

# National Transportation Safety Board

Office of Research and Engineering

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## **ENGINE DATA MONITOR**

Specialist's Factual Report

June 26, 2023

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## **A. INCIDENT**

Location: Desert Camp, California  
Date: March 2, 2022  
Time: 0813 pacific standard time (PST)  
1613 coordinated universal time (UTC)  
Airplane: Cessna 182D, private operator, N8814X

## **B. ENGINE DATA MONITOR SPECIALIST**

Specialist David Case  
Computer Engineer / Vehicle 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: JP Instruments EDM-700  
Part Number: EGT-701-6C  
Recorder Serial Number: 24439

Electronic File #1: U220818.JPI

### **1.0 EDM-700 Description**

The J. P. Instruments EDM-700 is a panel mounted gauge allowing the operator to 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 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-700 was in good condition (see figure 1) and the data were downloaded using the manufacturer's procedure.

## **1.2 EDM-700 Data Description**

The EDM recording contained approximately 16.5 hours of data over 15 power cycles. The accident flight was the last flight stored in memory, and its duration was approximately 27 minutes. Data were recorded at a rate of once every 6 seconds.

### **1.2.1 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.

## **1.3 EDM-700 Recording Description**

The EDM-700 was configured to record only basic engine instrumentation. The data recorded shows evidence of a normal start, engine warmup, a short flight, and then the engine temperature readings rapidly decrease before the recording's end.



**Figure 1.** EDM-700 Front View

## **1.4 EDM-700 Time Correlation**

The date of the last power cycle on the device was recorded as March 2, 2022. The end of the recording was timestamped as 16:13:56. The time of the accident was recorded as approximately 08:13:00 local time. The EDM-700 keeps the date and time using a battery backed up clock, and the time recorded by the device lines up with Pacific Standard time being UTC - 8. However, due to the uncertainty of how accurately the time was set by the operator, and there not being a more accurate source of time from the aircraft, time is displayed in this report as seconds since startup.

## **D. FIGURES AND TABULAR DATA**

Figure 2 contains EDM data recorded during the event on March 2, 2022. All the parameters listed in table 1 are plotted.

