

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, D.C. 20594

March 9, 2022

Electronic Devices

Specialist's Factual Report by Gerald Kawamoto

1. EVENT

Location: Logan, UT
Date: June 26, 2021
Aircraft: Searey LSX
Registration: N62EF
Operator: Private
NTSB Number: WPR21FA243

2. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following devices:

Device 1:	Dynon SkyView D700
Device 1 Serial Number:	1302
Device 2:	Garmin Aera 696
Device 2 Serial Number:	1H6005239

2.1. Dynon SkyView D700 Device Description

The Dynon Skyview (SV) D700 is a panel-mounted combination Electronic Flight Instrumentation System (EFIS) and Engine Monitoring System (EMS). The device is capable of displaying both EFIS and EMS data on a 7-inch LCD display. Data are stored on non-volatile memory.¹

2.1.1. Dynon SkyView D700 Data Recovery

The device was in good condition upon arrival at the Vehicle Recorder Division, as shown in Figure 1, and data were extracted normally using laboratory tools.

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



Figure 1. Dynon SkyView D700 as received.

2.1.2. Dynon SkyView D700 Data Description

The data extracted included sessions recorded between September 27, 2020, and June 27, 2021, Coordinated Universal Time (UTC). The event session started at 2:09:54 UTC and ended at 2:39:02 UTC on June 27, 2021, and is included in this report.

2.1.3. Dynon SkyView D700 Parameters Provided

Data were downloaded in engineering units and no conversions were performed. Table 1 describes data parameters provided by the device and verified by the recorder specialist. Additional parameters were recorded but were unable to be verified.

Table 1. Dynon Data Parameters

Parameter Name (units)	Parameter Description (units)
Time	Recorded Time (UTC)
Date	MM/DD/YYYY
GPS Altitude (ft)	GPS Altitude (feet)
Pressure Altitude (ft)	Pressure Altitude (feet)
Ground Speed (kts)	Ground Speed (knots)
Magnetic Heading (deg)	Magnetic Heading (degrees)
Roll (deg)	Roll (degrees)
Pitch (deg)	Pitch (degrees)
Manifold Pressure (inHg)	Manifold Pressure (inches of Mercury)
RPM	Engine RPM (revolutions per minute)
Oil Pressure (psi)	Oil Pressure (pounds per square inch)
Oil Temperature (degC)	Oil Temperature (degrees Celsius)
EGT # (degC)	Exhaust Gas Temperature # (degrees Celsius)
Vertical Speed (fpm)	Vertical Speed (feet per minute)
Lateral Accel (g)	Lateral Acceleration
Vertical Accel (g)	Vertical Acceleration

2.1.4. 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 latitude, longitude, and time parameters directly correlated to the coordinates recorded on the Garmin Aera 696 device, therefore it was determined that the time recorded was UTC.

2.2. Garmin Aera 696 Device Description

The Garmin GPSMAP 696 is a portable GPS receiver capable of storing date, route-of-flight, and flight-time information for up to 50 flights. A detailed tracklog including latitude, longitude, date, time, and groundspeed information is stored within the unit whenever the receiver has a lock on the GPS navigation signal. All recorded data is stored in non-volatile memory. The unit contains hardware and software permitting the download of recorded waypoint, route, and tracklog information to a PC via a built-in serial port. The unit can also communicate with external devices such as a computer using a built-in USB port. 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.

2.2.1. Garmin Aera 696 Data Recovery

The device was in good condition upon arrival at the Vehicle Recorder Division, as shown in Figure 2, and data were extracted normally using laboratory tools.

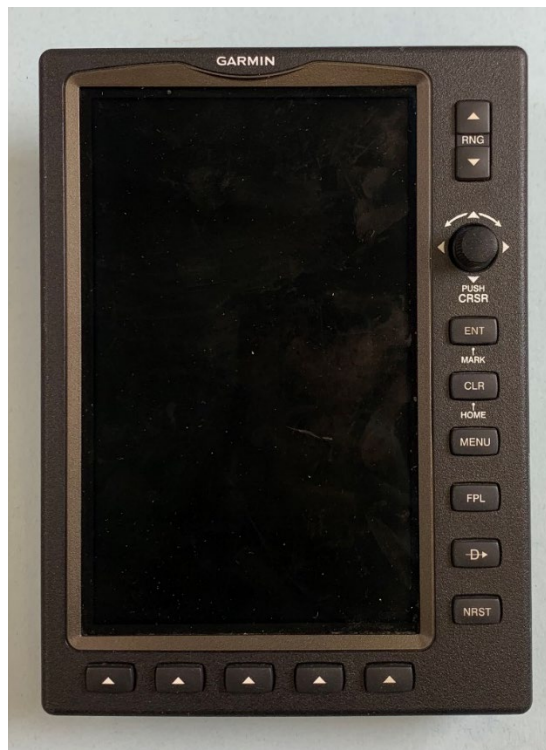


Figure 2. Garmin Aera 696 as received.

