

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

April 11, 2014

Engine Data Monitor (EDM)

Specialist's Factual Report
By George Haralampopoulos

1. EVENT SUMMARY

Location: Hesperia, California
Date: July 8, 2013
Aircraft: Cessna 182H
Registration: N2062X
Operator: Private
NTSB Number: WPR13LA317

On July 8, 2013, about 2320 Pacific daylight time, a Cessna 182H, N2062X, landed on a road following a loss of engine power near Hesperia, California. The airplane was registered to, and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91. The commercial pilot and passenger sustained minor injuries; the airplane sustained substantial damage during the accident sequence. The cross-country personal flight departed Apple Valley Airport, Apple Valley, California, about 2245 with a planned destination of French Valley Airport, Murrieta/Temecula, California. Night visual meteorological conditions prevailed, and no flight plan had been filed.

2. 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: **12894**

2.1. 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 that are monitored 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. EDM Condition

Upon arrival at the Vehicle Recorder Laboratory, an exterior inspection revealed that the JPI-700 unit had sustained minimal impact damage. The unit was powered on normally and the data was extracted using the manufacturer's recommended procedures.

2.1.2. Recording Description

The EDM recording contained 29 different logs. The accident flight was located by the unit's time stamp of July 8th and contained approximately 268 valid points of data over a span of about 27 minutes.

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.

2.2. Time Correlation

The EDM records time with the first data sample based on the units' internal clock. The internal clock is set and updated by the operator and displayed upon power up. The JPI was powered on and the internal time was observed to be set to UTC time.

Correlation of the EDM data to the event local time, Eastern daylight time (PDT), was established by using the unit's internal time and then applying a 7 hour offset. All times are referenced as PDT for the rest of this report.

2.3. EDM Plots and Corresponding Tabular Data

The following figure contains EDM data recorded during the July 8th event.

Figure 1 shows the aircraft's engine parameters during the day of the accident starting from 21:59:30 PDT, until 23:14:22 PDT, when the unit was powered off. The unit was power cycled from 22:38:58 PDT to 22:47:40 PDT. The CHT and EGT values after the power cycle are consistent with an engine start. The accident flight begins after this power cycle. At about 23:03:04 PDT, the Fuel Flow, EGT's, and CHT's begin to drop. At about 23:04:58 PDT, the EGT's fluctuate until returning to an average value of about 1250 degF. Figure 2 highlights the fluctuations of the engine EGTs.

The corresponding tabular data used to create this plot are provided in electronic (*.csv¹) format as Attachment 1 to this report.

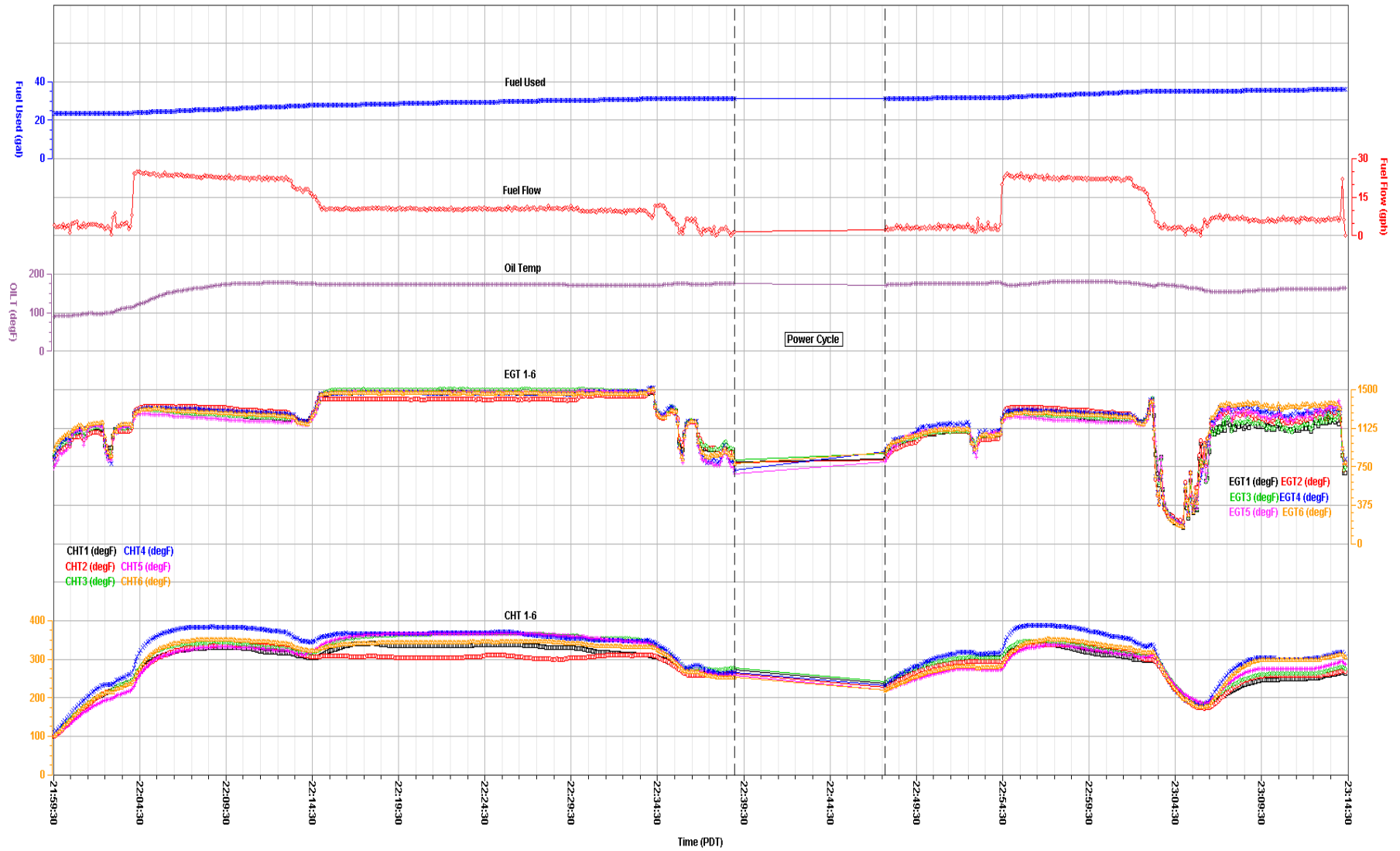
¹ Comma Separated Value format.

