

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

July 8, 2016

Global Positioning System Device

Specialist's Factual Report

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1. EVENT SUMMARY

Location: Critz, Virginia
Date: May 7, 2016
Aircraft: Taylorcraft BC12-D
Registration: N43363
Operator: Private
NTSB Number: ERA16LA179

On May 7, 2016, about 1415 eastern daylight time, a Taylorcraft BC12-D, N43363, registered to and operated by a private individual, collided with trees then the ground during landing at Moorefield's Airstrip (VA27), Critz, Virginia. The private pilot, the sole occupant sustained serious injuries. The airplane was substantially damaged. The airplane was being operated under the provisions of 14 *Code of Federal Regulations* as a Part 91 personal flight. Visual meteorological conditions prevailed at the time and no flight plan was filed. The flight originated about 45 minutes earlier from Person County Airport (TDF), Roxboro, North Carolina, and was destined for VA27.

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 296
Serial Number:	67024352

3.1. Device Description

The Garmin GPSMAP 296 is a hand-portable GPS unit equipped with a detachable antenna, a 256 color TFT LCD display, and is capable of supporting a built-in base map and internal Jeppesen aviation database. The unit can be powered using external power, or alternatively by using an internal Li-Ion rechargeable battery. The GPSMAP 296 is

capable of storing date, route of flight, and flight time for multiple flight sessions. Flight logging is triggered by a threshold airspeed and altitude configured by the manufacturer. A detailed flight 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. Once the current flight log memory becomes full, new information may either overwrite the oldest information or stop recording depending device configuration. The user can opt to activate or deactivate flight log storage, however, all recorded data is still stored in non-volatile¹ memory. The unit contains hardware and software that allows for the downloading of recorded waypoint, route, and flight log information to a PC via a built-in serial port using the NMEA 0183 version 2.0 protocol. 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. Data Recovery

The Garmin GPSMAPS 296 device arrived undamaged with a discharged battery. The device was supplied external power from a 12 volt, direct current (DC) power source and data was downloaded to a computer using the micro-USB port on the device. The raw data was converted to engineering units using the manufacturer's software.

3.3. Data Description

The data extracted included 36 flight sessions (flight sessions 0 through 35) from February 12, 2012, through May 8, 2016². The accident flight was recorded during flight session 24, starting 17:23:58 UTC and ending 18:29:49 UTC on May 7, 2016.

Flight sessions 24 through 35 contain some erroneous data that are later explained in the presentation of the GPS overlays and tabular data.

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.

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

² All dates and times are referenced to Coordinated Universal Time (UTC).

Table 1. GPS 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)
Groundspeed	Average derived groundspeed (knots)
Track	Average derived true course (degrees)

3.5. OVERLAYS AND TABULAR DATA

Figures 1 through 5 are a graphical overlays 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.

The accident flight departed Person County Airport (KTDF) from Runway 24 at approximately 17:23:58 UTC on May 7, 2016. The last relevant recorded parameter for the accident flight was as at 18:29:49 UTC on May 7, 2016, with a GPS altitude of 1096 feet above Mean Sea Level (MSL) and a ground speed of 38 knots. Figure 1 depicts the entire flight path recorded by the GPS unit for the accident flight recorded during flight session 24.

Figures 2 through 4 use the data of flight session 24 data to provide a close view of the aircraft's final approach to Runway 19 of Moorefield's Airport (VA27). Scattered data samples recorded for this session after 18:29:49 UTC were considered erroneous and likely a result of post-impact effects and search efforts. Figure 5 is included to demonstrate some of the erroneous data samples believed to have occurred after impact.

In addition to the erroneous data seen the accident flight session 24, subsequent flight sessions (flight sessions 25 through 35) contain scattered data samples. Data from these flight sessions were not used in generating the overlay images in figures 1 through 5, but are included in Attachment 1.

Attachment 1 is provided as an electronic comma-delimited (.CSV) and includes data from flight sessions 24 through 35.



