

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

June 5, 2017

Engine Data Monitor

Specialist's Factual Report
By Sean Payne

1. EVENT SUMMARY

Location: Dickinson, Texas
Date: October 04, 2016
Aircraft: Beechcraft D95A
Registration: N76S
Operator: Private
NTSB Number: CEN17FA005

On October 4, 2016, about 1827 central daylight time (CDT), a Beechcraft D95A "Travel Air", multi-engine airplane, N76S, was substantially damaged after impacting trees and terrain while maneuvering near Hitchcock, Texas. The flight instructor was fatally injured and the pilot receiving instruction was seriously injured. The airplane was registered to a private individual, and was operated by Bay Area Flying Club; Pearland, Texas; as a 14 *Code of Federal Regulations* Part 91 instructional flight. Visual meteorological conditions (VMC) prevailed and a visual flight rules (VFR) flight plan had not been filed. The airplane had departed from Pearland Regional Airport (KLVJ), Pearland, Texas, for the local flight.

2. DETAILS OF INVESTIGATION

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

Recorder Manufacturer/Model: **JPI EDM-700**
Recorder Serial Number: **06982**

2.1. JPI EDM-760 Description

The J. P. Instruments EDM-760 is a panel mounted gauge that the operator can monitor and record up to 24 parameters related to twin engine operations. Depending on the installation engine parameters monitored, for both engines, 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
- 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.

2.1.1. Data Recovery

The recorder was in good condition and the data were extracted normally from the recorder.

2.1.2. Data Description

The EDM recording contained data for approximately 11 data cycles. The event flight was the last flight of the recording and its duration was approximately 25 minutes and 24 seconds.

2.1.3. Engineering Units Conversions

The engineering units conversions used for the data contained in this report are based on documentation from the manufacturer of the EDM.

Appendix A lists the EDM parameters verified and provided in this report.

2.1.4. Engine 1 Cylinder Head Temperature – Cylinder #4

Engine 1's cylinder head temperature (CHT) on cylinder number 4 were found to be anomalous. Values recorded for engine 1's CHT on cylinder 4 were negative. Data from previous flights showed the same type of anomalous values. Engine 1 CHTs for cylinder number 4 are not plotted but the data for engine 1 CHT for cylinder 4 is included in the tabular data found in attachment 1 to this report.

2.2. Time Correlation

The EDM records time with the first data sample based on the unit's internal clock. This clock is set and updated by the operator.

Correlation of the EDM data to the event local time, (CDT), was established by comparing the recorded time of the last log to the accident time given by the Investigator-in-charge. The following offset was established to align the recorded time to CDT.

JPI EDM 700 Recorded Time – 18,282 seconds = CDT

2.3. Plots and Corresponding Tabular Data

The following two figures contain EDM data recorded during the October 4, 2016 event.

Figure 1 is a plot of all recorded JPI EDM 700 parameters during the entire flight. The displayed time ranges from 18:00:00 CDT to 18:30:00 CDT. Engine 1 CHTs for cylinder number 4 are not included.

Figure 2 is a plot of all recorded JPI EDM 700 parameters for the time period between 18:24:00 CDT and 18:27:30 CDT. Engine 1 CHTs for cylinder number 4 were removed from the plot.

The corresponding tabular data used to create these two plots are provided in electronic (*.csv¹) format as attachment 1 to this report.

¹ Comma Separated Value format.

Figure 1. Plot of basic parameters during entire flight.