Figure 1. Plot of JPI parameters for prior and accident flight.

Private, Cessna 182, N2062X

Location, Date: Hesperia CA, 07/08/13

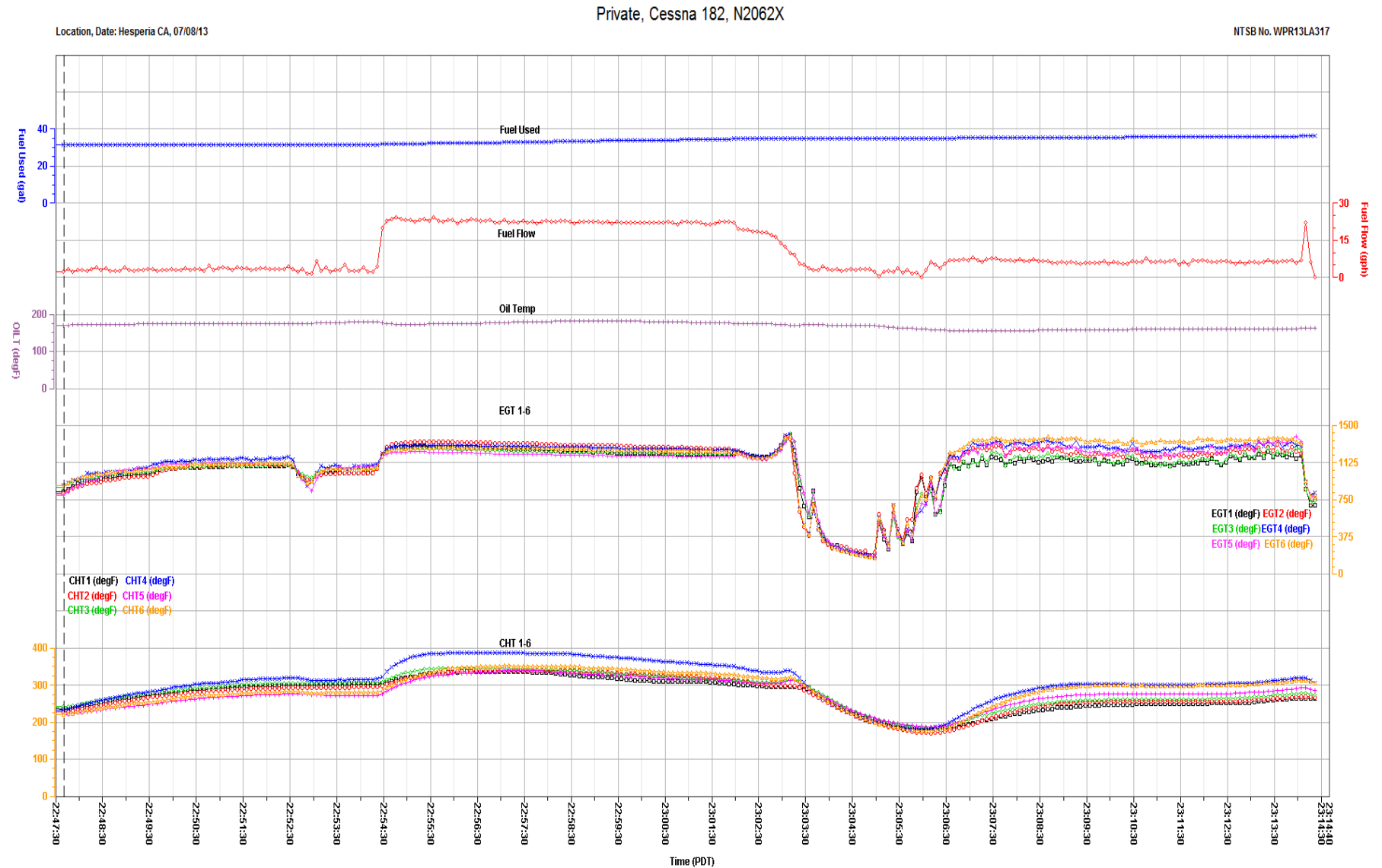
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Figure 1. Plot of JPI parameters for the accident flight.



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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. CHT-# (degF)	Engine Cylinder Head Temperature Cylinder #
2. EGT-# (degF)	Engine Exhaust Gas Temperature Cylinder #
3. OILT (degF)	Engine Oil Temperature
4. Fuel Used (gal)	Fuel Used
5. Fuel Flow (gph)	Fuel Flow

Table A-2. Unit abbreviations.

Units Abbreviation	Description
degF	Degrees Fahrenheit
gal	Gallon
gph	Gallon per Hour