

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

March 25, 2016

Non-Volatile Memory Factual Report

Specialist's Factual Report
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1. EVENT

Location:	Hempstead, TX
Date:	August 23, 2015
Aircraft:	Schleicher ASW 20
Registration:	N878S
Operator:	Private
NTSB Number:	CEN15LA376

On August 23, 2015, about 1337 central daylight time, a Schleicher ASW 20 glider, N878S, impacted powerlines and terrain near Hempstead, Texas. The pilot, who was the sole occupant, sustained fatal injuries. The glider sustained substantial fuselage damage. The glider was registered to and operated by the pilot as a 14 *Code of Federal Regulations* Part 91 personal flight. Day visual meteorological conditions prevailed in the area of the flight about the time of the accident, and the flight was not operating on a flight plan. The local flight originated from the Soaring Club of Houston Gliderport, near Waller, Texas, about 1256.

2. DETAILS OF DEVICE INVESTIGATION

The Safety Board's Vehicle Recorder Division received the following devices:

Manufacturer/Device:	Samsung Galaxy S4
Model Number:	SCH-1545

Manufacturer Device:	Unknown GPS
Serial Number:	Not Available

2.1. Samsung Galaxy S4 Device Description

The Samsung Galaxy S4 is a touch-screen smart-phone capable of voice calling, text messaging, email, photo/video recording, audio (music) playback, and numerous other specialized functions depending on configuration. Specialized functions are supported by additional user-installed program applications supported by the Android operating

system. Application data is stored in non-volatile memory and a removable micro-SD card, and may include call logs, text messaging logs, image, video, and position location information. In addition, the specialized application data may be stored in a proprietary file structure using numerous file formats. The amount and type of data stored varies based on the software version and configuration of the specific device.

2.1.1. Samsung Galaxy S4 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed that the unit had sustained impact damage to the touchscreen, as shown in figure 1.

An interior examination was performed and the internal circuit board containing the Samsung's memory was removed and placed into a surrogate Samsung Galaxy S4.

The phone was able to be powered on and imaged; however, the device contained no data that was pertinent to the accident and no further work was performed.

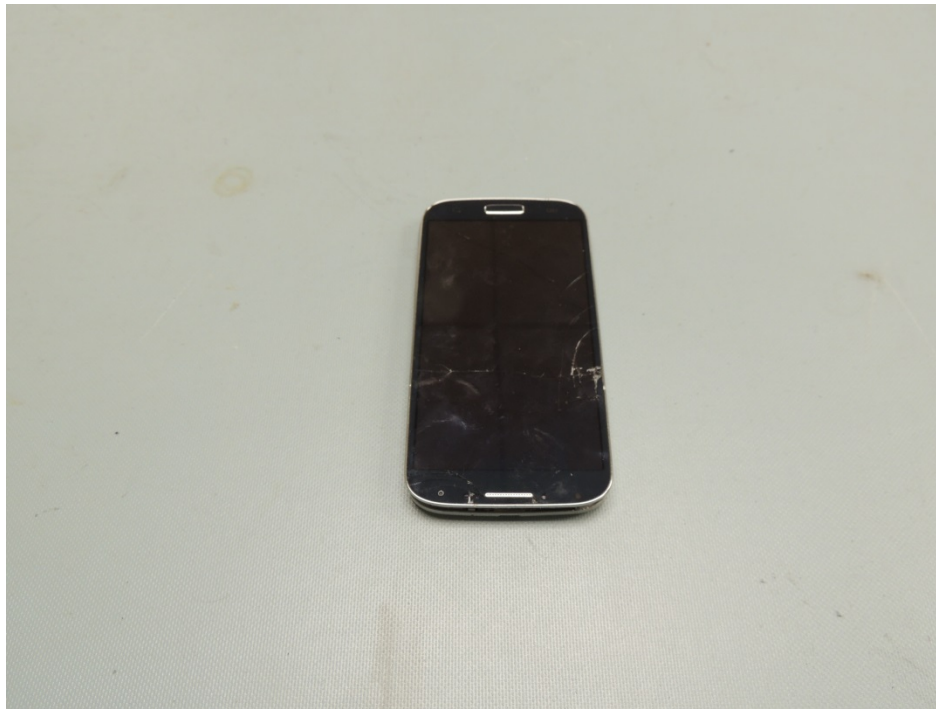


Figure 1. Samsung Galaxy S4, as received.

2.2. Unknown GPS Device Description and Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed that the GPS powered up normally and sustained minimal impact damage (figure 2). The internal micro SD card was removed and the flight log files were successfully extracted.

