

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA22LA144

ENGINE DATA MONITOR

Specialist's Factual Report

November 14, 2022

TABLE OF CONTENTS

A. ACCIDENT.....	3
B. ENGINE DATA MONITOR SPECIALIST.....	3
C. DETAILS OF THE INVESTIGATION	3
1.0 EDM.....	3
1.1 JPI EDM-700 Description.....	3
1.2 JPI EDM Data Recovery.....	4
1.3 JPI EDM Data Description.....	5
1.3.1 JPI EDM Engineering Unit Conversions	5
D. FIGURES AND TABULAR DATA.....	5
APPENDIX A. VERIFIED AND PROVIDED PARAMETERS JPI EDM-700.....	8

A. ACCIDENT

Location: Savannah, Georgia
Date: February 26, 2022
Time: 10:43 eastern standard time (EST)
Airplane: Piper PA-28-150, N5208W

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: 19730

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 Data Recovery

The EDM was recovered from the Savannah River, and the extent of the water damage rendered the device inoperable. The circuit board containing the non-volatile memory chips, shown in Figure 1, was removed, cleaned, read out, and converted to engineering units using laboratory tools.

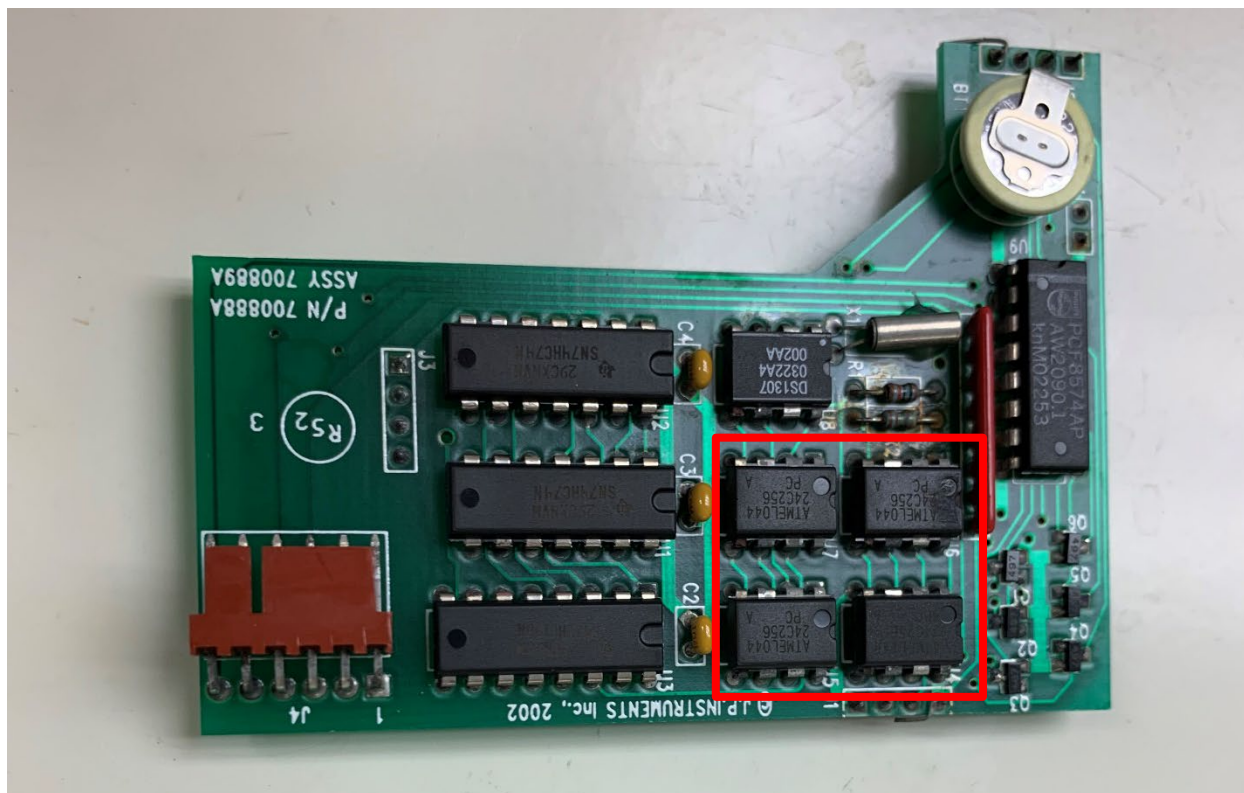


Figure 1. JPI EDM-700 non-volatile memory chips are highlighted in the red square.

