

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN22FA111

RECORDED FLIGHT DATA - RDM

Specialist's Factual Report

June 10, 2024

A. ACCIDENT

Location: Hutchinson, Minnesota
Date: January 31, 2022
Time: 1256 central standard time (CST)
Airplane: Cirrus SR22, Black Dog Aviation, LLC, N227BD

B. RECORDED FLIGHT DATA - RDM SPECIALIST

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National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A recorded flight data group was not convened. The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following Heads-Up Technologies (HUT) Recoverable Data Module (RDM) recovered from the accident airplane:

Recorder Manufacturer/Model: HUT RDM
Part Number: RDM100-02
Recorder Serial Number: 300000167

The HUT RDM was in good condition (see figure 1) and data were downloaded successfully from the RDM using the manufacturer's software and NTSB lab equipment.



Figure 1. HUT RDM, as received.

1.0 HUT RDM Description

The HUT RDM is a crash-hardened data storage unit installed in the tail of some Cirrus aircraft. The unit records flight, engine, and autopilot parameters. Data is logged once per second and stored internally on four thin small outline package (TSOP) memory devices inside the crash-hardened enclosure. When the storage limit of the memory device is reached, the oldest recording is deleted.

1.1 HUT RDM Data Description

The RDM recording contained multiple flight legs, which included the accident flight on January 31, 2022. The accident flight was the last flight on the recording and was approximately 1 hour and 11 minutes in duration.

The engineering unit conversions used for the data contained in this report are based on documentation from the manufacturer of the data acquisition unit installed in the airplane. Table 1 lists the parameters verified and provided in this report.

1.2 HUT RDM Time Correlation

Correlation of the event flight data to the event local time, CST, was established using the recorded Coordinated Universal Time (UTC) parameters and then applying an offset of 6 hours. All times in this report are CST.

D. FIGURES AND TABULAR DATA

Figures 2 to 8 contain the RDM data recorded during the accident flight on January 31, 2022.

Figures 2 and 4 contain basic parameters for the accident flight. Figures 3 and 5 contain engine parameters for the accident flight. Figures 6 to 8 show a graphical overlay of the final 14 minutes of the accident flight generated using Google Earth. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the accident.

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

The data show the CAPS handle was pulled at 12:56:23, however, the CAPS rocket did not indicate deployed in the recording. Any gaps in the plotted figures or tabular data show that a loss of signal occurred, and data was not recorded correctly. Specifically, the acceleration, heading, pitch, and roll parameters dropped out at 12:56:34 and returned at 12:57:56, which was about the time the airplane impacted the ground.

The tabular data used to create figures 2 to 8 are provided in electronic comma-separated value (CSV) format as attachment 1 to this report.

Submitted by:

