

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

November 4, 2019

Engine Data Monitor (EDM)

Specialist's Factual Report
By Alice Park

1. EVENT SUMMARY

Location: Whiteville, North Carolina
Date: October 31, 2017
Aircraft: Beech 35-C33
Registration: N293GC
Operator: Private
NTSB Number: ERA18FA012

On October 31, 2017, at 1005 eastern daylight time (EDT), a Beech 35-C33, N293GC, was substantially damaged when it impacted trees and terrain after a loss of engine power during approach to Columbus County Municipal Airport (CPC), Whiteville, North Carolina. The private pilot was fatally injured, and the pilot-rated passenger sustained minor injuries. Visual meteorological conditions prevailed, and no flight plan was filed for the personal flight, conducted under the provisions of 14 *Code of Federal Regulations* Part 91. The accident flight departed from Cannon Creek Airport (15FL), Lake City, Florida about 0735 to its destination of Westerly State Airport (WST), Westerly, 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-700**
Recorder Serial Number: **15081**

3.1. JPI EDM-700 Description

The J. P. Instruments EDM-700 is a panel mounted gauge that the operator can use to monitor and record up to 24 parameters related to engine operation. Depending on the installation, parameters can include: Exhaust Gas Temperature (EGT), Cylinder Head Temperature (CHT), Oil Pressure and Temperature (OILT), Manifold Pressure, Outside Air Temperature (OAT), Turbine Inlet Temperature (TIT), EGT Span (DIF), Engine Revolutions per Minute, Compressor Discharge Temperature, Fuel Flow, Carburetor Temperature, and Battery Voltage (BAT).

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 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.

3.1.1. Data Recovery

The device was in good condition and the data were extracted normally. Figure 1 shows a picture of the unit data plate, indicating the firmware revision of 2.9.

Figure 1. JPI EDM-700 data plate.



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

3.1.2. Data Description

The unit contained recorded data at a sample rate of once every 6 seconds. It starts at 07:21:54 and ends at 10:07:00 on October 31, 2017 as recorded by the unit's internal clock. The parameters recorded were EGT, CHT, OAT, DIF, OILT, and BAT.

3.1.3. Engineering Units Conversions

The engineering unit conversions used for the data contained in this report are based on documentation from the manufacturer of the EDM-700, JPI. Table 1 describes data parameters provided by the EDM-700.

Table 1. JPI EDM-700 Data Parameters

Parameter Name	Parameter Description
1. E-1 (degF)	Exhaust Gas Temperature Cylinder 1
2. E-2 (degF)	Exhaust Gas Temperature Cylinder 2
3. E-3 (degF)	Exhaust Gas Temperature Cylinder 3
4. E-4 (degF)	Exhaust Gas Temperature Cylinder 4
5. E-5 (degF)	Exhaust Gas Temperature Cylinder5
6. E-6 (degF)	Exhaust Gas Temperature Cylinder 6
7. C-1 (degF)	Cylinder Head Temperature Cylinder 1
8. C-2 (degF)	Cylinder Head Temperature Cylinder 2
9. C-3 (degF)	Cylinder Head Temperature Cylinder 3
10. C-4 (degF)	Cylinder Head Temperature Cylinder 4
11. C-5 (degF)	Cylinder Head Temperature Cylinder 5
12. C-6 (degF)	Cylinder Head Temperature Cylinder 6
13. OAT (degF)	Outside Air Temperature
14. DIF (degF)	Exhaust Gas Temperature Span
15. BAT (Volts)	Battery Voltage
16. OILT (degF)	Oil Pressure and Temperature
17. Time (HH:MM:SS)	Time of Data Sample
18. Date (MM/DD/YYYY)	Date of Data Sample

Note: degF is degrees Fahrenheit.

3.2. Time Correlation

The EDM records timestamped data based on the internal clock setting. This setting is input and updated by the operator.

The EDM data was consistent with the description of the accident. All times reported and plotted in this report are in given in EDT.

3.3. Plots and Corresponding Tabular Data

The following two figures are provided for orientation with the tabular data provided in attachment 1 to this report, which contains EDM data recorded during the last two power cycles.

Figure 1 shows Engine Exhaust Gas Temperature, Cylinder Head Temperature, Battery Voltage, Outside Air Temperature, and Oil Temperature for the entire flight of the accident airplane. Engine Exhaust Gas Temperature and Cylinder Head Temperature data are measured for each of the 6 cylinders in the engine.

