

# **NATIONAL TRANSPORTATION SAFETY BOARD**

Vehicle Recorder Division

Washington, D.C. 20594

February 10, 2016

## **Global Positioning System Device**

### **Specialist's Factual Report**

**By James Cash**

#### **1. EVENT SUMMARY**

Location: Galax Hillsville, Virginia  
Date: July 01, 2015  
Aircraft: Piper PA-28-151  
Registration: N43503  
Operator: Private  
NTSB Number: ERA15LA257

On July 1, 2015, about 1704 eastern daylight time, a Piper PA-28-151, N43503, touched down short of the intended runway at Twin Country Airport (HLX), Galax Hillsville, Virginia. The commercial pilot sustained a minor injury and the pilot-rated passenger was not injured. The airplane was substantially damaged. The airplane was registered to and operated by a private individual, under the provisions of 14 Code of Federal Regulations (CFR) Part 91 personal flight. Visual meteorological conditions prevailed at the time and no flight plan was filed. The flight originated from New River Valley Airport, Dublin, Virginia, about 1643, and was destined for HLX..

#### **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 396 |
| Serial Number:             | 28204053          |

##### **3.1. Device Description**

The Garmin GPSMAP 396 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 NEXTRAD radar, lightning, METARs, TAFs, and TFRs. 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 500 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 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 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<sup>1</sup>. 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

The unit recovered from the accident aircraft was undamaged and the data was downloaded normally using the Garmin download cable.

### 3.3. Data Description

The data extracted included 13 track logs from October 13, 2008<sup>2</sup> through July 1, 2015. The accident flight was recorded starting 1638:28 EDT and ending 1704:49 EDT on July 1, 2015.

### 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.

**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)                  |

<sup>1</sup> Type of solid state memory that does not require electrical power to retain information

<sup>2</sup> All dates and times are referenced to Eastern Daylight Time (EDT)

|             |                                       |
|-------------|---------------------------------------|
| 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 plots are not necessarily the weather and lighting conditions present at the time of the recording.

The flight departed the New River Valley Airport, Dublin, Virginia at approximately 1643:01 EDT. The last recorded inflight parameter was at 1703:53 EDT on July 1, 2015, with a GPS altitude of 2,618 feet above Mean Sea Level (MSL) and a ground speed of 62 knots.

Figure 2 is a graphical overlay generated using Google Earth zoomed in on the approach portion of the flight at the Twin County airport. Figure 3 highlights the final approach portion of the accident flight on Google Earth. The last inflight data point recorded is shown with time, heading, altitude and groundspeed highlighted. Figure 4 depicts the final approach to the Twin County airport with a 3 PAPI<sup>3</sup> degree glide slope shown as a white line overlaid on the Google Plot.

Figure 5 is a plot of the recovered GPS data for the entire flight from the New River Valley Airport, Dublin, Virginia to the Twin County airport.

Tabular data used to generate figures 1 through 4 are included as Attachment 1. This attachment is provided in electronic comma-delimited (.CSV) format.

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<sup>3</sup> PAPI – Precision Approach Path Indicator is a visual aid located adjacent to the runway that provides approach path guidance to the pilot

