

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR24LA012

ENGINE DATA MONITOR

Specialist's Factual Report

August 12, 2024

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A. ACCIDENT

Location: Chandler, Arizona
Date: October 11, 2023
Time: 1050 mountain standard time (MST)
Airplane: Piper PA-46-310P, private operator, N4380D

B. ENGINE DATA MONITOR SPECIALIST

Specialist Olivia Fowler
Mechanical Engineer - Vehicle Recorders 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-900
Part Number: 790000-A-1655
Recorder Serial Number: 05082

1.0 EDM 900 Description

The J. P. Instruments EDM-900 is a panel mounted display that the operator can monitor and record multiple parameters related to engine operations and GPS parameters, if connected. 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

- Fuel Pressure
- Fuel Level
- 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. The rate at which the data is stored is selectable by the operator from 1 to 500 seconds between samples. Data recording typically begins when RPM is greater than 500 rpm. The memory can store up to 300 hours of data at a 6 second sample rate. For a non-damaged unit, the data can then be downloaded using a USB flash drive and following the instructions on the unit.

2.0 EDM Data Recovery

The EDM was in good condition and the data were downloaded using the manufacturer's procedure.

3.0 EDM Data Description

The EDM recording contained 117 recordings between January 15, 2016, and October 11, 2023. The event flight was the last recording, and its duration was approximately 11 minutes.

3.1 EDM 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.

3.2 EDM Time Correlation

The EDM records time with the first data sample based on the unit's internal clock. This clock is set and updated by the operator. It is common for the internal clock to drift over time on this type of device.

Correlation of the EDM data to the event local time, MST, was established by correlating the ADS-B data available for the previous flight to establish the approximate time offset for the EDM. For the rest of this report, all times are referenced as MST.

D. FIGURES AND TABULAR DATA

Figures 1 and 2 contain EDM data recorded during the event on October 11, 2023. All the parameters listed in table 1 are plotted.

Figures 1 shows EDM data for the entire recorded portion of the last flight, and figure 2 shows EDM data for a period from just before takeoff until the accident. Around 10:45:20 the plots indicate a decrease in fuel flow, fuel pressure, manifold pressure, RPM, EGT and CHT, indicative of a loss of engine power.

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

Submitted by:

Olivia Fowler
Mechanical Engineer – Vehicle Recorders Specialist

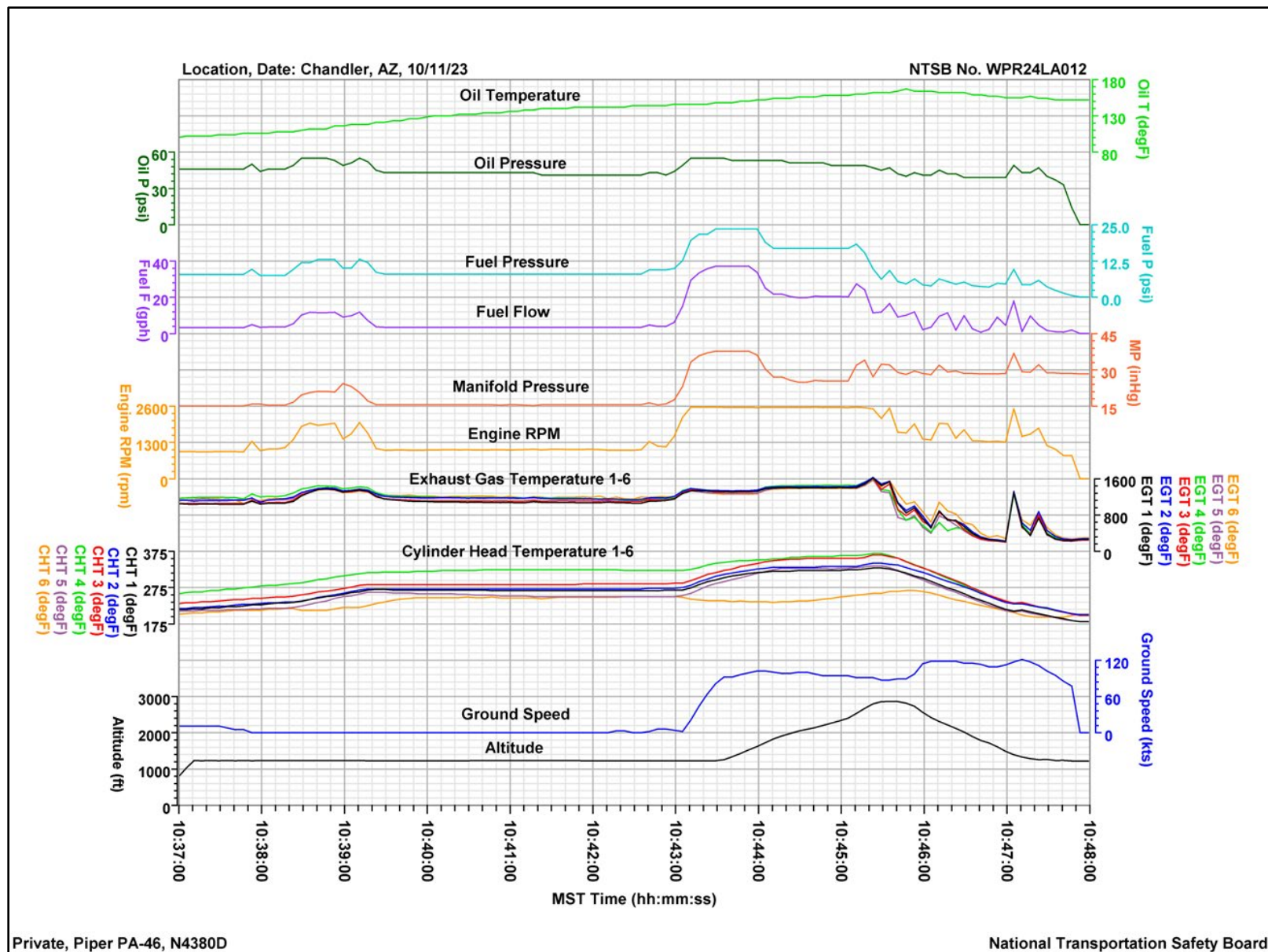


Figure 1. Plot of EDM parameters from engine start to the accident.

