

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA22FA137

VEHICLE PERFORMANCE

Aircraft Performance Study

A. ACCIDENT

Location: Hilltown Township, Pennsylvania
Date: February 24, 2022
Time: 16:56 Eastern standard time (EST)
21:56 UTC
Airplane: Beech 35-C33, N6129V

B. SUMMARY

On February 24, 2022, about 16:56 eastern standard time, a Beech 35-C33, N6129V, was destroyed when it was involved in an accident near Hilltown Township, Pennsylvania. The private pilot and flight instructor were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 instructional flight.

C. PERFORMANCE STUDY

1.0 Available Data

This performance study is based on Automatic Dependent Surveillance-Broadcast (ADS-B) data provided by the Federal Aviation Administration (FAA). ADS-B broadcasts an airplane's Global Positioning System (GPS) position and other data to the ground where it is recorded. The GPS position has an accuracy of approximately 20 meters (65 ft) in both the horizontal and vertical dimensions.

2.0 Weather

Weather was recorded at 16:54 at Doylestown Airport (KDYL), seven NM east of the wreckage location. The temperature was reported as 34°F (1°C), the dew point was 16°F (-9°C), and the barometric setting was 30.39 inHg. Winds were calm. Skies were overcast at 3,900 ft above ground level (AGL). Visibility was ten statute miles.

3.0 Flight Path

The airplane took off from KDYL and the pilots were practicing maneuvers in the area, as shown in Figure 1. The airplane's altitude varied between 1,400 ft msl and 4,000 ft msl and calibrated airspeed (in this case, nearly equal to groundspeed) varied between 50 and 150 kts, as shown in Figure 2.

