

National Transportation Safety Board

Office of Research and Engineering

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COCKPIT DISPLAY

Specialist's Factual Report

July 5, 2023

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A. ACCIDENT

Location: Waller, Texas
Date: September 12, 2022
Time: 1417 CDT
Airplane: Pipistrel Sinus 912 LSA, N397R

B. COCKPIT DISPLAY SPECIALIST

Specialist Charles Cates
Mechanical Engineer/Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A recorded flight data group was not convened. The NTSB Vehicle Recorder Division received the following cockpit display device capable of recording flight data:

Recorder Manufacturer/Model: Dynon Skyview SV-HDX1100
Part Number: SV-HDX1100
Recorder Serial Number: 14813

1.0 Dynon Skyview SV-HDX1100 Description

The Dynon SV-HDX1100 is a 10.6" widescreen display with a 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 2-150 hours of data at sampling rates ranging from 0.1-16 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 Recorder Condition

The as-received condition of the device is shown in Figure 1. The device was damaged by mechanical impact forces and the normal download interfaces were not operational. The device was disassembled, and the internal DOM device was read out normally using the NTSB's digital forensics tools.

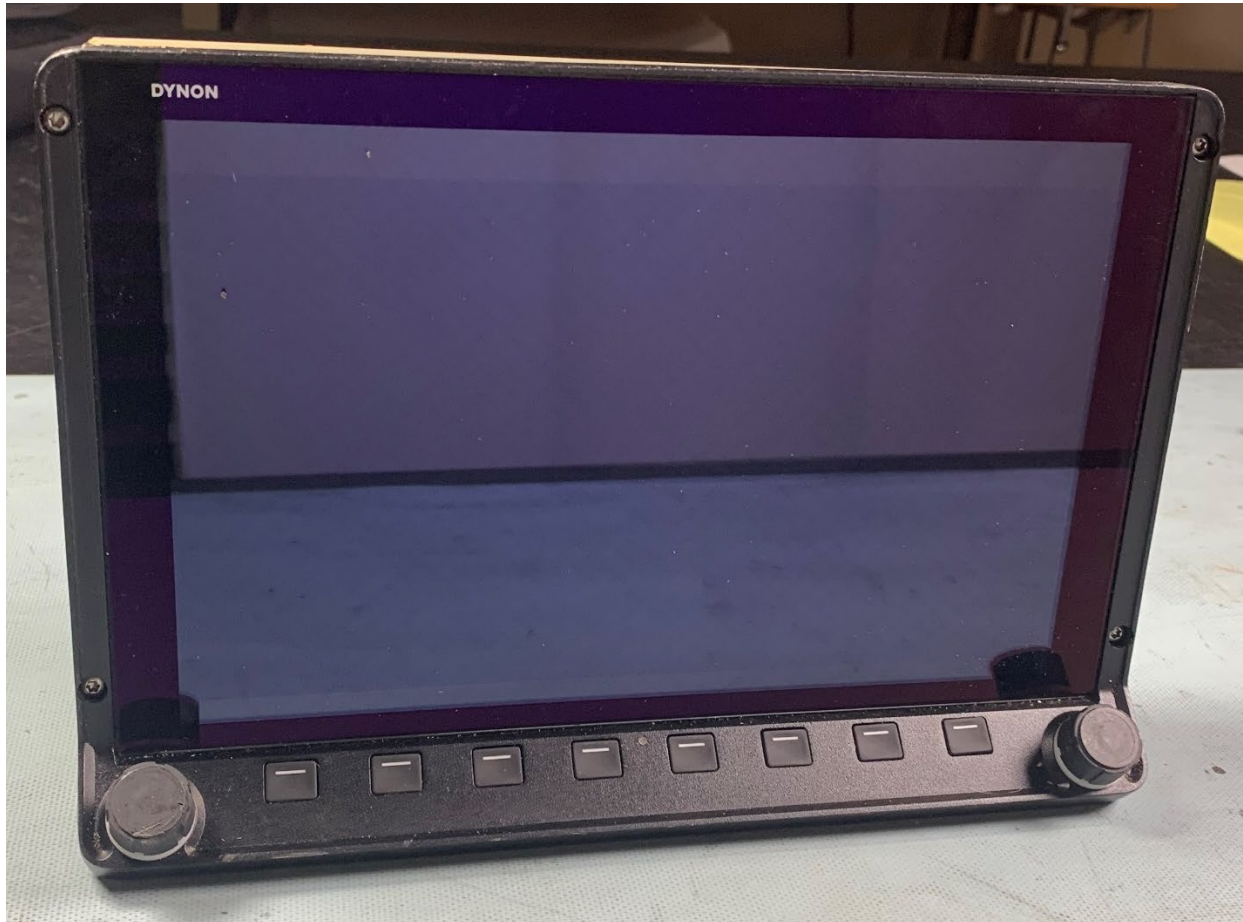


Figure 1. Damaged exterior of flight data recorder.



Figure 2. Memory module (DOM) removed from the recorder.

1.2 Recording Description

