

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

November 6, 2019

Engine Data Monitor (EDM)

Specialist's Factual Report
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1. EVENT SUMMARY

Location: Poughkeepsie, NY
Date: July 19, 2019
Aircraft: Piper PA-46-310P
Registration: N811SK
Operator: Private
NTSB Number: ERA19LA231

On July 19, 2019, about 1440 eastern daylight time (EDT), a Piper PA-46-310P, N811SK, was substantially damaged during a forced landing while on approach to Hudson Valley Regional Airport (POU), Poughkeepsie, New York. The private pilot and two passengers were seriously injured, and one passenger sustained minor injuries. Visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the flight that originated at Akron-Fulton International Airport (AKR), Akron, Ohio, about 1248. The airplane was owned and operated by the pilot under the provisions of Title 14 Code of Federal Regulations Part 91. The personal flight was originally destined for North Central State Airport (SFZ), Pawtucket, Rhode Island.

2. ENGINE DATA MONITOR GROUP

An Engine Data Monitor (EDM) group was not convened.

3. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following EDM:

Recorder Manufacturer/Model: **JPI EDM-900**
Recorder Serial Number: **05042**

3.1. EDM 900 Description

The J. P. Instruments EDM-900 is a panel mounted display that the operator can monitor and record multiple engine 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, 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 1 to 500 seconds per sample. Data recording typically begins when RPM is greater than 500 rpm. The memory can typically store over 300 hours of data at a 6 second sample rate. For a non-damaged unit, the data can then be downloaded by the operator using a USB flash drive and following the instructions on the unit.

3.1.1. Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an external examination revealed damage to the unit's display, as shown in Figure 1. The unit was otherwise in good condition and powered on normally with a surrogate display. Data was extracted normally using the manufacturer's tools.

Figure 1. JPI EDM-900 as received.



3.1.2. Data Description

The data extracted included 59 sessions from April 10, 2018, through July 19, 2019. The last session recorded was determined to be related to the accident event and is included in this report. The recorded time is based on the unit's internal clock, which is set and updated by the user. The clock was set 3 hours 33 minutes and 14 seconds (12794 seconds) ahead of EDT. The offset was applied to the plotted data and all times are referenced as EDT for the rest of this report. The data was recorded at a 6 second-per-sample rate.

3.1.3. Parameters Provided

Table 1 describes parameter recorded by the device. The engineering units conversions used for the data contained in this report are based on documentation from the manufacturer of the EDM.

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

Table 1: JPI EDM-900 Data Parameters

Parameter Name	Parameter Description
Time	Time for recorded data point (HH:MM:SS)
EGT 1-6 (degF)	Exhaust Gas Temperature Cylinder # (degrees Fahrenheit)
CHT 1-6 (degF)	Cylinder Head Temperature Cylinder # (degrees Fahrenheit)
TIT (degF)	Turbine Inlet Temperature (degrees Fahrenheit)
CLD (degF/min)	Shock Cooling Rate (degrees Fahrenheit per minute)
Fuel Flow (gph)	Fuel Flow (gallons per hour)
Fuel Used (gal)	Fuel Used (gallons)
Voltage (V)	Battery Voltage (Volts)
LFL (gal)	Left Fuel Level (gallons)
RFL (gal)	Right Fuel Level (gallons)
MAP (inHg)	Manifold Pressure (inches of Mercury)
HP (%)	Horsepower (percent)
RPM	Engine Revolutions per Minute
OilP (psi)	Oil Pressure (pounds per square inch)
OilT (degF)	Oil Temperature (degrees Fahrenheit)
OAT (degC)	Outside Air Temperature (degrees Celsius)

3.2. Plots and Corresponding Tabular Data

The following two figures contain EDM data recorded during the July 19, 2019, event. EGT 3 did not record data during the accident flight and is excluded from the plots. Past flights revealed that the parameter was not recording for flights dating back to 2018.

Figure 2 is a plot of parameters recorded by the JPI EDM-900 for the entire accident flight. The recording started at 12:37:02 EDT and ended at 14:40:42 EDT.

Figure 3 is a plot of parameters recorded by the JPI EDM-900 for the last 15 minutes of the accident flight. The time interval displayed is 14:26:00 EDT to 14:41:00 EDT.

