

National Transportation Safety Board
Office of Research and Engineering
Washington, D.C. 20594

Performance Study

Specialist Report
Marie Moler

A. ACCIDENT

Location:	Plainfield, Illinois
Date:	July 21, 2016
Time:	1114 CDT
Airplane:	Piper PA-30, N7409Y
NTSB Number:	CEN16FA276

B. GROUP

No vehicle performance group was formed.

C. SUMMARY

On July 21, 2016, about 1114 central daylight time, a Piper PA 30 airplane, N7409Y, impacted terrain during a descent near Plainfield, Illinois. The commercial pilot was fatally injured. The airplane was destroyed during the impact and subsequent fire. The airplane was registered to and operated by the pilot as a 14 Code of Federal Regulations Part 91 personal flight. Day visual meteorological conditions were reported near the accident site about the time of the accident and the flight was not operated on a flight plan. The flight originated from the Upper Cumberland Regional Airport (SRB), near Sparta, Tennessee, and was destined for the Eagle River Union Airport, near Eagle River, Wisconsin.

D. PERFORMANCE STUDY

Radar data used in this study are from the ASR-9 (airport surveillance radar) at Chicago O'Hare Airport (ORD) which sampled at a rate of once every 4.5 seconds. These radar data have approximately a 60 nautical mile (NM) range and an inherent uncertainty of ± 2 Azimuth Change Pulses (ACP) = $\pm (2 \text{ ACP}) \times (360^\circ/4096 \text{ ACP}) = \pm 0.176^\circ$ in azimuth, ± 50 ft in altitude, and $\pm 1/16$ NM in range. The airplane wreckage was approximately 28 NM from the ORD radar.

The radar path is shown in Figure 1 and Figure 2. The fuselage, empennage, right engine, right wing, and inboard section of the left wing were found together at the point labeled "Main Wreckage" in Figure 3. Additional pieces of the airplane were found up to a mile away from the main wreckage, indicative of an in-flight breakup.

