

National Transportation Safety Board

Office of Research and Engineering

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WPR24FA001

COCKPIT DISPLAY - RECORDED FLIGHT DATA

Specialist's Factual Report

June 2, 2025

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A. ACCIDENT

Location: Twisp, Washington
Date: October 1, 2023
Time: 1030 Pacific daylight time (PDT)
Airplane: Cub Crafters CCK-1865, Tesla Sunsets LLC, N56DV

B. COCKPIT DISPLAY - RECORDED FLIGHT DATA SPECIALIST

Specialist: Matthew Yandrick
Recorder Specialist - Electrical Engineer
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A cockpit display - recorded flight data group was not convened.

The NTSB Vehicle Recorder Division received the following electronic devices:

Recorder Manufacturer/Model: Dynon Skyview SV-HDX1100
Part Number: SV-HDX1100
Recorder Serial Number: 14277

Recorder Manufacturer/Model: Dynon SV-ADAHRS-200
Part Number: 503282-000
Recorder Serial Number: 15878

Recorder Manufacturer/Model: Dynon SV-EMS-220
Recorder Serial Number: 9075

1.0 Dynon Skyview SV-HDX1100 Description

The Dynon SV-HDX1100 is a 10.6-inch widescreen display with touchscreen interface suitable for mounting in the cockpit of various small aircraft. Its capabilities include engine monitoring, synthetic vision, moving map, traffic, airport diagrams, autopilot control, and radio integration.

The display receives input from multiple modules for flight instrumentation including modules for air data/attitude/heading (ADHARS), engine monitoring (EMS), Global Positioning System (GPS), transponder, radios, intercoms, and weather data.

Data is recorded on a Serial-ATA based Disk on Module (DOM) mounted to the main board. The DOM contains a user-configurable log file that can record between 2 and 150 hours of data at sampling rates ranging from 0.1 to 16 Hz. There

is also an alert log file that is recorded whenever the device triggers any kind of alert and a "Black Box" recent flight data log file which contains the most recent 15 minutes of flight recorded at 16 Hz.

1.1 Dynon Skyview SV-HDX1100 Data Recovery

The as-received condition of the Dynon HDX-1000 is shown in Figure 1. An internal inspection revealed a ribbon cable responsible for the eight bottom buttons was dislocated. After reconnecting the cable, data were downloaded using the manufacturer's procedure.



Figure 1. Photos of the Dynon HDX-1100, as received at the Vehicle Recorder Laboratory.

1.2 Dynon Skyview SV-HDX1100 Recording Description

The data extracted included comma-separated value (CSV) files from the "Black Box Log," the "Alert Data Log," and the "User Log".

The "Black_Box_Log" file contained records of various flights and power cycles between September 30, 2023, and October 1, 2023, UTC. The Black Box Log function was set to record at 16 samples per second rate (16 Hz) and begin recording at device power on.

The "User_Log" file contained records of various flights and power cycles between September 29, 2023, and October 1, 2023, UTC. The User Log function was set to record at 4 samples per second rate (4 Hz) and begin recording at device power on.

The "Alert_Data" logs contained cautions and warnings, as well as aural alert records from March 31, 2023, to October 1, 2023, UTC. No alert data were recorded during the accident flight.

The Black Box and User Logs recorded the accident flight. The higher sample rate Black Box data were used in this report. The duration of the accident recording was approximately 6 minutes and 7 seconds, from 10:24:30.5 to 10:30:37.5 PDT on October 1, 2023.

1.3 Dynon Skyview SV-HDX1100 Time Correlation

Data were recorded in universal coordinated time (UTC). The difference between PDT and UTC is 7 hours, or 25,200 seconds. The accident flight data has been offset from the recorded UTC time to PDT by subtracting 25,200 seconds. An offset was applied to display the data with the local time zone. Therefore, for the rest of this report, all times are referenced as PDT.

2.0 Dynon SV-EMS-220 Description

The Dynon SV-EMS-220 is an engine monitor pass-through device that collects engine data and passes it to a display device (in this installation, to the Dynon SV-HDX1100). This device does not record any information.

2.1 Dynon SV-EMS Data Recovery

Figure 2 shows the SV-EMS-220 device as received. As the device did not record data, no data recovery was attempted.



Figure 2. Dynon SV-EMS-220, as received at the Vehicle Recorder Laboratory.

3.0 Dynon SV-ADAHRS-200 Description

The Dynon SV-ADAHRS-200 is an air data, attitude, and heading reference system (ADAHRS) that functions as a pass-through device to collect air data, attitude and heading information and passes it to a display device (in this installation, to the Dynon SV-HDX1100). This device does not record any information.

