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

September 3, 2013

17 – Engine Monitor Report

Specialist's Factual Report
by Bill Tuccio

A. EVENT

Location:	Atlanta, GA
Date:	May 23, 2013
Aircraft:	Hawker Beechcraft A36
Registration:	N8225T
Operator:	Private
NTSB Number:	ERA13LA252

B. GROUP - No Group

C. SUMMARY

On May 23, 2013, about 1456 eastern daylight time a Beech A36, N8225T, was substantially damaged when it had an aerodynamic stall and impacted terrain shortly after takeoff at DeKalb-Peachtree Airport (PDK), Atlanta, Georgia. The private pilot and four passengers were not injured. Visual meteorological conditions prevailed, and an IFR flight plan had been filed for the personal flight destined for Venice Municipal Airport (VNC), Venice, Florida, which was conducted under Title 14 Code of Federal Regulations Part 91.

D. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Laboratory received the following device:

GPS Manufacturer/Model:	JPI EDM-700
Serial Number:	15754

JPI EDM-700 Device Description

The J.P. Instruments (JPI) EDM-700 is a panel mounted instrument enabling 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 (TIT), engine

revolutions per minute, compressor discharge temperature, fuel flow, carburetor temperature, and battery voltage.

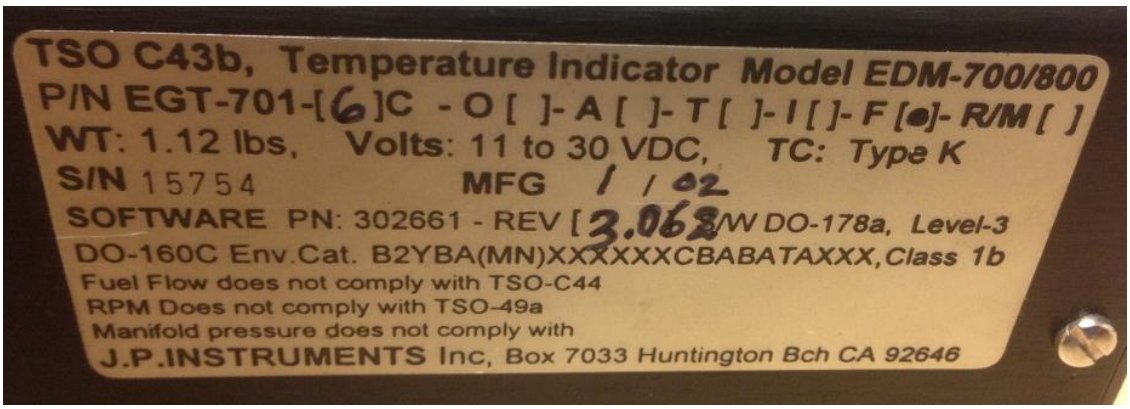
The unit can also calculate, in real-time, horsepower, fuel used, shock cooling rate and EGT differentials between the highest and lowest cylinder temperatures. The calculations are also based on the aircraft installation.

The unit contains non-volatile memory[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 sample rate. The data can then be downloaded by the operator using the J.P. Instruments software.

Data Recovery

The unit 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 3.062, the number "6" inscribed next to the letter "C," and a dot next to the letter "F." There were no entries on the data plate adjacent to the letters "O," "A," "T", "I," or "R/M." The number inscribed adjacent to "MFG" was "1/02".

Figure 1. Unit data plate.



Data Description

The unit contained recorded data over 13 power cycles, recorded at a sample rate of once every 6 seconds. The recorded data spanned dates of April 27, 2013 through the accident flight on May 23, 2013, as recorded by the unit internal clock. The parameters recorded were EGT, CHT, voltage, and fuel flow. Additionally, the calculated shock cooling rate and maximum difference between EGT sensors was also recorded. No other parameters were recorded by the unit.

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

When the unit was powered on, it displayed 71 gallons of fuel remaining and 2 gallons of fuel used. Both of these values are affected by pilot inputs usually made when the unit initially receives power.

This report examined the last flight on the recording on May 23, 2013 and the flight prior to the accident flight on May 21, 2013.

Engineering Units Conversion

The engineering units conversions used for the data contained in this report are based on documentation from the manufacturer of the EDM-700, J.P. Instruments.

Appendix A lists the EDM-700 parameters verified and provided in this report.

Time Correlation

The EDM-700 records time with the first data sample based on the unit's internal clock. This clock is set and updated by the operator. Examination of the recorded data, and comparison with the reported accident time provided by the IIC, indicated the EDM-700 internal clock was set to Coordinated Universal Time (UTC), but was 10 minutes ahead of actual UTC. As such, 10 minutes was subtracted from all EDM-700 recorded times to correct for the error.

