

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR22LA296

ENGINE DATA MONITOR

Specialist's Factual Report

July 18, 2023

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A. ACCIDENT

Location: Corona, California
Date: August 9, 2022
Time: 1231 pacific daylight time (PDT)
Airplane: Piper PA-32-300, N841AD

B. ENGINE DATA MONITOR SPECIALIST

Specialist: Gerald Kawamoto
Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A group was not convened. The NTSB Vehicle Recorder Division received the following electronic devices:

Recorder Manufacturer/Model: JPI EDM-830
Recorder Serial Number: Unknown

1.0 JPI EDM 830 Description

The J. P. Instruments EDM-830 is a panel mounted LCD display 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.¹ 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. For a non-damaged unit, the data can then be downloaded by the operator using a USB flash drive and following the instructions on the unit.

¹ Non-volatile memory (NVM) is semiconductor memory that does not require external power for data retention.

1.1 JPI EDM-830 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory an external examination revealed heat and fire damaged, as shown in Figure 1, rendering the device inoperable. The non-volatile memory chip was removed, installed on a functional lab surrogate unit, and data were downloaded normally using the manufacturer's procedures upon powering the surrogate unit.



Figure 1. JPI EDM-830 as received.

1.2 JPI EDM-830 Recording Description

Data included sessions recorded from September 16, 2021, through August 9, 2022. Time on the device is user set and due to its condition, the recorded timestamps could not be referenced back to a standard time. Time is referred to as Recorded Time in this report. The last session started at 17:27:06 and ended at 19:25:18 Recorded Time on August 9, 2022. When data was processed with the manufacturer's software, an error occurred after the 706th data point, which had a corresponding timestamp of 18:37:42. The manufacturer was able to parse out additional data beyond this point through the end of the session at 19:25:18. Due to the recording logic of the device, parameter values after 18:37:42 may not represent the exact value of the parameter at its corresponding timestamp and this data is included for trending purposes. Data were sampled once every 6 seconds. Table 1 describes JPI EDM-830 parameters provided and verified in this report.

Table 1. Verified and provided JPI EDM-830 parameters.

Parameter Name (units)	Parameter Description (units)
LAT (deg)	Latitude (degrees)
LONG (deg)	Longitude (degrees)
SPD (kts)	Groundspeed (knots)
C# (degF)	Cylinder Head Temperature (degrees Fahrenheit)
E# (degF)	Exhaust Gas Temperature (degrees Fahrenheit)
CLD (degF/min)	Shock Cooling Rate (degrees Fahrenheit per minute)
RPM	Engine Revolutions Per Minute
HP (%)	Horsepower (percent)
MAP (inHg)	Manifold Pressure (inches of Mercury)
FF (gph)	Fuel Flow (gallons per hour)
OILP (psi)	Oil Pressure (pounds per square inch)
OILT (degF)	Oil Temperature (degrees Fahrenheit)
USD (gal)	Fuel Used (gallons)

D. FIGURES AND TABULAR DATA

Figure 2 and Figure 3 are Google Earth overlays of the accident flight recorded on the JPI EDM-830. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the accident flight. The magenta flight path depicts data recorded prior to 18:37:42 Recorded Time. Figure 2 shows the entire flight. Figure 3 shows the end of the flight and the wreckage location. Note that GPS coordinates (LAT & LONG parameters) recorded at the end of the session may not represent the exact values because they were recorded after 18:37:42 Recorded Time.

Figure 4 is a plot of parameters of the entire event flight. The time displayed is 17:25:00 to 19:30:00 Recorded Time.

Figure 5 is a plot of parameters of the final two minutes of the event flight. The time displayed is 18:37:00 to 19:27:00 Recorded Time. Absolute parameter values are not shown due to conversion error at 18:37:43 Recorded Time.

Figure 6 is a plot of parameters of the final two minutes of the event flight. The time displayed is 19:22:30 to 19:25:30 Recorded Time. Absolute parameter values are not shown due to conversion error at 18:37:43 Recorded Time.