3.1 Dynon SV-ADAHRS-200 Data Recovery

Figure 3 shows the SV-ADAHRS-200 device as received. As the device did not record data, no data recovery was attempted.



Figure 3. Dynon SV-ADAHRS-200, as received at the Vehicle Recorder Laboratory.

D. OVERLAYS, FIGURES, AND TABULAR DATA

Data obtained from the Dynon SV-HDX1100 were used to produce the following figures, overlays, and tabular data. Figure 4 through Figure 6 are graphical overlays using Google Earth of the entire accident flight on October 1, 2023. The flight originated at an airfield near Piper Lane near Twisp, Washington. Figure 6 is a zoomed overlay detailing the end of the recording. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

Figure 7 to Figure 10 are plots of aircraft and engine data recorded during the accident flight on October 1, 2023. All the parameters listed in table 1 are plotted.

The parameter engine horsepower experienced an outage where no engine horsepower data were recorded for approximately 20 seconds from 10:28:32 to 10:28:52 PDT.

Figure 9 and Figure 10 are plots showing the details of the final portion of the recording that ended at 10:30:37.5 PDT.

These figures are configured such that right turns are indicated by the trace moving toward the bottom of the page, left turns towards the top of the page, and nose up attitudes towards the top of the page.

The corresponding tabular data used to create Figure 4 through Figure 10, are provided in electronic CSV format as attachment 1 to this report.

Submitted by:

Matthew Yandrick
Recorder Specialist - Electrical Engineer

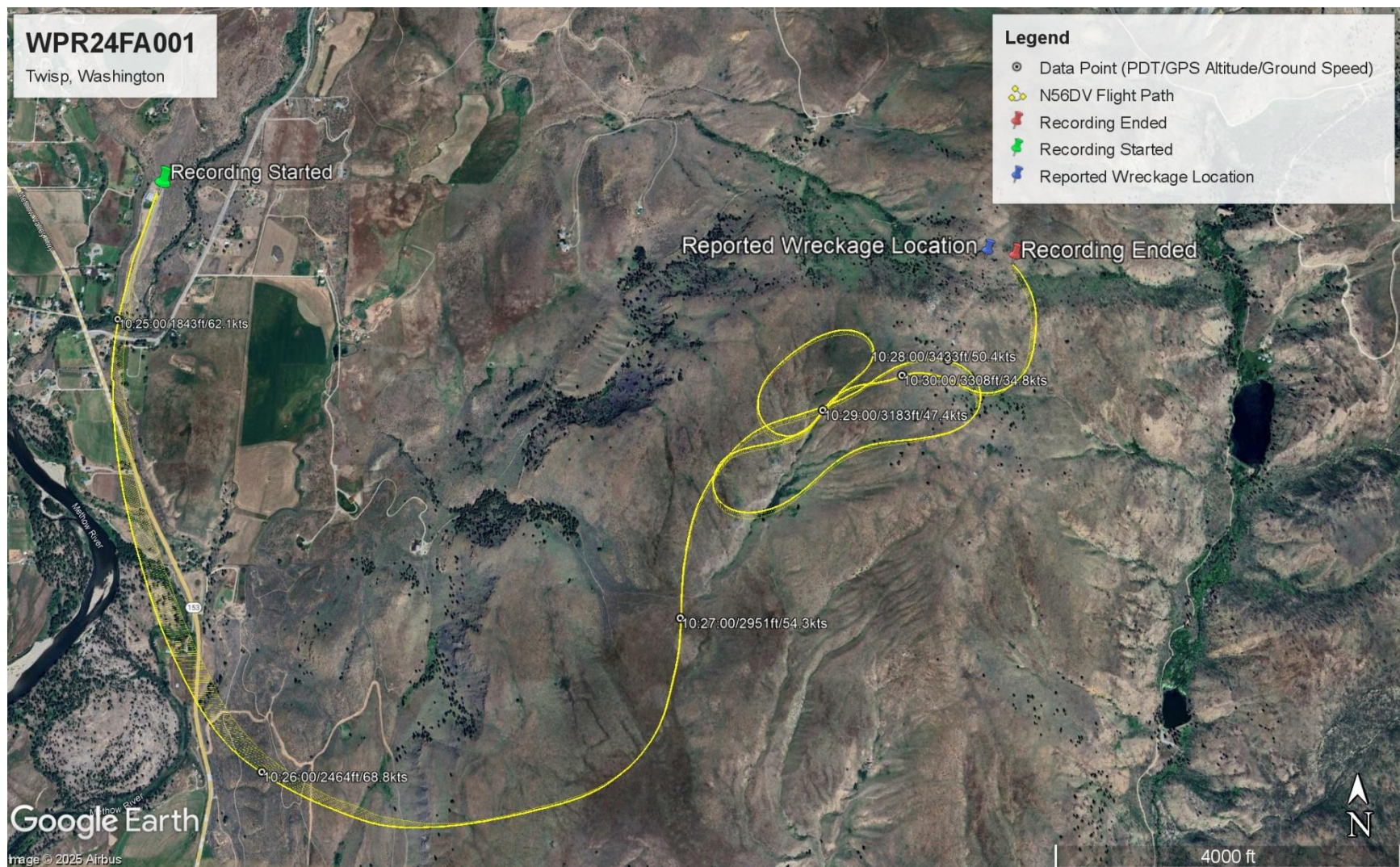


Figure 4. Google Earth overlay showing the entire accident flight.

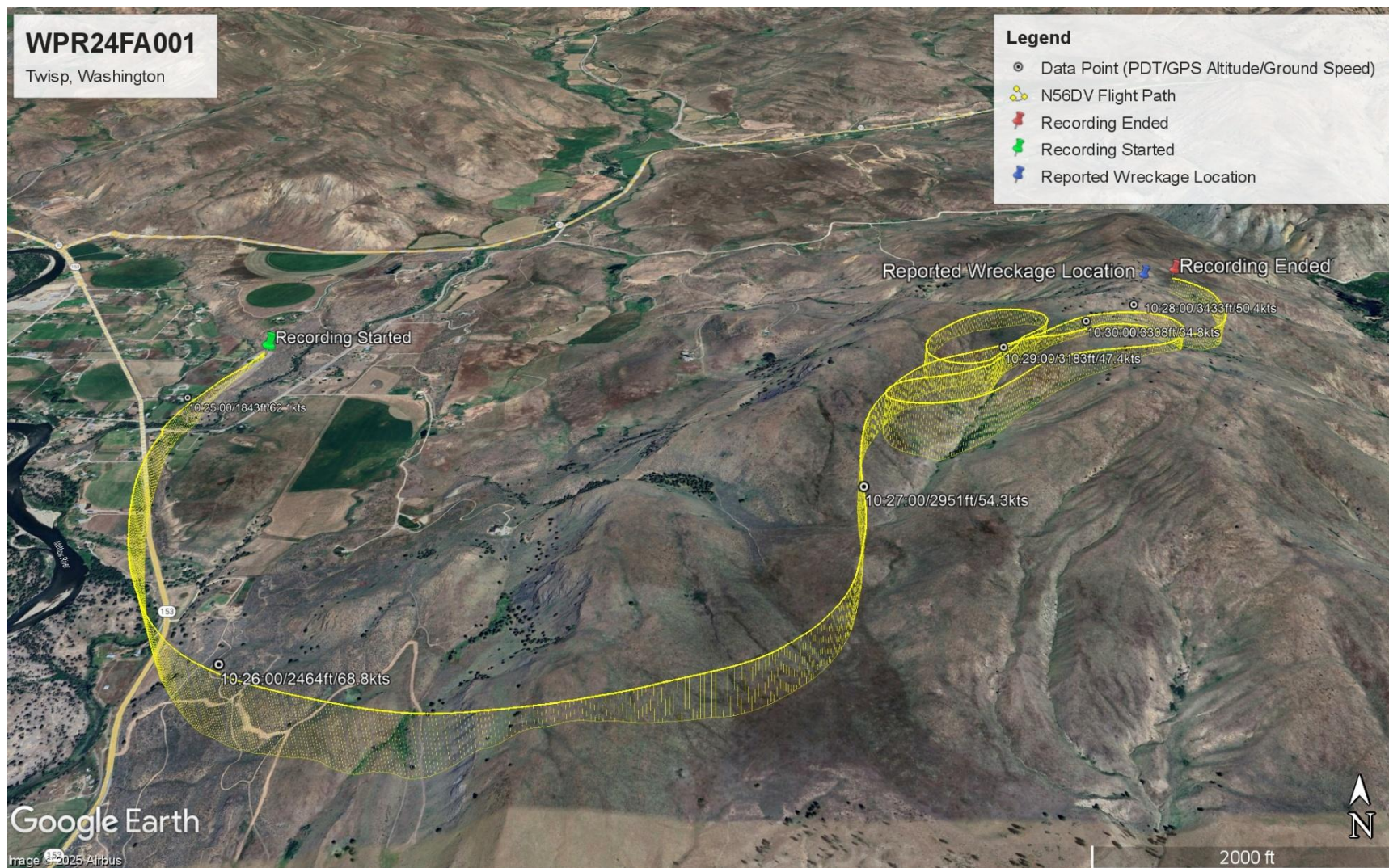


Figure 5. Google Earth overlay showing the entire accident flight.