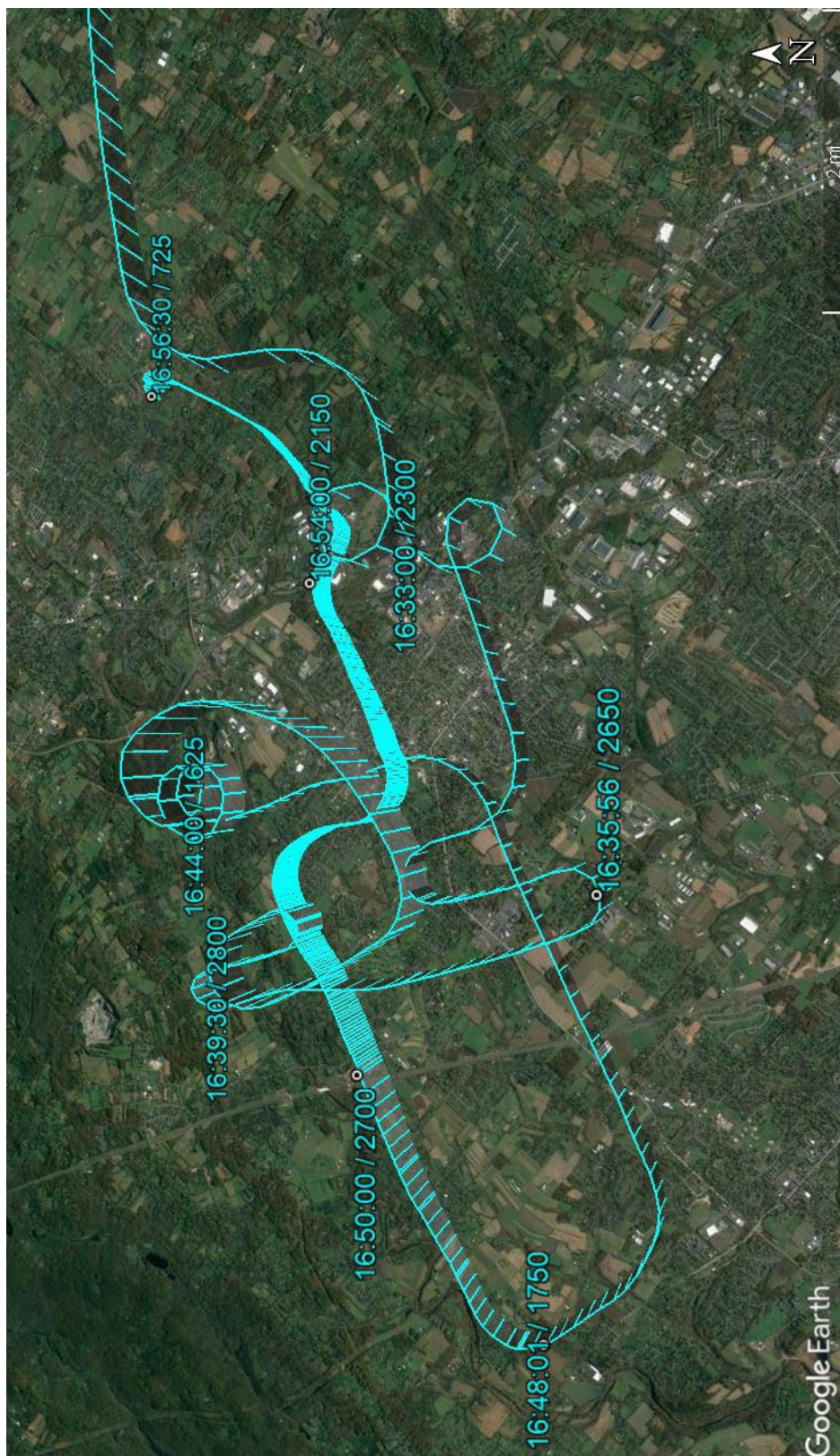


Figure 1. ADS-B flight path with selected times and altitudes (msl) annotated.

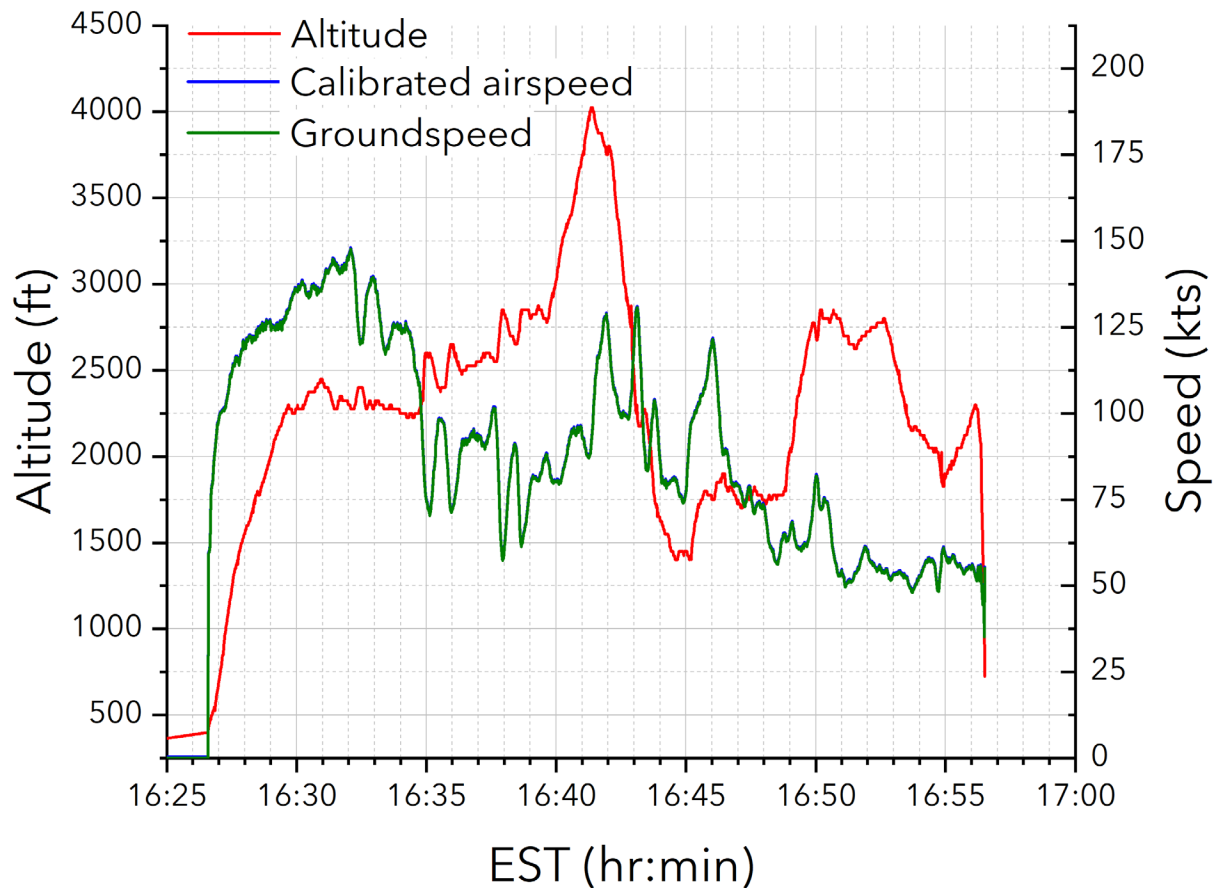


Figure 2. Airplane altitude (msl) with calculated groundspeed and calibrated airspeed. Due to meteorological conditions, groundspeed and calibrated airspeed were approximately equal.

