

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



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ENGINE DATA MONITOR

Specialist's Factual Report

June 5, 2024

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A. ACCIDENT

Location: Front Royal, Virginia
Date: March 12, 2024
Time: 1902 eastern standard time (EST)
Airplane: Beech K35, N59MK

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 engine data monitor:

Recorder Manufacturer/Model: JPI EDM-900
Recorder Serial Number: 07402

1.0 JPI EDM 900 Description

The J. P. Instruments EDM-900 is a panel mounted display that the operator can monitor and record multiple engine parameters related to engine operations and GPS parameters, if connected. 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 (RPM), Compressor Discharge Temperature, Fuel Flow, Fuel Pressure, Fuel Level, 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 1 to 500 seconds per sample. Data recording typically begins when RPM is greater than 500 rpm. The memory can typically store over 300 hours of data at a 6 second sample rate. For a non-damaged unit, the data can then be

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

downloaded by the operator using a USB flash drive and following the instructions on the unit.

1.1 JPI EDM-900 Data Recovery

The device was in good condition upon arrival at the Vehicle Recorder Laboratory, as shown in figure 1. The device powered on normally and data were extracted using the manufacturer's procedures.



Figure 1. JPI EDM-900 as received.

1.2 JPI EDM-900 Recording Description

Data included sessions recorded from June 10, 2022, through April 4, 2024, Recorded Time. An offset of 10,440 seconds was applied to the data to align takeoff power with the reported takeoff time of the accident flight in eastern daylight time, the local time of the accident. The last session was associated with an engine run up on April 4, 2024. The second to last session was the accident session and started at 12:53:16 EDT and ended at 18:53:10 EDT on March 12, 2024. The previous flight on March 12, 2024, started at 6:02:32 EDT and ended at 12:29:38 EDT and is included in this report. Data were sampled once every 6 seconds. Table 1 describes JPI EDM-900 parameters provided and verified in this report.

Table 1. JPI EDM-930 parameters.

Parameter Name (units)	Parameter Description (units)
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)
FP (psi)	Fuel Pressure (pounds per square inch)
OILP (psi)	Oil Pressure (pounds per square inch)
OILT (degF)	Oil Temperature (degrees Fahrenheit)
LFL & RFL (gal)	Left and Right Fuel Level Indicators (gallons)
LAUX & RAUX (gal)	Left and Right Aux Level Indicators (gallons)
OAT (degF)	Outside Air Temperature (degrees Fahrenheit)

D. FIGURES AND TABULAR DATA

Figure 2 is a plot of parameters for the entire accident session. The time displayed is 12:50:00 EDT to 19:00:00 EDT.

Figure 3 is a plot of parameters of the final 9 minutes and 10 seconds of the accident session. The time displayed is 18:44:00 EDT to 18:53:30 EDT. The value of RFL was "0 gal" from 18:33:28 EDT to 18:39:46 EDT. At 18:39:52 EDT, the value of RFL went from "0 gal" to "NA", a null value, therefore the data points do not appear on the graphed data.

Figure 4 is a plot of parameters from an engine run up test on April 4, 2024. The time displayed is 12:45:50 EDT to 12:54:50 EDT.

Figure 5 is a plot of parameters for the session recorded prior to the accident flight on March 12, 2024. The time displayed is 6:01:00 EDT to 12:31:00 EDT.

The corresponding tabular data used to create figures 2 through 5 are provided in electronic comma-separated value (CSV) format as attachment 1 to this report.

