

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

March 25, 2013

17 – Electronic Devices Factual Report

Specialist's Factual Report

by Joe Gregor

1. EVENT

Location: Ionia, Michigan
Date: May 29, 2012
Aircraft: Schleicher ASW-27
Registration: N127PC
Operator: Private
NTSB Number: CEN12LA330

On May 29, 2012, about 1550 eastern daylight time, a Schleicher ASW-27, N127PC, collided with the ground while maneuvering near the final approach for runway 27 at Ionia County Airport (Y70), Ionia, Michigan. Visual meteorological conditions prevailed and a flight plan had not been filed for the local flight that originated from Y70 about 1413.

2. DETAILS OF DEVICE INVESTIGATION

The Safety Board's Vehicle Recorder Division received the following devices:

Device 1: Cambridge Aero Inst. 301/302 Digital Variometer
Device 1 Serial Number: 3ve5018
Device 2: Naviter Oudie
Device 2 Serial Number: 2011004000135
Device 2: SPOT Personal Tracker
Device 2 Serial Number: 58821782

2.1. Cambridge Aero Inst. 301/302 Digital Variometer Device Description

The Cambridge Aero Instruments (CAI) Model 302 Direct Digital Variometer (DDV) is a flight instrument and data-logger containing sensors for measuring pressure altitude, airspeed, acceleration, engine noise level, and temperature. The 302 DDV includes an integral GPS receiver that generates IGC -approved Secure Flight Logs which are

stored in non-volatile Flash memory. The logging interval is user-selectable and newest data automatically replaces the oldest data if memory capacity is exceeded. Data produced by the DDV is altitude and temperature compensated. Older units contain a serial port for data download. Newer units contain both serial and USB ports for data download. If the case for the unit is open or physically compromised, an internal micro switch can be activated that will render the security protection of the downloaded IGC file to fail verification. However, the stored track data will not be otherwise compromised.

2.1.1. Cambridge Aero Inst. 301/302 Digital Variometer Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained significant impact damage. The internal memory components appeared to be intact. Repairs were made using parts from a surrogate unit and information was extracted using the manufacturer's recommended software normally, without difficulty.

2.1.2.2.1. Cambridge Aero Inst. 301/302 Digital Variometer Data Description

The data extracted included 4 IGC files. One file – 25CC3VE2.IGC contained data recorded on May 29, 2012 for a flight lasting 1:21:20 (h:m:s) in the area of Ionia, MI.

2.2. Naviter Oudie Device Description

The Naviter Oudie is a portable battery operated flight instrument and data-logger with an integrated GPS receiver capable of outputting NMEA¹-formatted navigation data to other electronic devices via a serial RS-232 interface running at 4800bps. The Oudie can also communicate to other devices via Bluetooth. The Oudie can generate IGC - approved Secure Flight Logs which are stored in non-volatile Flash memory. It can also store a log containing a sequential listing of the NMEA text strings broadcast to external devices. The Oudie is equipped with a 5" TFT LCD touchscreen used to control the device and display data to the pilot.

2.2.1. Naviter Oudie Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained impact damage destroying the LCD touchscreen, which is required for downloading any stored data. Repairs were made using a new touchscreen obtained from the manufacturer and information was extracted using the manufacturer's recommended software normally, without difficulty.

¹ National Marine Electronic Association – refers to an ASCII (text-based) data communications standard.

2.2.2. Naviter Oudie Data Description

The data extracted included 9 IGC² files and one NMEA log file. One IGC file – 25TX20R1.IGC contained data recorded on May 29, 2012 for a flight lasting 1:21:25 (h:mm:ss) in the area of Ionia, MI. This data is time-stamped with GPS time and recorded with 4-second spacing.

The NMEA.LOG file contained a listing of NMEA message strings output by the Oudie dated from November 5, 2011 to May 29, 2012. This data included:

- \$GPGGA - Global Positioning System Fix Data
- \$GPGSA - GPS DOP and active satellites
- \$GPGSV - GPS Satellites in view
- \$GPRMB - Recommended minimum navigation info
- \$GPRMC - Recommended minimum specific GPS/Transit data
- \$GPVTG - Track made good and ground speed

The \$GPRMC messages are time-stamped with GPS time and recorded with 1-second spacing.