For 2,500 lbs, an estimate of the airplane's weight, the airplane's wings-level, power-idle, no-flaps stall speed is 58 kts [1]. With flaps the stall speed is 49 kts. Figure 3 shows the last six minutes of flight. The airplane was mostly below the flaps-up stall speed and briefly dipped below the stall speed with flaps a few times but would quickly regain airspeed.

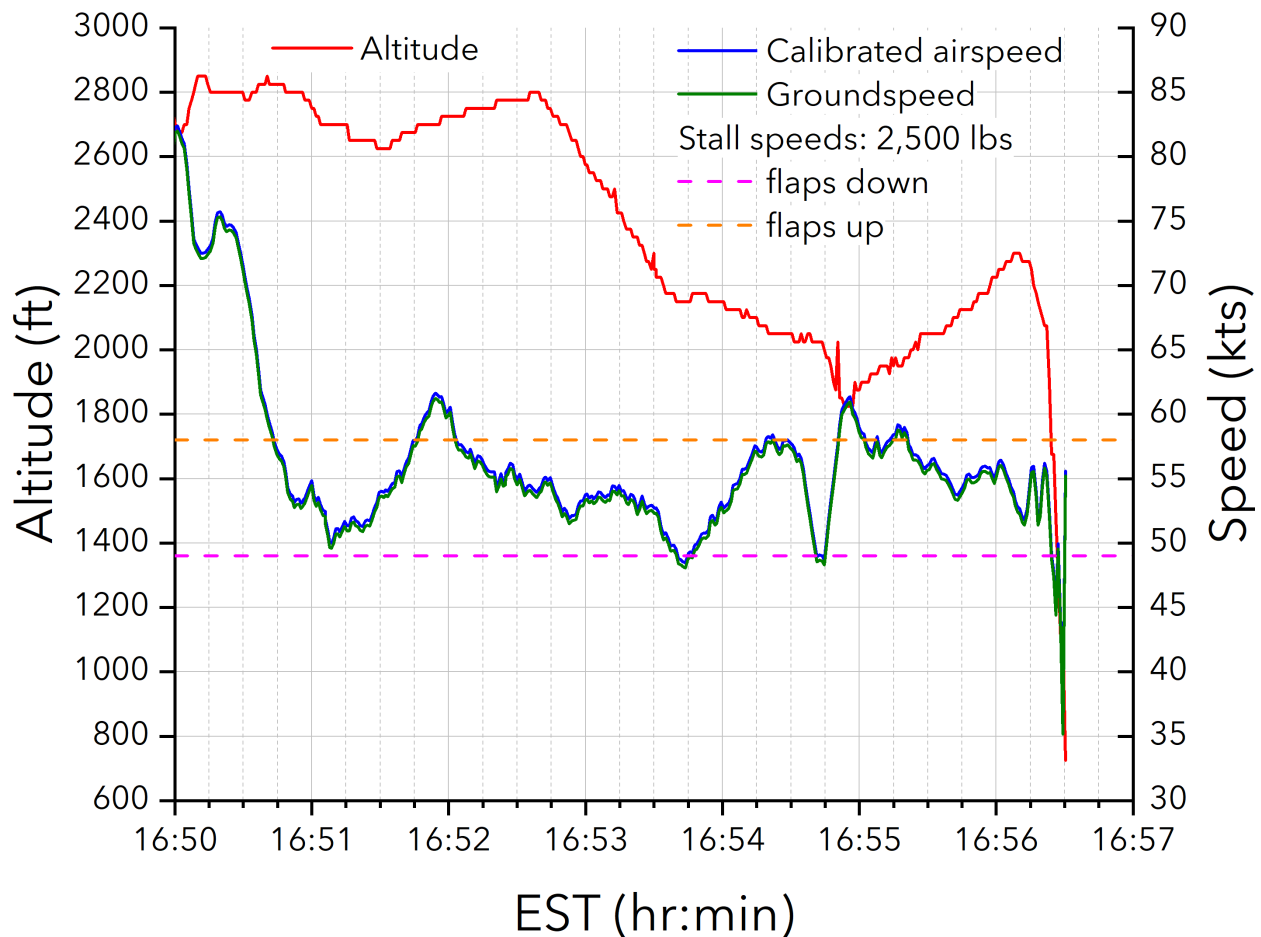


Figure 3. Airplane altitude (msl) with calculated groundspeed and calibrated airspeed. Due to meteorological conditions, groundspeed and calibrated airspeed were approximately equal. Stall speeds for flaps up and flaps down are shown as dotted lines.

