

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA23FA181

ENGINE DATA MONITOR

Specialist's Factual Report

November 22, 2023

TABLE OF CONTENTS

A. ACCIDENT.....	3
B. ENGINE DATA MONITOR SPECIALIST.....	3
C. DETAILS OF THE INVESTIGATION	3
1.0 EDM-830 DESCRIPTION.....	3
1.1 EDM-830 Data Recovery.....	4
1.2 EDM-830 Data Description.....	4
1.3 EDM-830 Time Correlation.....	4
D. FIGURES AND TABULAR DATA.....	5
APPENDIX A. VERIFIED AND PROVIDED PARAMETERS FROM EDM-830.....	8

A. ACCIDENT

Location: Venice, Florida
Date: April 5, 2023
Time: 2137 eastern daylight time (EDT)
Airplane: Piper PA-32R-300, private operator, N635BD

B. ENGINE DATA MONITOR SPECIALIST

Specialist Matthew Yandrick
Electronics 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-830
Recorder Serial Number: 35041

1.0 EDM-830 Description

The J.P. Instruments EDM-830 is a panel mounted LCD display that the operator can monitor and record up to 24 parameters related to engine operations. Depending on the installation engine parameters monitored can include:

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

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

The unit contains non-volatile memory (NVM) for data storage of the parameters recorded and calculated. 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 per sample rate. For a non-damaged unit, the data can then be downloaded by the operator using a USB flash drive and following the instructions on the unit.

1.1 EDM-830 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the EDM-830 was damaged in the event. The extent of the damage is shown in figure 1. The internal NVM component that retains flight data was identified, removed, and placed on a surrogate device. Power was applied to the surrogate device, and data were downloaded using the manufacturer's software.

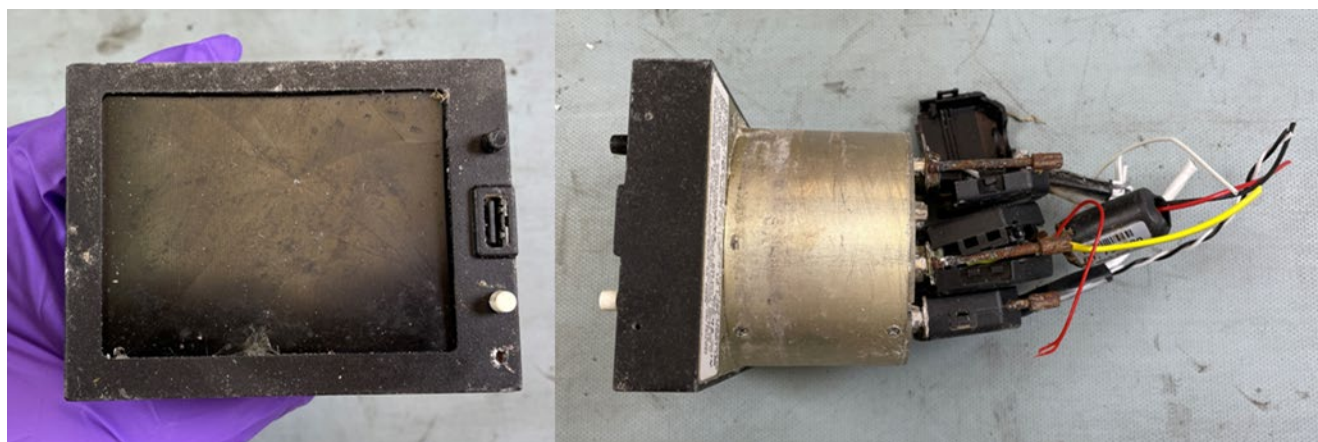


Figure 1. Front and side view of EDM-830, as received.

1.2 EDM-830 Data Description

The EDM recording contained approximately 237 power cycles from May 3, 2015, through April 5, 2023. The accident event was the last recording and its duration was approximately 11 minutes at a 10 second per sample rate.

1.3 EDM-830 Time Correlation

The EDM records time with the first data sample based on the unit's internal clock. This clock is set and updated manually by the operator.

D. FIGURES AND TABULAR DATA

Figures 2 to 3 contain EDM data recorded during the event on April 5, 2023. Figure 2 is a plot of the entire recording and figure 3 is a plot of approximately the final 2 minutes. All the parameters listed in table 1 are plotted.

