NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

November 6, 2014

Electronic Devices

Specialist's Factual Report
by Bill Tuccio, Ph.D.

1. EVENT

Location:	Carroll County, Virginia
Date:	September 10, 2014
Aircraft:	Piper J3C-65
Registration:	N26105
Operator:	Private
NTSB Number:	ERA14LA433

On September 10, 2014, about 1315 eastern daylight time (EDT), a Piper J3C-65 Cub, N26105, was substantially damaged after it impacted trees while maneuvering at low altitude near Carroll County, Virginia. The private pilot was seriously injured. Instrument meteorological conditions prevailed and no flight plan was filed for the flight that originated from Raleigh County Memorial Airport (BKW), Beckley, West Virginia at 1145 and was destined for Smith Reynolds Airport (INT), Winston Salem, North Carolina. The personal flight was conducted under the provisions of 14 *Code of Federal Regulations* Part 91.

2. DETAILS OF DEVICE INVESTIGATION

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

Device 1:	GoPro Hero
Device 1 Serial Number:	HD10211035062
Device 2:	Garmin GPSMAP 296
Device 2 Serial Number:	67023090

2.1. GoPro Hero Device Description

The GoPro Hero is a portable, rugged high definition capable video recorder. The camera is equipped with a wide-angle lens integrated into the camera body. The body also contains the camera controls, a battery, an internal microphone, an SD memory card slot, and a USB port. Recorded audio and video is written directly to the SD card.

2.1.1. GoPro Hero Data Recovery

Upon arrival at the NTSB's Vehicle Recorder Division, an exterior examination revealed the unit had not sustained any damage. No SD card was found in the unit and, as a result, no data could be recovered.

2.1.2. GoPro Hero Data Description

No data was recovered.

2.2. Garmin GPSMAP 296 Device Description

The Garmin GPSMAP 296 is a hand-portable GPS unit equipped with a detachable antenna, a 256 color TFT LCD display, built in base map and an internal Jeppesen aviation database. The unit employs a parallel 12 channel receiver and can be operated using external power, or alternatively by using an internal Li-Ion rechargeable battery. The GPSMAP 296 is capable of storing date, route of flight, and flight time information for up to 50 individual flights in the form of a flight log. Flight logging begins when the GPS unit senses a speed increase to greater than 30 knots together with an altitude gain of greater than 500 feet. The record is saved when the speed is sensed to decrease to below 30 knots, and a new log will be started if more than 10 minutes passes from this time. 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[1] memory. The unit contains hardware and software permitting the download of recorded waypoint, route, and tracklog 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.

2.2.1. Garmin GPSMAP 296 Data Recovery

Upon arrival at the NTSB's Vehicle Recorder Division, an exterior examination revealed the unit had not sustained any damage and information was extracted using the manufacturer's software normally, without difficulty.

2.2.2. Garmin GPSMAP 296 Data Description

The data extracted included 22 sessions from August 27, 2014 through September 10, 2014 (10,001 total data points). The accident flight was the last session, recorded

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

starting at 15:24:12 UTC and ending at 17:09:00 UTC on September 10, 2014 (529 total data points).

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.

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, MSL[2])
Groundspeed	Average groundspeed between current and previous data point (knots)
Track	Average true course between current and previous data point (degrees)

4. OVERLAYS AND TABULAR DATA

All graphical overlays generated in this report were generated using Google Earth. Weather conditions in Google Earth are not necessarily representative of weather conditions at the time of the accident.

Figures 1 through 8 show the aircraft departing BKW at about 15:41 EDT and proceeding south/southeast. While enroute the aircraft course paralleled ground features, such as Interstate 77, and the aircraft climbed and then descended multiple times. The last recorded points were along Interstate 77 in Carrol County, Virginia.

The following is a summary of figures 1 through 8:

- Figure 1 shows the entire accident flight recording. Select points show changes in altitude.
- Figure 2 is a plot of altitude and groundspeed for the entire flight. Altitude changes were:
    - Initial climb to about 3,800 feet by about 15:42 UTC.
    - Enroute climb to about 4,500 feet starting at about 16:06 UTC until about 16:13 UTC.