The corresponding tabular data used to create Figure 2 through Figure 6 are provided in CSV format as attachment 1 to this report.

Submitted by:

Gerald Kawamoto
Recorder Specialist

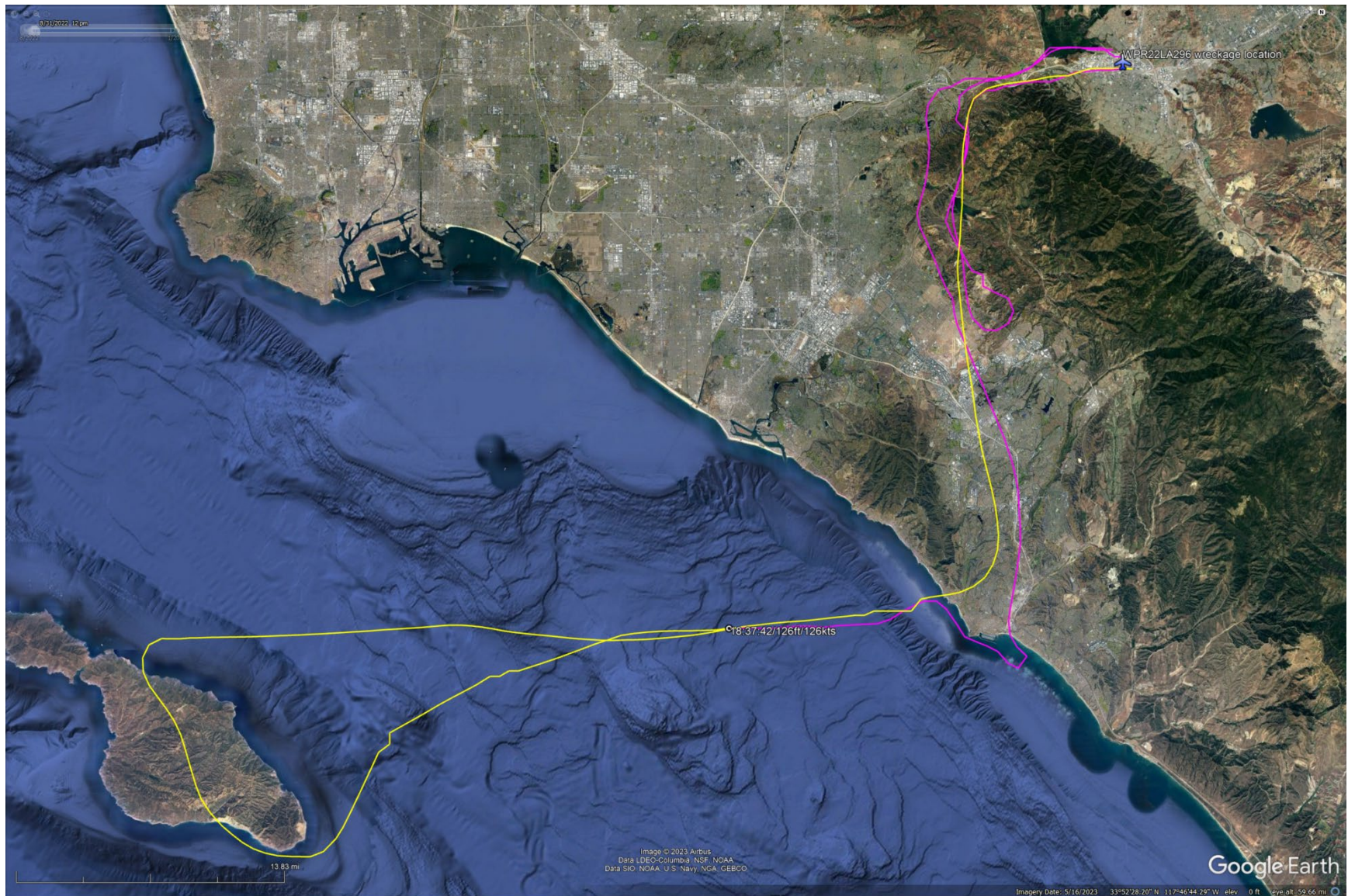


Figure 2. Google Earth overlay of the entire accident flight recorded on the JPI EDM-830.