The operator had the User Log function set to record at a 16 Hz rate and to begin recording at device power on. The recording contained two flights recorded on the day of the accident and one flight recorded two days prior to the accident. The accident flight was the last flight of the recording and had a duration of about 40 minutes.

1.3 Time Correlation

The Dynon Skyview records in elapsed seconds since unit power on and it records Coordinated Universal Time (UTC) GPS time as a parameter. The difference between the accident time zone, central daylight time (CDT), and UTC is -5 hours, or 18,000 seconds. An offset is applied to display the data with the local time zone. Therefore, for the rest of this report, all times are referenced as CDT.

D. FIGURES AND TABULAR DATA

Figures 3 to 8 contain data recorded during the event on September 12, 2022. All the parameters listed in table 1 are plotted.

Figures 3 and 4 are map overlays of Latitude, Longitude, and GPS Altitude plotted in Google Earth. Note that the atmospheric and weather conditions shown in Google Earth may not be representative of those at the time of the accident.

Figures 5 and 6 show data from the duration of the accident flight from 13:55 until 14:17:30. Figures 7 and 8 show data from the final 5 minutes of the accident

flight, from 14:12:30 until 14:17:30. Figures 5 and 7 show aircraft basic parameters, and figures 6 and 8 show engine data.

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 figures 3 to 8 are provided in electronic comma-separated value (CSV) format as attachment 1 to this report.

Submitted by:

Charles Cates
Mechanical Engineer/Recorder Specialist

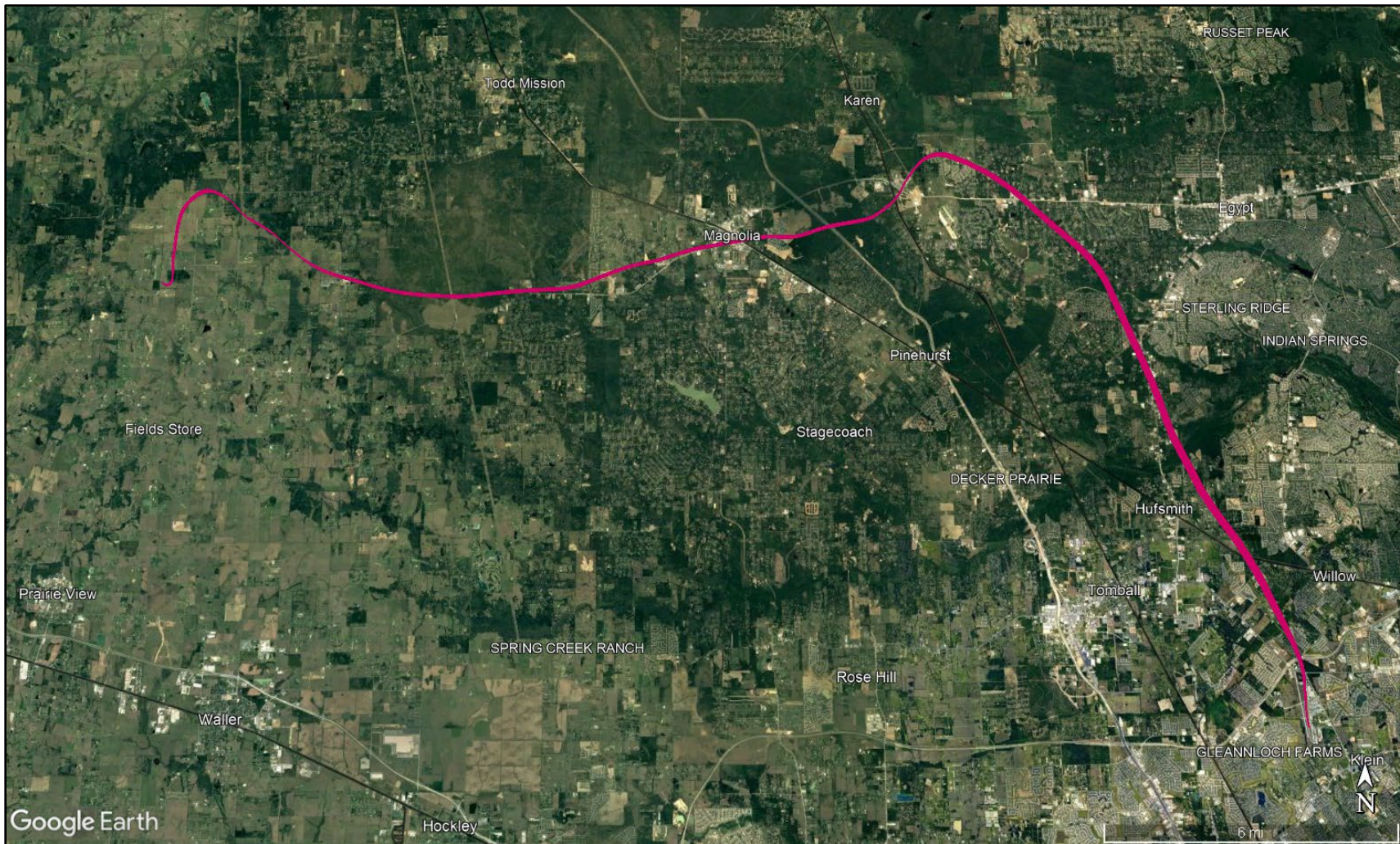


Figure 3. Map overlay of full flight.