Kyle Garner
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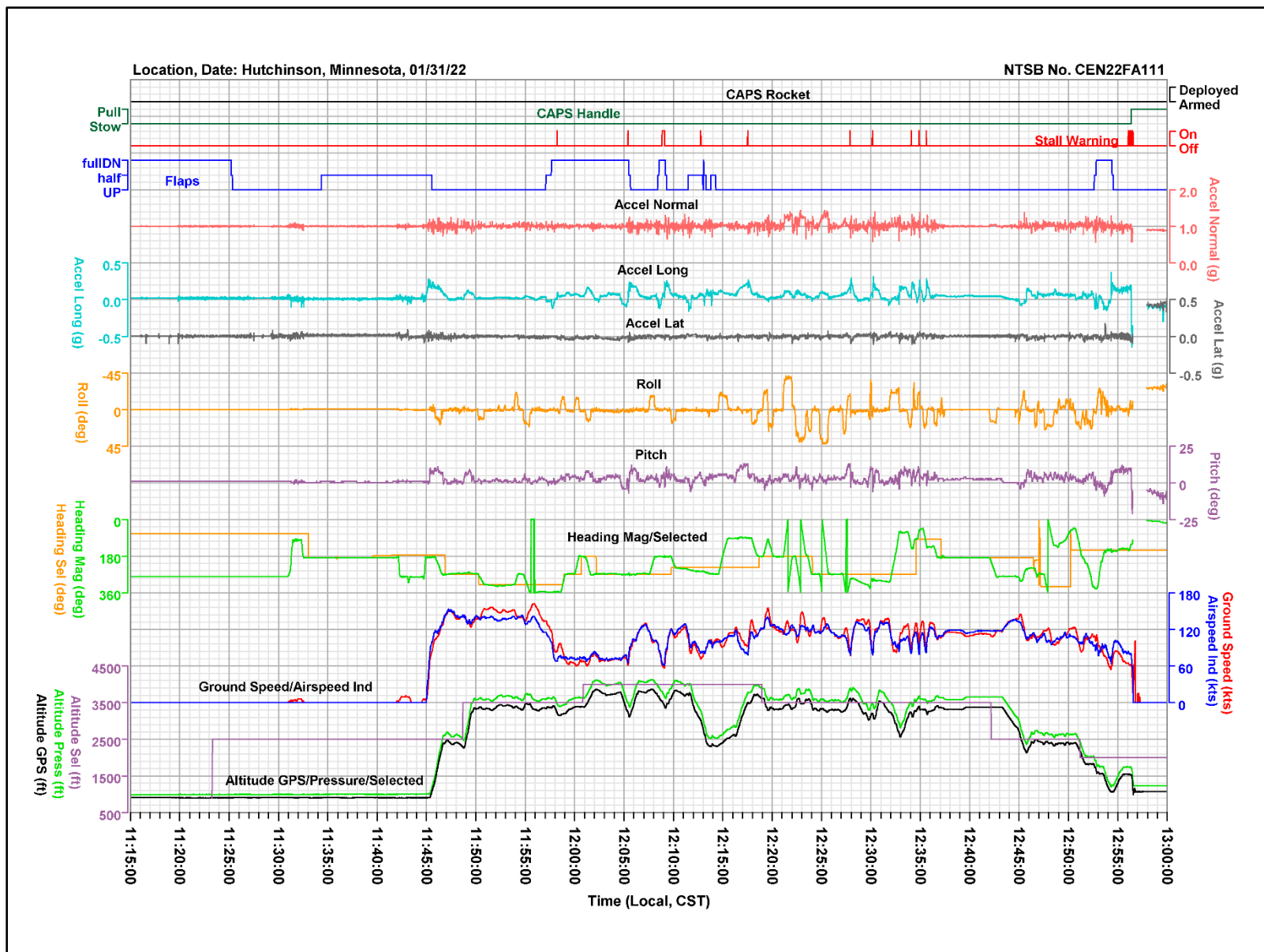


Figure 2. Plot of basic parameters for the entire flight from 11:15:00 to 13:00:00.

