

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

November 1, 2018

Cockpit Display – Recorded Flight Data

Specialist's Factual Report
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1. EVENT SUMMARY

Location: Bonita Springs, Florida
Date: January 22, 2018
Aircraft: Vans Aircraft RV-12
Registration: N262WS
Operator: Private
NTSB Number: ERA18FA064

On January 22, 2018, about 1214 eastern standard time, a Van's Aircraft RV-12, N262WS, was destroyed when it collided with terrain near Bonita Springs, Florida. The sport pilot was fatally injured. The special light sport airplane was registered to a corporation and was operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91. Day, visual meteorological conditions prevailed, and no flight plan was filed for the personal flight. The flight originated at Page Field (FMY), Fort Myers, Florida, about 1200 and was destined for Everglades Airpark (X01), Everglades City, Florida.

2. RECORDED FLIGHT DATA GROUP

A recorded flight data group was not convened.

3. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following electronic display device capable of recording information to non-volatile memory (NVM)¹:

Recorder Manufacturer/Model: **Dynon FlightDEK-D180**
Recorder Serial Number: **002940**

3.1. Dynon FlightDEK-D180 Description

The Dynon FlightDEK D180 is a 7" wide screen display mounted in the cockpit of non type certificated aircraft. The instrument integrates multiple flight instruments including airspeed, altitude, gyro-stabilized magnetic compass, turn rate, slip/skid ball, bank angle, pitch angle and vertical speed. The unit also has other functions that include a clock/timer, g-meter, voltmeter and a density altitude/true airspeed calculator. The unit contains an Air Data, Attitude and Heading Reference System (ADAHRS) to provide air data, attitude and heading

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

information to the display. Depending on the installation in the operator's aircraft certain parameters might not be displayed, for example angle-of-attack. The instrument also integrates up to 16 engine related instruments including manifold pressure, temperatures, RPM and fuel system information. Depending on the type of engine installed in the aircraft and pilot preferences, not all display options can be available.

Depending on the firmware version on the unit, the ability to log data to internal memory exists. According to the manufacturer, firmware versions 3.0 and later contain the ability to log certain engine parameters and firmware versions 5.0 and later contain the ability to log certain Electronic Flight Information System (EFIS) and GPS parameters. The data logging must be configured by the operator to enable logging and set the data log interval. The unit can also be configured to start logging data automatically at boot-up. The data logging interval can be set to store at 1,3,5,10,30 and 60 second intervals. The internal memory can store at least 30 minutes of cumulative data at a 1 second recording interval or at least 30 hours at a 60 second data recording interval. When the recording limit in the internal memory is reached, the oldest record is dropped and a new record is added.

3.1.1. Dynon FlightDEK-D180 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had not sustained any damage and the data were downloaded using the manufacturer's procedure.

3.1.2. Dynon FlightDEK-D180 Data Description

The D180 received contained firmware version 5.5.0.249. Based on information from the manufacturer, the unit stores data. The operator had the datalog function enabled and it was set to record information at a one second interval and start recording at boot up. The recording contained approximately 6 hours and 27 minutes of data in 42 sessions from July 17, 2017, through January 22, 2018. The last recorded session was determined to be related to the accident and is included in this report. Timing of the data is measured in seconds.

3.1.2.1. Dynon FlightDEK-D180 Engineering Units Conversions

Conversion of the data from the raw recorded information to engineering units is performed by the Dynon product support download program.

APPENDIX A lists the D100 parameters verified and provided in this report.

3.2. Time Correlation

The unit records clock time, either external or internal. The time is set by the operator for the internal clock, or if the unit is connected to a GPS, the unit will use the GPS system time. The clock time will be reset to 00:00:00 if the unit is not connected to a power source that remains powered after the unit is powered down, commonly referred to as a "Keep Alive" or "Hot" wire. The data downloaded from the unit indicated that the time recorded on the device was GPS time.

The GPS time is recorded in Universal Coordinated Time (UTC). The difference between eastern standard time and UTC is 5 hours, or 18,000 seconds. For the rest of this report, all times are in UTC.

3.3. Plots and Corresponding Tabular Data

The following four figures contain data recorded during the January 22, 2018, event.

Figure 1 is a graphical overlay generated using Google Earth for the entire 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 is a graphical overlay generated using Google Earth for the last portion of the accident flight. The last recorded parameter from the flight was at 17:14:14 UTC on January 22, 2018.

