

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN24FA095

RECORDED FLIGHT DATA

Specialist's Factual Report

September 13, 2024

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A. ACCIDENT

Location: Little Rock, Arkansas
Date: January 21, 2024
Time: 1320 central standard time (CST)
Airplane: Cirrus Design Corp SR22, N255JP

B. RECORDED FLIGHT DATA SPECIALIST

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

C. DETAILS OF THE INVESTIGATION

A FDR group was not convened. The NTSB Vehicle Recorder Division received the following recoverable data module (RDM):

Recorder Manufacturer/Model:	Heads Up Technologies RDM-100
Part Number:	13530900346591
Recorder Serial Number:	16815

1.0 Recorder Description

The Heads Up Technologies RDM-100 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 inside the crash-hardened enclosure. When the storage limit of the memory device is reached, the oldest recording is deleted.

1.1 Recorder Condition

The recorder was in good condition and the data were extracted normally from the recorder. See figure 1 for a photograph of the RDM as received by the NTSB vehicle recorder laboratory.



Figure 1. Undamaged RDM-100 as received by the NTSB vehicle recorder laboratory.

1.2 Recording Description

The RDM recording contained approximately 145 hours of data. The event flight was the last flight of the recording, and its duration was approximately 25 minutes including the engine start attempts leading up to the event flight.

1.3 Engineering Unit Conversions

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 aircraft. Where applicable, the conversions have been changed to ensure that the parameters conform to the NTSB's standard sign convention that climbing right turns are positive (CRT=+).¹ Note that engine temperatures (oil, exhaust gas, cylinder head, and turbine inlet) are not reported in the data below 32 degrees F.

¹ CRT=+ means that for any parameter recorded that indicates a climb or a right turn, the sign for that value is positive. Also, for any parameter recorded that indicates an action or deflection, if it induces a

Table 1 lists the RDM parameters verified and provided in this report. Additionally, table 2 describes the unit abbreviations used in this report.

1.4 Time Correlation

Correlation of the RDM data from RDM elapsed time in seconds to the event local time, CST, was established by using the recorded coordinated universal time (UTC) Hours, UTC Minutes, and UTC Seconds and then applying an additional -6 hours offset to change UTC to CST. However, start attempts and previous flights are referenced as recorder elapsed time, not local time.

D. FIGURES AND TABULAR DATA

Figures 2 to 5 contain RDM data recorded during the event on January 21, 2024. All the parameters listed in table 1 are plotted except UTC Hours, UTC Minutes, and UTC Seconds.

Figure 2 is a plot of engine parameters from all the engine start attempts recorded on the day of the accident up through the successful start prior to the accident flight. Note that these are displayed in RDM elapsed time because the time is discontinuous due to multiple power cycles where the recorder was not recording with aircraft power off. A total of eighteen attempts to start the engine were recorded before the engine successfully started on the nineteenth attempt.

Figure 3 is a plot of engine parameters showing the successful engine start, taxi, and acceleration to takeoff power, continuing through the end of the recording. The engine started at about 1302 CST and ran at speeds of generally less than 1,500 revolutions per minute (rpm) for about thirteen and a half minutes before accelerating to takeoff power. Oil temperature when the engine began accelerating to takeoff power was 109 degrees F.

Figure 4 is a plot of engine parameters from about one minute prior to takeoff until the end of the recording. During the acceleration to takeoff power there were three distinct steps in engine rpm, manifold pressure, percent power, and fuel flow. The first step was to about 2,080 rpm and 13.9 gallons per hour (gph), the second to 2,415 rpm and 29.2 gph, and the third to 2,700 rpm and 37.1 gph. After being stable at the third step for about 10 seconds, those parameters began to roll back while EGT climbed. After 15 seconds of EGT increase, the EGT suddenly dropped rapidly, rpm and fuel flow decreased, and manifold pressure remained constant.

Figure 5 is a plot of aircraft basic parameters from about one minute prior to takeoff until the end of the recording. Near the end of the recording the aircraft

climb or right turn, the value is positive. Examples: Right Roll = +, Left Aileron Trailing Edge Down = -, Right Aileron Trailing Edge Up = +, Pitch Up = +, Elevator Trailing Edge Up = +, Right Rudder = +.