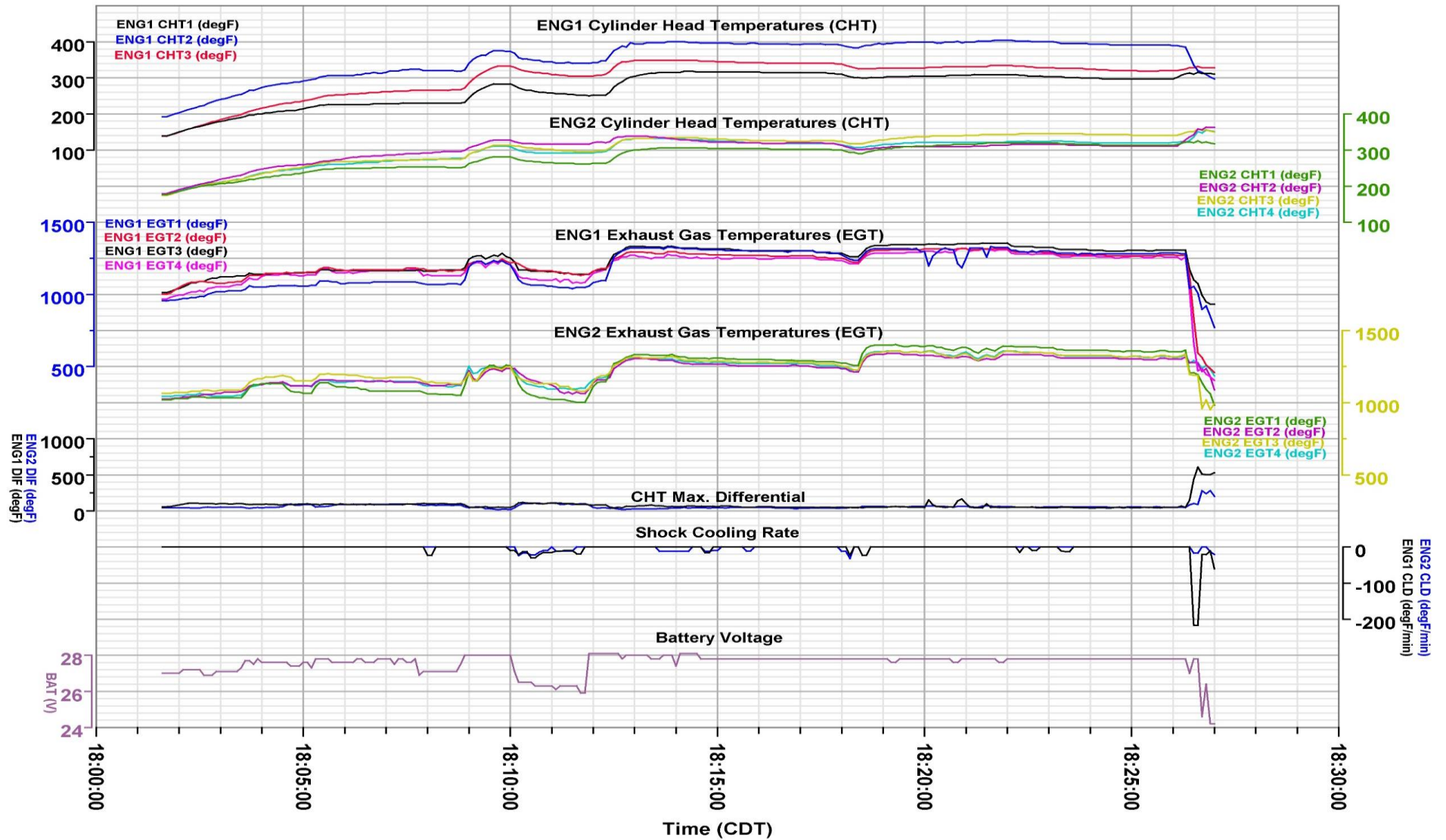
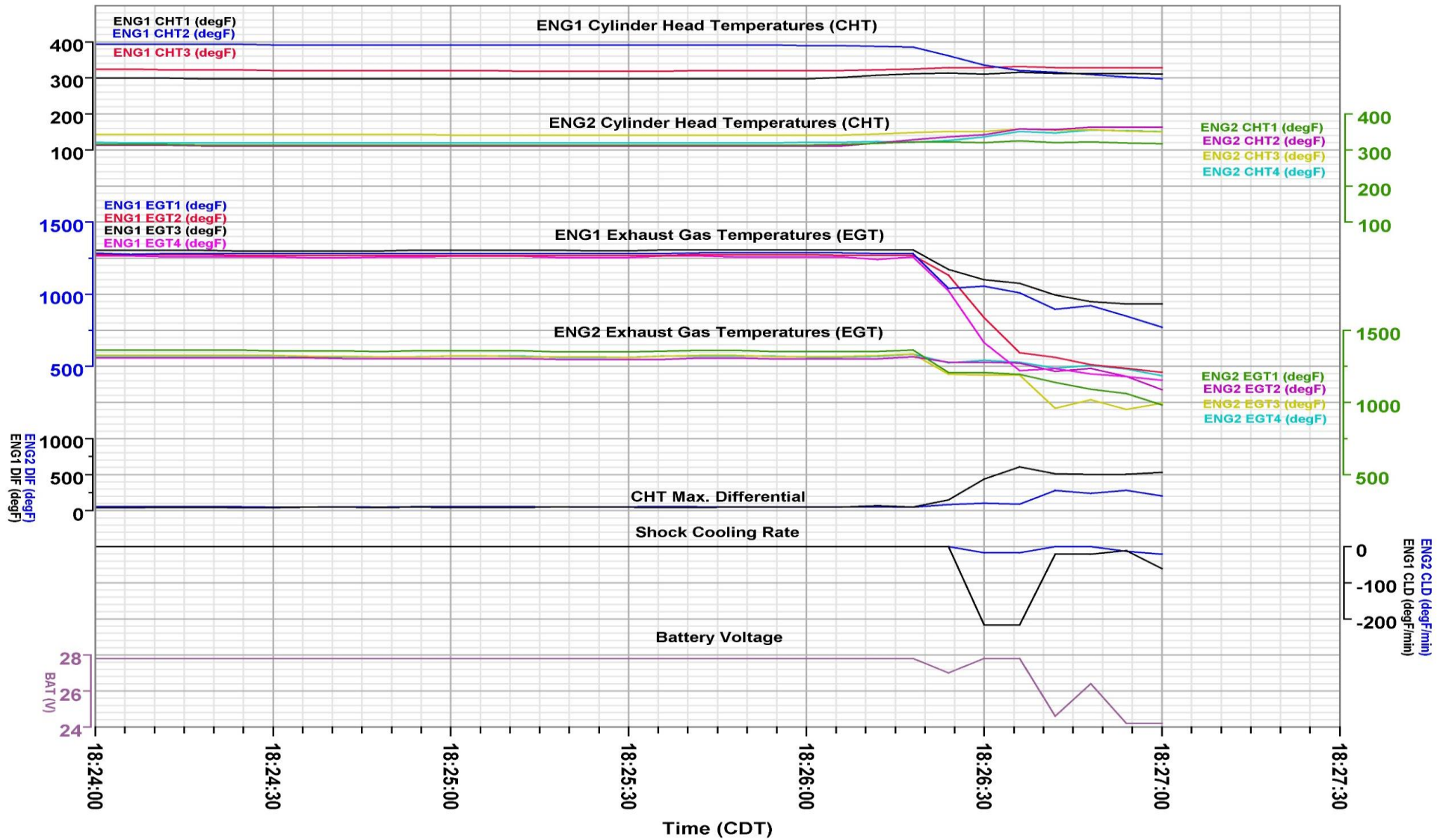