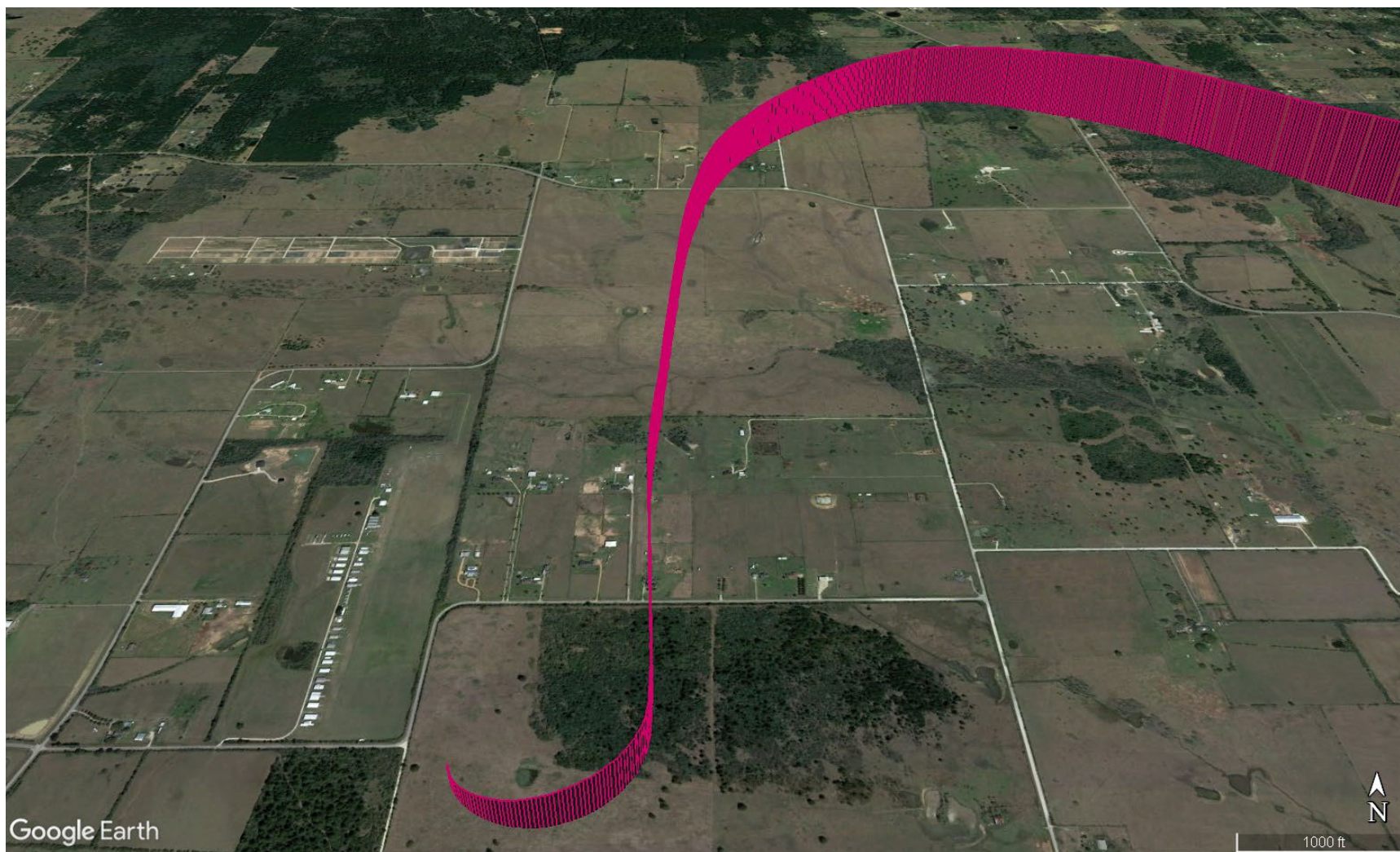


Figure 4. Map overlay of final 2 minutes and 30 seconds of accident flight.



Figure 5. Plot of recorded aircraft basic parameters from accident flight.

