

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

January 28, 2020

Engine Data Monitor (EDM)

Specialist's Factual Report
By Gerald Kawamoto

1. EVENT SUMMARY

Location: San Marcos, TX
Date: November 20, 2019
Aircraft: Raytheon (Beechcraft) A36
Registration: N88855
Operator: Caroline Aviation, LLC
NTSB Number: CEN20FA019

On November 20, 2019, about 0600 central standard time, a Raytheon (Beechcraft) A36 airplane, N88855, collided with terrain shortly after takeoff from San Marcos Municipal Airport (HYI), San Marcos, Texas. The pilot, sole occupant, was fatally injured and the airplane was destroyed. The airplane was registered to and operated by Caroline Aviation, LLC, under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a business flight. Instrument meteorological conditions prevailed and an IFR flight plan was filed. The flight was originating at the time of the accident and was destined for Odessa Airport-Schlemeyer Field (ODO), Odessa, Texas.

2. ENGINE DATA MONITOR GROUP

An Engine Data Monitor 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-700**
Recorder Serial Number: **29566**

3.1. Device Description

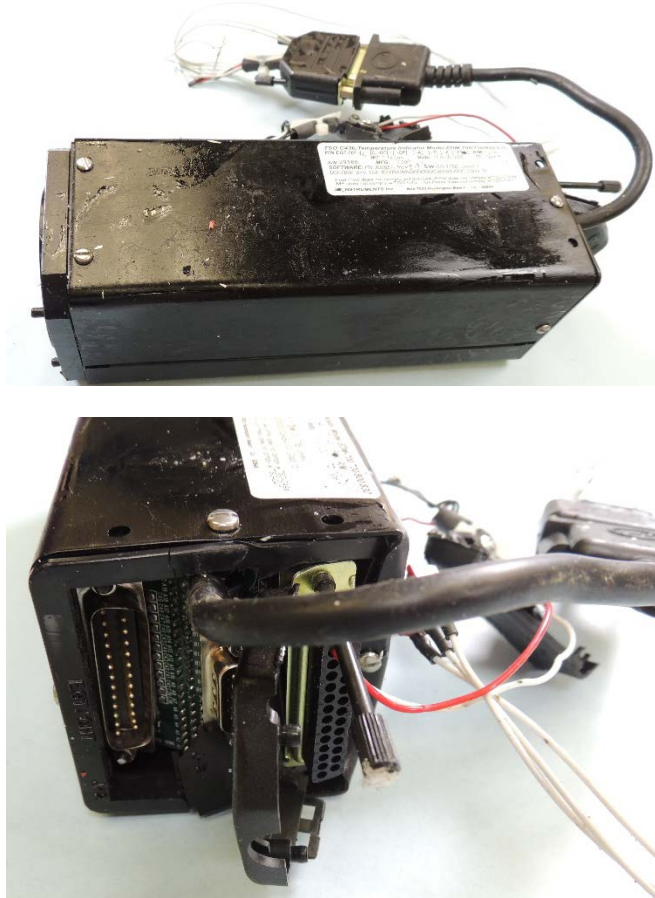
The J. P. Instruments EDM-700 is a panel mounted gauge that the operator can monitor and record up to 24 parameters related to engine operations. Depending on the installation engine parameters monitored can include: Exhaust Gas Temperature (EGT) Cylinder Head Temperature (CHT) Oil Pressure and Temperature, Manifold Pressure, Outside Air Temperature, Turbine inlet Temperature, Engine Revolutions per Minute, Compressor Discharge Temperature, Fuel Flow, Carburetor Temperature, 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 memory 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 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. An interior examination revealed the circuit boards were damaged. The non-volatile memory chips were removed, read out, and converted to engineering units using laboratory tools

Figure 1. JPI EDM-700 as received.



3.3. Data Description

The data extracted included 17 sessions from October 16, 2019, through November 20, 2019. 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 all times are referred to as JPI Time in this report. The last two recorded sessions were recorded on November 20, 2019, JPI Time and are 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
JPI 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)
Fuel Flow (gph)	Fuel Flow (gallons per hour)
Fuel Used (gal)	Fuel Used (gallons)
Voltage (V)	Battery Voltage (Volts)

3.5. OVERLAYS AND TABULAR DATA

Figure 2 is a plot of parameters from the first session recorded on November 20, 2019. The time interval plotted is 03:16:30 to 03:25:00 JPI Time.

