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

August 27, 2012

17 - GPS Factual Report

by Bill Tuccio

A. EVENT

Location:	Cross Lake, Minnesota
Date:	July 22, 2012, 0951 Central Daylight Time (CDT)
Aircraft:	Kitfox 4
Registration:	N602JT
Operator:	Private
NTSB Number:	CEN12LA466

B. GROUP - No Group

C. SUMMARY

On July 22, 2012, at 09:51 central daylight time (CDT), an experimental-amateur built Sky Star Kitfox 4 sustained substantial damage after it lost control and impacted Upper Whitefish Lake near Cross Lake, Minnesota. The private pilot was fatally injured and the passenger was seriously injured. No flight plan was filed for the local flight that departed from Pine River Regional Airport (PWC), Pine River, Minnesota, at 09:38. Visual meteorological conditions prevailed for the personal flight conducted under 14 Code of Federal Regulations Part 91.

D. DETAILS OF INVESTIGATION

On July 27, 2012, the NTSB Vehicle Recorder Laboratory received the following device(s):

GPS Manufacturer/Model:	Garmin GPSMAP 196
Serial Number:	65413871

Garmin GPSMAP 196 Device Description

The Garmin GPSMAP 196 is a portable GPS unit equipped with a detachable antenna, and a 320 x 240 12-level grayscale LCD display. The unit is equipped with a

built in base map and internal Jeppesen aviation database. The unit employs a parallel 12 channel WAAS-capable receiver and can be operated using external power, or alternatively by four standard AA-size batteries. The GPSMAP 196 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. Recorded flight log data is saved when the speed is sensed to decrease to below 30 knots, and a new log is started if more than 10 minutes passes from this time. A detailed track log – 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. Track log position is updated as a function of time or distance moved, depending on how the unit has been configured. Once the current track log memory becomes full, new information either overwrites the oldest information or recording stops, depending on how the unit is configured. The current track log can be saved to long-term memory and 15 saved track logs can be maintained in addition to the current track log. Track log storage may be activated or de-activated at user discretion. All recorded data is stored in non-volatile memory. The unit contains hardware and software permitting the download of recorded waypoint, route, and track 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.

GPS Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, it was evident that the unit had sustained the effects of prolonged freshwater exposure. An internal inspection was performed. The main board was removed and rinsed in fresh water. After this treatment the board was air dried. The unit was then reassembled and electrical power was applied. The unit started normally and recorded waypoint, route, and tracklog data was successfully downloaded from the unit via the serial port.

GPS Data Description

The data extracted included 19 sessions (1,673 data points) from September 8, 2007[1] through July 22, 2012 at 14:51:13 UTC. The accident flight was recorded starting 14:38:28 UTC and ending at 14:51:13 UTC on July 22, 2012.

GPS 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] 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 Altitude (feet), above Mean Sea Level
Groundspeed	Average groundspeed between current and previous data point (knots)
Track	Average true course between current and previous data point (degrees)

OVERLAYS AND TABULAR DATA

Figure 1 is a graphical overlay generated using Google Earth for the accident flight, with select points annotated. The flight departed the Pine River Regional Airport at approximately 14:38 UTC on July 22, 2012. The last recorded parameter was at 14:51:13 UTC, at a GPS altitude of 1,496 feet above Mean Sea Level (MSL) and a ground speed of 34 knots. Due to data buffering on the GPS unit, the data recording may have ended before impact.

Figure 2 is a plot of GPS altitude, computed true track, and computed groundspeed for the entire flight. At about 14:38, the aircraft initially accelerated from 0 to 49 knots on a true track of about 160 degrees. The aircraft then climbed to an initial altitude of about 1,673 feet while turning towards the southeast. At about 14:44, the aircraft began a climb, reaching a maximum altitude of about 1,909 feet at 14:45:48; thereafter descending until the end of the recording. After 14:45:48, during the descent, the aircraft turned towards the north until about 14:49. After 14:49, while still descending, the aircraft turned towards the southeast. From 14:49:55 until 14:50:59, the aircraft groundspeed was between about 38 and 44 knots, while descending from about 1,644 feet to 1,542 feet. The last 3 computed groundspeeds in the last 5 seconds of the recording were 38, 35, and 34 knots.