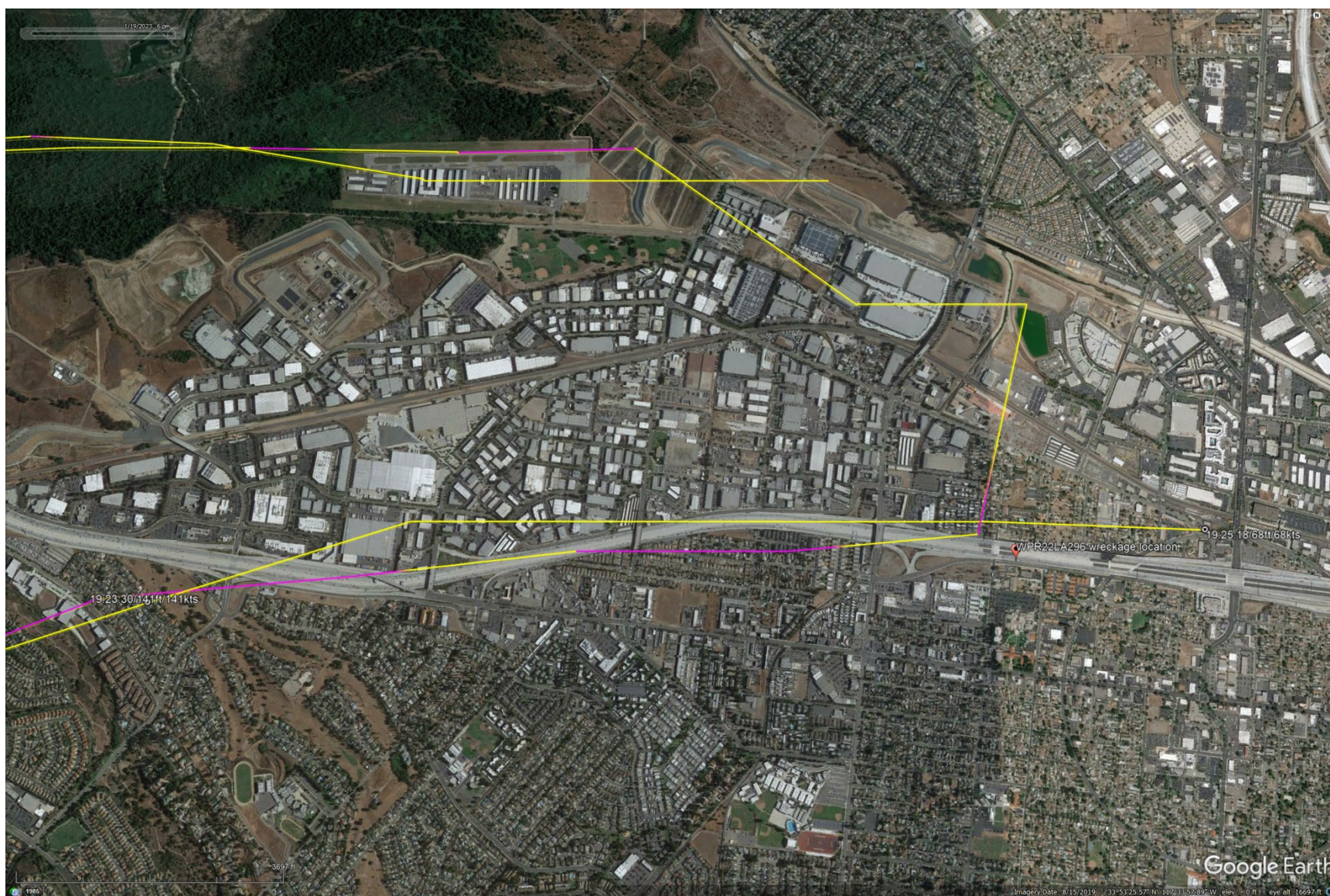


Figure 3. Google Earth overlay showing the end of the accident flight recorded on the JPI EDM-830 and the wreckage location.

