

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN22LA115

ENGINE DATA MONITOR

Specialist's Factual Report

July 6, 2023

A. ACCIDENT

Location: Olathe, Kansas
Date: February 4, 2022
Time: 1212 central standard time (CST)
Airplane: Piper PA-28R-201, N5145W

B. ENGINE DATA MONITOR SPECIALIST

Specialist: W. Deven Chen
Electrical Engineer – Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A recorder group was not convened. The NTSB Vehicle Recorder Division received the following engine data monitor (EDM):

Manufacturer/Model:	J.P. Instrument EDM-730
Serial Number:	36648

1.0 Recorder Description

The J.P. Instrument (JPI) EDM 730 is a panel-mounted gauge with color display that allows the operator to monitor and record up to 24 parameters related to engine operations. Depending on the installation, 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 (RPM), Fuel Flow, Amperage Load, and Bus Voltage, etc.

The unit can also calculate in real time, percent of maximum horsepower, fuel used, shock cooling rate, and EGT differentials between highest and lowest cylinder temperatures. The calculations are also based on the aircraft installation. The unit can also record basic GPS data if connected to an external GPS unit and configured properly.

The unit contains non-volatile memory¹ for data storage of the parameters recorded and calculated. The rate at which the data is stored is selectable by the operator from 1 to 500 seconds per sample. The memory can store up to 30 hours of

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

data at a 6 second-per-sample rate. The data can then be downloaded by the operator using the J.P. Instruments software.

1.1 Recorder Condition and Data Recovery

The device was in good condition upon arrival at the Vehicle Recorder Division, as shown in figure 1. The device powered on normally, and data were downloaded and converted into engineering unit using the manufacturer's software.

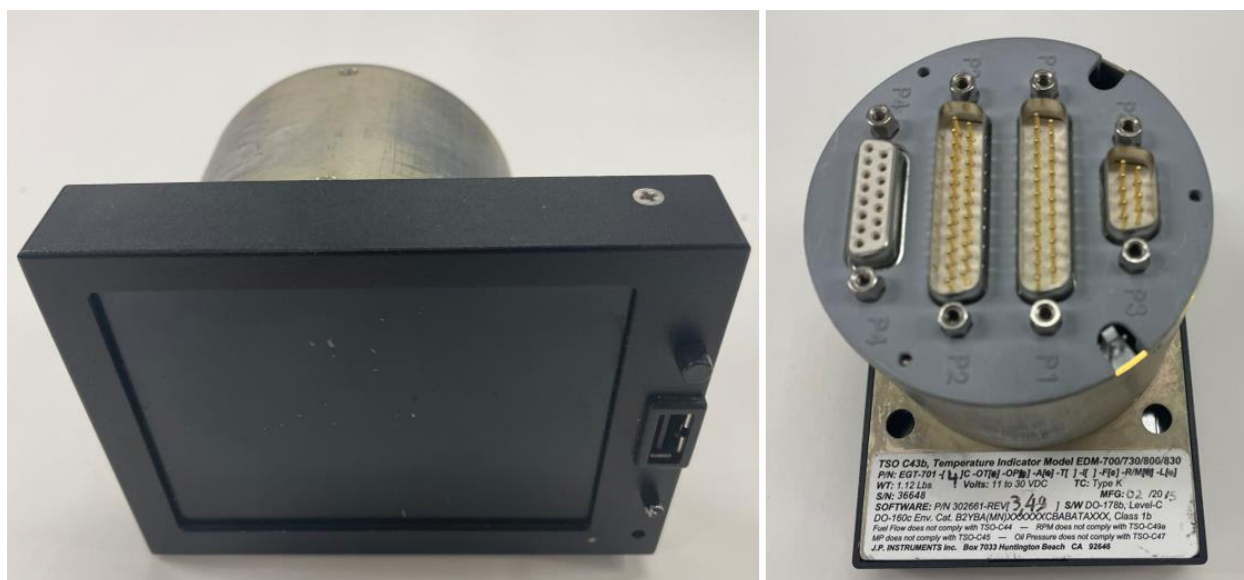


Figure 1. Front and back of the JPI EDM-730 as received.

1.2 Recording Description

The downloaded data included 94 sessions, ranging from October 1, 2021, to February 4, 2022. The last session recorded on February 4, 2022, was identified as the accident flight. The recording was 11 minutes and 40 seconds in duration. A previous flight was also recorded on February 4, 2022, and is included in this report. The data were recorded at a 5 second-per-sample rate.