Correlation of the EDM-700 data to the event local time, EDT, was established by using the corrected UTC recorded time and then subtracting a 4 hour offset to change UTC to EDT. Therefore, for the rest of this report, all times are referenced as EDT, not recorded time.

Plots and Corresponding Tabular Data

Figures 2 shows a plot of the entire accident flight recording. Figure 3 focuses on the accident flight period from fuel flow increase until the end of the recording. The fuel flow began to increase above 5 gph at about 1447:08 EDT, achieving a value of about 26 gph by 1447:20 EDT. Coincident with the fuel flow increase, the EGT and CHTs also increased. At about 1447:44 EDT, the fuel flow began to decrease from 26 gph, reaching 5 gph by 1447:56 EDT and then 0 gph by the end of the recording at 1448:08 EDT. Throughout the recording, CHT-5 was the coolest recorded cylinder.

Figure 4 shows the takeoff portion of the prior recorded flight. The fuel flow began to increase above 5 gph at about 1528:14 EDT, achieving a value of about 26 gph by 1528:20 EDT. Coincident with the fuel flow increase, the EGT and CHTs also increased. The fuel flow remained at about 26 gph until about 1530:26 EDT, when the fuel flow initially reduced to about 23 gph. CHT-5 was the coolest recorded cylinder from the start of the May 21 recording through the first 60 seconds of fuel flow values above 25 gph.

The corresponding tabular data used to create figures 2 and 3 are provided in electronic (*.csv[2]) format as Attachment 1 to this report. The tabular data used to create figure 4 are provided in electronic (*.csv) format as Attachment 2 to this report.

[2] Comma Separated Value format.

Figure 2. Plot of entire accident flight recording.

