

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

April 26, 2022

Cockpit Display – Recorded Flight Data

Specialist's Factual Report

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1. EVENT SUMMARY

Location: Montrose, Colorado
Date: January 2, 2022
Aircraft: Zenith CH750
Registration: N750DP
Operator: Private
NTSB Number: CEN22LA093

2. RECORDED FLIGHT DATA GROUP

A recorded flight data group was not convened.

3. DETAILS OF INVESTIGATION

On January 28, 2022, the National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following electronic device:

Device:	USB thumb-drive with recorded flight data
Source Device Manufacturer/Model:	Dynon Skyview series (unknown model)
Source Device Serial Number:	Unknown

3.1. Device Description

Dynon Skyview series can serve as either a Primary Flight Display (PFD) or a Multifunction Display (MFD) depending on installation. The unit has a solid-state Air Data and Attitude Heading Reference System (ADAHRS) and displays aircraft parameter data including altitude, airspeed, attitude, vertical speed, and heading. The unit also has external pitot/static inputs for altitude, airspeed, and vertical speed information. The device contains an internal flash memory device. The flash memory stores information with 16 samples per second for the last 30 minutes of flight in a file called a "Black_Box_Log," detailed alert logs that show both caution, warning and aural alerts generated by the display in a file called "Alert_Data," as well as a flight history log which

is sampled at a lower rate that can record many more hours of operation. The flight history is recorded in a file called "User_Log" with 4 samples per second.

3.2. Data Description

The recorded flight data contained User_Log, Alert_Data and Black_Box_Log files in CSV (comma separated values) format. The User_Log and Alert_Data files had the first recording session in November 2021 and the last recording session on January 21, 2022. All three files had a recording session on January 2, 2022, and this recording session was determined to be related to the event.

The Black_Box_Log file only contained the last 30 minutes of the event flight. The data used in this report were combined from the Black_Box_Log and User_Log files to yield a data set with the entire event flight and with the highest sampling frequency. Data were recorded in Universal Coordinated Time (UTC). All times were converted to mountain standard time (MST), the local time of the event, for the rest of this report. The difference between UTC and MST is 7 hours.

The Alert_Data file only contained data recorded whenever an alert/warning event occurred. Table 1 shows the alerts generated by the Dynon unit during the event flight. The alerts were either shown on the display or repeated in audio.

Table 1: Event Flight Alerts.

Time	Alert	Alert Description
10:36:50 - 10:40:30	FUEL PRE LOW (text)	Fuel pressure is low
10:36:50 - 10:40:30	EMS_FUEL_PRES (audio)	Emergency - fuel pressure is low
10:40:25 - 10:40:58	GEES (audio)	The G meter is in the yellow caution range
10:40:26	OIL PRES LOW (text)	Oil pressure is low
10:40:26	EMS_OIL_PRES (audio)	Emergency - oil pressure is low
10:40:26 - 10:40:27	OVER_GEEES (audio)	The G meter is in the red warning range
10:40:38	RIGHT LEVEL LOW (text)	Fuel level at the right tank is low
10:40:38	EMS_FUEL_QUANTITY (audio)	Emergency - fuel quantity is low

3.2.1. Parameters Provided

Table 2 shows the data parameters recorded by the Dynon unit.

Table 2: Data Parameters.

Parameter Name	Parameter Description
Latitude (deg)	GPS position latitude in degrees
Longitude (deg)	GPS position longitude in degrees
RPM (RPM)	Engine Rotational Speed (revolutions per minute)
Fuel Pres (PSI)	Fuel Pressure (pounds per square inch)