1.2.1 Parameters Provided

Table 1 lists the recorder parameters verified and provided in this report.

Table 1. JPI EDM-730 data parameters provided.

Parameter Name (unit)	Parameter Description (unit)
ALT (ft)	GPS Geometric Altitude Above Mean Sea Level(feet)
BAT (V)	Bus Voltage (volts)
C1-4 (degF)	Cylinder Head Temperature Cylinder # (degrees Fahrenheit)
CLD (degF/min)	Shock Cooling Rate (degrees Fahrenheit per minute)
E1-4 (degF)	Exhaust Gas Temperature Cylinder # (degrees Fahrenheit)

Parameter Name (unit)	Parameter Description (unit)
LAT (deg)	Geometric Latitude (degrees)
LNG (deg)	Geometric Longitude (degrees)
MAP (inHg)	Manifold Pressure (inches of mercury)
OIL P (PSI)	Engine Oil Pressure (pounds per square inches)
OIL T (degF)	Engine Oil Temperature (degrees Fahrenheit)
OAT (degF)	Outside Air Temperature (degrees Fahrenheit)
RPM (rpm)	Engine RPM (revolutions per minute)
SPD (kts)	GPS Ground Speed (knots)

1.3 Time Correlation

Upon powering on the device, an offset of 5:36:28 was observed between the device's time and CST (the local time of the accident). This time offset was applied, and times are expressed in CST for the rest of this report.

D. FIGURES AND TABULAR DATA

Figures 2 and 3 are parameter plots of the accident flight on February 4, 2022.

Figure 4 is a parameter plot of the previous flight which occurred on the same day.

Figure 5 is a Google Earth overlay of the accident flight track, and figure 6 is a Google Earth overly of the previous flight track. Note that the weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

The corresponding tabular data used to create figures 2 to 6 are provided in electronic comma-separated value (CSV) format as attachments to this report. The accident flight recording is attachment 1, and the previous flight recording is attachment 2. Note that not every additional parameter in the attachments have been validated by the specialist.

Submitted by:

W. Deven Chen
Electrical Engineer - Recorder Specialist

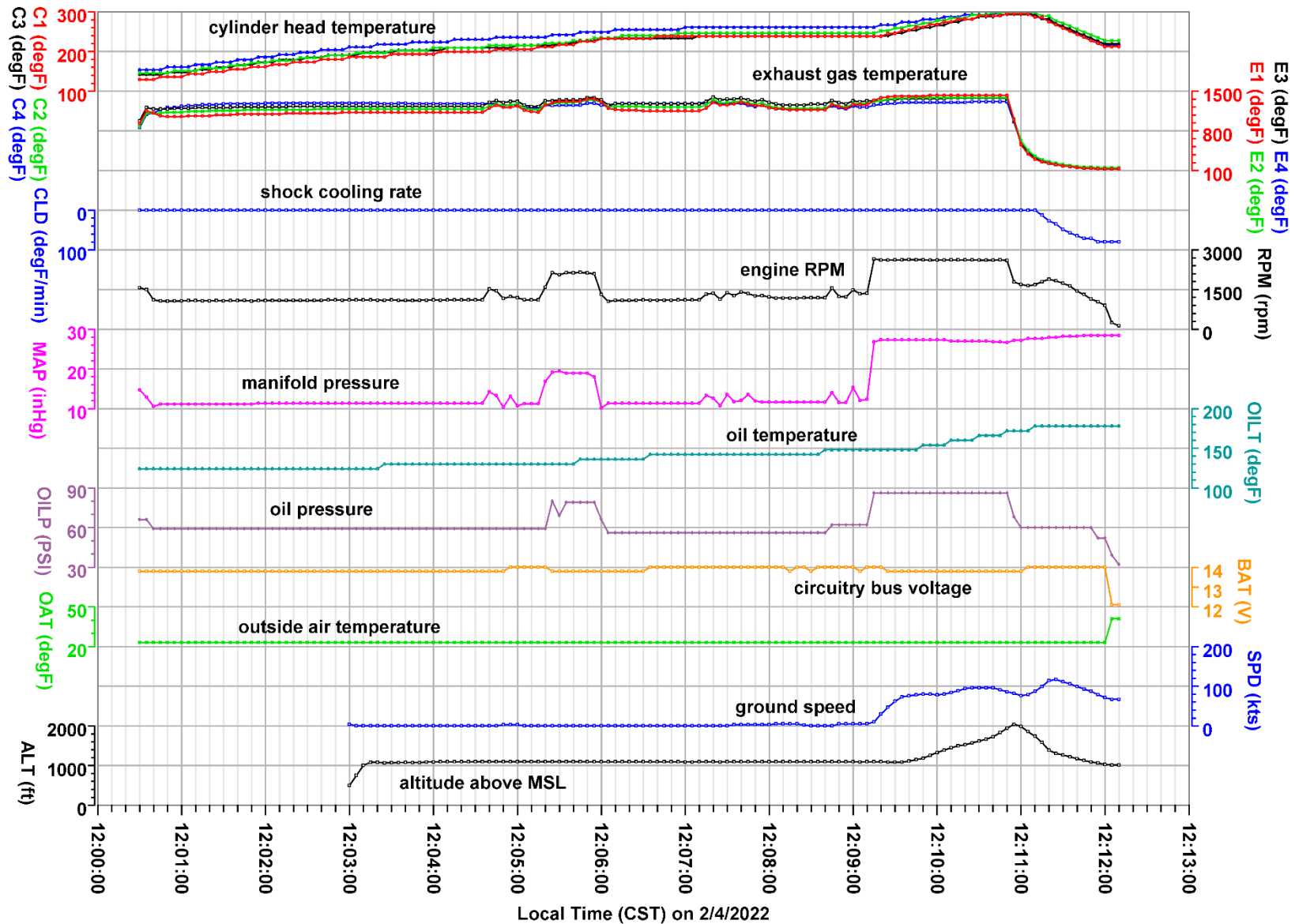


Figure 2. Plot of data parameters for the entire accident flight recording.