2.2.2. Garmin Aera 696 Data Description

The data extracted included 48 sessions. The date recorded was 1024 weeks (7168 days) offset from the recorded dates, a phenomenon known as GPS week number rollover. Software not coded to anticipate the rollover may be set back 20 or 40 years. The recorded dates ranged from December 4, 2000, through November 11, 2001. The last recorded session corresponded to the final session recorded on the Dynon device and was 7168 days offset from the event date.

Table 2 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 2. GPS Data Parameters

Parameter Name	Parameter Description (units)
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 GPS Altitude (feet)
Groundspeed	Average derived groundspeed (knots)
Track	Average derived true course (degrees)

3. Plots and Corresponding Tabular Data

Figures 3 through 4 are graphical overlays generated in Google Earth for the event flight. Weather and lighting conditions shown in Google Earth may not be representative of the conditions at the time of the event flight.

Figure 3 is an overlay of the entire event flight. Flight tracks for both the Garmin (Blue) and Dynon (Yellow) are included. The timestamps shown were recorded on the Dynon. The flight tracks corresponded to each other, however, the Dynon recorded at a higher sampling frequency, thus is solely used for the remainder of overlays in this report.

Figure 4 is an overlay showing the end of the event flight and the reported wreckage location.

Figure 5 is a plot of Dynon SkyView D700 parameters for the entire event flight. The time interval displayed is 2:09:00 to 2:40:00 UTC.

Figure 6 is a plot of Dynon SkyView D700 parameters at the end of the event flight. The time interval displayed is 2:38:30 to 2:39:05 UTC.

The corresponding tabular data used to create Figures 3 through 6 are provided in electronic comma-separated value (csv) format as Attachment 1 for Garmin data and Attachment 2 for Dynon data to this report.