Parameter Name	Parameter Description
Fuel Flow (gal/hr)	Fuel Flow Rate (gallon per hour)
Fuel Level L/R (gal)	Fuel Level at Left/Right tank (gallons)
Fuel Rem (gal)	Fuel Remaining (gallons)
OIL Temp (degF)	Oil Temperature (degrees Fahrenheit)
OIL Pres (PSI)	Oil Pressure (pounds per square inch)
Voltage (V)	Electric Bus Voltage (Volts)
Current (A)	Electric Bus Load Current (amperes)
OAT (deg F)	Outside Air Temperature (degrees Fahrenheit)
GEARBX Temp (degF)	Gearbox Temperature (degrees Fahrenheit)
COOLNT Temp (degF)	Coolant Temperature (degrees Fahrenheit)
COOLBX Temp (degF)	Coolant Box Temperature (degrees Fahrenheit)
Lateral Accel (g)	Lateral Acceleration (g)
Vertical Accel (g)	Vertical Acceleration (g)
Pitch (deg)	Pitch (degrees)
Roll (deg)	Roll (degrees)
Ground Speed (kts)	Average groundspeed between current and previous data point (knots)
Indicated Airspeed (kts)	Airspeed read from airspeed indicator onboard (knots)
True Airspeed (kts)	Airspeed corrected for temperature and pressure altitude (knots)
Vertical Speed (ft/min)	Aircraft vertical speed (feet per minute)
Ground Track (deg)	Path on the surface of the Earth directly below aircraft (degrees)
Magnetic Heading (deg)	Direction relative to magnetic north (degrees)
GPS Altitude (ft)	Geometric altitude above Mean Sea Level (feet)
Pressure Altitude (ft)	Altitude recorded at a 29.92 inHg pressure setting (feet)
Density Altitude (ft)	Altitude corrected for nonstandard temperature variations (feet)
Turn Rate (deg/s)	Aircraft turn rate (degree per second)

3.2.2. Plots and Corresponding Tabular Data

The following 11 figures contain data recorded by the Dynon unit on January 2, 2022. Figures 1 through 6 show parameters plots and figures 7 through 11 show Google Earth overlays of the event flight.

Figure 1 is a plot of the engine parameters for the entire event flight. The time interval displayed is 10:05:00 to 10:45:00 MST. The first fuel-pressure-low alert occurred at 10:36:50.

Figures 2 and 3 show the plots of the engine parameters for the last 6 minutes and last 2 minutes of the event flight, respectively.

Figure 4 is a plot of the operational parameters for the entire event flight. The time interval displayed is 10:05:00 to 10:45:00 MST.

Figures 5 and 6 show the plots of the operational parameters for the last 6 minutes and last 2 minutes of the event flight, respectively.

Figure 7 is a Google Earth overlay of the entire event 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 8 is a Google Earth overlay of the beginning of the flight. It shows the aircraft took off at the North Fork Valley Airport (7V2) at around 10:05:00 MST.

Figure 9 is a Google Earth overlay of the final portion of the event flight. The reported wreckage location is shown with a red pin.

Figures 10 and 11 are Google Earth overlays zoomed in on the final portion of the event flight.

The corresponding tabular data used to create figures 1 through 11 are provided in CSV format as Attachment 1 to this report. The Alert_Data file is provided in CSV format as Attachment 2 to this report. Not every additional parameter in the attachments have been validated by the specialist.

