

National Transportation Safety Board

Office of Research and Engineering

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AUTOMATIC DEPENDENT SURVEILLANCE- BROADCAST (ADS-B) STUDY

Aircraft Performance Study

By

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A. ACCIDENT

Location: Montebello, Virginia
Date: June 4, 2023
Time: 1523 eastern daylight time (EDT)
Airplane: Cessna Citation 560, N611VG

B. SUMMARY

On June 4, 2023, about 15:23 eastern daylight time, a Cessna Citation 560 airplane, N611VG, was destroyed when it impacted terrain near Montebello, Virginia. The airline transport pilot and three passengers were fatally injured. The airplane was operated by Encore Motors of Melbourne, Inc. as a personal flight conducted under the provisions of Title 14 *Code of Federal Regulations* Part 91.

C. PERFORMANCE STUDY

1.0 Aircraft

The airplane involved was a Cessna Citation 560, a swept wing business jet with twin aft-mounted turboprop engines. The airplane has a service ceiling of 45,000 ft and a maximum speed of 0.755 Mach.



Figure 1. Exemplar Cessna Citation 560.

2.0 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.

However, FAA ADS-B data was not available until 13:30 when the airplane was at altitude. Aviation Safety's Operational Factors group provided OpsVue data for the earlier portion of the flight. OpsVue data uses a multi-sensor system that aggregates and georeferences multiple FAA data sources. The OpsVue data recorded the airplane's take-off and climb before the FAA ADS-B data was available.

3.0 Weather

Weather was recorded for 15:53 at KCHO, 33 nautical miles from the wreckage location. The temperature was reported as 70°F (21°C), the dew point was 54°F (12°C), and the barometric setting was 30.01 inHg. Winds were 6 kts from 50°. Visibility was 10 miles with a broken ceiling at 2,900 ft above ground level.

4.0 Flight Path

The airplane departed from Elizabethton, Tennessee (0A9) at 13:13 bound for Long Island MacArthur Airport (ISP) (Figure 2). The airplane climbed to a pressure altitude of 34,000 ft by 13:29:45, which it then maintained until the end of flight (Figure 3). The airplane's flight path followed a series of navigation aids northeast towards ISP. Without descending, the airplane flew northeast of ISP, and then the airplane turned back towards the southwest, flying directly over ISP at 34,000 ft pressure altitude.