[2] MSL means altitude above mean sea level

- Enroute descent and altitude changes between 4,000 feet and 4,250 feet from about 16:13 UTC until about 16:30 UTC.
- Enroute descent to about 4,000 feet at about 16:32 UTC.
- Enroute descent to about 3,250 feet starting at about 16:43 UTC until about 16:52 UTC.
- Final descent starting at about 17:00 UTC.

- Figure 3 shows the start of the recording and departure from BKW. The recording began at 15:24:12 UTC. The aircraft taxied for departure and was airborne by about 15:37 UTC.
- Figure 4 shows the initial climb to about 3,800 feet by about 15:42 UTC.
- Figure 5 shows the enroute climb to about 4,500 feet starting at about 16:06 UTC, and the start of the ensuing descent at about 16:13 UTC.
- Figure 6 shows the enroute descent to about 3,250 feet starting at about 16:43 UTC.
- Figure 7 shows the final descent starting at about 17:00 UTC until the end of the recording at 17:09:00 UTC.
- Figure 8 shows the last 3 minutes of the recording as the aircraft descended along Interstate 77. The points after 17:07:21 UTC may be inaccurate and/or may represent the aircraft on the ground during or after impact.

Tabular data used to generate figures 1 through 8 are included as attachment 1. This attachment is provided in electronic comma-delimited (.CSV) format.

Figure 1. Accident flight as recorded by Garmin 296.

