

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

February 9, 2022

Engine Data Monitor (EDM)

Specialist's Factual Report

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1. EVENT SUMMARY

Location: Villa Rica, Georgia
Date: November 8, 2021
Aircraft: Mooney M20F
Registration: N3284F
Operator: Private
NTSB Number: ERA22FA050

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

On November 22, 2021, the National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following engine data monitor device:

Device Manufacturer/Model: J.P. Instruments EDM-700
Serial Number: 18059

3.1. Device Description

The J. P. Instruments EDM-700 is a panel mounted gauge that 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, and 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 memory¹ 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. The data can then be downloaded by the operator using the J.P. Instruments software.

3.2. Data Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed the unit had sustained damage, as shown in Figure 1. The device did not power up. The main circuit board was removed and placed into a surrogate device. The surrogate device powered up normally, and data were downloaded using the manufacturer's software.



Figure 1: Top view and side view of JPI EDM 700 as received.

3.3. Data Description

The downloaded data included 27 sessions, ranging from April 13, 2021, to November 8, 2021. The last recording session on November 8, 2021, was determined to be related to the event. The flight before the event flight was recorded on October 27, 2021. Both the accident flight and the flight on October 27, 2021, are included in this report. The data were recorded at a 6 second-per-sample rate.

3.4. Data Time Correlation

The date and time on JPI EDM 700 devices are manually adjusted by the user. Devices begin recording data when power is applied and stops when power is disconnected. Time displayed on the accident device was found to be 7 hour and 34 minutes ahead of eastern standard time (EST). The device only provided time to the nearest minute. All times for this device have been adjusted to reflect this offset and are referred to as EST for the rest of this report.

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

3.5. Parameters Provided

Table 1: JPI EDM 700 Data Parameters.

Parameter Name	Parameter Description
Date	Date for recorded data point (MM/DD/YYYY)
Time	Derived eastern standard time (EST) for recorded data point (HH:MM:SS)
C1-4 (degF)	Engine Cylinder Head Temperature Cylinder # (degrees Fahrenheit)
E1-4 (degF)	Engine Exhaust Gas Temperature Cylinder # (degrees Fahrenheit)
DIF (degF)	Difference between low and high Exhaust Gas Temperature (degrees Fahrenheit)
CLD (degF/MIN)	Shock Cooling Rate (degrees Fahrenheit per minute)
OILT (degF)	Engine Oil Temperature (degrees Fahrenheit)
BAT (V)	Bus Battery Voltage (voltage)

3.6. OVERLAYS AND TABULAR DATA

Figure 2 is a plot of parameters from the JPI device of the entire event flight. The time interval displayed is 12:45:00 to 12:57:00 EST on November 8, 2021.

Figure 3 is a plot of parameters from the JPI device of the final portion of the event flight. The time interval displayed is 12:55:00 to 12:56:15 EST on November 8, 2021.

Figure 4 is a plot of parameters from the JPI device of the flight before the event flight. The time interval displayed is 12:45:00 to 14:00:00 EST on October 27, 2021.

The tabular data recorded by the JPI EDM 700 device used to generate Figures 2 and 3 are included as Attachment 1, and the recorded data used to generate Figure 4 are included as Attachment 2 to this report. These attachments are provided in Comma Separated Value (CSV) format.