2.3. SPOT Personal Tracker Device Description

The SPOT Personal Tracker is a battery operated, multi-channel, GPS receiver and satellite communication transmitter designed to alert emergency services and designated individuals when activated by a user under duress. Tracker has four main functions: SOS/911, Help, Check-In, and Progress.

The SOS/911 function transmits a satellite communication (SATCOM) message to the GEOS International Emergency Response Center, which alerts the appropriate response agency (e.g. calls 911 in North America). Once activated, the SPOT will acquire its GPS location and send that information along with a distress message to the GEOS International Emergency Response Center every five minutes until cancelled or deactivated. If the SPOT cannot acquire its location, it will send a distress signal without position location information.

The Help function is designed to be used in a non-life threatening emergency to notify user pre-designated personal contacts that assistance is required. If the SPOT Assist feature has been contracted, the Help button will also notify professional services either on the land or water that non-life threatening assistance is required. Once activated, the SPOT acquires its GPS location and routes this information along with the HELP message through the SPOT satellite network every five minutes for one hour, or until cancelled. Designated contacts will receive an SMS text message including coordinates, or an email with a link to Google Maps™ showing the acquired GPS location. If the SPOT cannot acquire its location, it will attempt to send a HELP message without position location information to the designated contacts.

² International Gliding Commission.

The Check-in/OK function is used to notify designated contacts that all is OK using a pre-programmed message along with acquired GPS location information. This is accomplished via email or SMS for to up to 10 pre-determined contacts, and the position of the SPOT is stored as a waypoint in the SPOT database for later reference.

The Track Progress feature will send acquired GPS position location information in near real time to the SPOT servers so that designated contacts can view the information in near-real-time using Google Maps.

2.3.1. SPOT Personal Tracker Data Recovery

Manufacturer communication indicated that the SPOT Satellite Personal Tracker does not record or retain any data.

2.3.2. SPOT Personal Tracker Data Description

No accident data was recovered from this unit.

3. PARAMETERS PROVIDED

Table 1 describes data parameters included in the Cambridge Aero Instruments IGC file (see Attachment 1). Table 2 describes data parameters included in the Naviter Oudie IGC file (see Attachment 2). Table 3 describes data parameters included in the Naviter Oudie NMEA log file (see Attachment 3). In addition to the parameters summarized in Table 2, the Naviter Oudie IGC file also contained sporadic entries for wind direction and velocity computed by the unit.

Table 1: Cambridge Aero Instruments IGC Data Parameters

Parameter Name	Parameter Description
Date	Date for recorded data point (DD/MM/YY)
Time	Time (EDT) for recorded data point (HH:MM:SS)
Longitude	Recorded Longitude (degrees)
Latitude	Recorded Latitude (degrees)
Press Alt	Recorded Pressure Altitude (m, MSL ³)
GPS Alt	Recorded GPS Altitude (m, MSL)

³ Altitude above Mean Sea Level.

Table 2: Naviter Oudie IGC Data Parameters

Parameter Name	Parameter Description
Date	Date for recorded data point (DD/MM/YY)
Time	Time (EDT) for recorded data point (HH:MM:SS)
Longitude	Recorded Longitude (degrees)
Latitude	Recorded Latitude (degrees)
Press Alt	Recorded Pressure Altitude (m, MSL ⁴)
GPS Alt	Recorded GPS Altitude (m, MSL)
TAS	True Airspeed (km/h)
Groundspeed	Average groundspeed between current and previous data point (km/h)
Track	Average true course between current and previous data point (degrees)
Vario	Average rate of climb between current and previous data point (m/s)

Table 3: Naviter Oudie NMEA Log Data Parameters

Parameter Name	Parameter Description
Time	Time (EDT) for recorded data point (HH:MM:SS)
RCV Warn	Validity of GPS fix (A= 3-D fix, V= 2-D fix)
Latitude	Recorded Latitude (degrees)
Longitude	Recorded Longitude (degrees)
Groundspeed	Average groundspeed between current and previous data point (knots)
Track	Average true course between current and previous data point (degrees)

4. OVERLAYS AND TABULAR DATA

All graphical overlays generated in this report were generated using Google Earth.

Figure 1 represents a 2-D overlay of the accident flight using data from the Cambridge Aero Instruments variometer. The glider ground track is represented by a thick red line. The thinner red lines represent a triangle flight task programmed into the variometer. Each vertex of the triangle represents a mandatory turn point for the task being flown.

⁴ Altitude above Mean Sea Level.