A Video Study of a video from a camera on a residential building near the point of impact was completed [2]. Images of the end of flight were used to correlate the video with the ADS-B flight path. A sound spectrum analysis of the noise of the engine found that at two periods of reduced engine noise during the final 30 seconds of flight. Figure 4 shows the time correlation with the video study and the times when the reduction in engine noises were heard.

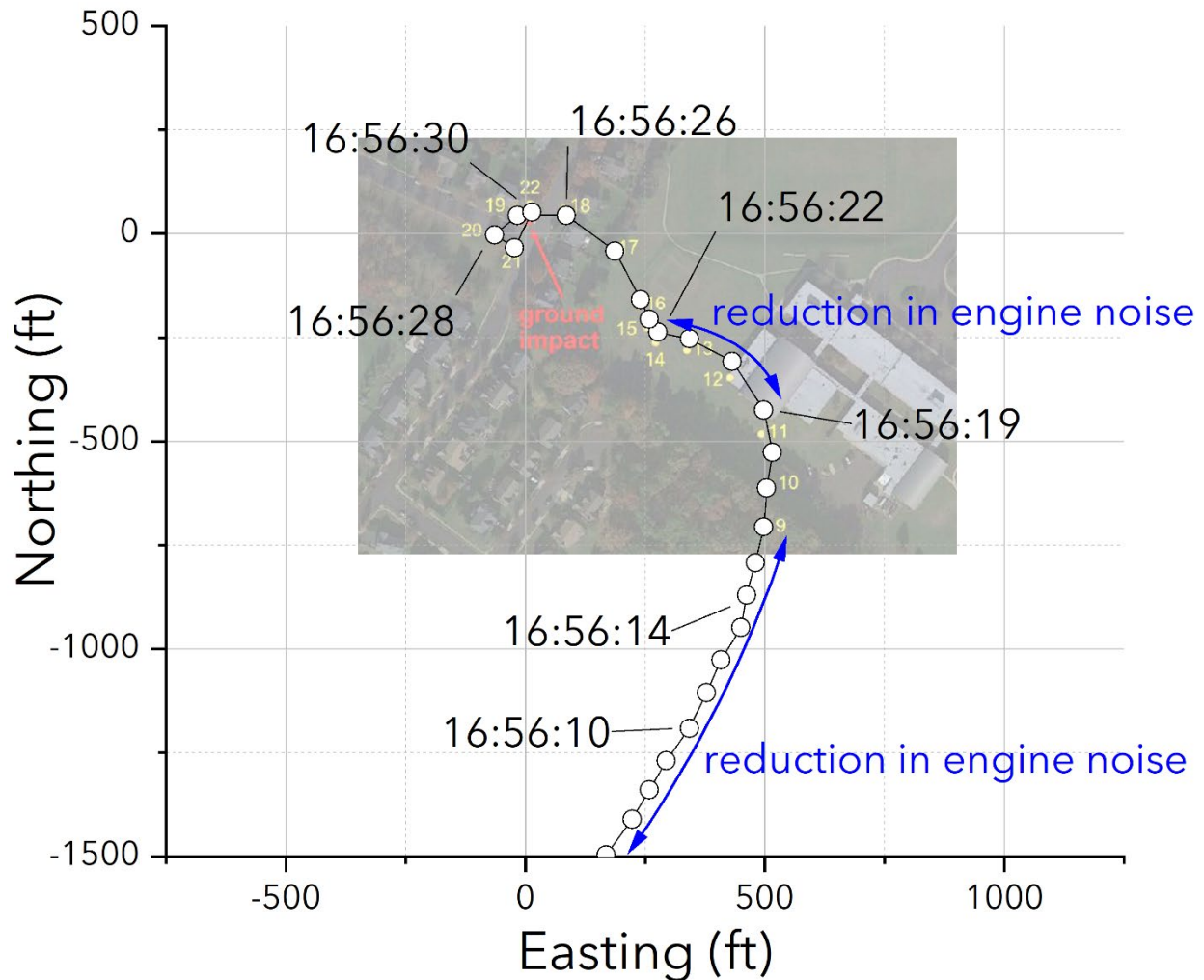


Figure 4. End of ADS-B flight in Northing and Easting with selected times annotated. Overlaid onto image from video study for time correlation. Time periods of reduced engine noise are highlighted.

