

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN23FA079

ELECTRONIC DEVICES

Specialist's Factual Report

July 11, 2023

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A. ACCIDENT

Location: Kingfisher, Oklahoma
Date: January 16, 2023
Time: 1242 central standard time (CDT)
Airplane: Piper PA-32-301T, N8266D

B. ELECTRONIC DEVICES 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

Recorder Manufacturer/Model: Garmin G5
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 memory¹ for data storage of the parameters recorded and calculated. 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

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-830 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an external examination revealed heat and fire damage, 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. Front and back of the JPI EDM-830 as received.

1.2 JPI EDM-830 Recording Description

Data included sessions recorded from May 26, 2022, through January 16, 2023. 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 17:15:26 and ended at 18:06:08 Recorded Time on January 17, 2023, and contained the accident event. 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)
ALT (ft)	GPS Altitude (feet)
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)
OAT (degC)	Outside Air Temperature (degrees Celsius)
USD (gal)	Fuel Used (gallons)

2.0 Garmin G5 Description

The Garmin G5 is an electronic flight instrument with a 3.5-inch color display that can be installed as an attitude display indicator (ADI) and/or horizontal situation indicator (HSI). The G5 contains integrated attitude and air data sensors and can also be interfaced with external sensors. Non-volatile memory is recorded to a front-mounted microSD card.

2.1 Garmin G5 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an external examination revealed heat and fire damage, as shown in Figure 2, rendering the device inoperable. A front-mounted 8GB microSD card was recovered from the front slot of the device. The microSD card sustained heat and mechanical impact damage, as shown in Figure 3, thus no data were recovered.



Figure 2. Garmin G5 as received.

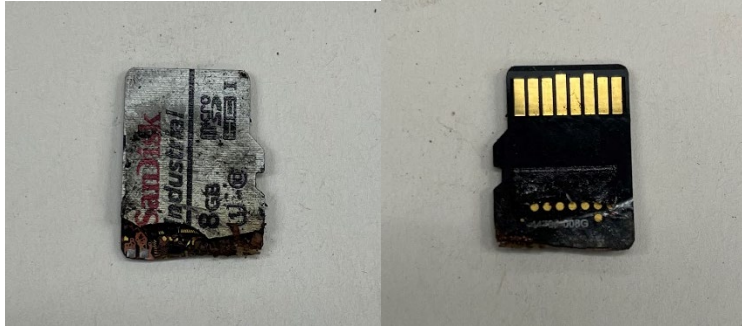


Figure 3. Garmin G5 microSD card.

D. FIGURES AND TABULAR DATA

Figures 4 and 5 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. Figure 4 shows the entire flight. Figure 5 shows the end of the flight.

Figure 6 is a plot of parameters of the entire event flight. The time displayed is 17:15:00 to 18:10:00 Recorded Time.

Figure 7 is a plot of parameters of the final two minutes of the event flight. The time displayed is 18:04:00 to 18:06:10 Recorded Time.

The corresponding tabular data used to create figures 4 through 7 are provided in CSV format as attachment 1 to this report.

Submitted by:

Gerald Kawamoto
Recorder Specialist

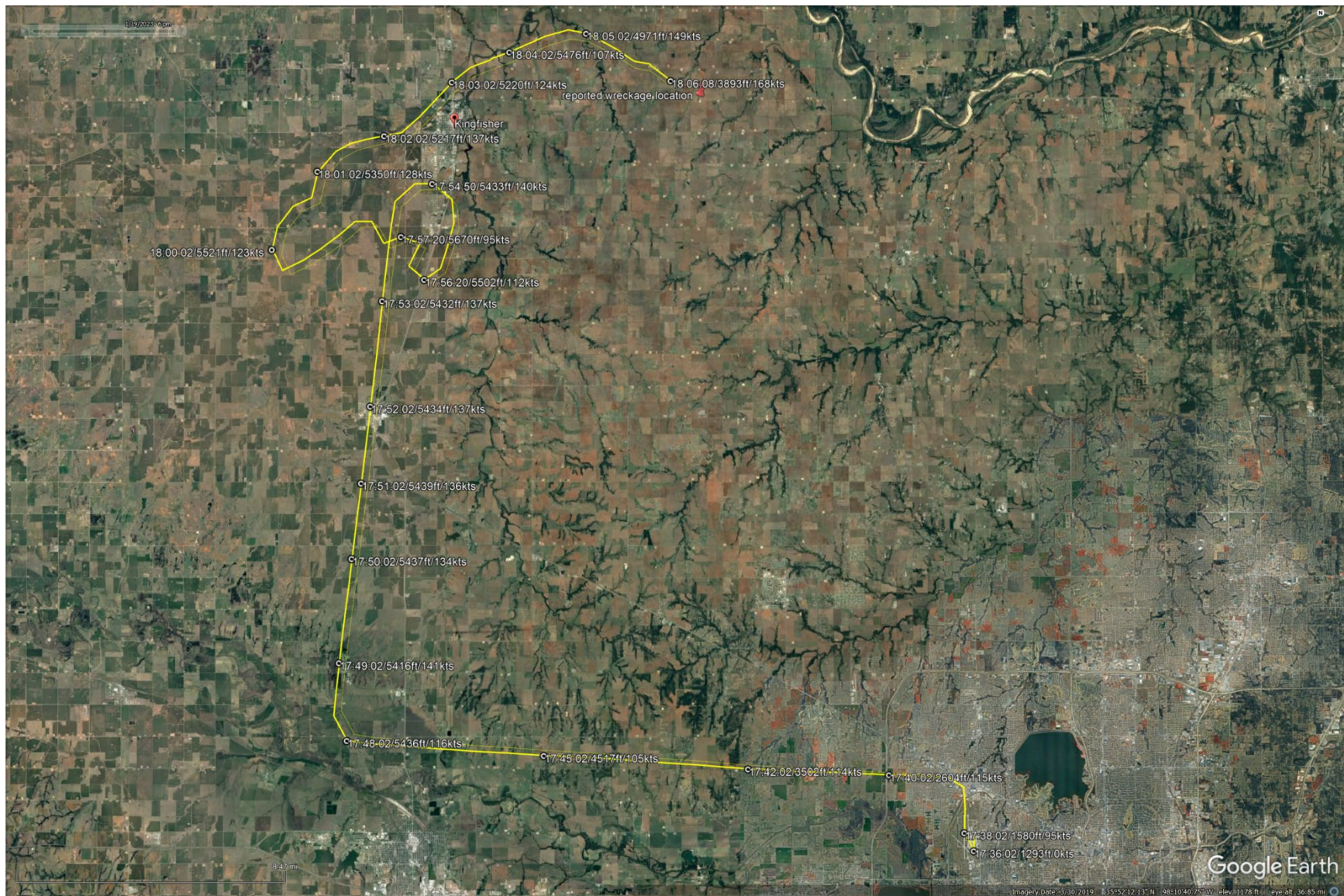


Figure 4. Google Earth overlay of the entire accident flight recorded on the JPI EDM-830.



Figure 5. Google Earth overlay showing the end of the accident flight recorded on the JPI EDM-830 and the reported wreckage location.