The GPS received contained an internal micro SD card that contained an open source GPS source code and recorded flight log files in .igc format. The .igc format is a gps data format used by the international gliding community to record gliding flights.



Figure 2. Unknown GPS, as received.

2.2.1. Unknown GPS Data Description

The data extracted included 32 logs. The accident event was identified by the file's recorded date on August 23, 2015. The event flight spanned from 17:54:07 to 18:36:59 UTC.¹

Additionally, the extracted data contained a log book function that kept tracked the recorded flight logs. All 32 flight logs were present.

2.3. 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.

¹ The GPS records data in Coordinated Universal Time (UTC).

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, MSL)
Groundspeed	Derived groundspeed (mph)
Track	Derived track (degrees)

3. PLOTS AND CORRESPONDING TABULAR DATA

The following figure contains GPS data recorded during the August 23, 2015 event flight. The flight path is shown in green with each data point represented in blue.

Figure 3 is a Google Earth overlay of the entire recorded event flight from 17:54:07 to 18:36:59 UTC, which shows the aircraft originating from the Soaring Club of Houston. The direction of flight is shown in red.

The aircraft performed several maneuvers throughout the flight. Figure 4 highlights the area of impact from the event flight. Two marker points “1” and “2” were superimposed on the overlay to denote the entry and exit of the set of maneuvers performed just prior to impact. The corresponding time of marker points “1” and “2” are 18:28:54 and 18:34:57 UTC.

Figure 5 is a plot of GPS parameters during the event flight. The area highlighted in blue corresponds to marker points “1” and “2” as shown in figure 4. At 18:13:11 UTC, the aircraft reached a max recorded GPS altitude of 3819 feet.

The corresponding tabular data used to create the overlay from the event flight are provided in electronic (*.csv²) format as Attachment 1 to this report.

² Comma Separated Value format.

