

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

October 2, 2018

Engine Data Monitor (EDM)

Specialist's Factual Report
By Joe Gregor

1. EVENT SUMMARY

Location: Llano, California
Date: July 31, 2017
Aircraft: Cessna 210F
Registration: N6109R
Operator: Private
NTSB Number: WPR17LA172

On July 31, 2017, about 1745 Pacific daylight time, a Cessna 210F, N6109R, was substantially damaged during a forced landing near Crystal Airport (46CN), Llano, California. The private pilot and his passenger were not injured. The personal flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed.

2. ENGINE DATA MONITOR GROUP

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

3. DETAILS OF INVESTIGATION

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

Recorder Manufacturer/Model: **JPI EDM-700**
Recorder Serial Number: **15817**

3.1. JPI EDM-790 Description

The J. P. Instruments EDM-700 is a panel mounted gauge that the operator can use to monitor and record up to 24 parameters related to engine operation. Depending on the installation, parameters can include: Exhaust Gas Temperature (EGT), Cylinder Head Temperature (CHT), Oil Pressure and Temperature, Manifold Pressure, Outside Air Temperature (OAT), 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. These calculations are also based on the aircraft installation. The unit may contain non-volatile memory for data storage. The rate at which the data is stored is operator selectable from 2 to 500 seconds between samples. 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. Data Recovery

The recorder was in good condition and the data were extracted normally using the J.P. Instruments software tool.

3.1.2. Data Description

The EDM in this accident recorded 17 power cycles occurring between July 13 and July 31, 2017. The event flight was the last event recorded and its duration was approximately 2.1 hours.

3.1.3. Engineering Units Conversions

The engineering unit conversions used for the data contained in this report are based on documentation from the manufacturer. Appendix A lists the parameters provided in this report.

3.2. Time Correlation

The EDM records timestamped data based on the internal clock setting. This setting is input and updated by the operator.

Correlation of EDM data to the event local time was established by noting the current time displayed by the EDM while powering the unit on in the recorder laboratory, then offsetting the recorded time to transform recorded time to the local PDT. All times reported and plotted in this report are in given in PDT.

3.3. Plots and Corresponding Tabular Data

The following two figures are provided for orientation with the tabular data provided in attachment 1 to this report, which contains EDM data recorded during the last two power cycles.

Figure 1 shows Engine Exhaust Gas Temperature, Cylinder Head Temperature, Inlet Temperature, Outside Air Temperature, and Oil Temperature for the flight before the accident flight. EGT and CHT data are measured for each of the 6 cylinders in the engine. Figure 2 shows this same data for the accident flight. This data began at 1326:54 PDT¹ on July 31, 2017.

Figure 1 shows the flight previous to the accident flight. Figure 2 shows the last flight recorded by the JPI. This flight lasted nearly 2 hours and exhibited several episodes of rapid stepwise increases or decreases in EGT during flight. At approximately 1642 PDT, oil temperature began to decrease, reaching an asymptote of about 125 °F by around 1655 PDT. At approximately 1724 PDT, EGTs rapidly dropped along with CHTs as the inlet temperature rapidly dropped and the OAT began to rise to approximately 100 °F. The last recorded data point was at 1729:48 PDT.

¹ All times are derived from the internally recorded time correcting for drift by noting the delta between actual time and the time reported by the device upon initial startup in the recorder laboratory before downloading.

Figure 1. EGT, CHT, Inlet, Oil, and Outside air temperatures for the flight prior to the accident flight.

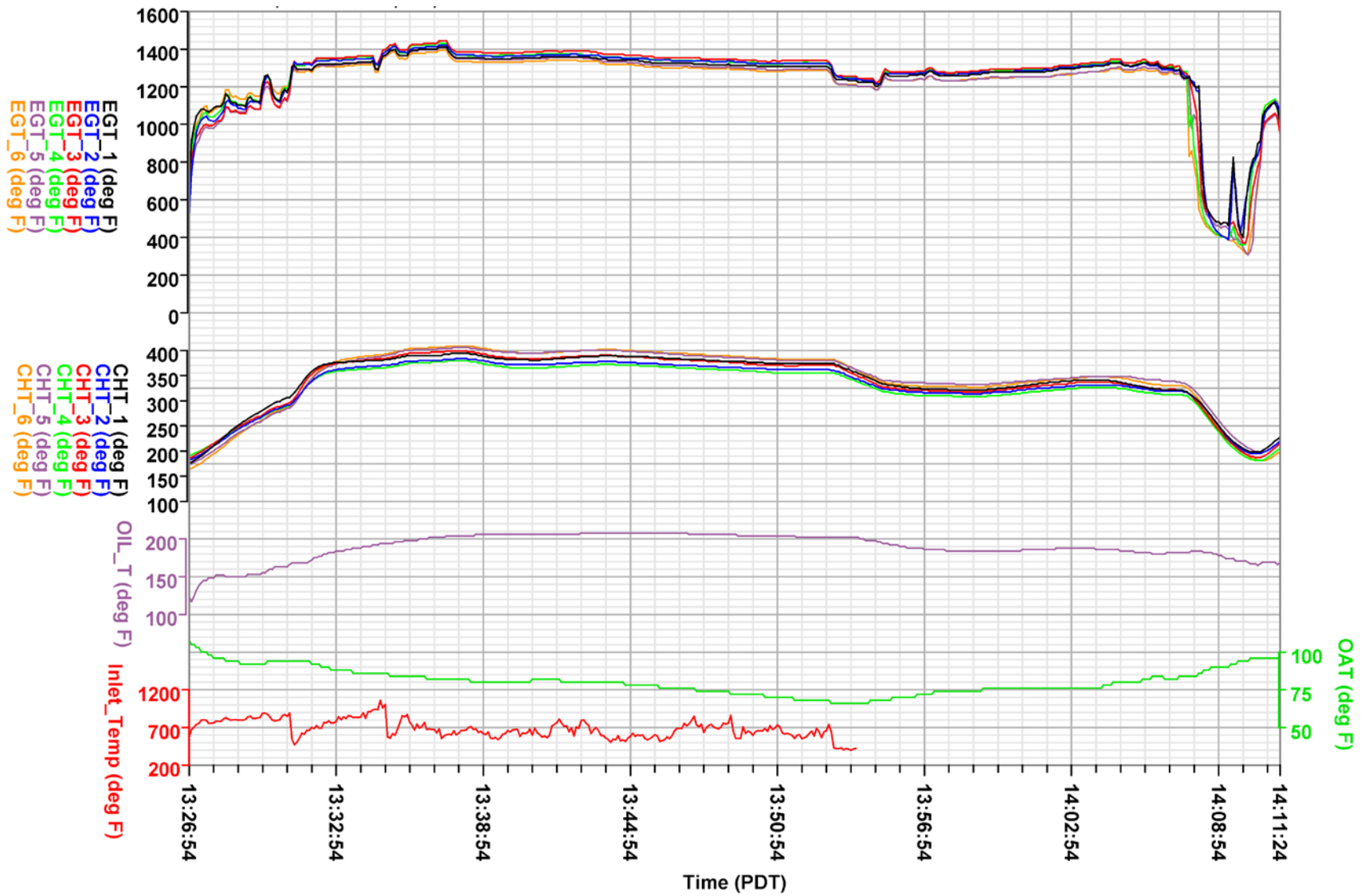


Figure 2. EGT, CHT, Inlet, Oil, and Outside air temperatures for the accident flight.