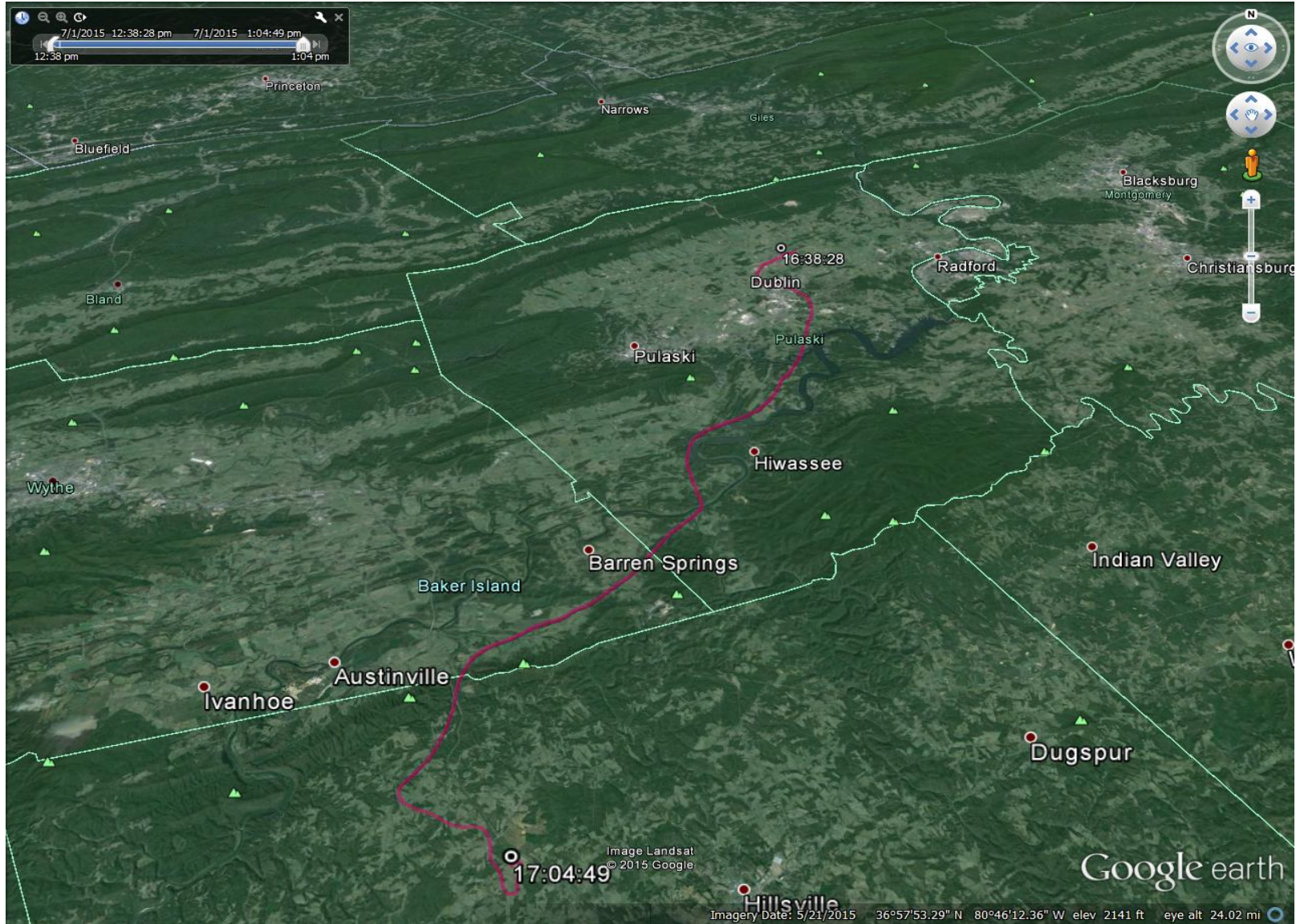


Figure 1. Google Earth overlay showing all recorded data of the flight from Dublin, Virginia to Twin County airport, Virginia.