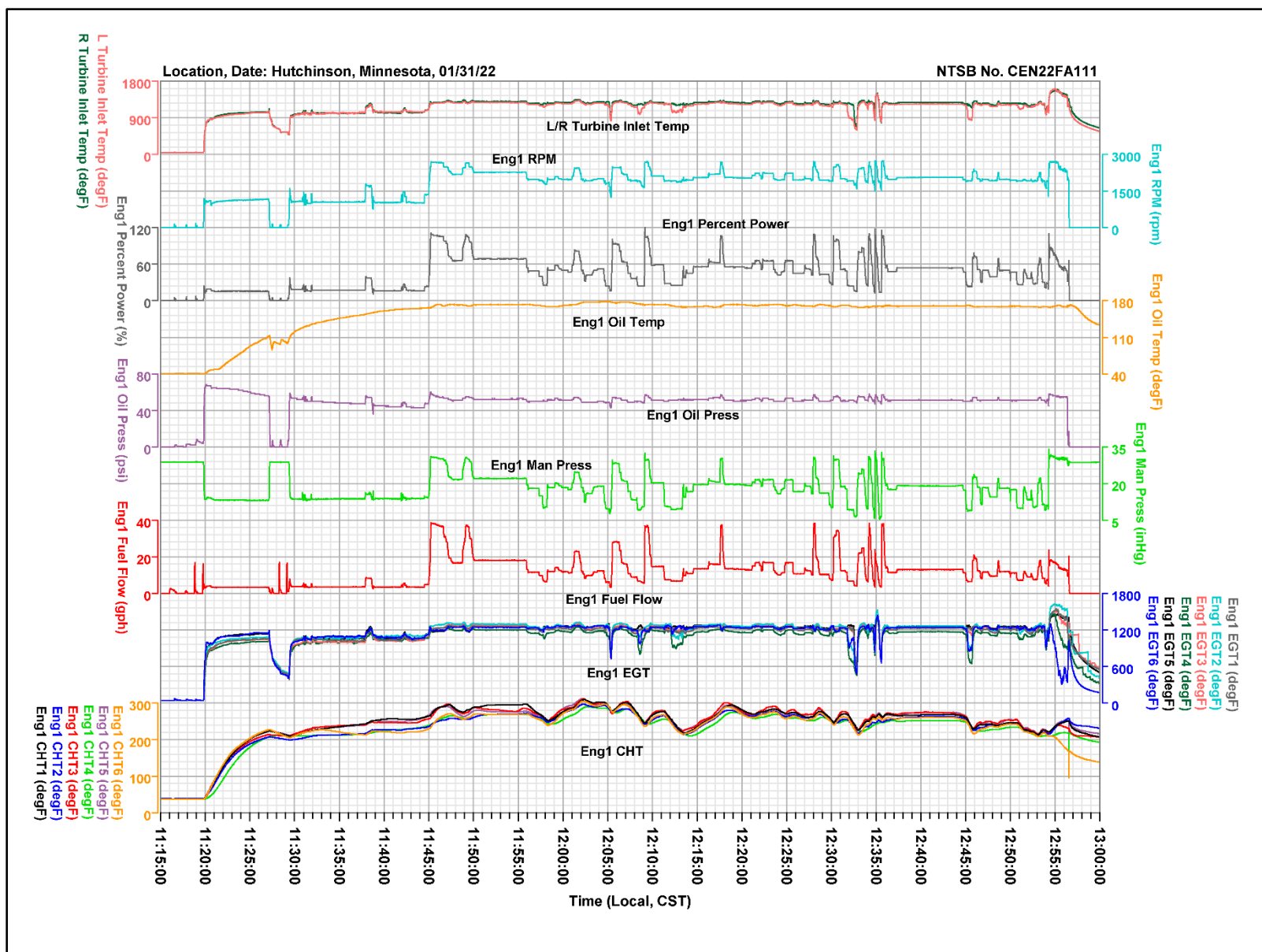


Figure 3. Plot of engine parameters for the entire flight from 11:15:00 to 13:00:00.

