

# NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

April 7, 2016

## Electronic Devices

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

### 1. EVENT

Location: Lebec, California  
Date: April 14, 2015  
Aircraft: Pitts S2E  
Registration: N75BH  
Operator: Private  
NTSB Number: WPR15FA147

On April 14, 2015, about 0815 Pacific daylight time, an experimental amateur-built Pitts S2E airplane, N75BH, was destroyed when it collided with trees and mountainous terrain about 3 miles northeast of Lebec, California. The airplane was being operated as a visual flight rules (VFR) cross-country personal flight under Title 14, *Code of Federal Regulations* Part 91, when the accident occurred. The airline transport pilot, the sole occupant, sustained fatal injuries. Instrument meteorological conditions (IMC) were reported in the area of the accident, and no flight plan had been filed. The accident flight originated at the Bakersfield Airport (BFL), Bakersfield, California about 0748, en route to Blythe, California.

### 2. DETAILS OF INVESTIGATION

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

#### Devices with no Data Recovered

Device 1:	Insight GEM-603
Device 1 Serial Number:	3114
Device 2:	Appareo Stratus (1 <sup>st</sup> Generation)
Device 2 Serial Number:	013360
Device 3:	Apple iPad
Device 3 Serial Number:	DMQLWRZSFK11
Device 4:	Apple iPad Mini
Device 4 Serial Number:	F7RM2DYLF84

## Device with Data Recovered

Device 5: Garmin GPSMAP 396  
Device 5 Serial Number: 28212385

### 2.1. Devices with no Data Recovered

Figures 1 through 4 show the Insight GEM-603, Appareo Stratus (1st Generation), Apple iPad, and Apple iPad Mini, respectively. The Insight GEM-603 and 1st generation Appareo Stratus did not have the capability to record information internally. The Apple iPad and iPad Mini were capable of recording information; however, both units were damaged. The Apple iPad was repaired; however, it would not start. The Apple iPad Mini suffered a dislodged chip, as shown in figure 5. In agreement with the Investigator-in-Charge, no further recovery attempts were made on the Apple iPad or Apple iPad Mini.

Figure 1. Insight GEM-603.