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

1.3 JPI EDM Data Description

The EDM contained 21 sessions recorded from February 17, 2022, through February 26, 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. Due to the condition of the device, the time could not be correlated to a standard time and is referred to as JPI Time in this report. 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. The session recorded on February 26 started at 17:29:20 and ended at 18:54:38 JPI Time, and is included in this report. Values for CHT (cylinder head temperature) 3 and 4 parameters did not always trend with the other CHT parameters for all sessions recorded.

1.3.1 JPI EDM 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.

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

D. FIGURES AND TABULAR DATA

Figures 2 and 3 contain data from the last session recorded on the device.

Figure 2 is a plot of parameters for the entire session. The time displayed is 17:25:00 to 18:55:00 JPI Time.

Figure 3 is a plot of parameters for the final 3 minutes of the session. The time displayed is 18:52:00 to 18:55:00 JPI Time.

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

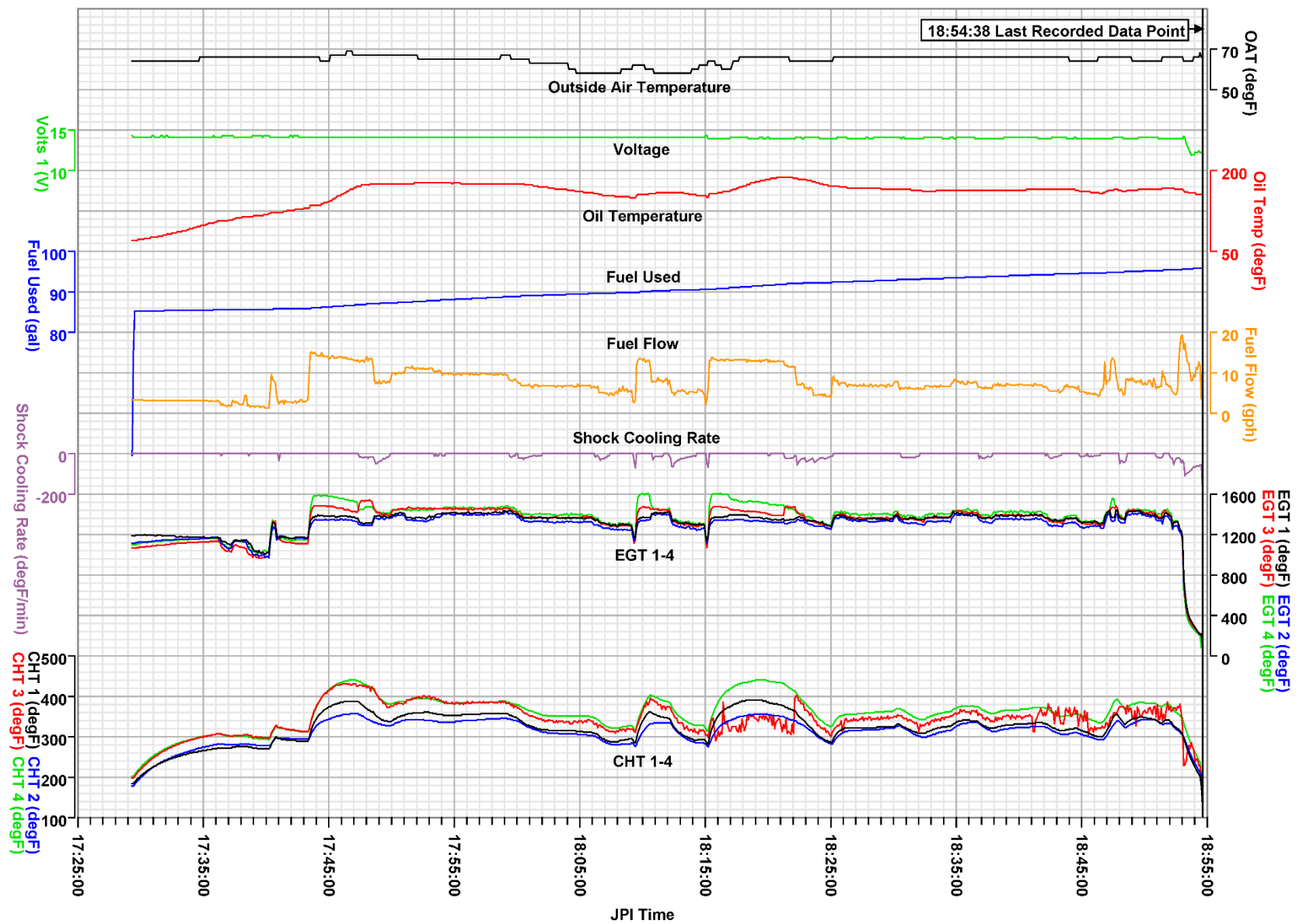


Figure 2. Plot of JPI parameters of the entire session on February 26, 2022.