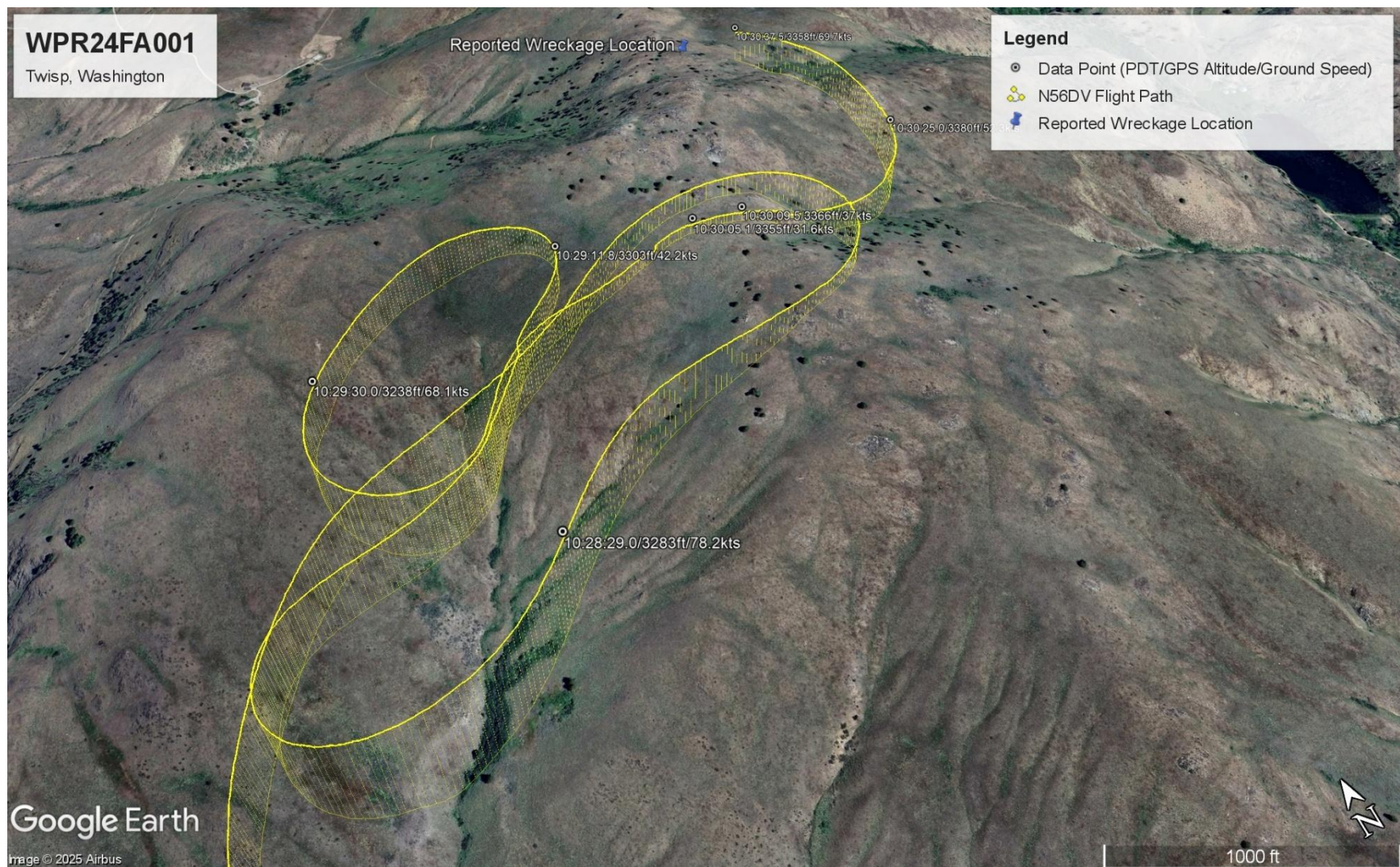


Figure 6. Google Earth overlay showing the final segment of the accident flight. The blue pin denotes the wreckage location.