Figure 1. Overview of accident flight session 24 from Person County Airport (KTDF) to Moorefield's Airport (VA27)

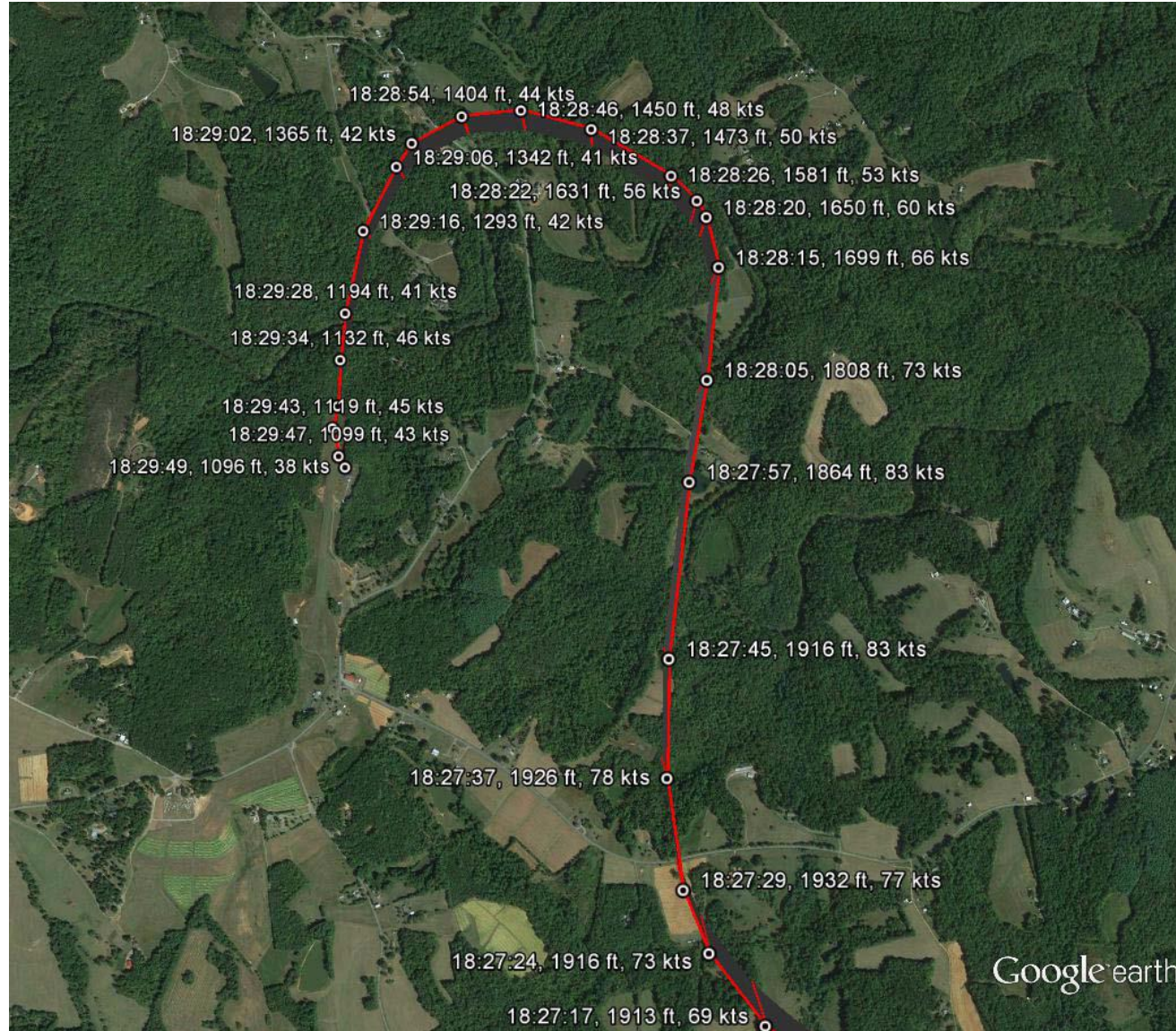


Figure 2. GPS recorded approach to Moorefield's Airstrip (VA27)

