

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

March 25, 2019

Engine Data Monitor (EDM)

Specialist's Factual Report

By Gerald Kawamoto

1. EVENT SUMMARY

Location: Enumclaw, Washington
Date: March 4, 2018
Aircraft: Beech A36
Registration: N207PC
Operator: Private
NTSB Number: WPR18LA098

On March 4, 2018, about 1558 Pacific standard time (PST), a Raytheon Aircraft Company A36 airplane, N207PC, was substantially damaged following a loss of engine power and forced landing about 3.5 nautical miles northeast of Enumclaw, Washington. The private pilot, the sole occupant of the airplane, was seriously injured. Instrument meteorological conditions prevailed for the personal cross-country flight, which was being operated in accordance Title 14 *Code of Federal Regulations* Part 91. An instrument flight rules (IFR) flight plan was filed and active at the time of the accident. The flight had departed Yuma International Airport, Yuma, Arizona, about 1100 mountain standard time, with the reported destination being Snohomish County Airport, Everett, Washington.

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

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

Device Manufacturer/Model:	JPI EDM-700
Serial Number:	27649

3.1. Device Description

The JPI EDM-700 is a panel-mounted gauge that allows 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 (RPM), Compressor Discharge Temperature, Fuel Flow, Carburetor Temperature, and Battery Voltage.

The unit can also calculate in real time, percent of maximum horsepower, fuel used, shock cooling rate, and EGT differentials between 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 2 to 500 seconds per sample. The memory can store up to 20 hours of data at a 6 second-per-sample rate. The data can then be downloaded by the operator using the J.P. Instruments software.

3.2. Data Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed the unit had sustained impact damage, as shown in Figure 1. The circuit boards were in functioning condition and the device powered on, however, the data was unable to be extracted normally using the manufacturer's software. The non-volatile memory chips were removed and a binary image was created using laboratory tools.

Figure 1. JPI EDM-700 as received.



3.3. Data Description

The data extracted included 9 sessions from January 22, 2018 through March 5, 2018. The recorded time is based on the unit's internal clock, which is set and updated by the user. The device begins recording data when power is applied and stops when power is disconnected. Due to the condition of the device, the user set time was unable to be verified and is referred to as Device Calculated PST in this report. The last recorded

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

session was determined to be related to the accident and is included in this report. The data was recorded at a 6 second-per-sample rate.

3.4. Parameters Provided

Table 1 describes data parameters recorded by the device.

Table 1: JPI EDM-700 Data Parameters

Parameter Name	Parameter Description
Time	Time (Device Calculated PST) 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)
CLD (degF/min)	Shock Cooling Rate (degrees Fahrenheit per minute)
Voltage (V)	Battery Voltage (Volts)

3.5. OVERLAYS AND TABULAR DATA

Figure 2 is a plot of parameters from the accident flight recorded on the device for the entire flight. The time interval is 10:10:00 to 16:40:00 Device Calculated PST.

Figure 3 is a plot of parameters from the accident flight recorded on the device at the end of the flight. The time interval is 16:16:00 to 16:27:00 Device Calculated PST. Between 16:17 and 16:18, EGT and CHT values for cylinders number 1, 2 and 4 begin to diverge. EGT and CHT values for cylinder 1 continue to diverge until stabilizing prior to the end of the recording.

The tabular data from the accident flight recorded by the JPI EDM-700 device is included as Attachment 1. This attachment is provided in electronic comma-delimited (.csv) format.

Figure 2. Plot of data from the JPI EDM-700 for the entire accident flight.

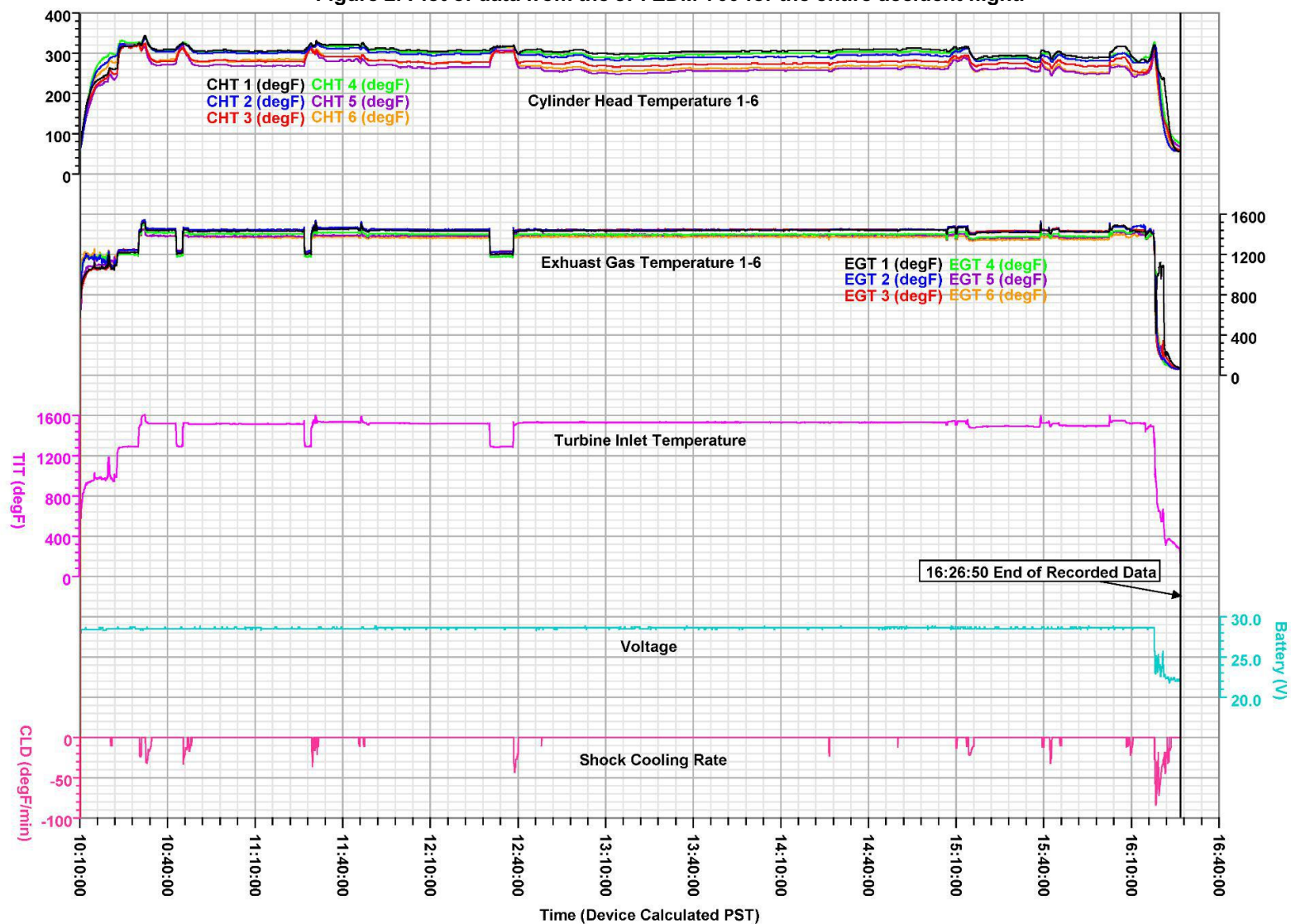


Figure 3. Plot of data from the JPI EDM-700 at the end of the accident flight.

