

National Transportation Safety Board

Office of Research and Engineering

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WPR23FA225

ENGINE DATA MONITOR

Specialist's Factual Report

February 28, 2024

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A. ACCIDENT

Location: McCall, Idaho
Date: June 12, 2023
Time: 1029 mountain daylight time (MDT)
Airplane: Cessna R182, private operator, N3138C

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-700
Part Number: EGT-701
Recorder Serial Number: 30426

1.0 EDM-700 Description

The J.P. Instruments EDM-700 is a panel mounted gauge 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.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 per sample rate. The data can then be downloaded by the operator using the J.P. Instruments software.

1.1 EDM-700 Data Recovery

The EDM was in good condition and the data were downloaded using the manufacturer's procedure. Figure 1 is the front and side view of the EDM-700 as received by the NTSB Vehicle Recorder Lab.

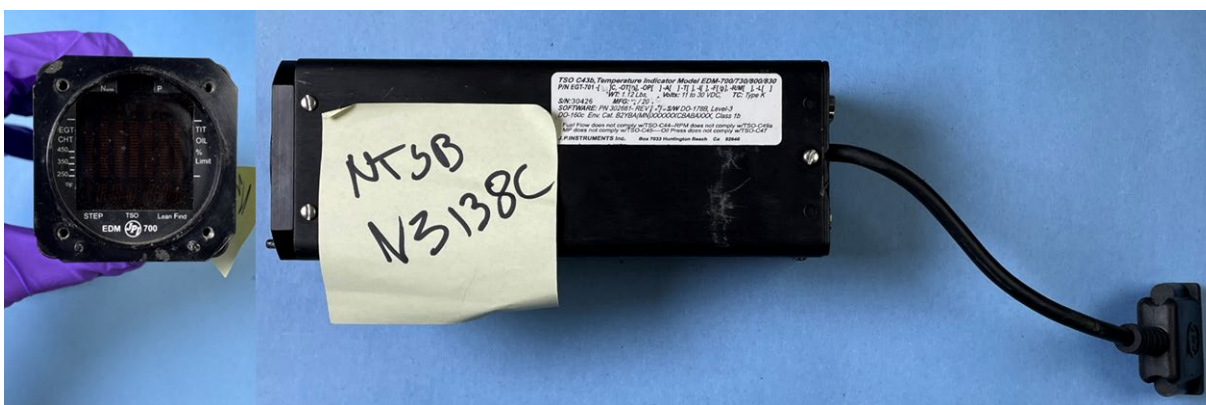


Figure 1. Front and side view of EDM-700, as received.

1.2 EDM-700 Data Description

The EDM recording contained approximately 14 hours of data over 14 power cycles from June 4, 2023, through June 12, 2023. The accident event was the last recording, and its duration was approximately 8 minutes at a 6 second per sample rate.

1.2.1 EDM-700 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.

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

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

1.3 EDM-700 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. Therefore, time will be referred to as JPI elapsed time in this report.

D. FIGURES AND TABULAR DATA

Figures 2 and 3 contain EDM data recorded during the event on June 12, 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 of Appendix A are plotted.

The display of fuel used pertains only to the fuel used since the last time the operator informed the EDM that the aircraft was refueled. Therefore, the starting value of fuel used may be a value greater than zero, and the ending value may be a value greater than the capacity of the fuel tank.

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, Cessna R182 Skylane RG, N3138C