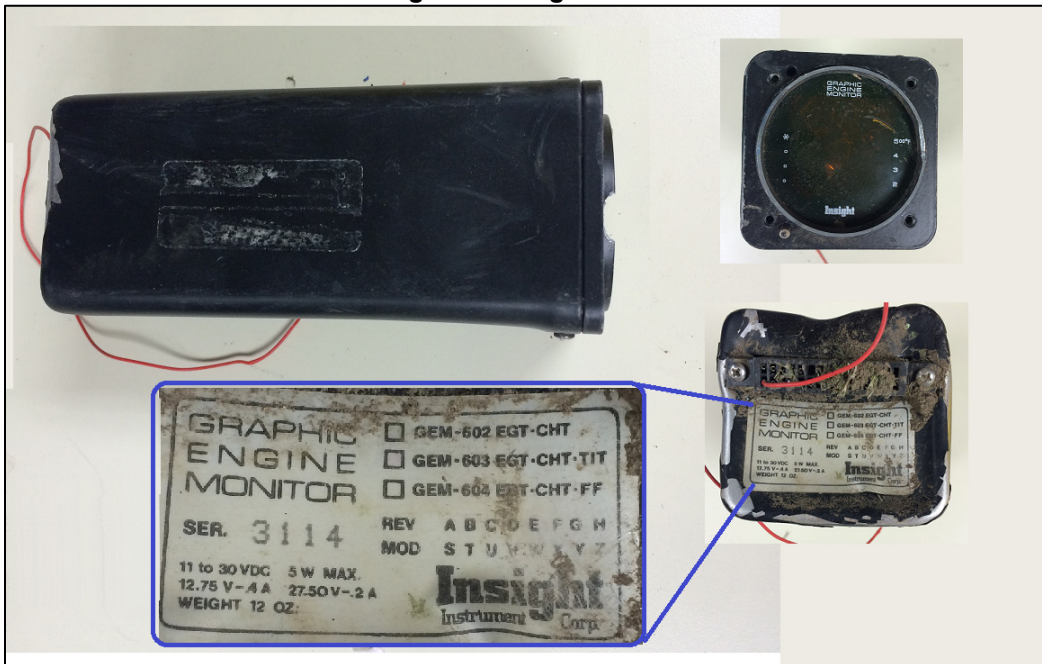


Figure 2. Appareo Stratus (1<sup>st</sup> Generation).



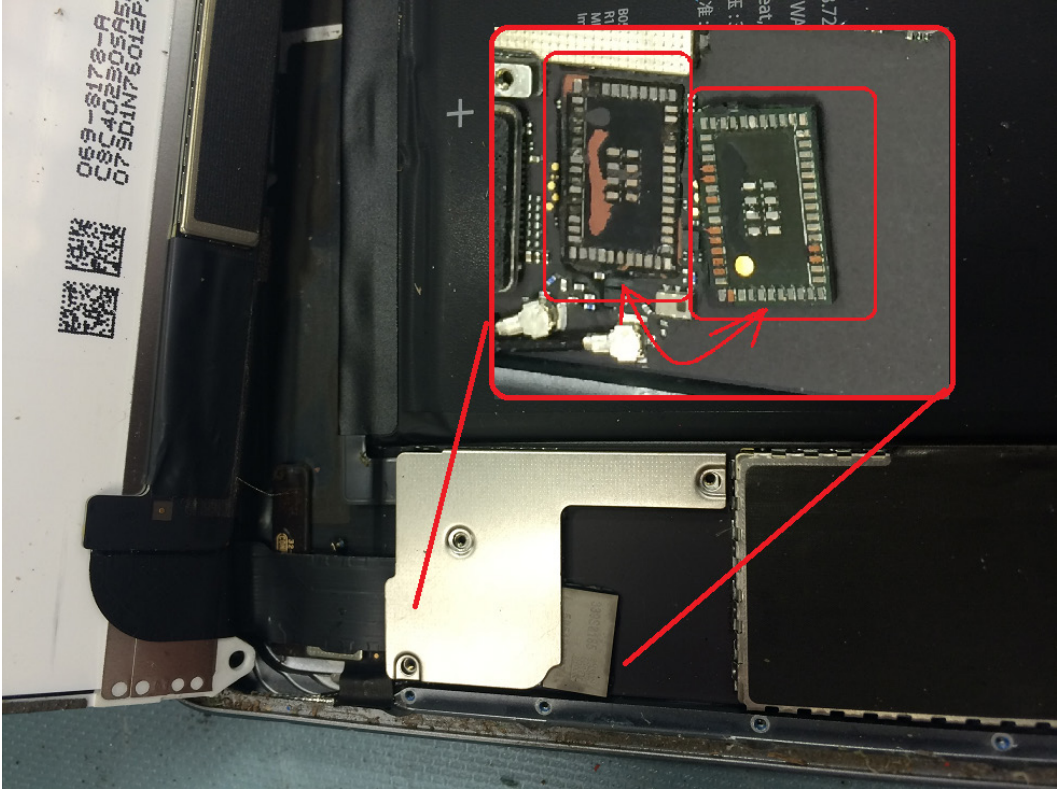
Figure 3. Apple iPad.



Figure 4. Apple iPad Mini.



Figure 5. Apple iPad Mini – dislodged chip.



## **2.2. Device with Data Recovered**

### **2.2.1. Garmin GPSMAP 396 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 NEXRAD 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<sup>1</sup> memory. 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.

#### **2.2.1.1. Garmin GPSMAP 396 Data Recovery**

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed the unit had sustained minor damage, as shown in figure 6 (back and front views). The unit was powered on and, although the screen did not work properly, information was extracted using the manufacturer's software normally, without difficulty.