Values for CHT 6 and EGT 6 did not trend with the other cylinders for all sessions recorded.

Figure 3 is a plot of parameters from the second session recorded on November 20, 2019. The time interval plotted is 12:03:00 to 12:21:00 JPI Time.

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 parameters from the first session recorded on November 20, 2019.

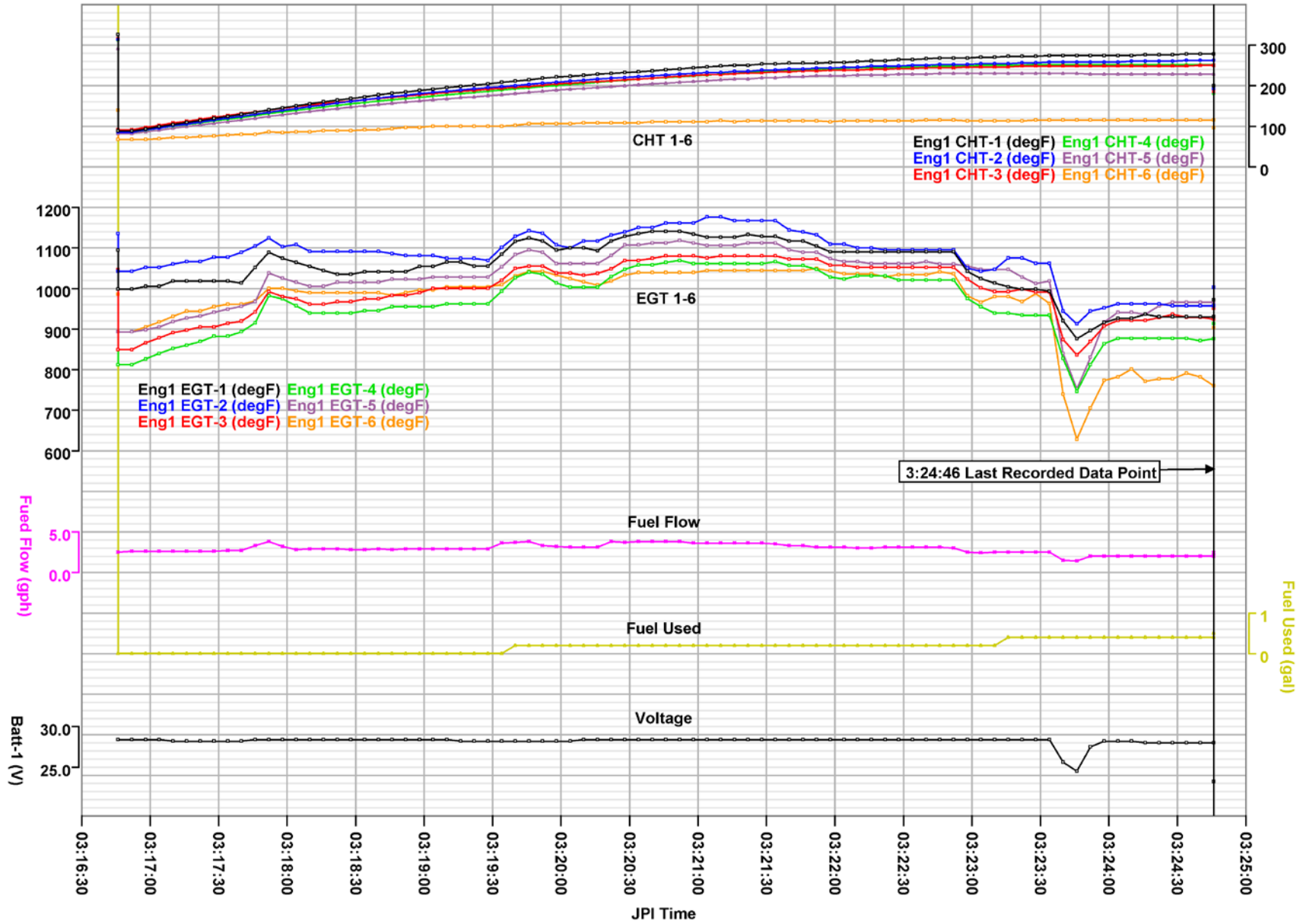


Figure 3. Plot of parameters from the second session recorded on November 20, 2019.

