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

November 7, 2019

Engine Data Monitor (EDM)

Specialist's Factual Report
By Gerald Kawamoto

1. EVENT SUMMARY

Location:	Maitland, Florida
Date:	June 12, 2019
Aircraft:	Cessna 182E
Registration:	N3051Y
Operator:	Golden Corner Flying Club
NTSB Number:	ERA19FA193

On June 12, 2019, about 1100 eastern daylight time, a Cessna 182E, N3051Y, was substantially damaged during a forced landing near Maitland, Florida. The private pilot and passenger were fatally injured. Visual meteorological conditions prevailed and no flight plan was filed for the flight destined for Massey Ranch Airpark (X50), New Smyrna, Florida. The airplane was owned and operated by Golden Corner Flying Club, under the provisions of Title14 *Code of Federal Regulations* Part 91. The personal flight originated from Executive Airport (ORL), Orlando, Florida, about 1055.

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-700**
Recorder Serial Number:	**21682**

3.1. JPI EDM-700 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 memory[1] 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

The device was recovered from water and was received dry upon arrival at the Vehicle Recorder Division. An exterior examination did not reveal any major signs of damage, as shown in Figure 1. An interior examination revealed corrosion to the circuit boards and its components, as shown in Figure 2. The non-volatile memory chips were removed, readout, and converted to engineering units using laboratory tools.

Figure 1. JPI EDM-700 as received.

Figure 2. Damaged internal components of the JPI EDM-700.

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

3.3. Data Description

The data extracted included 15 sessions from May 31, 2019, through June 12, 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 is referred to as JPI Time in this report. The last two sessions were recorded on June 12, 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. The engineering units conversions used for the data contained in this report are based on documentation from the manufacturer of the EDM.

Table 1: JPI EDM-700 Data Parameters

Parameter Name	Parameter Description
JPI Time	User set 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)
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)

3.5. Overlays and Tabular Data

The following three figures contain EDM data recorded from the two sessions recorded on June 12, 2019.

The display of fuel used pertains only to the fuel used since the last time the operator informed the EDM that the aircraft was refueled. Therefore, the starting value of fuel used may be a value greater than zero, and the ending value may be a value greater than the capacity of the fuel tank.

Figure 3 is a plot of parameters from the first session recorded on June 12, 2019. The recording started at 15:24:46 JPI Time and ended at 18:47:10 JPI Time.

Figure 4 is a plot of parameters from at the end of the first session recorded on June 12, 2019. The time interval is 18:40:00 to 18:47:30 JPI Time.

Figure 5 is a plot of parameters from the second session recorded on June 12, 2019. The recording started at 19:50:28 JPI Time and ended at 20:12:34 JPI Time.

The corresponding tabular data used to create these three plots are provided in electronic (*.csv[2]) format as Attachment 1 to this report.

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[2] Comma Separated Value format.

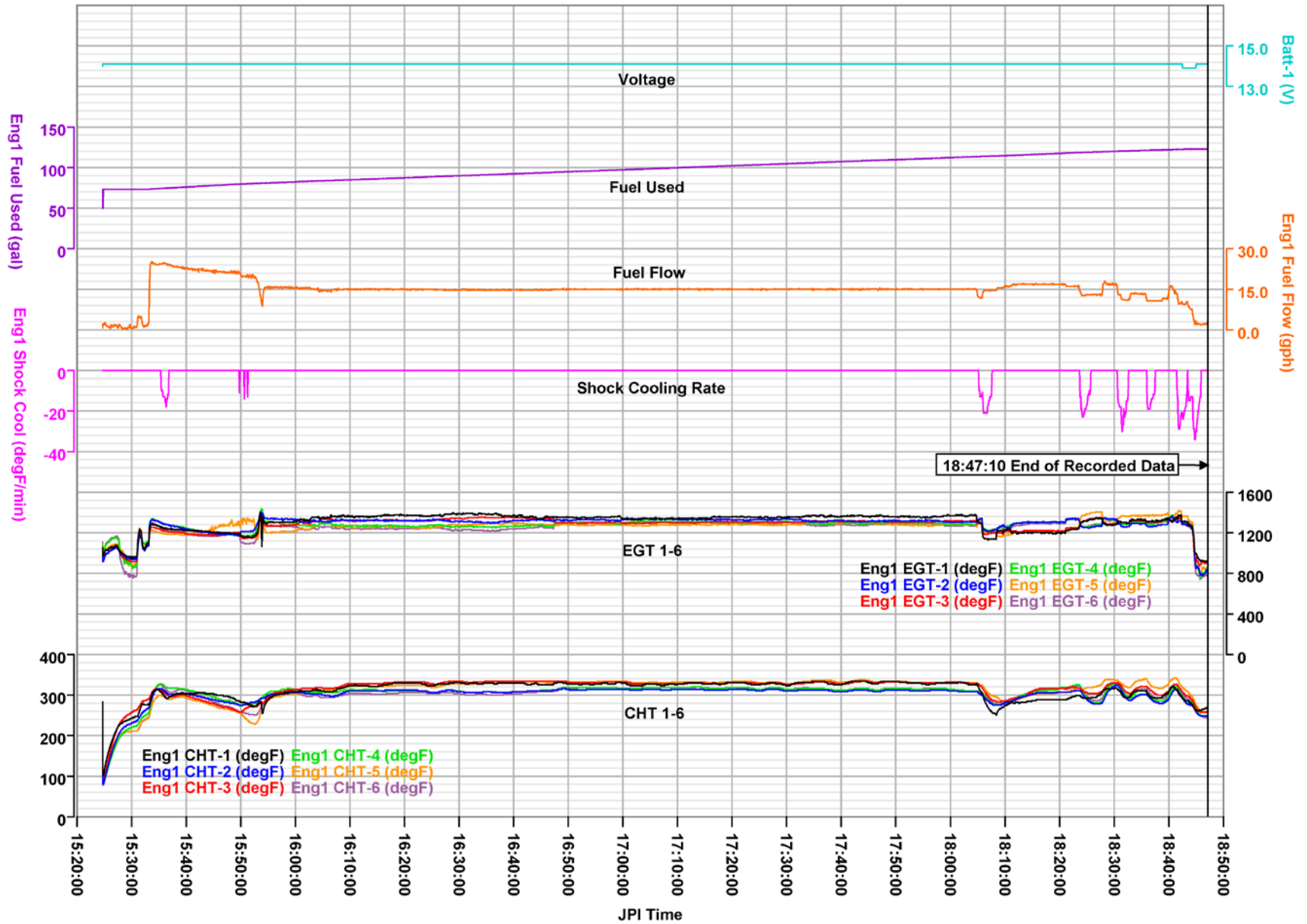**Figure 3. Plot of JPI data from the entire first session recorded on June 12, 2019.**