Figure 2 shows about the last 30 minutes of flight recorded by the JPI. At approximately 0948 EDT, Exhaust Gas Temperature and Cylinder Head Temperature began to decrease. At approximately 0951, Battery Voltage rapidly dropped along with Oil Temperature as the Engine Exhaust Gas Temperature and Cylinder Head Temperature rapidly dropped. The last recorded data point was at 10:07 EDT.

Figure 2. EGT, CHT, BAT, Oil, and OAT for the accident flight.

Beech 35_C33 N293GC

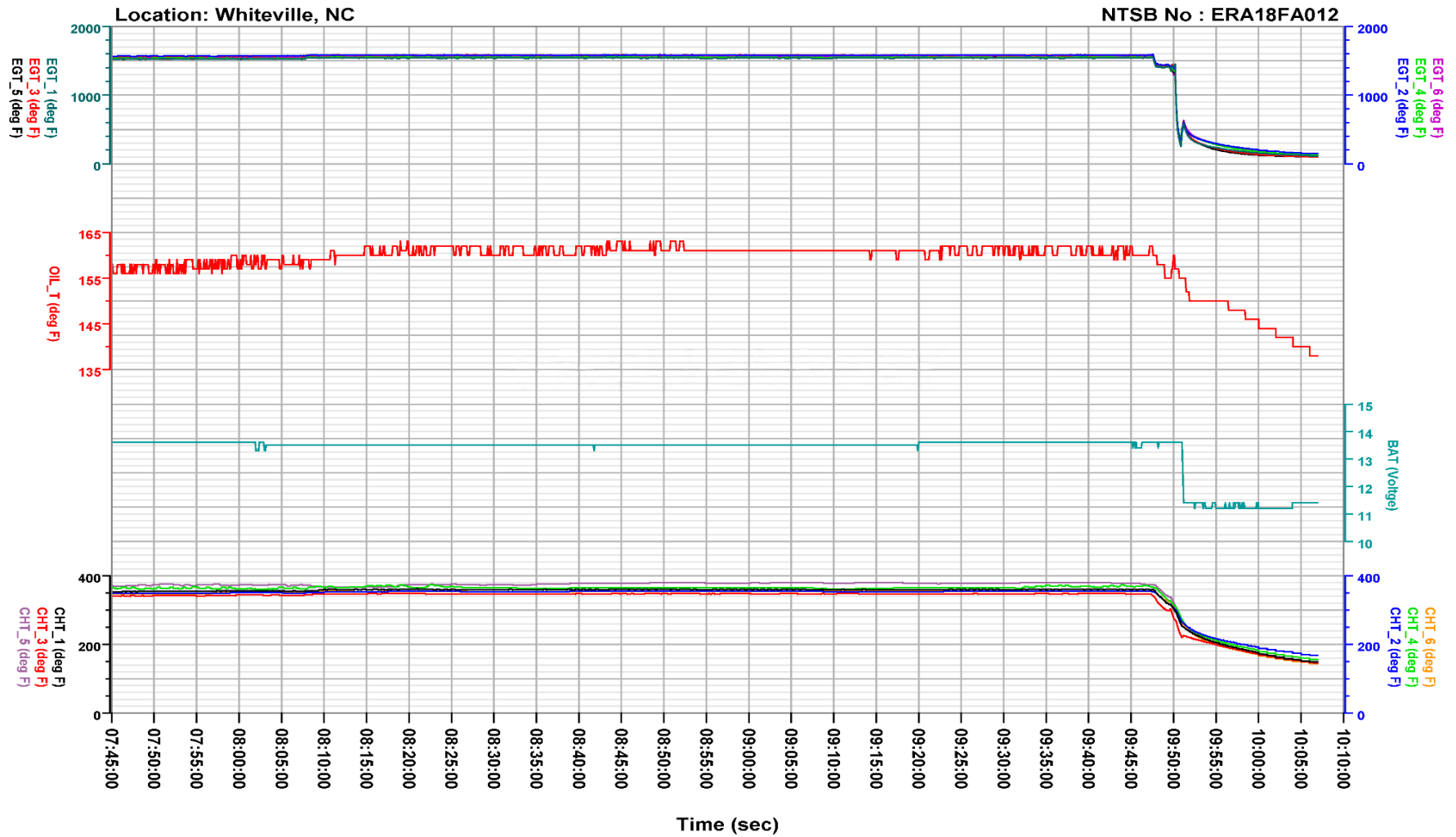


Figure 3. The last 30 minutes of EGT, CHT, BAT, Oil, and OAT for the accident flight.