Submitted by:

Gerald Kawamoto
Recorder Specialist

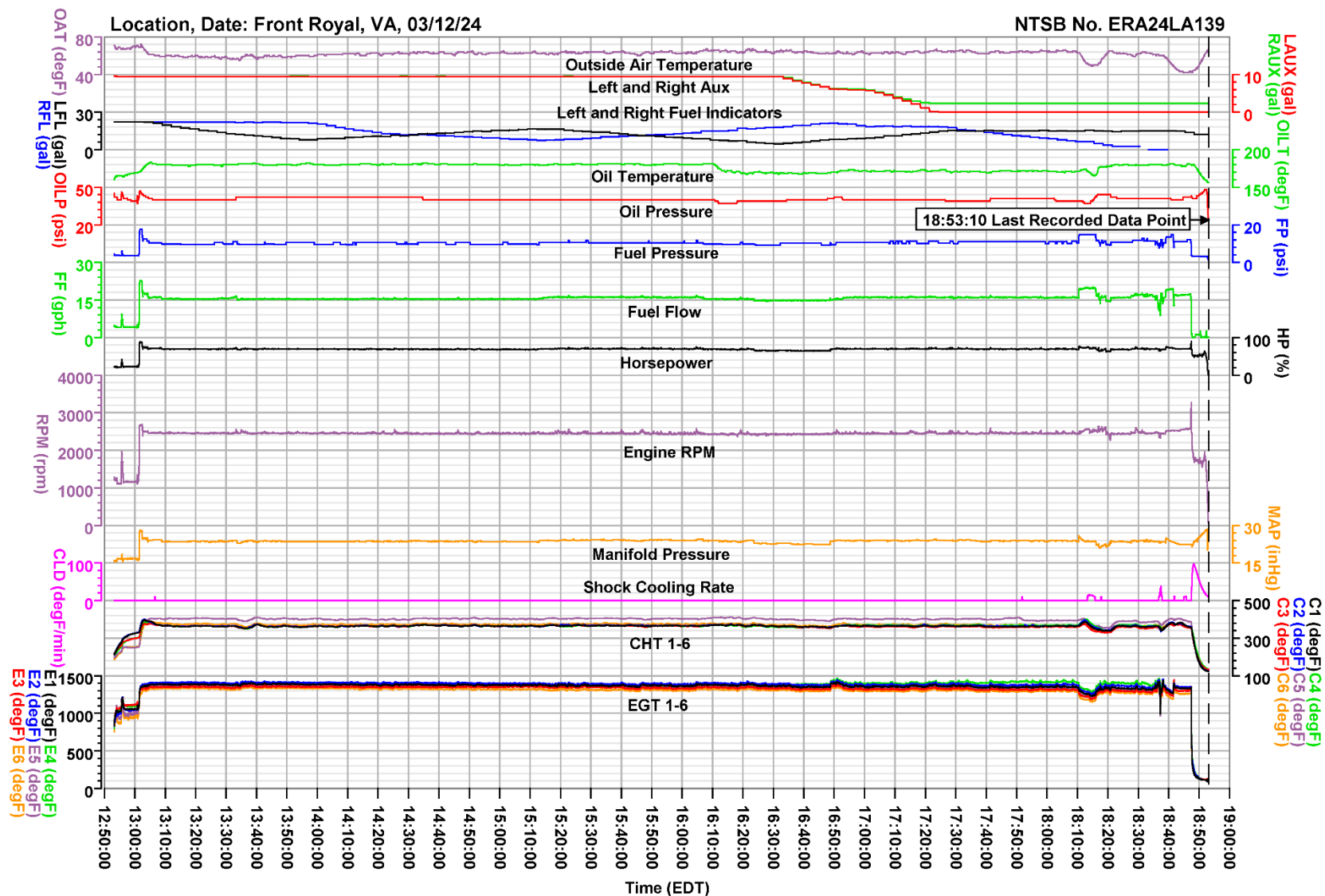


Figure 2. Plot of parameters of the entire accident flight recorded on the JPI EDM-900.