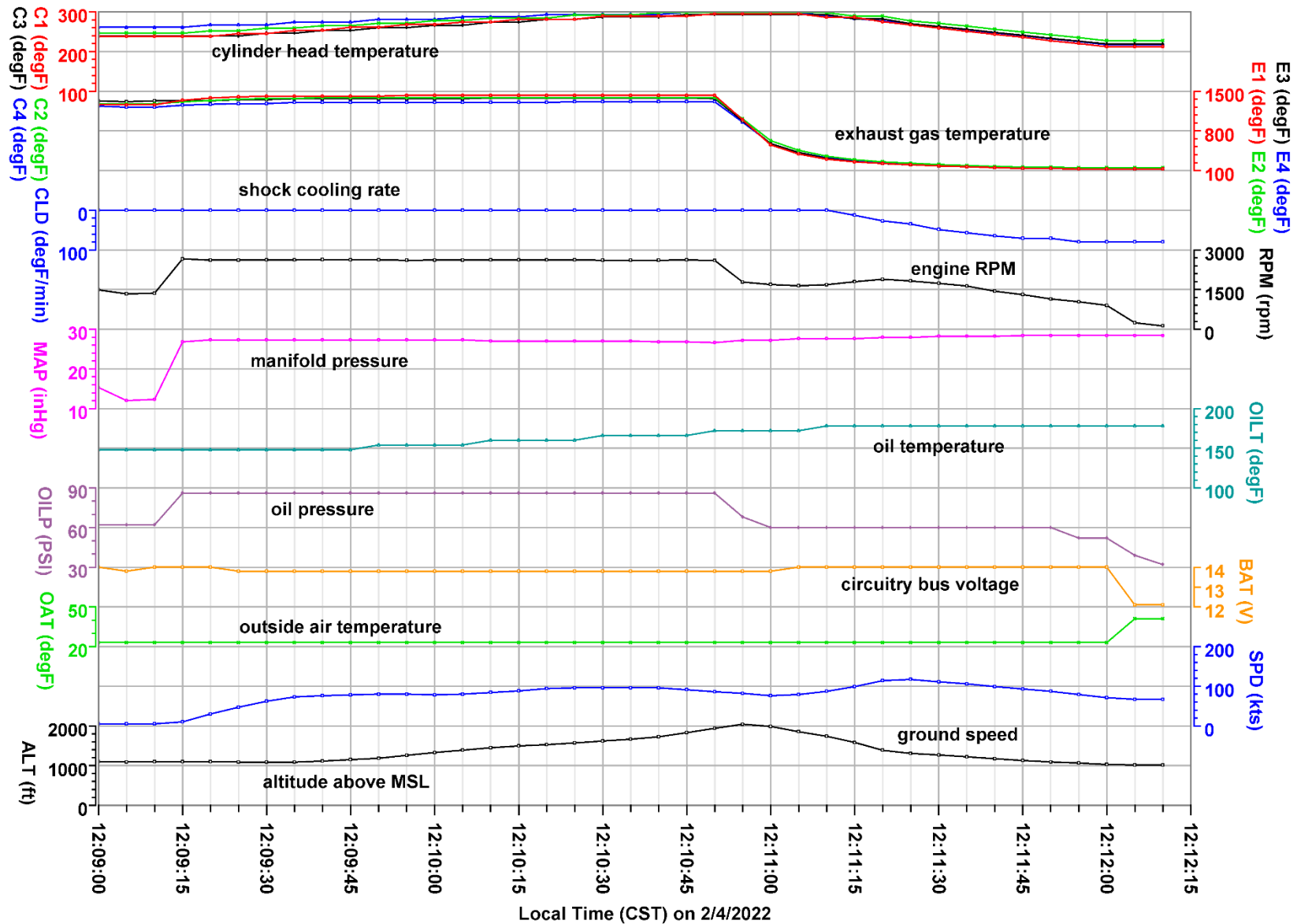


Figure 3. Plot of data parameters for the final portion of the accident flight recording.