Figure 2 represents a 3-D overlay of this same data, looking to the west. Figure 3 represents a 2-D depiction for the last approximately 13-minutes of the accident flight. It shows the glider circling in a weak thermal and drifting to the west of the field, then breaking off and returning to the airport.

Figure 4 depicts a graph of pressure altitude as a function of time during the accident flight from data recovered from the Cambridge Aero Instruments variometer. The graph is color coded with the instantaneous climb rate of the glider - with red representing higher climb rates, yellow representing median climb rates, and blue representing higher descent rates. Vertical blue lines labeled Ionia and Photo landing represent annotations made by the flight recorder based on the pre-programmed flight task stored in the unit (represented by the red triangle in figure 1).

Figures 5 and 6 depict graphs of Pressure Altitude, GPS Altitude, Groundspeed, and True Airspeed based on data recovered from the Naviter Oudie. Figure 5 depicts this information for the entire accident flight. Figure 6 depicts this information for the last approximately 6-1/2 minutes of the accident flight. Groundspeed from the NMEA log file (red line) is included alongside groundspeed obtained from the ICG file, due to its higher update rate (1 per second). Periods during which the glider is circling are characterized by highly variable groundspeed data along with a relatively constant true airspeed of around 100 km/h. The last entry for wind speed and velocity was recorded at 1533:46 EDT; indicating a direction of 262° true, and a velocity of 52. km/h.

Figure 1. 2-D depiction of the accident flight from Cambridge Aero Instruments IGC data.



Figure 2. 3-D depiction of the accident flight from Cambridge Aero Instruments IGC data.

