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

November 24, 2015

Global Positioning System Device

Specialist's Factual Report
By Jane Foster

1. EVENT SUMMARY

Location:	Talkeetna, Alaska
Date:	May 31, 2015
Aircraft:	Cessna 185
Registration:	N1694M
Operator:	Talkeetna Air Taxi, Inc.
NTSB Number:	ANC15LA033AB

On May 31, 2015, about 1720 Alaska daylight time, a wheel/ski equipped Cessna 185 airplane, N1694M, and tricycle gear equipped Cessna 172 airplane, N8525U, collided midair while landing at Talkeetna Airport, Talkeetna, Alaska. The Cessna 185 was registered to and operated by Talkeetna Air Taxi, Inc., Talkeetna, Alaska as a visual flight rules (VFR) on-demand commercial air tour, under the provisions of Title 14 *Code of Federal Regulation* (CFR) Part 135, when the accident occurred. The commercial pilot and three of the four passengers sustained no injuries, with the fourth passenger sustaining minor injuries. The Cessna 172 was registered to Artic's Air Academy, LLC, and operated by the student pilot as a VFR cross-country flight under the provisions of Title 14 CFR Part 91. The student pilot and sole occupant of the airplane sustained serious injuries. Visual meteorological conditions prevailed in the area at the time of the accident. The Cessna 185 departed Talkeetna Airport about 1456 for a non-stop sight-seeing tour around Denali National Park, and a VFR flight plan was on file. The Cessna 172 departed Palmer Airport, Palmer, Alaska, about 1625 destined for Talkeetna airport with no flight plan on file.

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 recovered from the Cessna 185:

Device Manufacturer/Model:	Garmin GPSMAP 296
Serial Number:	67001858

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, built in base map and an internal Jeppesen aviation database. The unit employs a parallel 12 channel receiver and can be operated 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 information for up to 50 individual flights in the form of a flight log. Flight logging begins when the GPS unit senses a speed increase to greater than 30 knots together with an altitude gain of greater than 500 feet. The record is saved when the speed is sensed to decrease to below 30 knots, and a new log will be started if more than 10 minutes passes from this time. A detailed tracklog – 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. 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[1] 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. 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 GPSMAP 296 received minor damage and was read out normally using laboratory software. Figures 1 and 2 show the front and back of the device as received.

[1] Non Volatile Memory is semiconductor memory that does not require external power for data retention.

Figure 1. Front of GPSMAP 296 as received

Figure 2. Back of GPSMAP 296 as received

3.3. Data Description

The data extracted included 14 track logs from May 24, 2015[2], through June 3, 2015. The accident flight was recorded starting 00:54:36 UTC and ending 01:15:09 UTC on June 1, 2015.

The device was not initially handed over to NTSB, allowing for data recording to continue after the accident had taken place.

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 (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

Figure 3 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.

The flight departed a glacier at approximately 00:54:36 UTC. The last recorded parameter of this flight was as at 01:15:09 UTC on June 1, 2015, with a GPS altitude of 538 feet above Mean Sea Level (MSL) and a ground speed of 61 knots. Due to data buffering on the GPS unit, the data recording may have ended before the accident event.

Figure 4 is a graphical overlay generated using Google Earth zoomed in on the end of the accident flight. Figure 5 is a graphical overlay generated using Google Earth for the beginning of the accident flight.

Tabular data used to generate figures 3 through 5 are included as Attachment 1. This attachment is provided in electronic comma-delimited (.CSV) format.

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

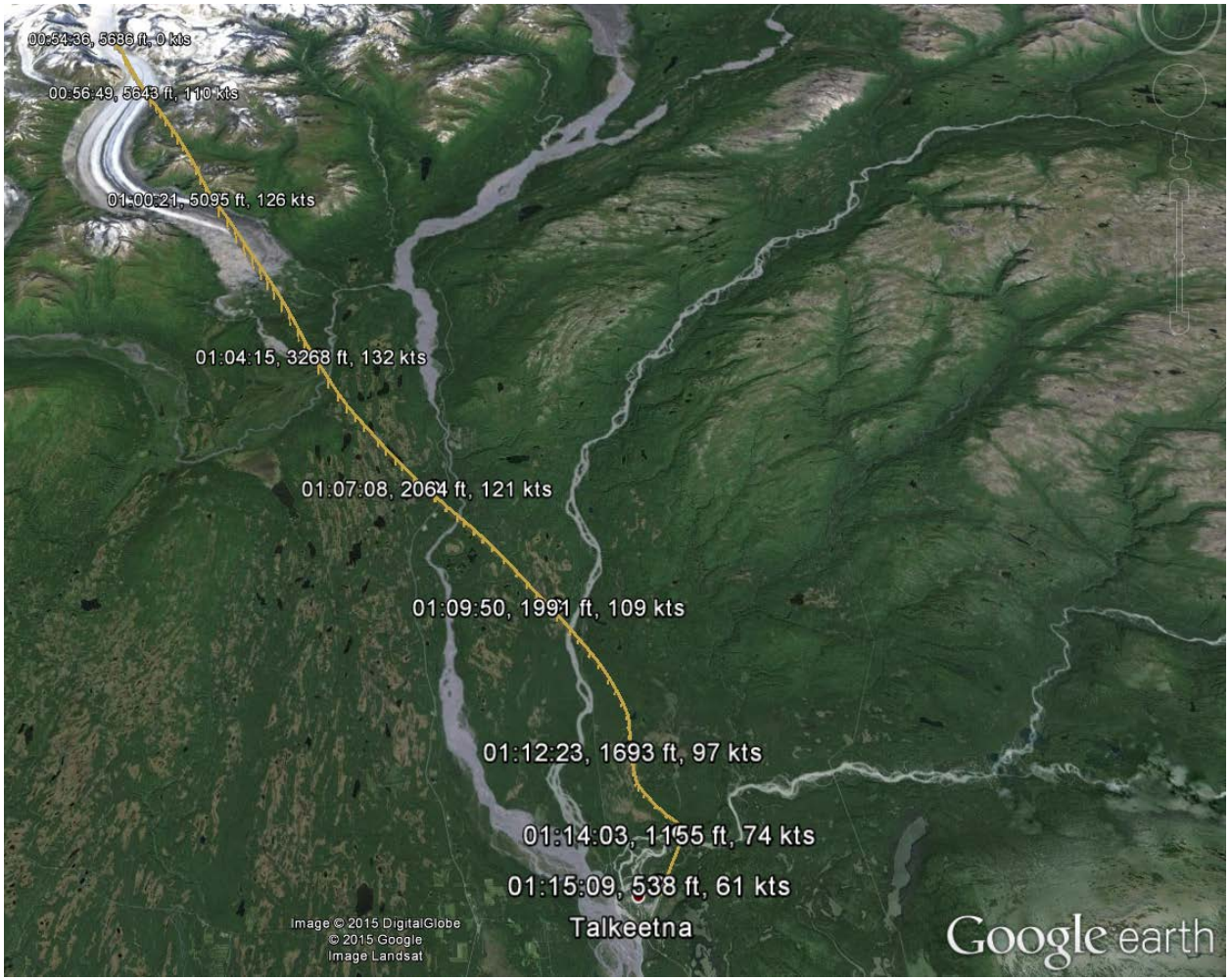

Figure 3. Google Earth overlay showing the accident flight.

Figure 4. Google Earth overlay showing the beginning of the accident flight.

Figure 5. Google Earth overlay showing the end of the accident flight.