

National Transportation Safety Board

Office of Research and Engineering

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ERA22FA058

VEHICLE PERFORMANCE

7/13/2022
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A. ACCIDENT

Location: Branchville, New Jersey
Date: November 11, 2021
Time: 1048 EST
1548 GMT
Airplane: Cessna 172S Skyhawk, N90559

B. VEHICLE PERFORMANCE

No airplane performance group was formed.

C. SUMMARY

On November 11, 2021, about 1048 eastern standard time (EST), a Cessna 172S Skyhawk, N90559, was destroyed when it was involved in an accident near Branchville, New Jersey. The flight instructor and a private pilot receiving instruction were fatally injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 instructional flight.

The airplane departed Essex County Airport (CDW), Caldwell, New Jersey, about 1029 and flew predominately in a northwesterly direction as it climbed. See Figure 1. The airplane reached an altitude of about 6,400 ft mean sea level (msl), before entering a steep descending left turn that continued until impact.

The airplane came to rest oriented on a magnetic heading of 330° in a wooded area. All the major components of the airplane were located at the accident site, and flight control cable continuity was observed for all the primary flight controls from the control surfaces to the cockpit control.

Times in the study are quoted in EST. Greenwich Mean Time (GMT) = EST + 5 hr.

D. THE AIRPLANE

A picture of the accident airplane, a Cessna C-172S Skyhawk, is shown in Figure 2. The airplane was manufactured by Cessna in 2011 and registered to Hanuman Aviation, LLC.

E. WEATHER SUMMARY

Essex County airport is located approximately 25 nautical miles (NM) southeast of the accident site. The Automated Surface Observing System (ASOS) at CDW recorded the following observation about an hour before the accident:

KCDW 111453Z 08006KT 10SM CLR 11/01 A3032

The automated surface weather observation at Essex County airport on November 11 at 0953 EST is wind from 080° at 6 knots (kt); 10 statute miles visibility; clear skies; temperature 11° Celsius (C); dew point 1°C; altimeter 30.32" of mercury.

F. AIRPLANE PERFORMANCE STUDY

The data used in the airplane performance study were recovered from the airplane's Garmin G1000 integrated flight instrument system. The G1000 recorded time, position, altitude, attitude, airspeed, acceleration, and engine parameters.

Figure 3 contains the G1000 altitude and airspeed for the accident flight that departed CDW around 1029 EST. The airplane climbed to a cruise altitude of approximately 6,400 ft and remained largely on a northwesterly heading for the first 17 min of the flight. Airspeeds were consistent with climb and cruise for a C-172.

At 1046:30, the airspeed began to decay as the result of a power reduction from about 2,400 revolutions/min (rpm) to 1,300 rpm around the same time. Shortly before 1047, the airplane began to pitch nose-up, ultimately reaching a maximum pitch attitude of approximately 37° at 1047:04 as the airspeed slowed to 28 kt indicated¹. See Figures 4 through 7.

At 1047:10, the airplane reached a left-wing-down bank angle of 102° and a nose-down pitch attitude of 79°. The G1000 recorded the airplane's decent rate at over 8,000 ft/min three seconds later.

Both normal and lateral load factors for most of the final three minutes of the flight are shown in Figure 7. However, the G1000 did not capture load factors for the final seconds of the flight, likely due to buffering between volatile and non-volatile memory². Also note that normal acceleration is typically around 1g in cruise flight, but the normal acceleration recorded by the G1000 system is an increment relative to 1g.

¹ The flaps up, power off stall speed published in the Pilot's Operating Handbook is 53 kt calibrated airspeed for the C-172S. The position error that would be used to correct indicated airspeed to calibrated airspeed for N90559 is unknown.

² Data buffers are typically used when the rate of data coming in differs from the rate it is being processed at. Airplane attitude angles and load factors for the final seconds of the flight were likely still in the volatile memory buffer and had not been written to non-volatile memory before airplane

The recorded airplane data indicate that the pilot made a recovery attempt between 1047:10 and 1047:30. The pitch attitude increased to 32°, the rate of climb (ROC) increased to over 2,000 ft/min, and the airplane was wings-level for the 20 seconds as power was increased to 2,400 rpm. However, airspeed only momentarily recovered at 1047:16.