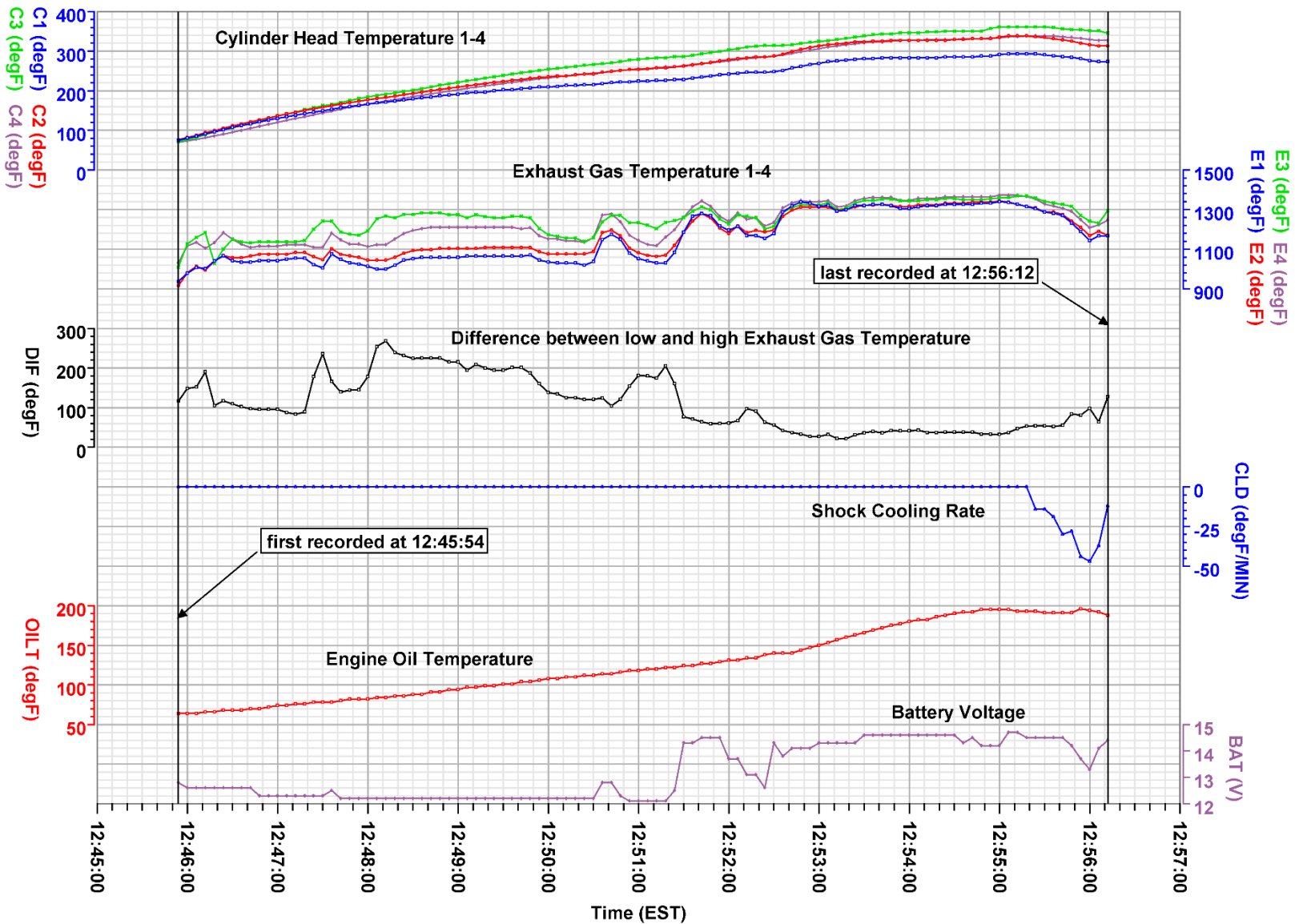


Figure 2: Plot of JPI EDM 700 data of the entire event flight.

