

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

December 23, 2014

Electronic Devices Factual Report

Specialist's Report
by George Haralampopoulos

1. EVENT

Location: Biglerville, Pennsylvania
Date: December 26, 2013
Aircraft: Piper PA-30
Registration: N8372Y
Operator: Private
NTSB Number: ERA14FA077

2. SUMMARY

On December 26, 2013, about 0530 eastern standard time, a Piper PA-30, N8372Y, was destroyed following an inflight break up, and impact with terrain near Biglerville, Pennsylvania. Night visual meteorological conditions prevailed and no flight plan was filed for the flight. The certificated private pilot and passenger were fatally injured. The personal flight was conducted under the provisions of Title 14 *Code of Federal Regulations* Part 91. The flight originated from Bloomsburg Municipal Airport (N13), Bloomsburg, Pennsylvania, around 0445, with an intended destination of Summerville Airport (DYB), Summerville, South Carolina.

3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Laboratory received the following devices:

GPS Manufacturer/Model:	Garmin GPSMAP 696
Serial Number:	Unknown
GPS Manufacturer/Model:	Apple iPad ¹
Serial Number:	Unknown
Device Manufacturer/Model:	Apple iPhone ¹
Serial Number:	Unknown

¹ Recovery of data from this device was not possible due to damage sustained by impact.

Device Manufacturer/Model:
Serial Number:

Motorola Droid¹
Unknown

3.1 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 display screen. The unit includes a built-in Jeppesen database and is capable of receiving XM satellite radio for flight information. The unit can also perform and store weight and balance calculations. A built-in 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 GPS 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 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-volatile² memory (NVM). 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.

3.2 Garmin GPSMAP 696 Data Recovery

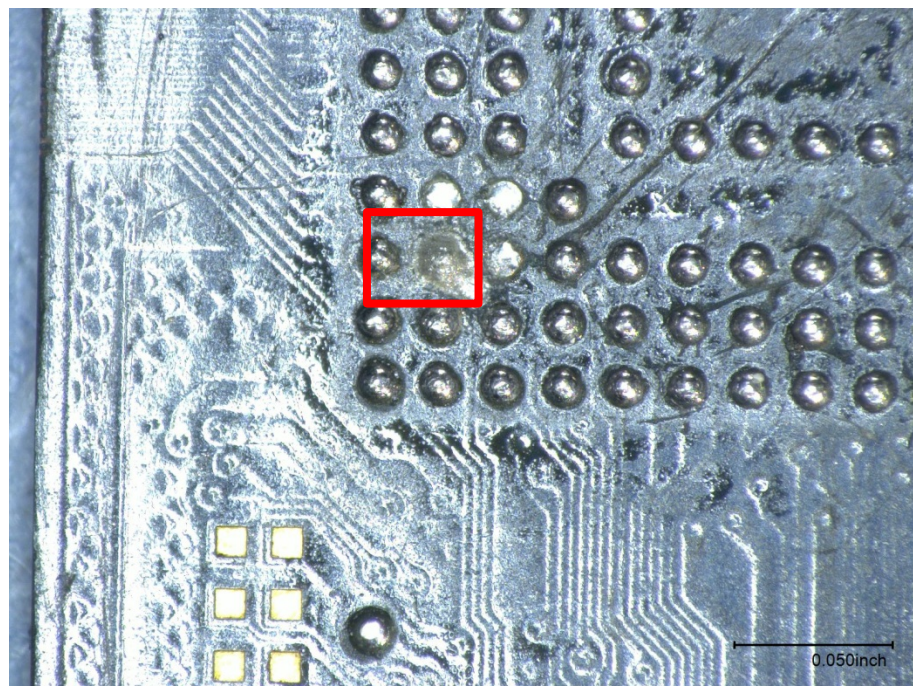
Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit sustained major impact damage compromising its functionality (figure 1). An interior examination revealed the chip containing the units NVM was dislogged from the circuit board and sustained damage to one of its connectors. Conductive silver epoxy was used to repair the chip's connector (figure 2). The repaired chip was placed into a forensic reader and the data was then successfully extracted.

² Non-volatile memory is semiconductor memory that does not require external power for data retention.

Figure 1. Photo of Garmin 696 unit, as received.



Figure 2. Photo of NVM chip with repaired connector (highlighted in red).



3.3 Garmin GPSMAP 696 Data Description

The data extracted included 24 sessions from December 19, 2013³, through December 26, 2013. The event flight was located from the recorded data starting from 9:39:20 until 10:27:28 UTC, on December 26, 2013, consisting of 375 data points.