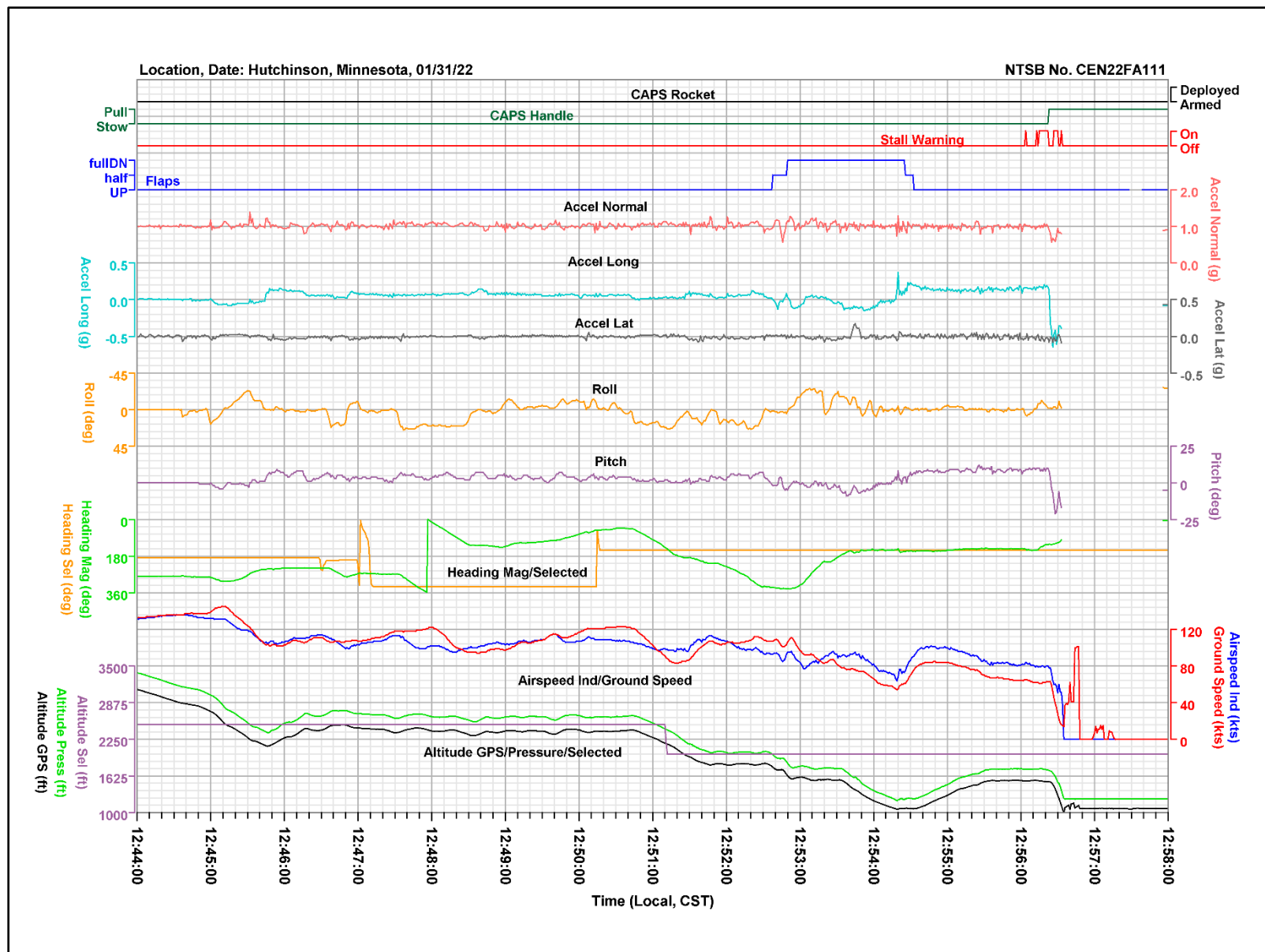


Figure 4. Plot of basic parameters with a focus on the end of the flight from 12:44:00 to 12:58:00.

