

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

March 13, 2011

17 - GPS Factual Report

by Joseph A. Gregor

A. EVENT

Location:	Curren, Michigan
Date/Time:	September 23, 2011 / 2030 Eastern Daylight Time (EDT) ¹
Aircraft Type/ID:	Robinson R44 / N8324F
Operator:	Private
NTSB Number:	CEN11FA666

B. GROUP - No Group

C. SUMMARY

On September 23, 2011, approximately 2030 eastern daylight time, a Robinson R44 single-engine helicopter, N8324F, sustained substantial damage when it impacted trees and terrain while maneuvering near Curren, Michigan. The flight departed the pilot's residence near Richmond, Michigan, approximately 1830, enroute to a private hunting camp.

D. DETAILS OF INVESTIGATION

On October 3, 2011, the NTSB Vehicle Recorder Laboratory received the following device:

GPS Manufacturer/Model:	Garmin GPS III+
Serial Number:	96418394

¹ All times are given in Eastern Daylight Time (EDT) unless otherwise noted.

GPS Description: GPS III+

The Garmin GPS III+ is a battery operated, portable 12-channel GPS receiver equipped with a B&W LCD display. An external antenna, attached via a BNC-style connector, is required for reliable satellite reception. The GPS III Pilot is capable of storing position and altitude information for up to 500 waypoints in *volatile*² memory. Twenty routes, each representing a linked list of up to 30 waypoints, may also be stored in memory. A detailed tracklog - composed of latitude, longitude, date, time, and groundspeed information sampled at intervals while the unit is powered up and receiving satellite signals - can also be stored. The unit contains hardware and software permitting the download of recorded waypoint, route, and track log information via a Garmin proprietary interface. The GPS communicates with other electronic devices via a serial port employing the NMEA 0183 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.

GPS Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed that the unit had sustained minimal damage. Power was applied to the accident unit and recorded waypoint, route, and track log data was successfully downloaded via the Serial port.

GPS Data Description

Data was downloaded using Garmin *MapSource v6.16.3*. Five (5) user defined waypoints, zero (0) user defined routes, and thirteen (13) track logs dated from October 12, 2008 to May 1, 2011 were downloaded from the unit. No track log was recorded on the date of the accident. Downloaded track log data included the following parameters for each recorded data point: Index, GPS date/time, distance from previous update [leg length], time since last update [leg time], average groundspeed during the interval [leg speed], average course during the interval [leg course], and latitude/longitude position

² Volatile memory requires a constant application of power to retain data. The instant power is removed from a volatile memory device, all stored data is lost.

at the time of the update. Leg length, leg time, leg speed, and leg course information are all calculated by the download software and are not directly calculated and recorded within the GPS unit itself.

Figure 1 depicts recovered track log information overlaid on a 2-D Google Earth plot, along with the latitude longitude information for the accident site. This data is consistent with previous flights the pilot made in this area. No accident data was recovered from the unit.

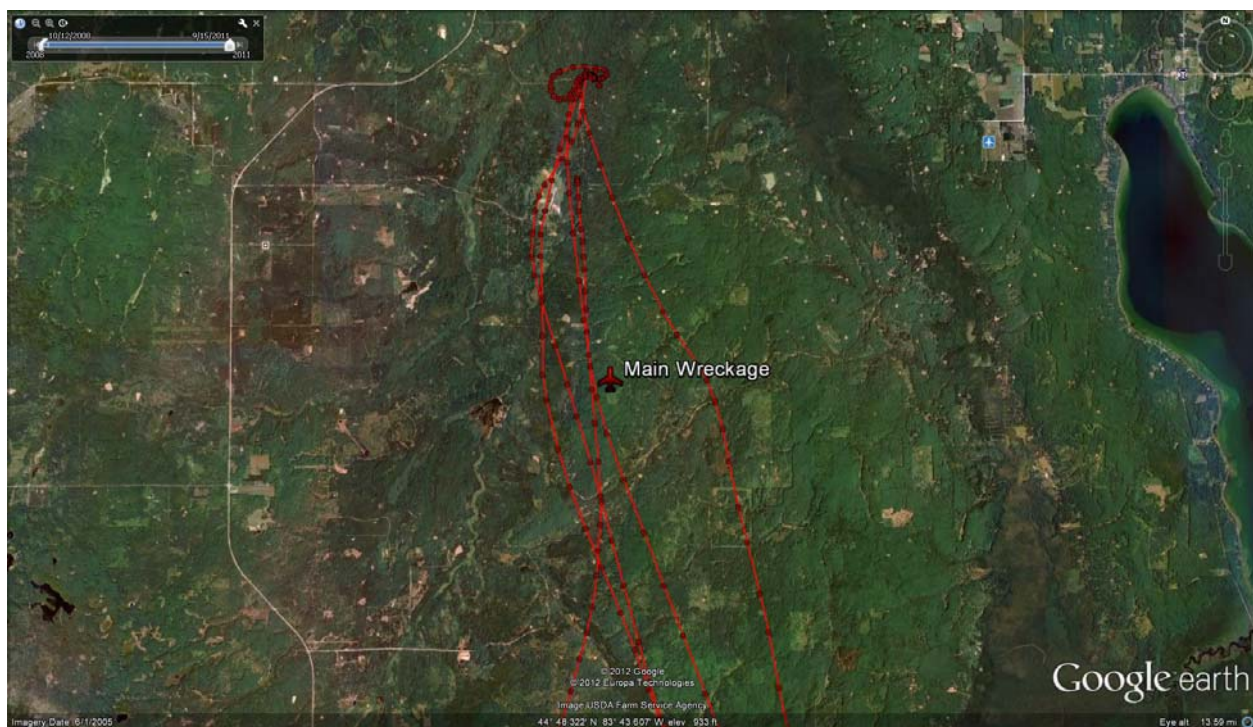


Figure 1. *Google Earth* 2-D overlay depicting aircraft position for all recorded track logs downloaded from the GPS III+.

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