

# NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division  
Washington, D.C. 20594

April 12, 2022

## Engine Monitoring System

**Specialist's Factual Report  
by Gerald Kawamoto**

### 1. EVENT

Location: Santa Fe, New Mexico  
Date: April 22, 2021  
Aircraft: Flight Design CTSW  
Registration: N378CT  
Operator: Private  
NTSB Number: WPR21LA173

### 2. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following Cockpit Display:

**Device:** Dynon EMS-D120  
**Device Serial Number:** 001031

#### 2.1. Device Description

The Dynon EMS-D120 is a panel-mounted Engine Monitoring System (EMS) capable of displaying EMS data on a 7-inch LCD display. Data are stored on non-volatile memory.<sup>1</sup>

##### 2.1.1. Data Recovery

The device was in good condition upon arrival at the Vehicle Recorder Division, as shown in Figure 1, and data were extracted normally using laboratory tools.

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



**Figure 1.** Dynon EMS-D120 as received.

### **2.1.2. Data Description**

The data extracted included one session recorded on April 22, 2021. The recording started at 15:26:36 Coordinated Universal Time (UTC) and GPS position data became static after 16:05:02 UTC. From 16:05:02 through 16:07:58 UTC, date parameters were invalid. After 16:07:58, time parameters were invalid and the recording ended 62 seconds later.

### 2.1.3. Parameters Provided

Data were downloaded in engineering units and no conversions were performed. Table 1 describes data parameters provided by the device and verified by the recorder specialist.

**Table 1.** Dynon Data Parameters.

| Parameter Name (units)   | Parameter Description (units)                    |
|--------------------------|--------------------------------------------------|
| Time                     | Recorded Time (UTC)                              |
| Date                     | MM/DD/YYYY                                       |
| GPS Altitude (ft)        | GPS Altitude (feet)                              |
| Ground Speed (kts)       | Ground Speed (knots)                             |
| Manifold Pressure (inHg) | Manifold Pressure (inches of Mercury)            |
| RPM                      | Engine RPM (revolutions per minute)              |
| Oil Pressure (psi)       | Oil Pressure (pounds per square inch)            |
| Oil Temperature (degF)   | Oil Temperature (degrees Fahrenheit)             |
| Fuel Flow (gph)          | Fuel Flow (gallons per hour)                     |
| Fuel Pressure (psi)      | Fuel Pressure (pounds per square inch)           |
| EGT # (degF)             | Exhaust Gas Temperature # (degrees Fahrenheit)   |
| CHT # (degF)             | Cylinder Head Temperature # (degrees Fahrenheit) |

### 2.1.4. Time Correlation

The unit records clock time, either external or internal. The time is set by the operator for the internal clock or if the unit is connected to a GPS, the unit will use the GPS system time.

## 3. Plots and Corresponding Tabular Data

Figures 2 and 3 are graphical overlays generated in Google Earth for the event flight. Weather and lighting conditions shown in Google Earth may not be representative of the conditions at the time of the event flight.

