

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA22LA186

COCKPIT DISPLAY - RECORDED FLIGHT DATA

Specialist's Factual Report

February 1, 2023

A. ACCIDENT

Location: Mountain City, Tennessee
Date: April 7, 2022
Time: 1310 eastern daylight time (EDT)
Airplane: Arion Lightning LS-1, private, N6688S

B. COCKPIT DISPLAY - RECORDED FLIGHT DATA SPECIALIST

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

C. DETAILS OF THE INVESTIGATION

A cockpit display - recorded flight data group was not convened.

The NTSB Vehicle Recorder Division received the following electronic file downloaded from a Dynon SkyView SV-1000 installed on the accident airplane:

Electronic File #1: Dynon Data.zip

1.0 Dynon SkyView SV-1000 Description

The Dynon SV-D1000 is an uncertified 10" wide screen display suitable for mounting in the cockpit of non-type certificated aircraft. Its capabilities include engine monitoring, synthetic vision, moving map, traffic, airport diagrams, autopilot control, and radio integration. The display receives input from multiple modules for flight instrumentation including modules for air data/attitude/heading (ADHARS), engine monitoring (EMS), GPS, Transponder, radios, and intercoms.

Data is recorded on a Serial-ATA based Disk on Module (DOM) mounted to the main memory board. The DOM contains a user-configurable log file that can record between 2-150 hours of data at sampling rates ranging from 0.1-16 Hz. There is also an alert log file that is recorded whenever the device triggers any kind of alert and a "Black Box" recent flight data log file which contains the most recent 15 minutes of flight recorded at 16 Hz.

1.1 Dynon SkyView SV-1000 Data Recovery

The device was downloaded by a local mechanic, as neither the FAA nor the NTSB Investigator in Charge (IIC) traveled to the accident's remote location.

1.2 Dynon SkyView SV-1000 Data Description

The recorded flight data contained User_Log, Alert_Data and Black_Box_Log files in CSV (comma separated values) format. The Alert_Data was comprised of 12 files and had the first recording session on March 11, 2016, and the last recording session on April 7, 2022. The Alert_Data file only contained data recorded whenever an alert/warning event occurred. The alerts were either shown on the display or repeated in audio.

The User_Log file had the first recording session on March 14, 2022, and the last recording session on April 7, 2022.

The Black_Box_Log file had the first recording session on March 28, 2022, and the last recording session on April 7, 2022. The Black_Box_Log file was recorded at 16 samples per second (16 Hz). The entirety of the accident flight was contained on this CSV file. Data were recorded in Universal Coordinated Time (UTC). All times were converted to EDT, the local time of the accident. The EDT is lagged of UTC by 4 hours.

1.2.1 Dynon SkyView SV-1000 Parameters Provided

Table 1 lists the recorded parameters verified and provided in this report. The provided data contained Fuel Pressure parameter, with a range of 0 and 1 PSI (pound per square inch), which were determined to be invalid.

Table 1. Data Parameters

Parameter Name (units)	Parameter Description
Amps	Engine circuitry bus current in Amperage
CHT 1-6 (degC)	Engine Cylinder Head Temperature Cylinders 1 through 6 in degrees Celsius
EGT 1-6 (degC)	Engine Exhaust Gas Temperature Cylinders 1 through 6
GPS Altitude (ft)	GPS Altitude in feet
Ground Speed (kts)	Ground Speed in knots
Ground Track (deg)	Magnetic Ground Track in degrees
Indicated Airspeed (kts)	Indicated Airspeed in knots
Lateral Accel (g)	Lateral Acceleration in g's
Latitude (deg)	Present Latitude in degrees
Longitude (deg)	Present Longitude in degrees
Magnetic Heading (deg)	Magnetic Heading in degrees
Oil Pressure (psi)	Engine Oil Pressure in pounds per square inch
Oil Temp (degC)	Engine Oil Temperature in degrees Celsius
Pitch (deg)	Pitch Attitude in degrees
Roll (deg)	Roll Attitude in degrees

Parameter Name (units)	Parameter Description
RPM (revolutions/minute)	Engine speed in revolutions per minute
True Airspeed (kts)	True Airspeed in knots
Vertical Accel (g)	Vertical Acceleration in g's
Vertical Speed (feet/minute)	Vertical Speed in feet per minute
Volts (Volts Direct Current)	Engine circuitry bus voltage in volts

1.3 Dynon Time Correlation

The GPS time is recorded in coordinated universal time (UTC). The difference between EDT and UTC is 4 hours, or 14400 seconds. An offset is applied to display the data with the local time zone. Therefore, for the rest of this report, all times are referenced as EDT, not recorded time.