G. SUMMARY AND CONCLUSIONS

Garmin G1000 data recovered from the wreckage indicate that N90559 likely experienced at least one stall and was in a spin for the final minute of the flight. Security video that captured the final seconds also indicate a spin.

It appears that the airplane did not break up before impact; all the airplane pieces were recovered at the accident site, and flight control continuity was established.

It is unknown if high normal load factors experienced by the pilot played a role in the accident. The normal load factor recorded by the G1000 was over 3g's and increasing when the device stopped updating.

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power was lost.

H. FIGURES

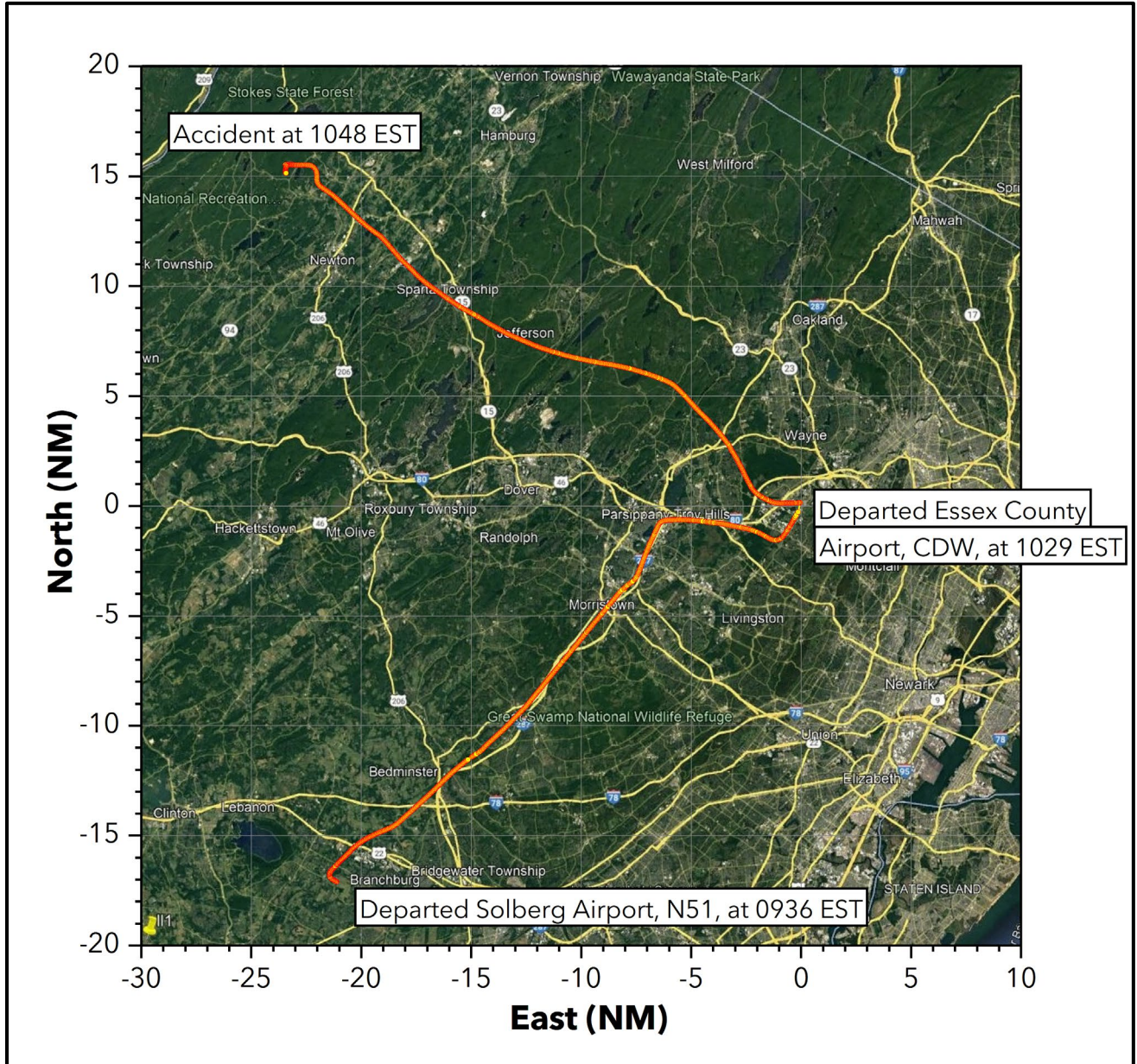


Figure 1: The Instructional Flight Departed Solberg Airport with a Stop at Essex County Airport. The Accident Happened After Leaving Essex County.