Figure 3 is a plot of basic parameters during the entire accident flight. The time interval is 16:58:15 to 17:14:15 UTC.

Figure 4 is a plot of basic parameters during the last portion of the accident flight. The time interval is 17:13:45 to 17:14:15 UTC.

The corresponding tabular data used to create figures 1 through 4 are provided in electronic (*.csv²) format as Attachment 1 to this report.

² Comma Separated Value format.

Figure 1. Google Earth overlay showing the entire accident flight.

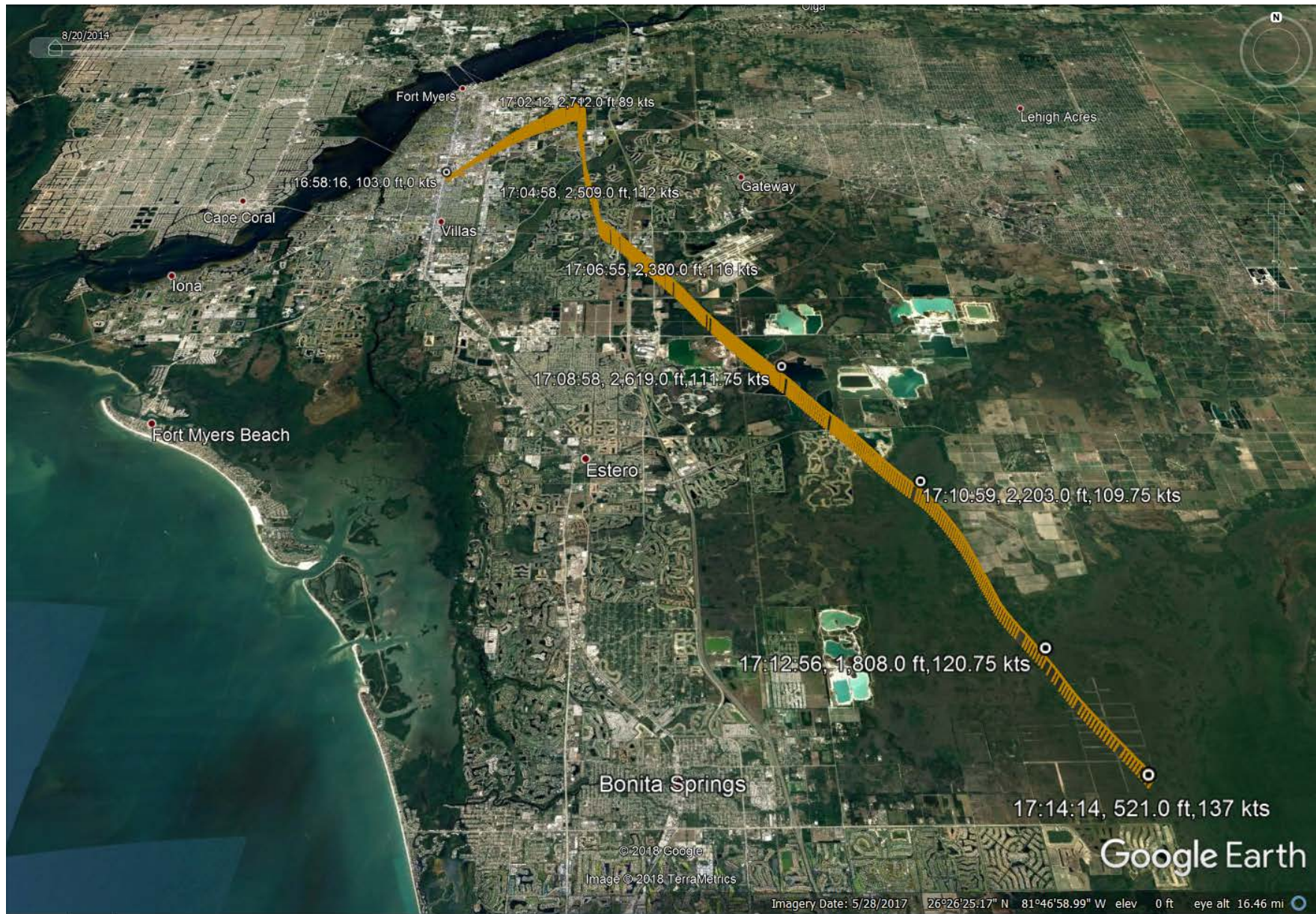


Figure 2. Google Earth overlay showing the last portion of the accident flight.