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

Private, Piper PA32R-300, N635BD

Location, Date: Venice, FL, 04/05/23

NTSB No. ERA23FA181

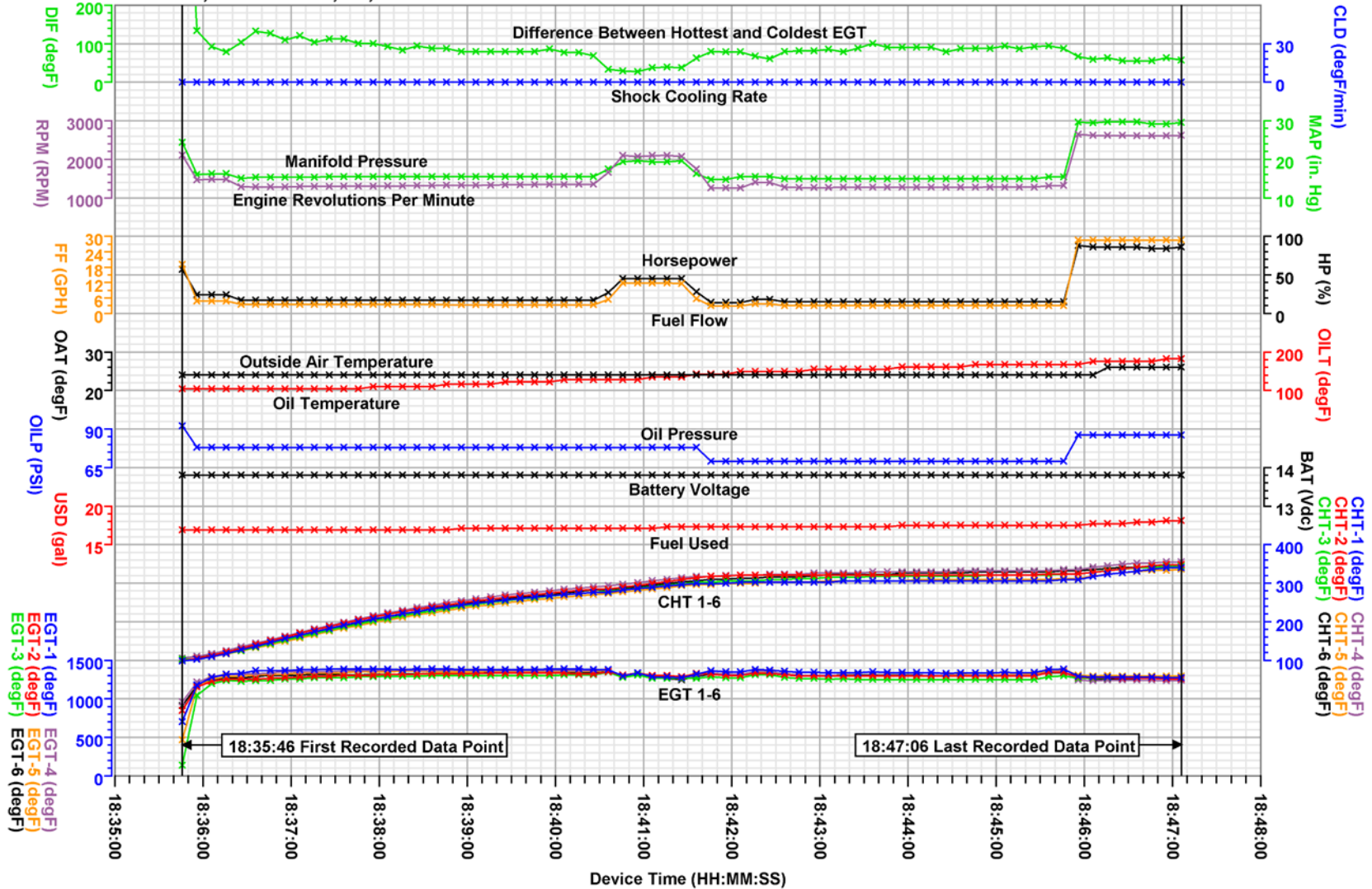


Figure 1. Plot of JPI EDM-830 parameters for entire accident recording.