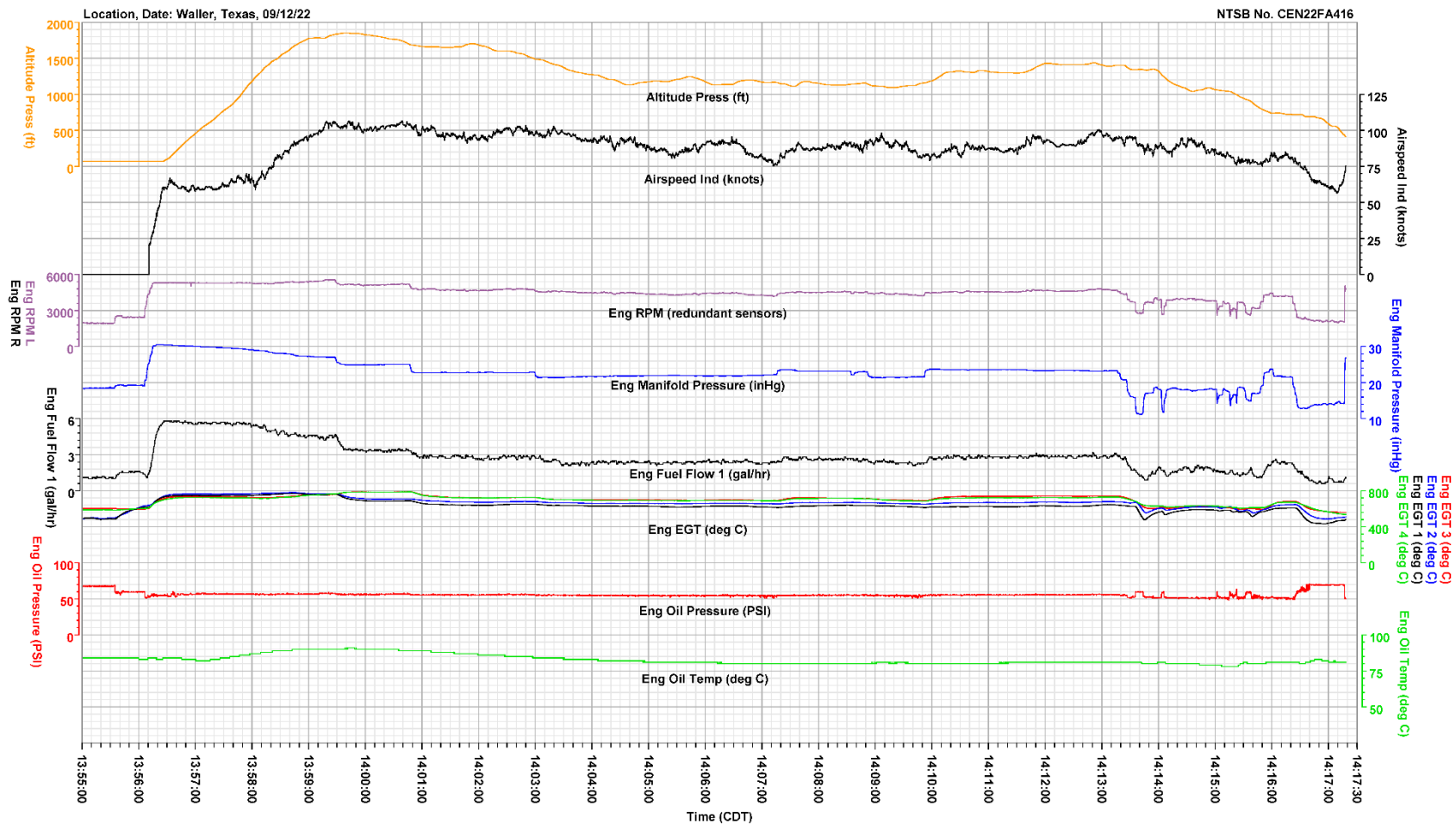


Figure 6. Plot of recorded engine parameters from accident flight.