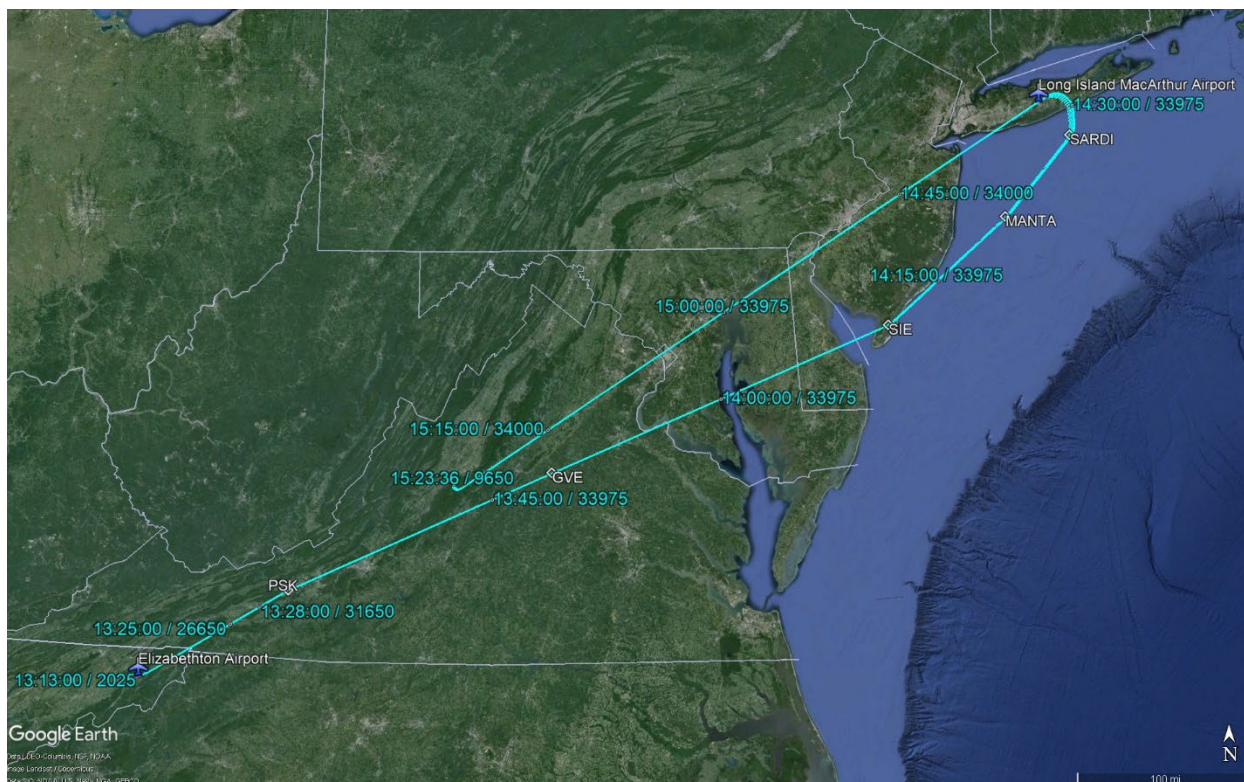


Figure 2. ADS-B flight path with selected times and pressure altitudes marked. Also shown are navigation markers along the flight path.