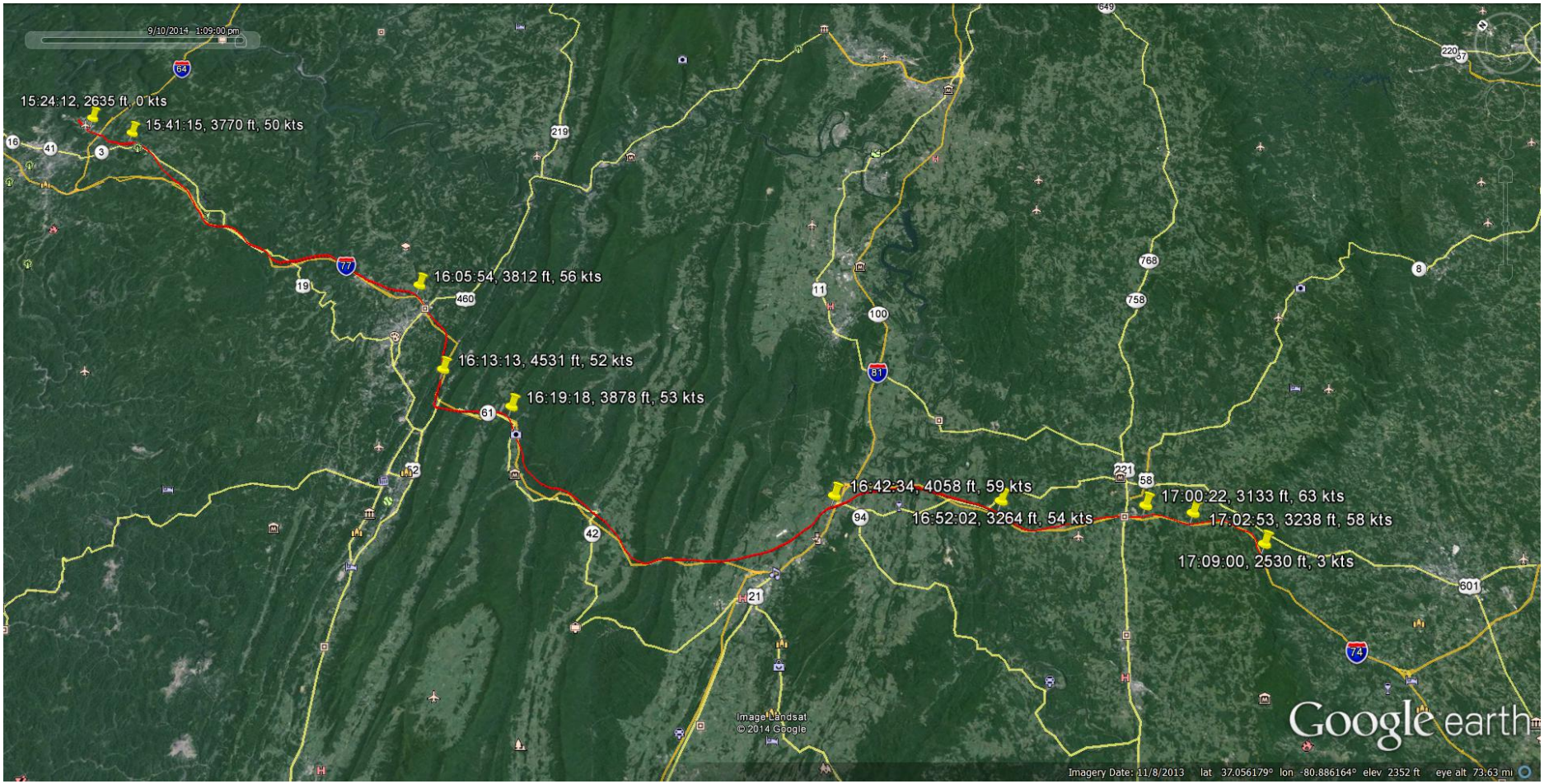

Figure 2. Accident flight altitude and groundspeed profile, as recorded by Garmin 296.