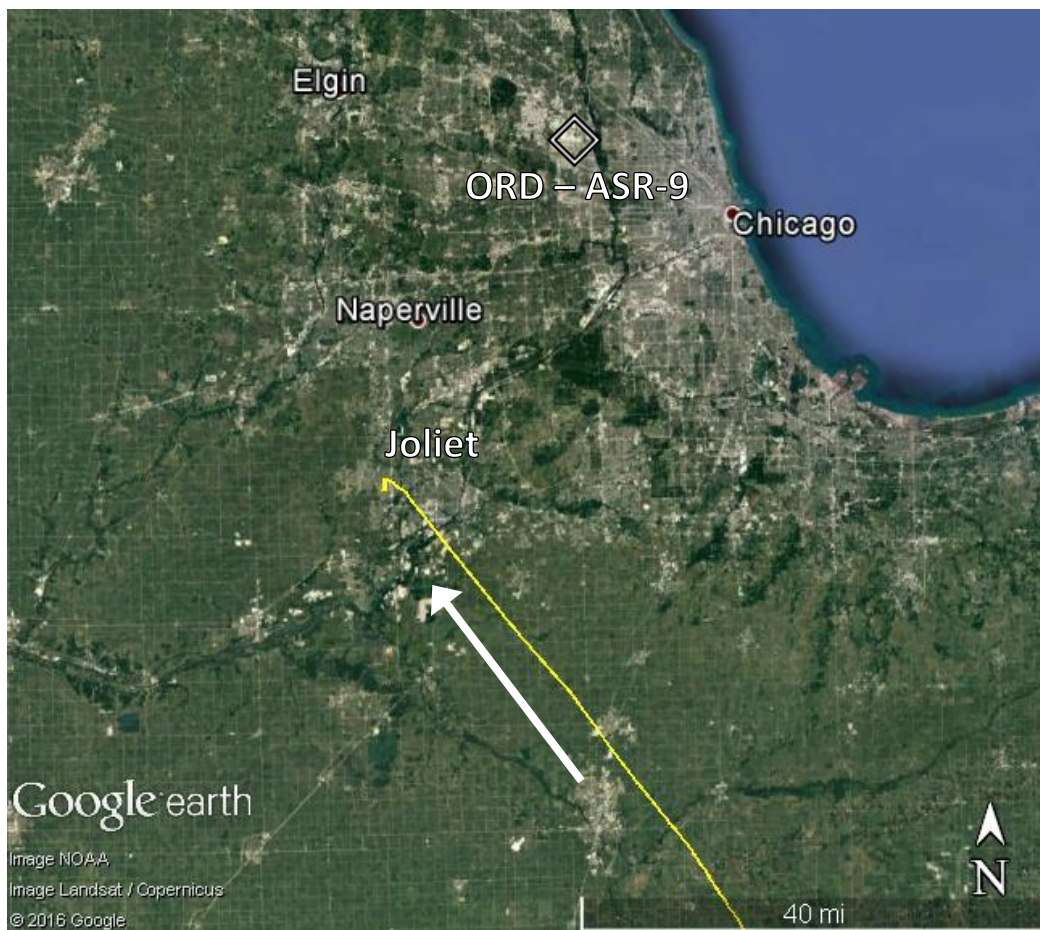


Figure 1. Aircraft flight path shown in yellow.

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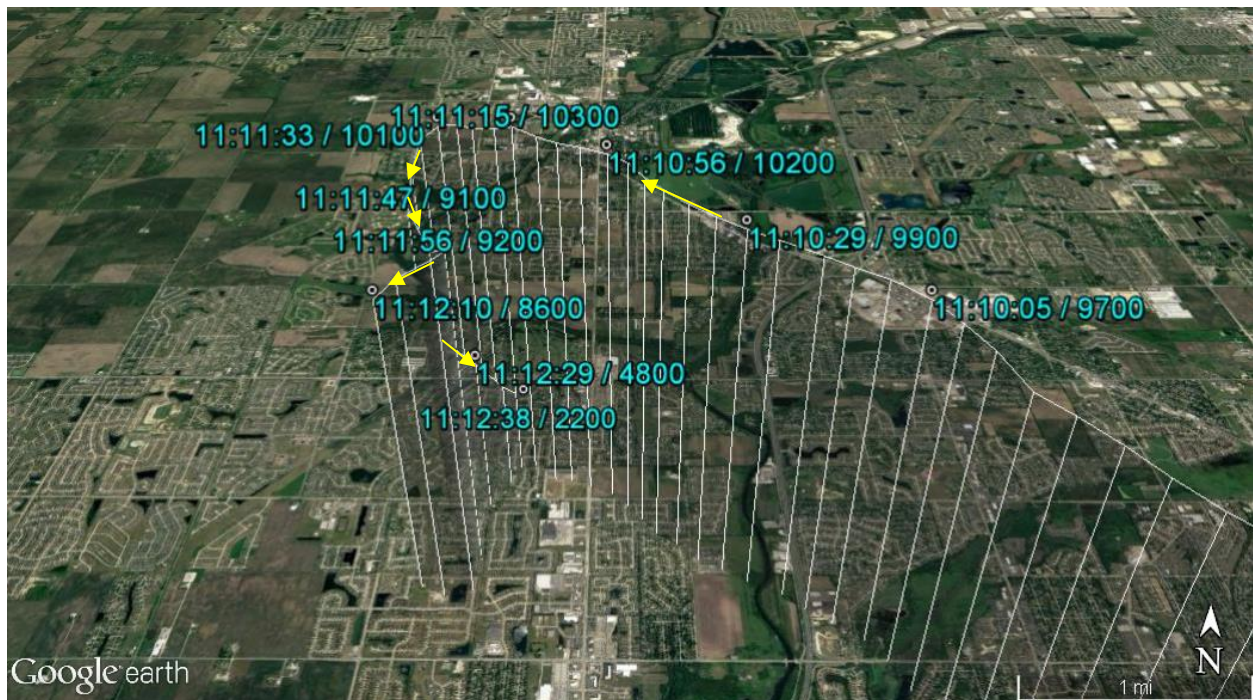


Figure 2. End of flight path. Last point is at 11:12:38 and 2200 ft.

