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

April 18, 2012

Engine Data Monitor (EDM)

Specialist's Factual Report
By Michael Bauer

1. EVENT SUMMARY

Location: Nunica, Michigan
Date: September 17, 2011
Aircraft: North American AT-6
Registration: N217RK
NTSB Number: CEN11LA651

On September 17, 2011, about 1815 Eastern Daylight Time, a North American AT-6, N217RK, sustained substantial damage when it impacted a tree and terrain after a loss of engine power during takeoff from runway 8 (3,600 feet by 100 feet, dry turf) at the Hat Field Airport (5N7), near Nunica, Michigan. The commercial pilot received serious injuries. The airplane, registered to Tailwinds Inc., was being operated under the provisions of the 14 Code of Federal Regulations Part 91. No flight plan was on file for the personal flight. Visual meteorological conditions prevailed at the time of the accident. The flight was originating at the time of the accident.

2. ENGINE DATA MONITOR GROUP

An Engine Data Monitor (EDM) group was not convened.

3. DETAILS OF ENGINE DATA MONITOR INVESTIGATION

The Safety Board's Vehicle Recorder Division received the following EDM:

Recorder Manufacturer/Model: **JPI EDM-700**
Recorder Serial Number: **23408**

3.1. EDM 700/800 Description

The J. P. Instruments EDM-700/800 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
- 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.

3.1.1. EDM Condition

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

3.1.2. Recording Description

The EDM recording contained approximately 11 hours of data over 18 power cycles. The event flight was the last flight of the recording and its duration was approximately 8 minutes.

3.1.3. 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.

3.2. Time Correlation

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

Correlation of the EDM data to the event local time, Eastern Daylight Time (EDT), was established by using the recorded Time and then subtracting an additional 4 hour offset to change UTC to EDT. Therefore, for the rest of this report, all times are referenced as EDT, not recorded time.

3.3. EDM Plots and Corresponding Tabular Data

The following two plots contain EDM data recorded during the 09/17/2011 accident flight and the previous flight on 09/17/2011.

Plot one contains engine cylinder and exhaust temperatures and the battery voltage read by the EDM from the accident flight. The plot covers a time period from 17:58:46 to 18:07:10.

Plot two contains engine cylinder and exhaust temperatures and the battery voltage read by the EDM from the accident flight. The plot covers a time period from 14:24:00 to 15:28:12.

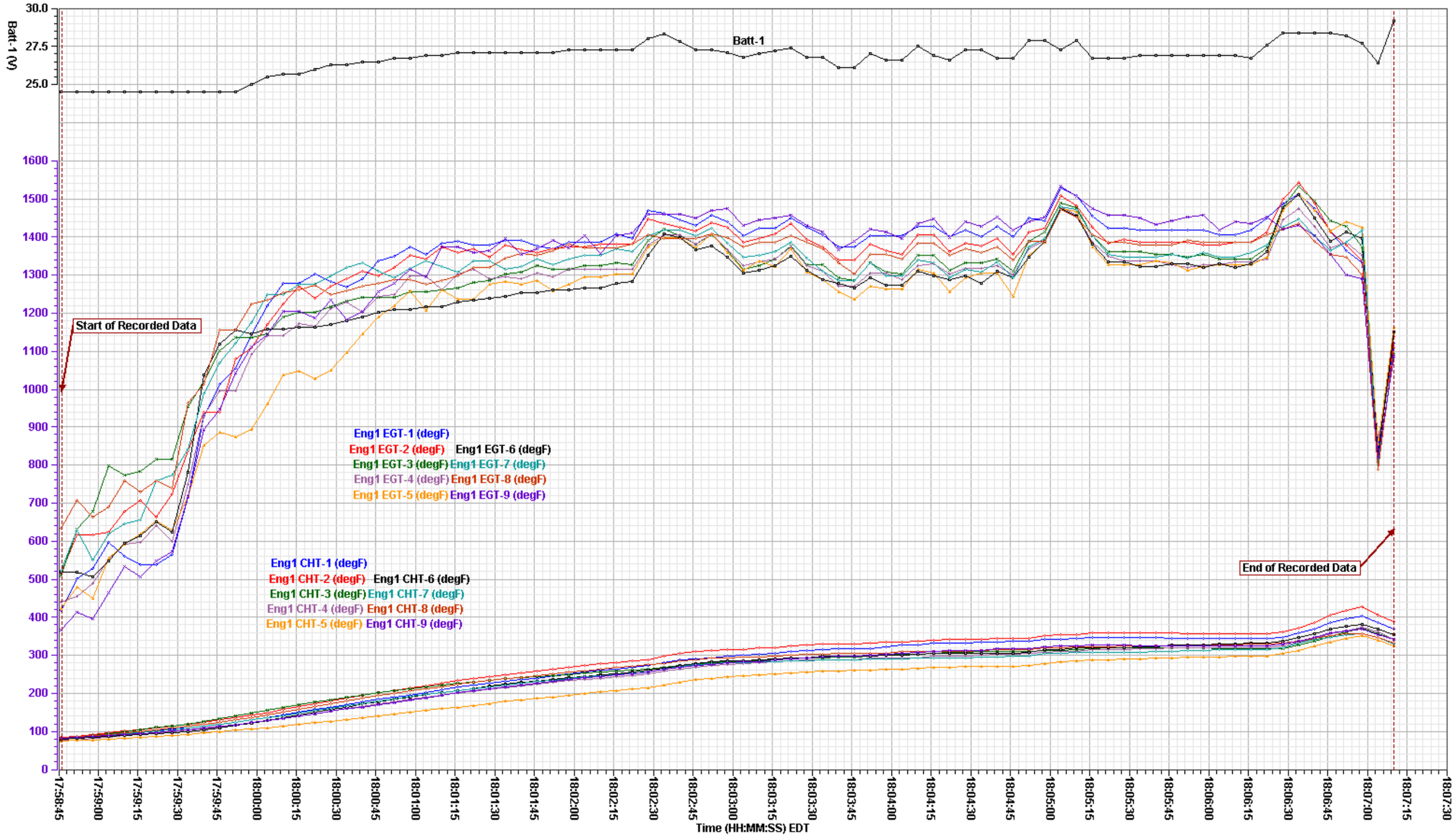
The corresponding tabular data used to create these two plots are provided in electronic (*.csv[1]) format as Attachment 1 to this report.