Between 14:27 and 14:28, LFL reached 0 and Oil Pressure increased from 46 to 48 psi. About 14:31, values for MAP, HP, RPM, EGT and CHT began to decrease. Between 14:36 and 14:37, RFL reached 0. Between 14:37 and 14:38, Oil Pressure increased from 48 to 50 psi, values for HP and Fuel Flow became erratic, EGT values for all cylinders became erratic then decreased rapidly, CHT values for all cylinders began to decrease, and MAP began to increase. From 14:38 until the end of the recording at 14:40:42, CHT values for all cylinders decreased rapidly, MAP continued to increase, HP was erratic, Oil Pressure and RPM increased then decreased, and Fuel Flow hovered around 0 gph.

The corresponding tabular data used to create these two plots are provided in electronic (*.csv²) format as Attachment 1 to this report.

² Comma Separated Value format.

Figure 2. Plot of JPI EDM-900 parameters for the entire accident flight.

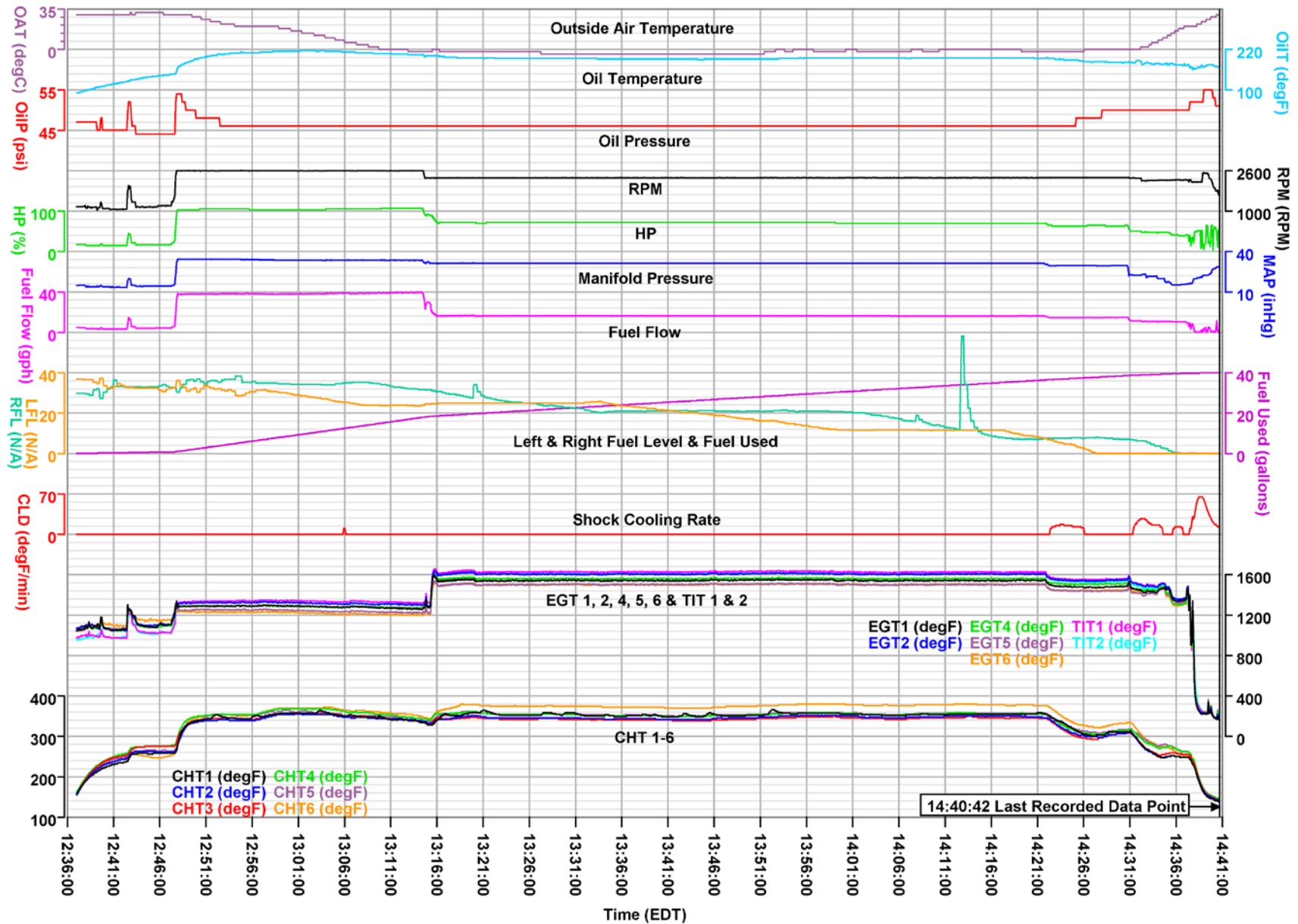


Figure 2. Plot of JPI EDM-900 parameters at the end of the accident flight.