D. FIGURES AND TABULAR DATA

The following three figures contain data recorded by the Dynon device on April 7, 2022. Figure 1 and Figure 2 show parameter time history plots, and Figure 3 is a Google Earth overlay of the accident flight.

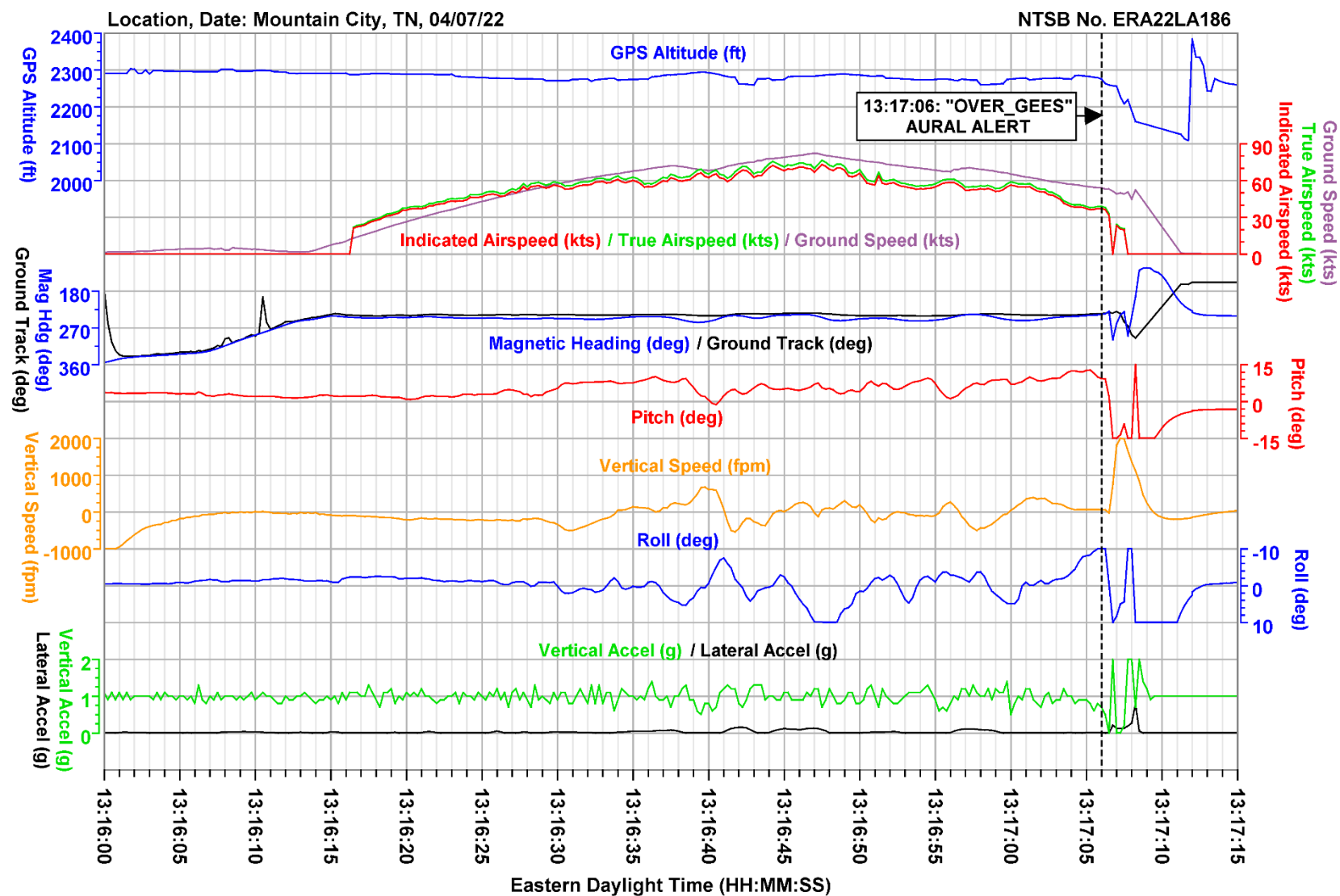
Figure 1 shows a time history plot of the basic flight parameters for the entirety of the flight. Figure 2 is a time history plot of the engine parameters for the length of the flight. The Alert_Data log detailed the first "OVER_GEES" warning at 13:17:06 EDT and is shown on each time history plot.