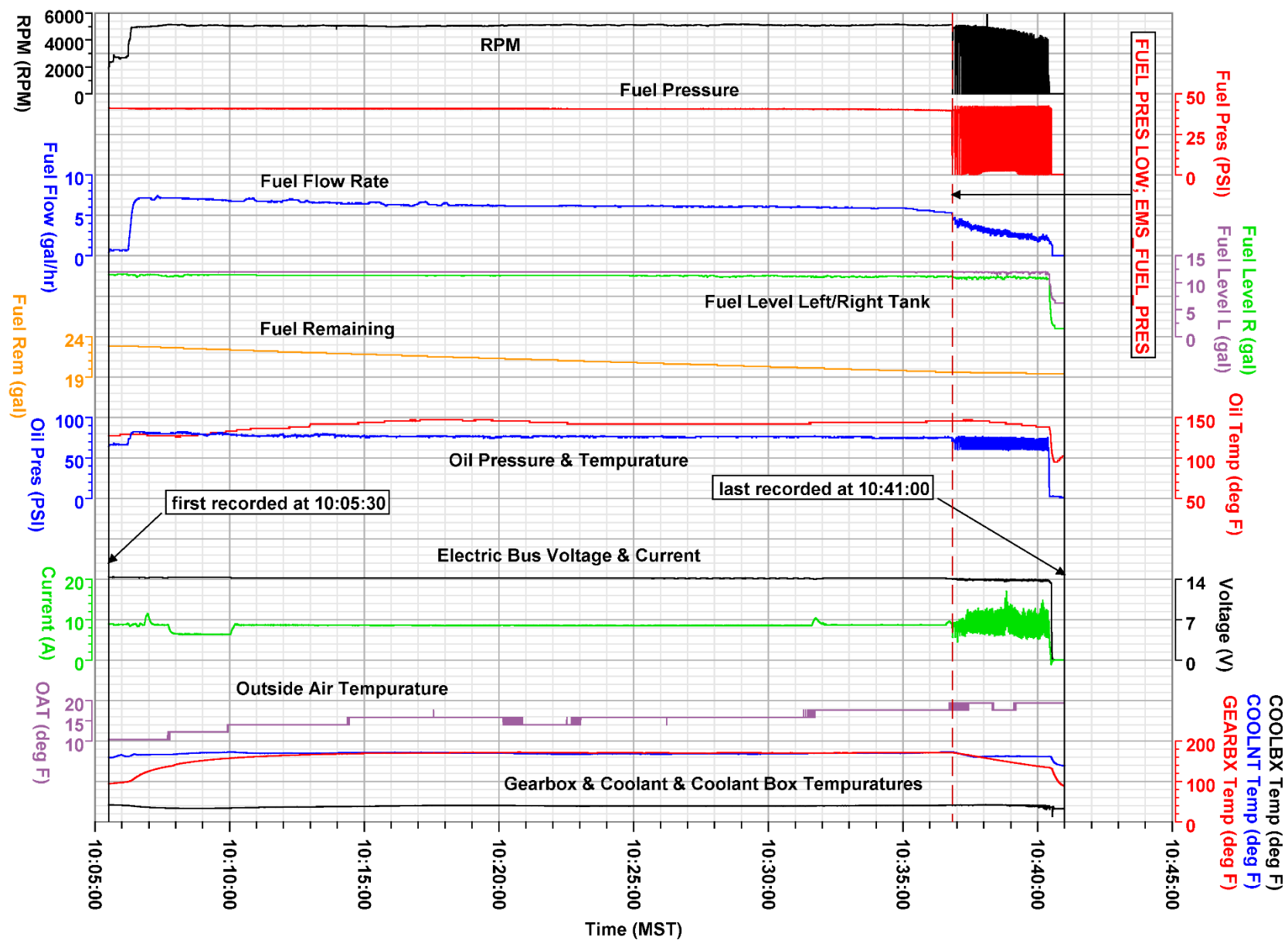


Figure 1: Plot of engine parameters for the entire event flight recorded on January 2, 2022.