3.4 Garmin GPSMAP 696 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
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	Derived groundspeed (knots)

4. OVERLAYS AND TABULAR DATA

The following overlays were created using Google Earth. The aircraft's track is shown in light green.

Figure 3 is an overlay from the entire event flight and begins with the aircraft departing from Bloomsburg Municipal Airport. The first and last recorded data points are shown along with additional data points to denote direction of flight.

Figure 4 is an overlay that combines NEXRAD weather radar information⁴ with the aircraft's recorded track during the event flight. The overlay shows the weather radar information in the surrounding area during the event flight.

Figure 5 is an overlay that highlights the last recorded data points of the event flight. Figure 6 contains the weather radar information surrounding the last recorded data points. A marker is placed on the wreckage location; this point was provided by onscene investigators. At about 10:24:29 UTC, the aircraft began to enter the green band of precipitation. Shortly after entering the green band, the aircraft began to perform several turning maneuvers before the recorded end of data at 10:27:28 UTC.

³ All dates and times are referenced to Coordinated Universal Time (UTC).

⁴ More information regarding the generated radar images and its associated data can be referenced in "IIC Factual Report" in the public docket.

Tabular data from the GPS used to generate figures 3 through 6 are included as Attachment 1. This attachment is provided in electronic comma-delimited (*.CSV) format.

Figure 3. Top view of the aircraft's track for event flight.

