

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR23LA232

ELECTRONIC FLIGHT INFORMATION SYSTEM (EFIS)

Specialist's Factual Report

October 24, 2023

A. ACCIDENT

Location: Rochester, Nevada
Date: June 16, 2023
Time: 2201 pacific daylight time (PDT)
Airplane: Piper PA-28, private operator, N3508K

B. ELECTRONIC FLIGHT INFORMATION SYSTEM (EFIS) SPECIALIST

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

C. DETAILS OF THE INVESTIGATION

An EFIS group was not convened.

The NTSB Vehicle Recorder Division received the following electronic device:

Recorder Manufacturer/Model: Dynon EFIS-D10A
Part Number: 503296-000
Recorder Serial Number: 12659

1.0 Dynon EFIS-D10A Device Description

The Dynon EFIS-D10A is a 4-inch cockpit display mounted in non-type certificated (experimental) aircraft. The instrument integrates multiple flight instruments including airspeed, altitude, gyro-stabilized magnetic compass, turn rate, slip/skid ball, bank angle, pitch angle and vertical speed. The unit also has other functions that include a clock/timer, g-meter, voltmeter, and a density altitude/true airspeed calculator. The unit contains an Air Data, Attitude and Heading Reference System (ADAHRS) to provide air data, attitude and heading information to the display. Depending on the installation in the operator's aircraft certain parameters might not be displayed, for example angle-of-attack.

The data logging must be configured by the operator to enable logging and set the data log interval. The unit can also be configured to start logging data automatically at boot-up. The data logging interval can be set to store at 1, 3, 5, 10, 30 and 60 second intervals. The internal memory can store at least 2 hours of cumulative data at a 1 second recording interval or at least 120 hours at a 60 second data recording interval. When the recording limit in the internal memory is reached, the oldest record is erased, and a new record is added.

1.1 Dynon EFIS-D10A Data Recovery

The Dynon EFIS-D10A was in good condition and the data were downloaded using the manufacturer's procedure. Figure 1 shows the Dynon EFIS-10A in excellent condition and powered on, with little to no damage from the accident.



Figure 1. Dynon EFIS-10A as received and powered on.

1.2 Dynon EFIS-D10A Recording Description

The data extracted from the Dynon EFIS-D10A included one comma separated value (CSV) file, which contained approximately 26,000 samples, recorded at a rate of 0.1 Hz. Data was presented in engineering units (EUs) and no additional conversions were required. The accident flight was identified as samples 24,562 through 25,880.

1.2.1 Dynon EFIS-D10A Parameters

Table 1 lists the recorder parameters validated in this report.

Table 1. Dynon EFIS-10A Parameters.

Parameter Name (units)	Parameter Description (units)
Airspeed (kts)	Indicated Airspeed (knots)
Alt Press (ft)	Pressure Altitude (feet)
Mag Hdg (deg)	Magnetic Heading (degrees)

Parameter Name (units)	Parameter Description (units)
Pitch (deg)	Pitch Attitude (degrees)
Roll (deg)	Roll Attitude (degrees)
Turn Rate (deg/s)	Turn Rate (degrees/second)
Vert Spd (fpm)	Vertical Speed (feet per minute)

1.3 Dynon EFIS-10A Time Correlation

The unit records clock time, either external or internal. The time is set by the operator for the internal clock. Time and altitude parameters from available Automatic Dependent Surveillance – Broadcast (ADS-B) were compared against the Dynon EFIS-10A parameters to establish the approximate time used in this report.

D. FIGURES AND TABULAR DATA

Figures 2 and 3 contain data recorded during the event on June 16, 2023. All the parameters listed in table 1 are plotted.

Figures 2 and 3 are time history plots presenting the same parameters for the entire flight and the final 12 minutes surrounding the accident, 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 aircraft departed at approximately 18:59:47 PDT. The takeoff and a portion of the cruise flight was uneventful. At approximately 21:25:27 PDT the aircraft began to climb from 9,527 ft and leveled off at approximately 21:45:47 PDT at 11,450 ft. At approximately 21:50:17 PDT, altitude was 11,392 ft, airspeed was 93 kts, and vertical speed was -36 fpm. At approximately 22:01:50 PDT, altitude was 4,440 ft, airspeed was 0 kts, and vertical speed was -4 fpm. The last recorded sample was at approximately 22:02:27 PDT.