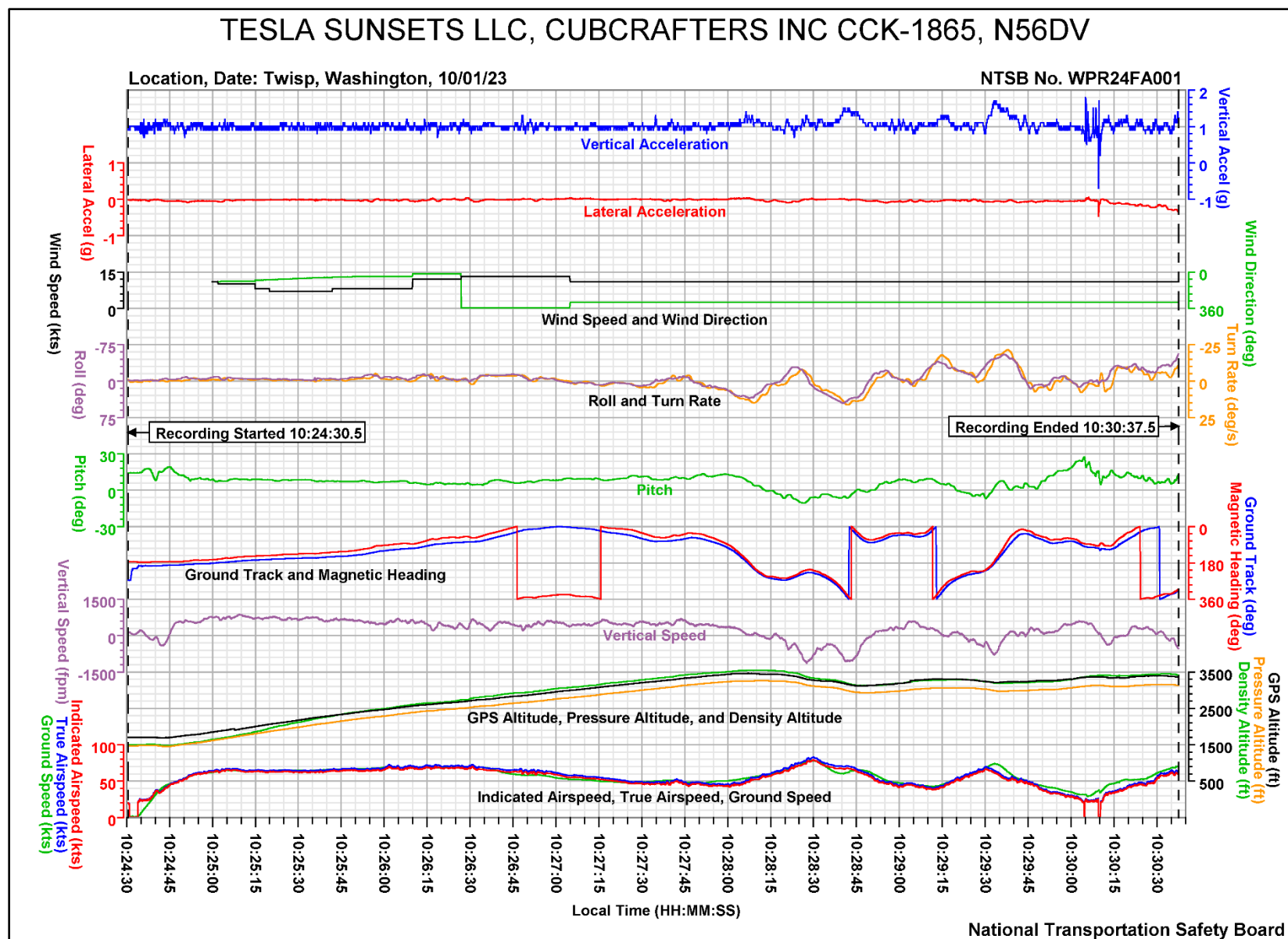


Figure 7. Plot of aircraft parameters recorded during final power cycle of Dynon.