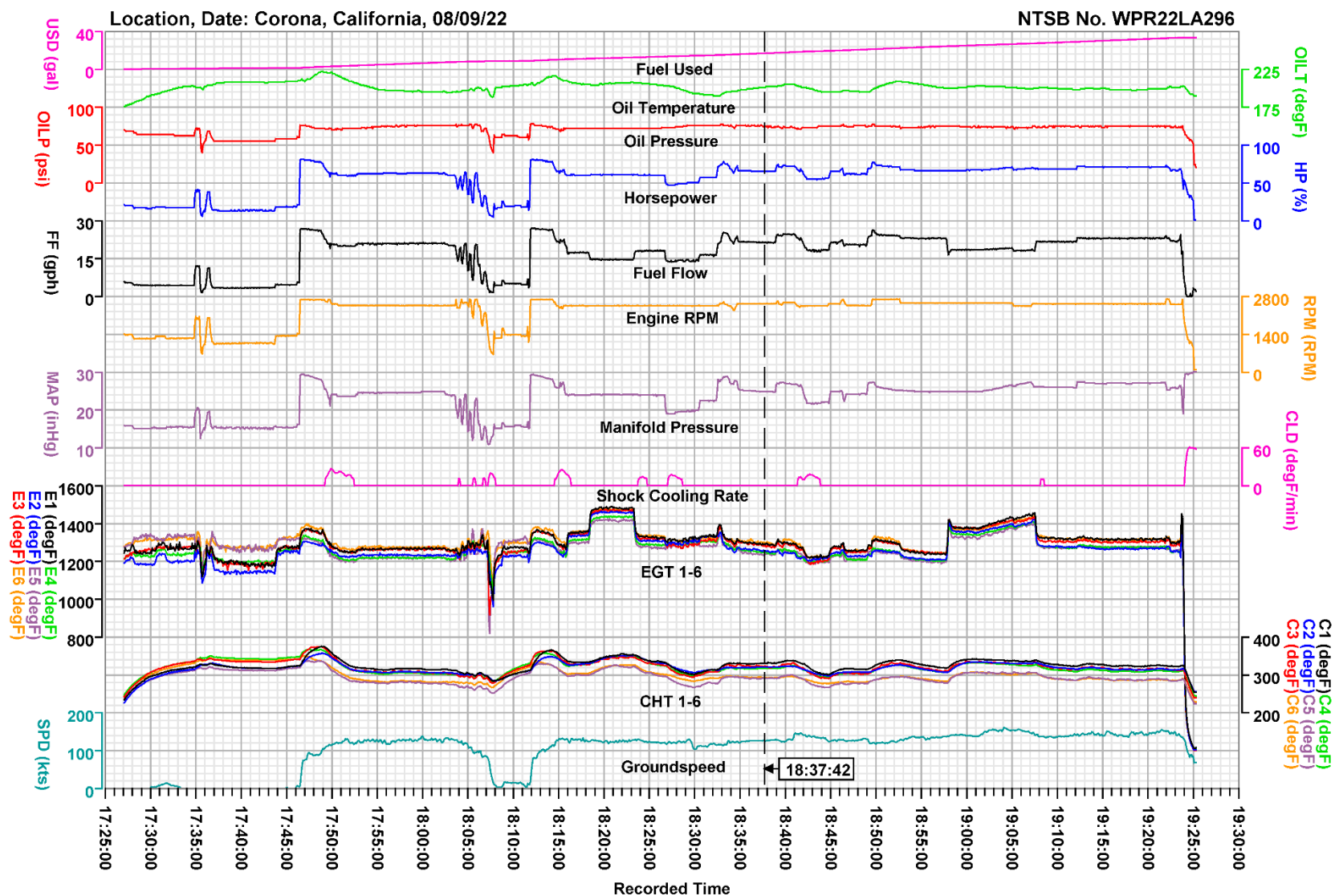


Figure 4. Plot of JPI EDM-830 parameters for the entire accident session.

