

National Transportation Safety Board

Office of Research and Engineering

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ENGINE DATA MONITOR

Specialist's Factual Report

December 20, 2024

TABLE OF CONTENTS

A. ACCIDENT.....	3
B. ENGINE DATA MONITOR SPECIALIST.....	3
C. DETAILS OF THE INVESTIGATION	3
1.0 EDM-900 Description.....	3
1.1 EDM-900 Data Recovery.....	4
1.2 EDM-900 Data Description.....	4
1.2.1 EDM-900 Engineering Unit Conversions.....	5
1.3 EDM-900 Time Correlation.....	5
D. FIGURES AND TABULAR DATA.....	5
APPENDIX A. VERIFIED AND PROVIDED PARAMETERS FROM EDM-900.....	8

A. ACCIDENT

Location: Cullman, Alabama
Date: September 29, 2023
Time: 1200 central day time (CDT)
1700 coordinated universal time (UTC)
Airplane: Cozy Mark IV, private operator, N95SF

B. ENGINE DATA MONITOR SPECIALIST

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

C. DETAILS OF THE INVESTIGATION

An engine data monitor (EDM) group was not convened.

The NTSB Vehicle Recorder Division received the following EDM:

Recorder Manufacturer/Model: JPI EDM-900
Part Number: 790000-4C
Recorder Serial Number: 00662

1.0 EDM-900 Description

The J.P. Instruments EDM-900 is a panel-mounted gauge that allows the operator to monitor and record up to 24 parameters related to engine operations. Depending on the installation, engine parameters monitored can include:

- Battery Voltage
- Carburetor Temperature
- Compressor Discharge Temperature
- Cylinder Head Temperature (CHT)
- Engine Revolutions per Minute (RPM)
- Exhaust Gas Temperature (EGT)
- Fuel Flow
- Manifold Pressure
- Oil Pressure and Temperature

- Outside Air Temperature
- Turbine inlet Temperature

The unit can also calculate, in real time, percent of maximum horsepower, fuel used, shock cooling rate, and EGT differentials between highest and lowest cylinder temperatures. The calculations are also based on the aircraft installation.

The unit contains non-volatile memory for data storage of the parameters recorded and calculated.¹ The rate at which the data is stored is selectable by the operator from 2 to 500 seconds per sample. The memory can store up to 20 hours of data at a 6 second sample rate. The data can then be downloaded by the operator using the J. P. Instruments software.

1.1 EDM-900 Data Recovery

The EDM was damaged in the event. The extent of the damage is shown in figure 1. An interior examination revealed the circuit boards were in good condition. The data were downloaded using the manufacture's procedure.