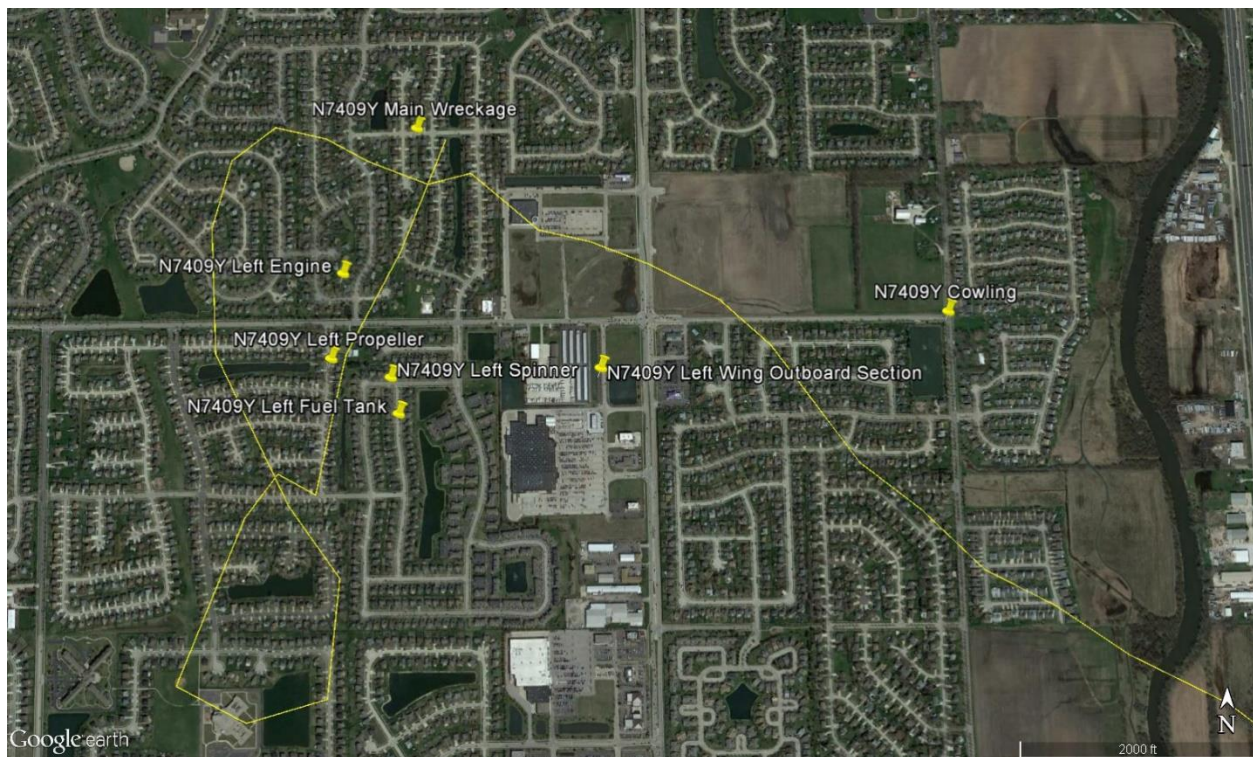


Figure 3. End of flight path and wreckage locations.

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Weather Observations

An Automated Weather Observing System (AWOS) was located at Joliet Regional Airport (KJOT) in Joliet, Illinois, about 2.5 miles south-southwest of the accident location at an elevation of 582 feet. At 1115 CDT the weather was reported as winds from 230° at 7 kts, 32°C, 10 miles visibility, broken cloud layer at 2100 ft. The next automated recording, at 1135 CDT, was for winds from 210° at 3 kts, 31°C, 10 miles visibility, broken cloud layers at 4200 ft and 5000 ft, thunderstorms in the vicinity (5 and 10 NM from the reporting station), lightning to the distant northeast and east (between 10 and 30 NM from the reporting station).