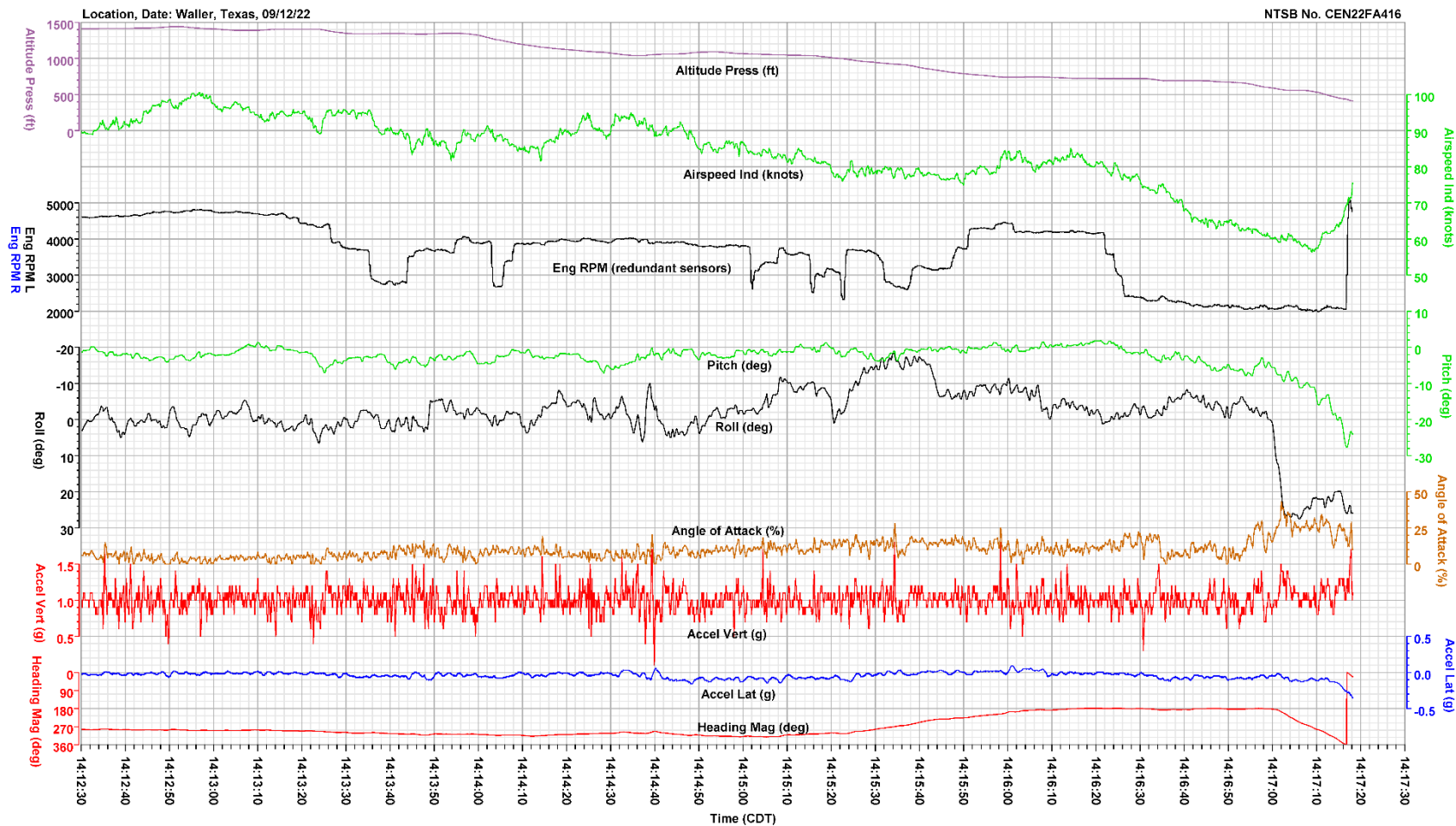


Figure 7. Plot of recorded aircraft basic parameters from final 5 minutes of accident flight.