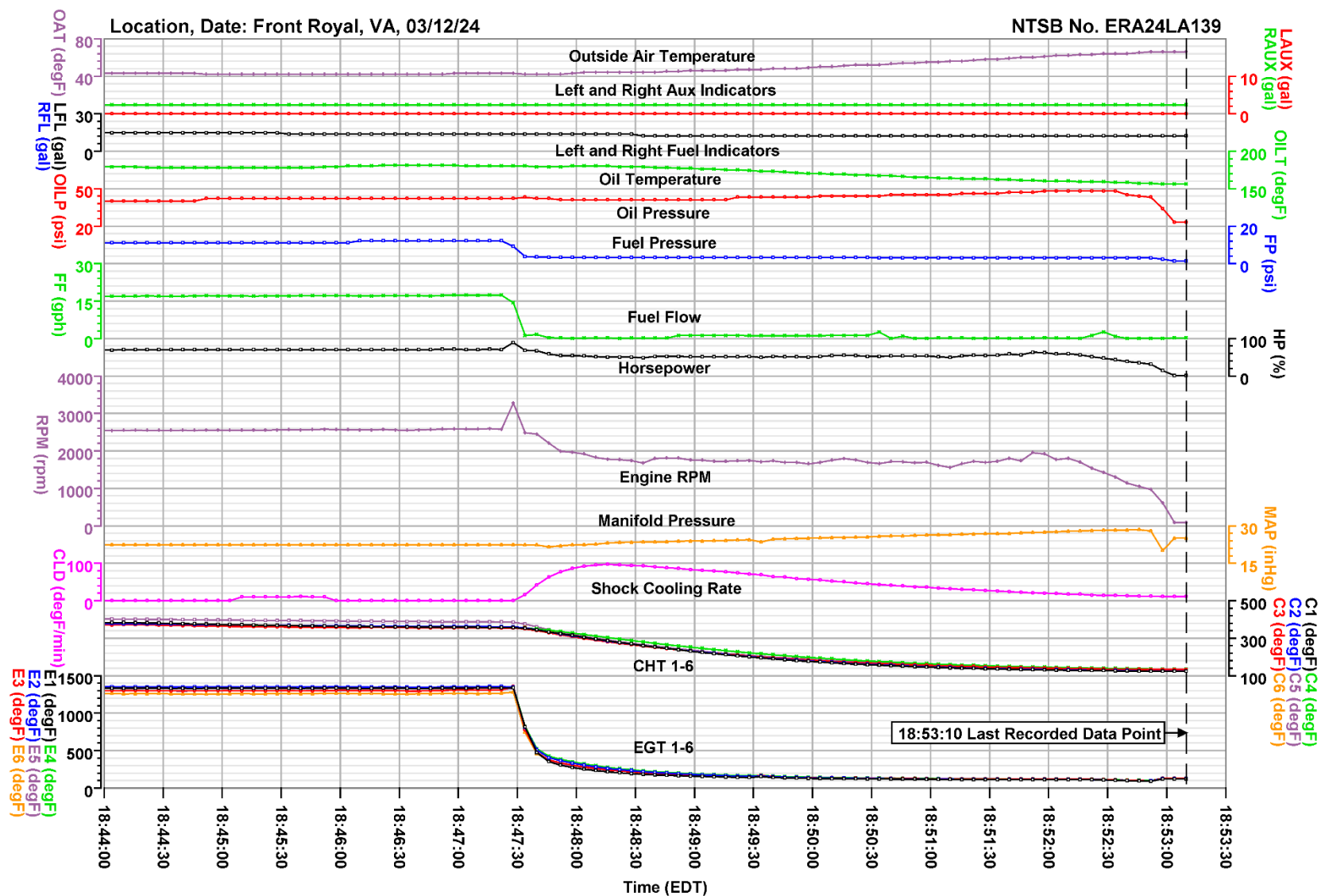


Figure 3. Plot of parameters of the end of the accident flight recorded on the JPI EDM-900.

