

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

May 7, 2014

Global Positioning System Device

Specialist's Factual Report
By Ben Hsu

1. EVENT

Location: Oak Ridge, Louisiana
Date: July 18, 2013
Aircraft/ID: Champion 7KCAB / N2978G
Operator: Private
NTSB Number: CEN13FA420

2. DETAILS OF DEVICE INVESTIGATION

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

Device: Hemisphere LiteStar II
Device Serial Number: 1050-13075-0030

The global positioning system (GPS) device exhibited major damage from impact forces (Figure 1). The contents of the internal memory card were downloaded using NTSB laboratory equipment and analyzed using Hemisphere GPS MapStar software.

2.1. GPS Device Description

The Hemisphere LiteStar II is a guidance system for aerial agricultural applicators. Navigation data is determined using GPS satellites and optional base stations for increased accuracy. The system is capable of storing navigation data including latitude: longitude, date, time, GPS altitude, and groundspeed in a removable non-volatile¹ memory module.

2.2. Time Correlation

Due to the severity of the impact damage, no time correlation could be performed on the device's internal clock. Therefore, dates and times are presented as-recorded by the device.

2.3. GPS Data Description

The data extracted included 67 sessions from May 22, 2013 through July 18, 2013. The last session, recorded on July 18, 2013, was determined to be related to the accident and is included in this report.

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

2.4. Parameters Provided

Table 1 describes data parameters provided by the GPS device. Time, Latitude, Longitude, and GPS Altitude are recorded by the device. Course and speed 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 Altitude (feet)
Speed	Average groundspeed between current and previous data point (MPH)
Course	Average course between current and previous data point (degrees)

3. OVERLAYS AND TABULAR DATA

Graphical overlays were generated using Google Earth for the accident flight.

Figure 2 is a view of the last four passes made by the aircraft over the field.

Figure 3 is a detailed view of the end of the last recorded session with each pass highlighted in a different color.

The tabular data corresponding to the session on July 18, 2013 is included as Attachment 1. This attachment is provided in electronic comma-separated value (CSV) format.



Figure 1: Hemisphere GPS LiteStar II (S/N 1050-13075-0030)