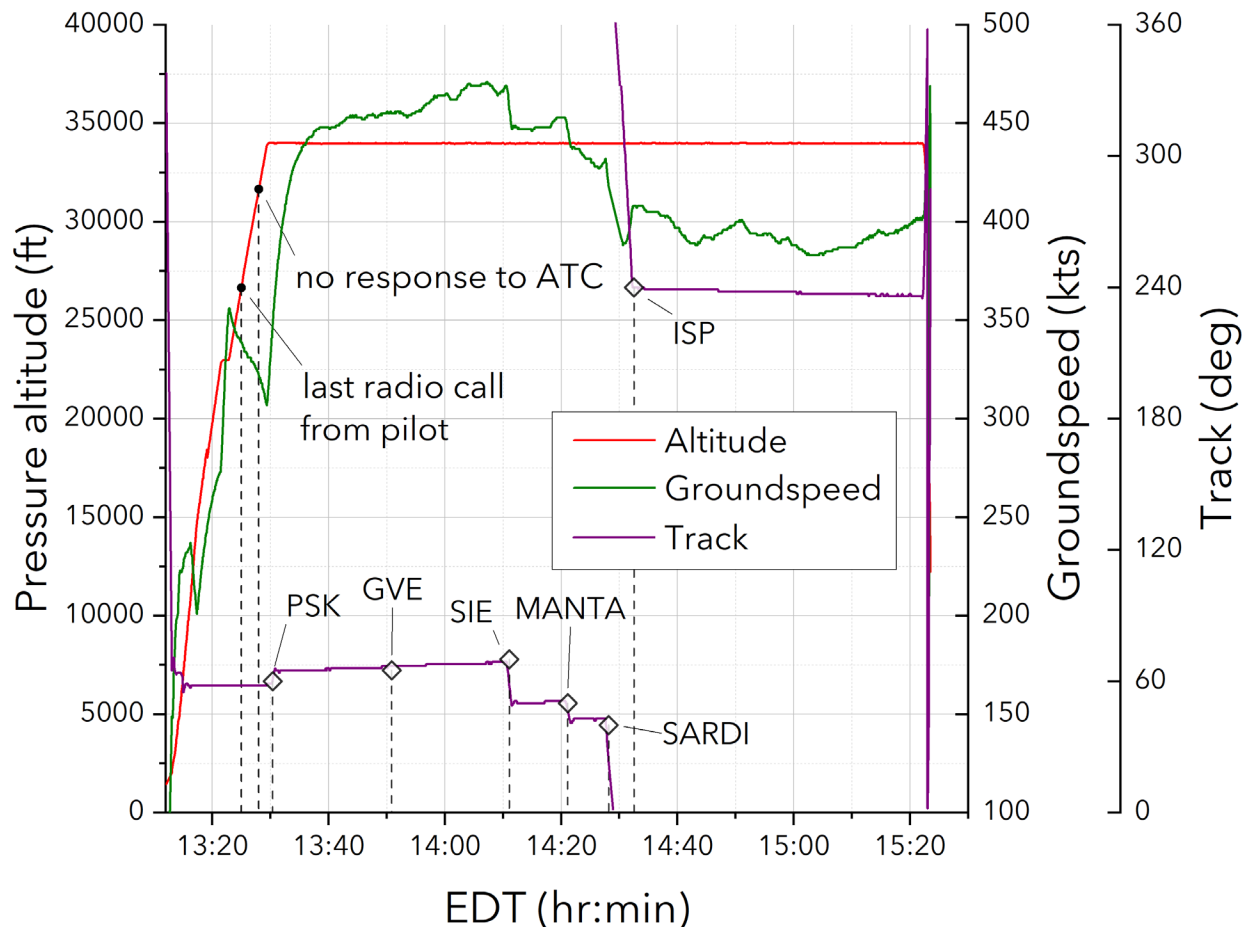


Figure 3. ADS-B recorded pressure altitude, groundspeed, and track for the flight. The time of the last radio communication with the pilot and the first time ATC fails to contact the pilot are noted. Also shown are the times the airplane passed navigation aids PSK, GVE, SIE, MANTA, and SARDI and over the airport ISP.

After take-off, the airplane took three minutes to climb through 10,000 ft pressure altitude. At 13:21:30, eight minutes after take-off, the airplane briefly leveled at about 23,000 ft, before continuing to climb at 13:22:49 (Figure 4). The pilot's last communication with air traffic control (ATC) was at 13:25 as the airplane was climbing through 26,600 ft. ATC tried to contact the airplane three minutes later at 13:28 as the airplane climbed through 31,600 ft but received no response. The pilot made no response to ATC for the remainder of the flight.

