

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ANC23LA009

ENGINE DATA MONITOR

Specialist's Factual Report

April 24, 2023

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A. ACCIDENT

Location: Lihue, Hawaii
Date: December 15, 2022
Time: 1205 Hawaii-Aleutian Standard Time (HST)
Airplane: Beech 77, N991AB

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: 17441

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 downloaded 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 26, 2021, through December 15, 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. When powered on at the Vehicle Recorder Laboratory, the internal time was approximately 10 hours and 56 minutes ahead of HST. This offset was applied to the data and time is referred to as approximated HST for the remainder of the report.² 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 final session started at 11:55:40 and ended at 12:03:16 HST (approximate), on December 15, 2022, and is 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 session. The time range displayed is 11:55:30 to 12:03:30 HST (approximate).

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

Submitted by:

Gerald Kawamoto
Recorder Specialist

² Time is referred to as approximate because it is set and updated by the operator. The resolution of the time parameter upon powering on is to the nearest minute.

Private, Beech 77, N991AB

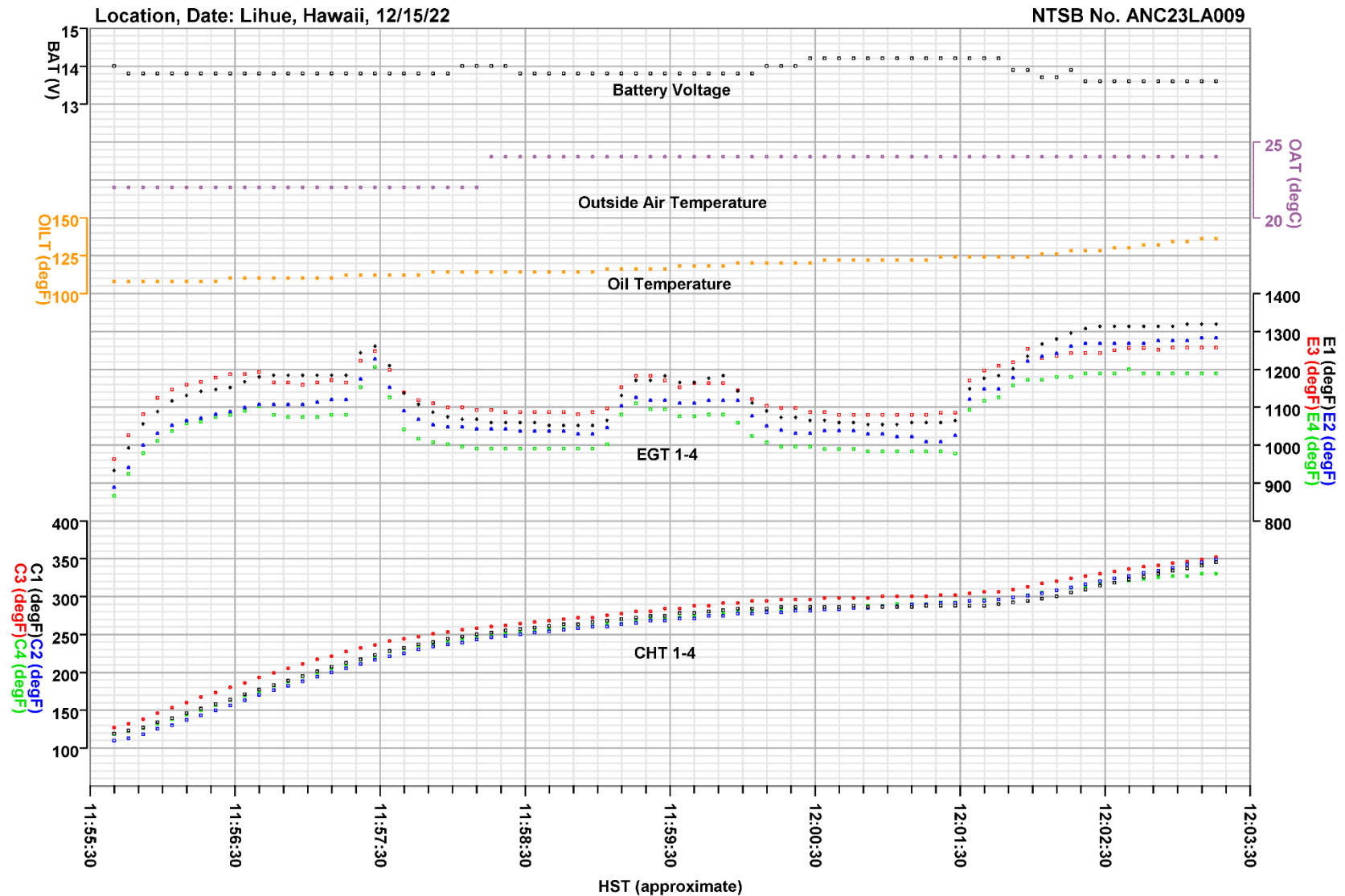


Figure 2. Plot of EDM parameters of the final session recorded on December 15, 2022.

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 # ³ (degrees Fahrenheit)
E-# (degF)	Exhaust Gas Temperature Cylinder # (degrees Fahrenheit)
OILT (degF)	Oil Temperature (degrees Fahrenheit)
OAT (degC)	Outside Air Temperature (degrees Celsius)
BAT (V)	Battery Voltage (volts)

³ Depending on aircraft configuration, number of cylinders that are instrumented varies. In the data plots the '#' is replaced with the appropriate cylinder ID.