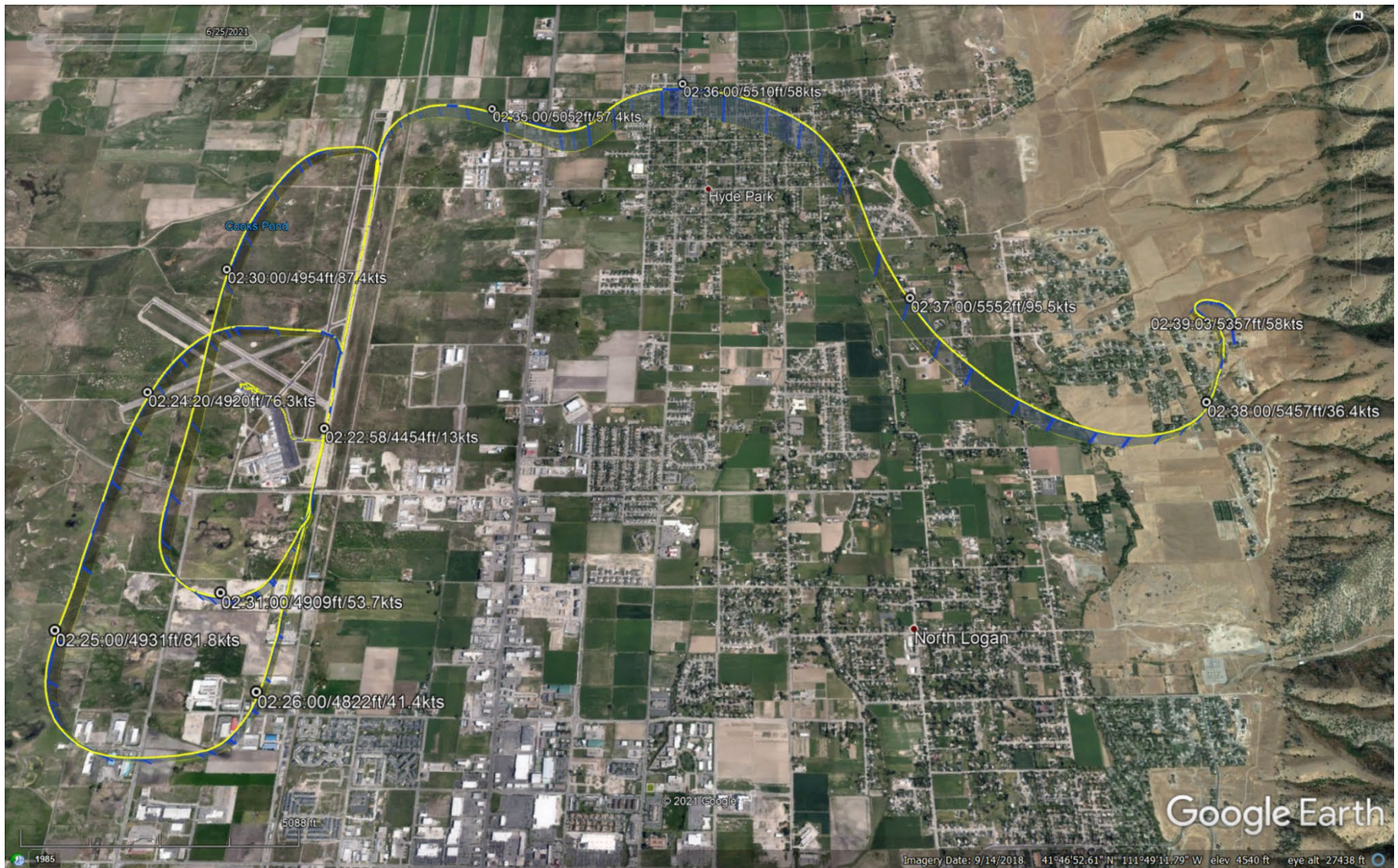


Figure 3. Google Earth overlay of the entire event flight. The blue flight track was recorded on the Garmin Aera 696 and the yellow was recorded on the Dynon SkyView D700. The timestamps and data values shown were recorded on the Dynon.



Figure 4. Google Earth overlay showing end of the event flight and reported wreckage location.

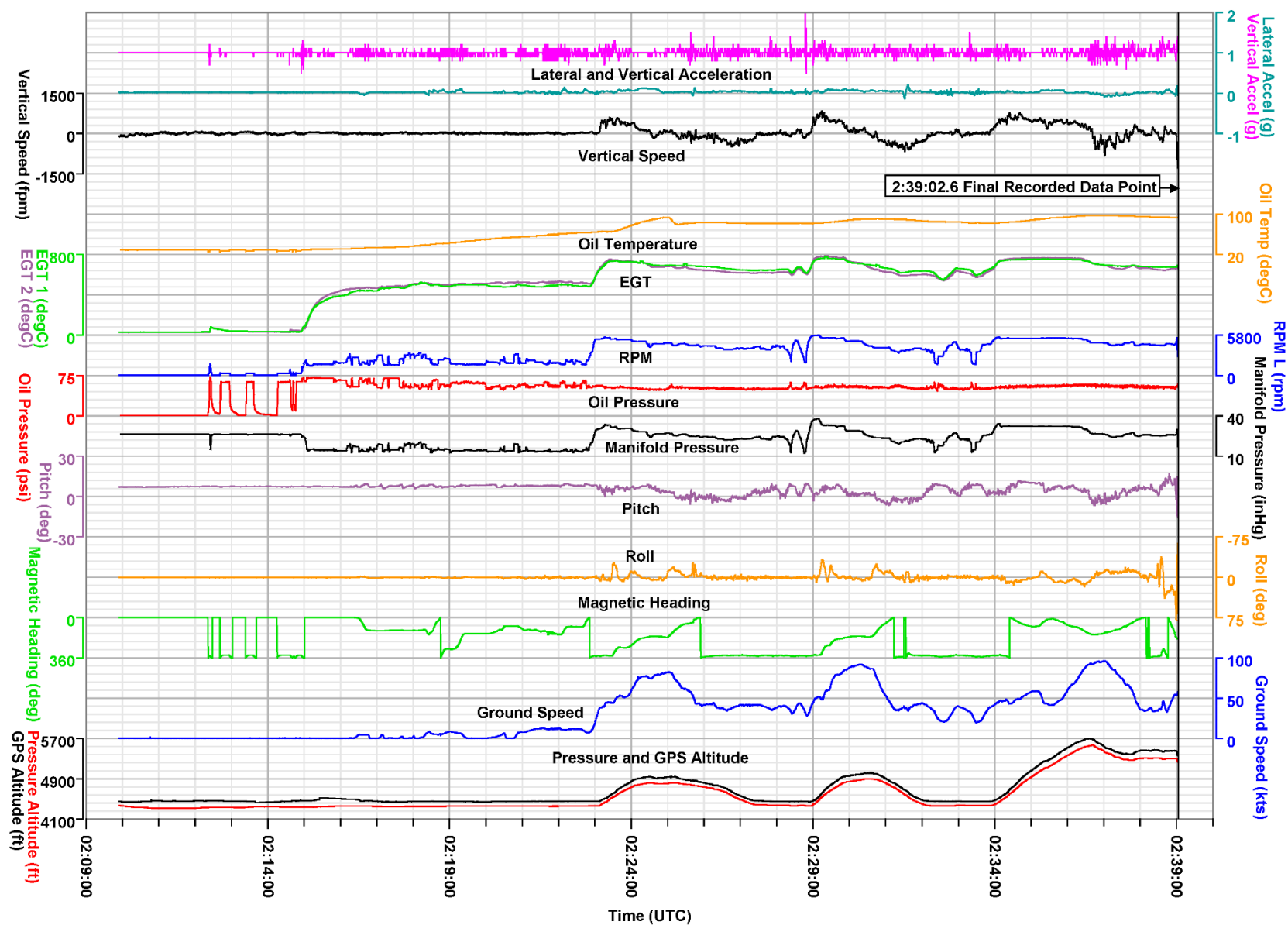


Figure 5. Plot of parameters recorded on the Dynon SkyView D700 for the entire event flight.

