

National Transportation Safety Board

Office of Research and Engineering

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WPR23LA149

COCKPIT DISPLAY - RECORDED FLIGHT DATA

Specialist's Factual Report

December 11, 2023

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A. ACCIDENT

Location: Morgan, Utah
Date: April 8, 2023
Time: 1937 mountain daylight time (MDT)
0137 April 9, 2023 coordinated universal time (UTC)
Airplane: Vans RV-7, private operator, N17NK

B. COCKPIT DISPLAY - RECORDED FLIGHT DATA SPECIALIST

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Electrical Engineer - Recorder Specialist
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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: Advanced Flight Systems
Part Number: AF-5600T MFD
Recorder Serial Number: 71496

Recorder Manufacturer/Model: Advanced Flight Systems
Part Number: AF-5600T EM-V
Recorder Serial Number: 71641

1.0 Advanced Flight Systems AF-5600T Description

The AF-5600T is a flight and navigation instrumentation system that provides information to a pilot via 10.4" touchscreen panel-mounted display. The displays can be configured as either a primary flight display (PFD), showing only information critical to flight, or a multifunction display (MFD) capable of showing a variety of system, navigation, and weather information screens. The units can record dynamic flight information on internal flash non-volatile memory (NVM) at a pilot selectable interval.¹ The unit records approximately 50 discrete data parameters to the internal NVM.

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

1.1 Advanced Flight Systems AF-5600T Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, exterior examinations revealed the devices were in good condition (see figures 1 and 2). The devices were labeled being configured as an AF-5600T MFD and AF-5600T EM-V.² Data were downloaded normally using the manufacturer's procedure.



Figure 1. Front and side view of Advanced Flight Systems AF-5600T MFD, as received.



Figure 2. Front and side view of Advanced Flight Systems AF-5600T EM-V, as received.

² The EM-V designation indicates the unit has capability for engine monitoring and voltage sensors for oil and fuel pressure monitoring.

1.2 Advanced Flight Systems AF-5600T Recording Description

The data extracted from the AF-5600T MFD included information from June 26, 2022 UTC, through April 9, 2023 UTC. The data extracted from the AF-5600T EM-V included information from June 25, 2022 UTC, through April 9, 2023 UTC.

The accident event was the last recording on both devices. The recording duration on the AF-5600T MFD was 27 minutes and 2 seconds, and the duration on the AF-5600T EM-V was 27 minutes and 54 seconds. The sample rate on both devices was 1 second per sample. The data from both devices were parsed into one electronic comma-separated value (CSV) file.

1.2.1 Advanced Flight Systems AF-5600T Engineering Unit Conversions

The AF-5600T records parameters in engineering units; therefore, no conversions were necessary. Table 1 in Appendix A lists the AF-5600T parameters verified and provided in this report.

1.3 Advanced Flight Systems AF-5600T Time Correlation

AF-5600T data was recorded in UTC. The difference between MDT (local time) and UTC is 6 hours. The accident data has been offset from the recorded AF-5600T time to MDT by subtracting 6 hours. Therefore, for the rest of this report, all times are listed as MDT.

D. FIGURES AND TABULAR DATA

Figures 3 to 6 contain flight data recorded during the event flight on April 8, 2023. Figures 3 and 4 are plots of the entire recording. Figures 5 and 6 are plots of the recording as oil pressure approached 0 psi. All the parameters listed in table 1 are plotted.

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.

Figures 7 through 9 are graphical overlays of the accident event generated using Google Earth. Figure 7 provides an overlay of the entire recording detailing the takeoff and departure from Skypark Airport (BTF), Woods Cross, Utah. Figures 8 and 9 are zoomed overlays detailing the final recorded datapoints near West Richville Lane, Morgan, Utah. The weather, landscaping, and lighting conditions in Google Earth are not necessarily the weather, landscaping, and lighting conditions present at the time of the recording.

The corresponding tabular data used to create figures 3 to 9 are provided in electronic CSV format as attachment 1 to this report.