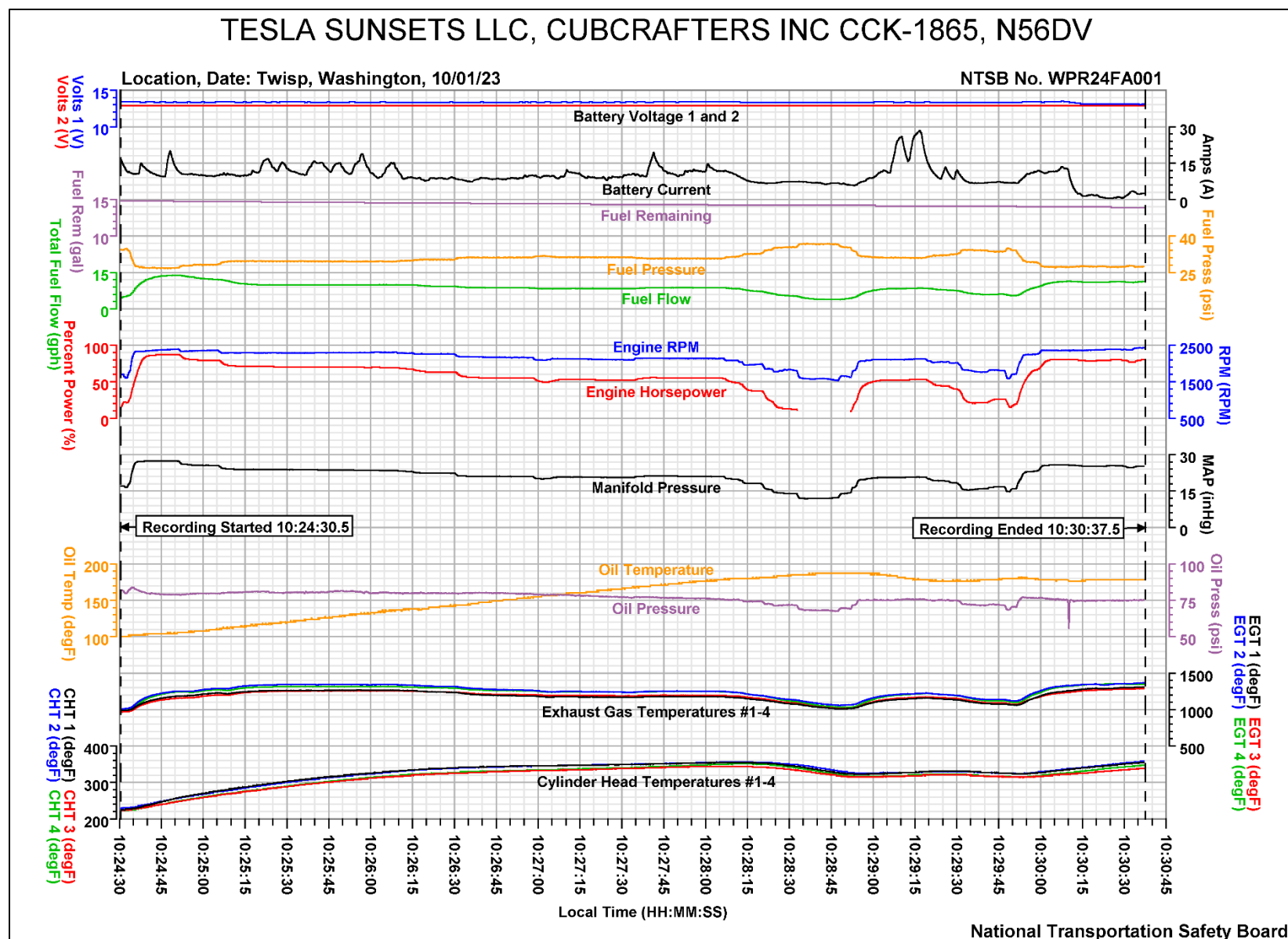


Figure 8. Plot of engine parameters recorded during final power cycle of Dynon.