Figure 3 is a graphical overlay generated using Google Earth showing all recorded points after 14:49:42. The overlay shows the aircraft heading southeast, descending, and slowing as described in Figure 2.

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

Figure 1. Google Earth overlay showing accident flight.

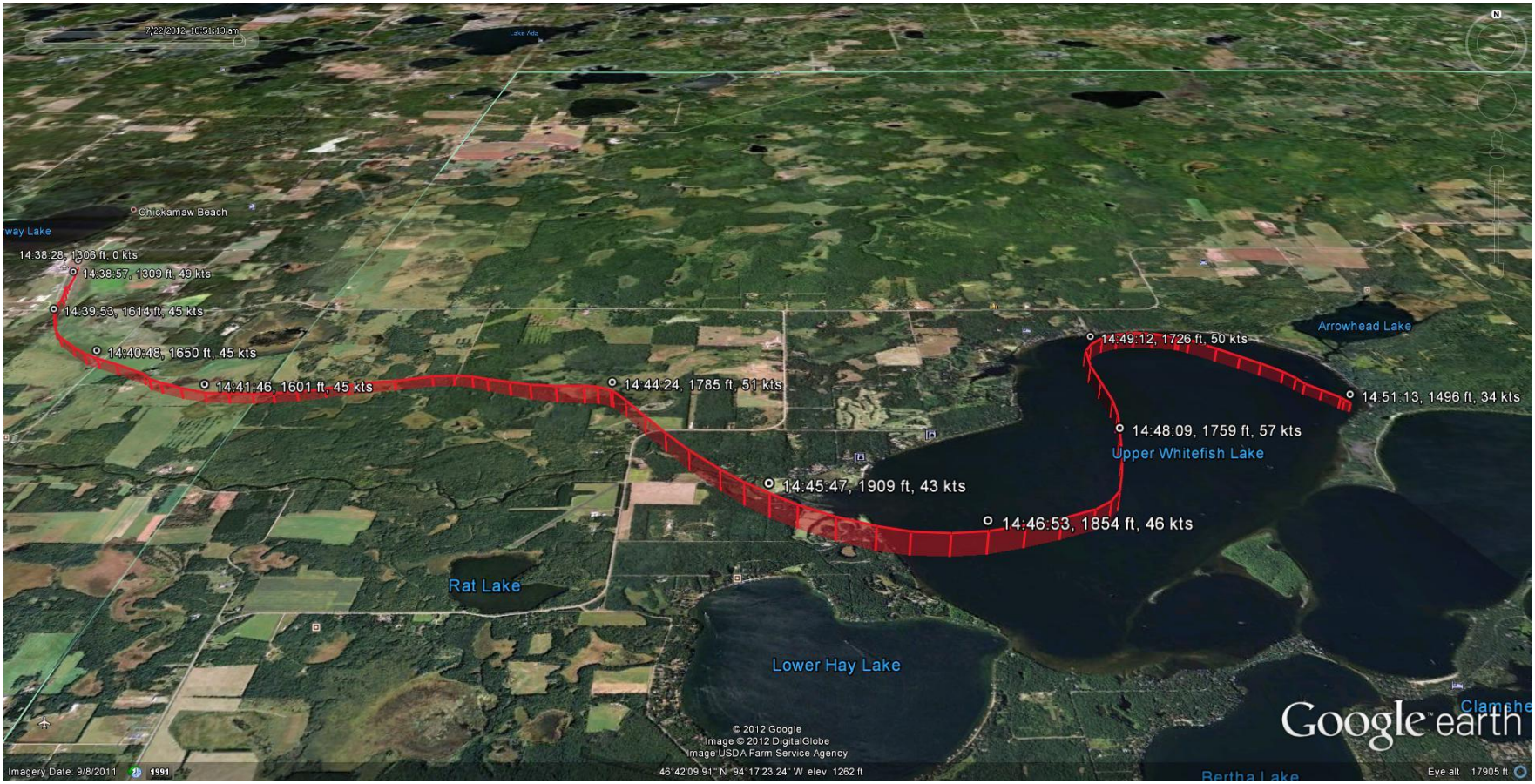

Figure 2. Plot of accident flight parameters.