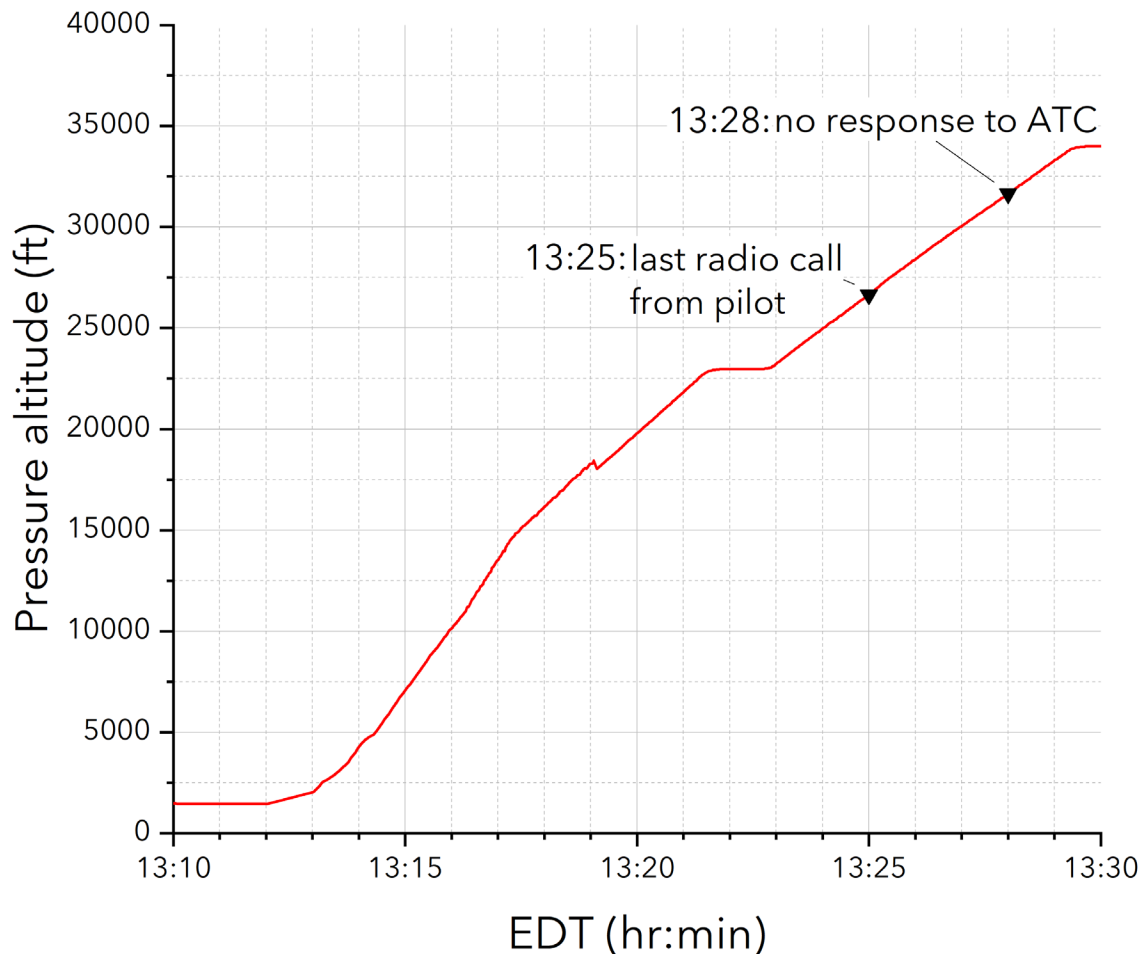


Figure 4. ADS-B recorded pressure altitude for climb to 34,000 ft. The time of the last radio communication with the pilot and the first time ATC fails to contact the pilot are noted.

The airplane reached 34,000 ft pressure altitude by 13:30 and continued on headings following navigation aids to ISP. At 14:30, it reached the destination airport area but was still at an altitude of 34,000 ft. The airplane then turned onto a heading towards the southwest.

The airplane continued at a pressure altitude of 34,000 ft until 15:22:10 when it began to roll to the right and descend, eventually reaching 10,000 fpm (Figure 5 and Figure 6). By this time, the airplane had been flying for two hours and 9 minutes or about 870 NM (1,012 miles). The descent and right spiral turn continued until 15:23:36 when ADS-B data ended at a pressure altitude of 9,650 ft.