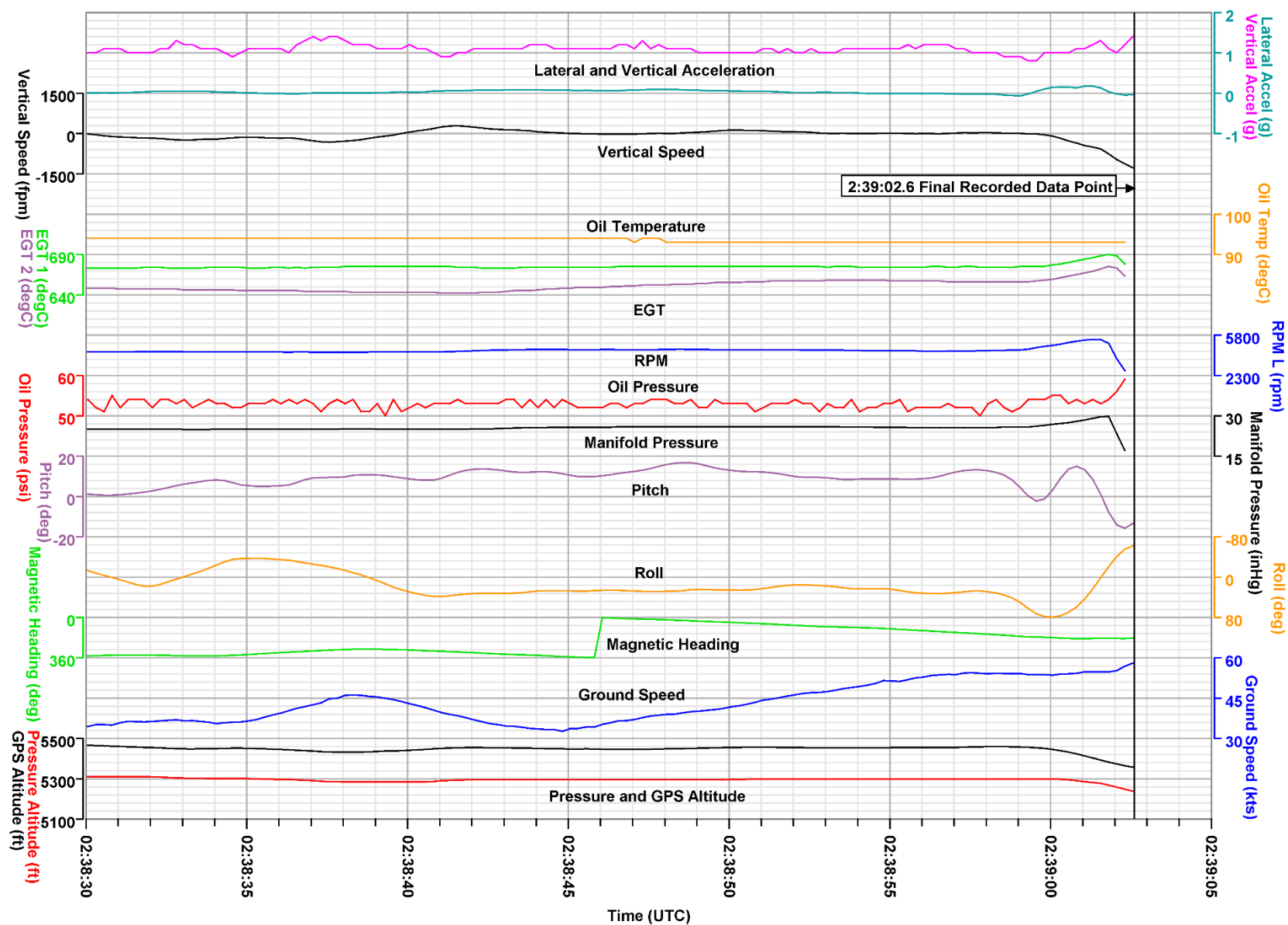


Figure 6. Plot of parameters recorded on the Dynon SkyView D700 at the end of the event flight.