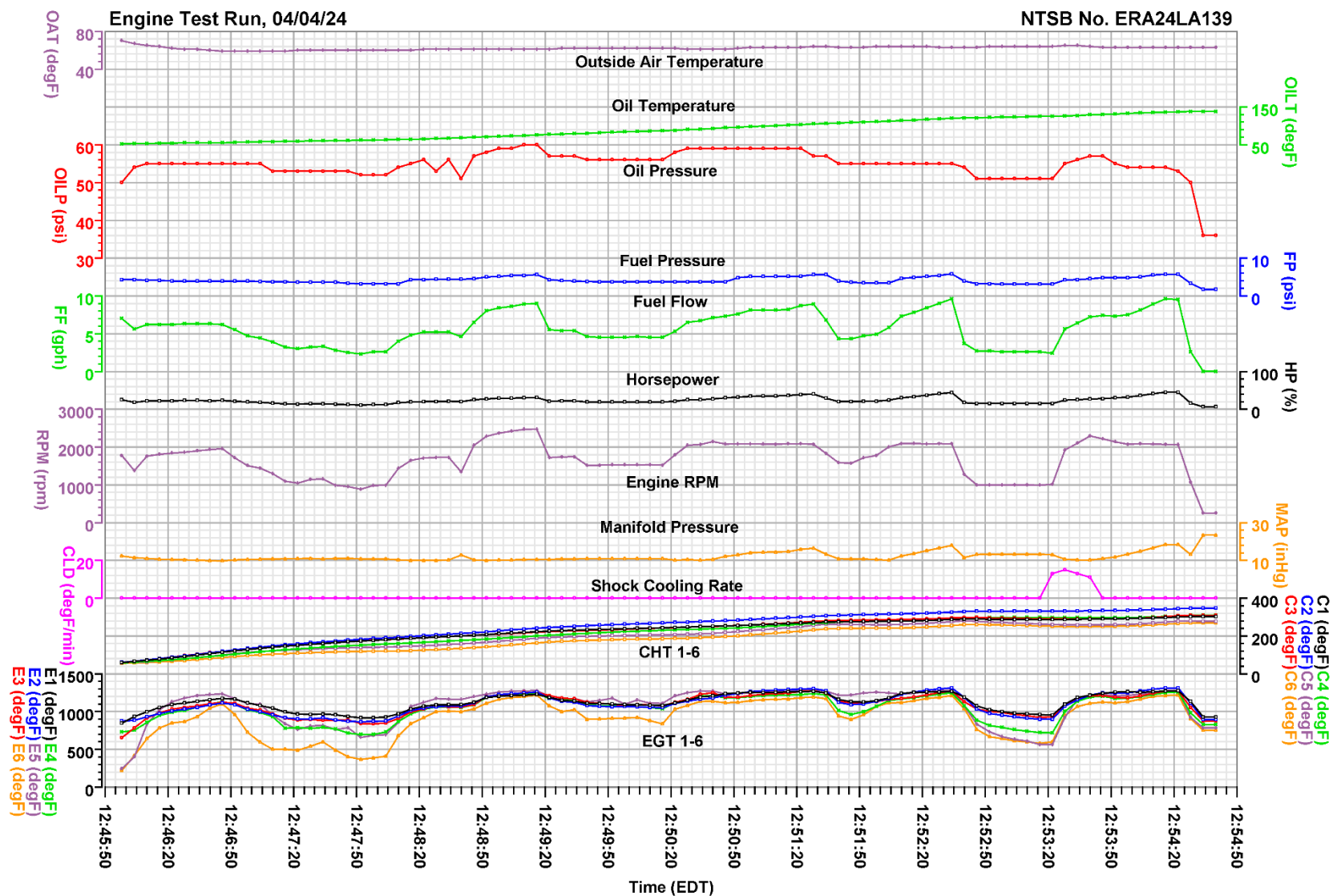


Figure 4. Plot of parameters of the engine test run on April 4, 2024, recorded on the JPI EDM-900.