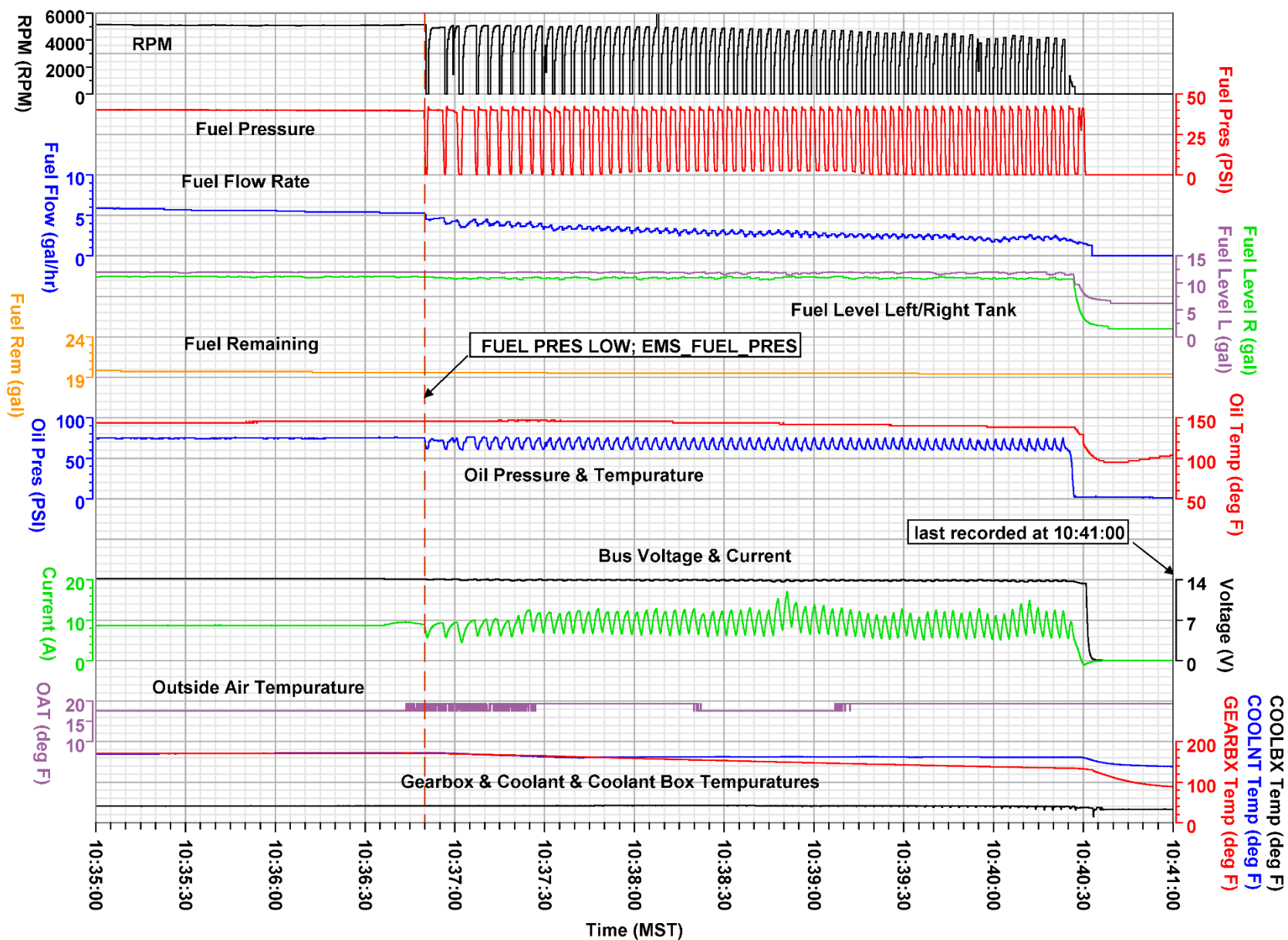


Figure 2: Plot of engine parameters for the last 6 minutes of the event flight.