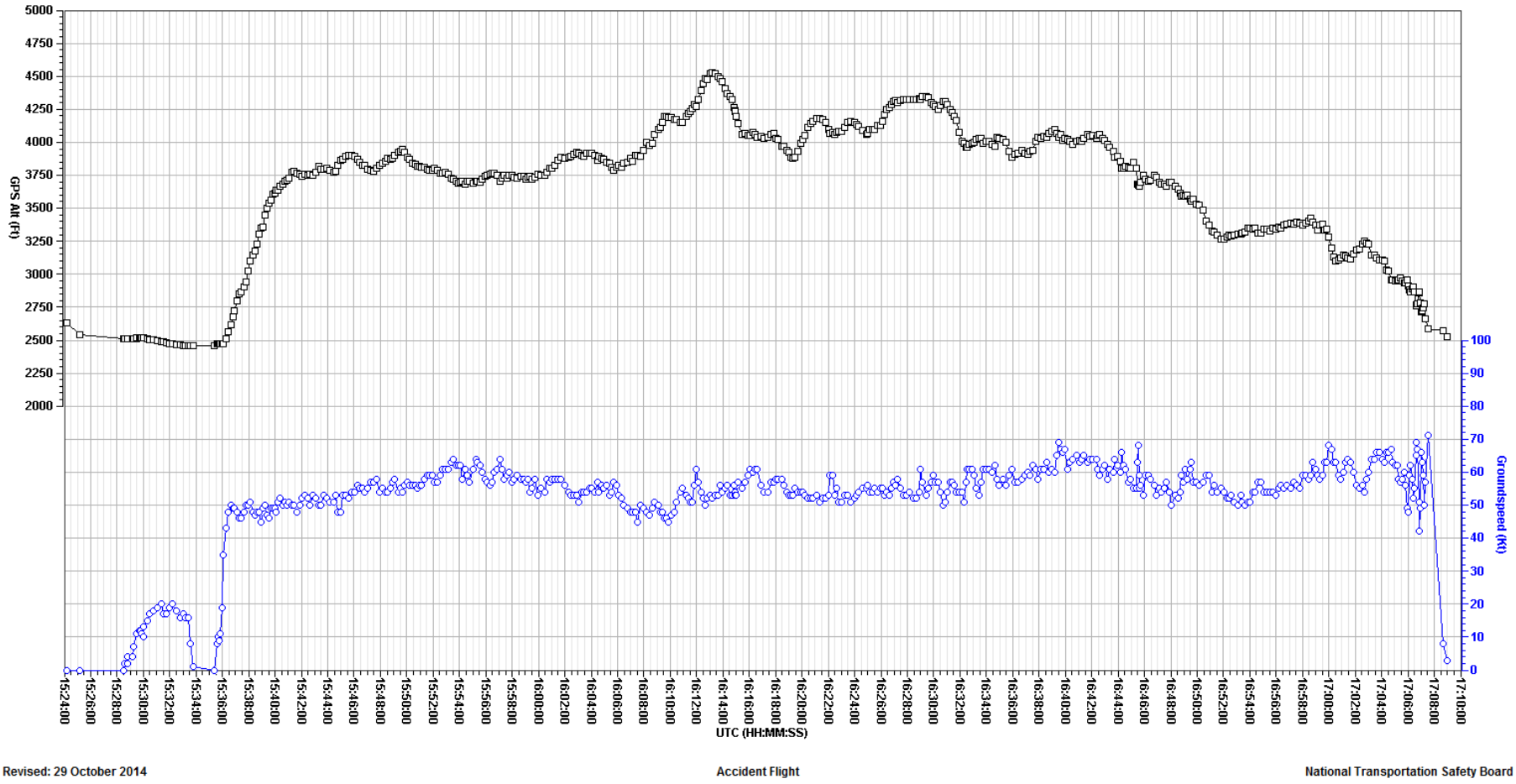

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Figure 3. Start of recording as recorded by Garmin 296.