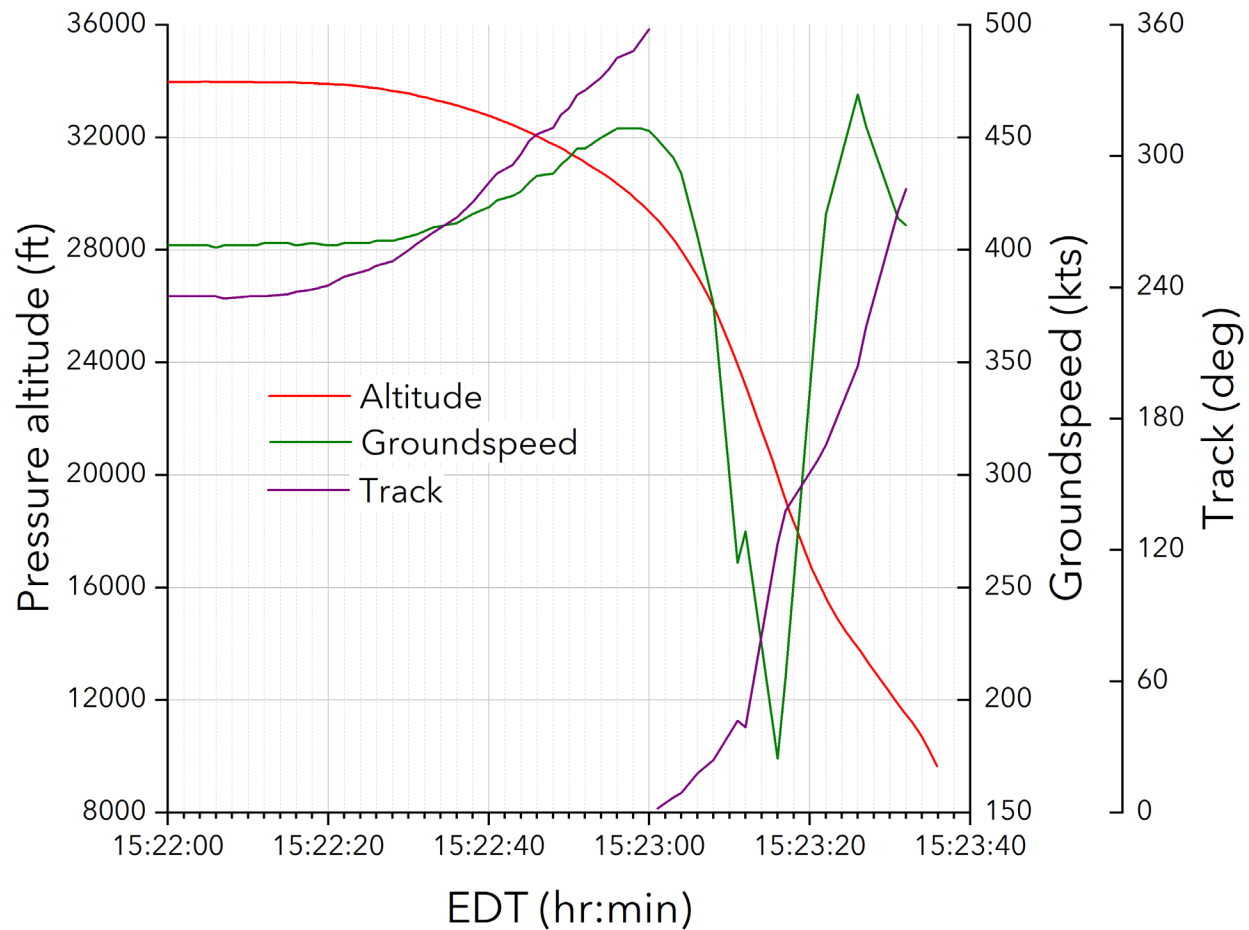


Figure 5. ADS-B recorded pressure altitude, groundspeed, and track for the end of flight.

