

National Transportation Safety Board

Office of Research and Engineering

Washington, D.C. 20594

Performance Study

Specialist Report

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A. ACCIDENT

Location:	Zeeland, Michigan
Date:	September 19, 2020
Time:	06:38 Eastern daylight time (EDT)
Airplane:	Vans RV9, N94KJ
NTSB Number:	CEN20LA399

B. SUMMARY

On September 19, 2020, about 06:38 Eastern daylight time, an amateur-built Vans RV9A airplane, N94KJ, was destroyed when it was involved in an accident at Ottawa Executive Airport (Z98), Zeeland, Michigan. The private pilot and passenger were fatally injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight.

C. PERFORMANCE STUDY

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 (m) in both the horizontal and vertical dimensions.

Weather recorded at West Michigan Regional Airport (KBIV), about nine nautical miles from the accident, was 35°F (2°C), dew point 34°F (1°C), and the barometric setting was 30.39 inHg. Winds were 3 kts from 100°. Skies were clear. Civil Twilight on the day of the accident was 06:59, so the flight was conducted in night conditions.

The aircraft took off from Ottawa Executive Airport Runway 20 just before 06:34 EDT (Figure 1 and Figure 2). While climbing, the airplane made a 180° left hand turn back to the runway. The airplane descended, overflew the runway, and began a second climb before the flight ended just after 06:37.

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Figure 1. Accident flight in blue with select times and altitudes (msl) annotated in blue.

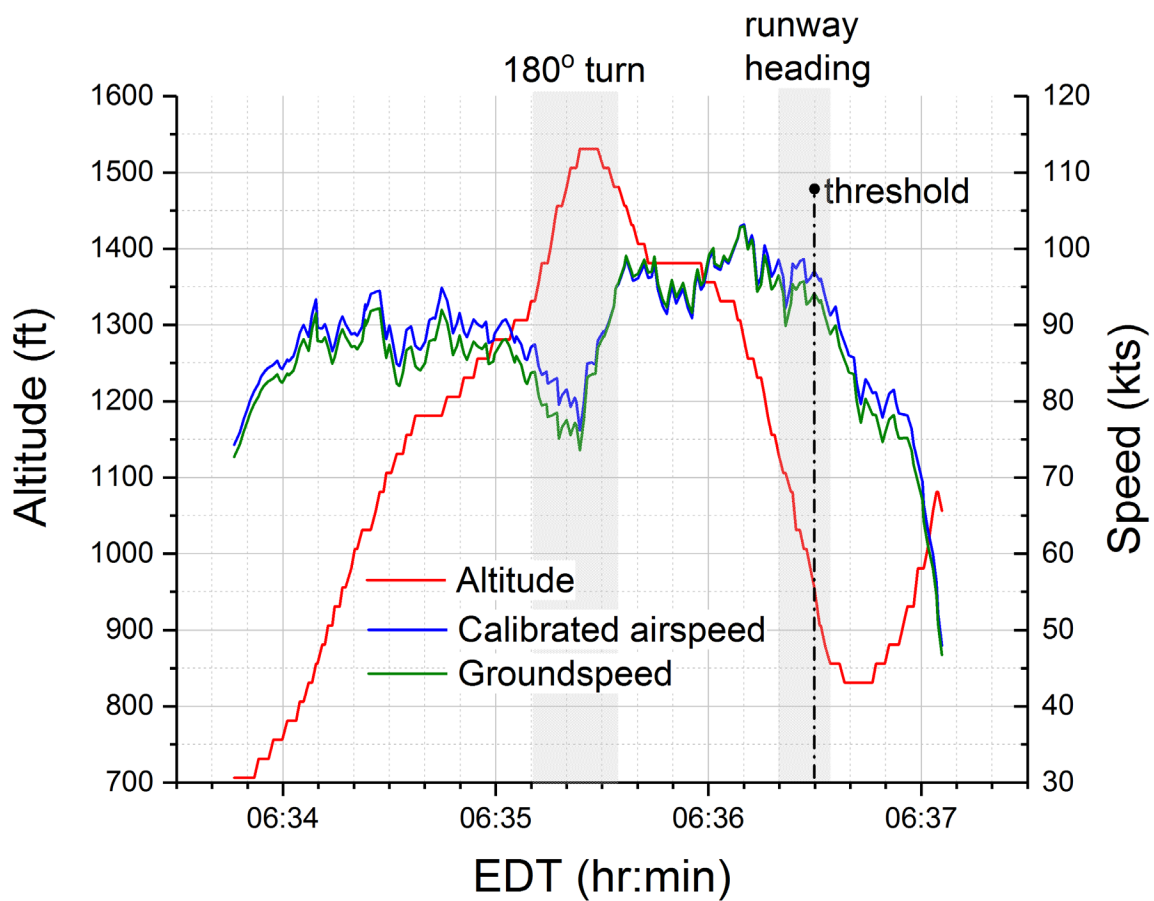


Figure 2. Altitude (msl) and calculated groundspeed and calibrated airspeed. The 180° turn and time of runway alignment are highlighted.

