

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: Marion, Ohio
Date: October 31, 2023
Time: 1123 Eastern daylight time (EDT)
Airplane: Piper PA32-300, N44601

B. SUMMARY

On October 31, 2023, at 1123 eastern daylight time, a Piper PA32-300, N44601, was destroyed when it was involved in an accident near Marion, Ohio. The pilot and pilot-rated passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

C. PERFORMANCE STUDY

1.0 Aircraft

The airplane involved was a Piper PA32-300, or Cherokee Six, a single-engine, fixed-landing-gear light airplane.



Figure 1. Piper PA32-300, N44601.

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.

3.0 Weather

Weather was recorded for 11:53 at Marion Municipal Airport (MNN), six (6) nautical miles from the wreckage location. The temperature was reported as 41°F (5°C), the dew point was 25°F (-4°C), and the barometric setting was 30.1 inHg. Winds were 10 kts from 200°. Visibility was 10 miles.

4.0 Flight Path

The airplane departed Rickenbacker International Airport (LCK) in Columbus, Ohio at 10:58 (Figure 2). The airplane climbed to 4,000 ft above mean sea level (msl) (Figure 3), then turned onto a northern course as it flew around Columbus to the west. It continued to climb to about 6,000 ft.

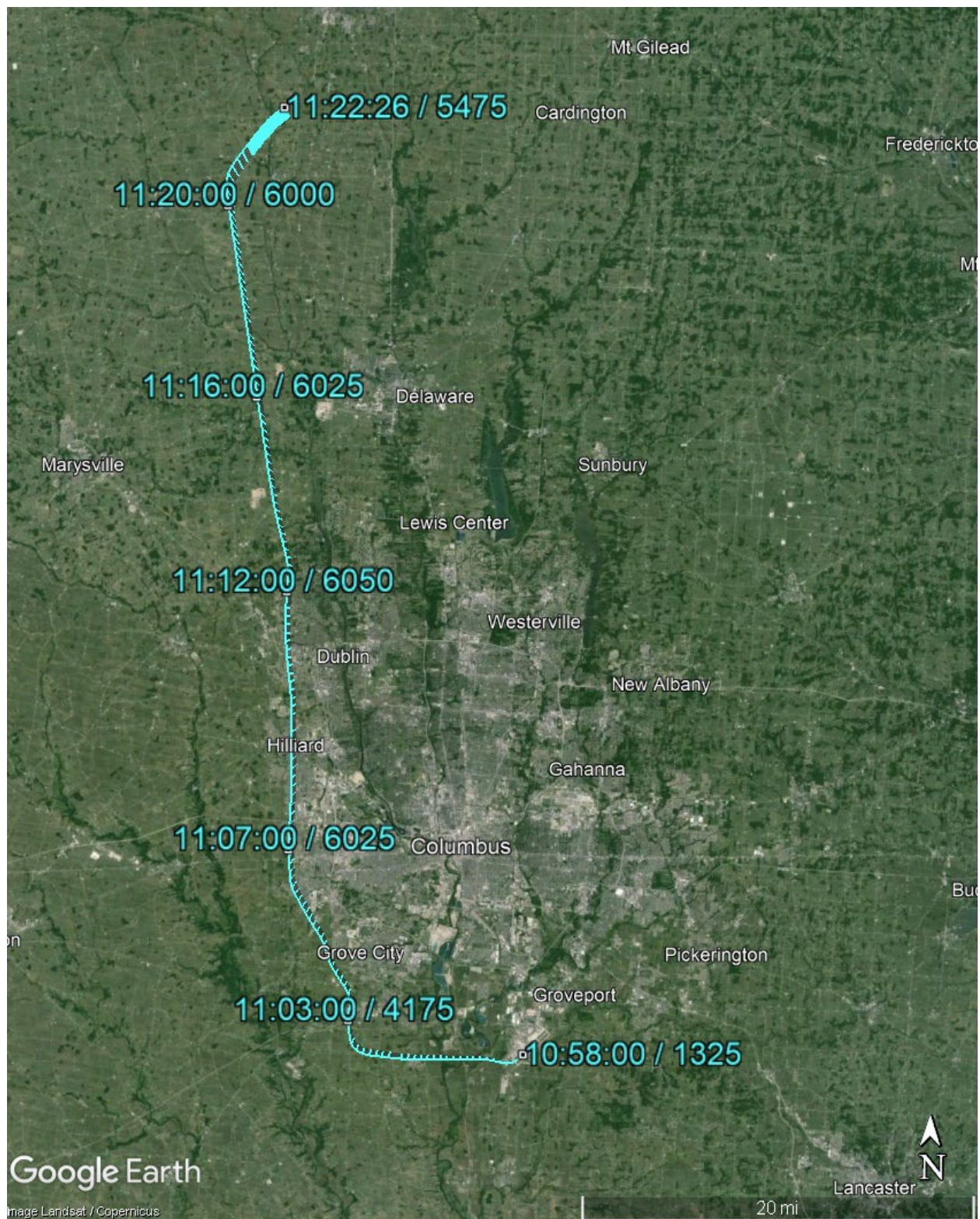


Figure 2. ADS-B flight path with selected times and altitudes notated.

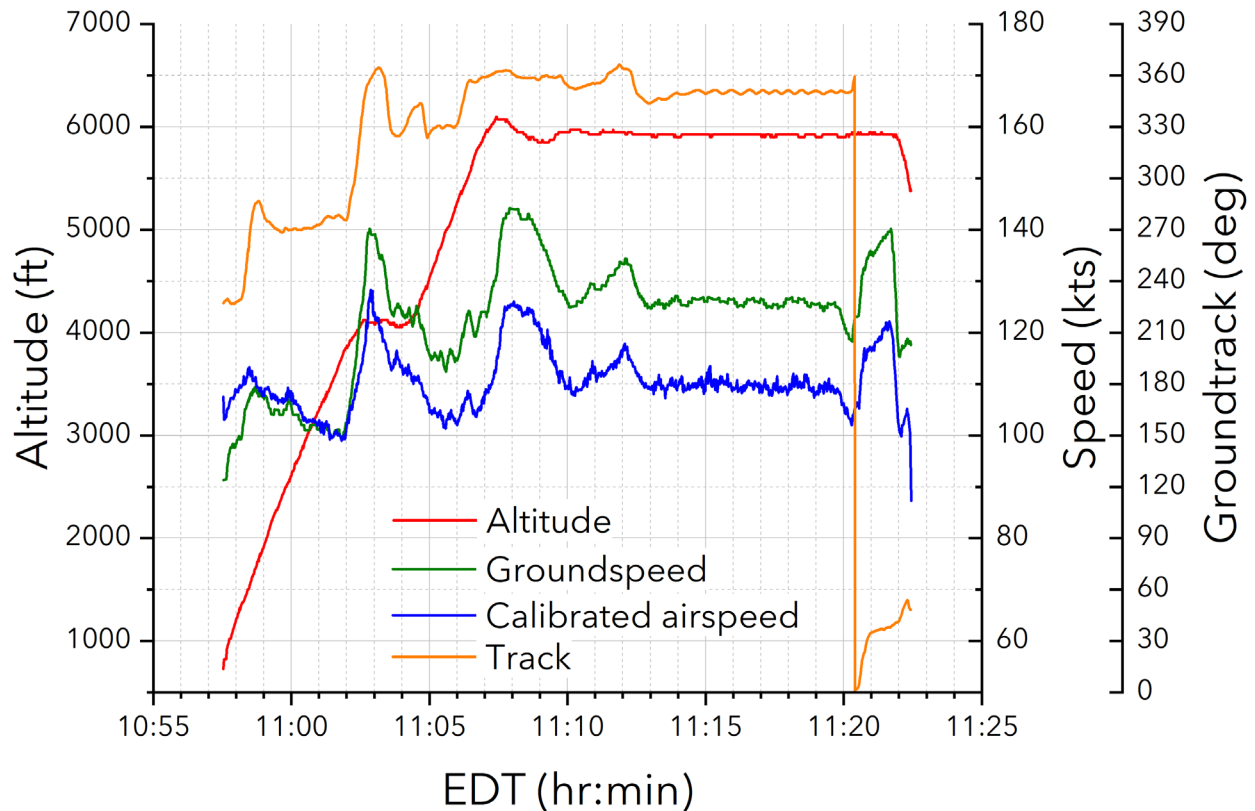


Figure 3. Recorded altitude, groundspeed, and track angle with calculated calibrated airspeed.

After reaching 6,000 ft, the airplane's airspeed increased from 108 kts at 11:07 to 125 kts at 11:08. After some airspeed variation, the airplane settled at an airspeed of 110 kts while at a constant altitude and a ground track of 350° from 11:13 to 11:19:30.