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<sup>1</sup> Non-volatile memory is semiconductor memory that does not require external power for data retention

Figure 6. Garmin GPSMAP 396.



### 2.2.1.2. Garmin GPSMAP 396 Data Description

The data extracted included 7 sessions (923 total data points) from April 13, 2015<sup>2</sup> through April 14, 2015. The accident flight was the last session, recorded starting at 1421:30 UTC and ending at 1511:16 UTC on April 14, 2015 (191 total data points).

### 2.2.1.3. Garmin GPSMAP 396 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: Garmin GPSMAP 396 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 (ft), MSL)

<sup>2</sup> All dates and times are referenced to Coordinated Universal Time (UTC).

Parameter Name	Parameter Description
Groundspeed	Average groundspeed (knots (kts))
Track	Average true course (degrees)

Note: MSL means altitude above mean sea level

#### 2.2.1.4. Garmin GPSMAP 396 Overlays and Corresponding Tabular Data

Figures 7 through 11 were generated using data extracted from the Garmin GPSMAP 396 and overlaid using Google Earth. The weather and lighting depicted in Google Earth are not necessarily representative of the weather and lighting conditions experienced during the accident flight.

Figure 7 shows the accident flight overlaid on terrain imagery and figure 8 shows the accident flight overlaid on a Federal Aviation Administration Los Angeles Sectional Chart. The flight departed BFL and proceeded south towards the Tehachapi Mountains and Tejon Pass. From BFL to north of the Tehachapi Mountains, the aircraft reached a maximum recorded GPS altitude of 2,703 feet (about 2,300 feet above ground level (AGL)) at 1452:09 UTC, shortly after takeoff. The aircraft then flew at about 2,500 feet GPS altitude until about 15 nautical miles south of BFL, after which the aircraft descended. At about 1505:54 UTC, the aircraft was over Interstate 5 at a GPS altitude of 2,238 feet.

Figure 9 shows ground operations at BFL. The recording began at 1421:30 UTC. By 1444:52 UTC, the aircraft was taxiing for takeoff. By 1446:11 UTC, the aircraft was in the runup area for runway 30R. By 1450:01 UTC, the aircraft began its takeoff roll.

Figure 10 shows the aircraft path through the Tehachapi Mountains. At 1506:59 UTC, the aircraft was over Interstate 5 at a GPS altitude of 2,608 feet (about 340 feet AGL). At 1507:50 UTC, the aircraft was over Interstate 5 at a GPS altitude of 3,136 feet (about 210 feet AGL). At 1507:57 UTC, the aircraft was over Interstate 5 at a GPS altitude of 3,219 feet (about 200 feet AGL). By 1508:31 UTC, the aircraft began to track east of Interstate 5 at a GPS altitude of 3,675 feet (about 330 feet AGL). The aircraft continued to climb towards the northeast, away from Interstate 5 and towards higher terrain.

Between 1509:03 UTC and 1509:13 UTC, the aircraft climbed from 4,295 feet GPS altitude to 4,678 feet GPS altitude, with a computed AGL altitude below 100 feet AGL.

Figure 11 shows the end of the recording. Between 1509:03 UTC and 1510:23 UTC, the aircraft continued to climb and turn left towards the north; thereafter, the aircraft began a right turn, reaching a maximum GPS recorded altitude of 5,971 feet (about 900 feet AGL) at 1510:46 UTC. Thereafter, the aircraft began a descending right turn. The last recorded point was at 1511:16 UTC at a recorded GPS altitude of 4,606 feet (about 650 feet AGL).

Tabular data used to generate figures 7 through 11 are included as attachment 1 in electronic comma-delimited (.CSV) format.

Figure 7. Overview of accident flight (terrain overlay).