Submitted by:

Matthew Yandrick
Electrical Engineer – Recorder Specialist

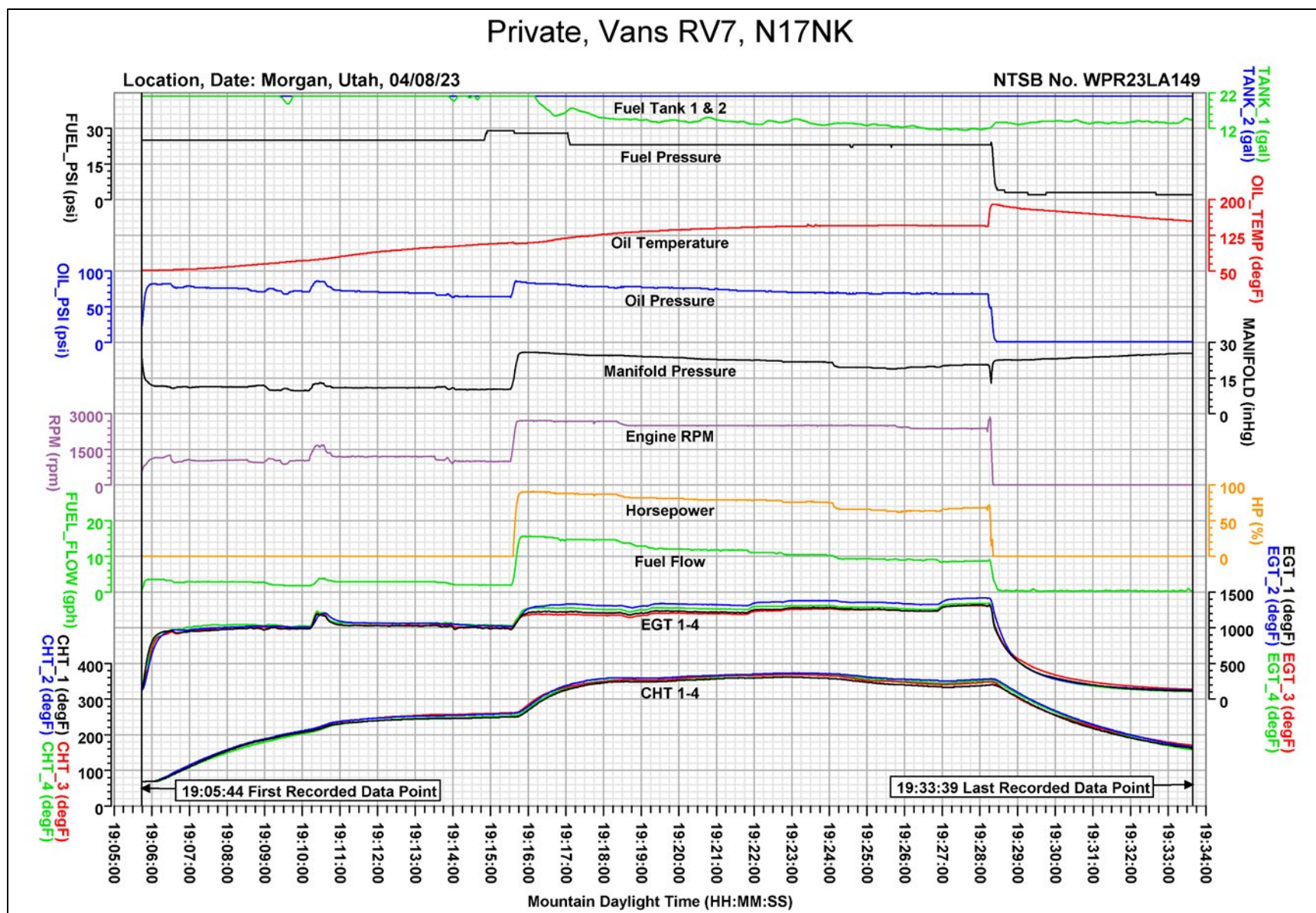


Figure 3. Plot of Advanced Flight Systems AF-5600T parameters for entire accident recording.