Figure 2: Accident Airplane, N90559, a 2011 Cessna 172S Skyhawk

ERA22FA058: Cessna 172S, N90559
Branchville, NJ
11/11/2021

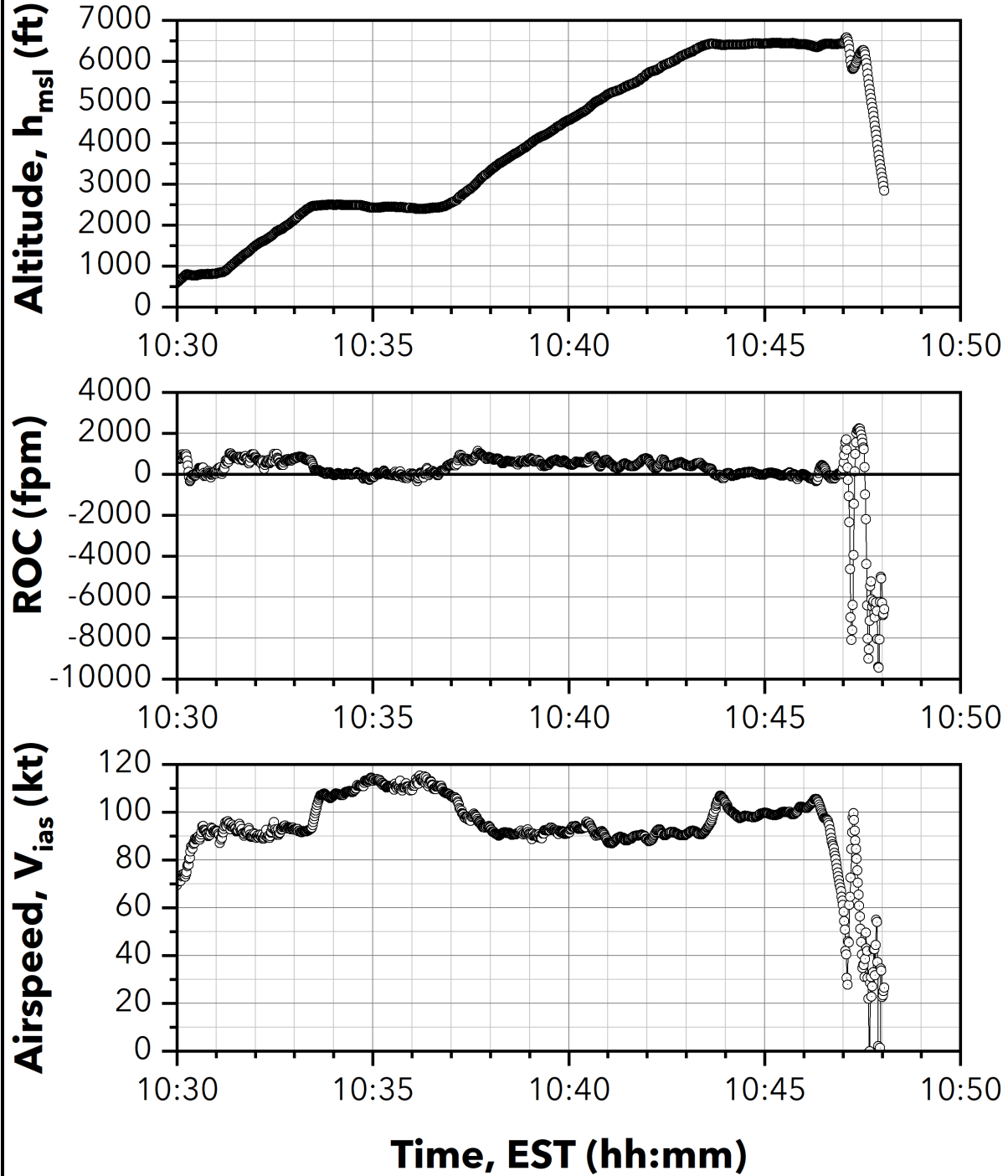