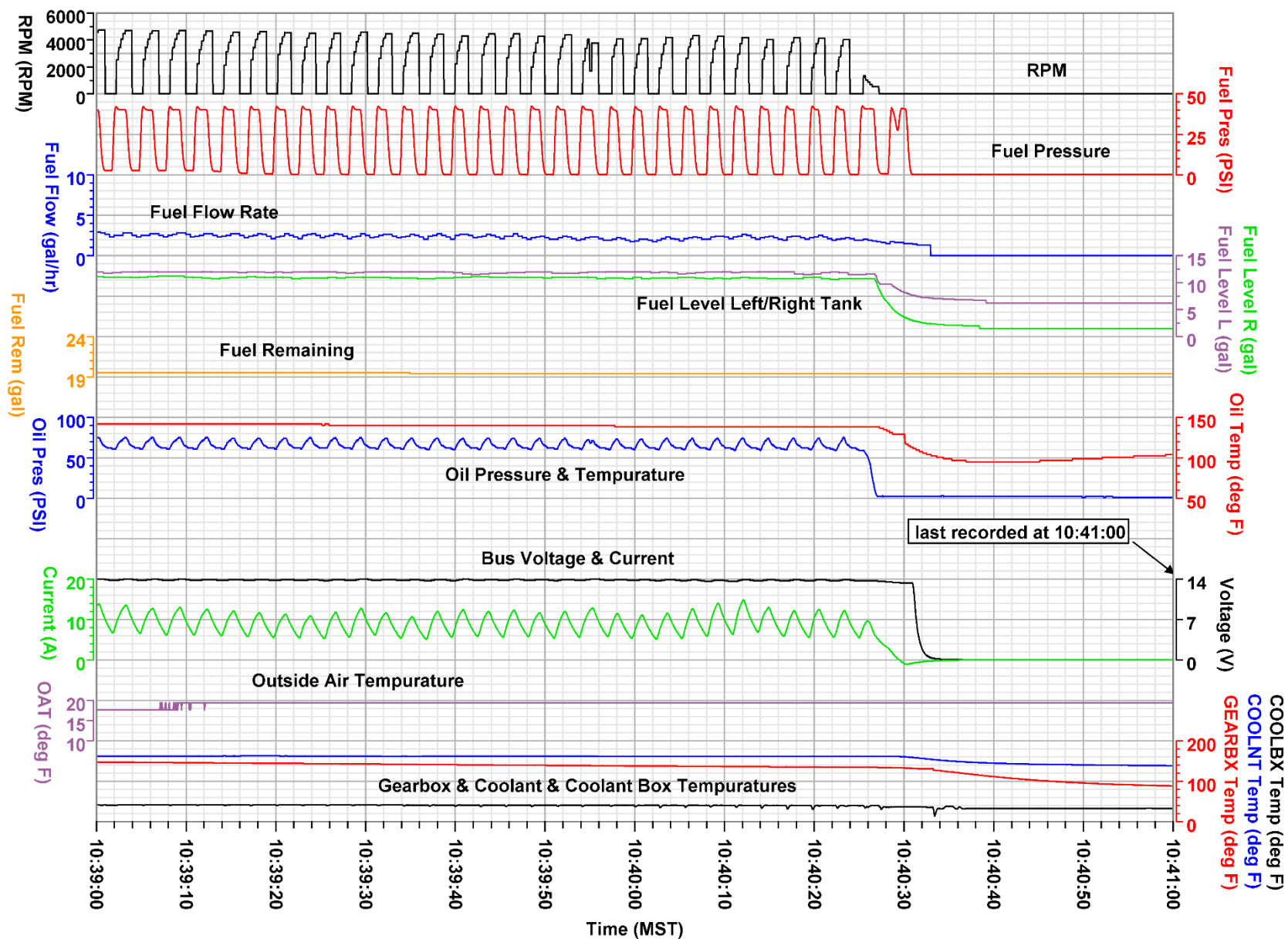


Figure 3: Plot of engine parameters for the last 2 minutes of the event flight.