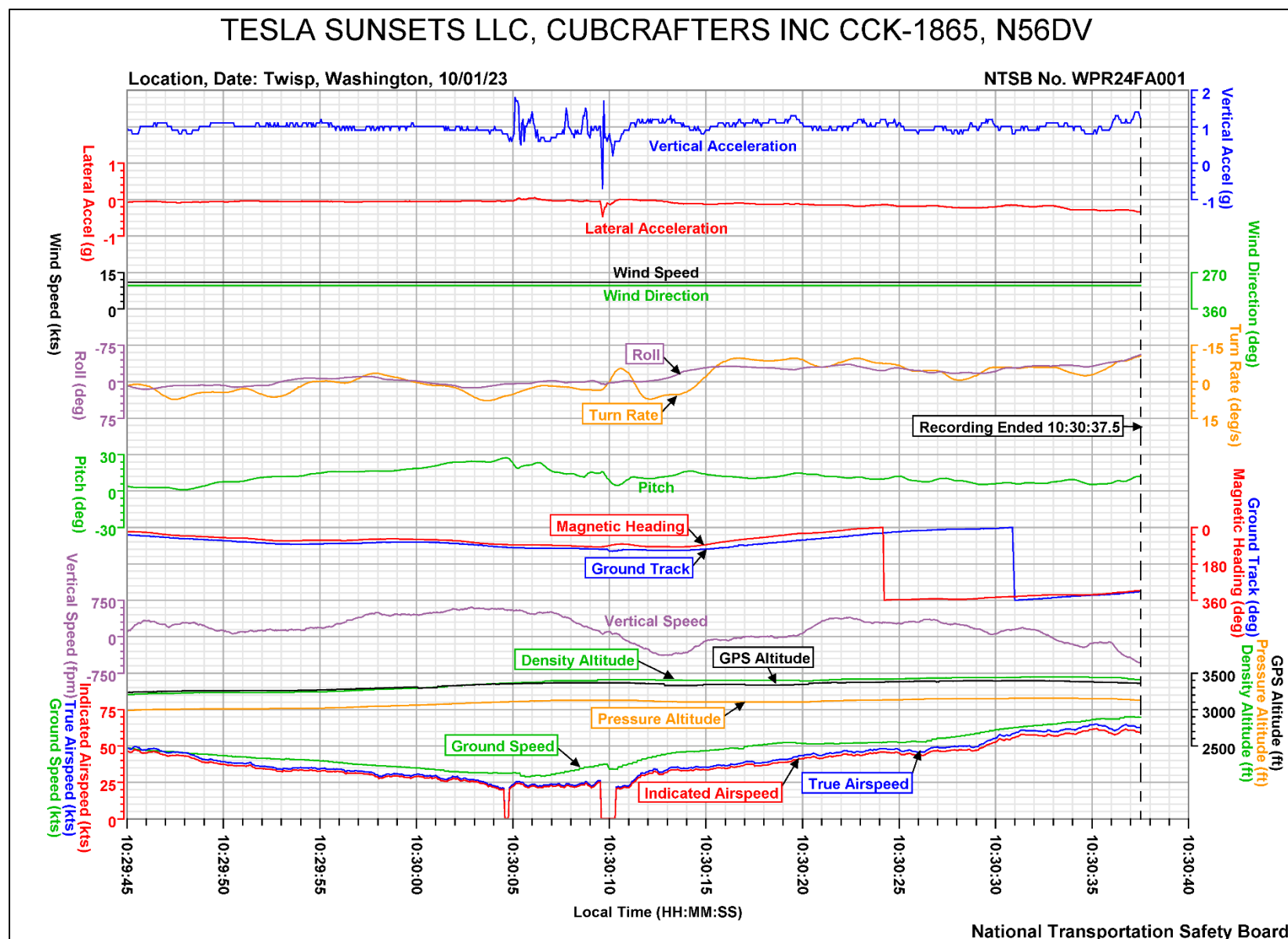


Figure 9. Plot of aircraft parameters recorded during final minute of Dynon.