Figure 3: Recorded Altitude, ROC, and Indicated Airspeed for Accident Flight

**ERA22FA058: Cessna 172S, N90559
Branchville, NJ
11/11/2021**

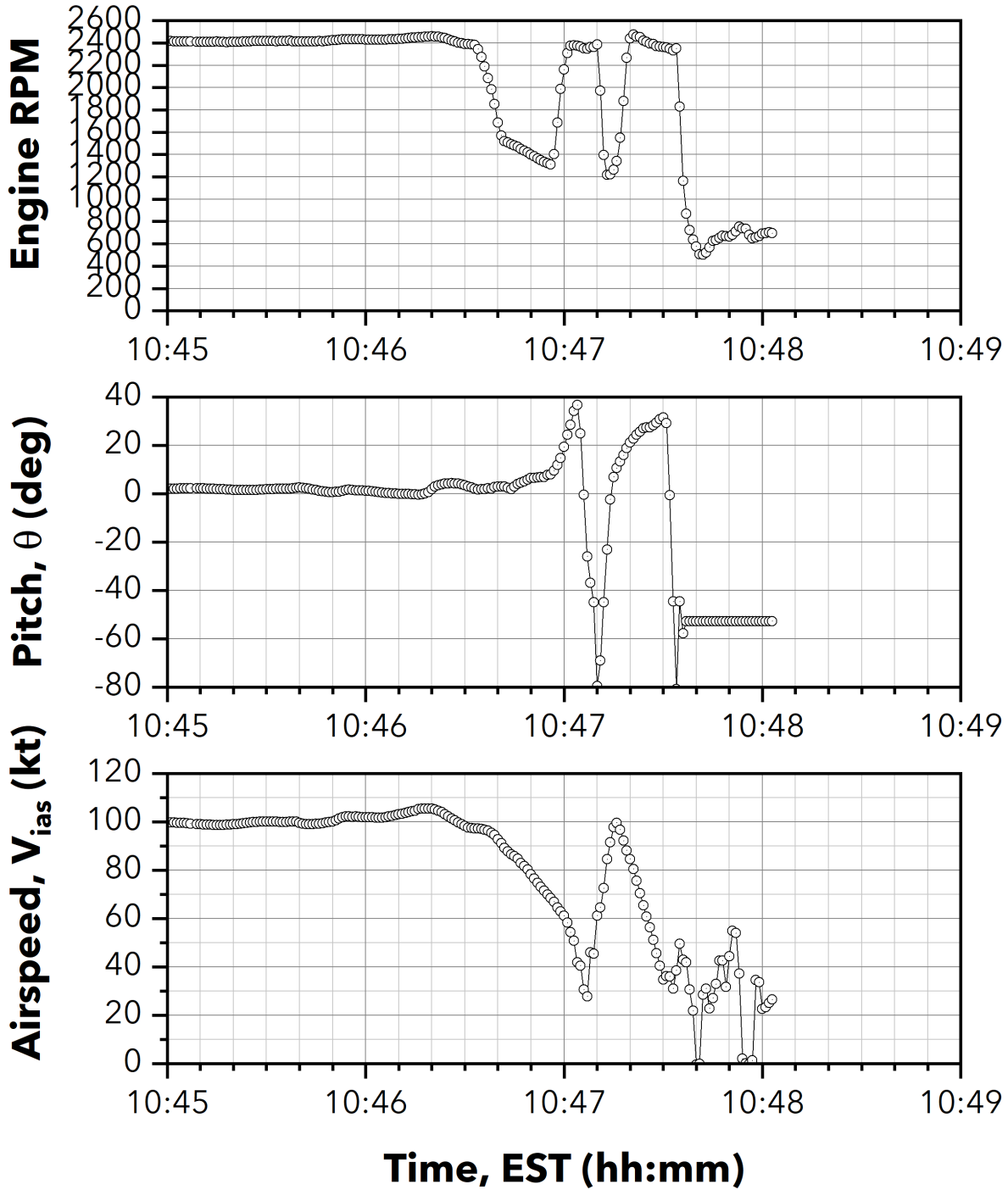