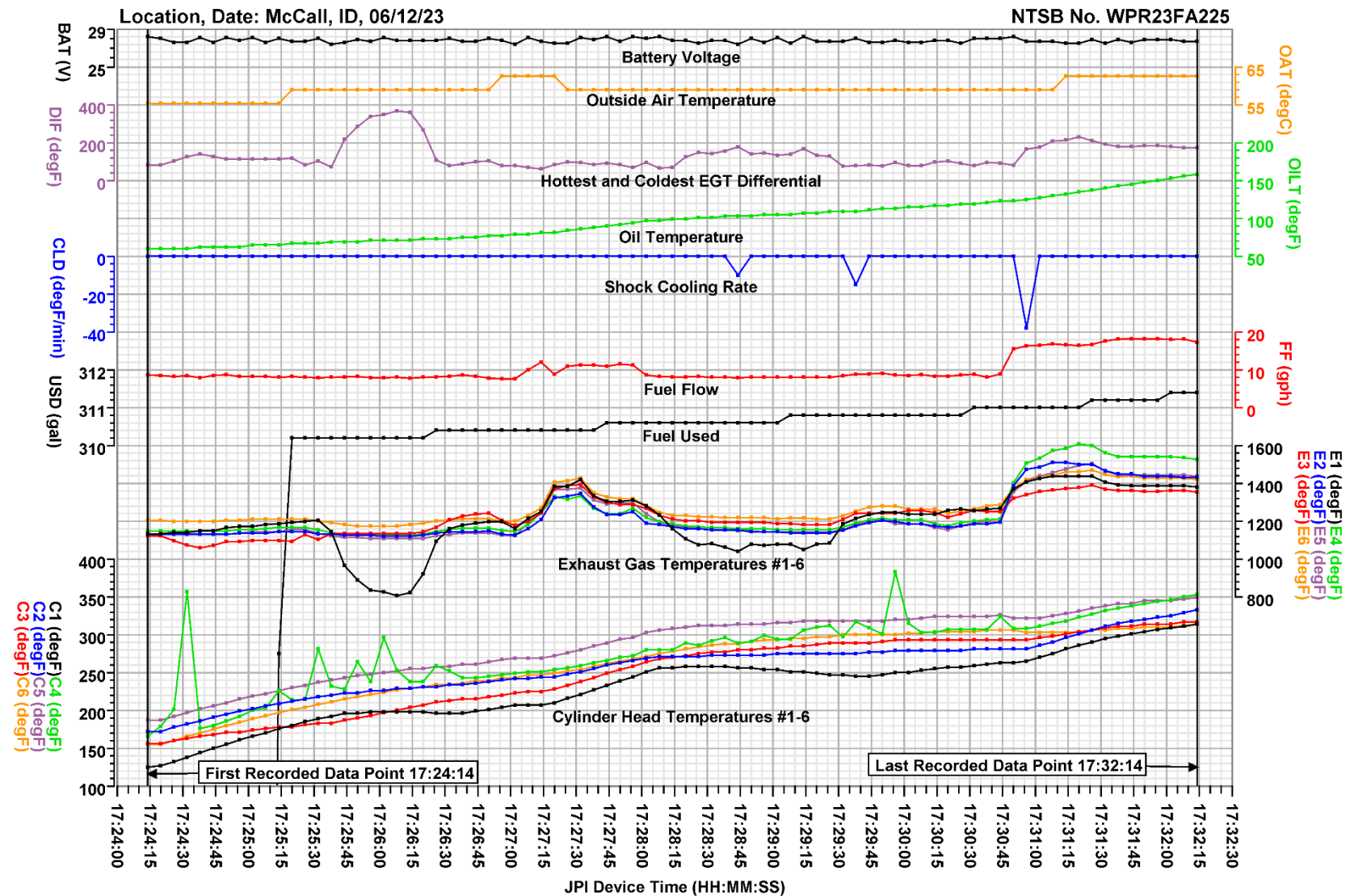


Figure 2. Plot of JPI EDM-700 parameters for entire accident recording.