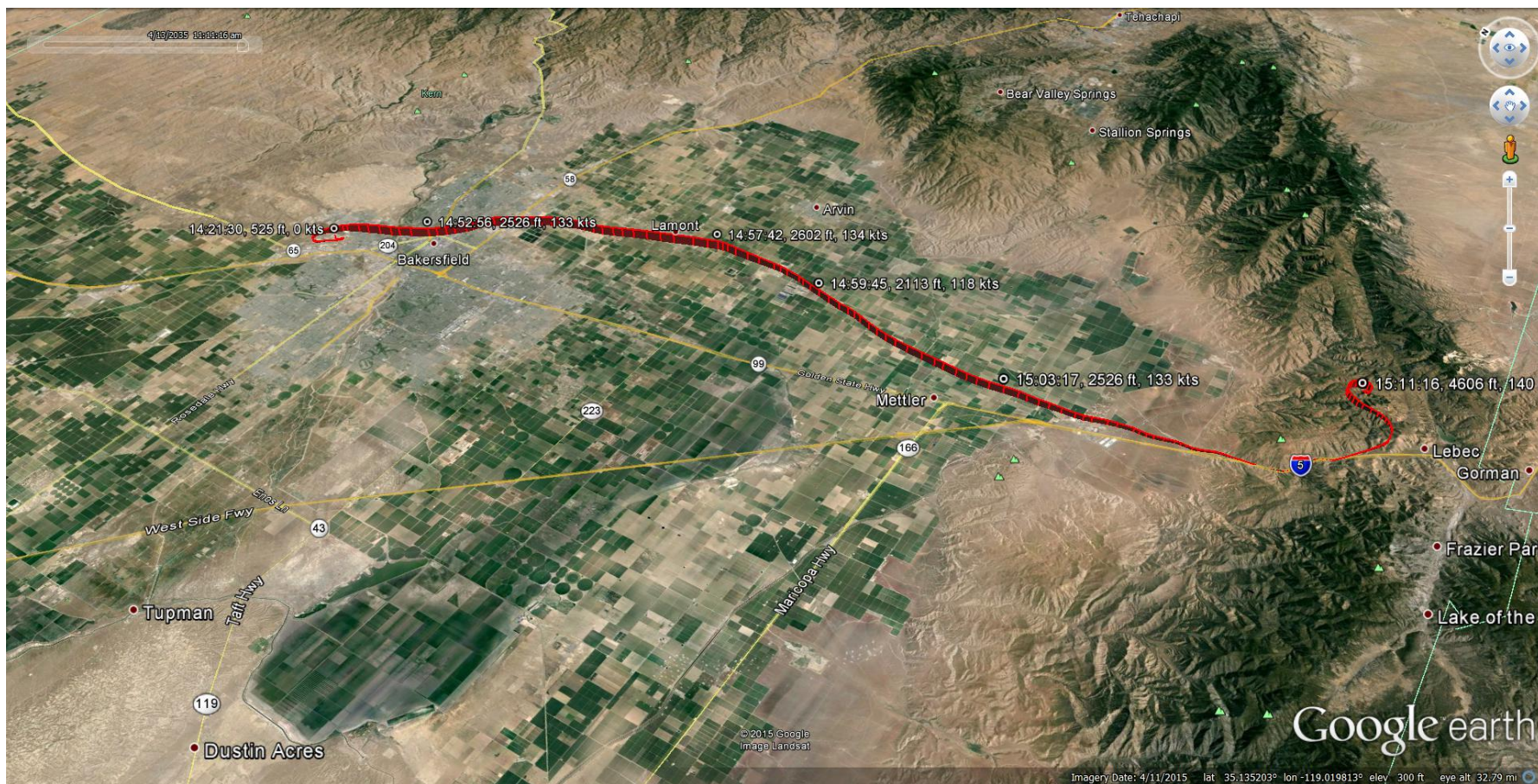




Figure 8. Overview of accident flight (aviation sectional overlay).