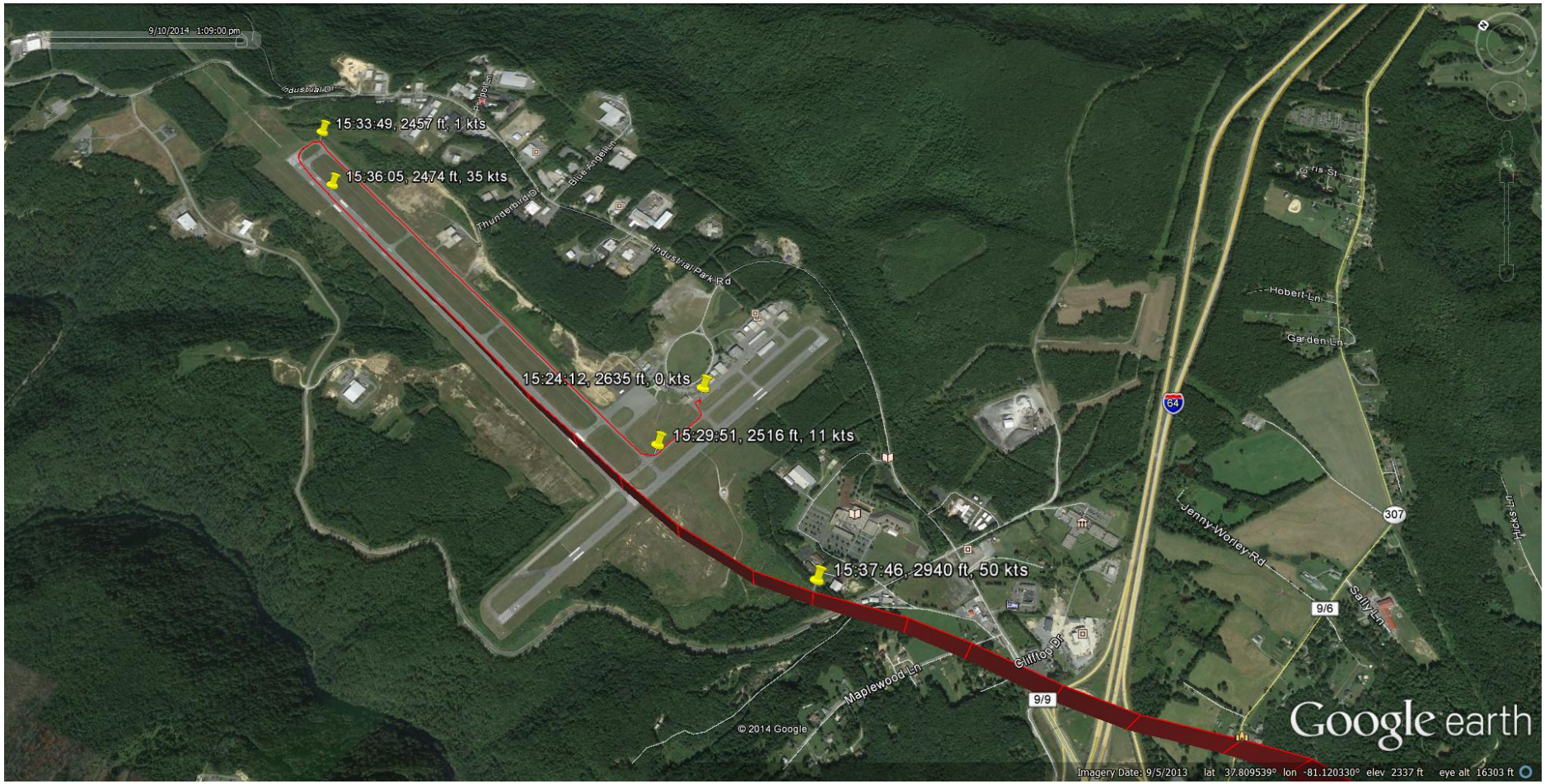

Figure 4. Initial climb as recorded by Garmin 296.

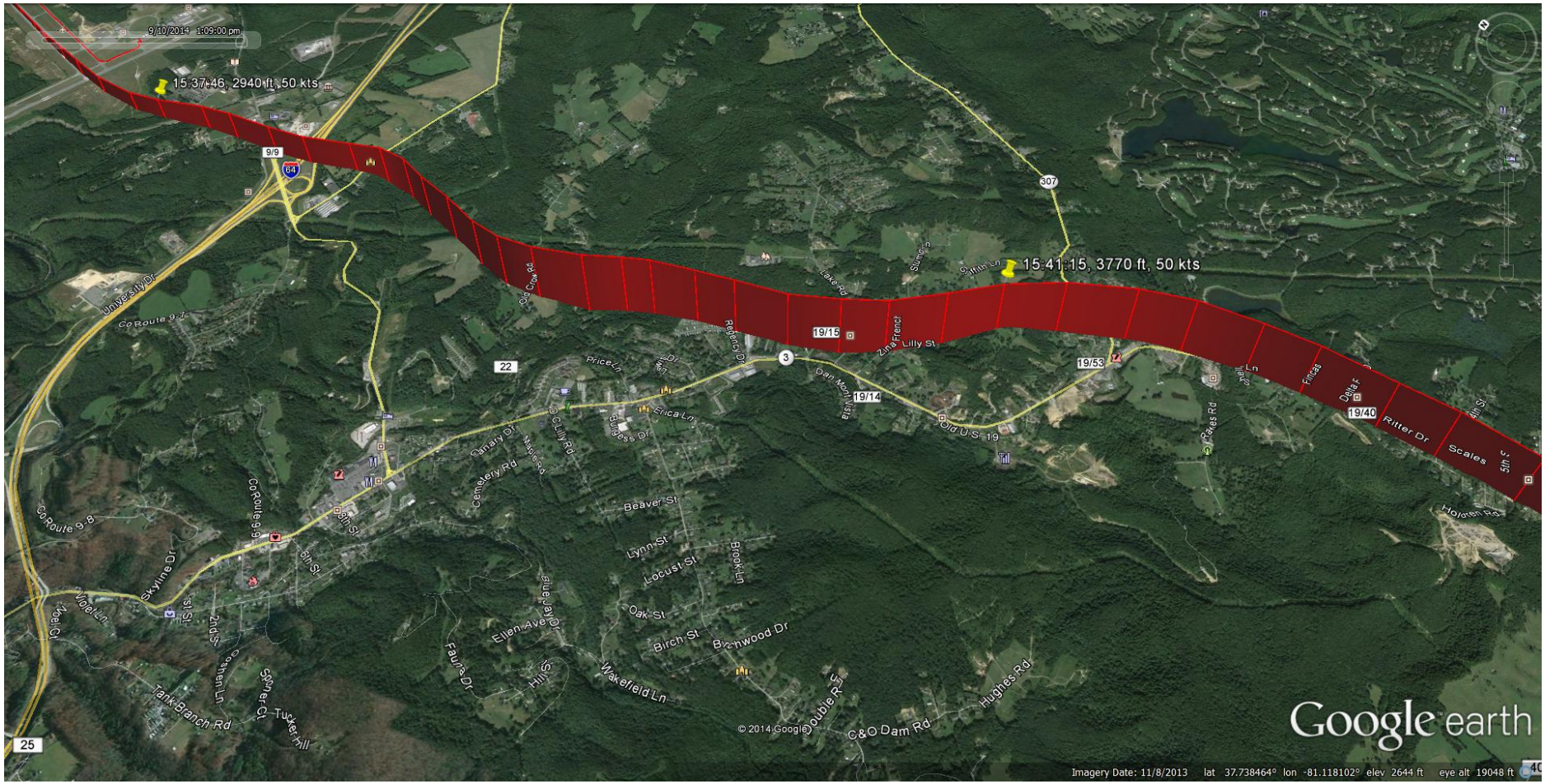

Figure 5. Enroute climb as recorded by Garmin 296.