The corresponding tabular data used to create figures 2 and 3 are provided in electronic CSV format as attachment 1 to this report.

The corresponding tabular ADS-B data are provided in electronic CSV format as attachment 2 to this report.

Submitted by:

Steven Smith
Mechanical Engineer

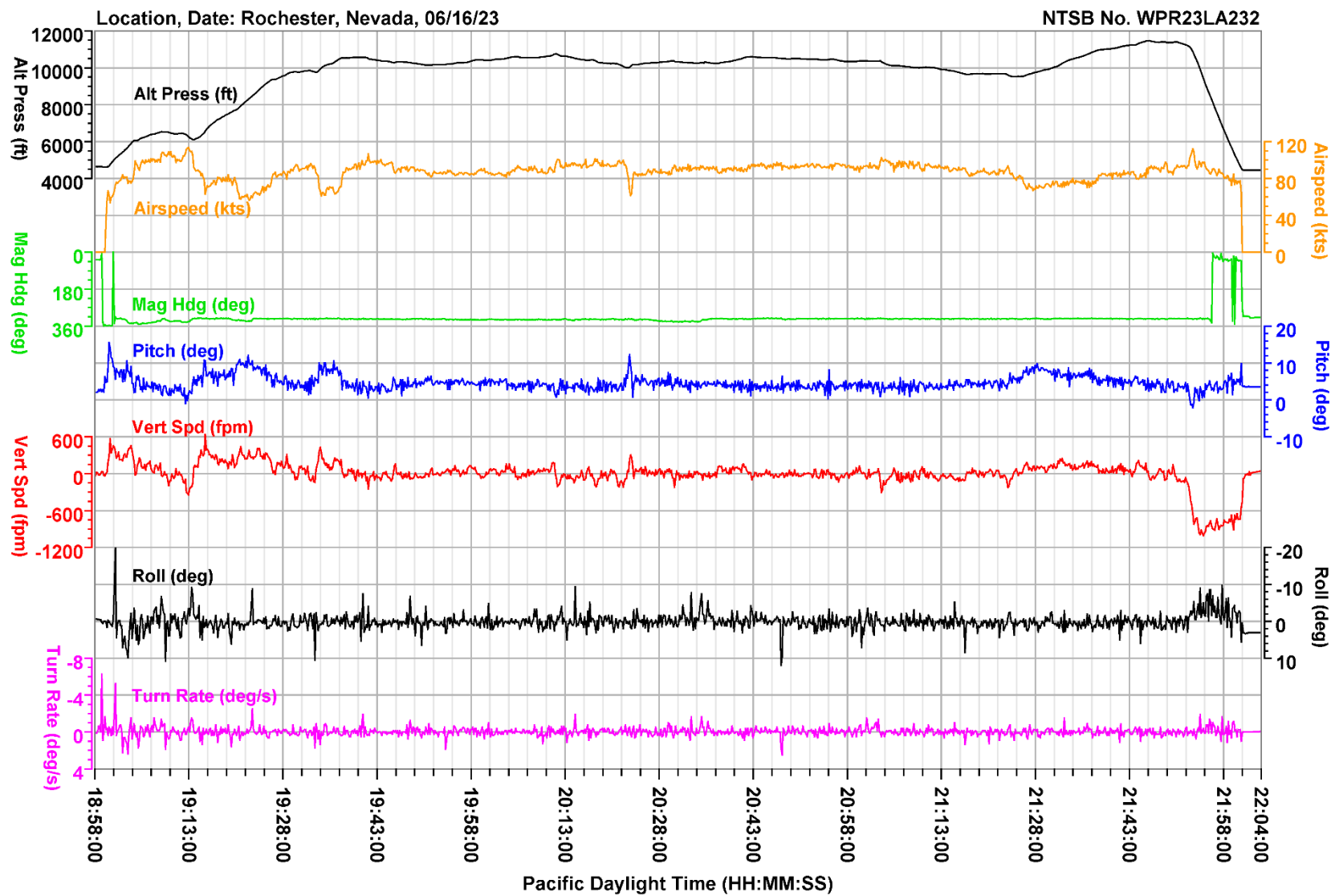


Figure 2. Time history plot of the entire flight.