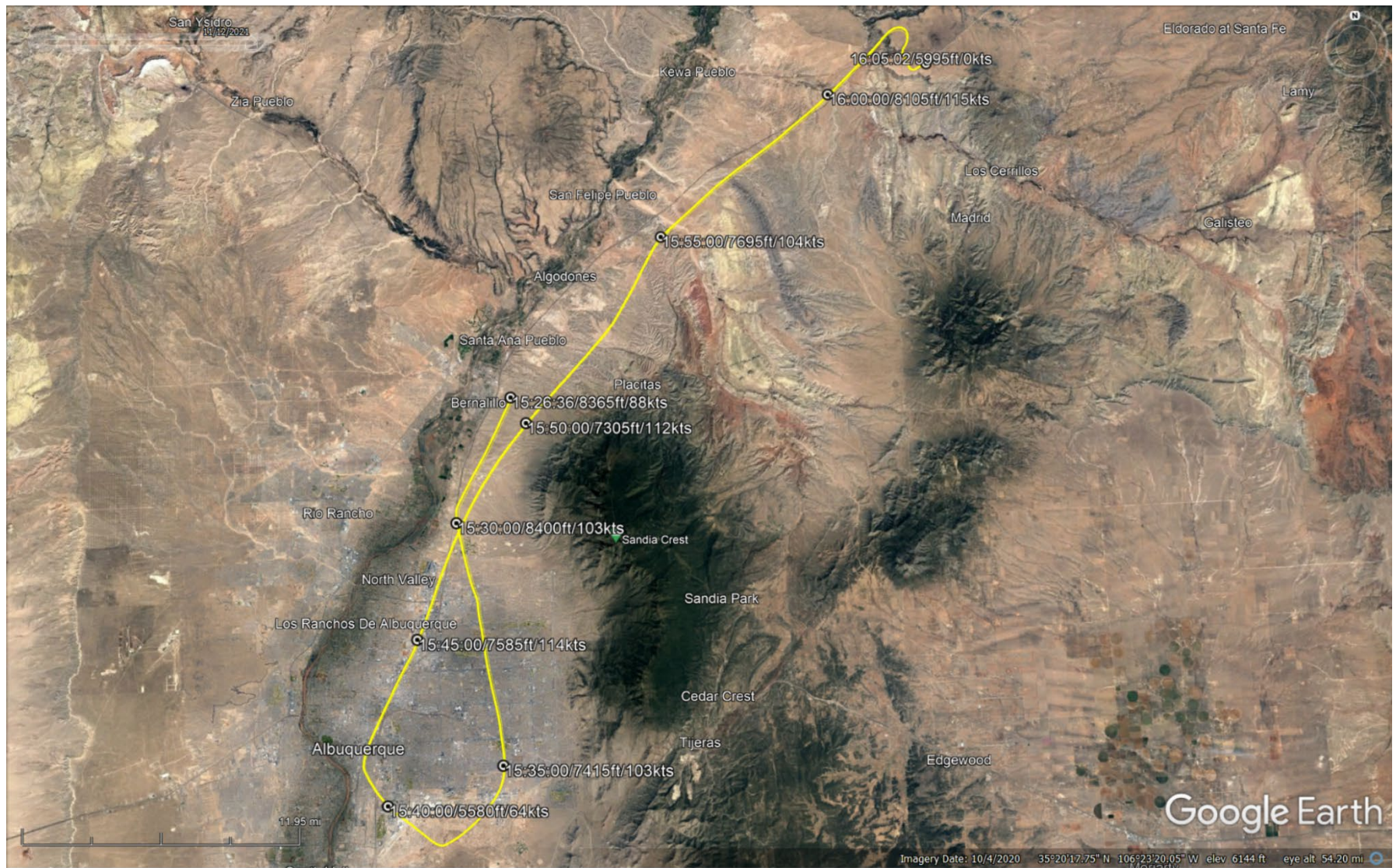
Figure 2 is an overlay of the entire event session.

Figure 3 is an overlay showing the end of the event session.

Figure 4 is a plot of parameters for the entire event session. The time interval displayed is 15:25:00 to 16:10:00 UTC. Data appears to become invalid after 16:05:02 UTC.

Figure 5 is a plot of parameters between 16:01:20 and 16:02:00 UTC. At 16:01:40 UTC oil pressure had dropped to 0 and at 16:01:45 engine RPM was 0.