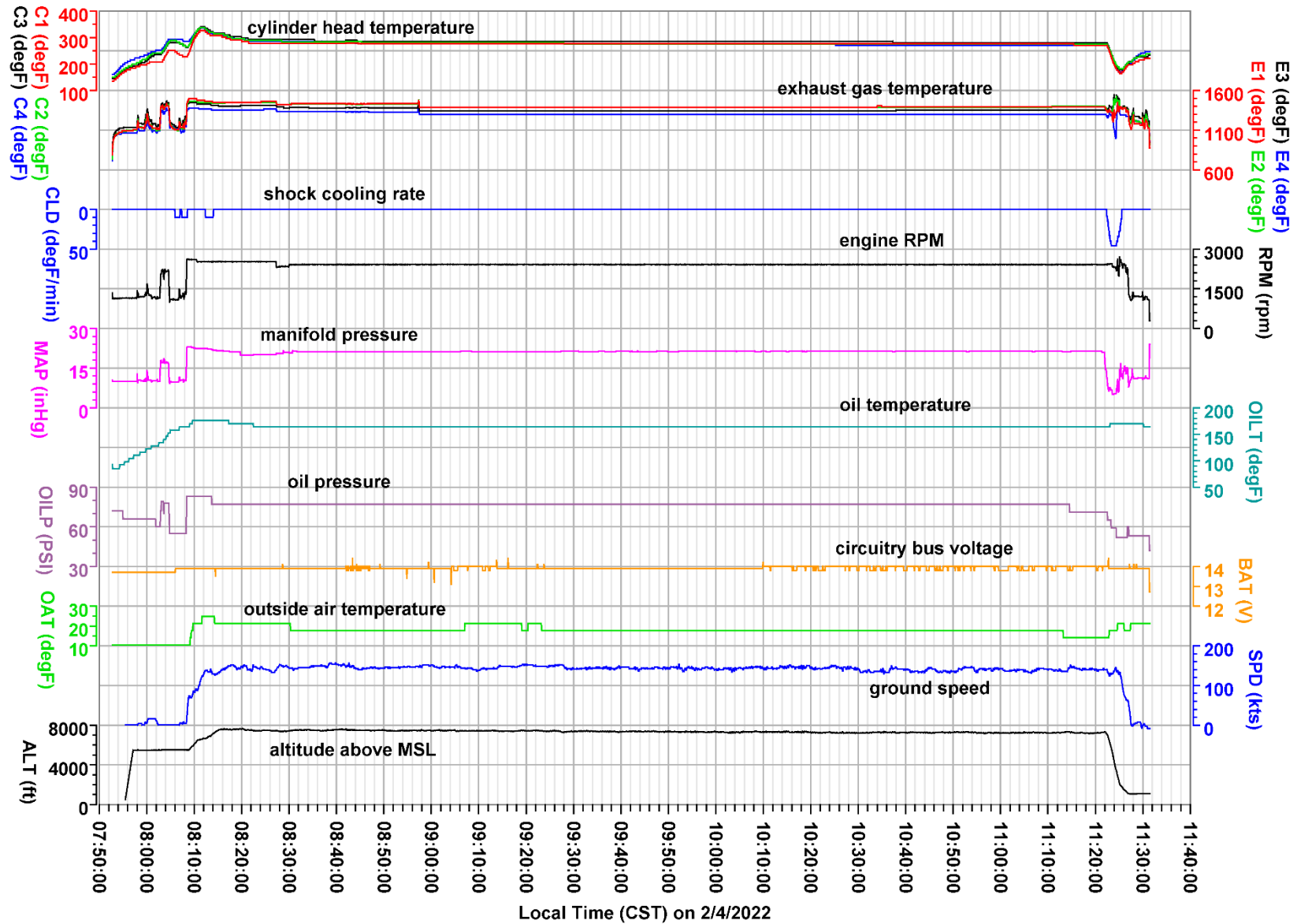


Figure 4. Plot of data parameters for the entire previous flight recording.

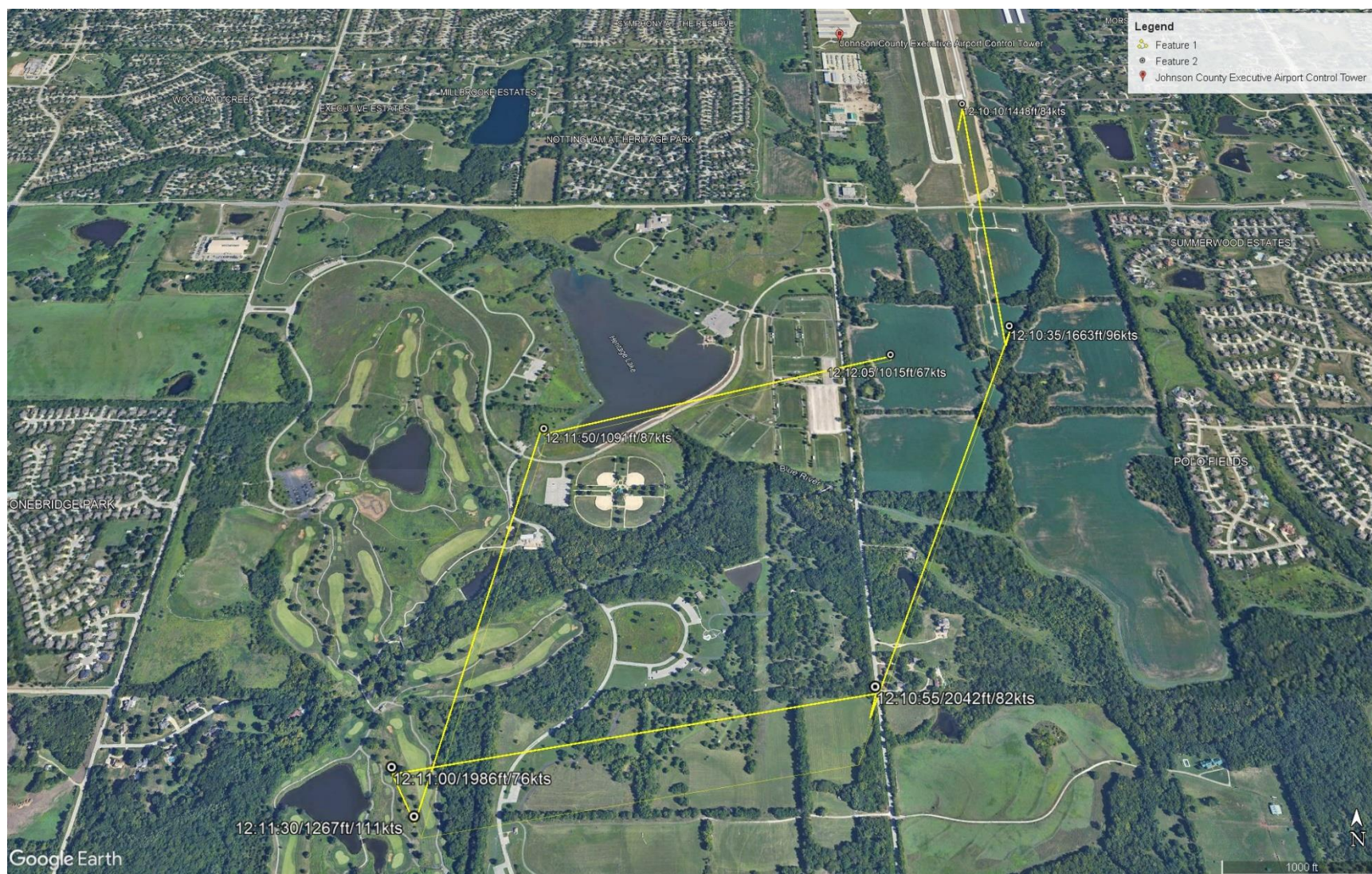


Figure 5. Google Earth overlay of the entire accident flight track.