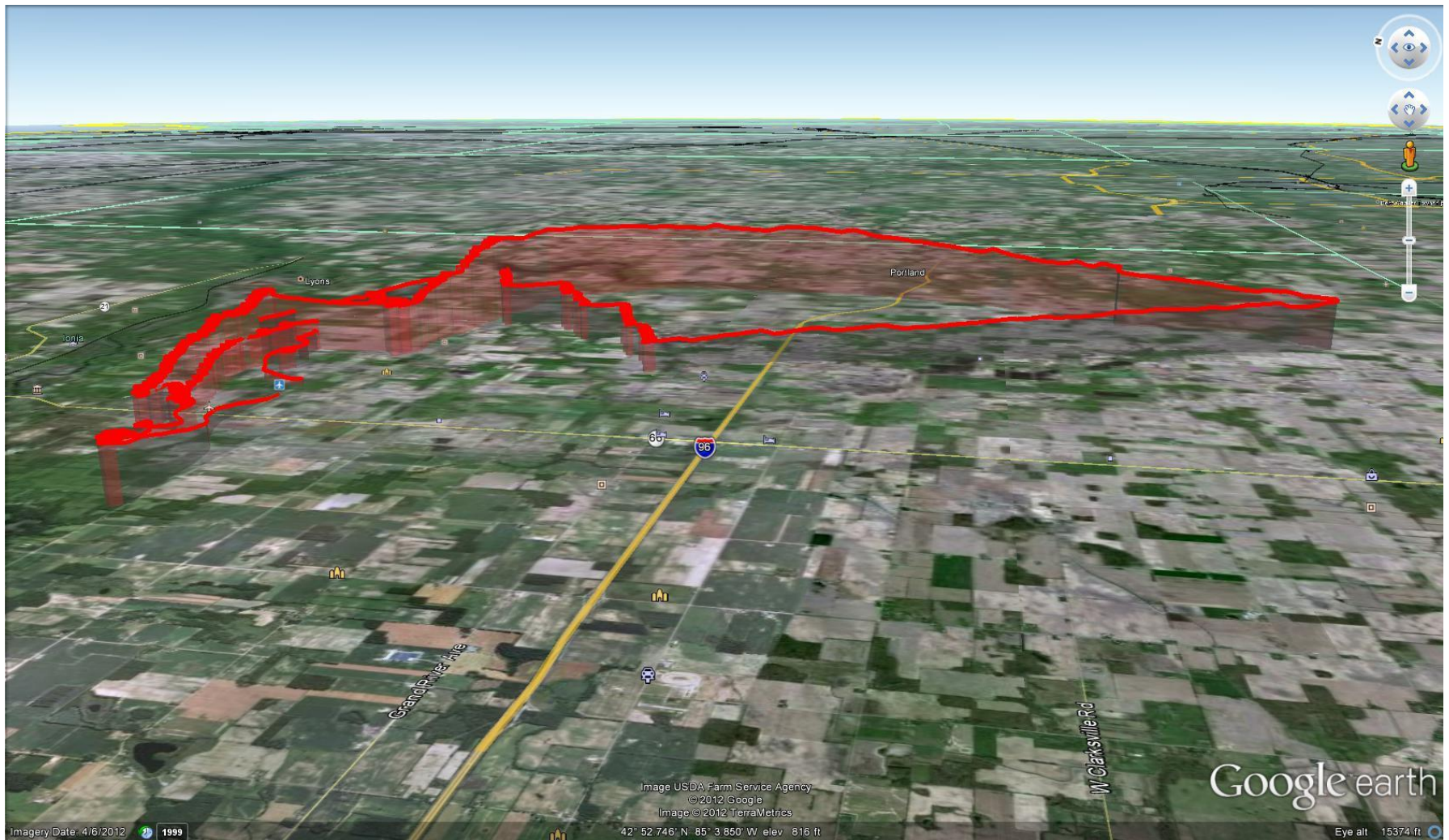


Figure 3. 2-D depiction of the accident flight from Cambridge Aero Instruments IGC data (1522:24 to end).