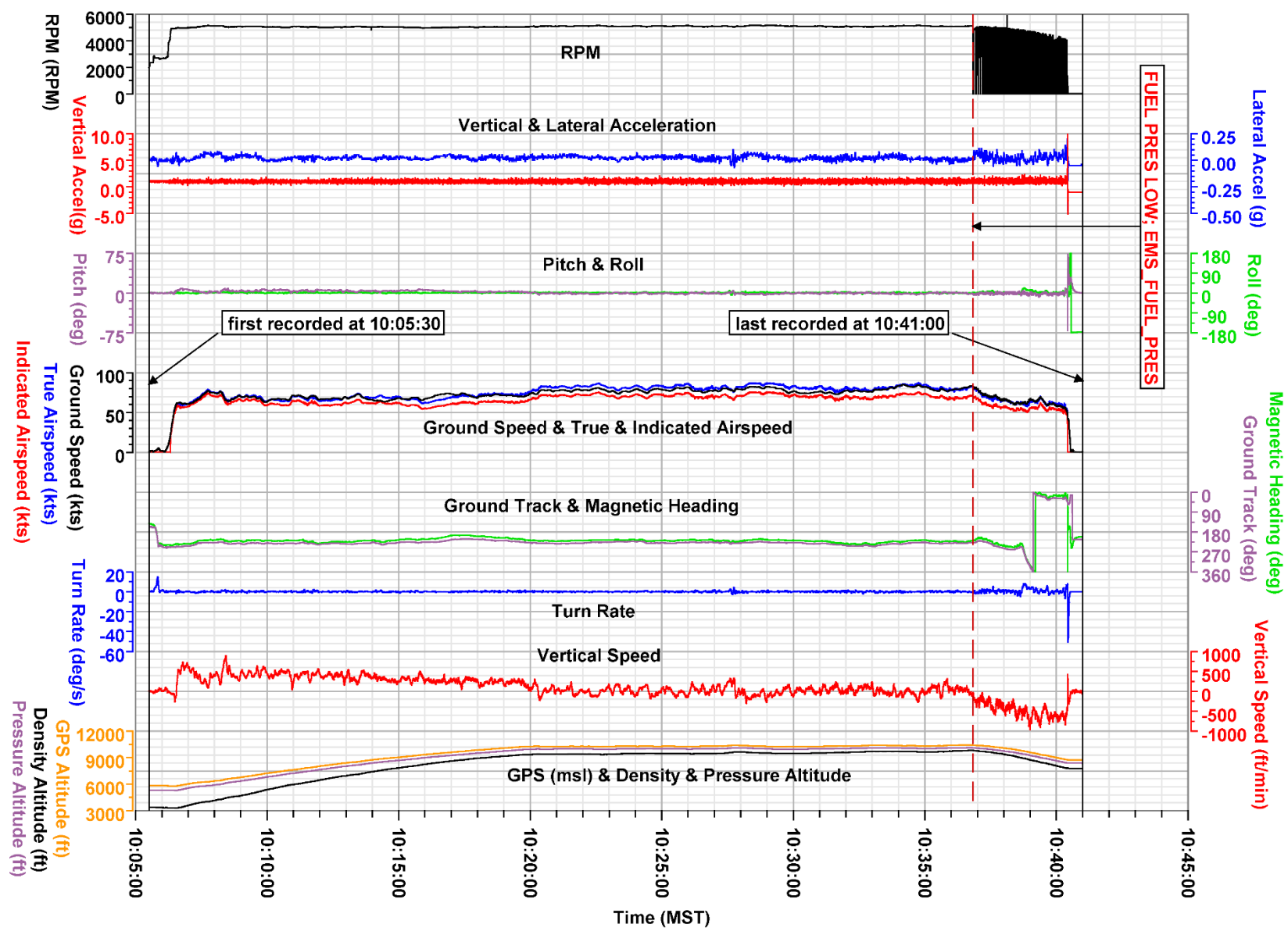


Figure 4: Plot of operational parameters for the entire event flight recorded on January 2, 2022.

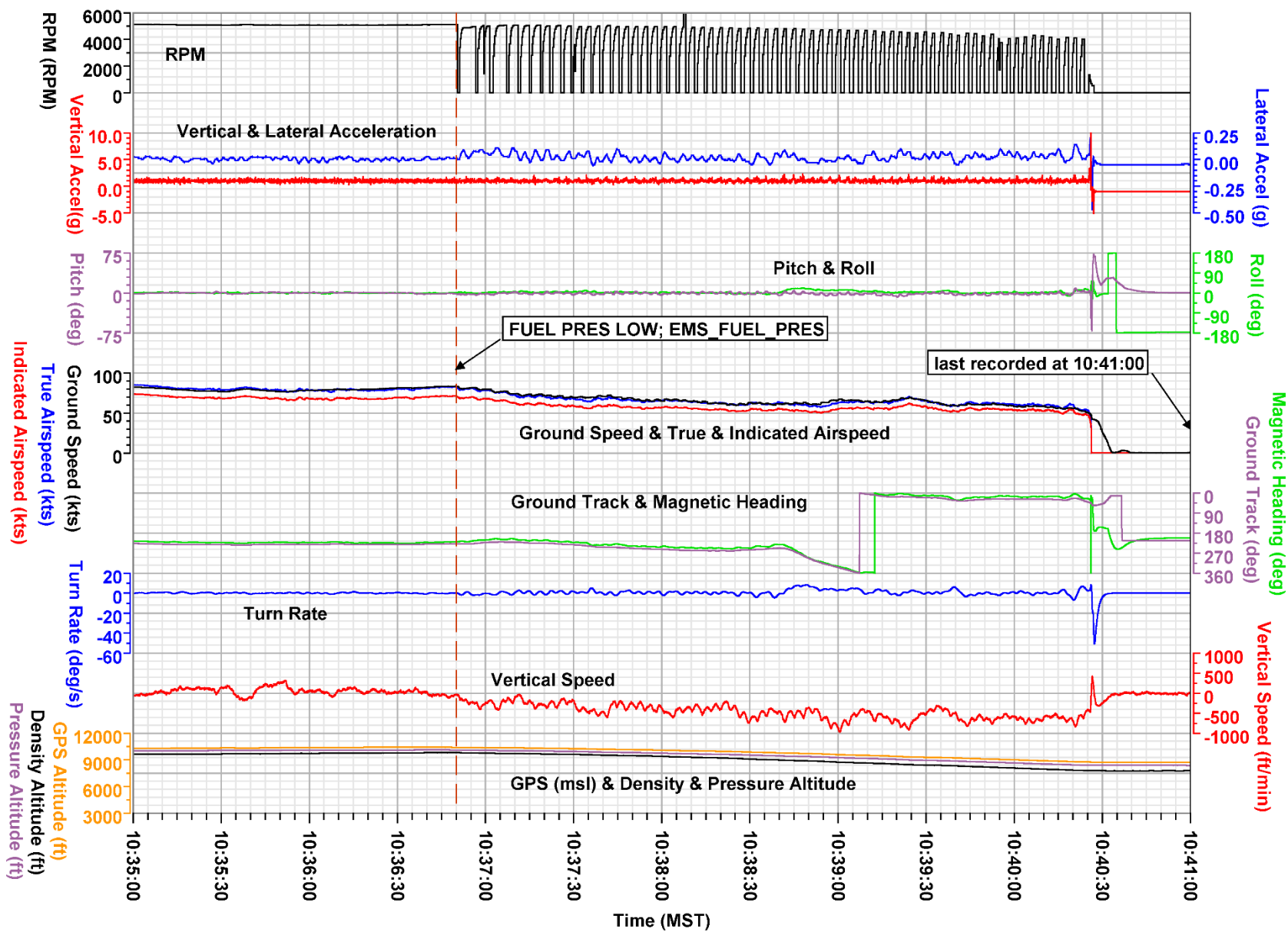


Figure 5: Plot of operational parameters for the last 6 minutes of the event flight.