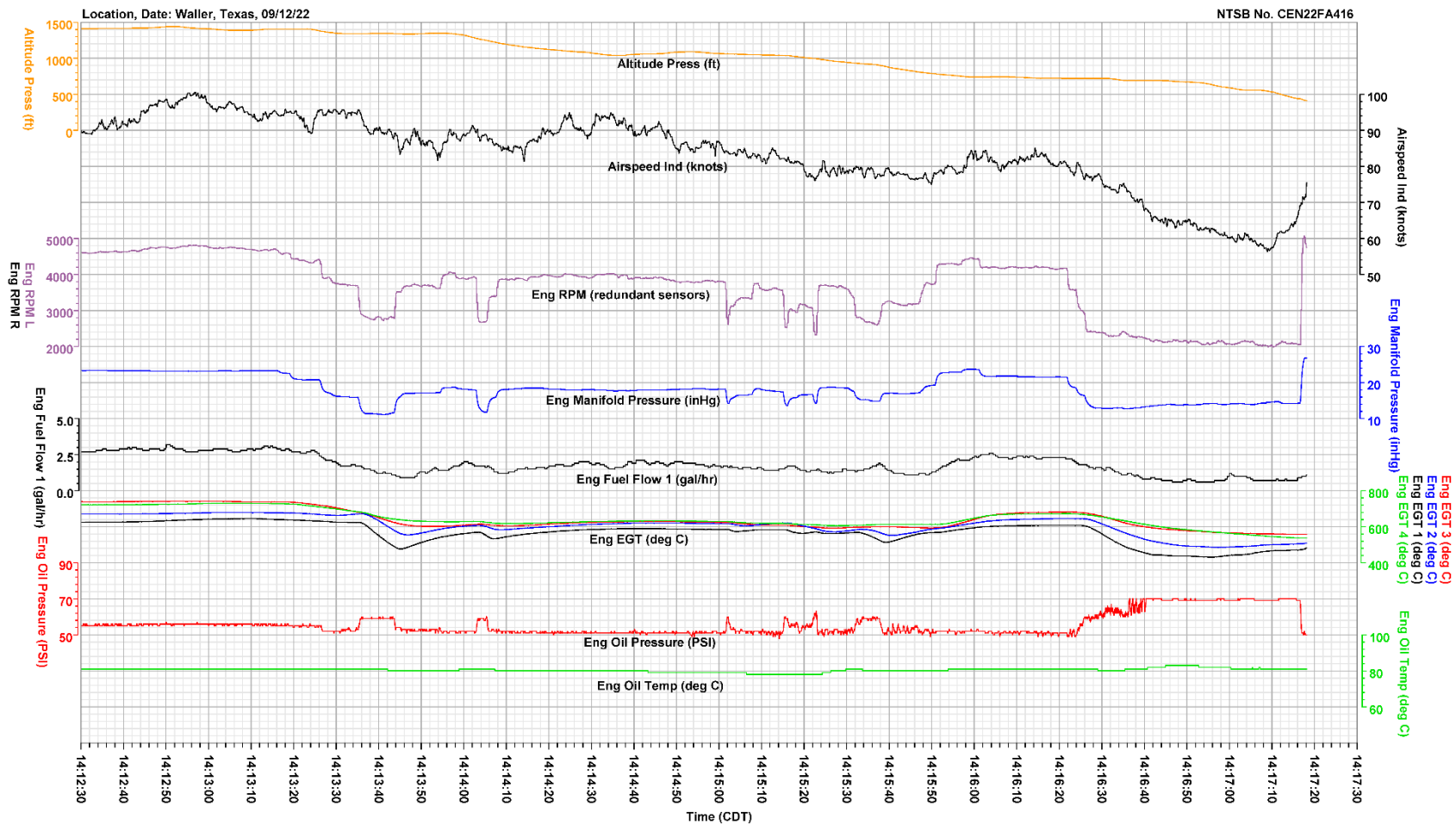


Figure 8. Plot of recorded engine parameters from final 5 minutes of accident flight.

APPENDIX A. VERIFIED AND PROVIDED PARAMETERS

This appendix describes the parameters provided and verified in this report. Table 1 lists the plot/table labels, parameter names, and units. Additionally, table 2 describes the unit abbreviations used in this report.

Table 1. Verified and provided Dynon Skyview parameters.

Plot/Table Labels	Parameter Names	Units
1. Accel Lat	Lateral Acceleration	g
2. Accel Vert	Vertical Acceleration	g
3. Airspeed Ind	Indicated Airspeed	kts
4. Altitude GPS	Global Positioning System Altitude	Ft
5. Altitude Press	Pressure Altitude	ft
6. Angle of Attack	Normalized Wing Angle of Attack	%
7. Eng EGT #	Exhaust Gas Temperature at Cylinder #	deg C
8. Eng Fuel Flow 1	Engine Fuel Flow	gal/hr
9. Eng Manifold Pressure	Manifold Pressure	inHg
10. Eng Oil Pressure	Engine Oil Pressure	psi
11. Eng Oil Temp	Engine Oil Temperature	deg C
12. Eng RPM L / Eng RPM R	Engine RPM (redundant sensors)	rpm
13. Heading Mag	Magnetic Heading	deg
14. Latitude	Latitude	deg
15. Longitude	Longitude	Deg
16. Pitch	Pitch Attitude	deg
17. Roll	Roll Attitude	deg

Note: This device records pressure altitude, which is based on a standard altimeter setting of 29.92 inches of mercury (in Hg). 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 discretes. 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
g	gravitational acceleration
kts	knots
ft	feet
deg C	degrees Celsius
gal	gallons
hr	hour
inHg	inches of Mercury
psi	pounds per square inch
rpm	revolutions per minute
deg	degrees