

National Transportation Safety Board

Office of Research and Engineering

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ENGINE DATA MONITOR

Specialist's Factual Report

January 2, 2025

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A. ACCIDENT

Location: Reno, Nevada
Date: June 13, 2024
Time: 1510 Pacific daylight time (PDT)
2210 coordinated universal time (UTC)
Airplane: Cessna P210N, private operator, N36RW

B. ENGINE DATA MONITOR SPECIALIST

Specialist: Steven Smith
Mechanical Engineer (Recorder Specialist)
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

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

Recorder Manufacturer/Model: JPI EDM-800
Part Number: EGT-701-6C
Recorder Serial Number: 23670

1.0 JPI EDM-800 Description

The J. P. Instruments EDM-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 monitored can include:

- Battery Voltage
- Carburetor Temperature
- Compressor Discharge Temperature
- Cylinder Head Temperature (CHT)
- Engine Revolutions per Minute
- Exhaust Gas Temperature (EGT)
- Fuel Flow
- Manifold Pressure
- Oil Pressure and Temperature
- Outside Air Temperature
- Turbine inlet Temperature

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. The data can then be downloaded by the operator using the J.P. Instruments software.

1.1 JPI EDM-800 Data Recovery

The JPI EDM-800 was in good condition and the data were downloaded using the manufacturer's procedure. Figure 1 shows the JPI EDM-800 as received by the NTSB Vehicle Recorder Laboratory.



Figure 1. JPI EDM-800 as received by the NTSB Vehicle Recorder Laboratory.

1.2 JPI EDM-800 Data Description

The data extracted included 19 sessions from November 8, 2023, through June 13, 2024. The last session recorded was determined to be associated with the accident flight. The recording was 13 minutes and 12 seconds in duration with a sampling rate of once every 6 seconds.

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

1.3 JPI EDM-800 Parameters Provided

Table 1 lists the JPI EDM-800 parameters verified and provided in this report. This aircraft engine is configured with 6 cylinders. In table 1, '#' represents the number of cylinders. In the data plots, '#' is replaced by the appropriate cylinder ID.

Table 1. JPI EDM-800 Parameters provided.

Parameter Name (unit)	Parameter Description (unit)
CHT# (degF)	Engine Cylinder Head Temperature (degrees Fahrenheit)
EGT# (degF)	Engine Exhaust Gas Temperature (degrees Fahrenheit)
FF (gph)	Engine Fuel Flow (gallons per hour)
MAP (inHg)	Engine Manifold Pressure (inches of Mercury)
RPM (rpm)	Engine Speed (revolutions per minute)
TIME (HH:MM:SS)	Time for recorded data point (Hours:Minutes:Seconds)
VOLTS (V)	Battery Voltage (volts)

1.4 JPI EDM-800 Time Correlation

The EDM records time with the first data sample based on the unit's internal clock. This clock is set and updated by the operator.

Correlation of the JPI EDM-800 data to the event local time, PDT, was established by using the approximate coordinated universal time (UTC) from the EDM and then applying an additional 7 hours offset to change UTC to PDT. Therefore, for the rest of this report, all times are referenced as PDT.

In addition to the 7 hours offset needed to convert the recorded data to PDT, an additional 11 minutes and 43 seconds offset (703 seconds) was required to correlate the recorded data to the automatic dependent surveillance - broadcast (ADS-B) time. Correlation of the JPI EDM-800 to the ADS-B time was established by comparing the recorded ADS-B time, latitude, longitude, and pressure altitude parameters at the start of the takeoff roll.

2.0 ADS-B Parameters Provided

Table 2 lists the ADS-B parameters verified and provided in this report.

Table 2. Automatic Dependent Surveillance - Broadcast Parameters provided.

Parameter Name (unit)	Parameter Description (unit)
ADS-B Alt Press (ft)	Pressure Altitude (feet)
Latitude (deg)	Latitude Coordinate (degrees)
Longitude (deg)	Longitude Coordinate (degrees)
Time (HH:MM:SS)	Time for recorded data point (Hours:Minutes:Seconds)

D. FIGURES AND TABULAR DATA

Figures 2 and 3 contain EDM data recorded during the event on June 13, 2024. All the parameters listed in table 1 are plotted.

Figures 2 and 3 present time history plots of the entire flight (15:02:30 PDT to 15:10:10 PDT) and device power on and taxi (14:57:00 PDT to 15:02:30 PDT), respectively.

These figures are configured such that right turns are indicated by the trace moving toward the bottom of the page, left turns towards the top of the page, and nose up attitudes towards the top of the page.