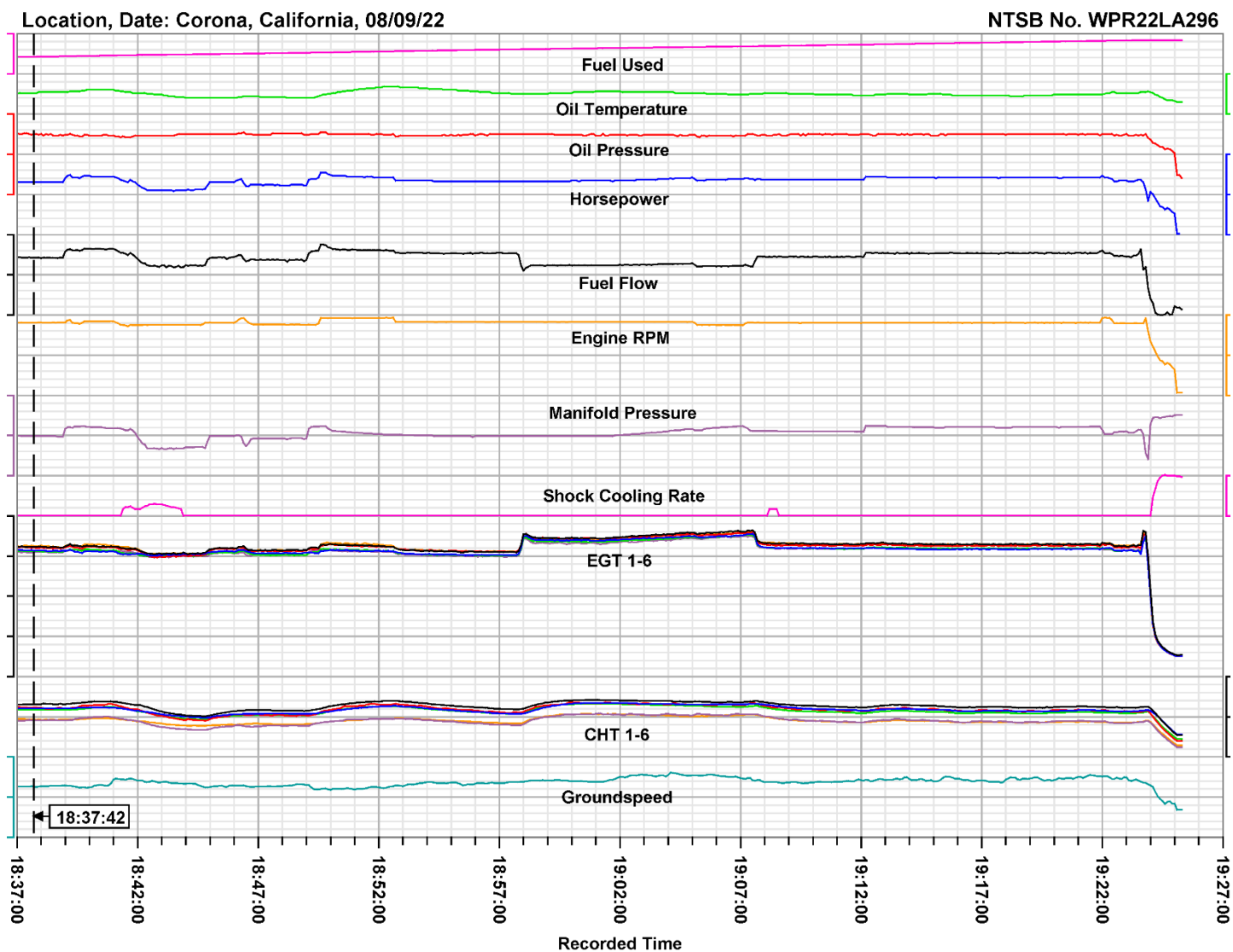


Figure 5. Plot of JPI EDM-830 parameters after 18:37:42 Recorded Time. Absolute parameter values are not shown due to conversion error at 18:37:43 Recorded Time.