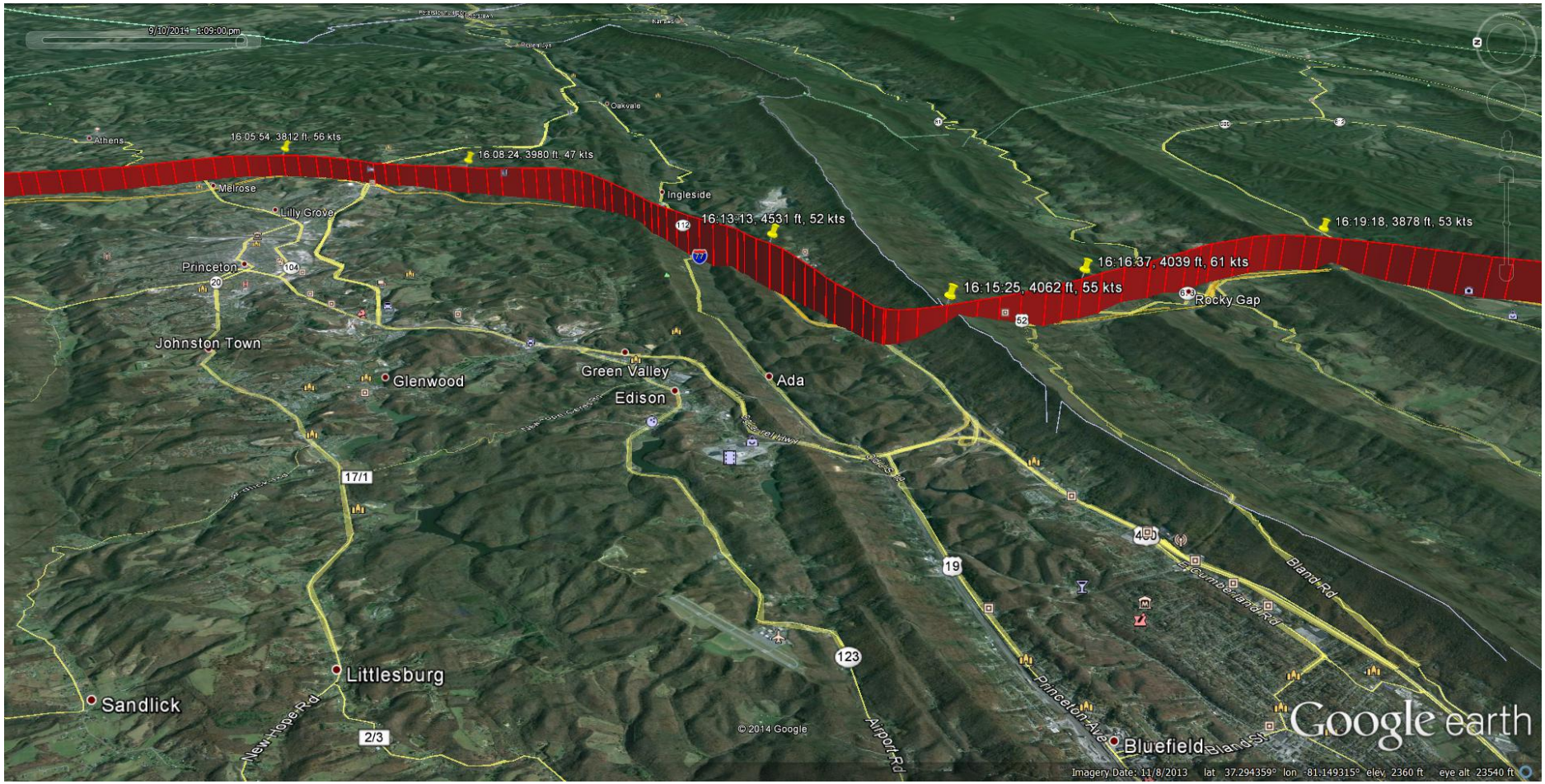

Figure 6. Enroute descent as recorded by Garmin 296.