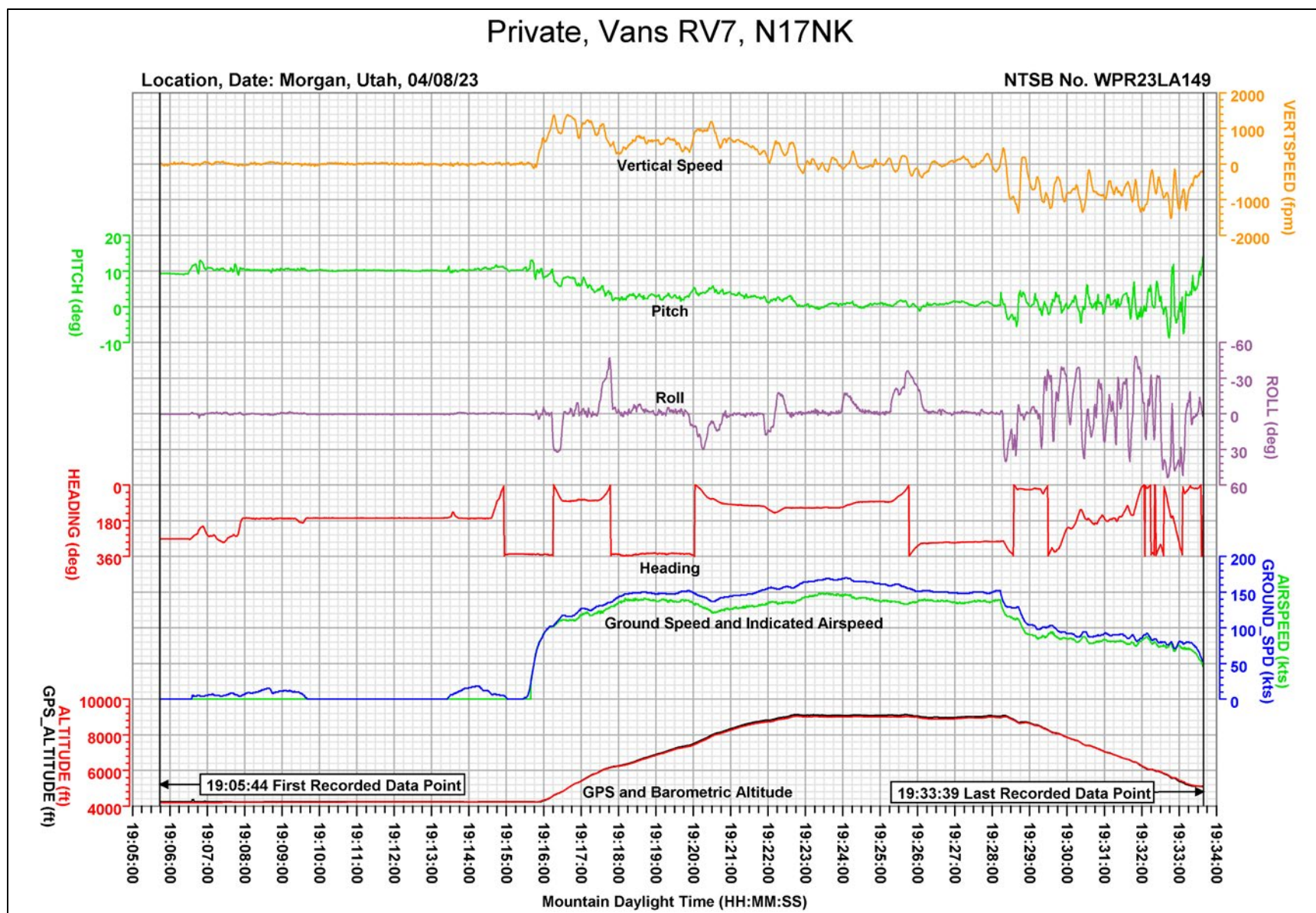


Figure 4. Plot of Advanced Flight Systems AF-5600T parameters for entire accident recording.