The JPI EDM-800 and ADS-B data indicated the following sequence of events:

- **14:56:53 PDT:** The EDM device was powered on and recording.
- **15:02:35 PDT:** ADS-B data indicated that the aircraft was on runway 26 and about to cross runway 32 at Reno/Stead Airport (KRTS), Reno, Nevada. The EDM data was consistent with takeoff roll.
- **15:03:23 PDT:** Battery voltage dropped from 27.1 V to 22.5 V.
- **15:05:18 PDT:** The aircraft leveled at 6,600 ft. Battery voltage continued to decrease and was below 20.9 V.
- **15:08:34 PDT:** The aircraft began a descent from 6,600 ft.
- **15:08:59 PDT:** Fuel flow reduced from 19.7 gph to 13.3 gph.
- **15:09:05 PDT:** RPM, manifold pressure, and battery voltage were 2520 rpm, 24.3 inHg, and 13.6 V, respectively.
- **15:09:11 PDT:** Fuel flow reduced from 13.5 gph to 1.8 gph.
- **15:09:58 PDT:** The last recorded ADS-B data point, approximately 2,513 ft from the reported wreckage location.
- **15:10:05 PDT:** The last recorded EDM data point. RPM, manifold pressure, and battery voltage were 1771 rpm, 24.2 inHg, and 11.6 V, respectively.

Figure 4 is a graphical overlay derived from the ADS-B data generated using Google Earth presenting the entire accident flight departing from and landing at KRTS. 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 and 3 are provided in electronic comma-separated value (CSV) format as attachment 1 to this report. The corresponding tabular data used to create figure 4 is provided in CSV format as attachment 2 to this report.

Submitted by:

Steven Smith
Mechanical Engineer (Recorder Specialist)

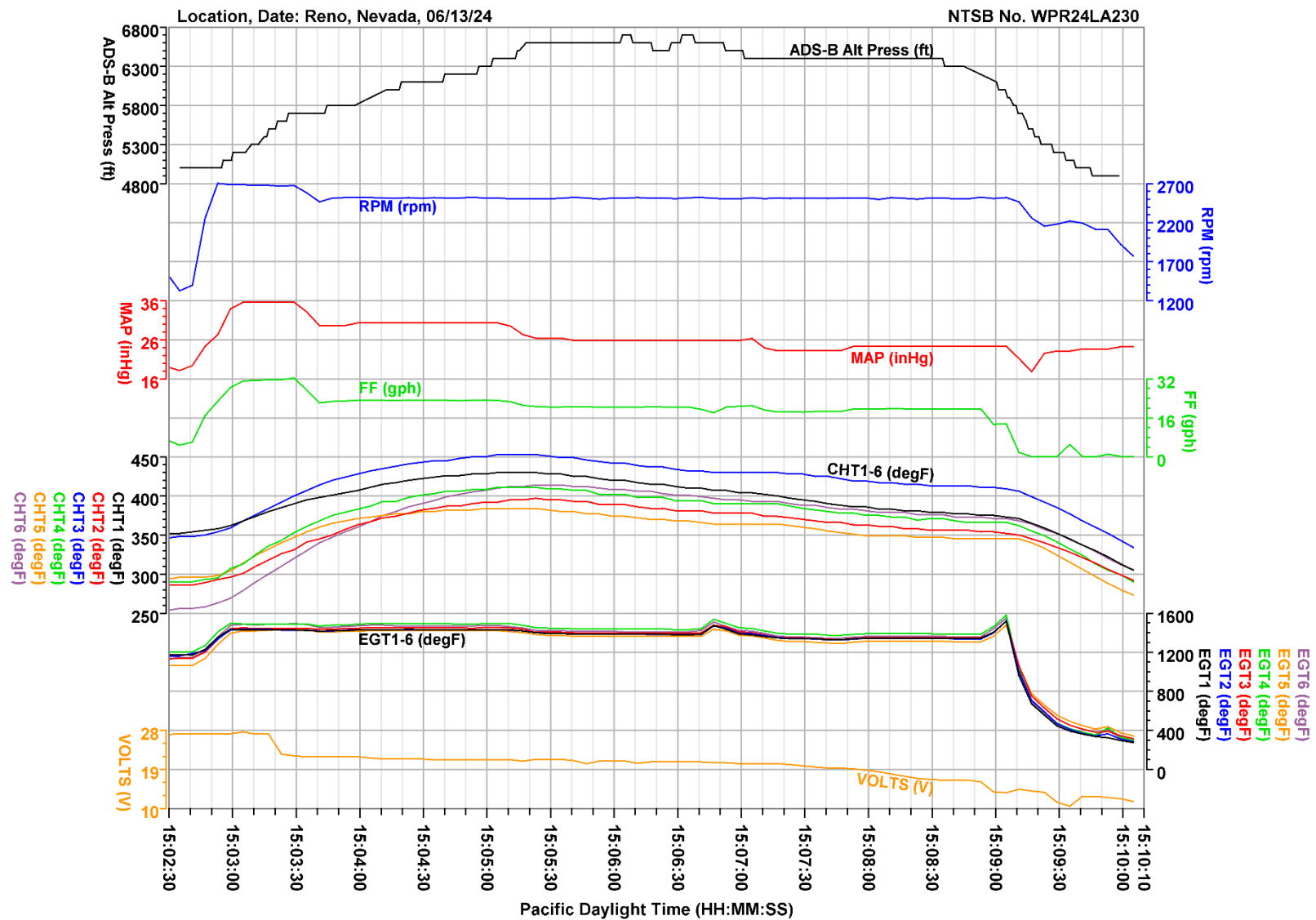


Figure 2. Time history plot of the entire accident flight from 15:02:30 PDT to 15:10:00 PDT.