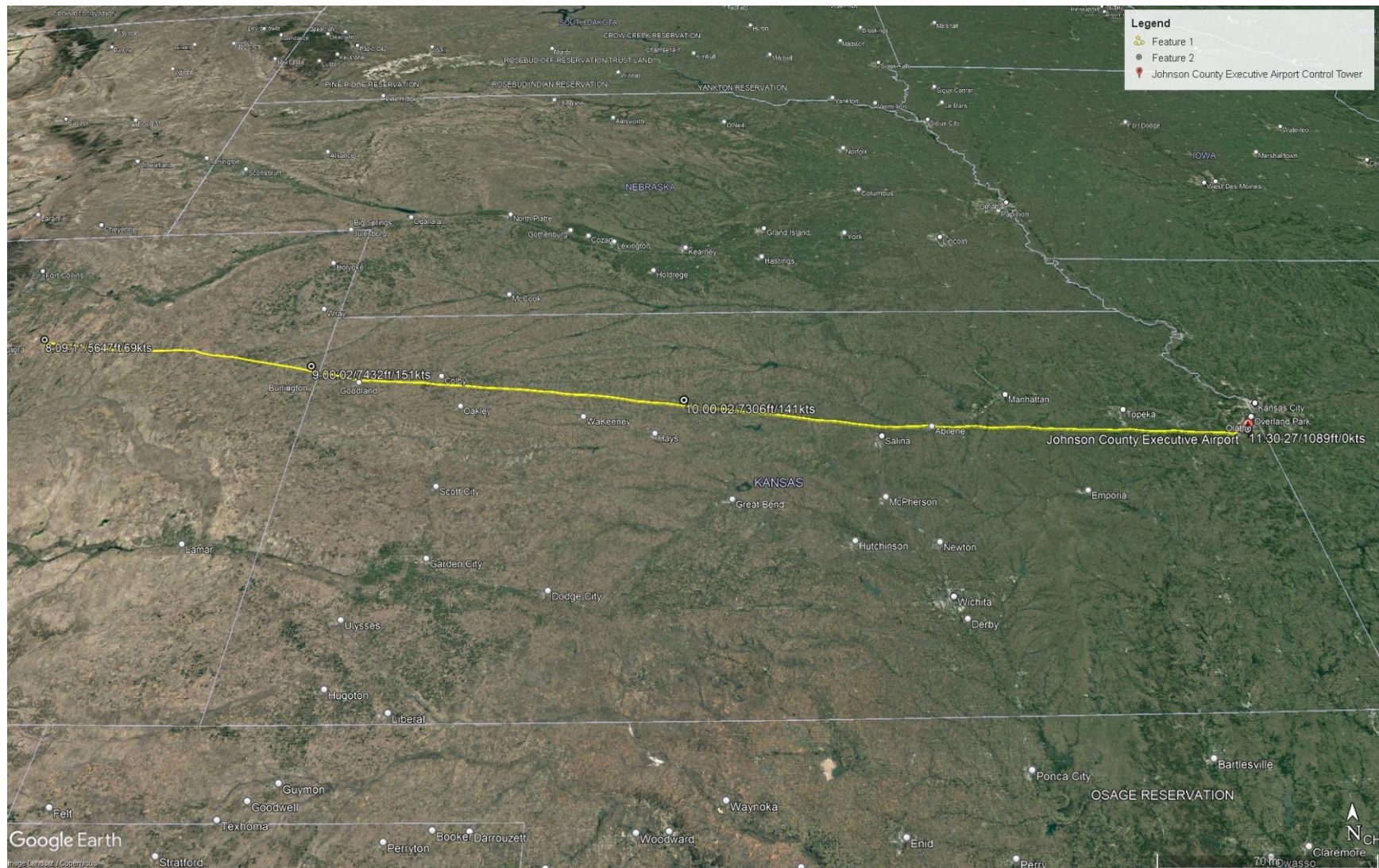


Figure 6. Google Earth overlay of the entire previous flight track.