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

April 10, 2012

17 – Engine Monitor Report

by Bill Tuccio

A. EVENT

Location:	Lewiston, California
Date:	February 17, 2012, 1155 Pacific Standard Time (PST)
Aircraft:	Mooney M20J
Registration:	N367MR
Operator:	Private
NTSB Number:	WPR12LA108

B. GROUP - No Group

C. SUMMARY

On February 17, 2012, at 1155 Pacific standard time (PST), a Mooney M20J, N367MR, experienced a loss of engine power about 5 minutes after takeoff near Lewiston, California. The pilot executed a forced landing on California Highway 299. The private pilot operated the airplane under the provisions of Title 14 Code of Federal Regulations, Part 91. The pilot was not injured, and the airplane was substantially damaged. Visual meteorological conditions prevailed, and no flight plan had been filed. The flight originated at Lonnie Pool Field/Weaverville Airport, Weaverville, California, at 1150.

D. DETAILS OF INVESTIGATION

On April 5, 2012, the NTSB Vehicle Recorder Laboratory received the following device:

GPS Manufacturer/Model:	JPI EDM-700
Serial Number:	18177

JPI EDM-700 Device Description

The J.P. Instruments EDM-700 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, 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 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 2.92, and the number “4” inscribed next to the letter “C.” There were no entries on the data plate adjacent to the letters “O,” “A,” “T,” “I,” “F,” or “R/M.” The number inscribed adjacent to “MFG” was “4/03”.

Figure 1. Unit data plate.

Data Description

The unit contained about 11.2 hours of recorded data over 21 power cycles. The recorded data spanned dates of October 5, 2011 through the accident flight on February 17, 2012, as recorded by the unit internal clock. The parameters recorded were EGT, CHT, and battery voltage. Additionally, the calculated shock cooling rate was also

recorded. No other parameters were recorded by the unit. The firmware revision number indicated on the configuration screens was 2.92.

In agreement with the IIC, only the accident flight and the flight prior to the accident flight are included in this report.

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.

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

Time Correlation

The JPI 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 determined the JPI internal clock was set to Coordinated Universal Time (UTC).

Correlation of the JPI data to the event local time, PST, was established by using the recorded time and then subtracting an eight hour offset to change UTC to PST. Therefore, for the rest of this report, all times are referenced as PST not recorded time.

Plots and Corresponding Tabular Data

Figure 2 shows the plot of the flight before the accident flight. The recording session began at 17:29:00 on February 13, 2012 and continued for about 25 minutes until 19:54:06. The recording shows a peak CHT of about 403 degF at about 17:43:18. The peak EGT of about 1,527 degF was recorded at about 17:43:28.

Figure 3 shows the plot of the accident flight. The recording session began at 11:47:16 on February 17, 2012 and continued for about 11 minutes 48 seconds until 11:59:04. The recording shows a steady-state, CHT of about 386 degF prior to a CHT rise at about 11:54:09. The EGT also was in a steady-state, at about 1,303 degF until an EGT rise at about 11:54:04. The CHT began to decrease at about 11:56:03, about 42 seconds after the EGT began to decrease.

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

[1] Comma Separated Value format.

Figure 2. Plot of flight before accident flight.