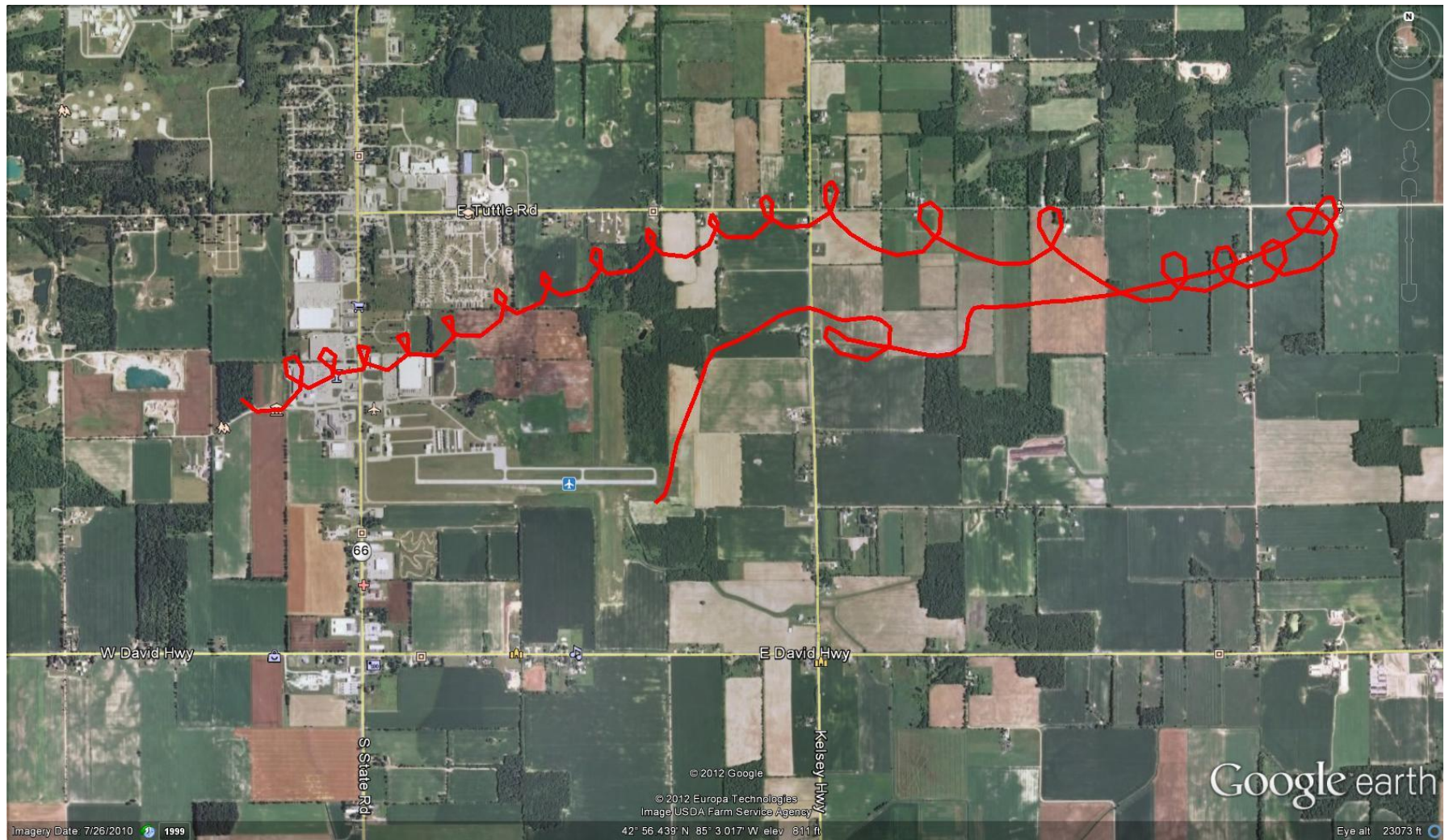


Figure 4. Pressure Altitude during the accident flight from Cambridge Aero Instruments IGC data.