At 11:19:50, the airplane's airspeed began to decrease from 108 kts to 101 kts by 11:20:16 while track and altitude remained steady (Figure 4). The airplane then accelerated to 120 kts while turning right onto a heading of 36° (Figure 4 and Figure 5). At 11:21:45, the speed began to drop and by 11:21:55 the airplane was losing altitude at a rate of 1,000 ft/min. While descending, the airplane's airspeed stabilized near 100 kts before the data ended at 11:22:26. The airplane's descent and deceleration after 11:21:50 indicated a reduction in total energy consistent with a loss of thrust.

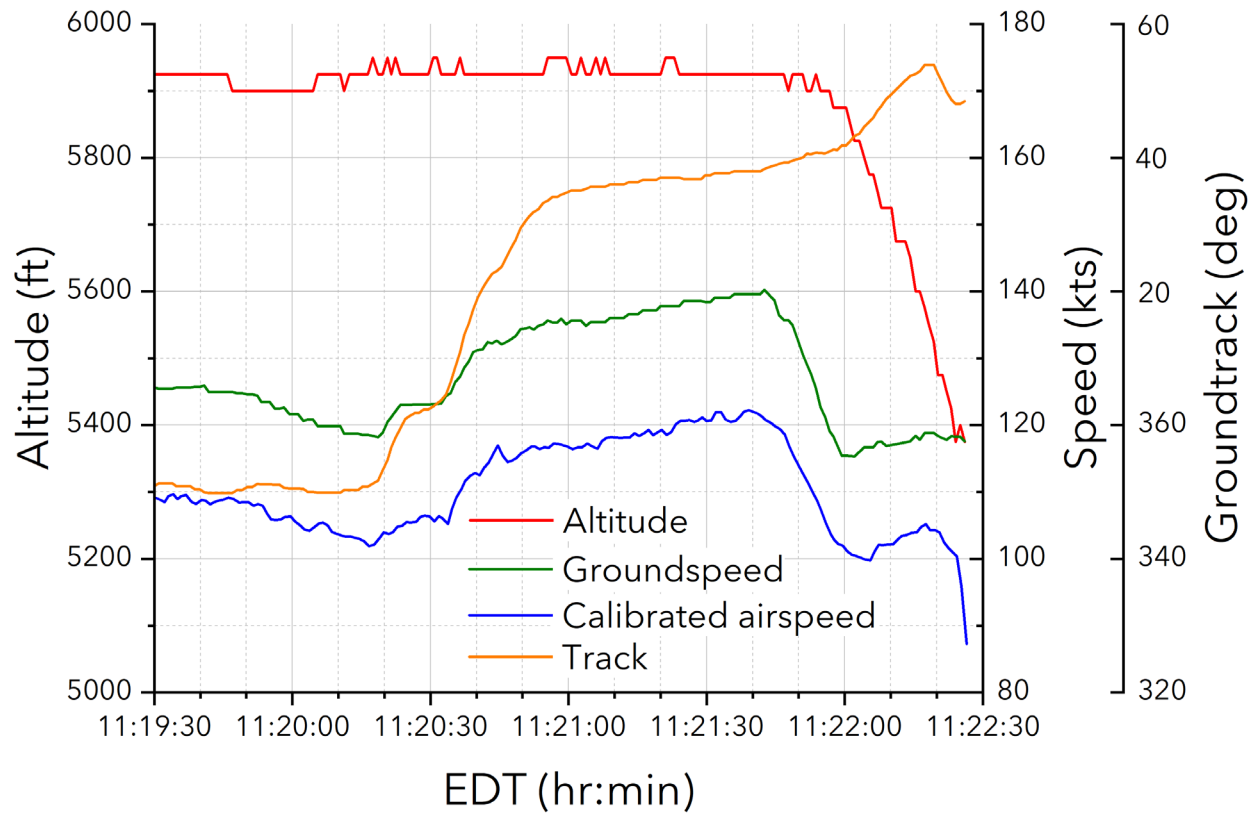


Figure 4. Recorded altitude, groundspeed, and track angle with calculated calibrated airspeed for the last three minutes of flight.



Figure 5. End ADS-B flight path with selected times and altitudes notated. Data before 11:18:00 is shown every 10 seconds. Data after 11:18:00 is shown at the full ADS-B resolution of 1 Hz.

The Cherokee Six 300 Information Manual [1] reports the glide performance as 7.5 miles of range for every 5,000 ft of altitude lost for no flaps, no wind, propeller windmilling, and the airspeed maintained at between 90 - 100 mph (78 - 87 kts). During the descent that began at 11:21:50, the airplane outperformed the reported glide performance while at an airspeed 10 kts faster than recommended and with a tailwind.