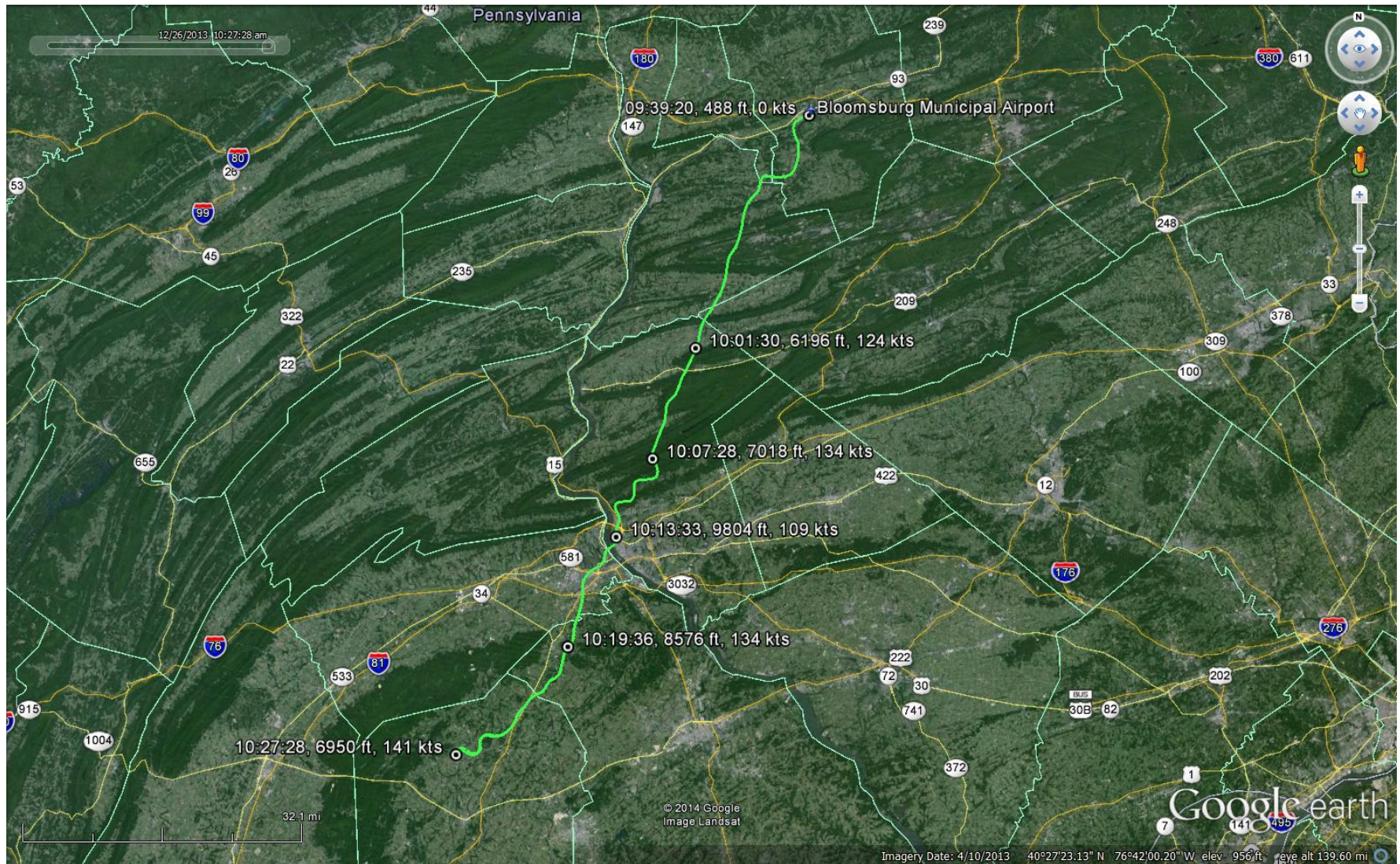


Figure 4. Weather radar condition of surrounding area during event flight.

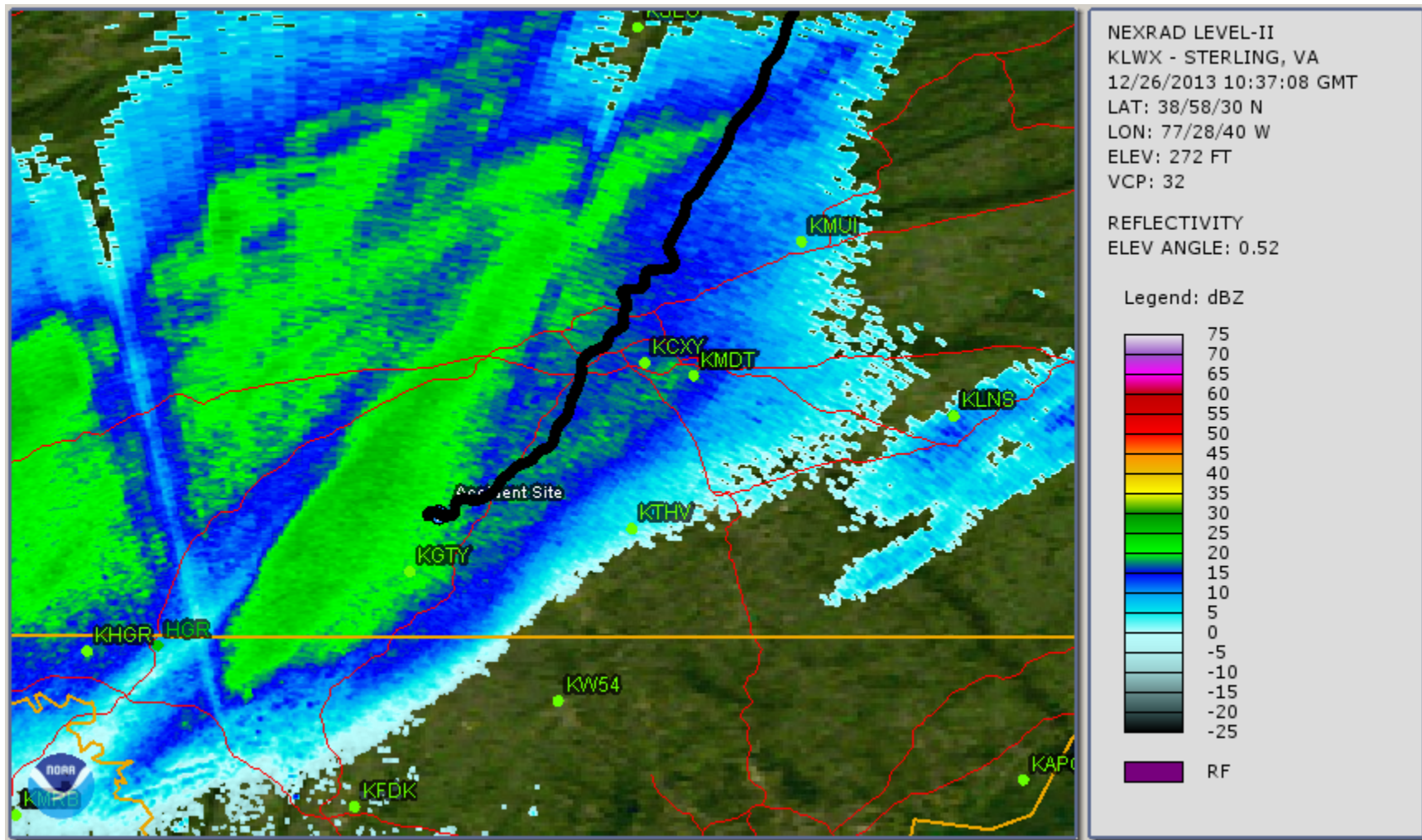


Figure 5. Last recorded data points near wreckage location.

