiction of the recorded GPS data.