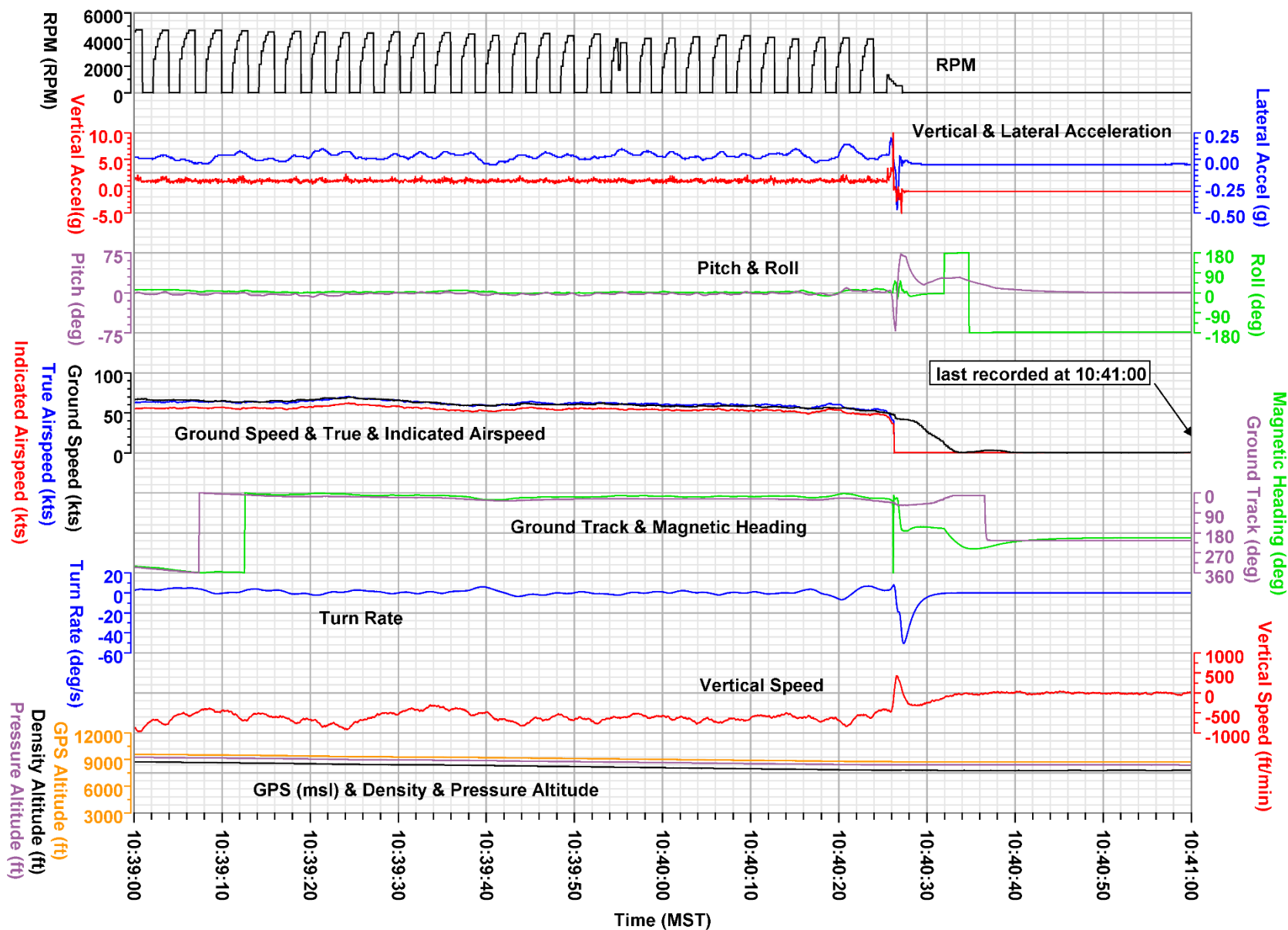


Figure 6: Plot of operational parameters for the last 2 minutes of the event flight.