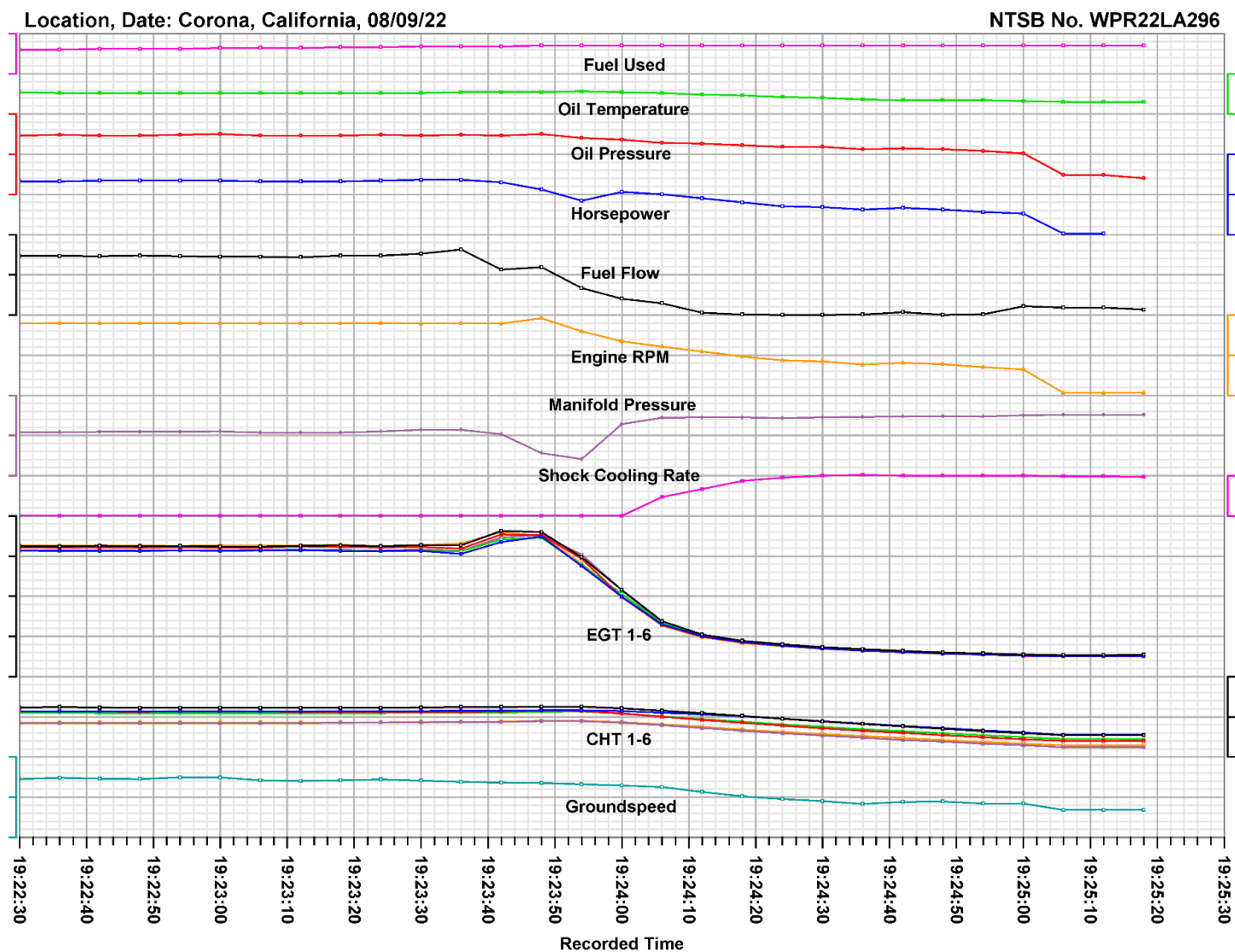


Figure 6. Plot of JPI EDM-830 parameters of approximately the final 3 minutes of the accident session. Absolute parameter values are not shown due to conversion error at 18:37:43 Recorded Time.