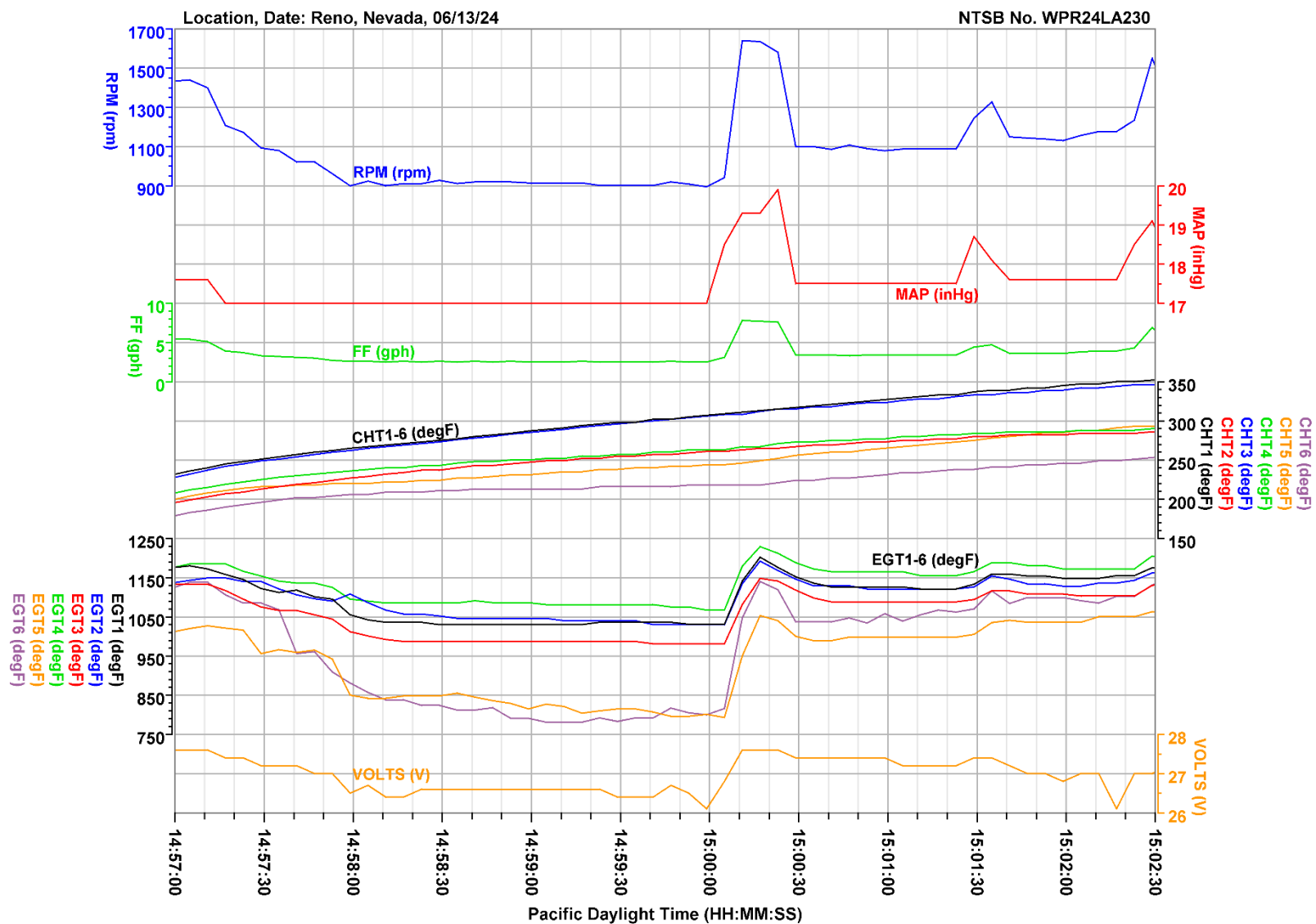


Figure 3. Time history plot of the device power on and taxi from 14:57:00 PDT to 15:02:30 PDT.



Figure 4. Google Earth overlay of the entire accident flight (Source: ADS-B data).