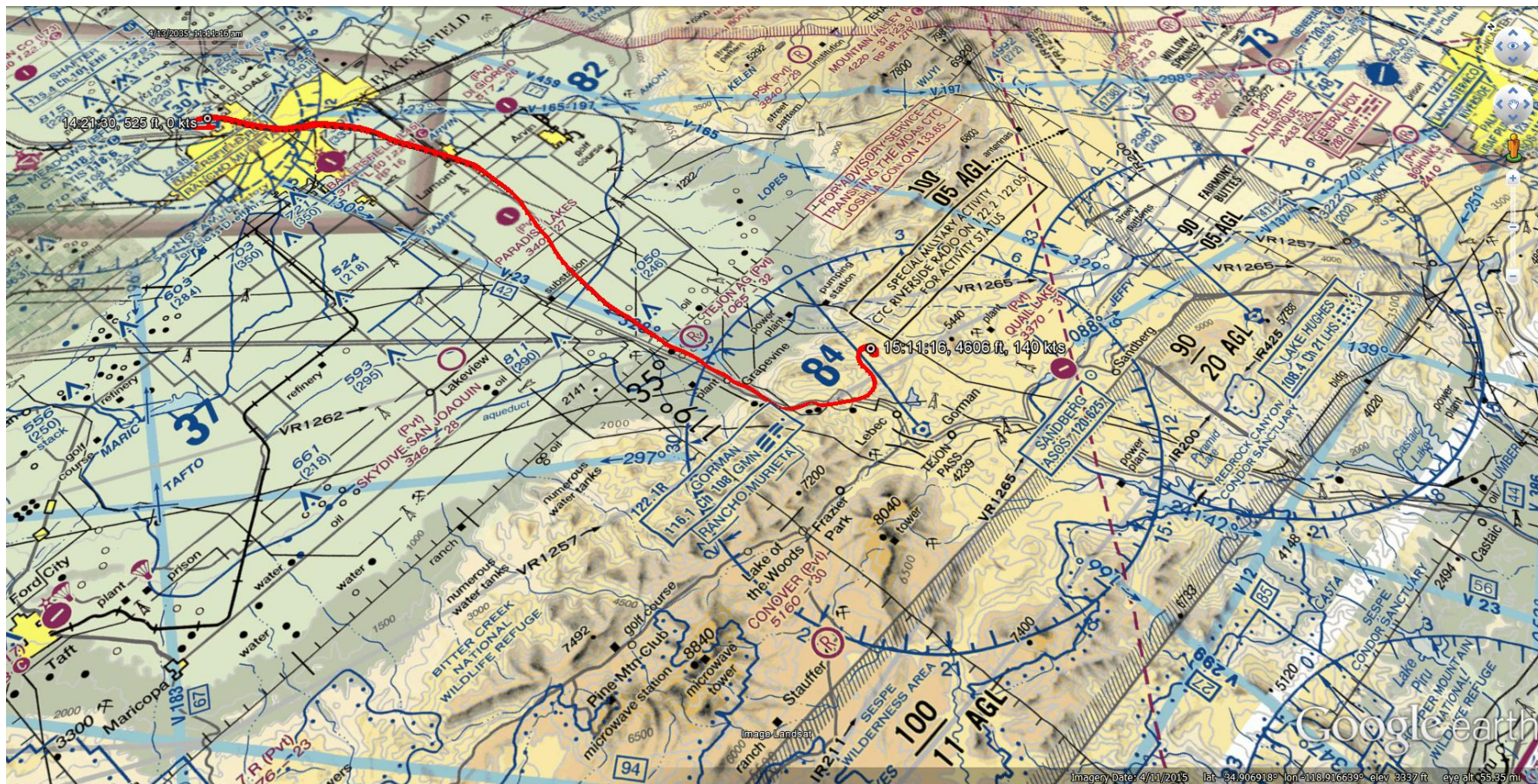


Figure 9. Ground operations at BFL.