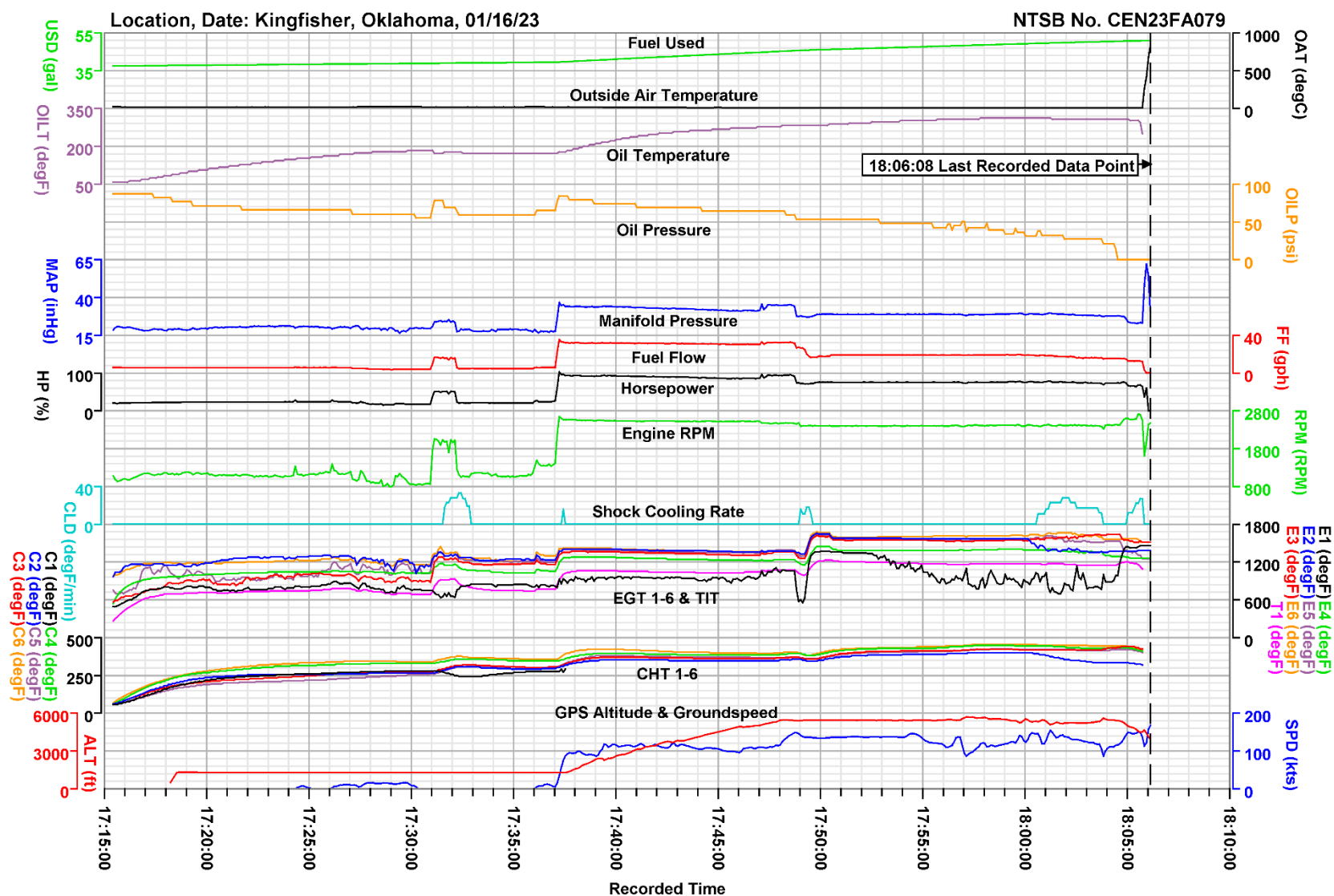


Figure 6. Plot of JPI EDM-830 parameters for the entire accident session.

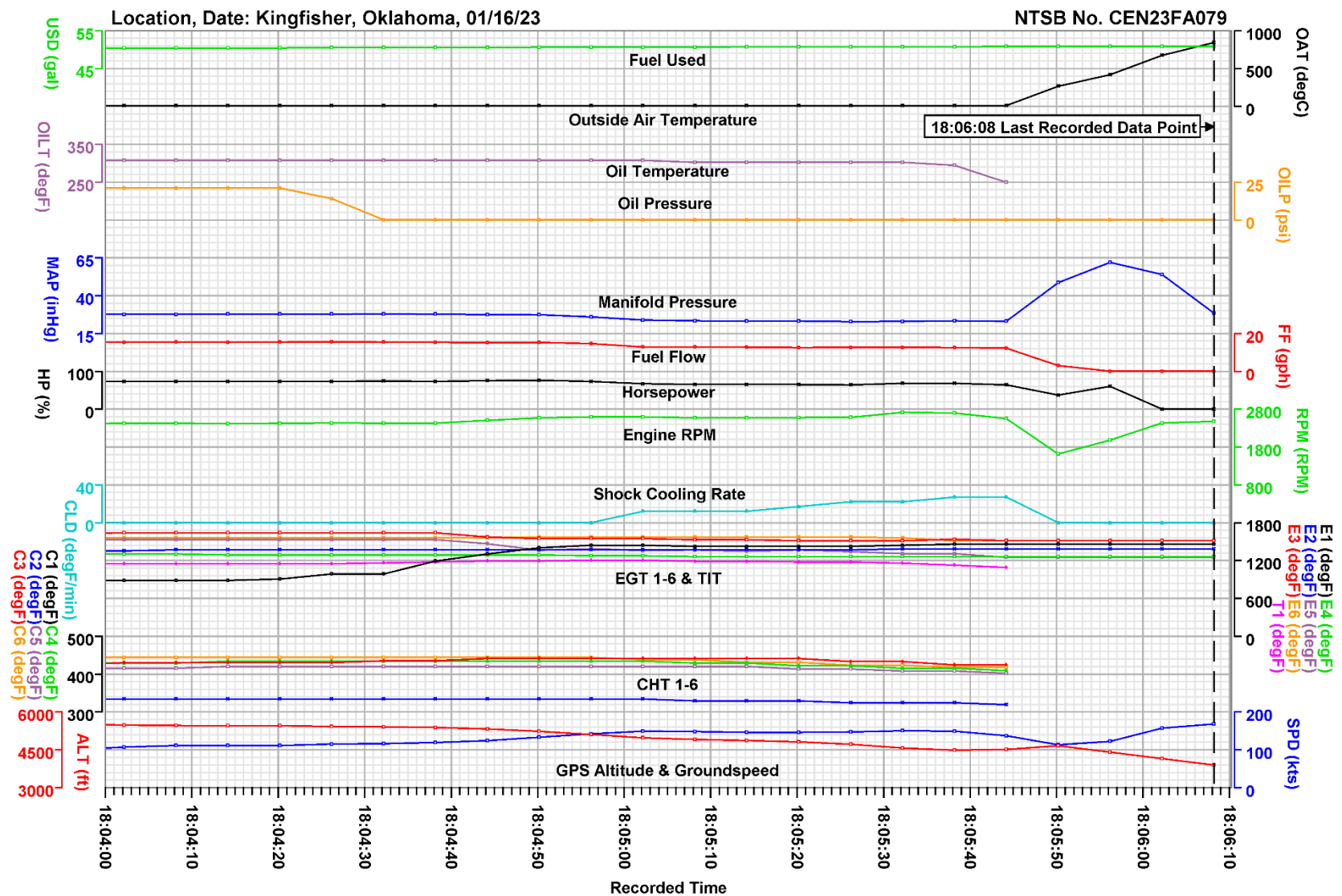


Figure 7. Plot of JPI EDM-830 parameters of approximately the final 2 minutes of the accident session.