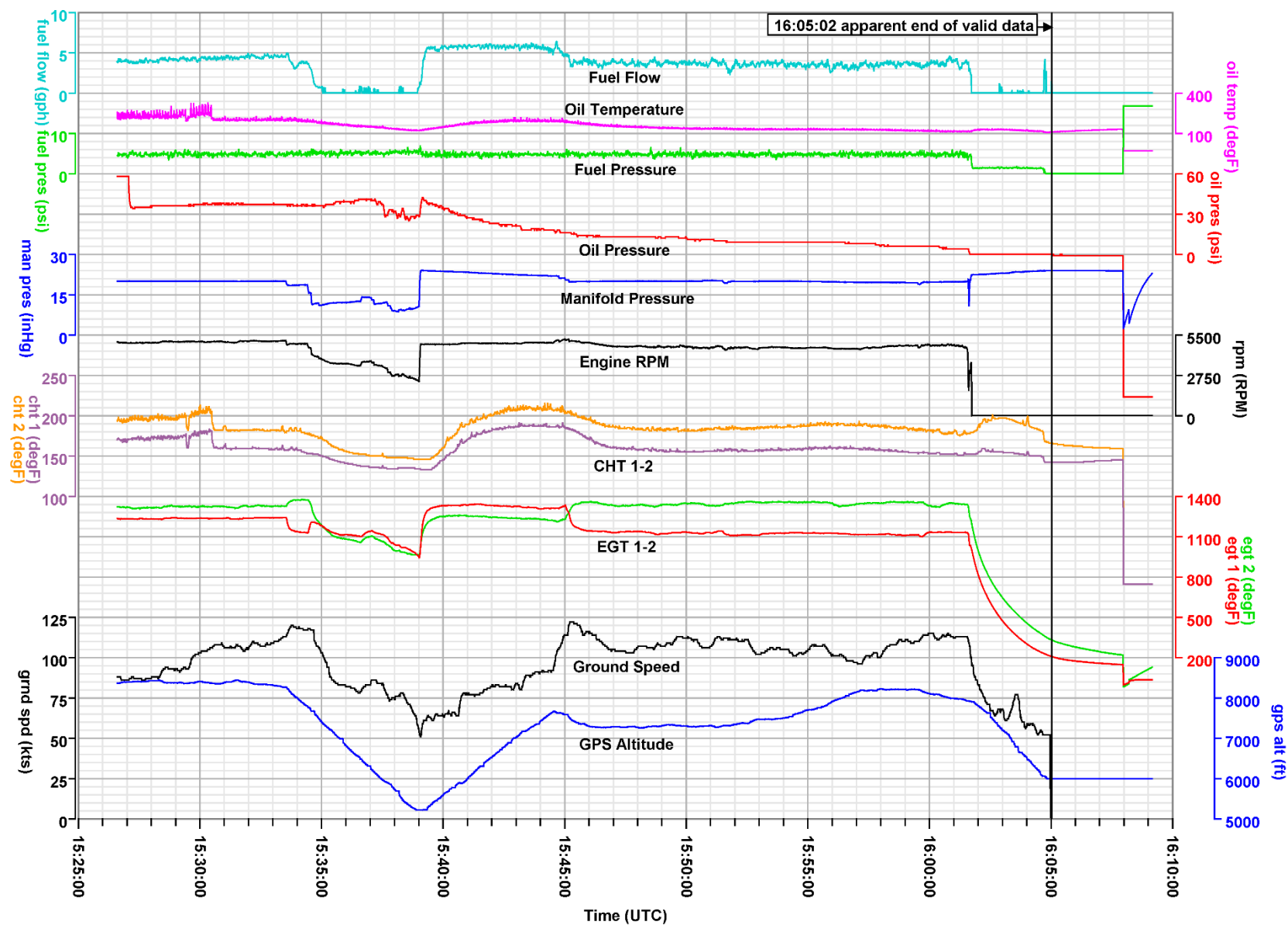
The corresponding tabular data used to create Figures 2 through 5 are provided in electronic comma-separated value (csv) format as Attachment 1 to this report. Attachment 1 contains additional parameters, however, not all parameters were validated by the specialist.