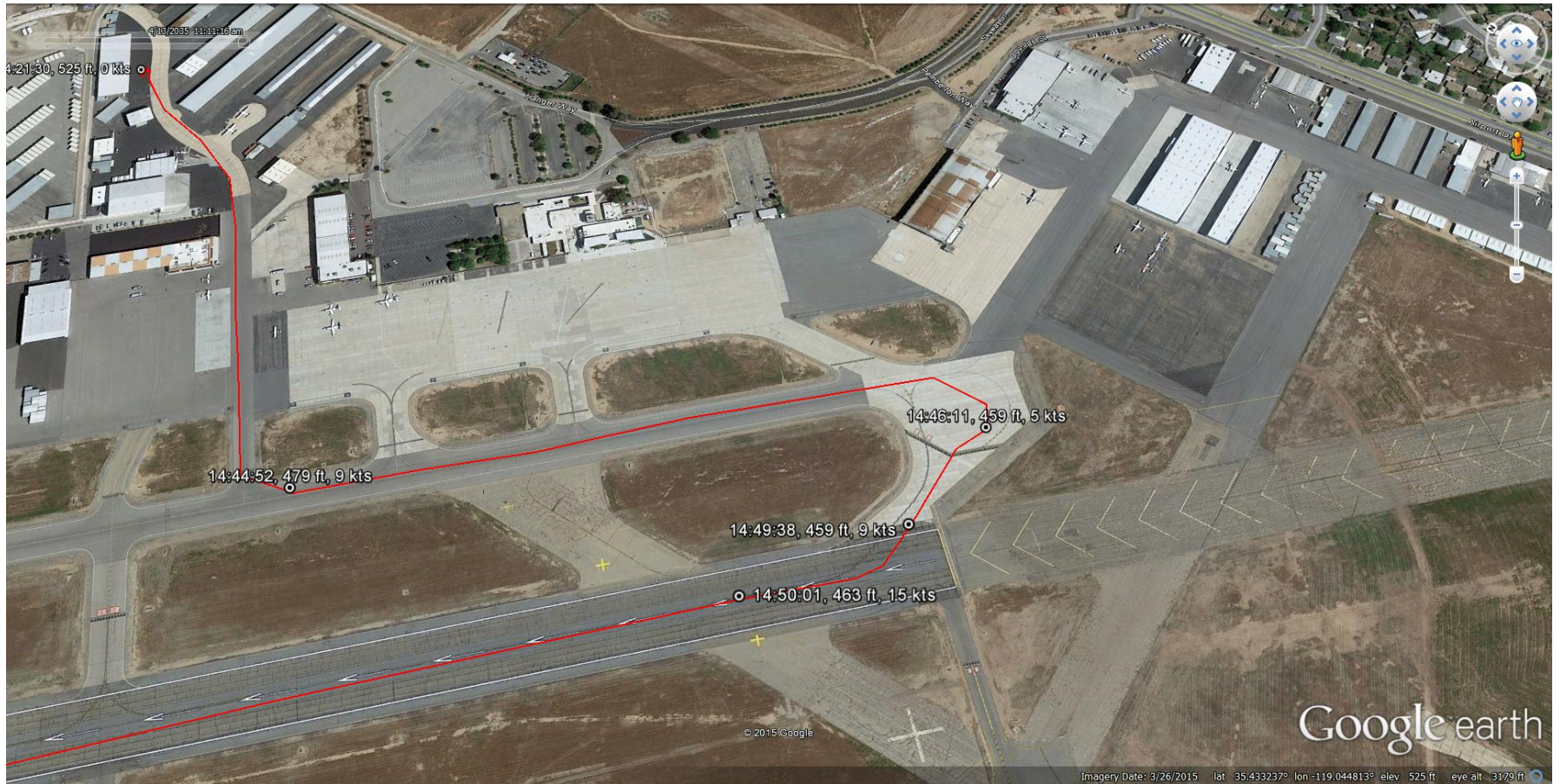


Figure 10. Flight over Interstate 5 until end of recording.