At the final ADS-B point, the airplane was at an altitude of 5,475 ft and the ground elevation in the area was approximately 1,000 ft. At this point the airplane's reported glide range would have been 6.6 miles (Figure 6). At this altitude, the two closest airports - Marion Municipal Airport and Morrow County Airport - were both beyond the airplane's glide performance.

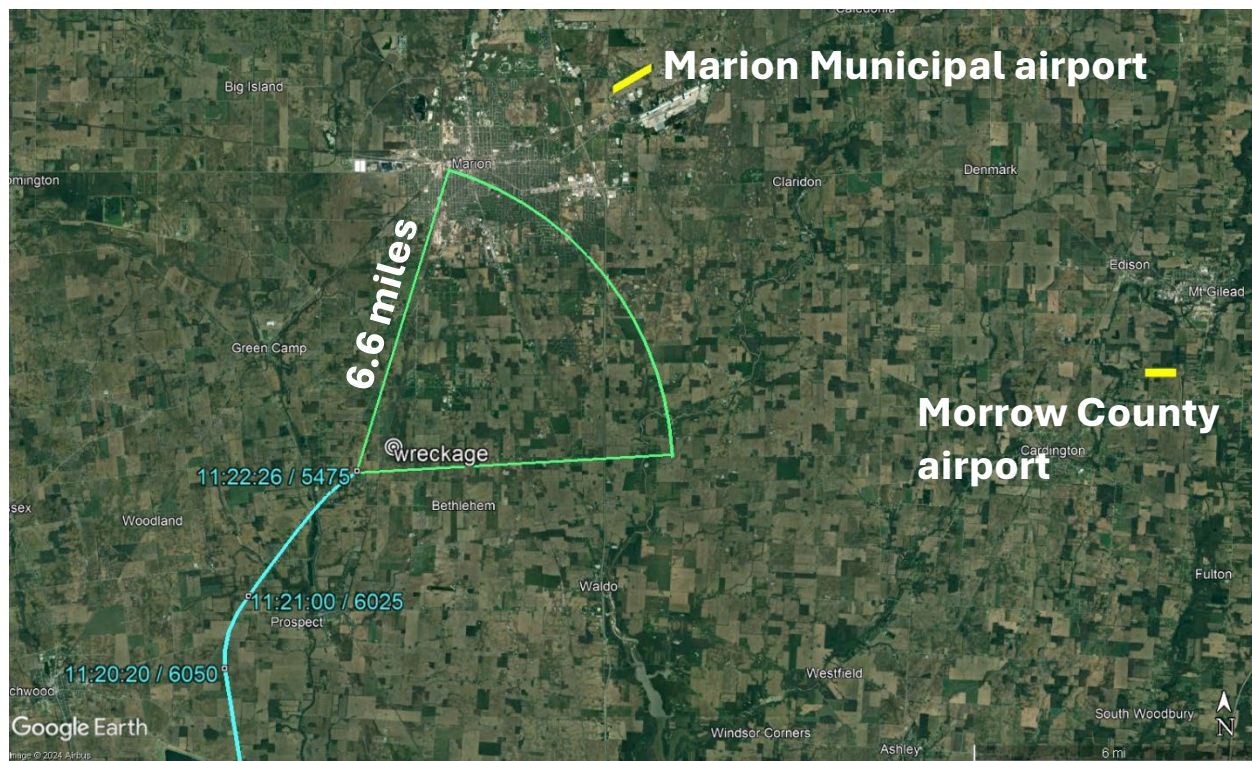


Figure 6. End ADS-B flight path with selected times and altitudes notated. The green arc shows the airplane's predicted glide range from the last ADS-B data point. The two closest airports and their runways are shown in yellow.

However, the airplane wreckage was located 4,800 ft from the final ADS-B return at an elevation of 951 ft msl and the wreckage indicated the airplane impacted nearly vertically on a heading of 90°.

D. SUMMARY

The airplane's flight path was uneventful, at a steady altitude, track angle and speed, until 11:19:50 when it began to slow slightly while maintaining altitude. During the last 40 seconds of recorded flight, the airplane lost both speed and altitude, consistent with a reduction in thrust.

E. REFERENCES

1. Cherokee Six 300 Information Manual, PA-32-300, Handbook Part No 761-559, Piper Aircraft Corporation, July 1973.