Figure 4. Plot of JPI data from the end of the first session recorded on June 12, 2019.
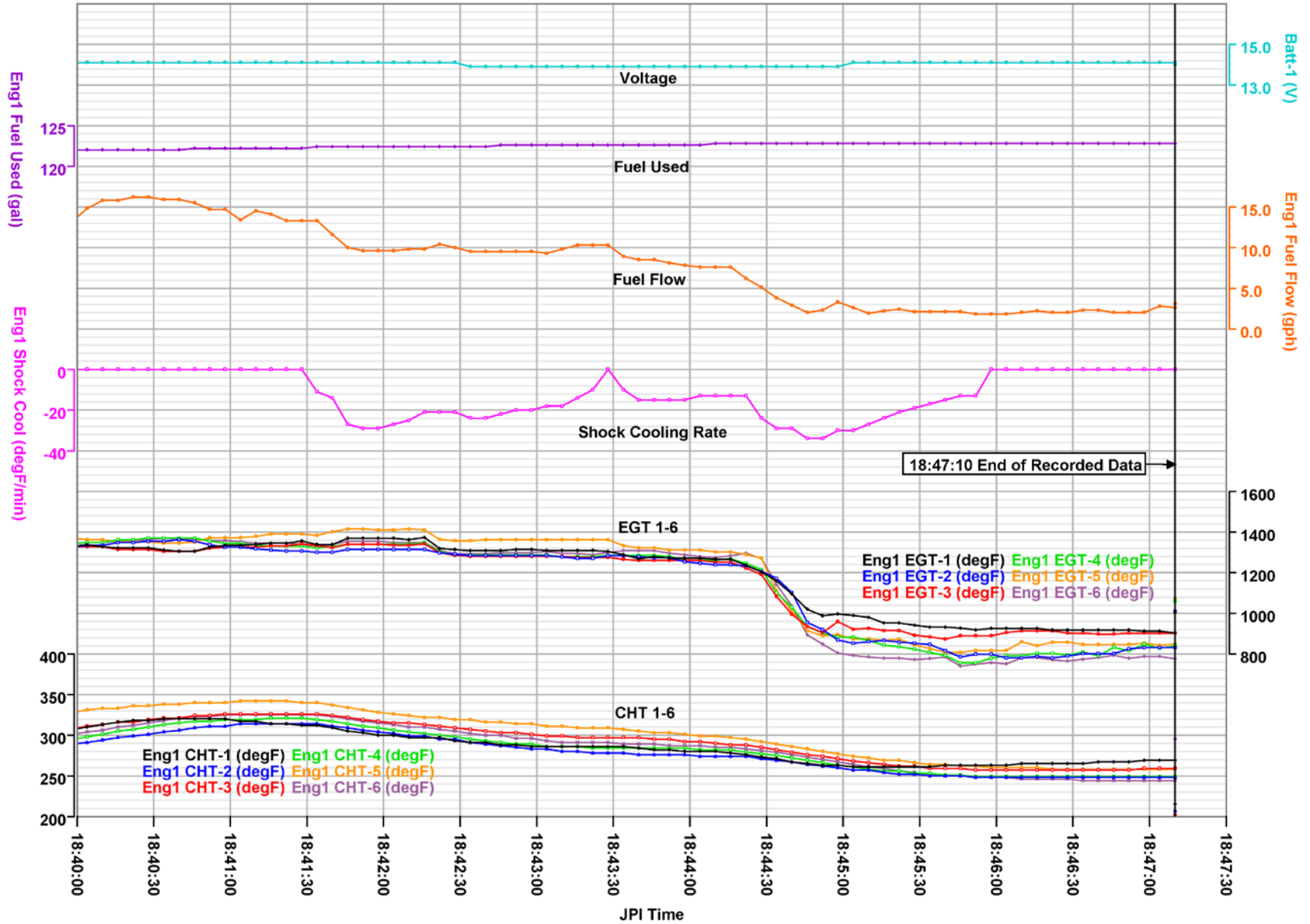
Figure 5. Plot of JPI data from the second session recorded on June 12, 2019.