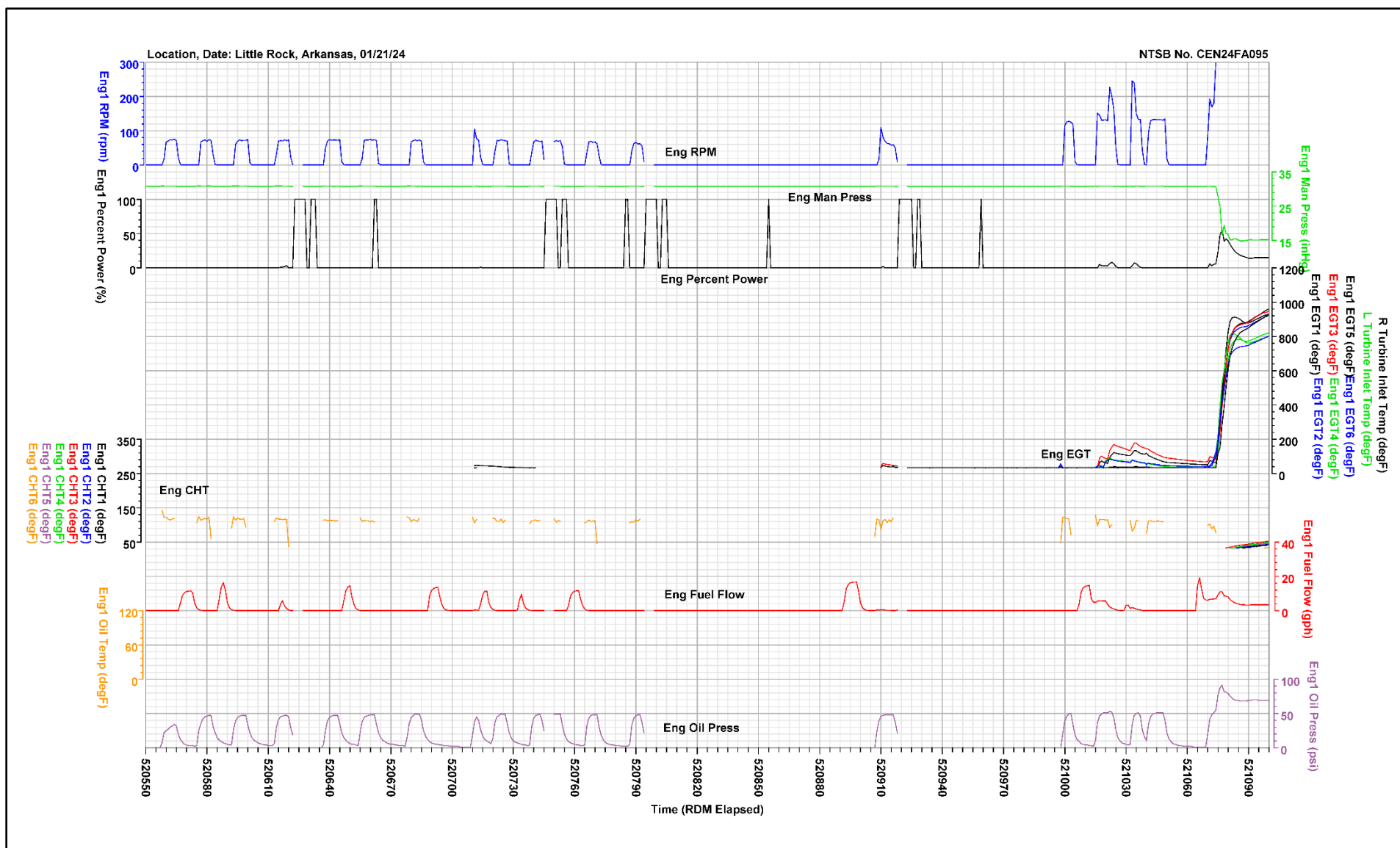
attitude reached nearly 15 degrees nose down and 60 degrees of right roll. The stall warning became active and remained active for the last six seconds of the recording. The CAPS handle remained stowed and the CAPS rocket was armed but not deployed for the full flight.

Figure 6 is a plot of aircraft basic and engine parameters from the previous flight on January 11, 2023. Fuel flow at takeoff peaked at 36.3 gph.

The corresponding tabular data used to create figures 2 to 5, including UTC Hours, UTC Minutes, and UTC Seconds, are provided in electronic comma-separated value (CSV) format as attachment 1 to this report. The corresponding tabular data used to create figure 6 is provided as attachment 2 to this report.

