

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN22LA403

ENGINE DATA MONITOR

Specialist's Factual Report

June 9, 2023

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A. ACCIDENT

Location: Houghton Lake, Michigan
Date: August 31, 2022
Time: 1640 Eastern Daylight Time (EDT)
Airplane: Beech A36, N2270L

B. ENGINE DATA MONITOR SPECIALIST

Specialist: Gerald Kawamoto
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
Recorder Serial Number: 20258

1.0 EDM

1.1 JPI EDM-700 Description

The J. P. Instruments (JPI) 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 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.

1.2 JPI EDM-700 Data Recovery

The device was in good condition upon arrival at the Vehicle Recorder Laboratory, as shown in figure 1, and data were extracted normally using the manufacturer's procedures.



Figure 1. JPI EDM-700 as received.

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

1.3 JPI EDM-700 Data Description

The EDM contained sessions recorded from December 15, 2021, through August 31, 2022. The EDM recorded time with the first data sample based on the unit's internal clock which is set and updated by the operator. An offset of 15,220 seconds was applied to the data such that times appear in EDT for the remainder of the report. The offset was calculated by aligning the application of takeoff power from EDM parameters to the approximate time of takeoff shown in available ADS-B data. The device recorded at a 6 second-per-sample rate. The engineering unit conversions used for the data contained in this report are based on documentation from the manufacturer of the EDM.

There were two sessions recorded on August 31, 2022, EDT. The accident session was the final session recorded and started at 16:12:20 EDT and ended at 16:34:56 EDT. The first session started at 12:33:18 EDT and ended at 14:13:31 EDT. Plots for both sessions are included in this report.

1.3.1 JPI EDM-700 Engineering Unit Conversions

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

Appendix A lists the EDM parameters verified and provided in this report.

D. FIGURES AND TABULAR DATA

Figure 2 is a plot of EDM parameters for the entire accident session. The time range displayed is 16:12:00 to 16:35:00 EDT.

Figure 3 is a plot of EDM parameters for the first session recorded on August 31, 2022. The time range displayed is 12:30:00 to 14:15:00 EDT.

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

Submitted by:

Gerald Kawamoto
Recorder Specialist

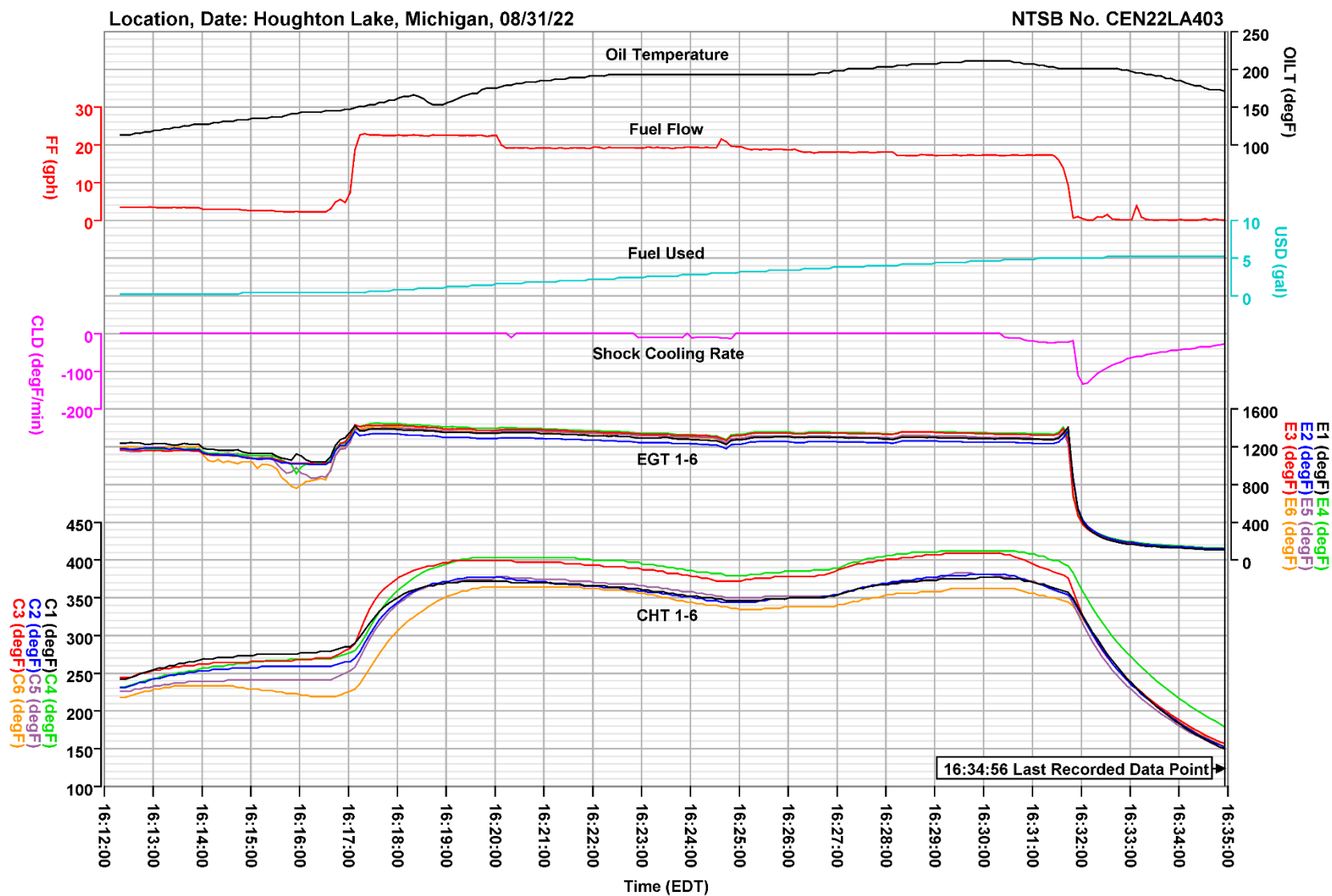


Figure 2. Plot of EDM parameters for the accident session recorded on August 31, 2022.