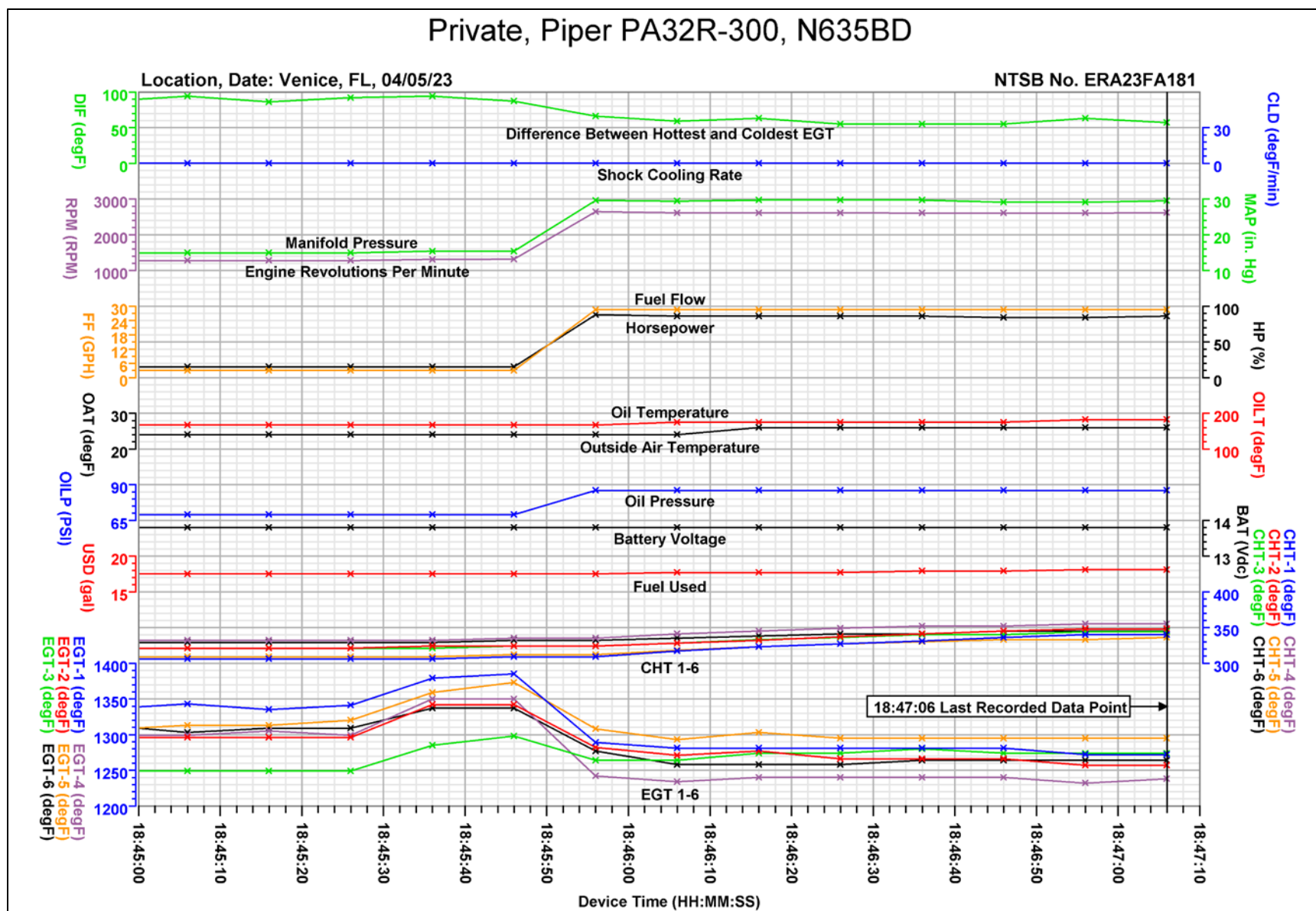


Figure 2. Plot of JPI EDM-830 parameters for the final segment of the accident recording.

APPENDIX B. VERIFIED AND PROVIDED PARAMETERS FROM EDM-830

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 (units)	Parameter Description
Date (MM/DD/YYYY)	Device Date
Time (HH:MM:SS)	Device Time
EGT 1-6 (degF)	Exhaust Gas Temperature
CHT 1-6 (degF)	Cylinder Head Temperature
DIF (degF)	Hottest and Coldest Exhaust Gas Temperature Differential
CLD (degF/min)	Shock Cooling Rate
RPM (RPM)	Engine Revolutions Per Minute
MAP (in.Hg)	Manifold Pressure
HP (%)	Horsepower
OIL T (degF)	Oil Temperature
OIL P (PSI)	Oil Pressure
FF (GPH)	Fuel Flow
USD (gal)	Fuel Used
OAT (degF)	Outside Air Temperature
BAT (V)	Battery Voltage

Table 2. Unit abbreviations.

Unit Abbreviations	Descriptions
MM/DD/YYYY	Month/Day/Year
HH:MM:SS	Hours:Minutes:Seconds
degF	Degrees Fahrenheit
degF/min	Degrees Fahrenheit per minute
in.Hg	Inches of mercury
RPM	Revolutions per minute
%	Percentage
gal	Gallons
GPH	Gallons per hour
PSI	Pounds per square inch
V	Voltage