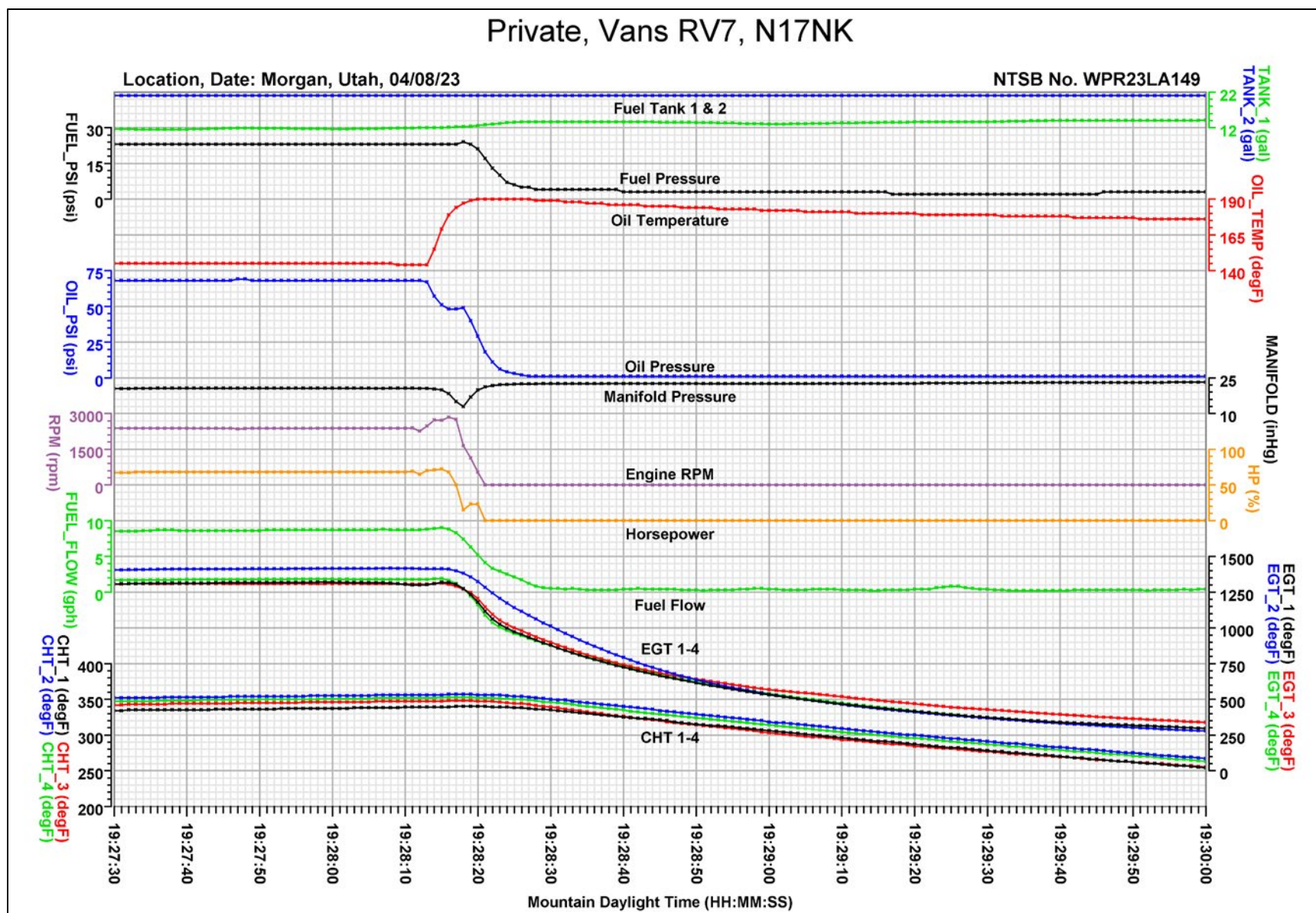


Figure 5. Plot of Advanced Flight Systems AF-5600T parameters when oil pressure approaches 0 psi.