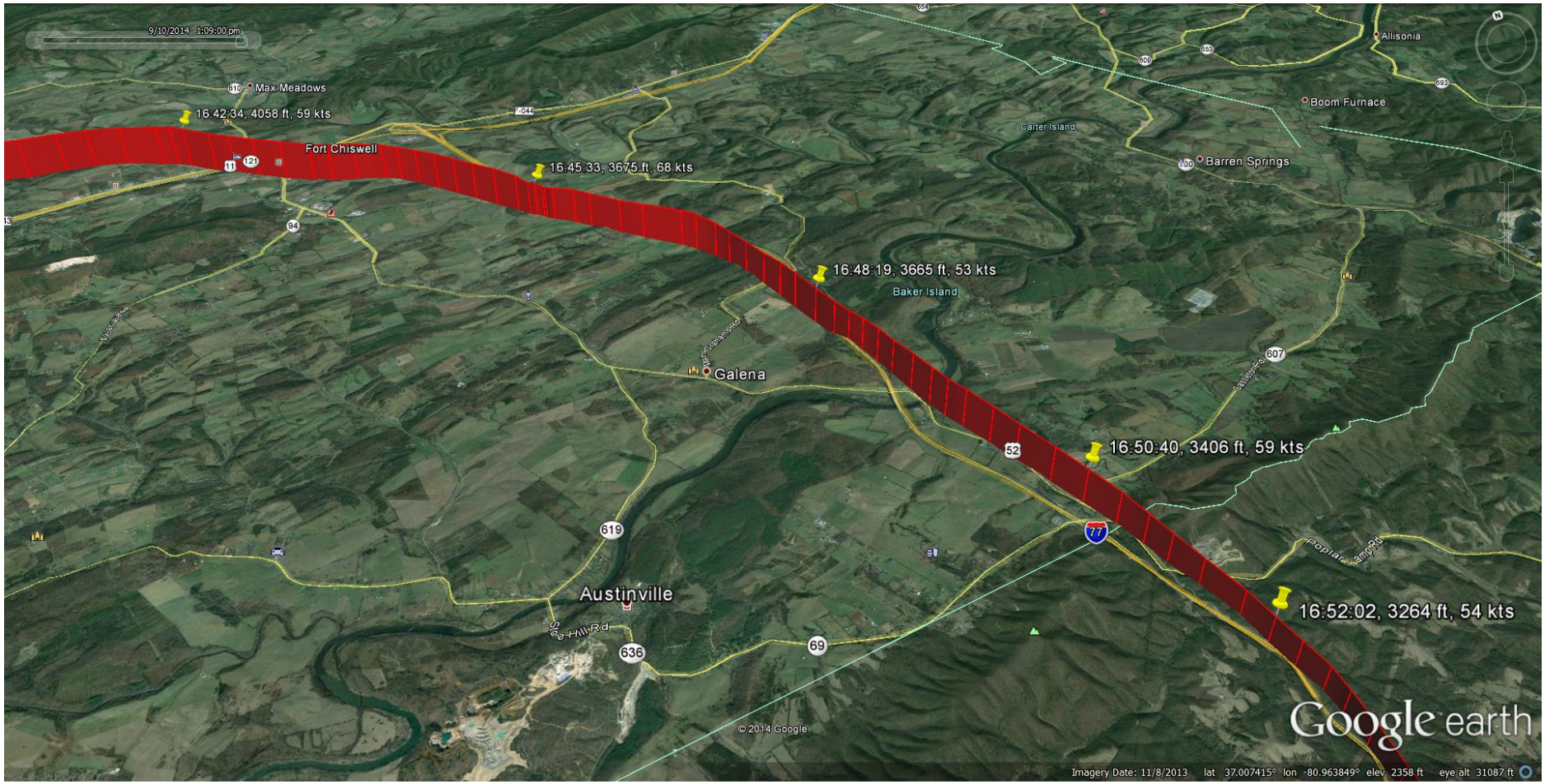

Figure 7. Enroute descent to end of recording, as recorded by Garmin 296.