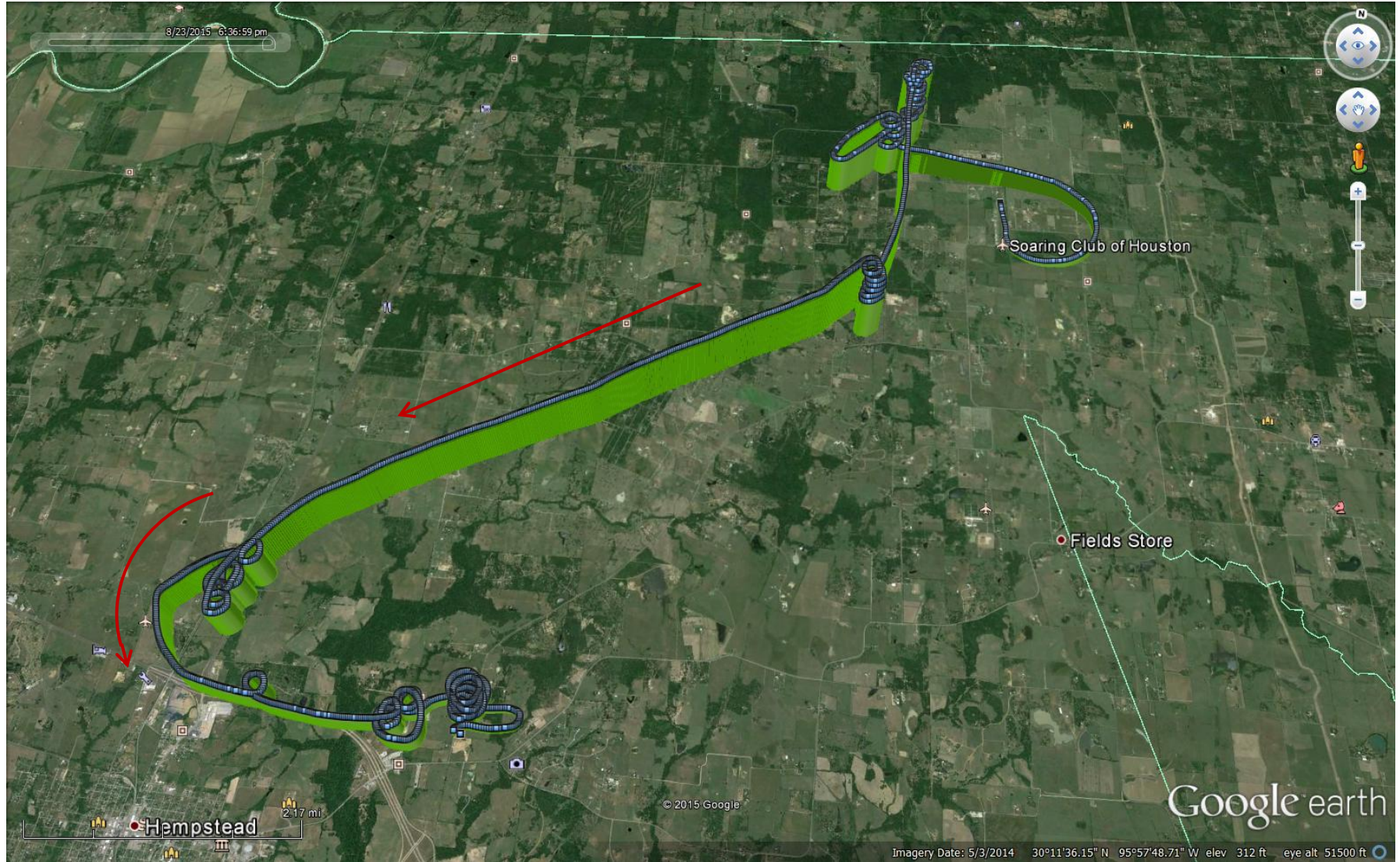


Figure 3. Entire event flight as recorded by the GPS.

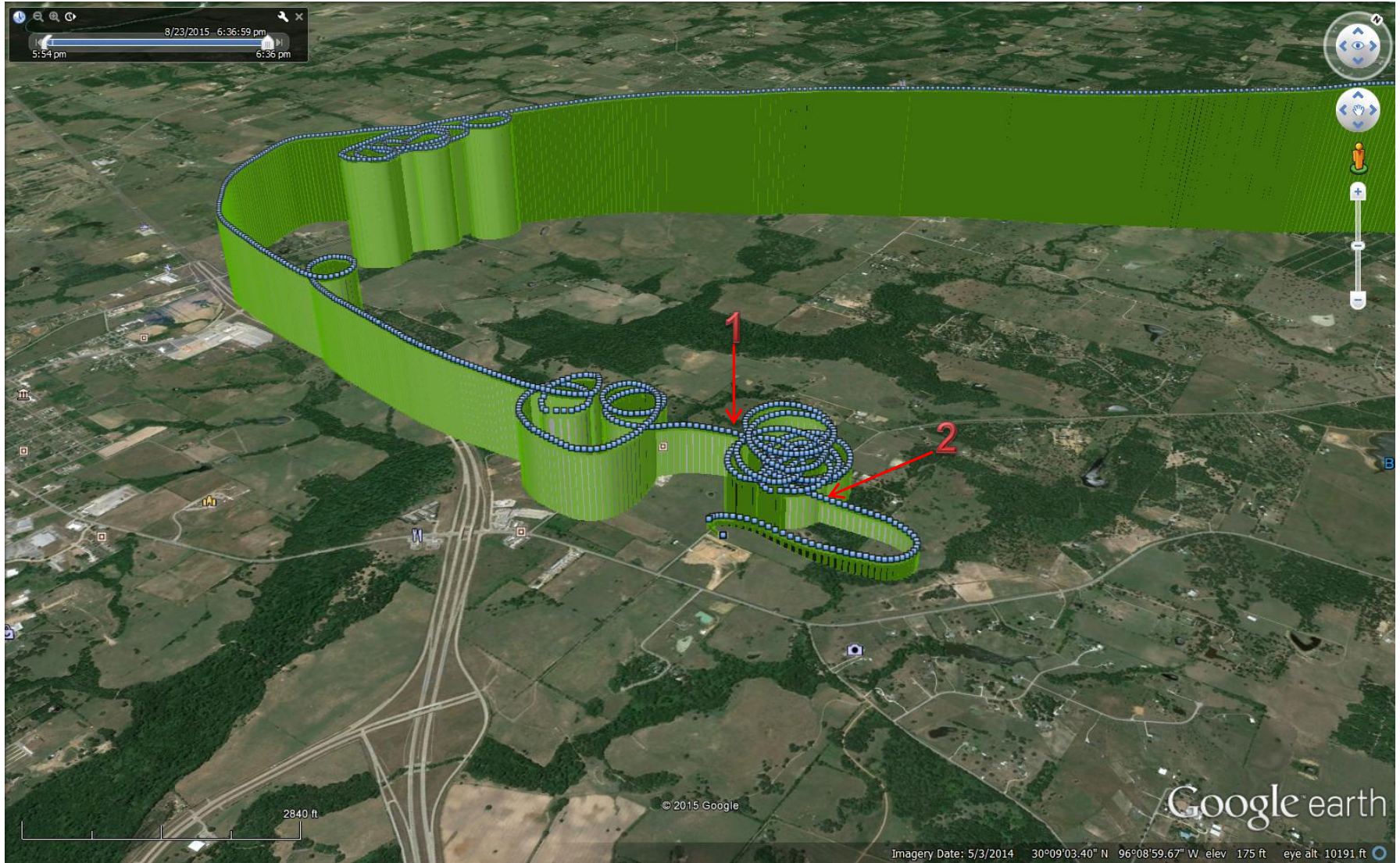


Figure 4. Event flight highlighting impact area.