Figure 2. Plot of basic parameters during the last portion of flight.



APPENDIX A

This appendix describes the parameters provided and verified in this report. Table A-1 lists the parameters and table A-2 describes the unit abbreviations used in this report.

Table A-1. Verified and provided parameters.

Parameter Name	Parameter Description
1. Bat (V)	Battery Voltage
2. Eng1 CHT-# (deg F)	Left Engine Cylinder Head Temperature Cylinder # ²
3. Eng1 EGT-# (deg F)	Left Exhaust Gas Temperature Cylinder #
4. Eng1 CLD(deg F/min)	Left Engine Shock Cooling
5. Eng1 DIF (deg F)	Left Engine Cylinder Head Temperature Maximum Differential
6. Eng2 CHT-# (deg F)	Right Engine Cylinder Head Temperature Cylinder #
7. Eng2 EGT-# (deg F)	Right Exhaust Gas Temperature Cylinder #
8. Eng2 CLD(deg F/min)	Right Engine Shock Cooling Rate
9. Eng2 DIF (deg F)	Right Engine Cylinder Head Temperature Maximum Differential

NOTE: 2. Depending on aircraft configuration number of cylinders that are instrumented varies. In the data plots the '#' is replaced with the appropriate cylinder ID.

Table A-2. Unit abbreviations.

Units Abbreviation	Description
deg F/min	Degrees Fahrenheit per minute
deg F	Degrees Fahrenheit
V	Volts DC

NOTE: For parameters with a unit description of discrete, a discrete is typically a 1-bit parameter that is either a 0 state or a 1 state where each state is uniquely defined for each parameter.