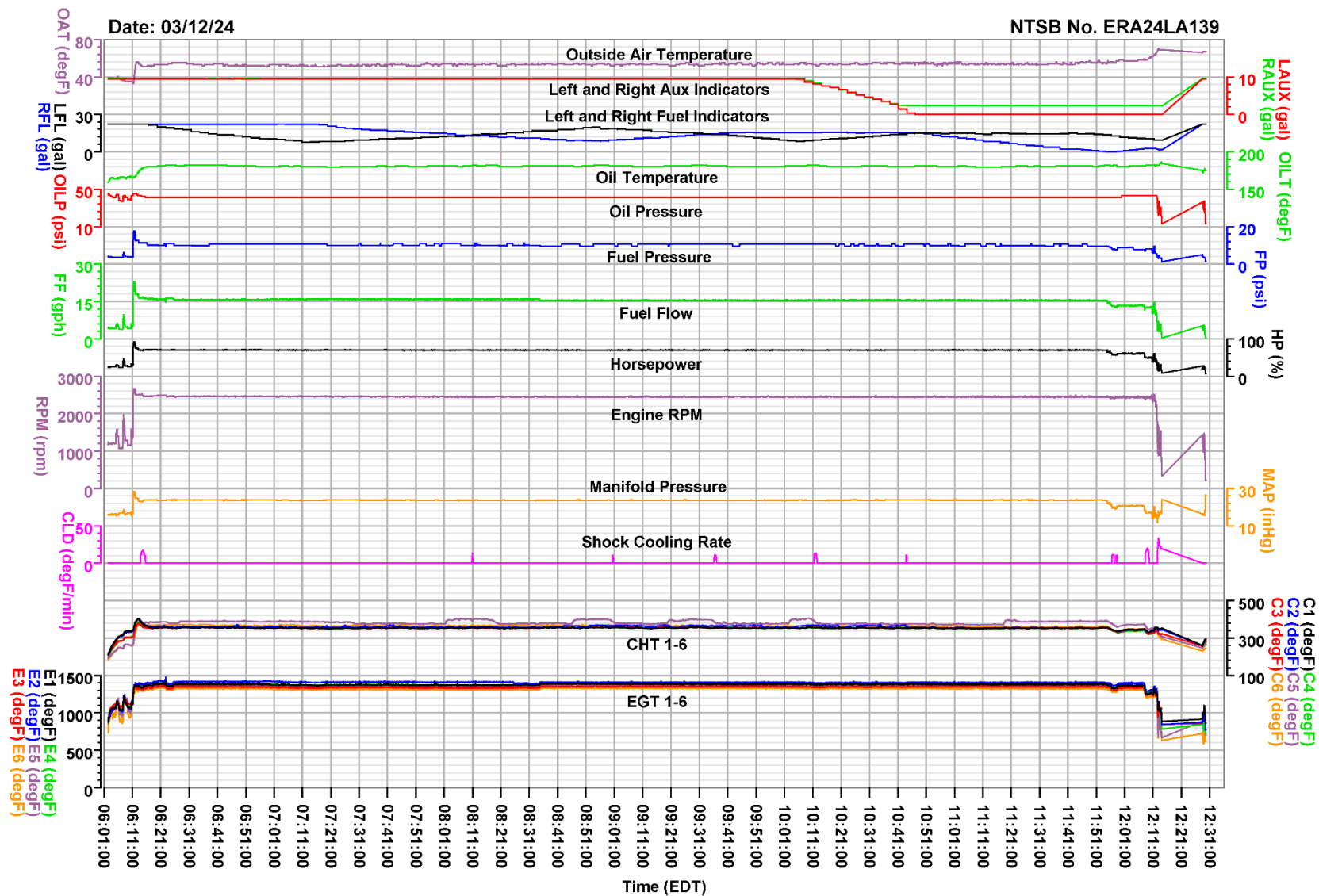


Figure 5. Plot of parameters of the previous flight on March 12, 2024, recorded on the JPI EDM-900.