

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

March 7, 2017

Global Positioning System Device

Specialist's Factual Report

By James Cash

1. EVENT SUMMARY

Location: Fresno, California
Date: December 26, 2016
Aircraft: Express S90
Registration: N176PA
Operator: Private
NTSB Number: WPR17FA041

On December 26, 2016, about 1318 Pacific Standard Time, an experimental amateur-built Express S-90, N176PA, was destroyed when it departed controlled flight and impacted terrain shortly after takeoff from runway 30 at Sierra Sky Park Airport (E79), Fresno, California. The private pilot/owner and his passenger received fatal injuries. The personal flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed at the time of the accident.

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 496
Serial Number:	19787454

3.1. Device Description

The Garmin GPSMAP 496 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. A built-in AOPA Airport Directory and Safe Taxi Airport Diagrams are included for selected fields. The unit stores date, route-of-flight,

and flight-time information. A flight record is triggered when groundspeed exceeds 30 knots and altitude exceeds 250 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. Tracklog storage may be activated or de-activated at user discretion. All recorded data is stored in non-volatile memory¹. 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.

3.2. Data Recovery

The Garmin GPS was still wet when it arrived in the laboratory. The unit was shipped in a metal can filled with fresh water. The GPS was removed from the packaging and rinsed in additional fresh water. The unit was vacuum dried for several hours in a heated oven. The unit had not sustained any physical damage but the water emersion during the accident precluded powering up the unit and downloading the data using normal downloading procedures. The onboard memory chip was removed from the device and the data were dumped using the lab's memory chip reader. The resulting data file was converted to individual tracks using the lab's custom software.

3.3. Data Description

The data extracted included 59 track logs/sessions dated from August 2, 2016² through December 26, 2016. The accident flight was recorded starting 1310:55 PST and ending 1317:48 PST on December 26, 2016.

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 Solid-state memory that retains recorded information after electrical power is removed from the device.

² All dates and times are referenced to Pacific Standard Time (PST).

Table 1: GPS Data Parameters

Parameter Name	Parameter Description
Date	Date for recorded data point (MM/DD/YYYY)
Time	Time PST 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 1 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 the Sierra Sky Park airport at approximately 1317:10 PST. The last recorded parameter was as at 1317:48 on December 26, 2016, with a GPS altitude of 434 feet above Mean Sea Level (MSL) and a ground speed of 66.4 knots. Due to data buffering on the GPS unit, the data recording may have ended before the accident impact.

Figure 2 is a graphical overlay generated using Google Earth zoomed in on the last 20 seconds of recorded data.

Tabular data used to generate figures 1 and 2 are included as Attachment 1. This attachment is provided in electronic comma-delimited (.CSV) format.

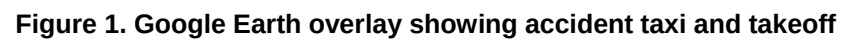




Figure 2. Google Earth overlay showing last 20 seconds of accident flight