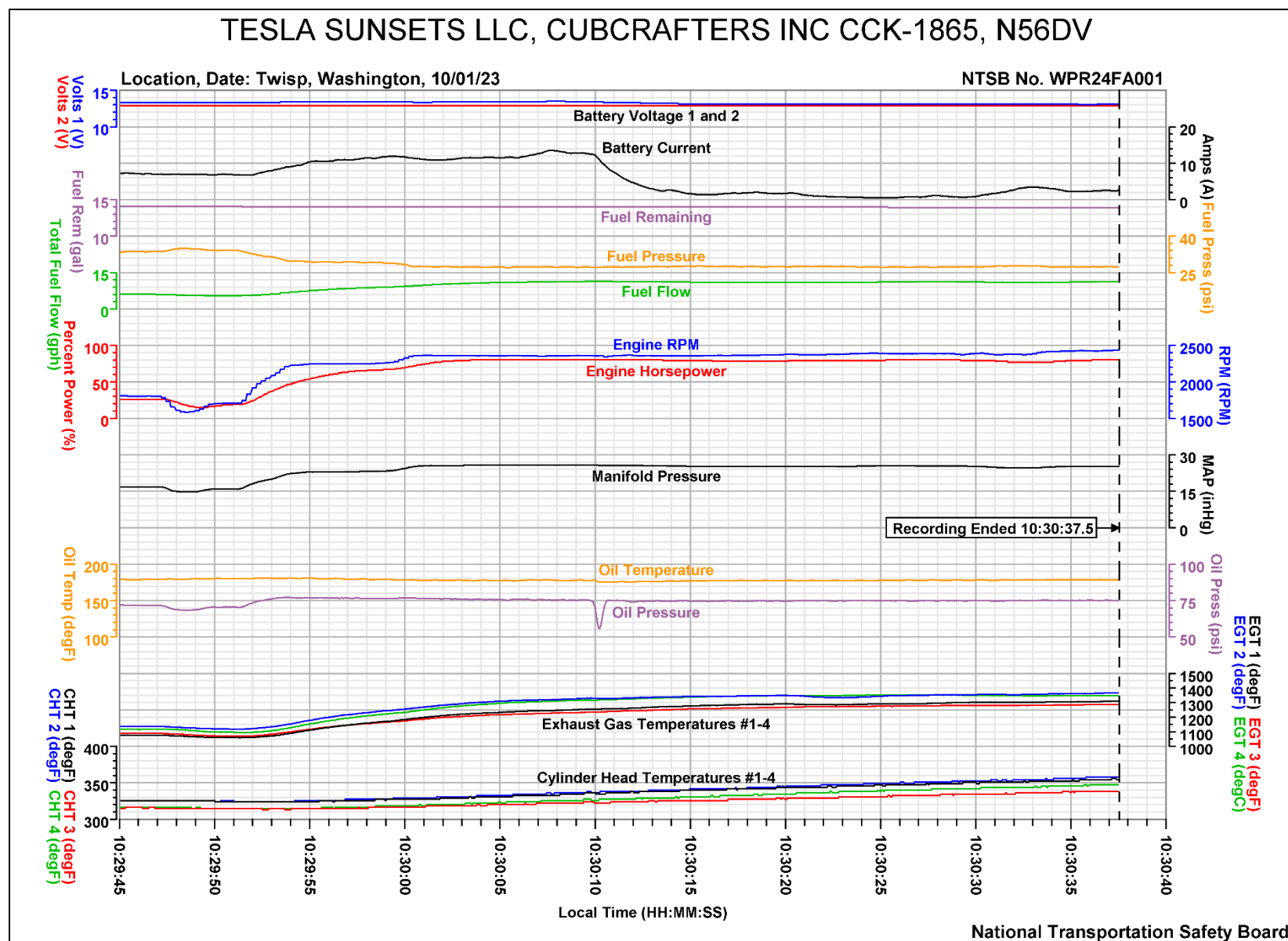


Figure 10. Plot of engine parameters recorded during final minute of Dynon.

APPENDIX A. VERIFIED AND PROVIDED PARAMETERS

This appendix describes the parameters provided and verified in this report. Table 1 lists the Dynon Skyview SV-HDX1100 parameters and table 2 describes the unit abbreviations used in this report.

Table 1. Verified and provided parameters.

Parameter Name (units)	Parameter Description
Amps (A)	Electrical Current
CHT Cyl# (degF)	Cylinder Head Temperature Cylinder # ¹
Density Altitude (ft)	Density Altitude
EGT Cyl# (degF)	Exhaust Gas Temperature Cylinder #
Fuel Press (psi)	Engine Fuel Pressure
Fuel Rem (gal)	Fuel Remaining
GPS Altitude (ft)	GPS Altitude
Ground Speed (kts)	Ground Speed
Ground Track (deg)	Ground Track
Indicated Airspeed (kts)	Indicated Airspeed
Lateral Accel (g)	Lateral Acceleration
Magnetic Heading (deg)	Magnetic Heading
MAP (inHg)	Engine Manifold Pressure
Oil Press (psi)	Engine Oil Pressure
Oil Temp (degF)	Engine Oil Temperature
Percent Power (%)	Engine Power
Pitch (deg)	Pitch
Pressure Altitude (ft)	Pressure Altitude
Roll (deg)	Roll
RPM (RPM)	Engine RPM
Total Fuel Flow (gph)	Engine Fuel Flow
True Airspeed (kts)	True Airspeed
Turn Rate (deg/sec)	Turn Rate
Vertical Accel (g)	Vertical Acceleration
Vertical Speed (fpm)	Vertical Speed
Volts 1 (V)	Battery Voltage 1
Volts 2 (V)	Battery Voltage 2
Wind Speed (kts)	Wind Speed
Wind Direction (deg)	Wind Direction

Table 2. Unit abbreviations.

Unit Abbreviations	Descriptions
%	percent
A	Amperes
deg	degrees
deg/s	degrees per second

¹ Depending on aircraft configuration, the number of cylinders that are instrumented varies. In the data plots the '#' is replaced with the appropriate cylinder ID.

Unit Abbreviations	Descriptions
degF	degrees Fahrenheit
ft	feet
fpm	feet per minute
gal	gallons
gph	gallons per hour
inHg	inches of Mercury
kts	knots
psi	pounds per square inch
rpm	revolutions per minute
V	Volts DC