Figure 7: Google Earth overlay of the entire event flight.



Figure 8: Google Earth overlay showing the takeoff portion of the event flight.



Figure 9: Google Earth overlay showing the final portion of the event flight.



Figure 10: Google Earth overlay showing the final portion of the event flight when zoomed in.

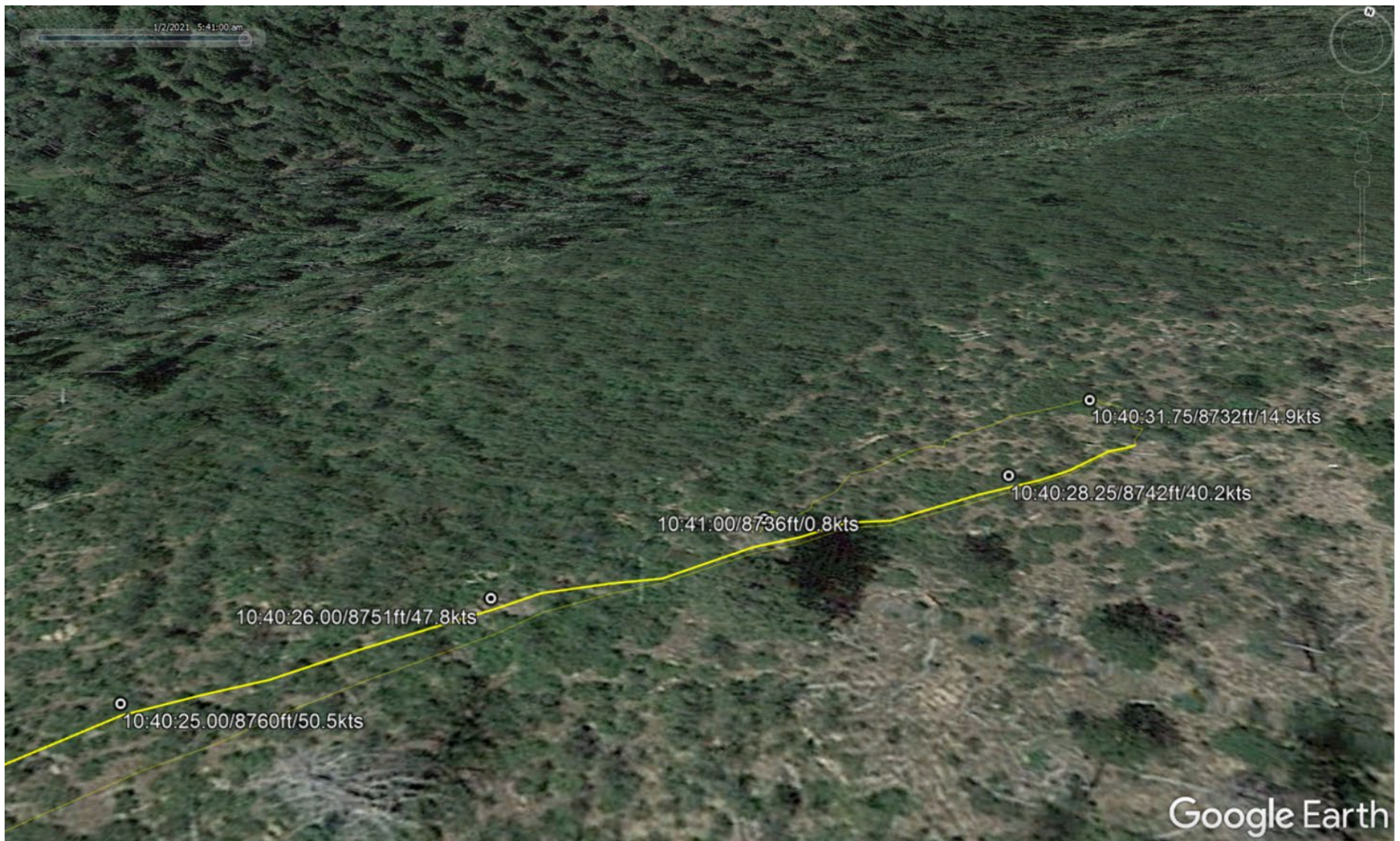


Figure 11: Google Earth overlay showing the final portion of the event flight when zoomed in more.