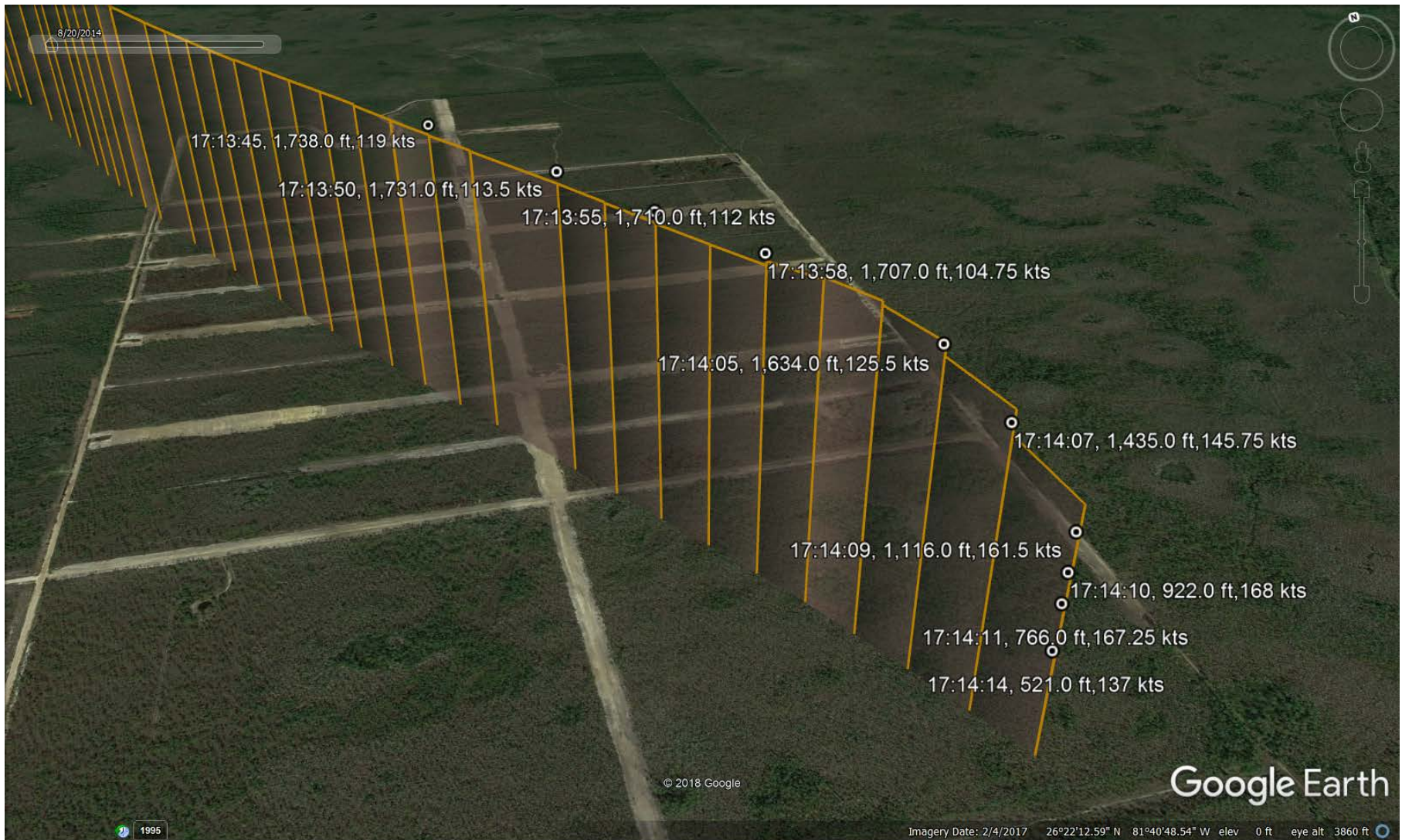


Figure 3. Plot of basic parameters during the entire accident flight.

