

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

March 7, 2017

Global Positioning System Device

Specialist's Factual Report

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1. EVENT SUMMARY

Location: Chatham, Massachusetts
Date: June 17, 2016
Aircraft: Robinson R44
Registration: N141TM
Operator: Ryan Rotors Inc.
NTSB Number: ERA16LA216

On June 17, 2016, about 1245 eastern daylight time (EDT), a Robinson R44, N141TM, operated by Ryan Rotors, was substantially damaged during a forced landing to a pond, following a total loss of engine power while maneuvering near Chatham, Massachusetts. The commercial pilot and passenger were seriously injured. The local aerial photography flight was conducted under the provisions of 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed and no flight plan was filed for the flight that originated at Plymouth Municipal Airport (PYM), Plymouth, Massachusetts, about 1026 EDT.

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:	19708292

3.1. Device Description

The Garmin GPSMAP 496 is a battery-powered portable GPS receiver with a color LCD display. 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, time, latitude, longitude, and altitude for multiple flights.

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 496 sustained water damage during the accident, and would not power on. It was disassembled and, using a universal chip programmer, data was recovered directly from the NVM chip that contained the recorded information. Figure 1 shows the damaged device, after disassembly and cleaning; the NVM chip that was removed from the circuit board assembly is identified with a red circle.



Figure 1. Photo of disassembled Garmin GPSMAP 496.

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

3.3. Data Description

The recovered data included track logs from June 13, 2016, through June 17, 2016. The last log corresponds to the accident flight. The track log of the accident flight, on June 17, 2016, contained data from 10:26:32 EDT to 12:45:44 EDT, updated once every 10 seconds. Due to data buffering on the GPS device, the data recording may have ended before the accident event.

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 (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

Figures 2 and 3 are 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.

Figure 2 shows an overhead view of the entire flight. Figure 3 shows an oblique overhead view of the final minutes of the flight.

Tabular data used to generate Figures 2 and 3 are included as Attachment 1, provided in electronic comma-delimited (CSV) format.

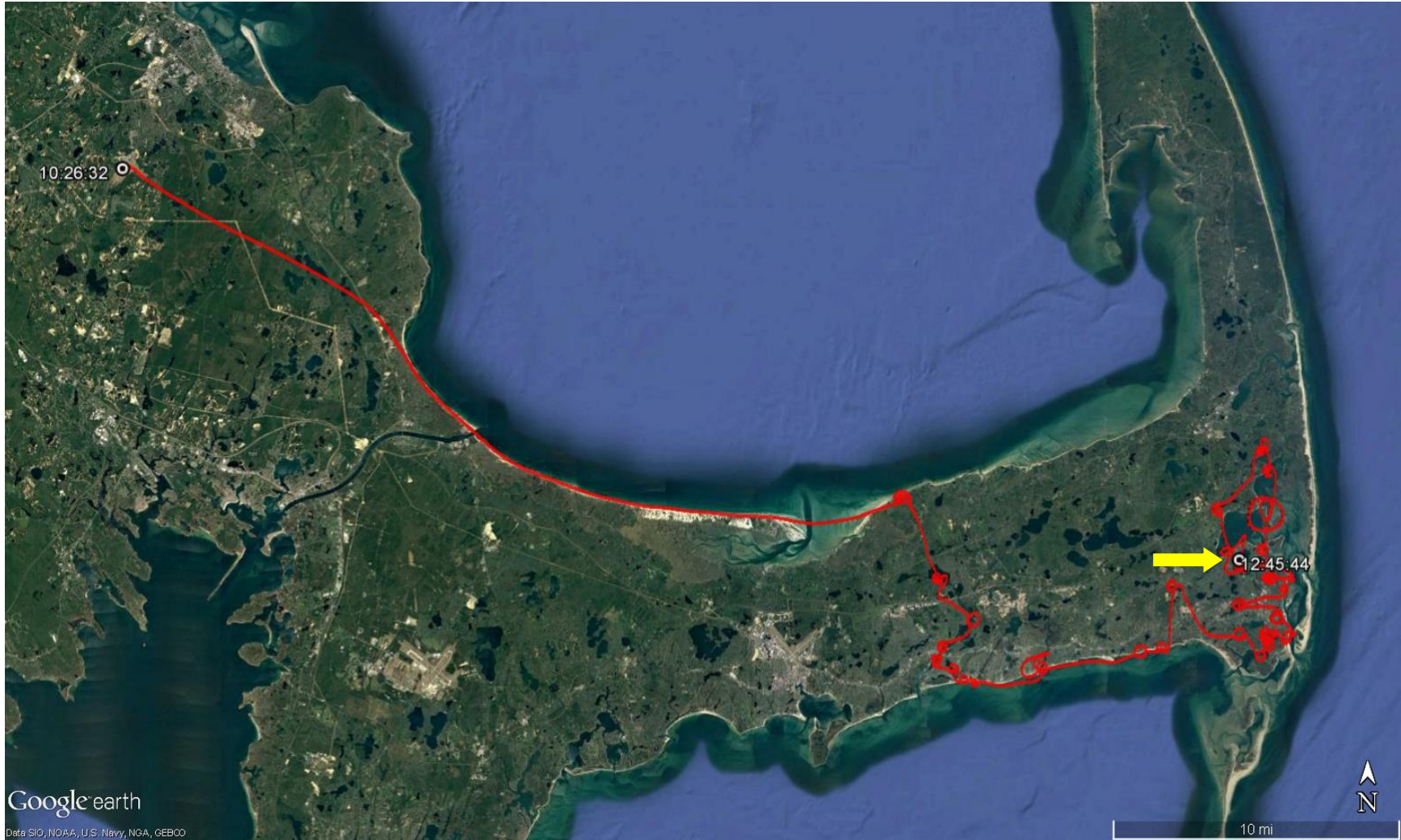


Figure 2. Google Earth overlay of entire accident flight. The final position was recorded at 12:45:44 EDT, highlighted with a yellow arrow.



Figure 3. Google Earth overlay of accident flight, immediately prior to accident. The final position was recorded at 12:45:44 EDT, highlighted with a yellow arrow.