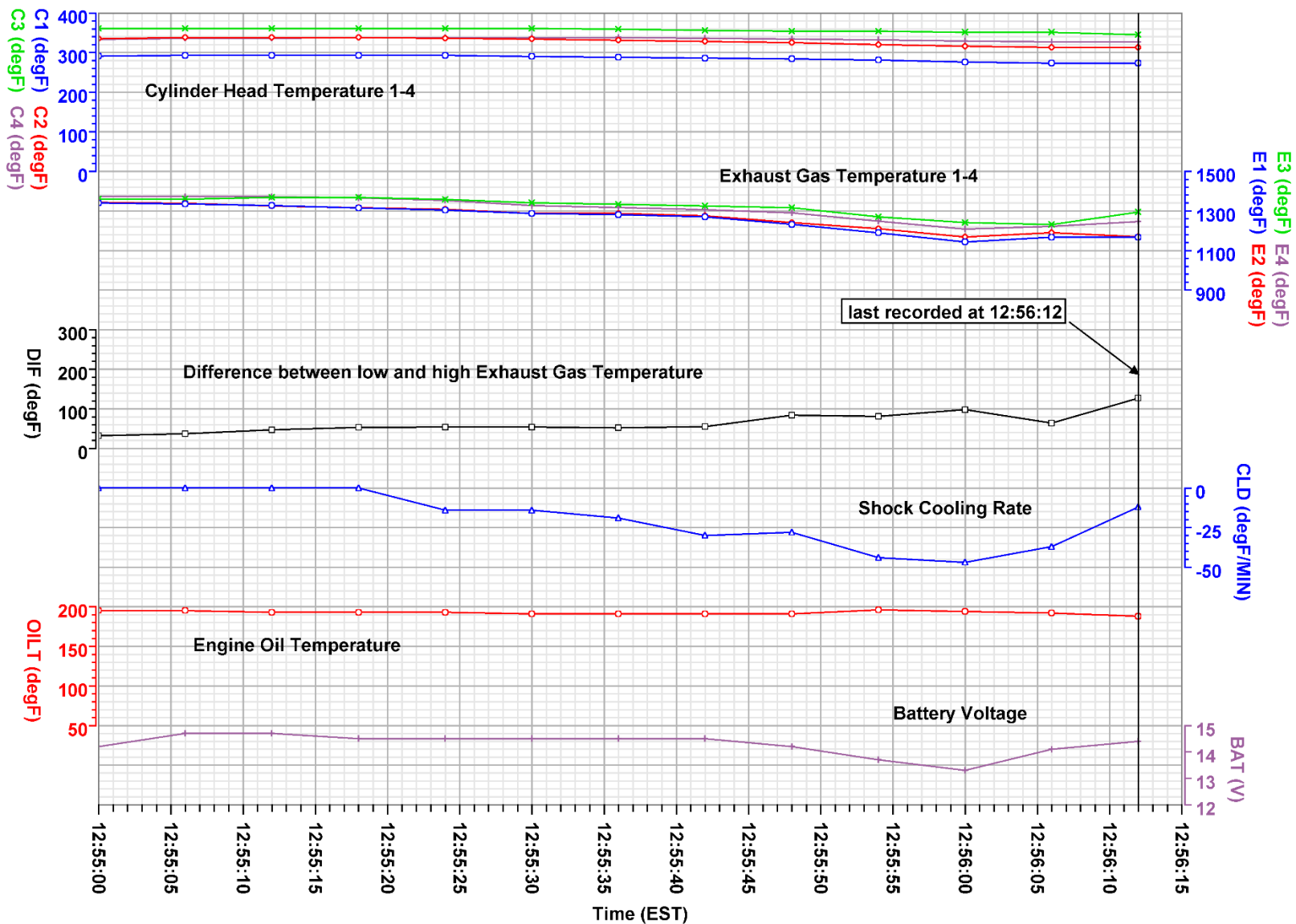


Figure 3: Plot of JPI EDM 700 data of the final portion of the event flight.

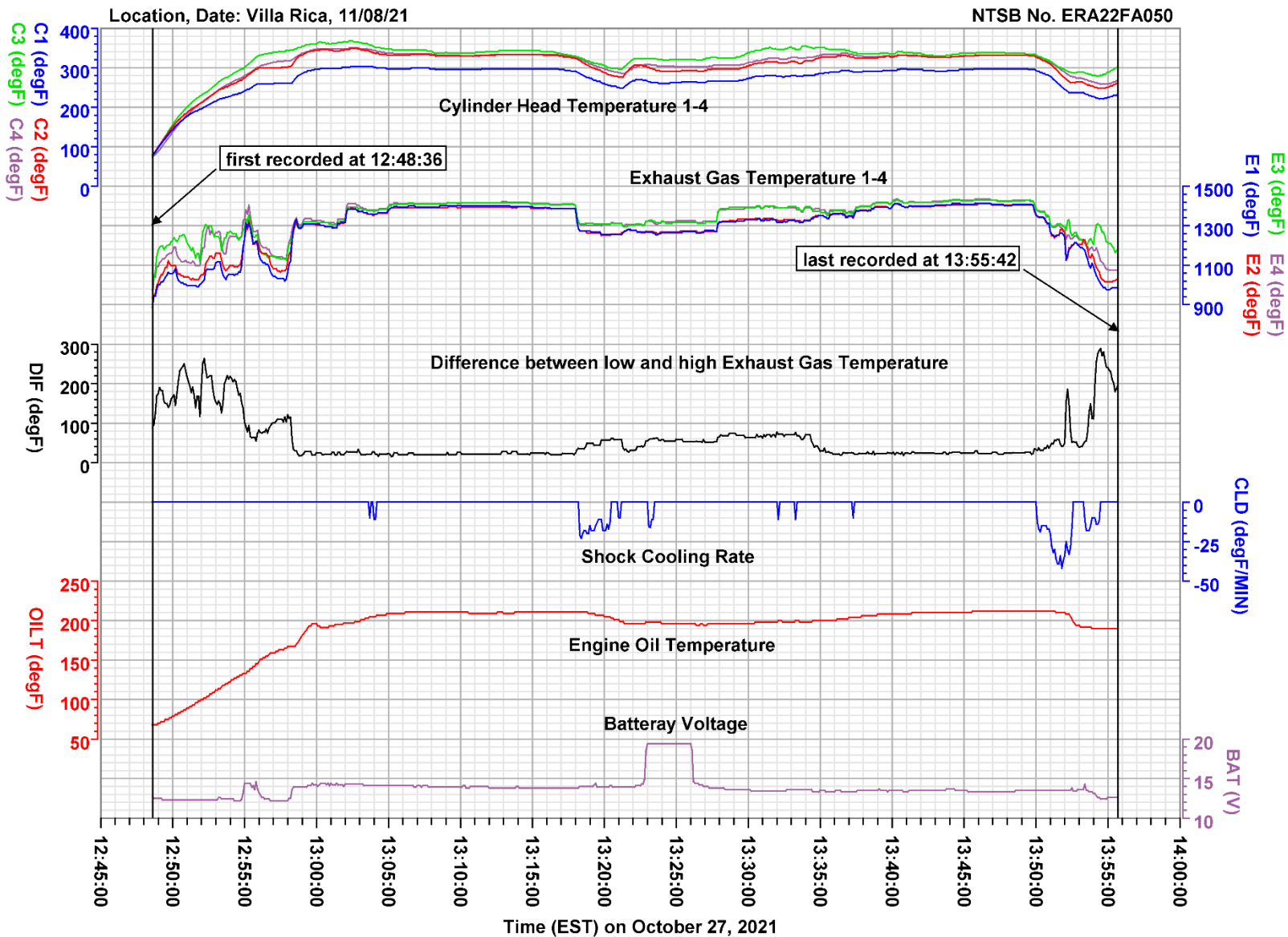


Figure 4: Plot of JPI EDM 700 data of the flight before the event flight.