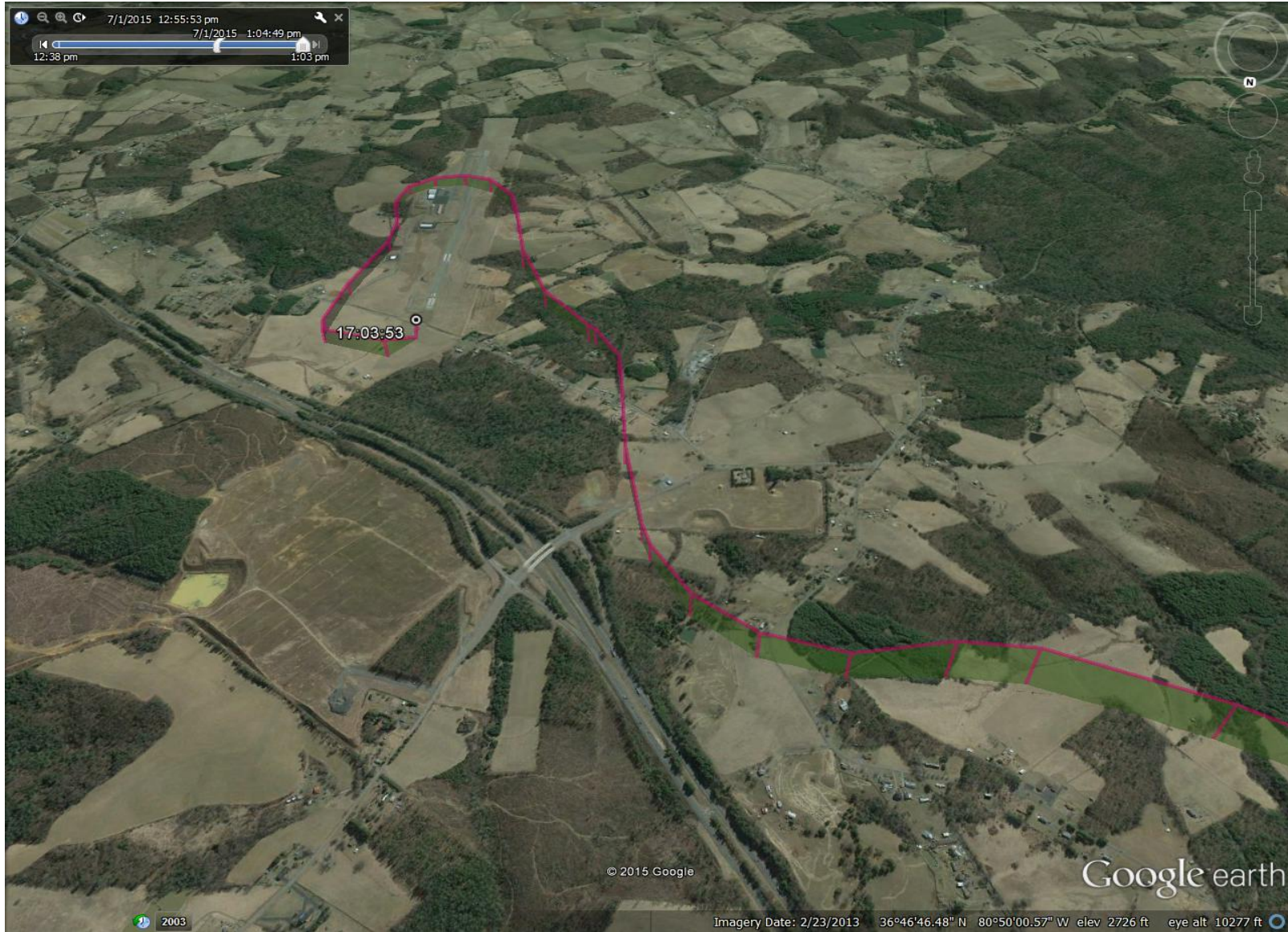


Figure 2. Google Earth overlay showing the approach into Twin County airport.