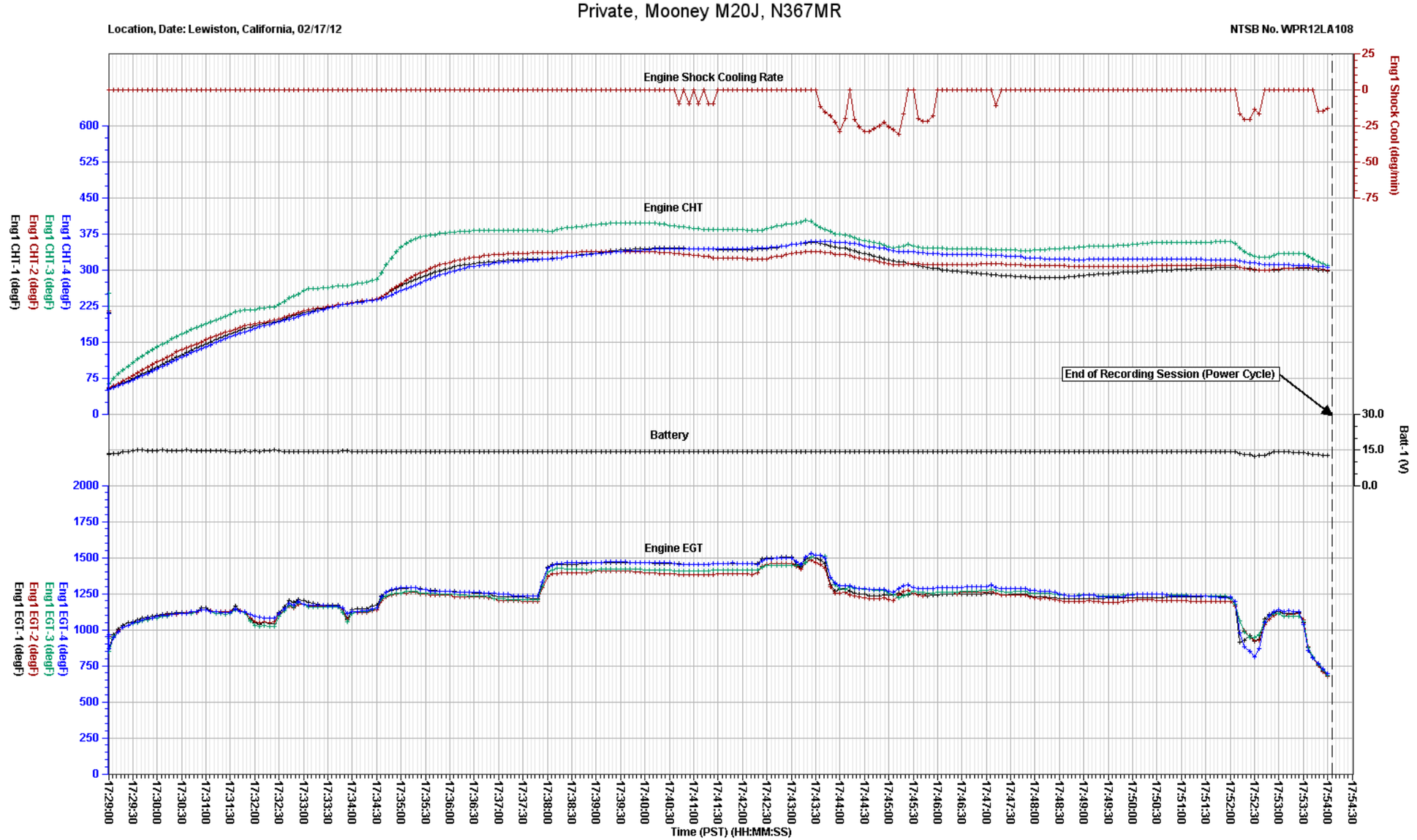
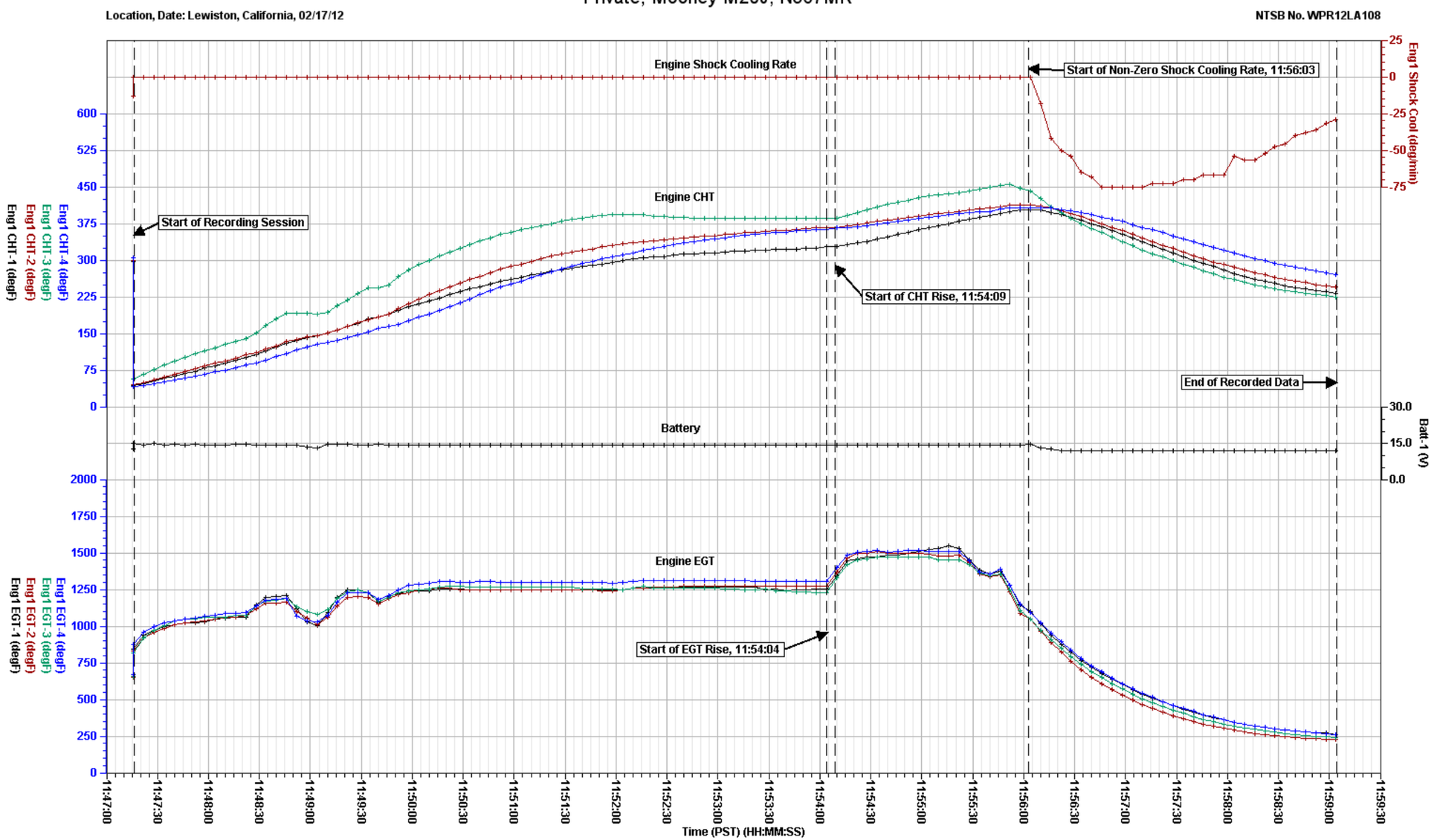


Figure 3. Plot of accident filght.



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. Batt-1 (V)	Battery Voltage Input 1
2. Eng1 CHT-1 (degF)	Cylinder Head Temperature Cylinder 1
3. Eng1 CHT-2 (degF)	Cylinder Head Temperature Cylinder 2
4. Eng1 CHT-3 (degF)	Cylinder Head Temperature Cylinder 3
5. Eng1 CHT-4 (degF)	Cylinder Head Temperature Cylinder 4
6. Eng1 EGT-1 (degF)	Exhaust Gas Temperature Cylinder 1
7. Eng1 EGT-2 (degF)	Exhaust Gas Temperature Cylinder 2
8. Eng1 EGT-3 (degF)	Exhaust Gas Temperature Cylinder 3
9. Eng1 EGT-4 (degF)	Exhaust Gas Temperature Cylinder 4
10. Eng1 Shock Cool (deg/min)	Engine Shock Cooling

Table A-2. Unit abbreviations.

Units Abbreviation	Description
degF	degrees Fahrenheit
deg/min	degrees per minute
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.