Private, Cessna R182 Skylane RG, N3138C

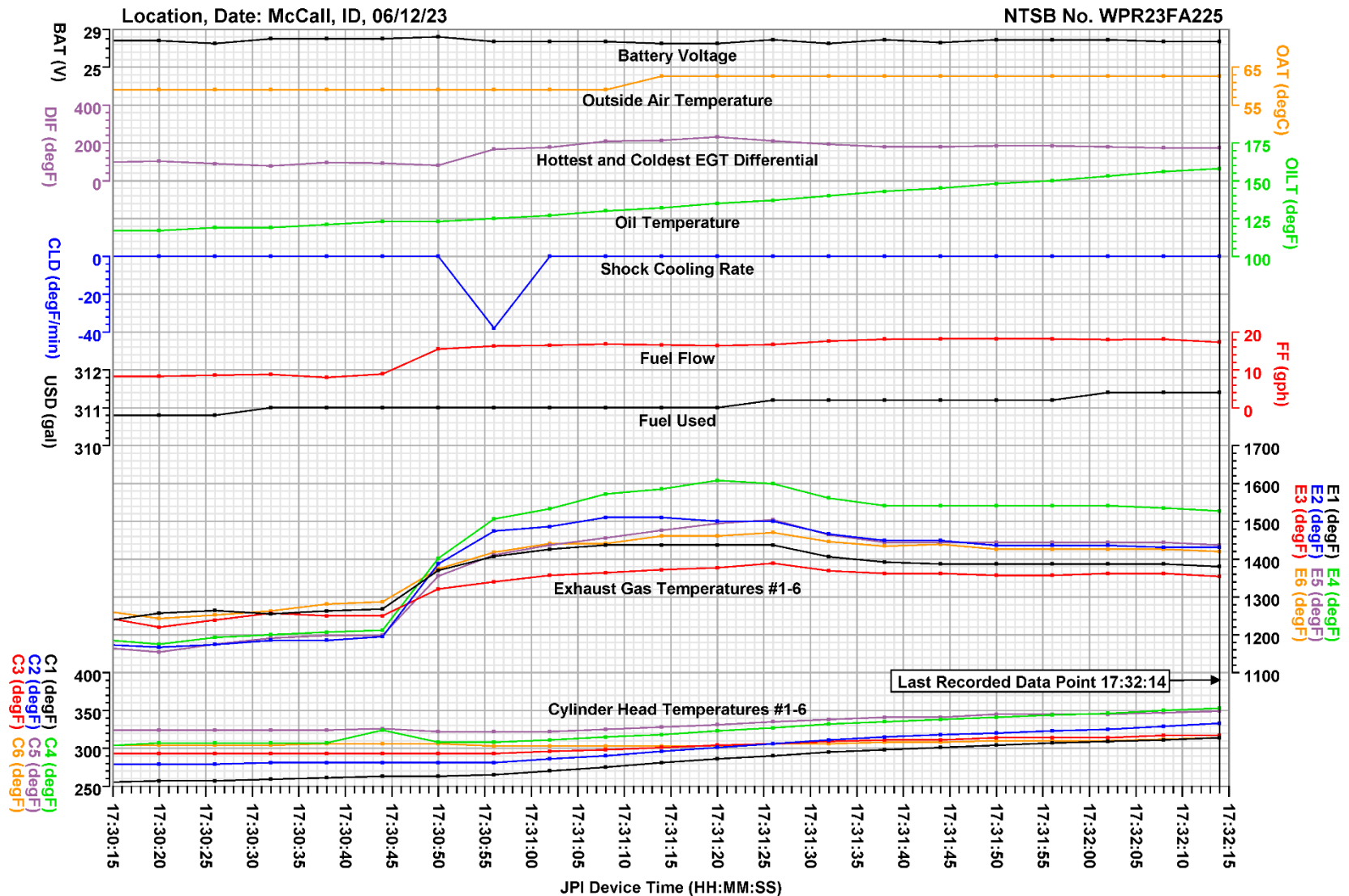


Figure 3. Plot of JPI EDM-700 parameters for the final segment of the accident recording.

APPENDIX A. VERIFIED AND PROVIDED PARAMETERS FROM EDM-700

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

Table 1. Verified and provided parameters.

Parameter Name (unit)	Parameter Description
Date (MM/DD/YYYY)	Device Date (Month/Day/Year)
Time (HH:MM:SS)	Device Time (Hours:Minutes:Seconds)
E 1-6 (degF)	Exhaust Gas Temperature Cylinder 1-6 (Degrees Fahrenheit)
C 1-6 (degF)	Cylinder Head Temperature Cylinder 1-6 (Degrees Fahrenheit)
DIF (degF)	Hottest and Coldest Exhaust Gas Temperature Differential (Degrees Fahrenheit)
CLD (degF/min)	Shock Cooling Rate (Degrees Fahrenheit per minute)
OIL T (degF)	Oil Temperature (Degrees Fahrenheit)
FF (GPH)	Fuel Flow (Gallons per hour)
USD (gal)	Fuel Used (Gallons)
OAT (degF)	Outside Air Temperature (Degrees Fahrenheit)
BAT (V)	Battery Voltage (Volts)