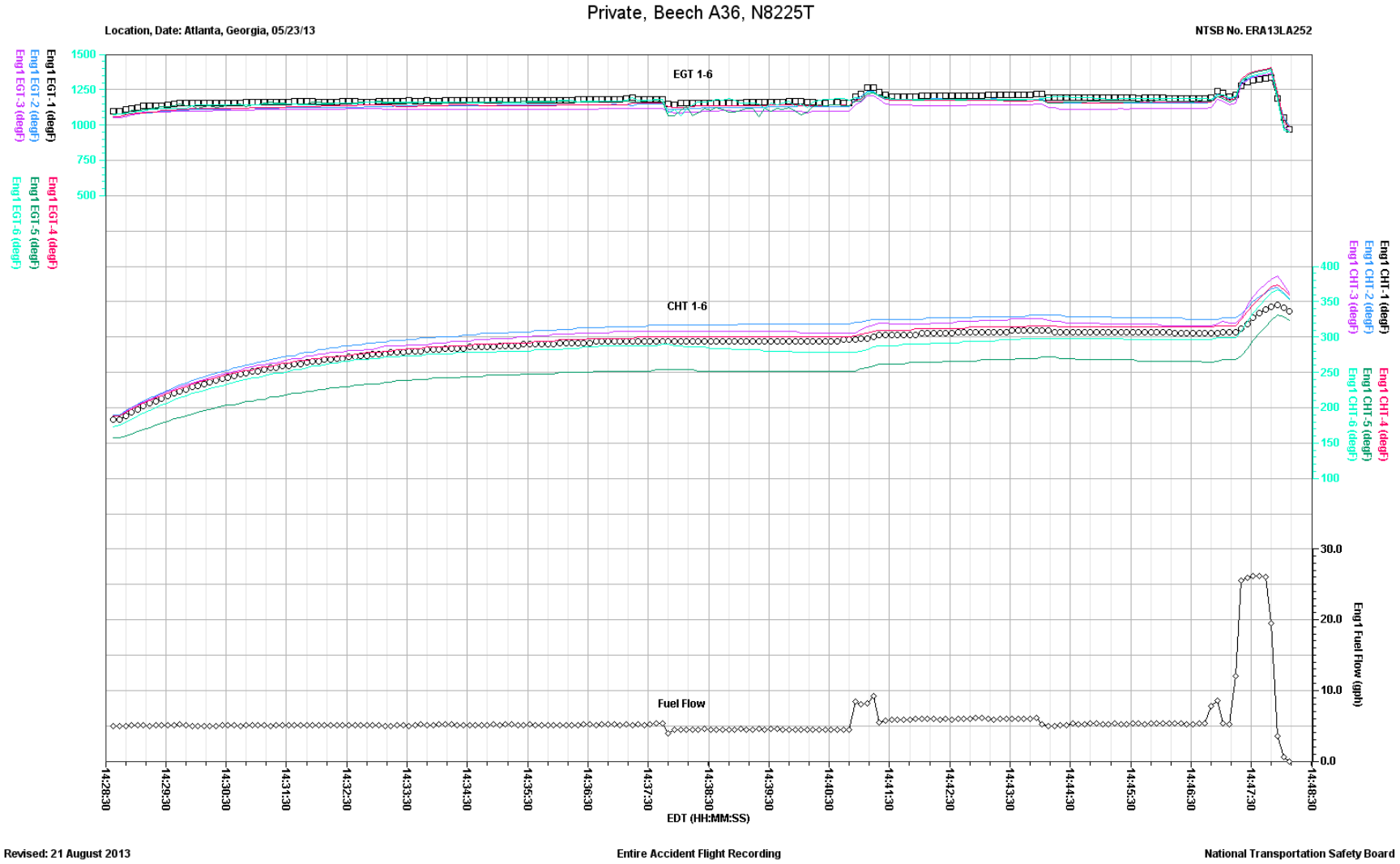


Figure 3. Plot of accident flight from fuel flow increase to end of recording.

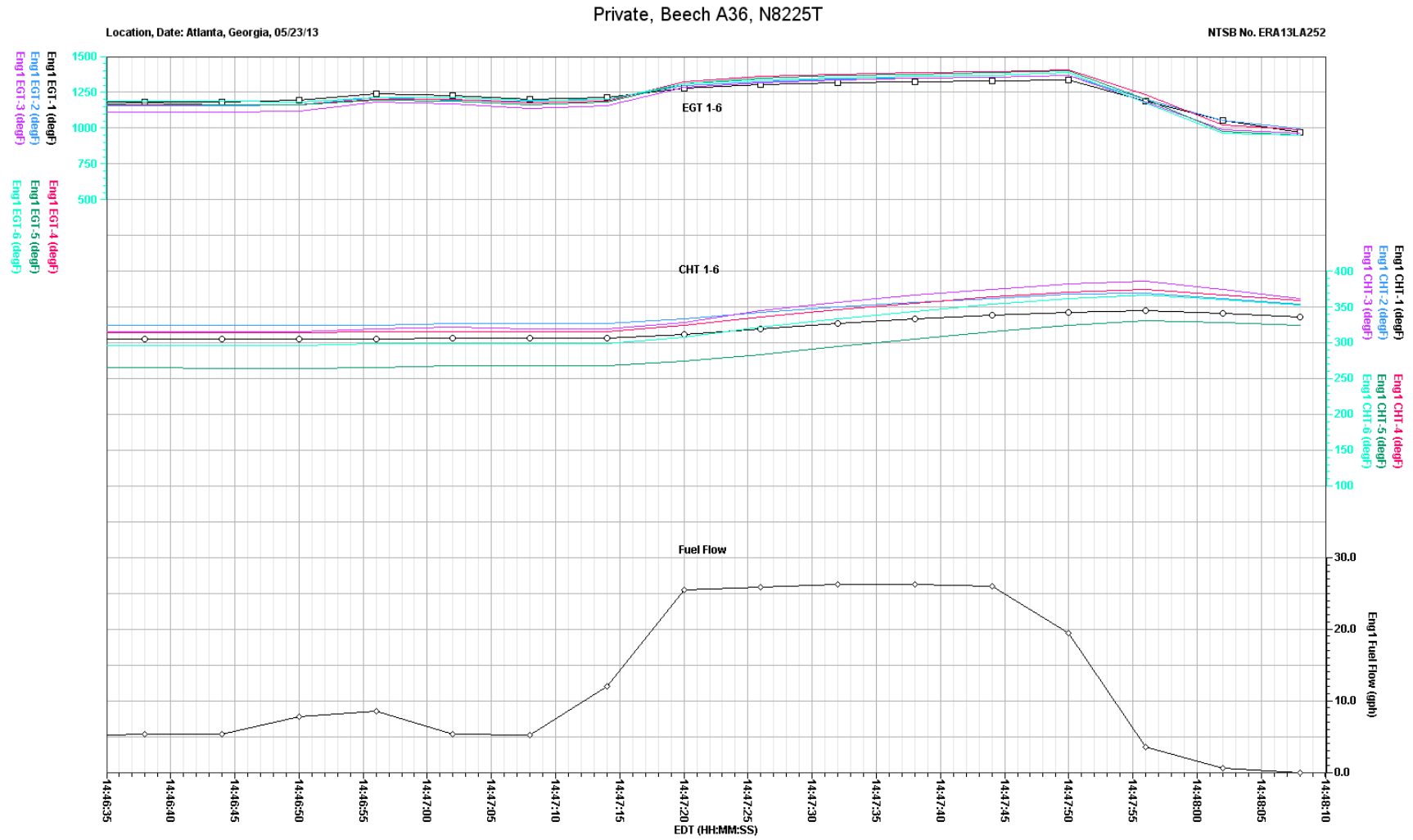
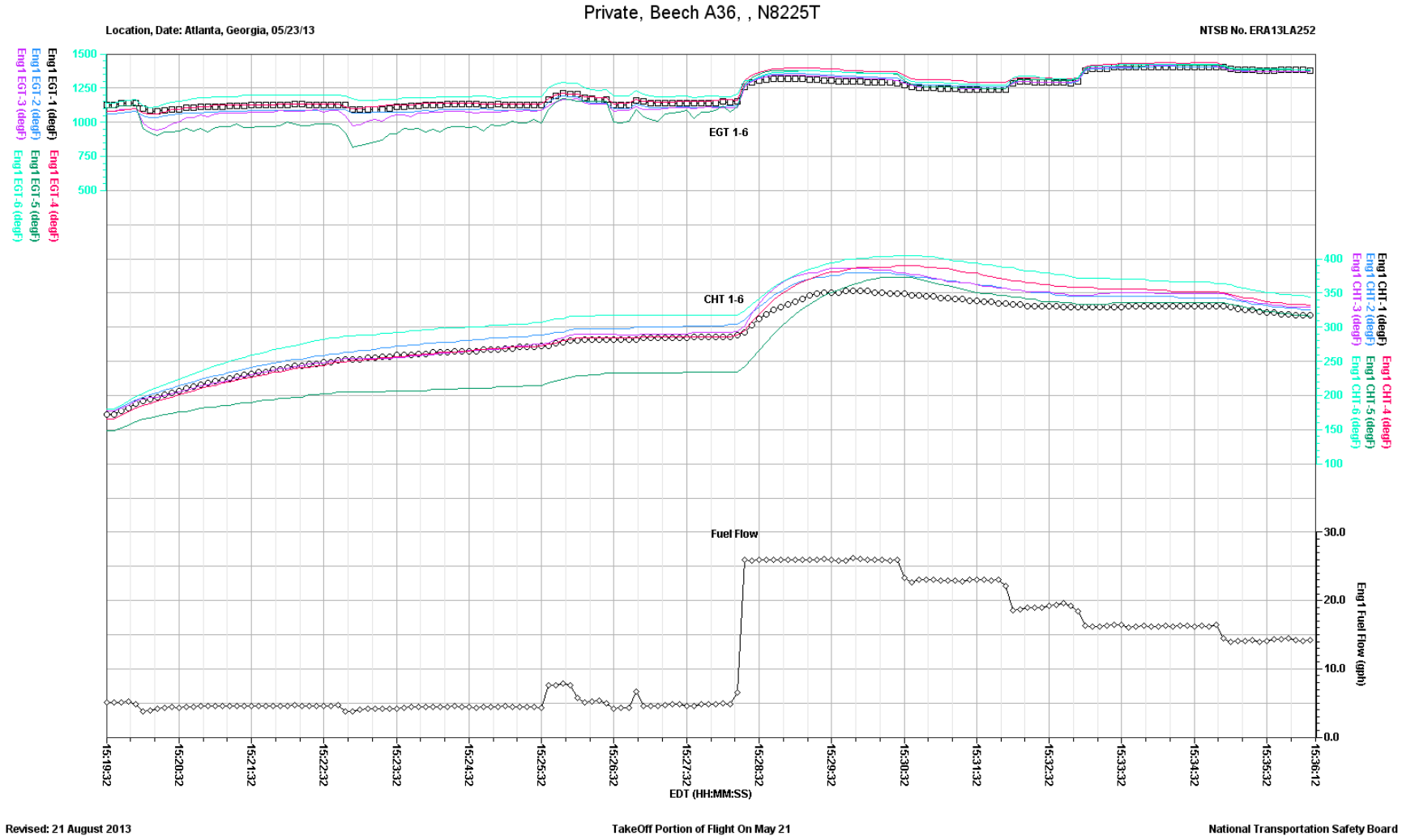


Figure 4. Plot of takeoff portion of May 21 flight.



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 JPI parameters.

Parameter Name	Parameter Description
1. Eng1 CHT-1 (degF)	Cylinder Head Temperature Cylinder 1
2. Eng1 CHT-2 (degF)	Cylinder Head Temperature Cylinder 2
3. Eng1 CHT-3 (degF)	Cylinder Head Temperature Cylinder 3
4. Eng1 CHT-4 (degF)	Cylinder Head Temperature Cylinder 4
5. Eng1 EGT-1 (degF)	Exhaust Gas Temperature Cylinder 1
6. Eng1 EGT-2 (degF)	Exhaust Gas Temperature Cylinder 2
7. Eng1 EGT-3 (degF)	Exhaust Gas Temperature Cylinder 3
8. Eng1 EGT-4 (degF)	Exhaust Gas Temperature Cylinder 4
9. Eng1 Fuel Flow (gph)	Fuel Flow

Table A-2. Unit abbreviations.

Units Abbreviation	Description
degF	degrees Fahrenheit
gph	gallons per hour