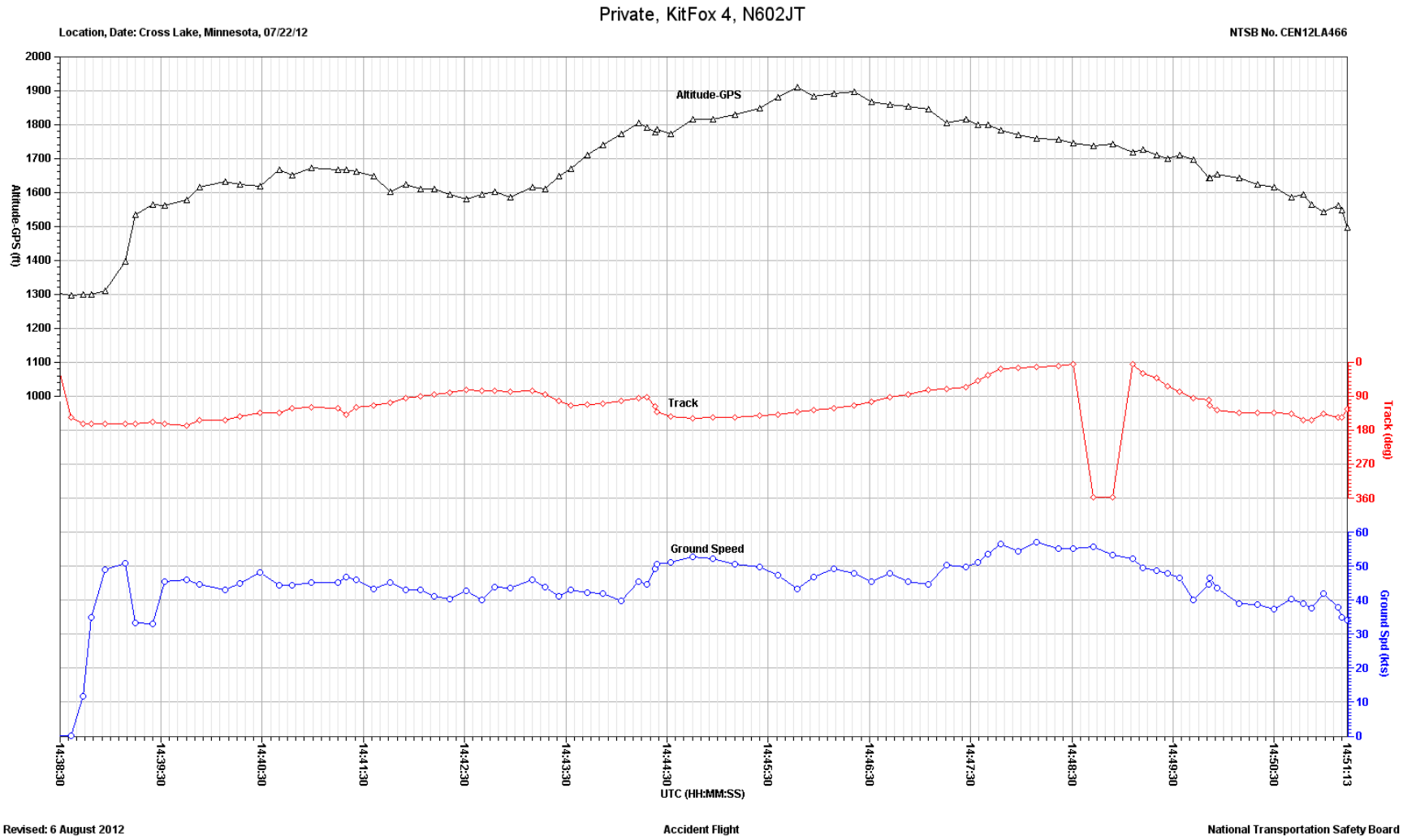

Figure 3. Google Earth overlay showing end of accident flight.