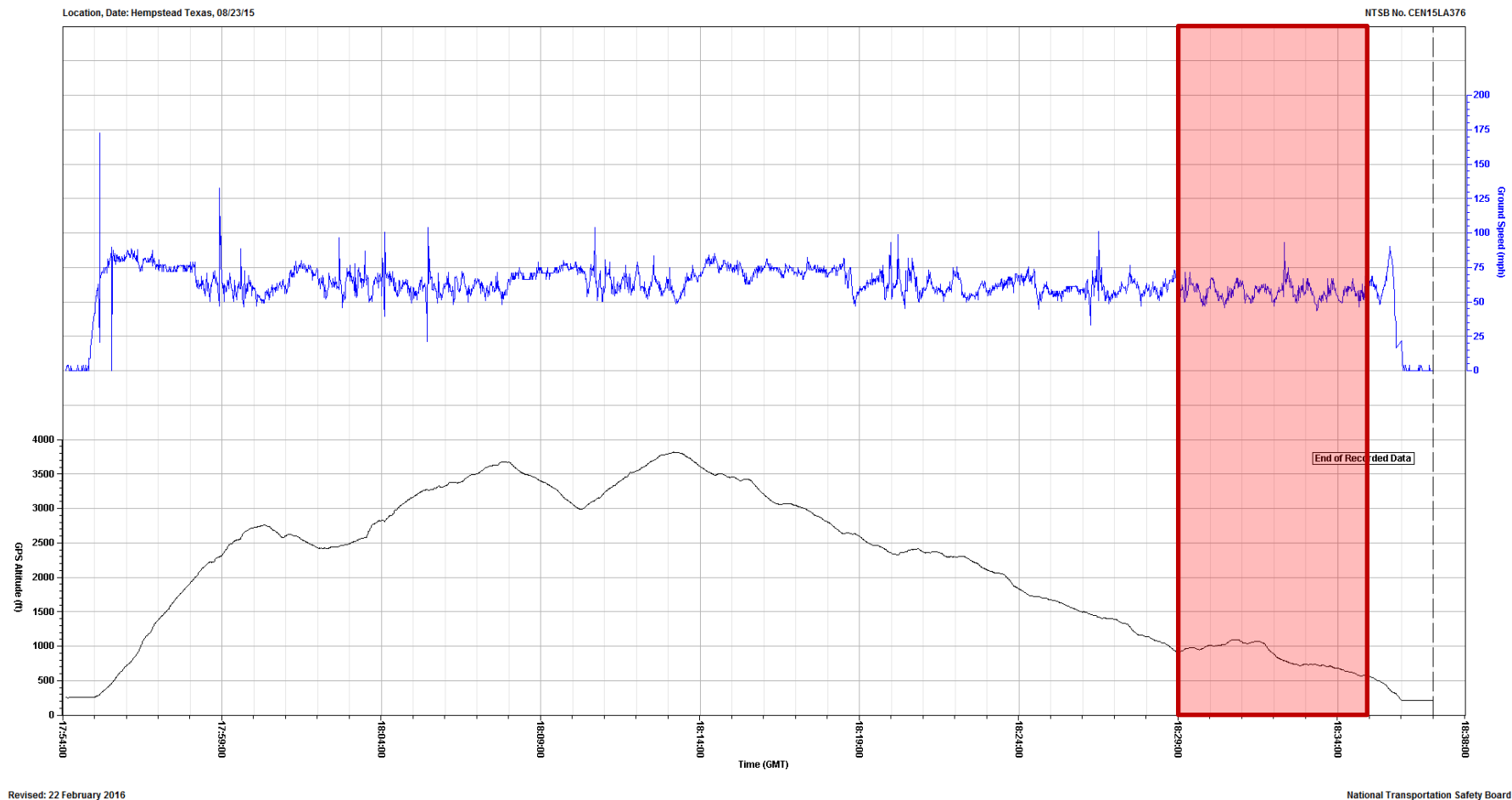


Figure 5. Plot of GPS parameters for recorded event flight.