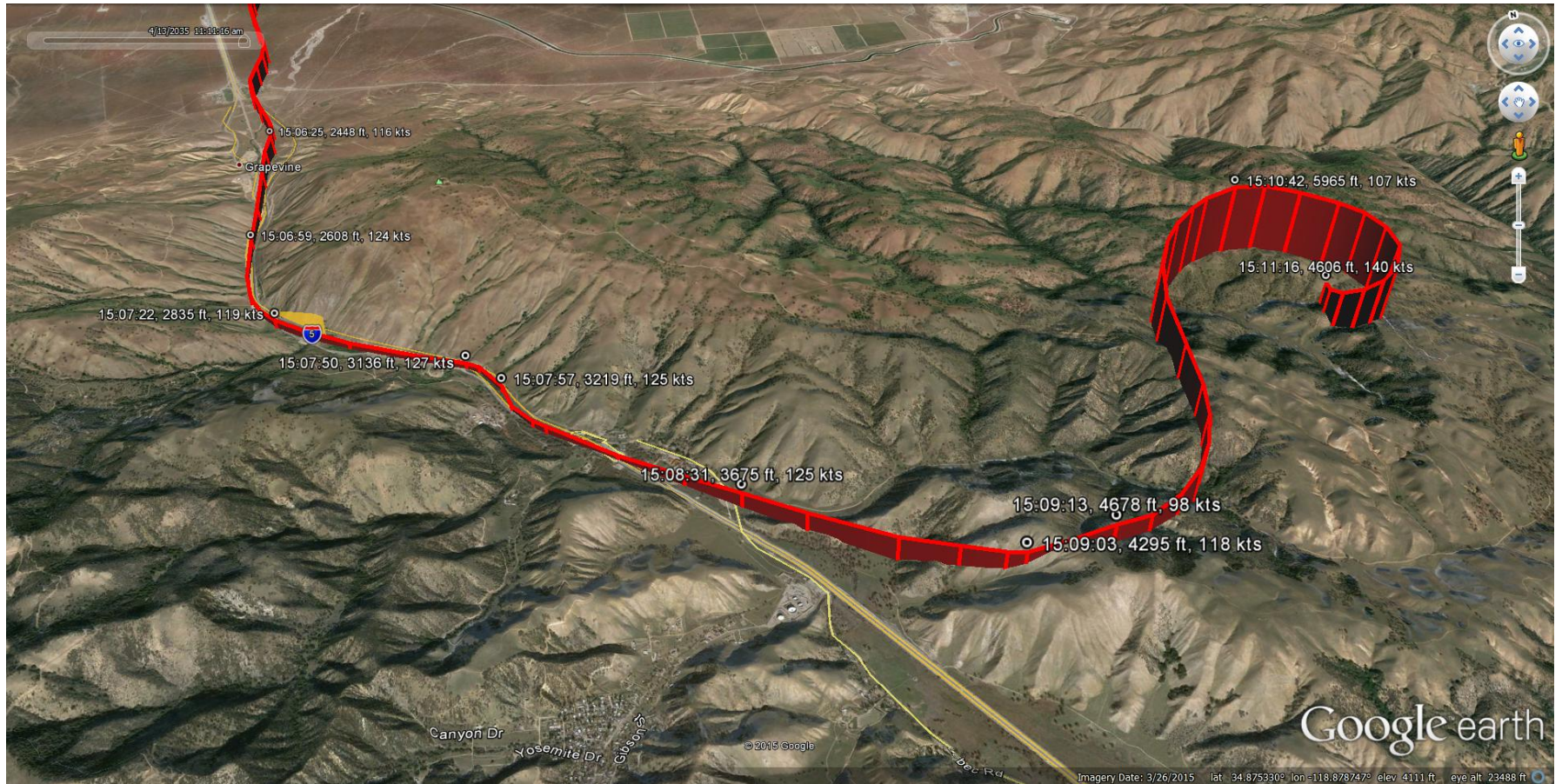


Figure 11. End of recording.