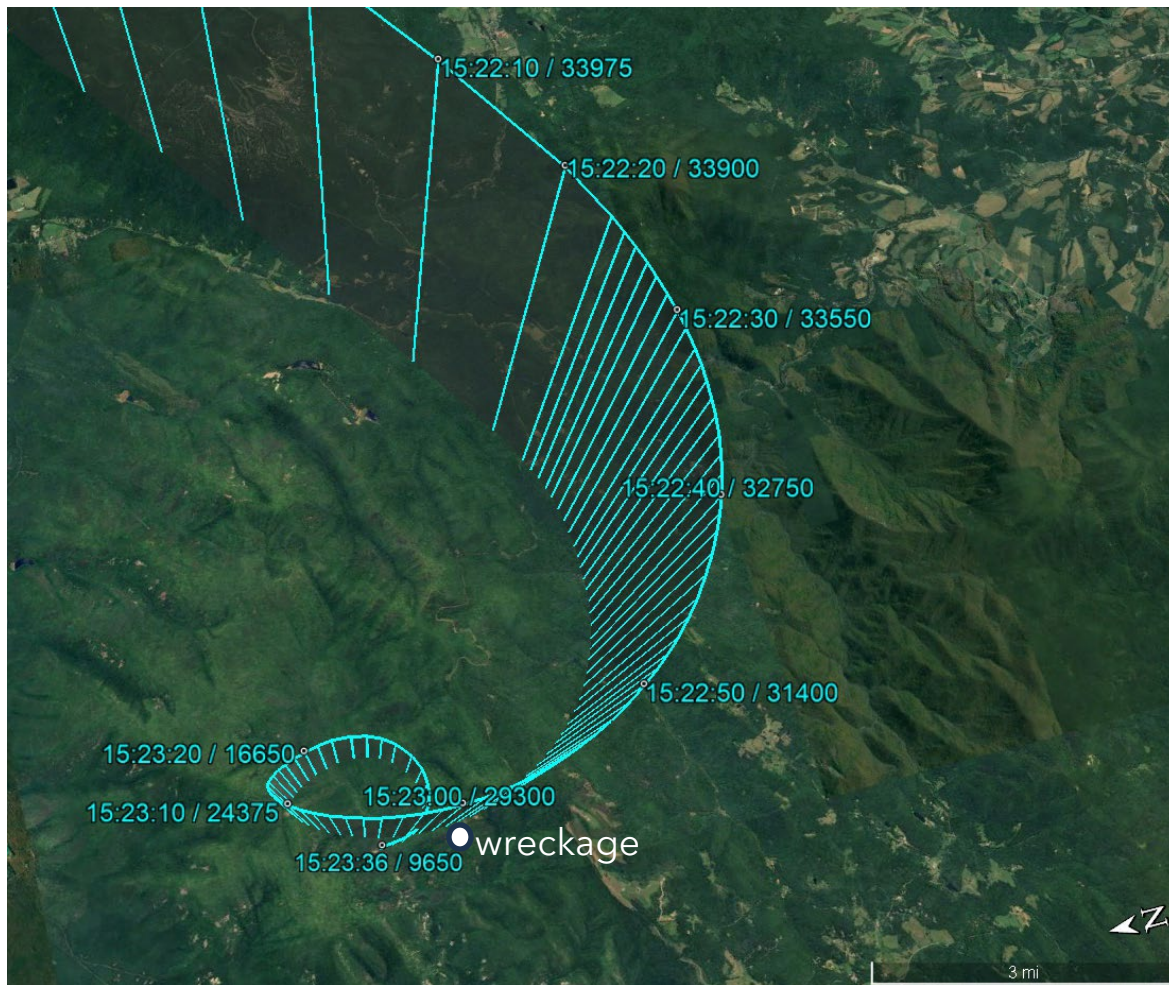


Figure 6. ADS-B recorded pressure altitude, groundspeed, and track for the end of flight.

The wreckage was found about 3,500 ft away from the final ADS-B location at an elevation of about 3,000 ft. The impact crater and wreckage were consistent with a high-speed impact.

D. SUMMARY

The airplane took off from Elizabethton, Tennessee at 13:13 and climbed to 34,000 ft pressure altitude. During the climb, the pilot stopped responding to air traffic control. For the rest of the flight the airplane maintained 34,000 ft while following navigation aids to the destination airport. Once reaching the destination airport at about 14:30 the airplane turned back onto a heading towards the southwest. The airplane flew until 15:22:10 when it began losing altitude and entered a right spiral ending in a high-speed impact with terrain.