Figure 3. Google Earth overlay showing final approach into Twin County Airport

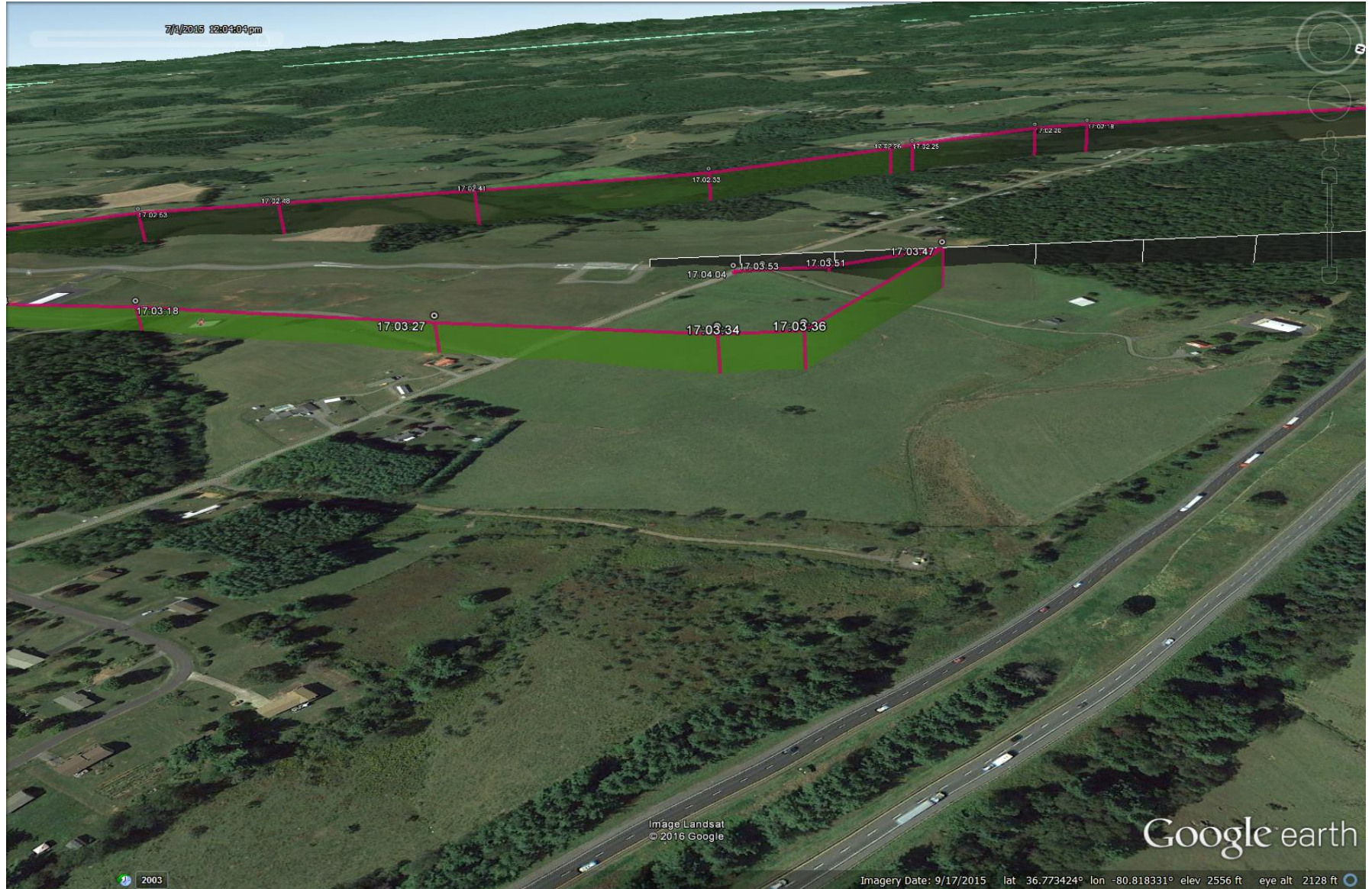


Figure 4. Google Earth overlay showing final approach with a 3 degree approach depicted

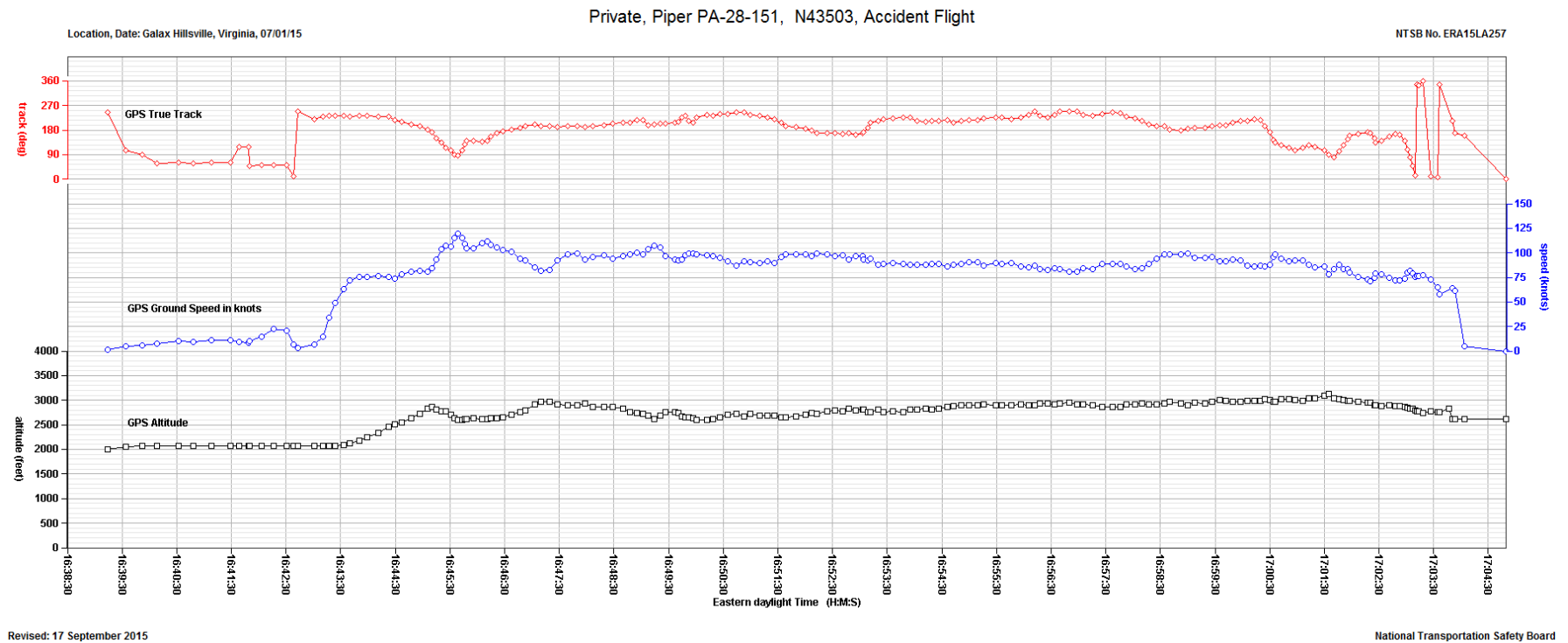


Figure 5. Plot of recorded GPS data