Figure 4: Power, Pitch, and Airspeed for Final Three Minutes

**ERA22FA058: Cessna 172S, N90559
Branchville, NJ
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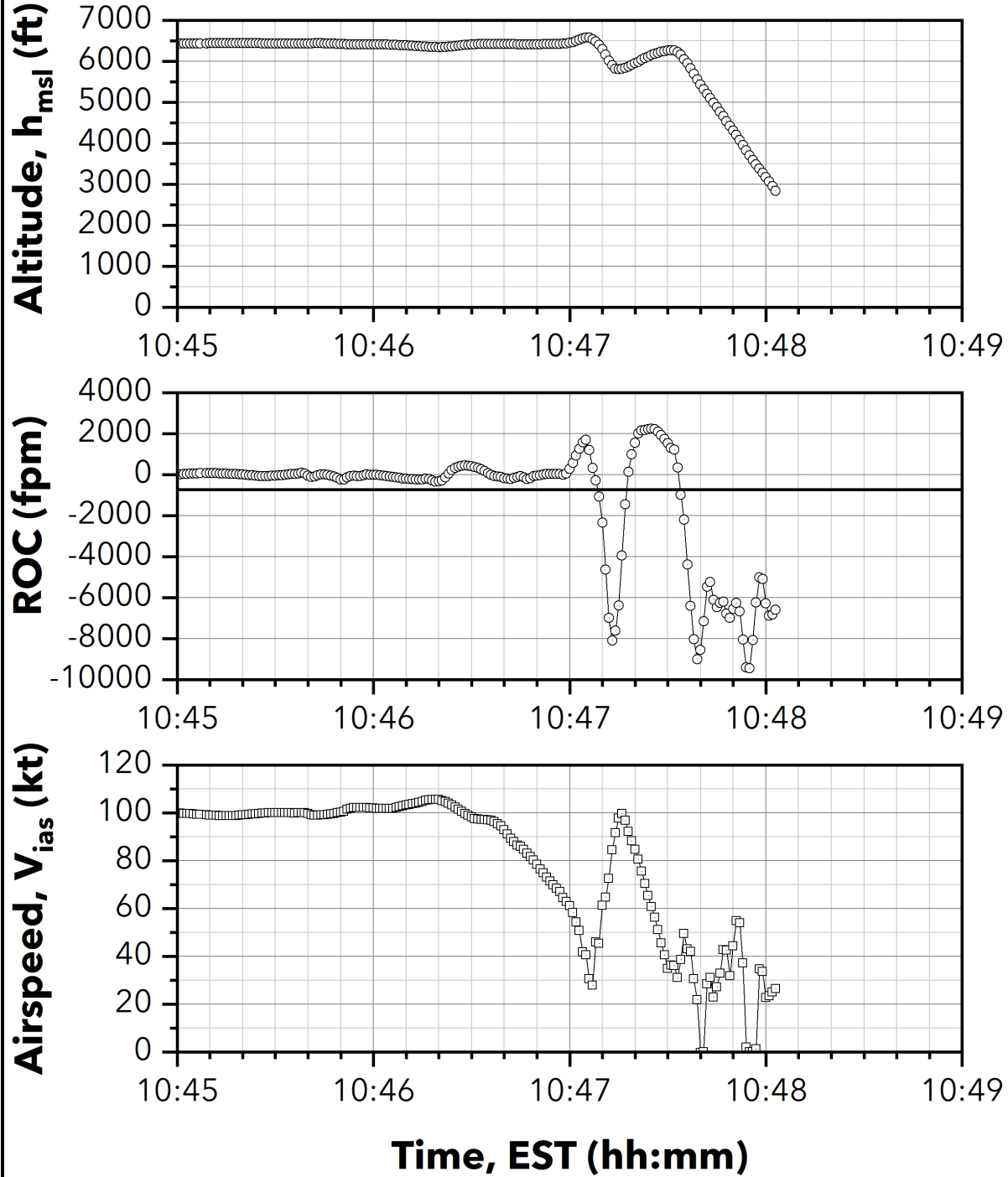