Submitted by:

Charles Cates
Mechanical Engineer/Recorder Specialist



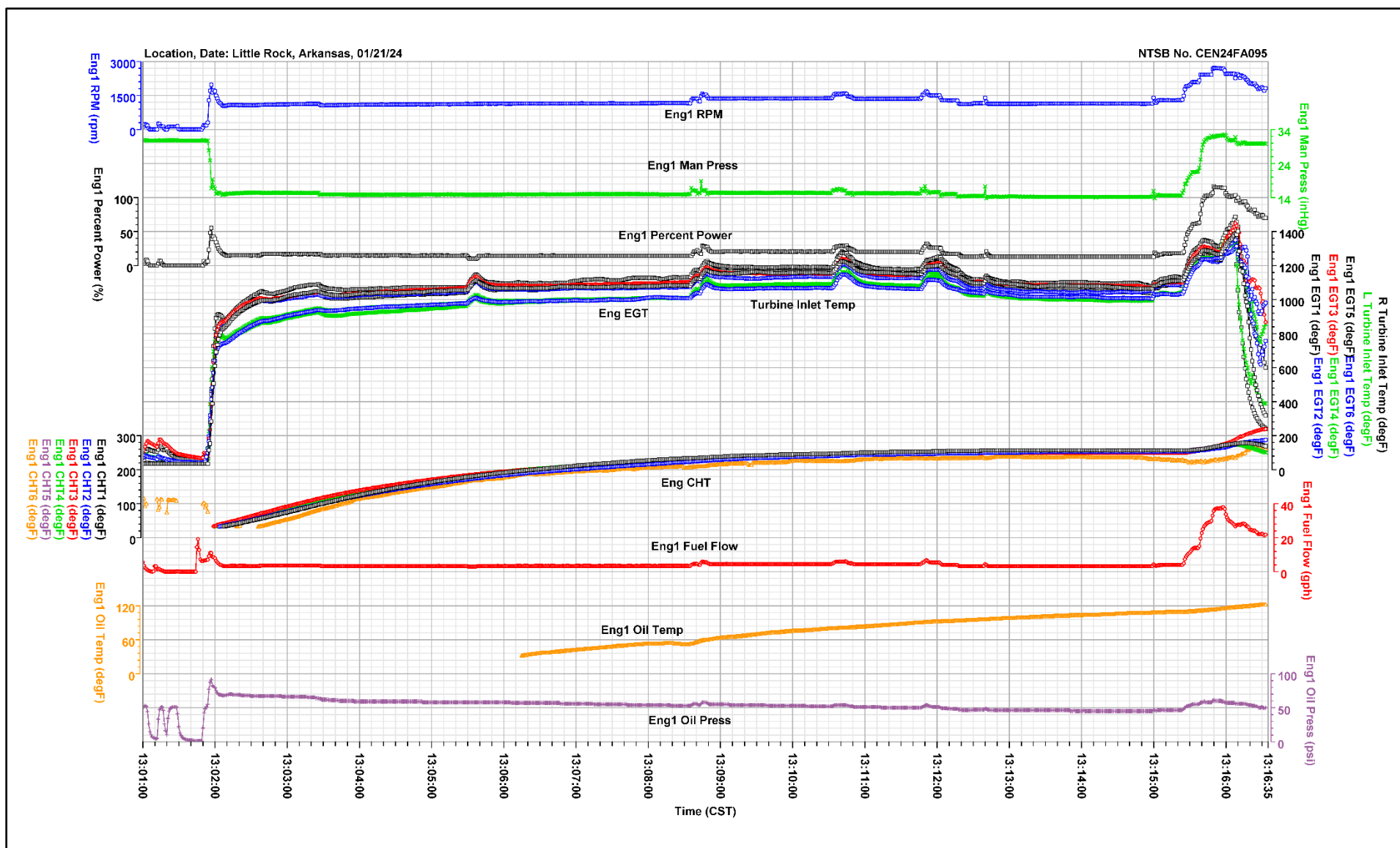


Figure 3. Plot of engine parameters showing start, idling, and takeoff until end of recording.