Figure 3 is a Google Earth overlay of the takeoff sequence for the accident flight. 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 Figure 1 through Figure 3 are provided in electronic comma separated value (CSV) format as Attachment 1 to this report. The Alert_Data file is provided in CSV format as Attachment 2 to this report.

Submitted by:

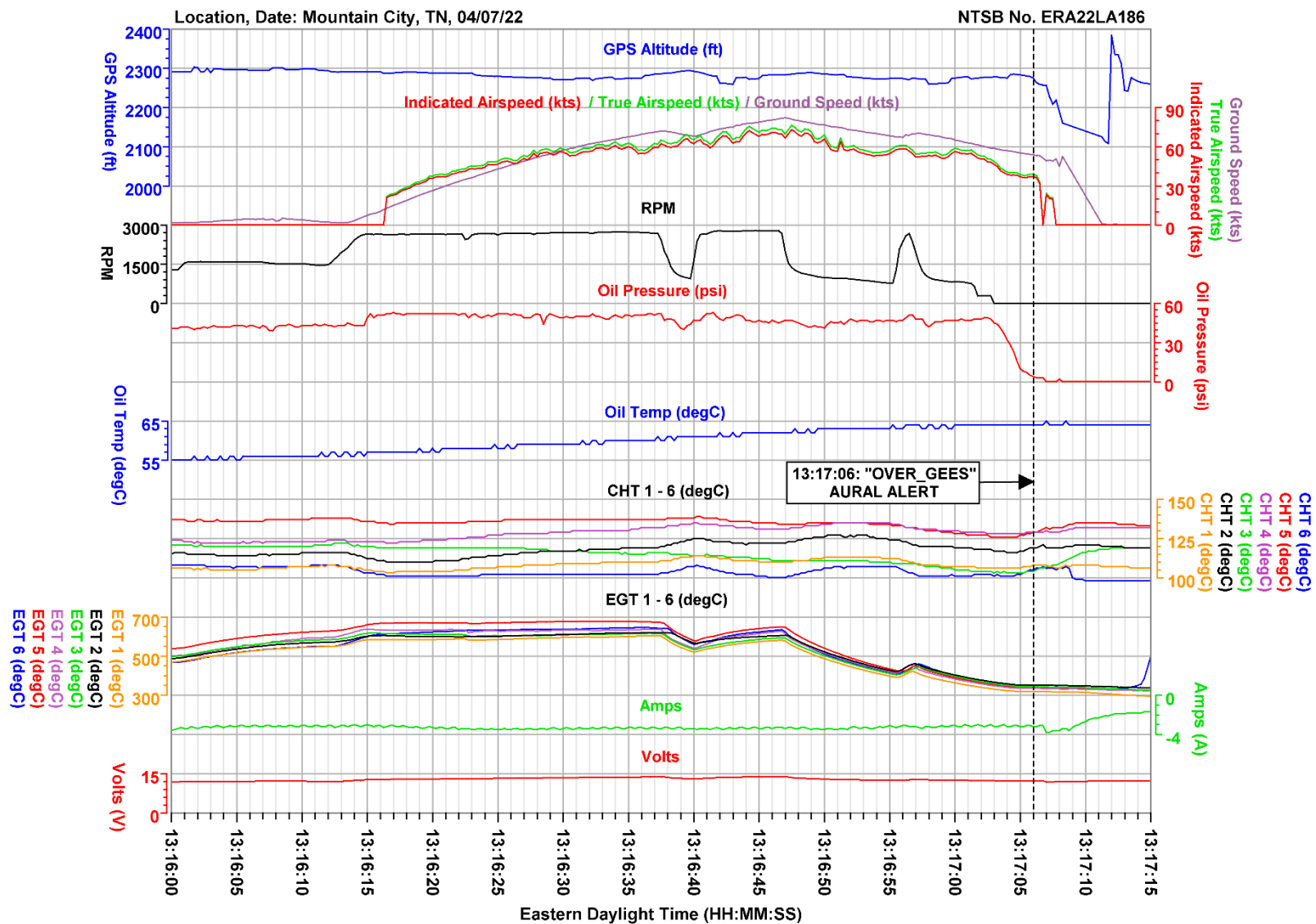
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PRIVATE, ARION LIGHTNING LS-1, N6688S

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Figure 1. Time history plot of basic flight parameters for the entire takeoff sequence to the accident.



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Figure 2. Time history plot of engine parameters for the entire flight sequence to the accident.

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Figure 3. Google Earth overlay of the takeoff sequence to the accident site.