Figure 5: Recorded Altitude, ROC and Indicated Airspeed for Final Three Minutes

ERA22FA058: Cessna 172S, N90559
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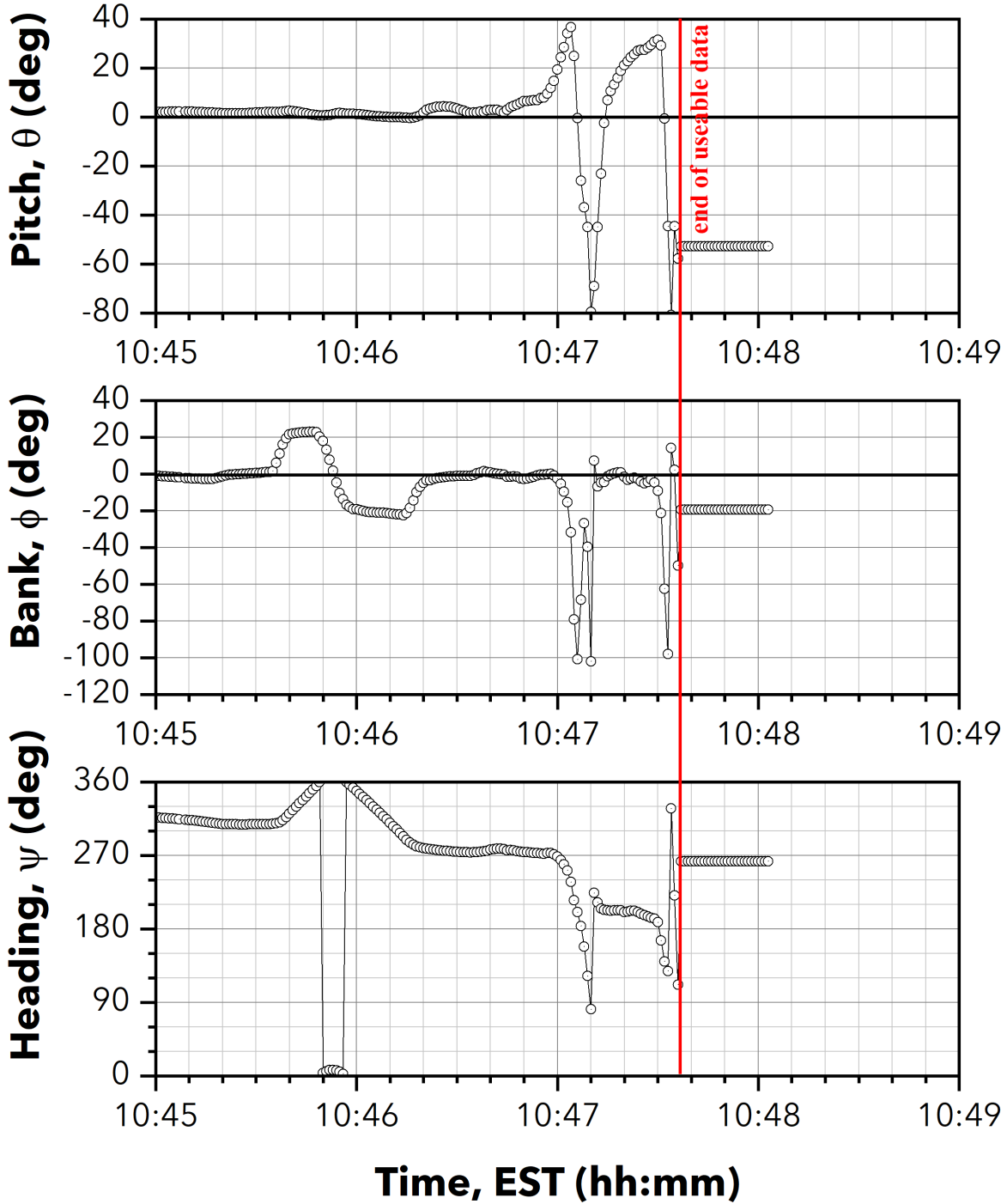