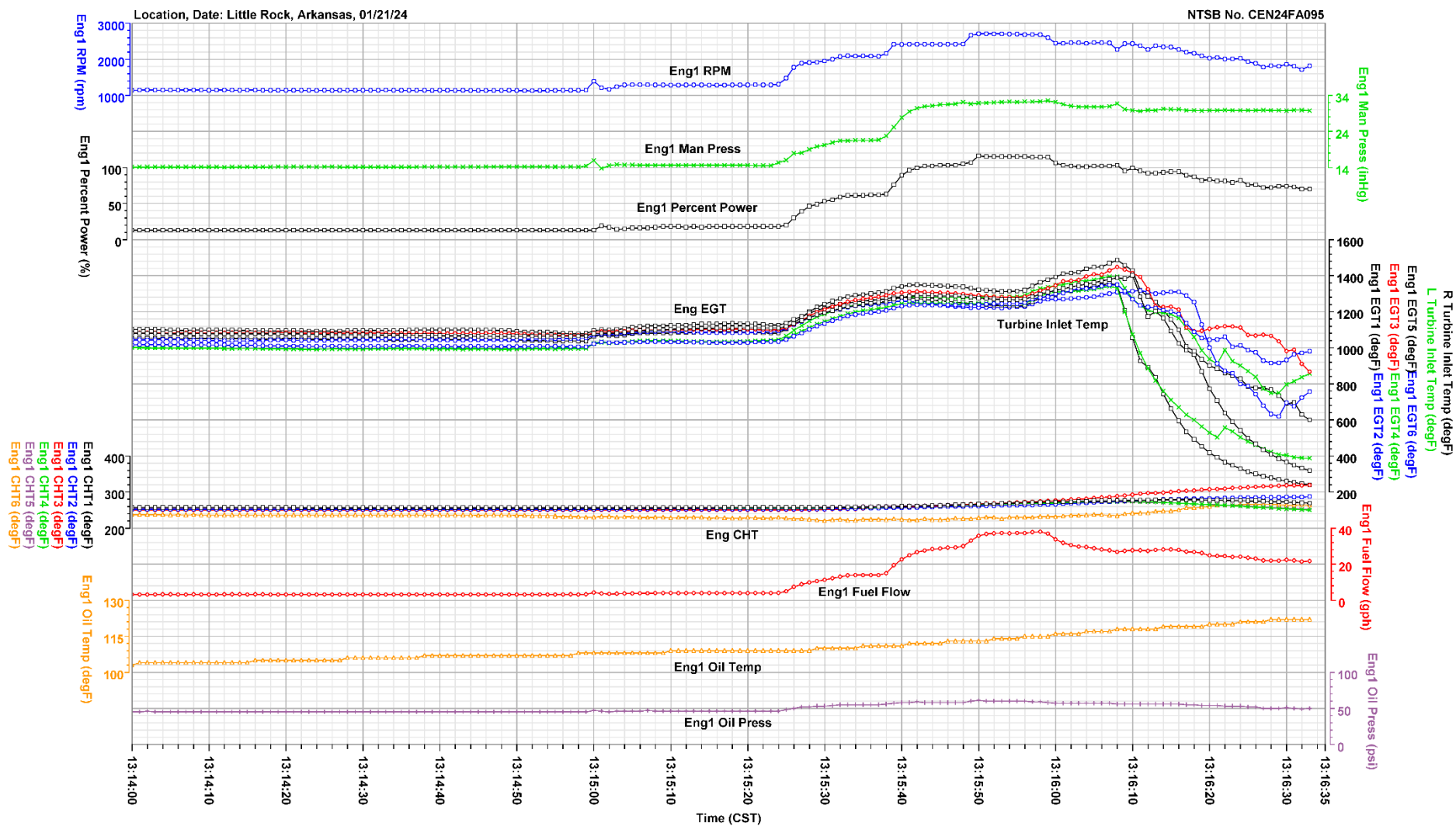


Figure 4. Plot of engine parameters from one minute prior to takeoff to end of recording.