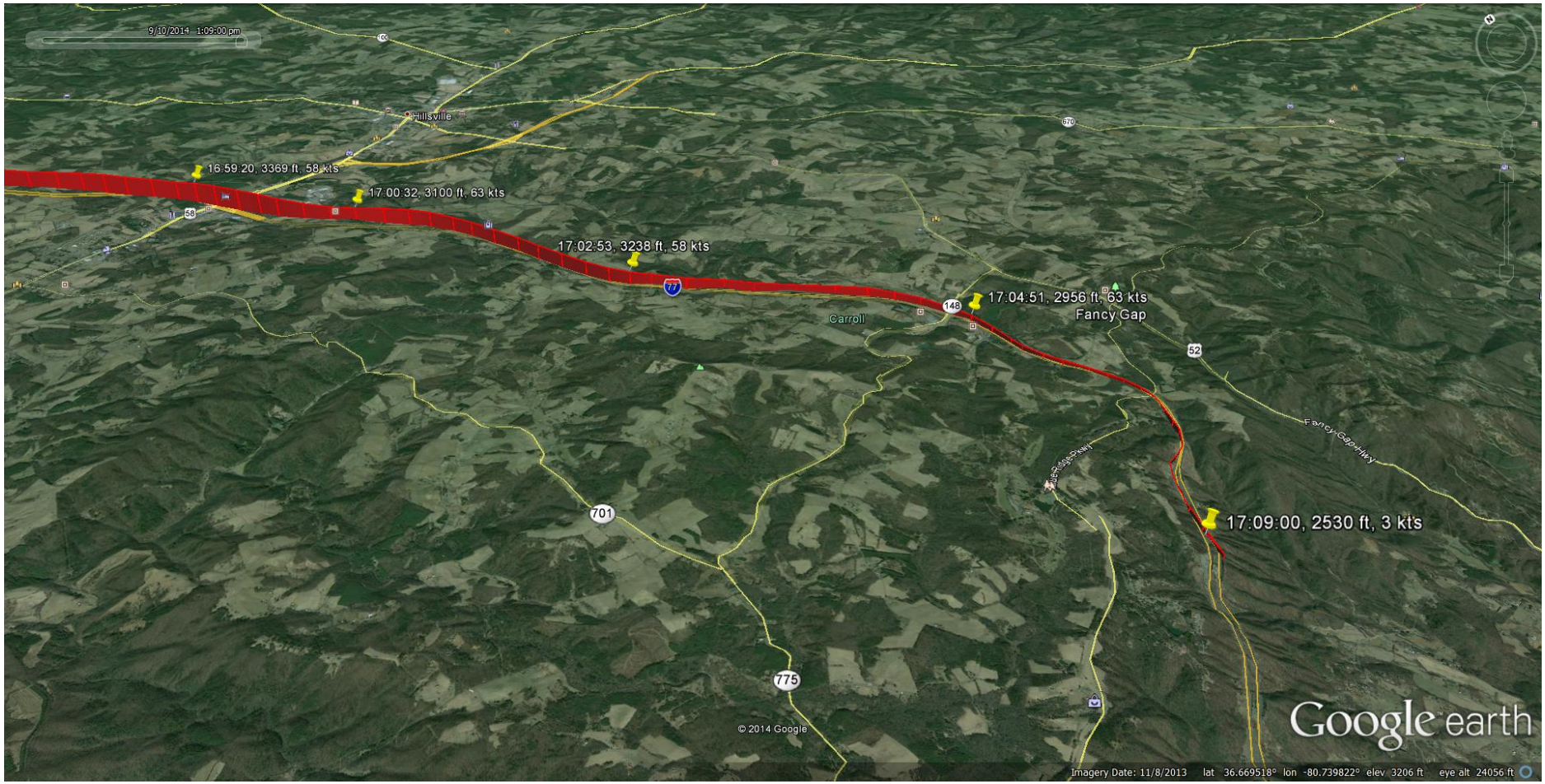

Figure 8. End of recording as recorded by Garmin 296.