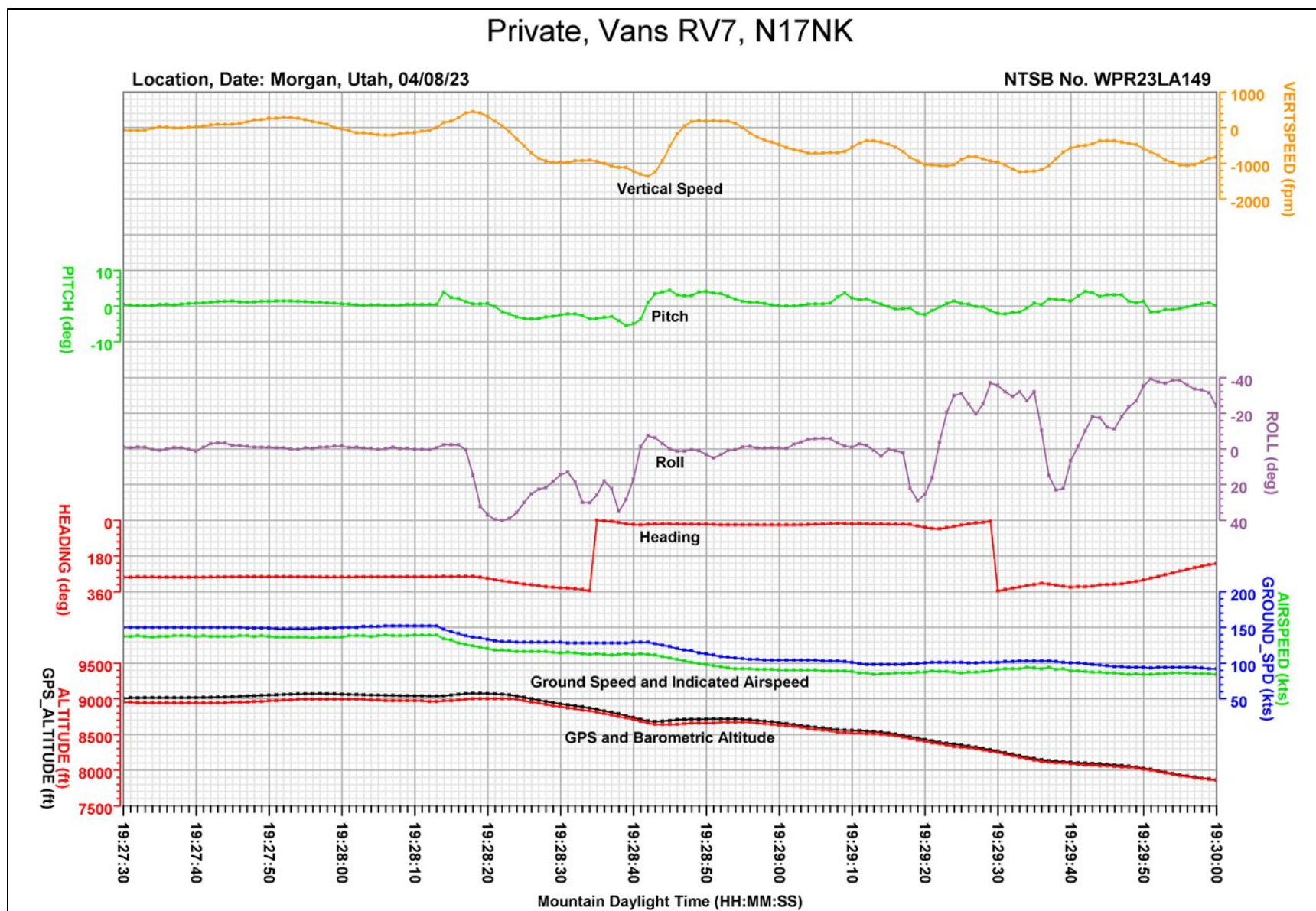


Figure 6. Plot of Advanced Flight Systems AF-5600T parameters when oil pressure approaches 0 psi.