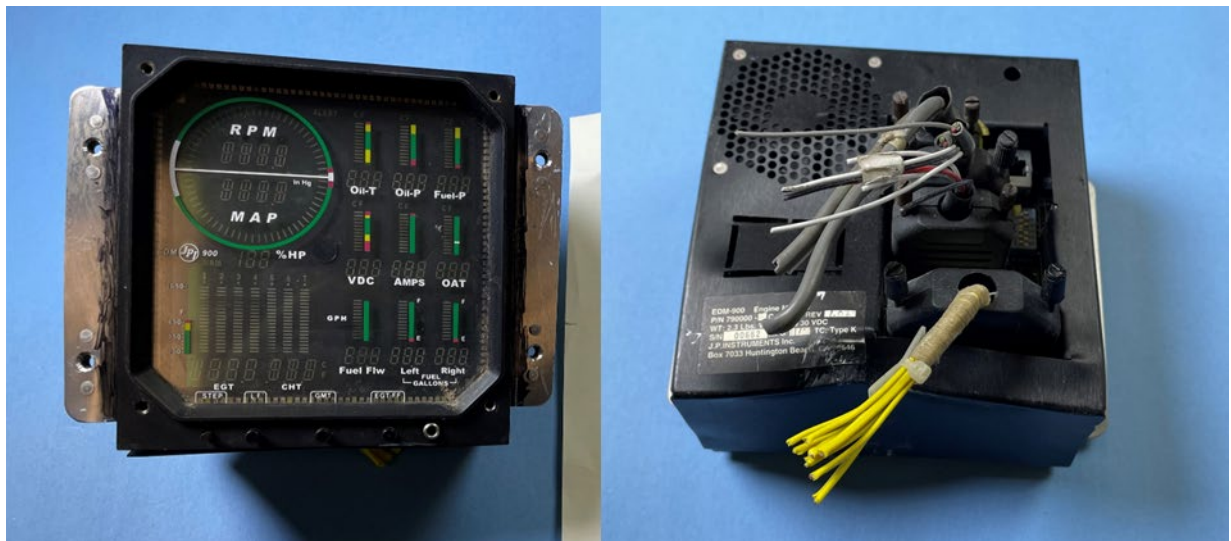


Figure 1. Front view (left) and back view (right) of JPI EDM-900, as received by the NTSB Vehicle Recorder Laboratory.

1.2 EDM-900 Data Description

The EDM recording contained 83 sessions of data from March 9, 2023, to September 29, 2023. The accident flight was the last flight of the recording and its

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

duration was approximately 42 minutes. The data rate was found to be 6 seconds per sample.

1.2.1 EDM-900 Engineering Unit Conversions

The engineering units conversions used for the data contained in this report are based on documentation from the manufacturer of the EDM.

Appendix A, table 1 lists the EDM parameters verified and provided in this report. Appendix A, table 2 lists the unit abbreviations used in this report.

1.3 EDM-900 Time Correlation

The EDM records time with the first data sample based on the unit's internal clock. This clock is set and updated by the operator. All times are referenced as recorded time.

D. FIGURES AND TABULAR DATA

Figures 2 and 3 contain EDM data recorded during the event on September 29, 2023. Figure 2 is a plot of the entire recording from 11:52:16 to 12:33:34 device time. Figure 3 is plot of approximately the final 4 minutes from 12:30:00 to 12:33:34 device time.

The corresponding tabular data used to create figures 2 to 3 are provided in electronic comma-separated value (CSV) format as attachment 1 to this report.

Submitted by:

Matthew Yandrick
Electrical Engineer – Recorder Specialist

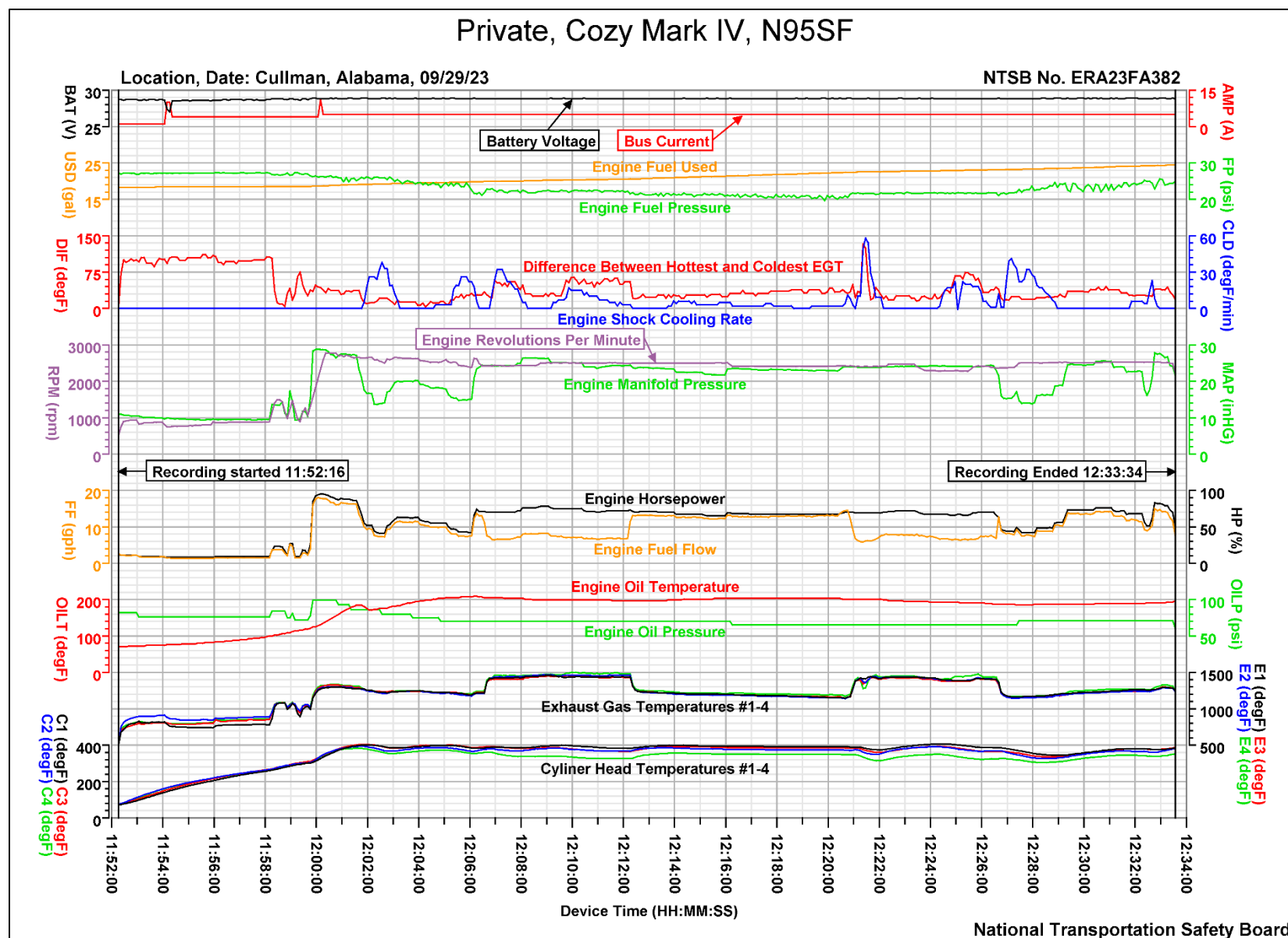


Figure 2. Plot of JPI EDM-900 parameters for the entire accident recording.