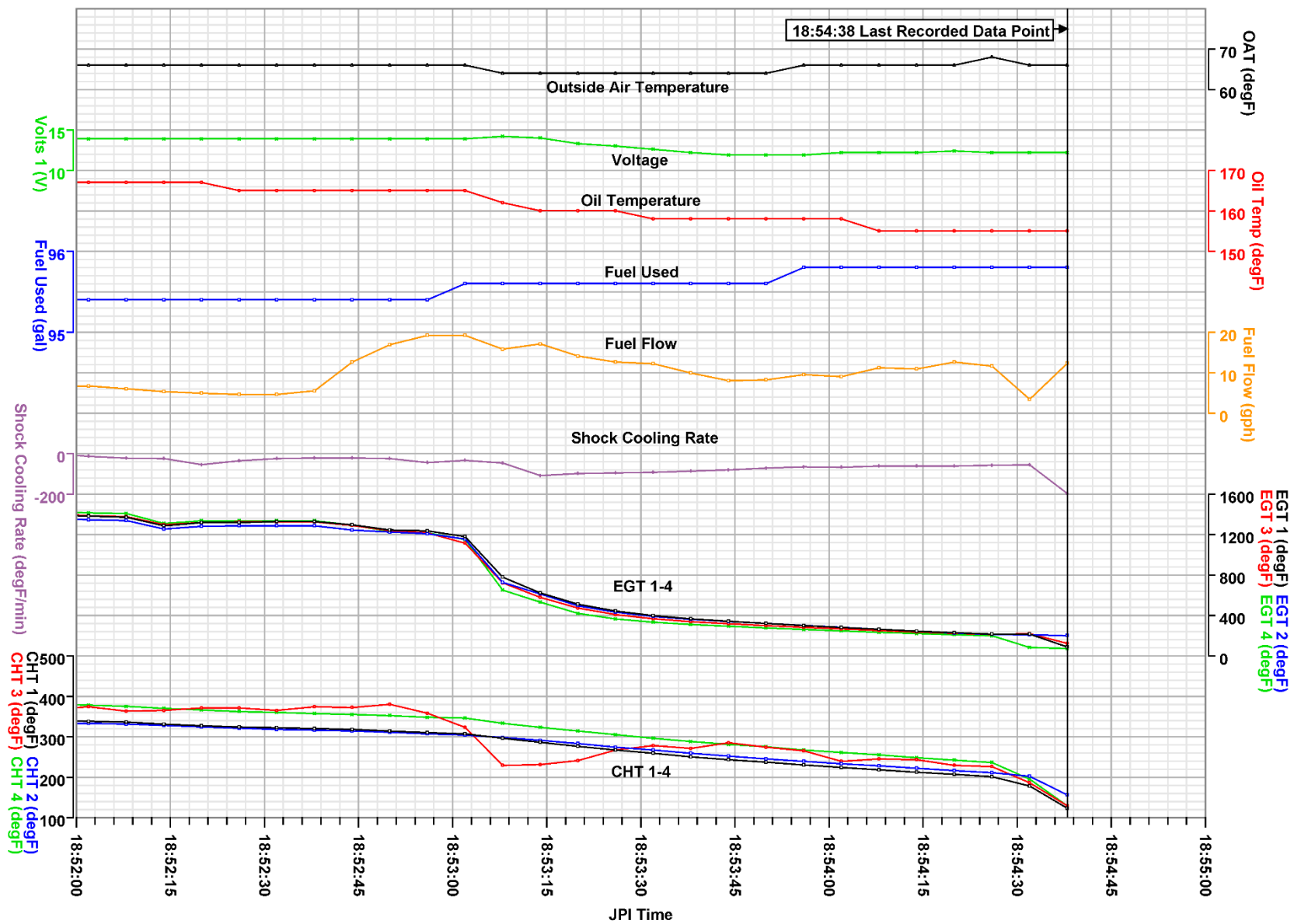


Figure 3. Plot of JPI parameters at the end of the session on February 26, 2022.

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	Parameter Description
CHT-# (degF)	Cylinder Head Temperature Cylinder # ² (degrees Fahrenheit)
EGT-# (degF)	Exhaust Gas Temperature Cylinder # (degrees Fahrenheit)
Fuel Flow (gph)	Engine Fuel Flow (gallons per hour)
Fuel Used (gal)	Engine Fuel Used (gallons)
Oil Temp (deg)	Engine Oil Temperature (degrees Fahrenheit)
Shock Cooling Rate (degF/min)	Engine Shock Cooling (degrees Fahrenheit per minute)
OAT (degF)	Outside Air Temperature (degrees Fahrenheit)
Volts 1 (V)	Voltage (volts)

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