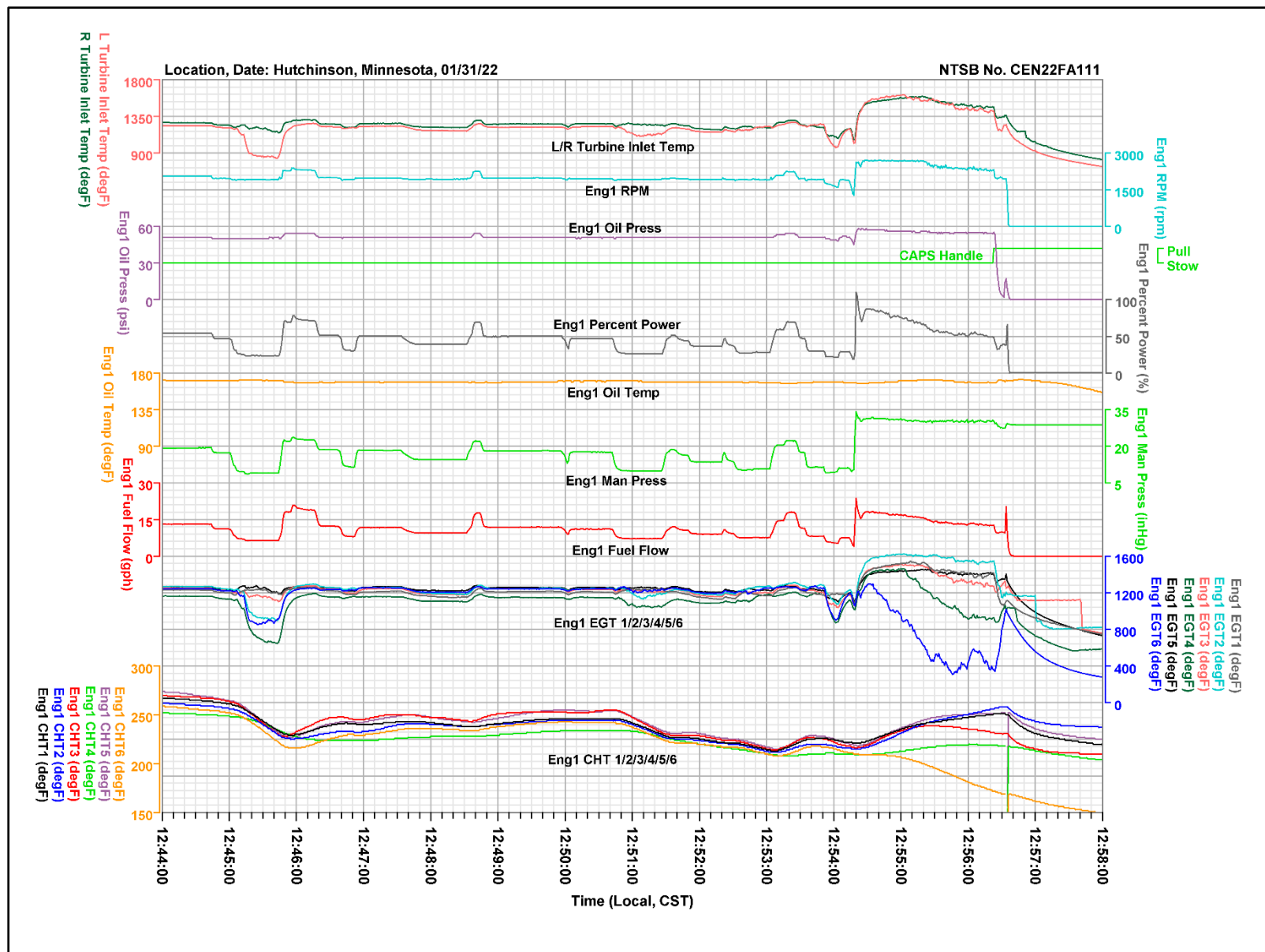


Figure 5. Plot of engine parameters with a focus on the end of the flight from 12:44:00 to 12:58:00.



Figure 6. Google Earth overlay of the final 14 minutes of the accident flight.



Figure 7. Google Earth overlay of the final 14 minutes of accident flight - zoom to the accident site.



Figure 8. Google Earth overlay of the final 14 minutes of the accident flight - further zoom to the accident site.

APPENDIX A. VERIFIED AND PROVIDED PARAMETERS

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

Table 1. Verified and provided parameters.

Parameter Name	Parameter Description	Units
Accel Lat	Lateral Acceleration	g
Accel Long	Longitudinal Acceleration	g
Accel Normal	Normal/Vertical Acceleration	g
Airspeed Ind	Indicated Airspeed	kts
Altitude GPS	Altitude GPS	ft
Altitude Press	Pressure Altitude	ft
Altitude Sel	Selected Altitude	ft
CAPS Handle	CAPS Handle	
CAPS Rocket	CAPS Rocket	
Eng1 CHT 1/2/3/4/5/6	Engine 1 Cylinder Head Temperature Cylinder 1/2/3/4/5/6	degF
Eng1 EGT 1/2/3/4/5/6	Engine 1 Exhaust Gas Temperature Cylinder 1/2/3/4/5/6	degF
Eng1 Fuel Flow	Engine 1 Fuel Flow	gph
Eng1 Man Press	Engine 1 Manifold Pressure	inHg
Eng1 Oil Pressure	Engine 1 Oil Pressure	psi
Eng1 Oil Temp	Engine 1 Oil Temperature	degF
Eng1 Percent Power	Engine 1 Percent Power	%
Eng1 RPM	Engine 1 RPM	rpm
Flaps	Flap Position	
Ground Speed	Ground Speed	kts
Heading Mag	Magnetic Heading	deg
Heading Sel	Selected Heading	deg
L/R Turbine Inlet Temp	Turbine Inlet Temperature-Left/Right	degF
Latitude	Latitude	deg
Longitude	Longitude	deg
Pitch	Pitch	deg
Roll	Roll	deg
Stall Warning	Stall Warning	
UTC Hour	UTC Hours	hrs
UTC Minute	UTC Minutes	min
UTC Second	UTC Seconds	sec

Note: The HUT RDM records pressure altitude, which is based on a standard altimeter setting of 29.92 inches of mercury (inHg). The pressure altitude information presented in the plots and in the electronic data has not been corrected for the local altimeter setting at the time of the event.

Note: Parameters with a blank unit description in table 1 are discrettes. A discrete is typically a 1-bit parameter that is either a 0 state or a 1 state where each state is uniquely defined for each parameter.

Table 2. Unit abbreviations.

Unit Abbreviations	Descriptions
%	percent
CAPS	Cirrus Airframe Parachute System
deg	degrees
degF	degrees Fahrenheit
ft	feet
g	gravitational constant
gph	gallons per hour
hrs	hours
inHg	inches of mercury
kts	knots
min	minutes
psi	pounds per square inch
RPM	revolutions per minute
sec	seconds
UTC	Coordinated Universal Time