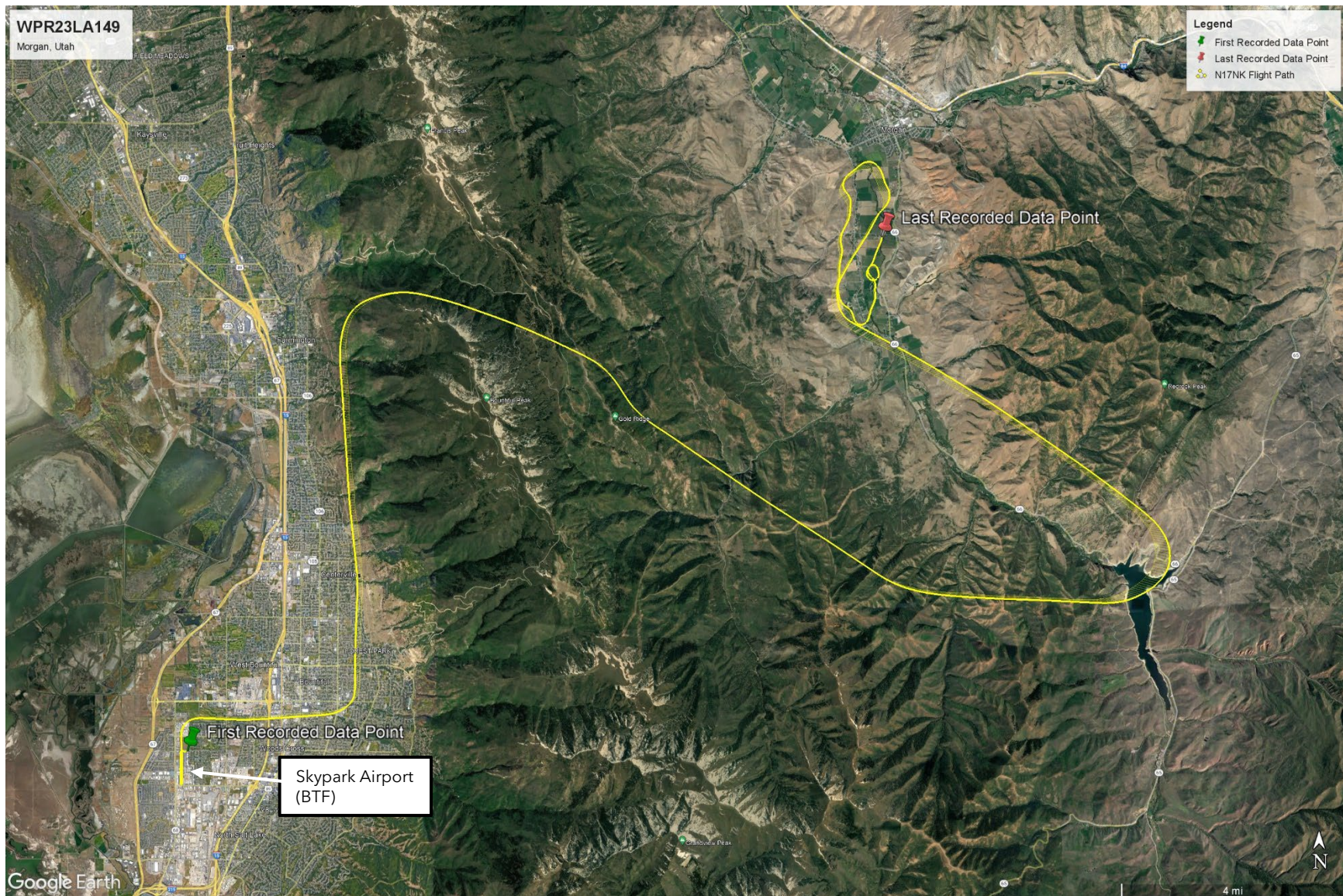


Figure 7. Google Earth overlay showing the entire accident recording.