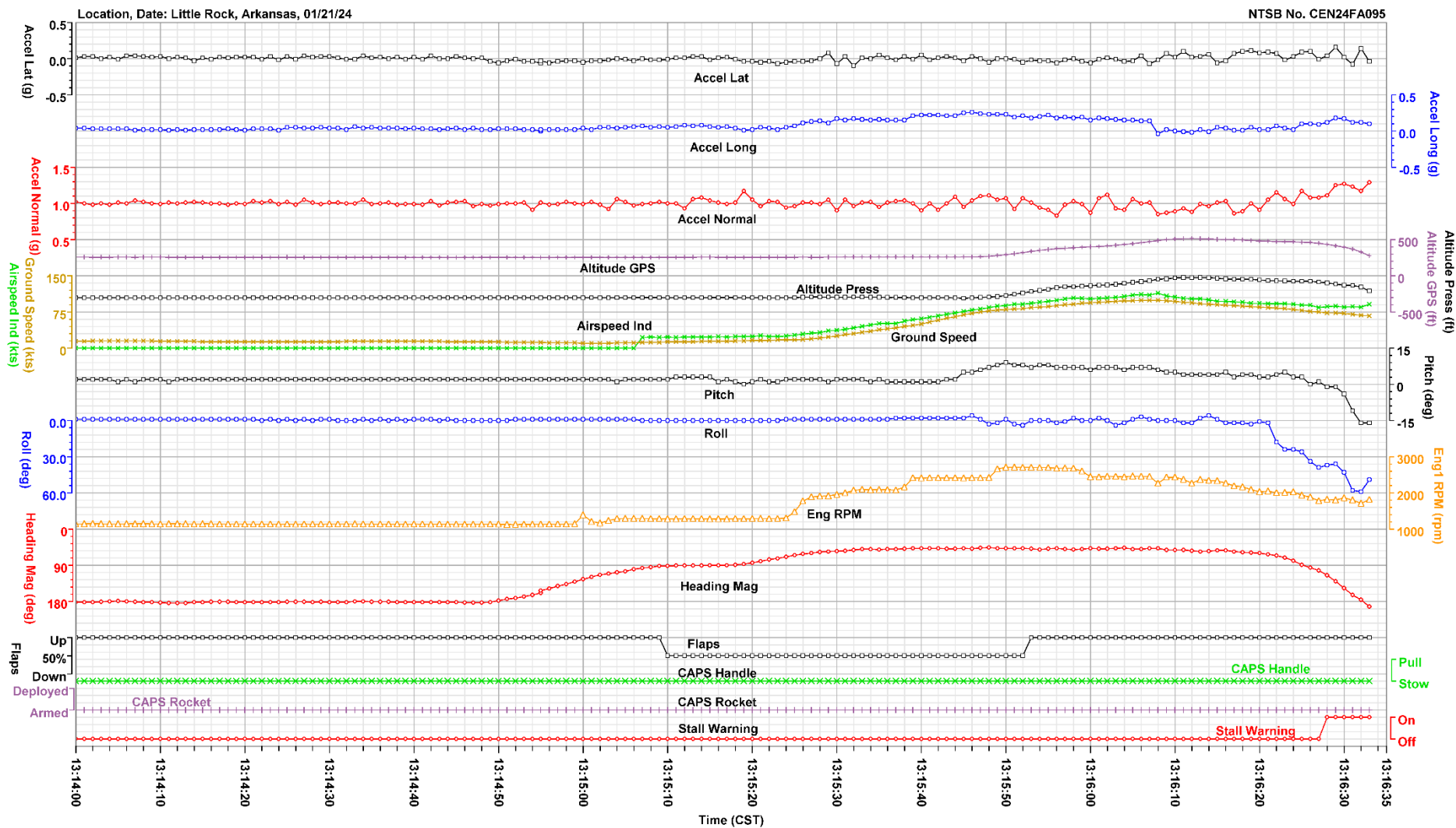
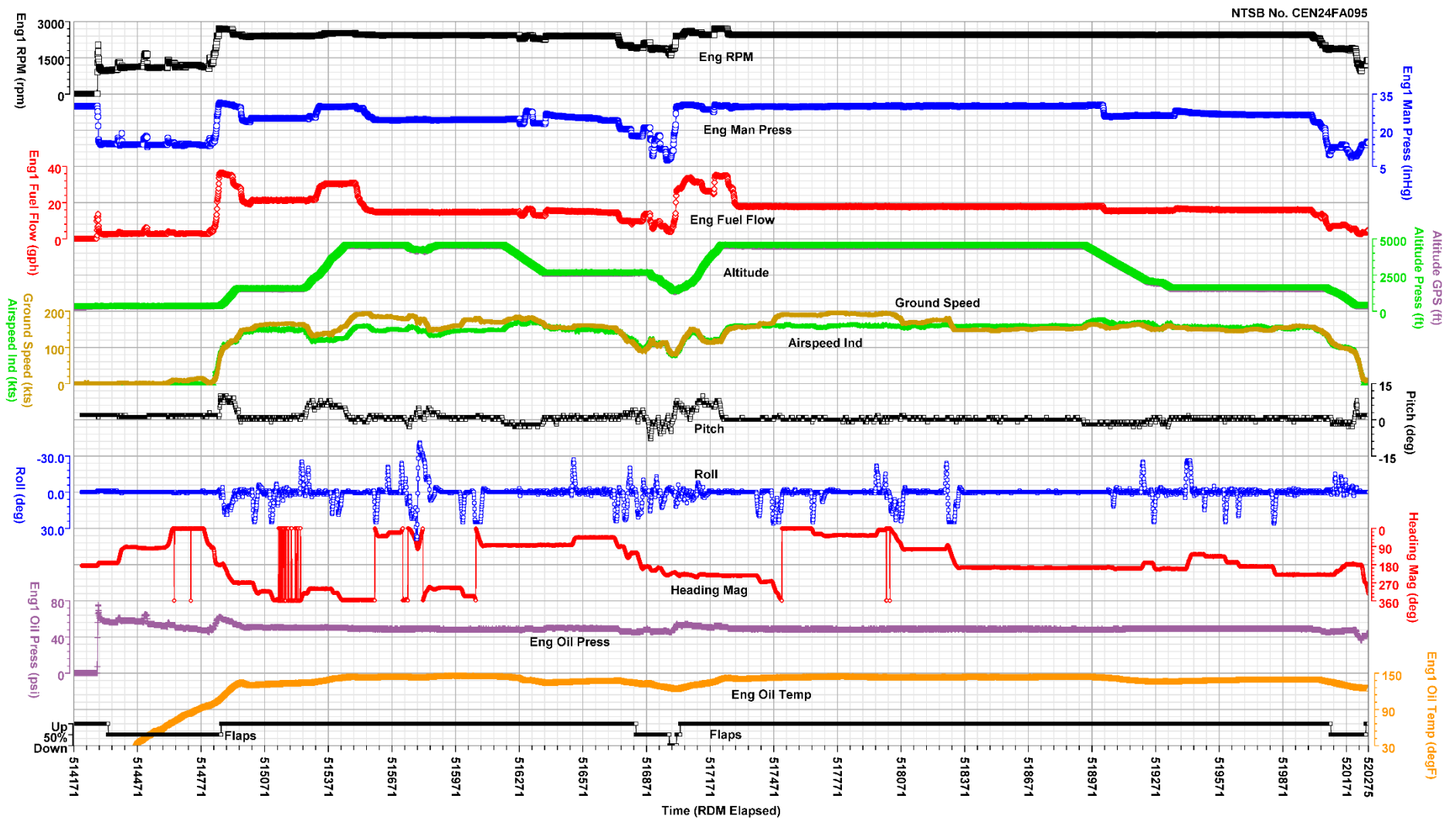