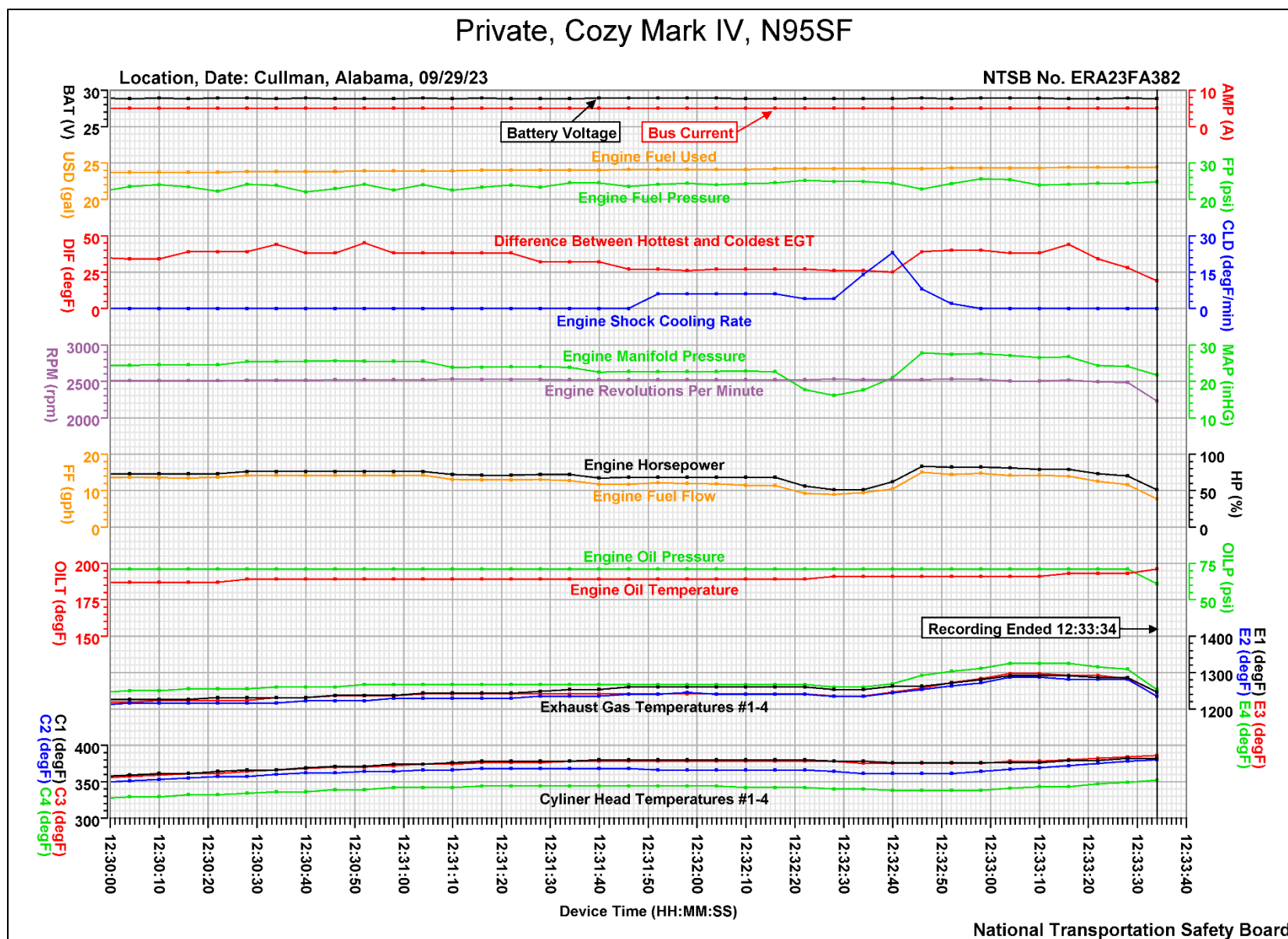


Figure 3. Plot of JPI EDM-900 parameters for the final segment of the accident recording.

APPENDIX A. VERIFIED AND PROVIDED PARAMETERS FROM EDM-900

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

Table 1. Verified and provided parameters.

Parameter Name (unit)	Parameter Description
AMP (A)	Bus Current
BAT (V)	Battery Voltage
C# (degF)	Cylinder Head Temperature # ²
CLD (degF/min)	Engine Shock Cooling Rate
DIF (degF)	Difference Between Hottest and Coldest EGT
E# (degF)	Exhaust Gas Temperature #
FF (gph)	Engine Fuel Flow
FP (psi)	Engine Fuel Pressure
HP (%)	Engine Horsepower
HRS (hrs)	Engine Tach Time
MAP (inHg)	Engine Manifold Pressure
OAT (degF)	Outside Air Temperature
OilP (psi)	Engine Oil Pressure
OilT (degF)	Engine Oil Temperature
RPM (rpm)	Engine Revolutions Per Minute
USD (gal)	Engine Fuel Used

Table 2. Unit abbreviations.

Unit Abbreviations	Descriptions
%	percent
A	Amperes
degF	degrees Fahrenheit
degF/min	degrees Fahrenheit per minute
gal	gallons
gph	gallons per hour
hrs	hours
inHg	inches of Mercury
psi	pounds per square inch
rpm	revolutions per minute
V	Volts DC

² Depending on aircraft configuration number of cylinders that are instrumented varies. In the data plots the '#' is replaced with the appropriate cylinder ID.