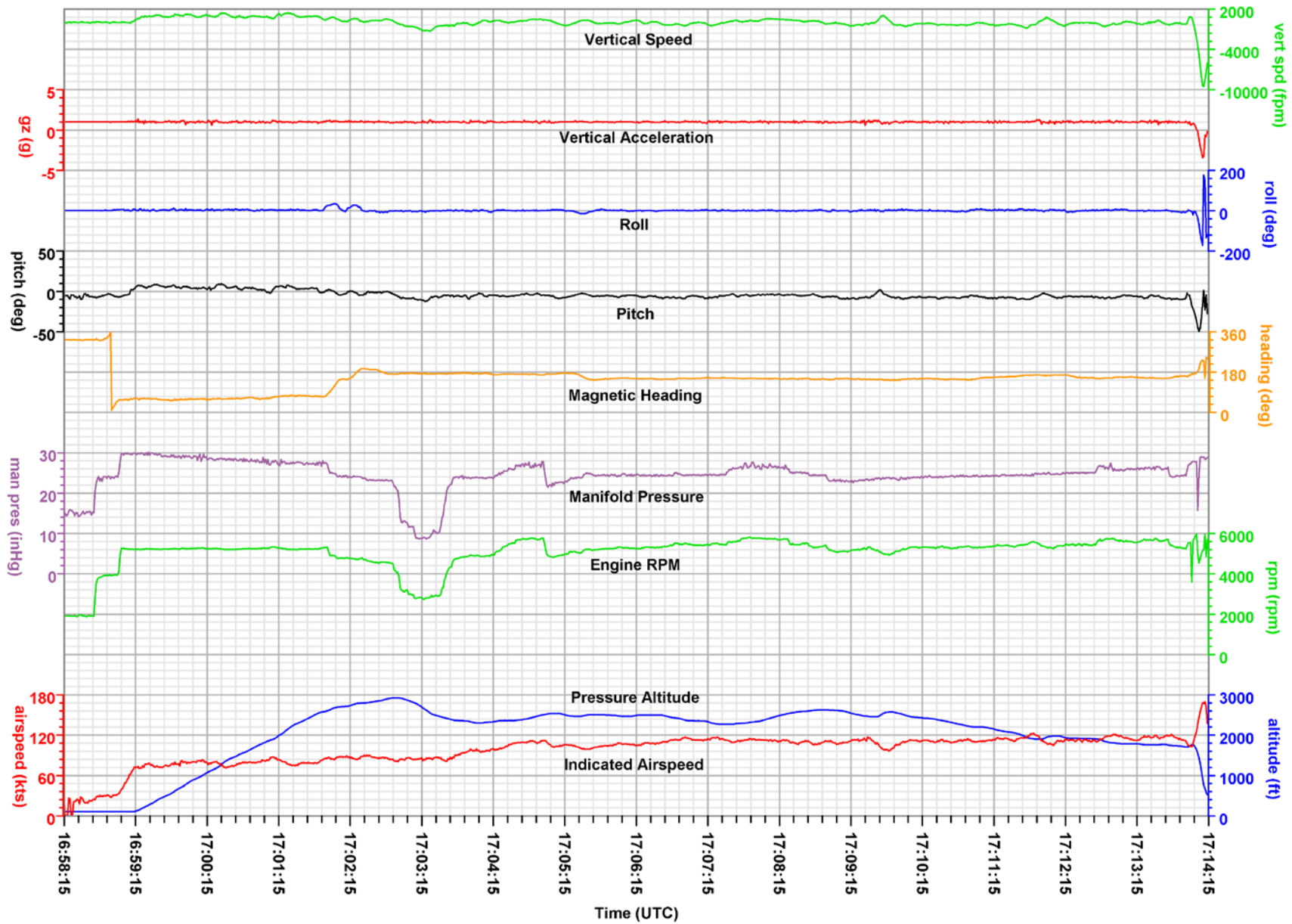
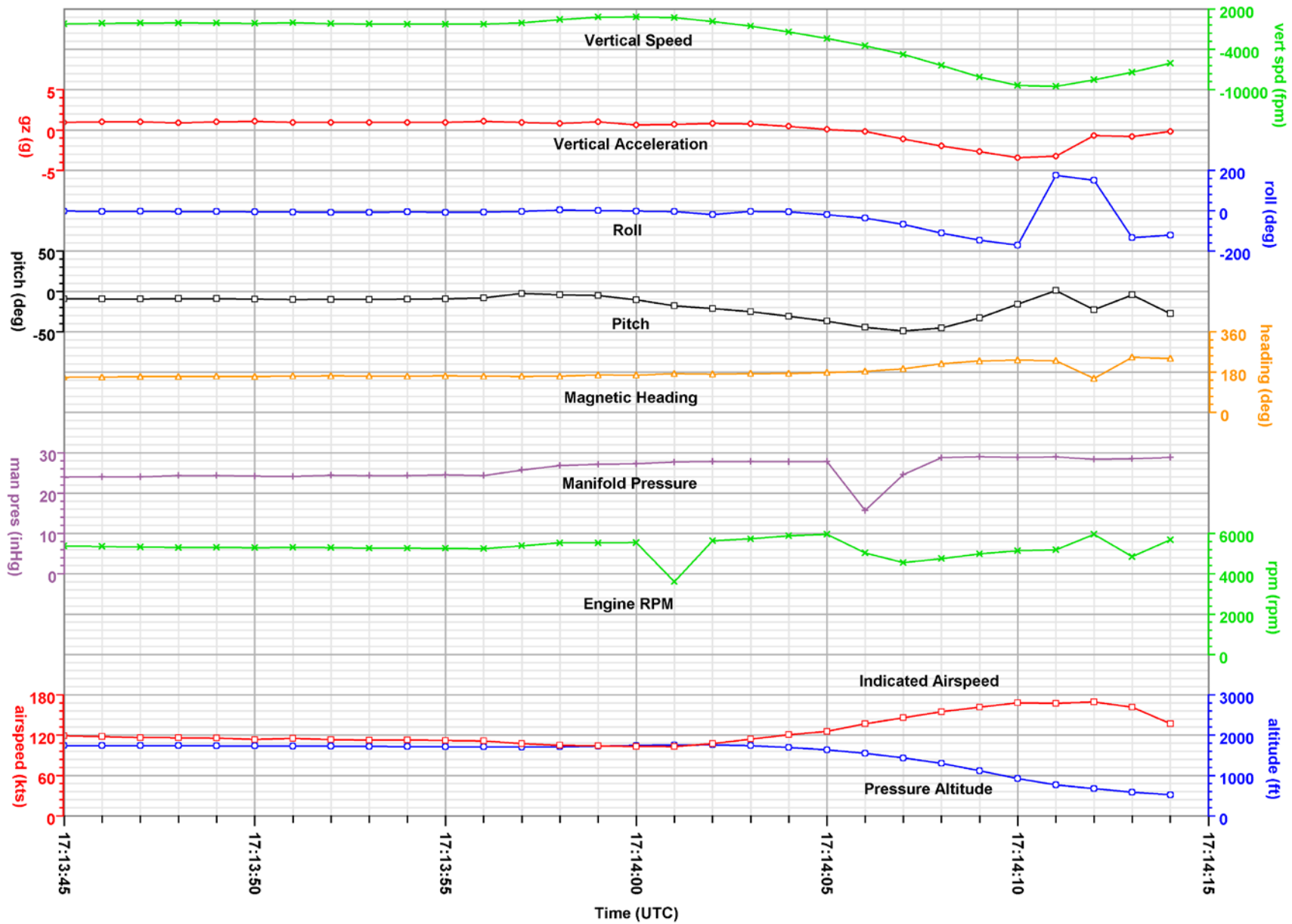


Figure 4. Plot of basic parameters at the end of the flight.



APPENDIX A - Dynon Parameters

This appendix describes the parameters provided and verified in this report. Table A-1 lists the parameters and table A-2 describes the unit abbreviations used in this report.

Table A-1 - Verified and provided parameters.

Parameter Name	Parameter Description
1. airspeed (kts)	Indicated Airspeed
2. altitude (ft)	Pressure Altitude
3. gz (g)	Vertical Acceleration
4. heading (deg)	Heading
5. man pres (inHg)	Manifold Pressure
6. pitch (deg)	Pitch
7. roll (deg)	Roll
8. rpm (rpm)	Engine RPM
9. vert spd (fpm)	Vertical Speed

Table A-2 - Unit abbreviations.

Units Abbreviation	Description
deg	degrees
ft	feet
fpm	feet per minute
g	Acceleration
inHg	inches of Mercury
kts	knots
rpm	revolutions per minute