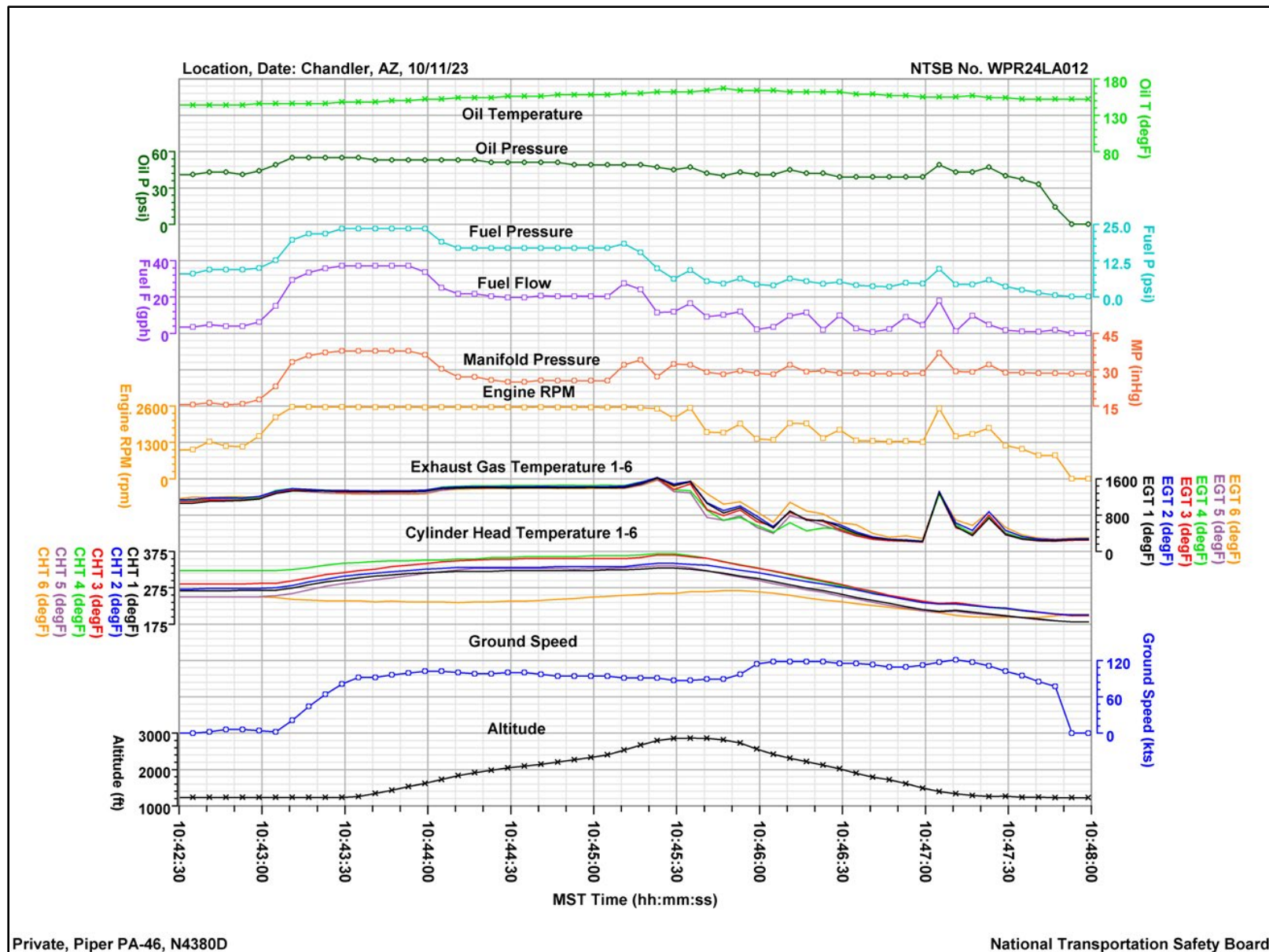


Figure 2. Plot of EDM parameters from just prior to takeoff to the accident.

APPENDIX A. VERIFIED AND PROVIDED PARAMETERS

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
Altitude (ft)	GPS Altitude
CHT # (degF)	Cylinder Head Temperature Cylinder # ¹
EGT # (degF)	Exhaust Gas Temperature Cylinder # ¹
Engine RPM (rpm)	Engine RPM
Fuel F (gph)	Fuel Flow
Fuel P (gph)	Fuel Pressure
Ground Speed (kts)	Ground Speed
MP (inHg)	Manifold Pressure
OIL T (degF)	Oil Temperature
OIL P (degF)	Oil Pressure

Table 2. Unit abbreviations.

Unit Abbreviations	Descriptions
degF	degrees Fahrenheit
ft	feet
gph	gallons per hour
inHg	inches of Mercury
kts	knots
rpm	revolutions per minute
psi	pounds per square inch

¹ Depending on aircraft configuration number of cylinders that are instrumented varies. In the data plots the '#' is replaced with the appropriate cylinder ID.