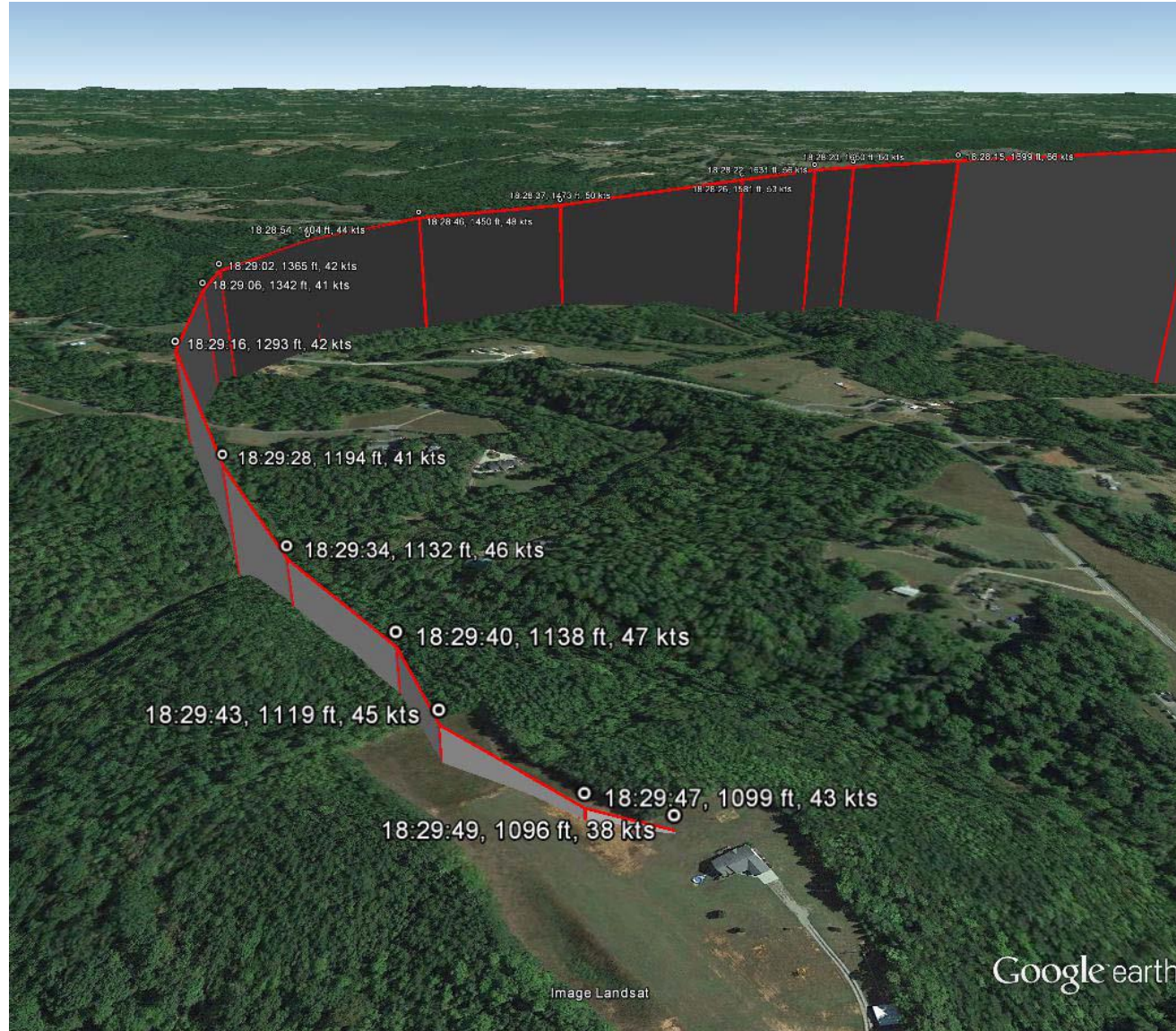


Figure 3. View of the aircraft's approach to VA27 displaying the aircraft's loss of altitude and deviation from Runway 19



Figure 4. Ground path of aircraft's final approach to Moorefield's Airport (VA27) displaying area of impact



Figure 5. Aircraft's final approach and impact including some samples of post-crash data