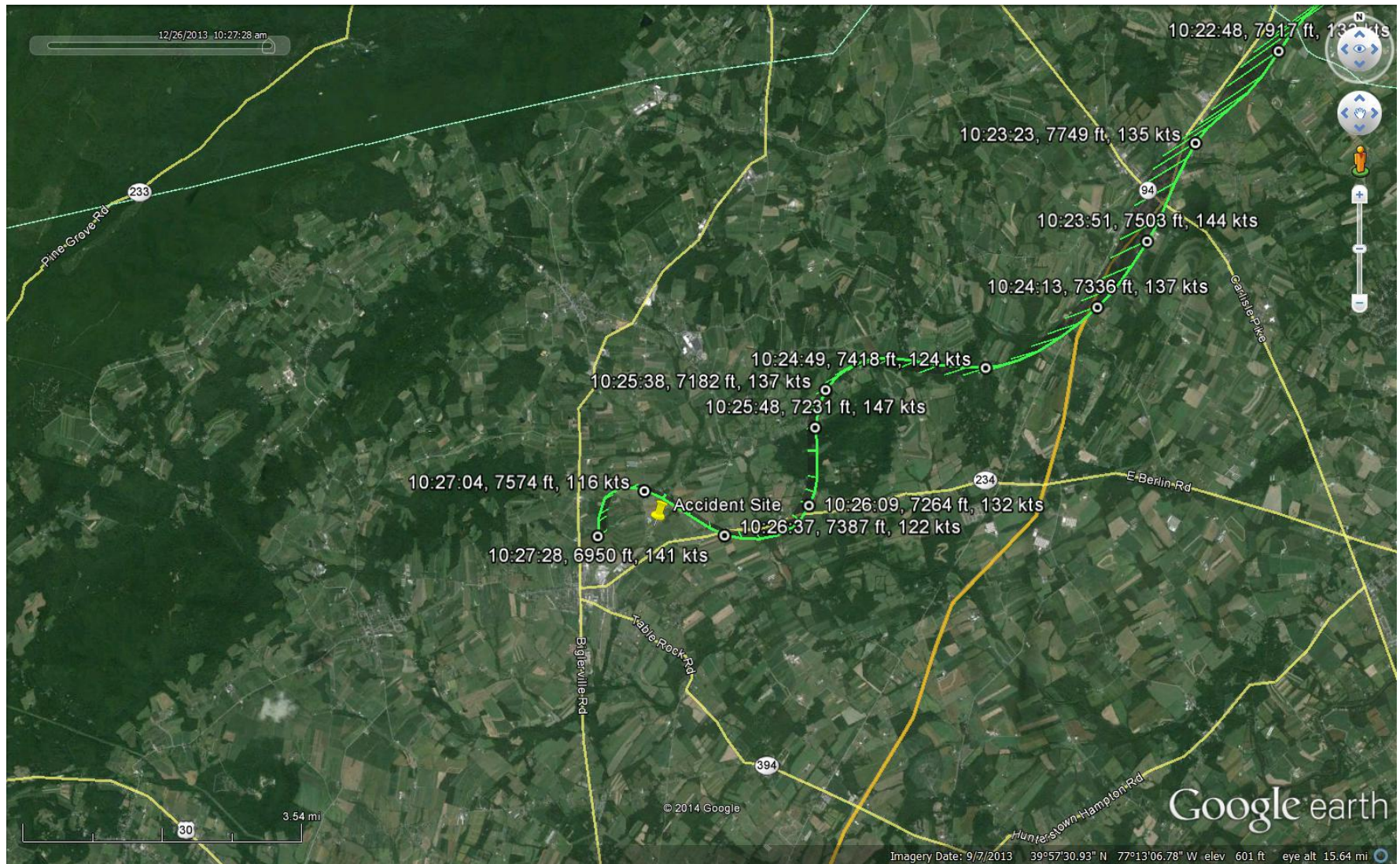


Figure 6. Weather radar conditions during last recorded data points.