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The airplane maintained an airspeed of about 90 kts during the initial take-off climb. Just after 06:35, the rate of climb increased, the airspeed decreased to about 75 kts, and the airplane began the 180° turn back to the runway. It continued to climb while turning until 06:35:25 when it reached a maximum altitude of 1,530 ft. During the descent, airspeed increased to between 90 and 100 kts. While descending the airplane aligned with Runway 2. At 06:36:30 at an airspeed of 95 kts, it crossed over the threshold at an altitude of about 950 ft msl, more than 200 ft above the runway surface. The airplane continued to descend and slowed to about 80 kts before making a slight right turn off the runway heading and beginning a climb.

In the final 20 seconds of flight, the airplane climbed about 250 ft and began a left turn. During this climb, the airspeed was slowing to below 50 kts at the end of the data. The final data returns show the airplane slowing while in a left turn. The wings-level stall speed for a Vans RV9 is reported as between 42 and 43 kts (48 to 50 mph).

Since lift varies with airspeed squared, the stall speed varies with the square root of the load factor so that in a banked turn, the stall speed increases. A bank angle of 45° results in a load factor of 1.414 and the airplane's stall speed would increase from the wings level 42 kts to 50 kts. Figure 3 shows the track angle and calculated bank angle of the airplane for the flight. The airplane's final left turn necessitated a bank angle greater than 60° left wing down, placing the airplane's final calculated speed below the likely banked stall speed.

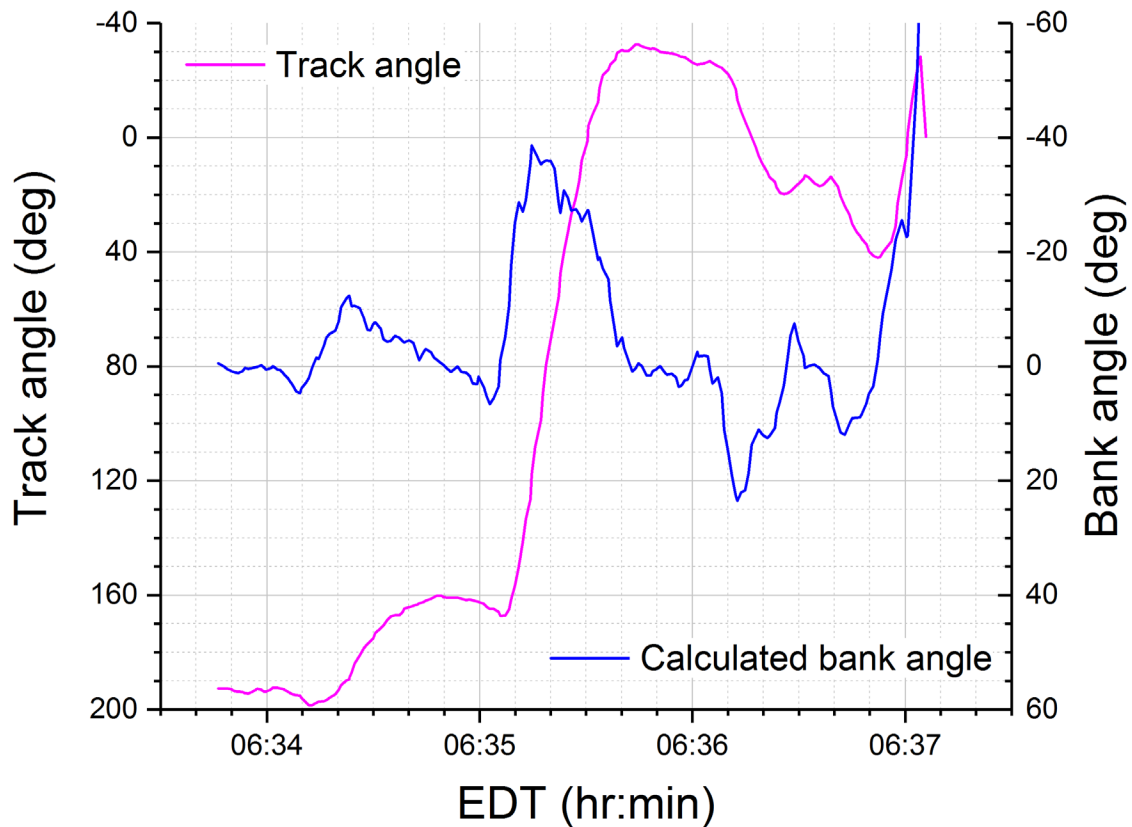


Figure 3. Track angle and calculated bank angle.

D. CONCLUSIONS

The airplane initiated a 180° turn about one minute after take-off while at an altitude of 1,300 ft. The airplane completed the turn and descended towards the runway but was too high and too fast to land. The airplane slowed and climbed again while turning right off the runway heading. At the time of the last ADS-B return, the airplane was slowing while continuing to climb and turning left. The airplane was likely below the reported stall speed when the effect of bank angle is considered.

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