Figure 5 shows the times of reduced engine noise on the last 40 seconds of altitude and speed data. Roll was calculated from flight parameters and a basic aerodynamic model of the airplane. The airplane was near wings level leading into the first period of reduced engine noise. During that time the airplane rolled left to 20°. The left roll was arrested during the 4-5 seconds normal engine sounds were heard but about 150 ft of altitude was lost. During the second period of reduced engine noise, the airplane continued to roll rapidly left and the banked stall speed exceed the airspeed. The airplane descended rapidly left wing down in a tightening spiral. The wreckage was found directly underneath the last two ADS-B returns.

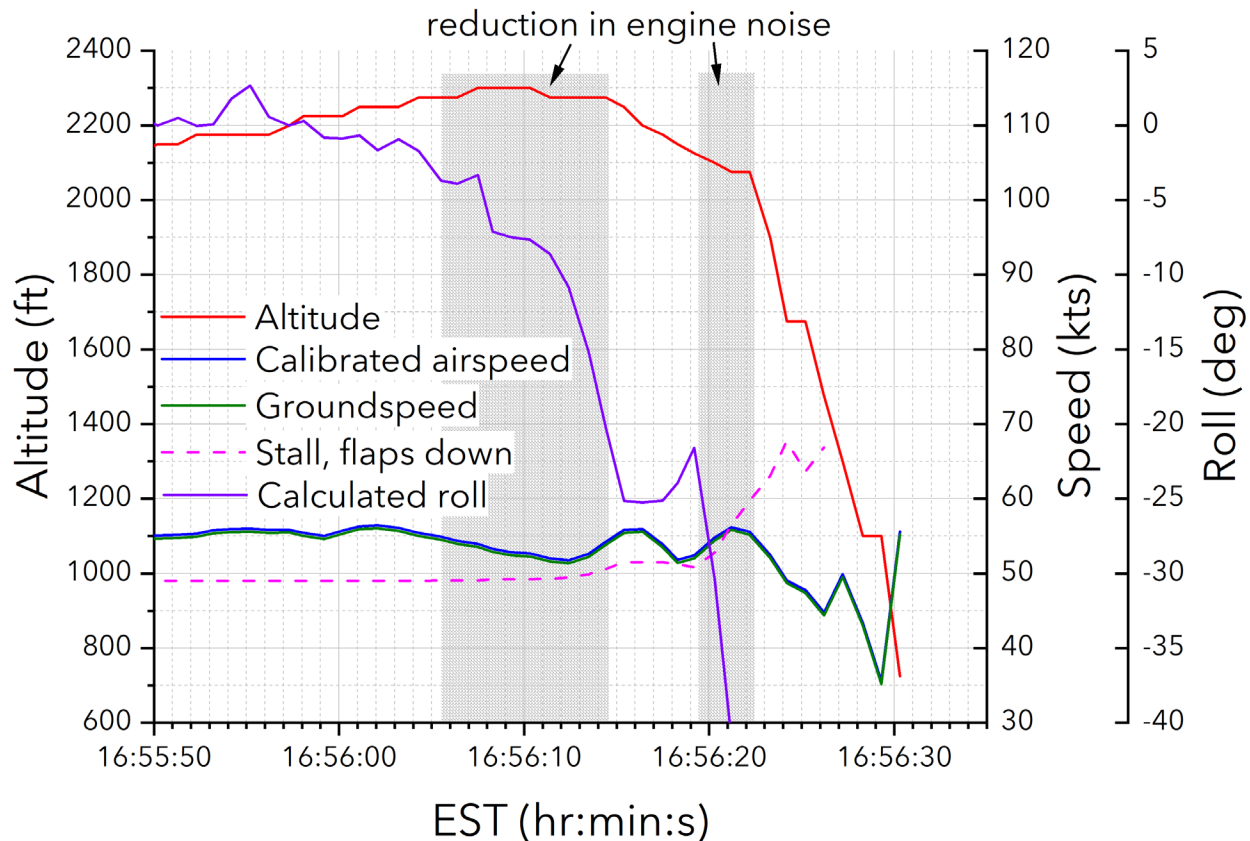


Figure 5. Airplane altitude (msl) with calculated groundspeed and calibrated airspeed, and calculated roll. The stall speed as a function of the roll angle is a dotted pink line. The two grey boxes are highlighting time periods of reduced engine noise.

D. CONCLUSIONS

The airplane's maneuvers during the final portion of flight were below the airplane's flaps up, power idle stall speed and twice briefly below the flaps down stall speed. During the final 30 seconds of flight, the airplane rolled left during times that corresponded with periods when engine noise was reduced. The airplane's rapid left roll and loss of altitude was consistent with an aerodynamic stall.

E. REFERENCES

1. Beechcraft Debonair 35-C33 Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. Beech Aircraft Corporation, 1996.
2. Video Study, EAR22FA137. National Transportation Safety Board, 2022.

Submitted by:
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