[1] Comma Separated Value format.

North American AT-6, N217RK

Location, Date: Nunica, Michigan, 09/17/11

NTSB No. CEN11LA651



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Plot 1 - Engine data from the accident flight

North American AT-6, N217RK

Previous Flight on 09/17/11

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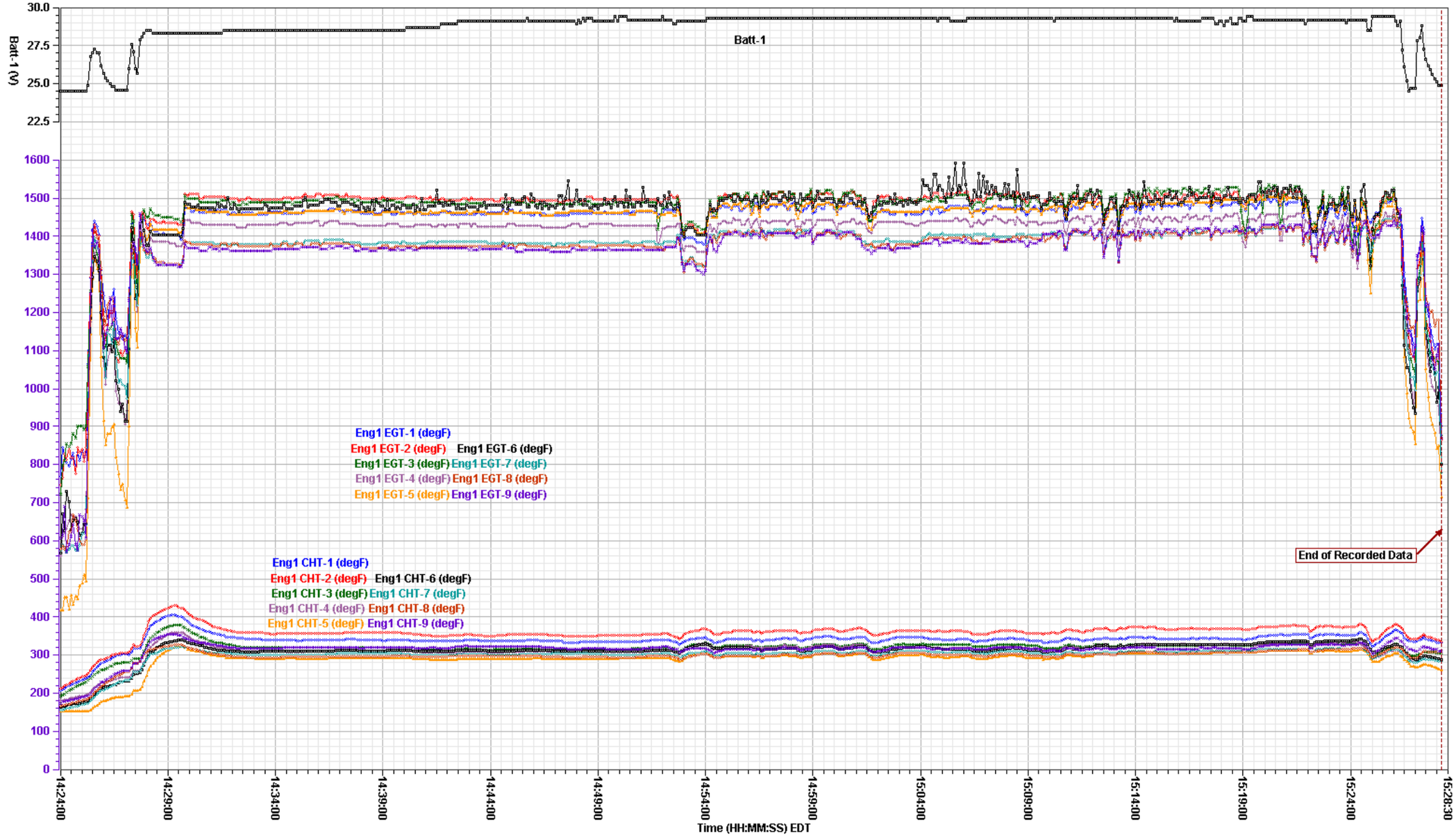

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Previous Flight

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Plot 2 - Engine data from the previous 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. Batt-1 (V)	Battery Voltage Input 1
2. Eng1 CHT-# (degF)	Cylinder Head Temperature Cylinder #[2]
3. Eng1 EGT-# (degF)	Exhaust Gas Temperature Cylinder #[2]

Table A-2. Unit abbreviations.

Units Abbreviation	Description
degF	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.

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