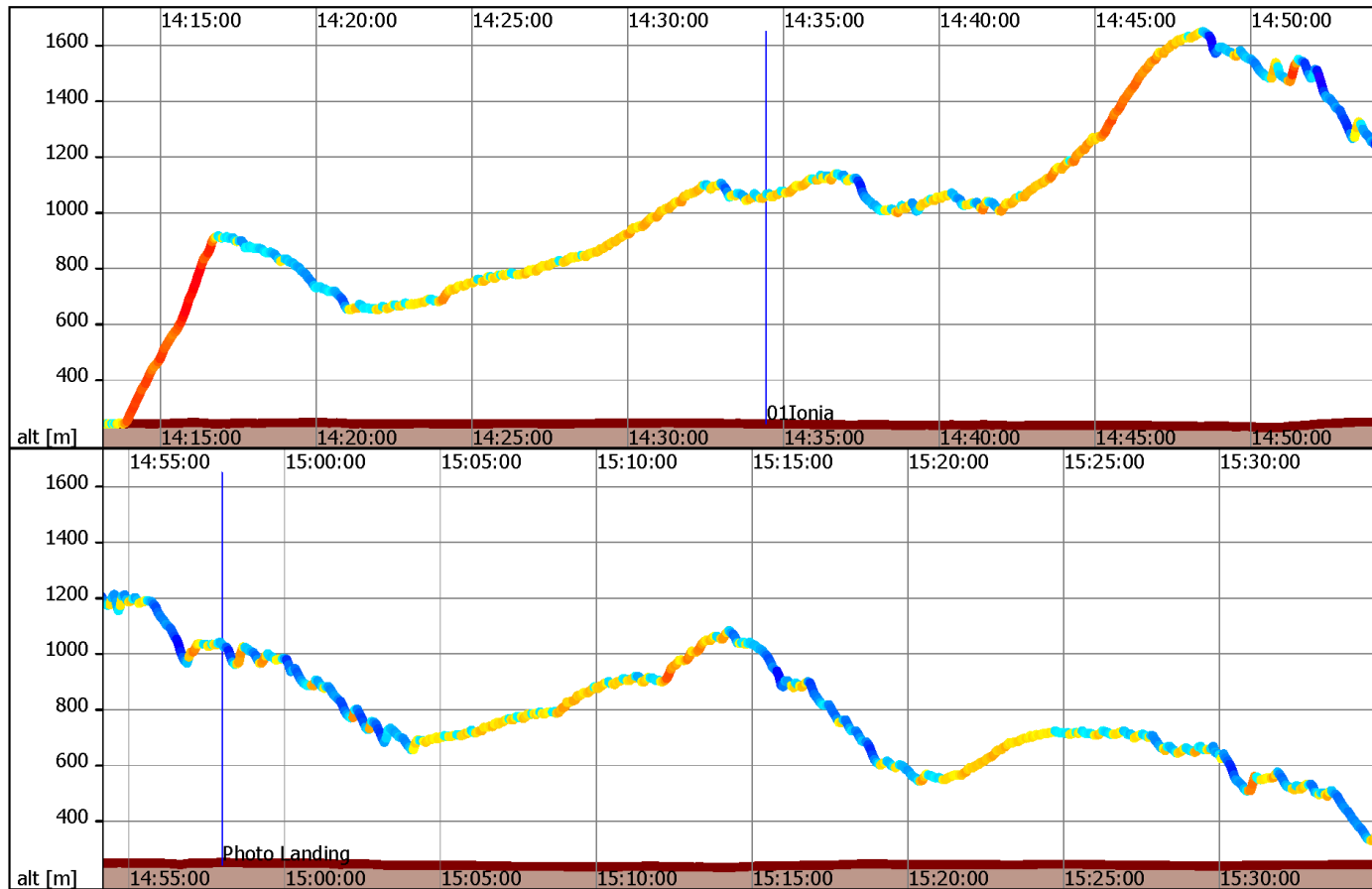
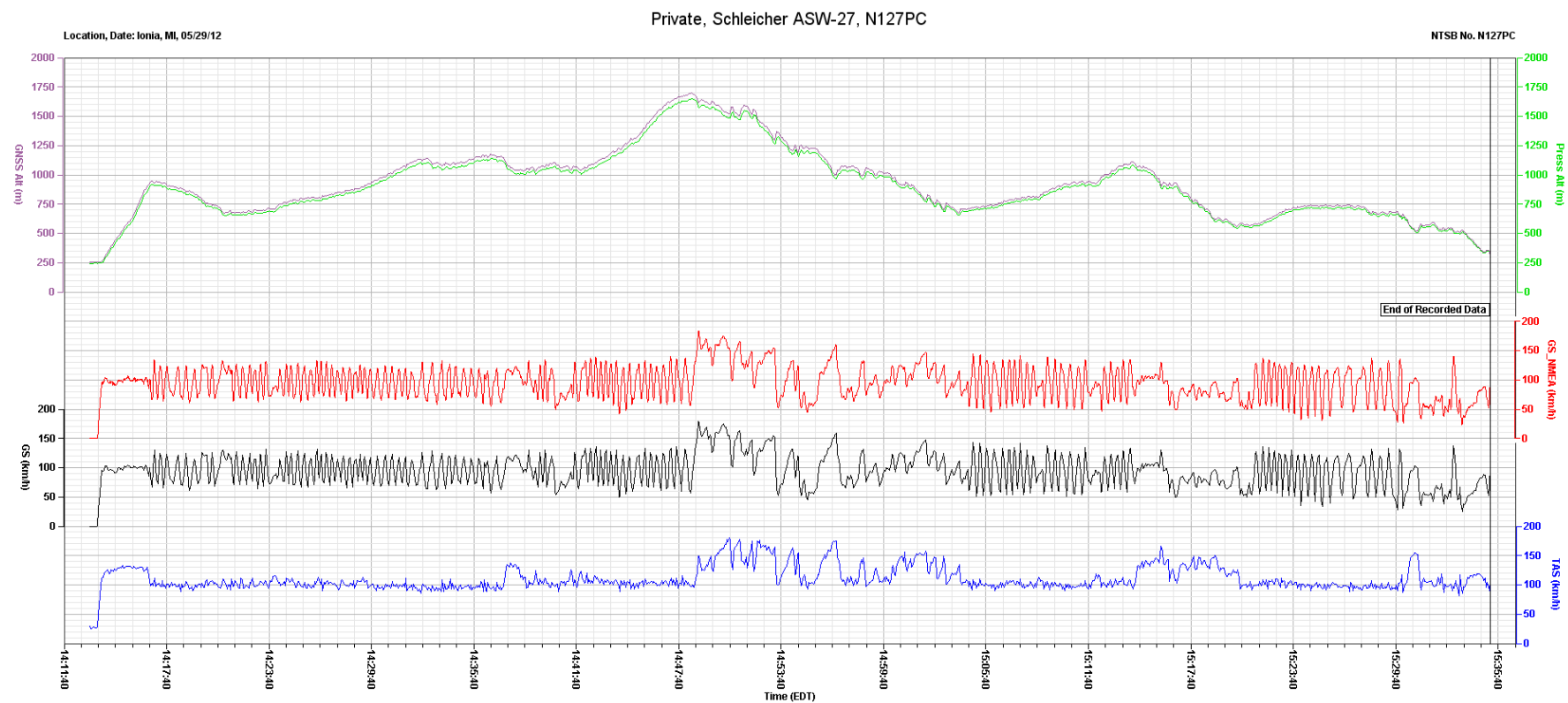


Figure 5. Recorded Altitude and Speed for the accident flight from Naviter Oudie IGC and NMEA data.



Revised: 12 February 2013

CEN12LA330

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Figure 6. Recorded Altitude and Speed for the last 6-½ minutes of the accident flight from Naviter Oudie IGC and NMEA data.