Figure 5. Plot of aircraft basic parameters from one minute prior to takeoff to end of recording.



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Figure 6. Plot of aircraft basic and engine parameters from previous 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 FDR parameters.

Plot/Table Labels	Parameter Names	Units
1. Accel Lat	Lateral Acceleration	g
2. Accel Long	Longitudinal Acceleration	g
3. Accel Normal	Vertical Acceleration	g
4. Airspeed Ind	Indicated Airspeed	kts
5. Altitude GPS	GPS Altitude	kts
6. Altitude Press	Pressure Altitude	ft
7. CAPS Handle	CAPS handle pulled	
8. CAPS Rocket	CAPS rocket fired	
9. Eng1 CHT#	Cylinder Head Temperature #	deg F
10. Eng1 EGT1	Exhaust Gas Temperature #	deg F
11. Eng1 Fuel Flow	Engine Fuel Flow	gph
12. Eng1 Man Press	Engine Manifold Pressure	inHg
13. Eng1 Oil Press	Engine Oil Pressure	psi
14. Eng1 Oil Temp	Engine Oil Temperature	deg F
15. Eng1 Percent Power	Engine Percent Power	%
16. Eng1 RPM	Engine speed	rpm
17. Flaps	Flap position	
18. Ground Speed	GPS Ground Speed	kts
19. Heading Mag	Magnetic Heading	deg F
20. L Turbine Inlet Temp	Turbine Inlet Temperature - Left	deg F
21. Pitch	Pitch Attitude	deg
22. R Turbine Inlet Temp	Turbine Inlet Temperature - Right	deg F
23. Roll	Roll Attitude	deg
24. Stall Warning	Stall Warning	
25. UTC Day	Day	day
26. UTC Hour	Hour	hour
27. UTC Minute	Minute	minute
28. UTC Month	Month	month
29. UTC Second	Second	second

Note: This FDR 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 FDR 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 Abbreviation	Description
deg F	degrees Fahrenheit
ft	feet
gph	gallons per hour
inHg	inches of mercury
kts	knots
psi	pounds per square inch