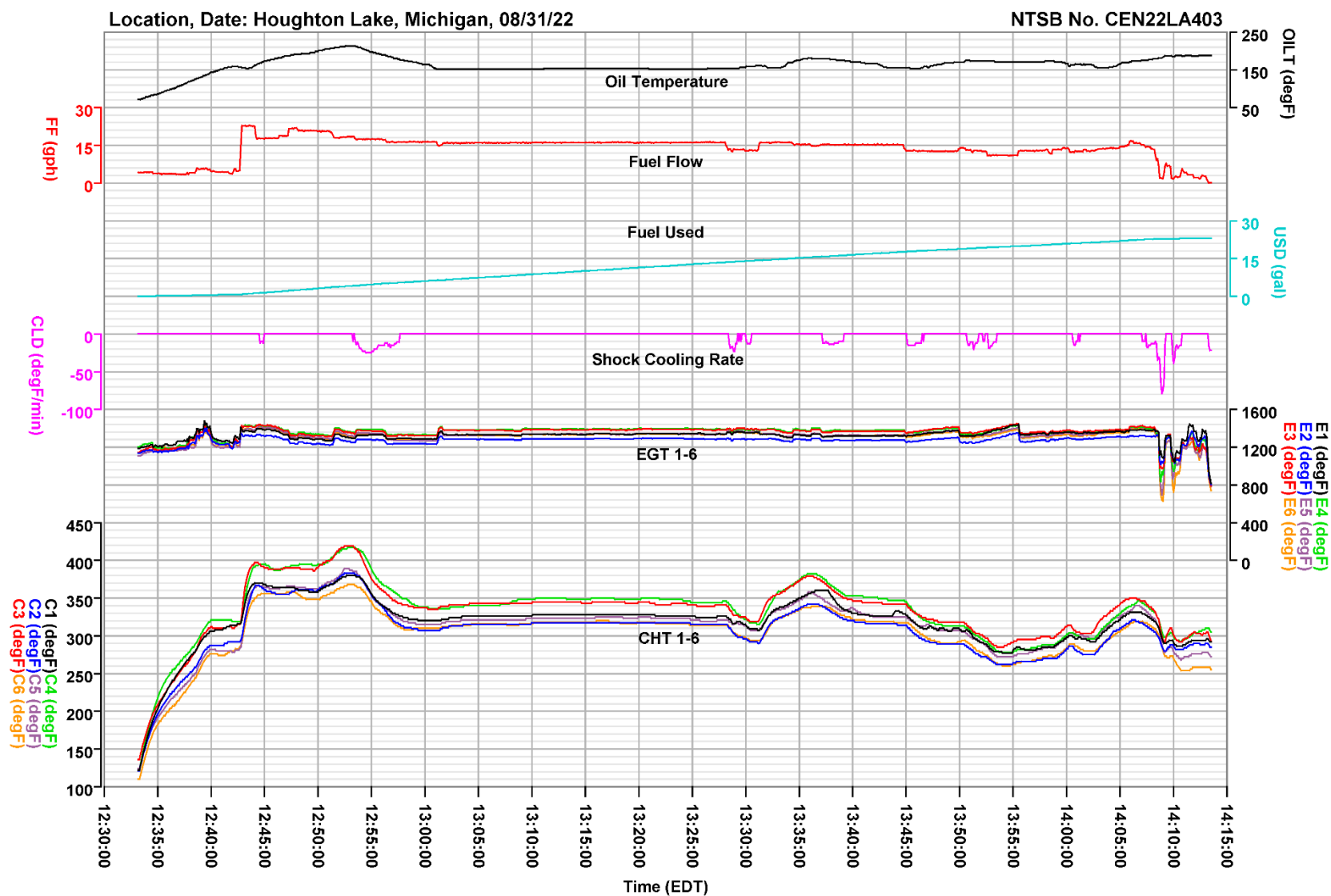


Figure 3. Plot of EDM parameters for the first session recorded on August 31, 2022.

APPENDIX A. VERIFIED AND PROVIDED PARAMETERS JPI EDM-700

This appendix describes the parameters provided and verified in this report. Table 1 lists the EDM parameters.

Table 1. Verified and provided parameters.

Parameter Name (units)	Parameter Description (units)
Time (hh:mm:ss)	Recorded Time (hours:minutes:seconds)
Date (mm/dd/yyyy)	Recorded Date (month/day/year)
C-# (degF)	Cylinder Head Temperature Cylinder # ² (degrees Fahrenheit)
E-# (degF)	Exhaust Gas Temperature Cylinder # (degrees Fahrenheit)
OIL T (degF)	Oil Temperature (degrees Fahrenheit)
FF (gph)	Fuel Flow (gallons per hour)
USD (gal)	Fuel Used (gallons)

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