

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, D.C. 20594

February 15, 2017

Global Positioning System Device

Specialist's Factual Report
By Douglas Mansell

1. EVENT SUMMARY

Location: Holly Ridge, North Carolina
Date: June 21, 2015
Aircraft: Czech Sport Aircraft Piper Sport
Registration: N35EP
Operator: Private
NTSB Number: ERA15FA245

On June 21, 2015, at approximately 1530 eastern daylight time (EDT), a Czech Sport Aircraft, Piper Sport; N35EP, was substantially damaged when it impacted trees and terrain after a loss of control during climb, after departing from Topsail Airpark (01NC), Holly Ridge, North Carolina. The certificated private pilot was fatally injured. Visual meteorological conditions prevailed, and no flight plan was filed for the Title 14 *Code of Federal Regulations* Part 91 personal flight, destined for Albert J. Ellis Airport (OAJ), Jacksonville, North Carolina.

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following global positioning system (GPS) device:

Device Manufacturer/Model:	Garmin GPSMAP 696
Serial Number:	1H6008557

3.1. Device Description

The Garmin GPSMAP 696 is a battery-powered portable multi-function display and GPS receiver with a 7-inch diagonal high resolution LCD display. The unit includes the ability to support a Jeppesen database, AOPA Airport Directory, and Safe Taxi Airport Diagrams. Additional options include support for receiving XM satellite radio, NEXRAD radar, lightning, METARs, TAFs, and TFRs. The unit stores date, time, latitude, longitude,

and altitude for multiple flights. A flight record is triggered at certain threshold altitudes and groundspeeds, defined by the manufacturer. All recorded data is stored in non-volatile memory (NVM).¹ Data can be downloaded from an undamaged unit to a PC, using a USB cable. An internal button-battery provides back-up power to the internal memory and clock when main power is removed.

3.2. Data Recovery

The Garmin GPSMAP 696 sustained substantial damage from the accident. Figure 1 shows the damaged device, as received by the Vehicle Recorder Division. It was disassembled and, using a universal chip programmer, data was recovered directly from the NVM chip that contained the recorded data.



Figure 1. Photo of damaged Garmin GPSMAP 696.

3.3. Data Description

The recovered data included track logs from June 5, 2011, through June 21, 2015. The last log corresponds to the accident flight. The track log of the accident flight, on June 21, 2015, contained data from 15:25:57 EDT to 15:31:35 EDT. The airplane departed southbound from Topsail Airpark (01NC), runway 21, and turned west before the final recorded position, about one minute after takeoff, at a GPS altitude of 309 feet. Due to data buffering on the GPS device, the data recording may have ended before the accident event.

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

3.4. 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 (m/dd/yyyy)
Time	Time (EDT) for recorded data point (hh:mm:ss)
Latitude	Latitude (degrees)
Longitude	Longitude (degrees)
GPS Alt	GPS Altitude (feet)
Groundspeed	Average derived groundspeed (knots)
Track	Average derived true course (degrees)

3.5. Overlays and Tabular Data

Figure 2 is a graphical overlay, generated using Google Earth, for the accident flight. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

Tabular data used to generate Figure 2 is included as Attachment 1, provided in electronic comma-delimited (CSV) format.