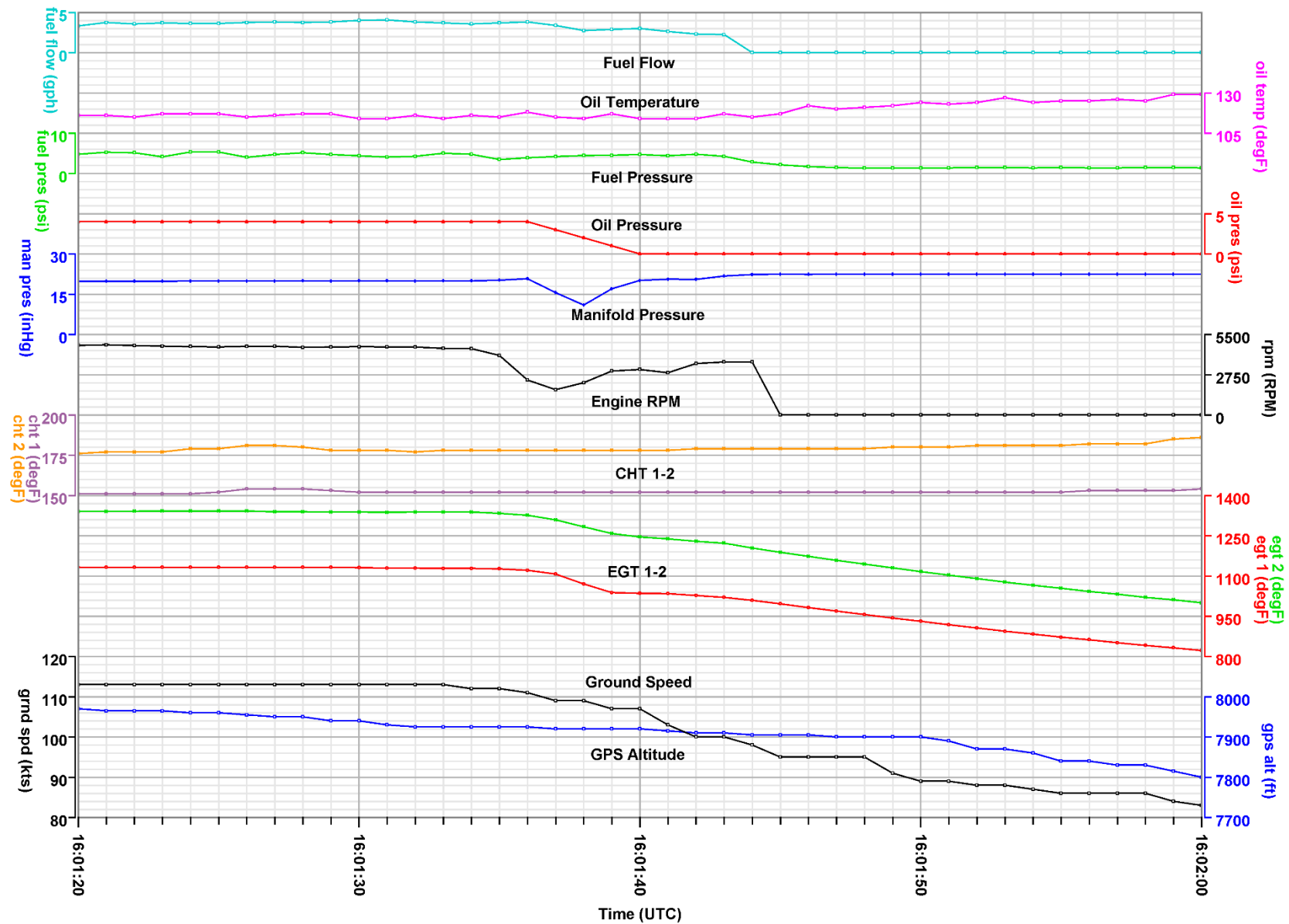
**Figure 2.** Google Earth overlay of the entire event session.



**Figure 3.** Google Earth of the end of the event session.



**Figure 4.** Plot of parameters recorded on the Dynon EMS-D120 for the entire event session.



**Figure 5.** Plot of parameters recorded on the Dynon EMS-D120 between 16:01:20 and 16:02:00 UTC.