Figure 6: Recorded Pitch, Bank, and Heading Angles for Final Three Minutes

ERA22FA058: Cessna 172S, N90559
Branchville, NJ
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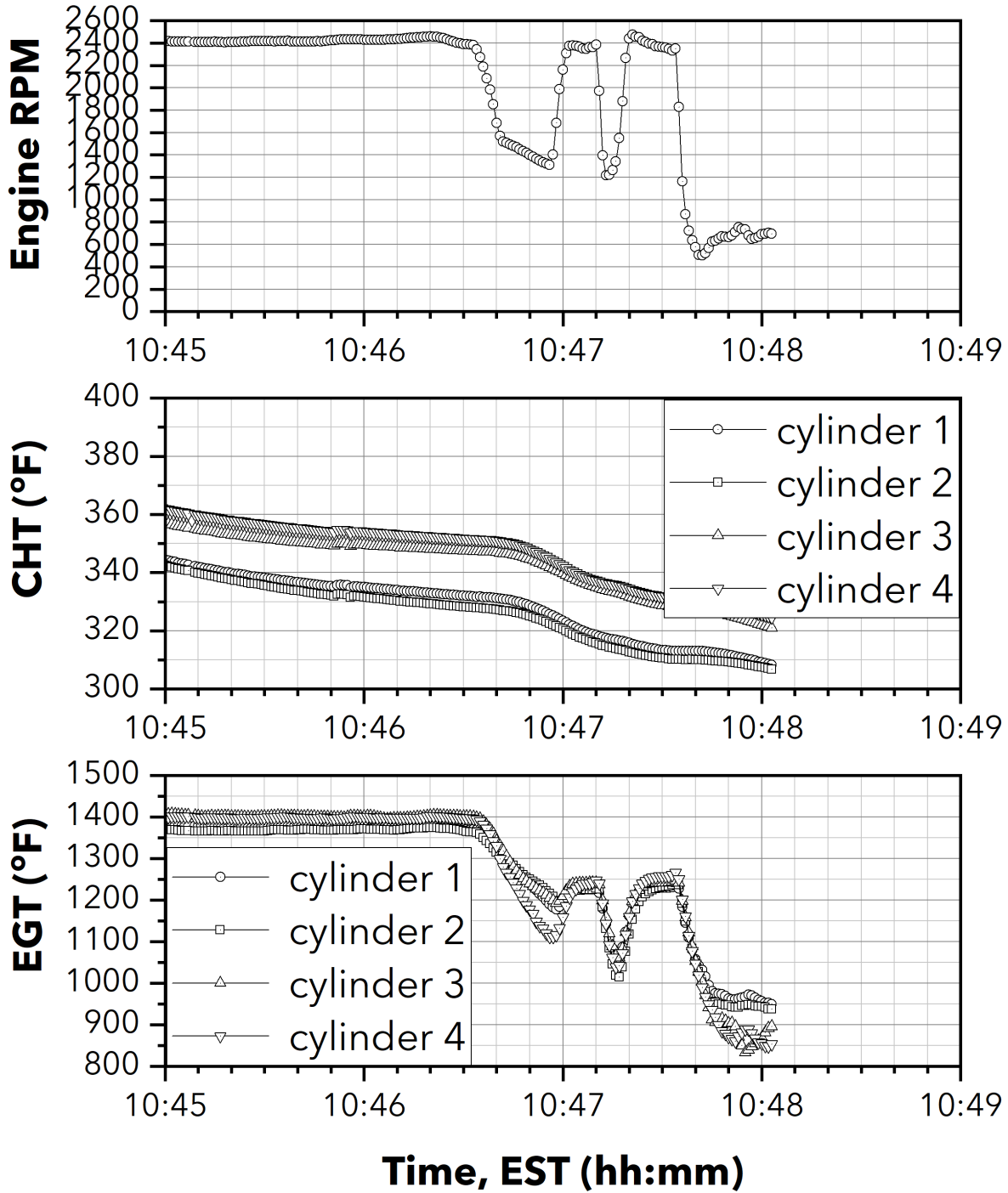