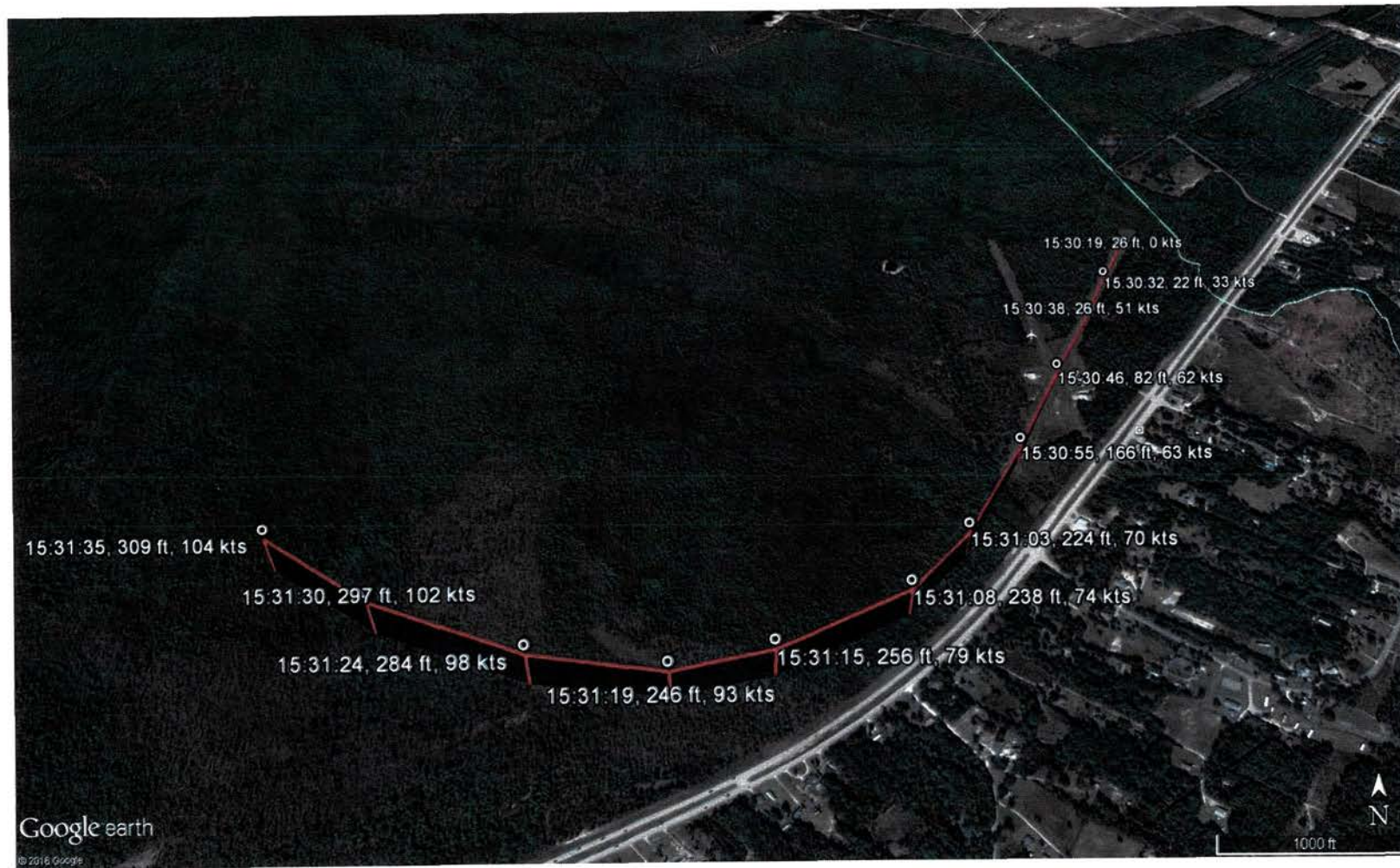


Figure 2. Google Earth overlay of accident flight displaying time (hh:mm:ss EDT), GPS altitude (ft), and groundspeed (kts).

NTSB ERA1 Attachment 1 to GPS Factual Report

Operator: Private

Registration: N35EP

Source of c 1H6008557

Date of Eve 2015

Location: F North Carolina

DATA

Date	Time	Latitude	Longitude	GPS Alt	Groundspe	Track
m/dd/yyyy	hh:mm:ss	(Deg	Deg	Ft	Kt	Deg
#####	15:25:57	34.4743	-77.5814	-9	0	0
#####	15:25:58	34.47435	-77.5814	-14	10	14.4
#####	15:26:01	34.47435	-77.5814	-14	1	301.1
#####	15:26:11	34.4742	-77.5815	-11	4	205.5
#####	15:26:29	34.47388	-77.5815	24	4	179.7
#####	15:26:42	34.47375	-77.5813	27	3	127.7
#####	15:26:54	34.47406	-77.581	21	7	31.6
#####	15:27:11	34.47457	-77.5807	22	7	30.3
#####	15:27:25	34.475	-77.5804	18	7	27.6
#####	15:27:40	34.47552	-77.5801	16	8	26.2
#####	15:27:57	34.47622	-77.5796	16	10	27.7
#####	15:28:18	34.47696	-77.5792	15	9	29.1
#####	15:28:36	34.47752	-77.5788	15	8	27.8
#####	15:28:51	34.47819	-77.5783	15	11	29.9
#####	15:29:03	34.4784	-77.5781	15	5	34.2
#####	15:29:06	34.47842	-77.5782	16	1	332.2
#####	15:29:16	34.47837	-77.5783	16	2	242.5
#####	15:30:19	34.47837	-77.5783	26	0	180
#####	15:30:26	34.47805	-77.5785	21	11	207
#####	15:30:32	34.47725	-77.579	22	33	209.4
#####	15:30:38	34.476	-77.5798	26	51	207.5
#####	15:30:46	34.47397	-77.5811	82	62	208.5
#####	15:30:55	34.47163	-77.5826	166	63	207.4
#####	15:31:03	34.46941	-77.5842	224	70	210.7
#####	15:31:08	34.46814	-77.5856	238	74	222
#####	15:31:15	34.46696	-77.5883	256	79	242.6
#####	15:31:19	34.46658	-77.5904	246	93	257
#####	15:31:24	34.46684	-77.5931	284	98	276.7
#####	15:31:30	34.46787	-77.5963	297	102	291.5
#####	15:31:35	34.46921	-77.5987	309	104	303.8