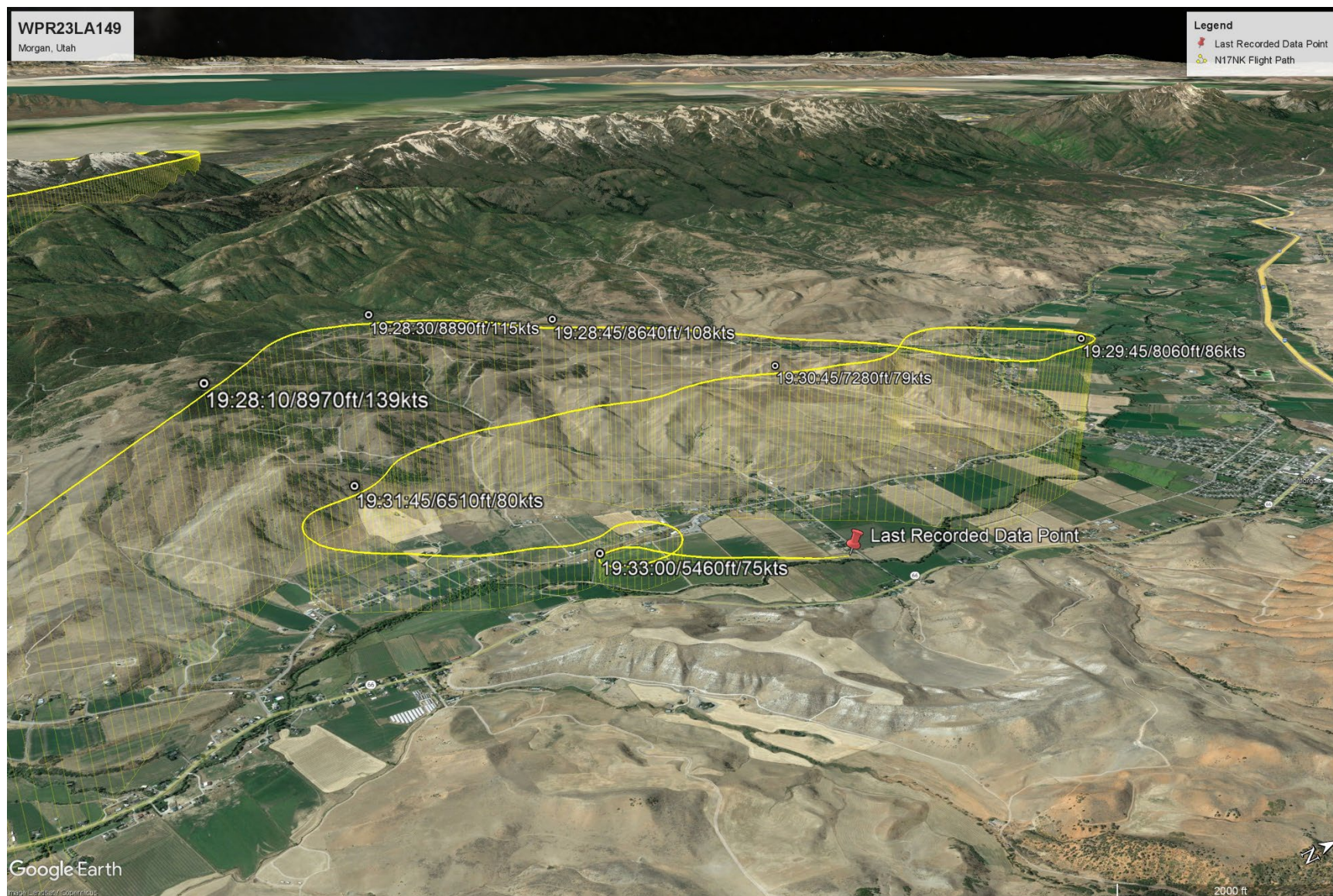


Figure 8. Google Earth overlay showing approximately the final 5 minutes of the recording.



Figure 9. Google Earth overlay showing approximately the final 1 minute of the recording.

APPENDIX A. VERIFIED AND PROVIDED PARAMETERS FROM ADVANCED FLIGHT SYSTEMS AF-5600T

This appendix describes the parameters provided and verified in this report. Table 1 lists the AF-5600T parameters and table 2 describes the unit abbreviations used in this report for AF-5600T parameters.

Table 1. Verified and provided parameters.

Parameter Name (units)	Parameter Description
AIRSPEED (kts)	Indicated Airspeed
ALTITUDE (ft)	Altitude Pressure
CHT # (degF)	Cylinder Head Temperature 1-4
EGT # (degF)	Exhaust Gas Temperature 1-4
RPM (rpm)	Engine RPM
FUEL_FLOW (gph)	Fuel Flow
Fuel_PSI (psi)	Fuel Pressure
GPS_ALTITUDE (ft)	GPS Altitude
GROUND_SPD (kts)	Groundspeed
HEADING (deg)	Magnetic Heading
HP (%)	Horsepower
LATITUDE (deg)	Latitude
LONGITUDE (deg)	Longitude
MANIFOLD (in.Hg)	Manifold Pressure
OIL_PSI (psi)	Oil Pressure
OIL_TEMP (degF)	Oil Temperature
PITCH (deg)	Pitch Angle
ROLL (deg)	Roll Angle
TANK_1 (gal)	Fuel Quantity Tank 1
TANK_2 (gal)	Fuel Quantity Tank 2
VERTSPEED (fpm)	Vertical Speed

Table 2. Unit abbreviations.

Unit Abbreviations	Descriptions
MM/DD/YYYY	Month/Day/Year
HH:MM:SS	Hours:Minutes:Seconds
%	percent
deg	degrees
degF	degrees Fahrenheit
ft	feet
gal	gallons
gph	gallons per hour
inHg	inches of Mercury
kts	knots
psi	pounds per square inch
rpm	revolutions per minute