Figure 7: Recorded Engine Parameters for Final Three Minutes

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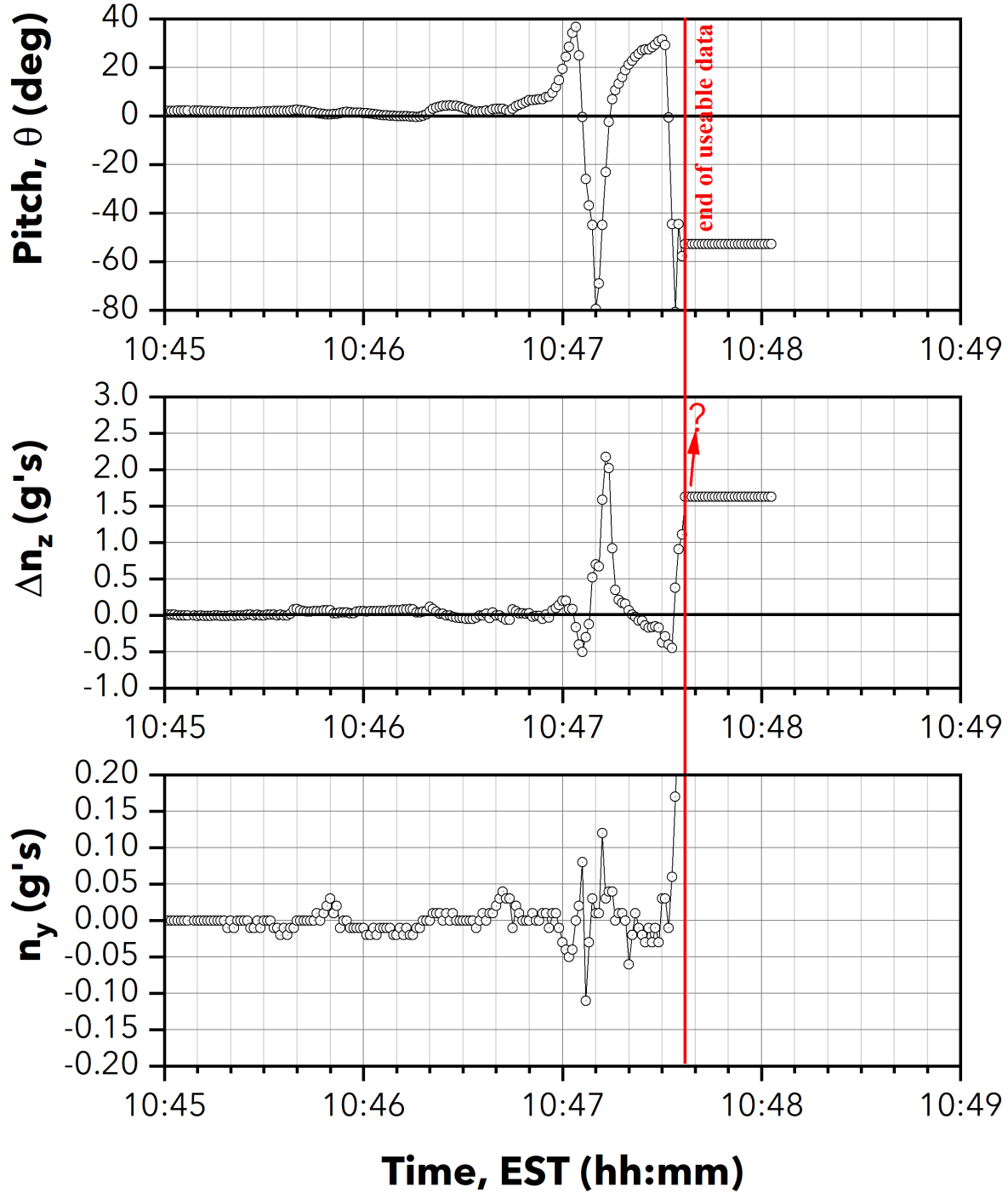


Figure 8: Recorded Normal and Lateral Load Factors for Final Three Minutes