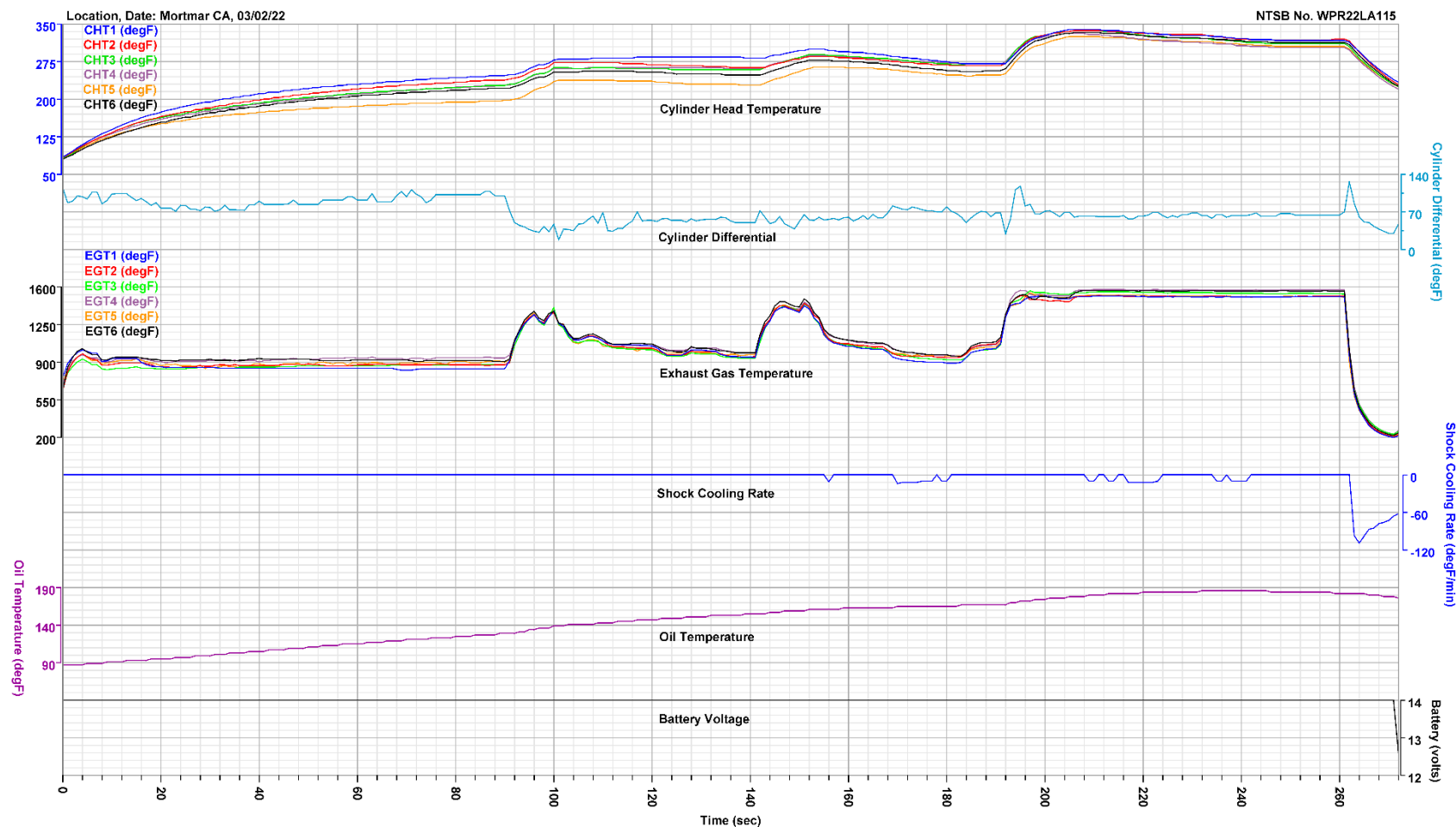
The corresponding tabular data used to create figure 2 are provided in electronic comma separated value (CSV) format as attachment 1 to this report.

Submitted by:

David L. Case

Computer Engineer / Vehicle Recorder Specialist

# Cessna 182D, N8814X



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**Figure 2.** Plot of engine parameters for the entire (accident /incident) 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 table 2 describes the unit abbreviations used in this report.

**Table 1.** Verified and provided parameters

| Parameter Name                | Parameter Description                                                        |
|-------------------------------|------------------------------------------------------------------------------|
| CHT1 (degF)                   | Cylinder Head Temperature #1                                                 |
| CHT2 (degF)                   | Cylinder Head Temperature #2                                                 |
| CHT3 (degF)                   | Cylinder Head Temperature #3                                                 |
| CHT4 (degF)                   | Cylinder Head Temperature #4                                                 |
| CHT5 (degF)                   | Cylinder Head Temperature #5                                                 |
| CHT6 (degF)                   | Cylinder Head Temperature #6                                                 |
| Cylinder Differential (degF)  | The difference between the temperatures of the hottest and coldest cylinders |
| EGT1 (degF)                   | Exhaust Gas Temperature #1                                                   |
| EGT2 (degF)                   | Exhaust Gas Temperature #2                                                   |
| EGT3 (degF)                   | Exhaust Gas Temperature #3                                                   |
| EGT4 (degF)                   | Exhaust Gas Temperature #4                                                   |
| EGT5 (degF)                   | Exhaust Gas Temperature #5                                                   |
| EGT6 (degF)                   | Exhaust Gas Temperature #6                                                   |
| Shock Cooling Rate (degF/min) | Cylinder cooling rate over time                                              |
| Battery Voltage (V)           | Battery Voltage                                                              |
| Oil Temp (deg)                | Engine Oil Temperature                                                       |

**Table 2.** Unit abbreviations

| Unit Abbreviations | Descriptions       |
|--------------------|--------------------|
| deg                | degrees            |
| deg/min            | degrees per minute |
| degF               | Degrees Fahrenheit |
| sec                | seconds            |
| V                  | Volts DC           |