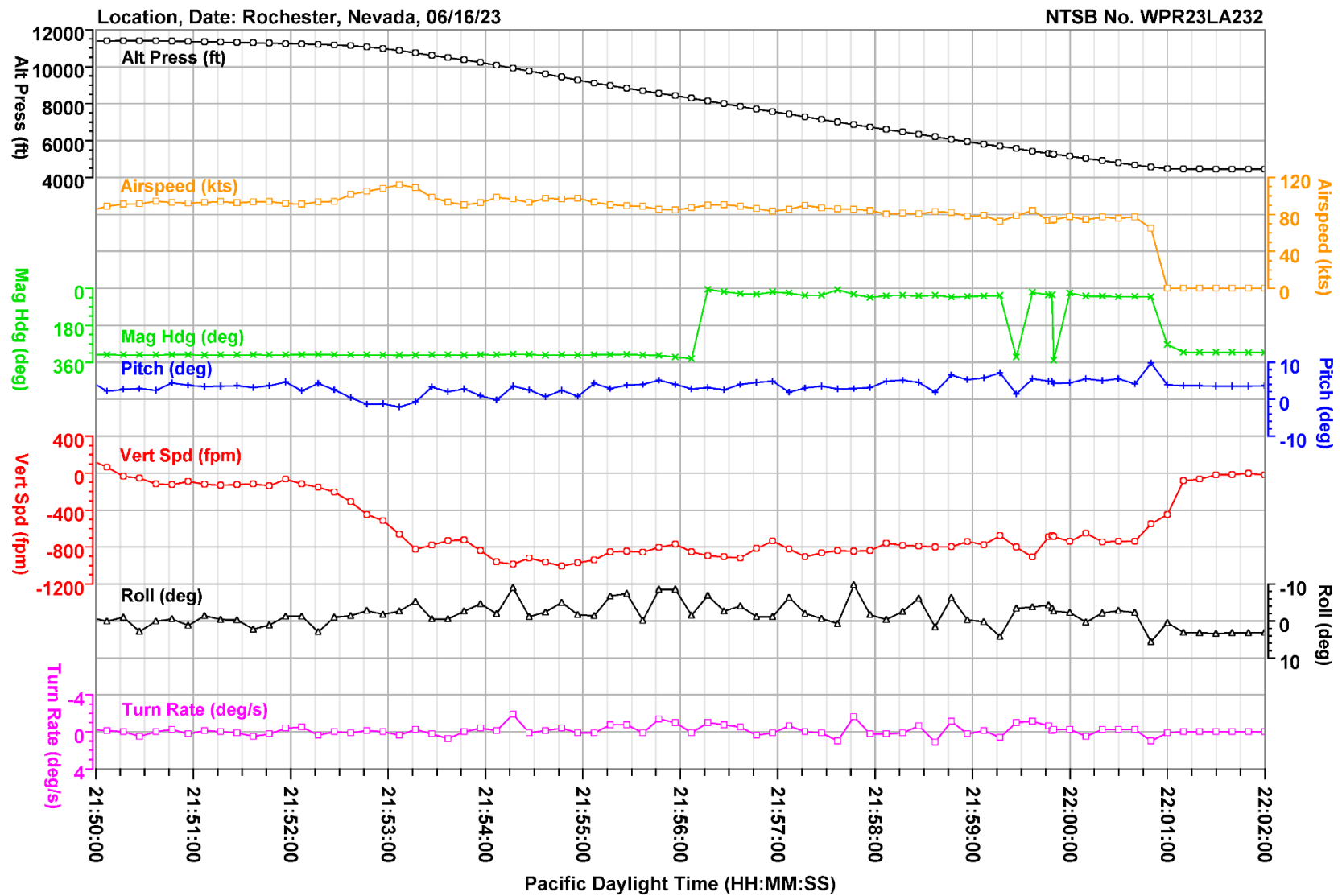


Figure 3. Time history plot of the time surrounding the accident.