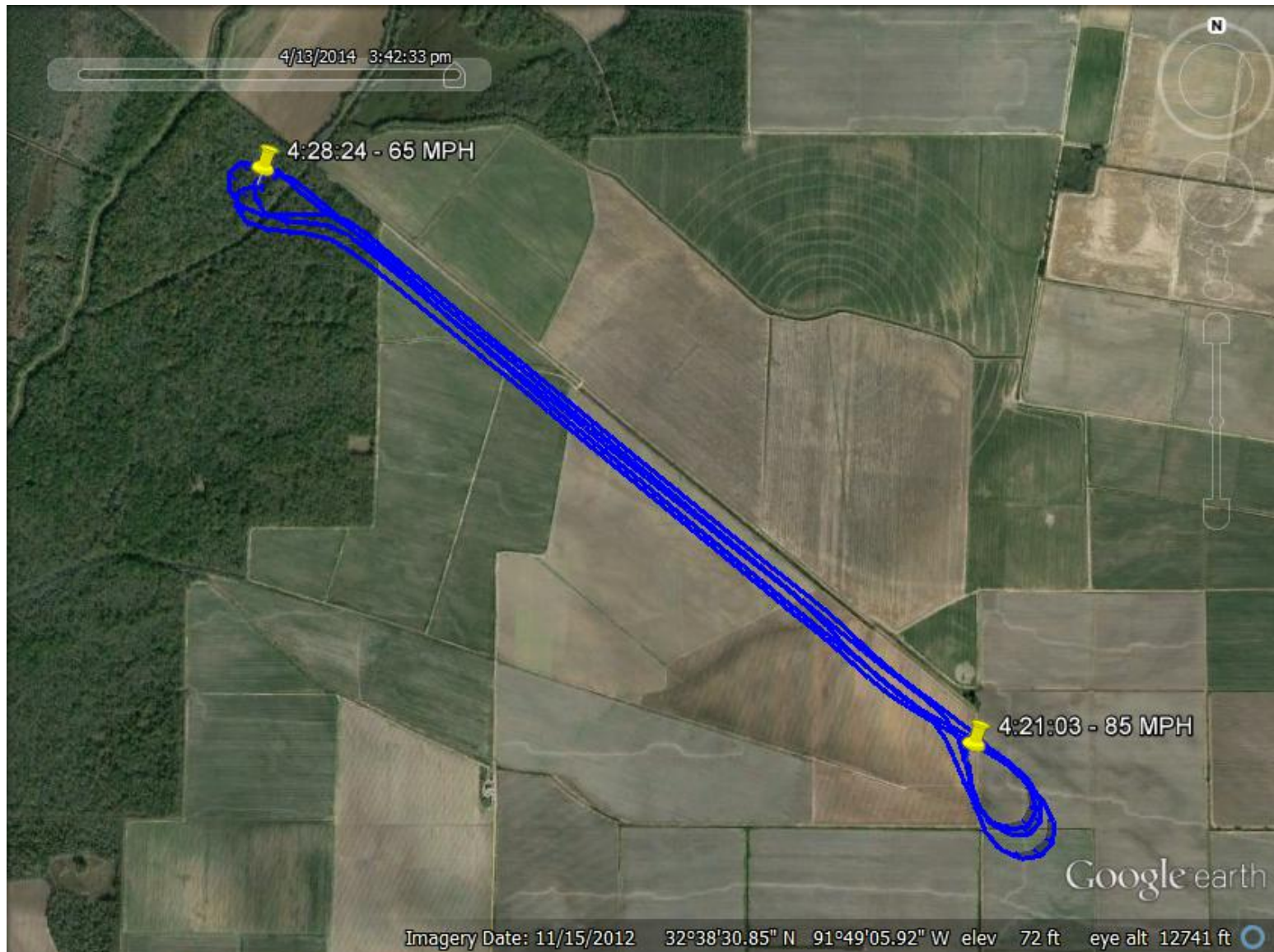
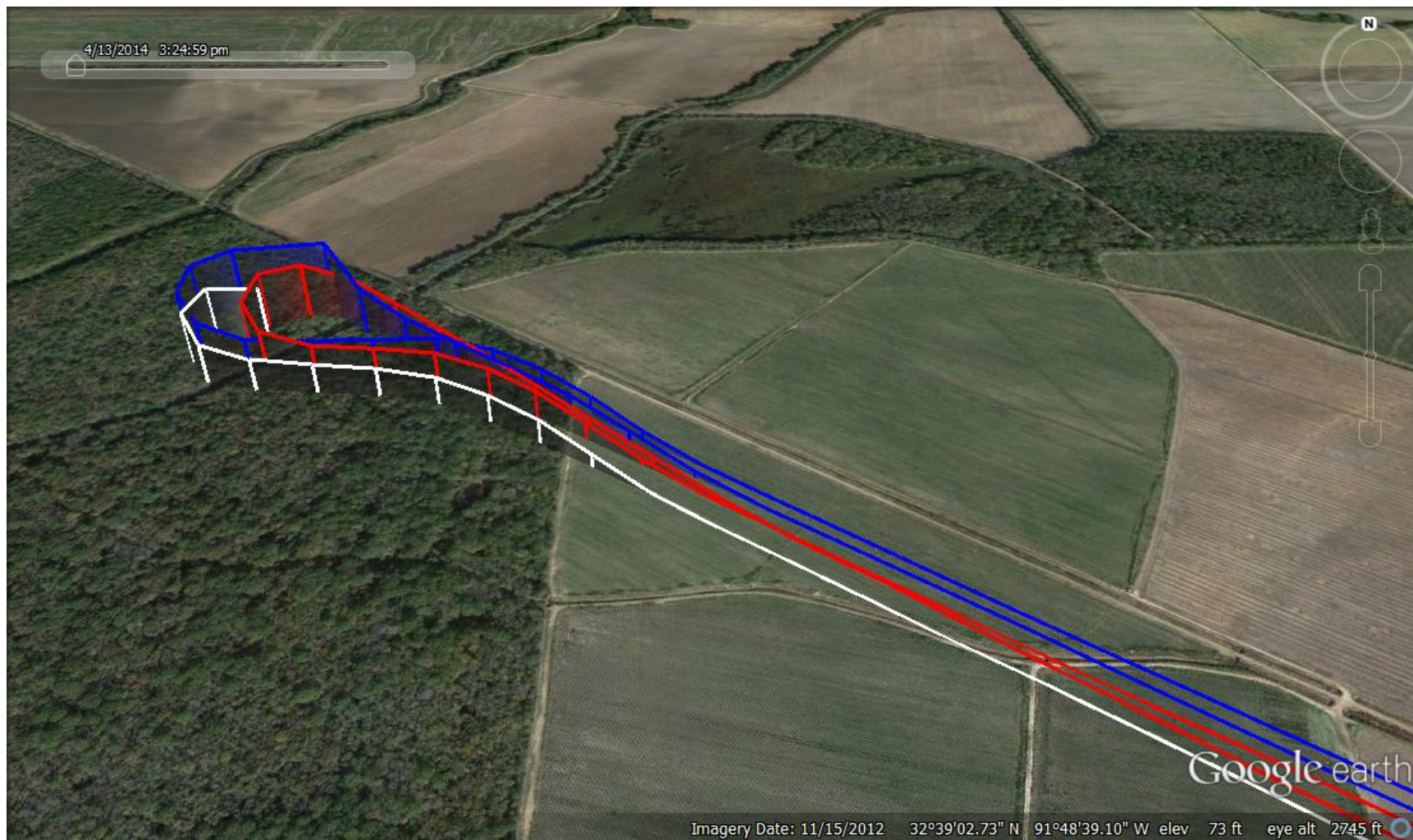


Figure 2: Google Earth overlay of the aircraft's last four passes over the field



**Figure 3: Google Earth overlay showing the last 3 turns made by the aircraft at the NW corner
(White = Accident turn, Red = Back 1 turn, Blue = Back 2 turns)**