Aircraft Ground Track, Altitudes, Speeds, and Attitude

The radar data provided began at about 1044 CDT. From this time until 1108, the airplane was travelling along a path oriented at approximately 320° (true), at an altitude of 8500 ft, and a groundspeed of about 150 kts (airspeed calculations use the weather at the time and location of the accident and may not accurately reflect the winds at the start of the radar track, 60 NM away and 30 minutes earlier). At 1108:23 the airplane began to gain altitude while losing speed until 1111:10 when it reached an altitude of 10300 ft (Figure 4 and Figure 5). The airplane held 10300 ft until 1111:23 when it began to descend and gain speed. At 1111:28 the airplane reached its lowest calculated equivalent airspeed of 48 kts. The final radar point was at 1112:37.78 when the altitude was recorded at 2200 ft and the calculated equivalent airspeed was 211 kts.

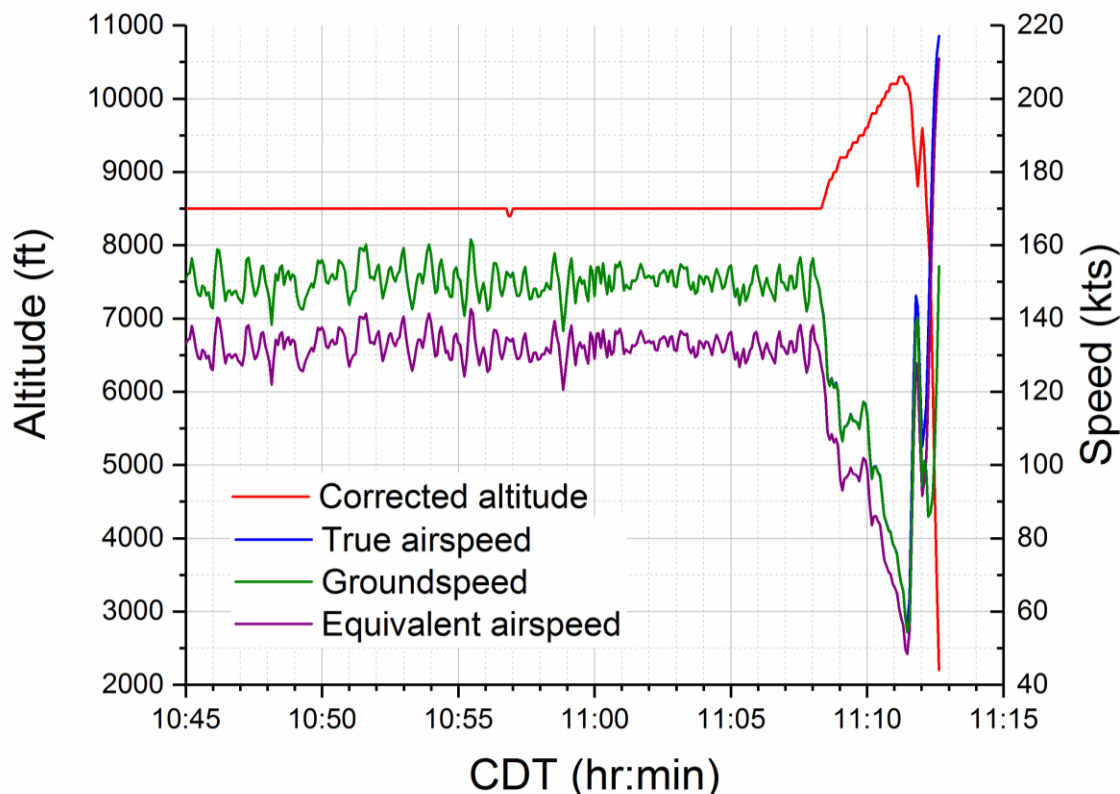


Figure 4. Altitude and calculated speeds versus time.

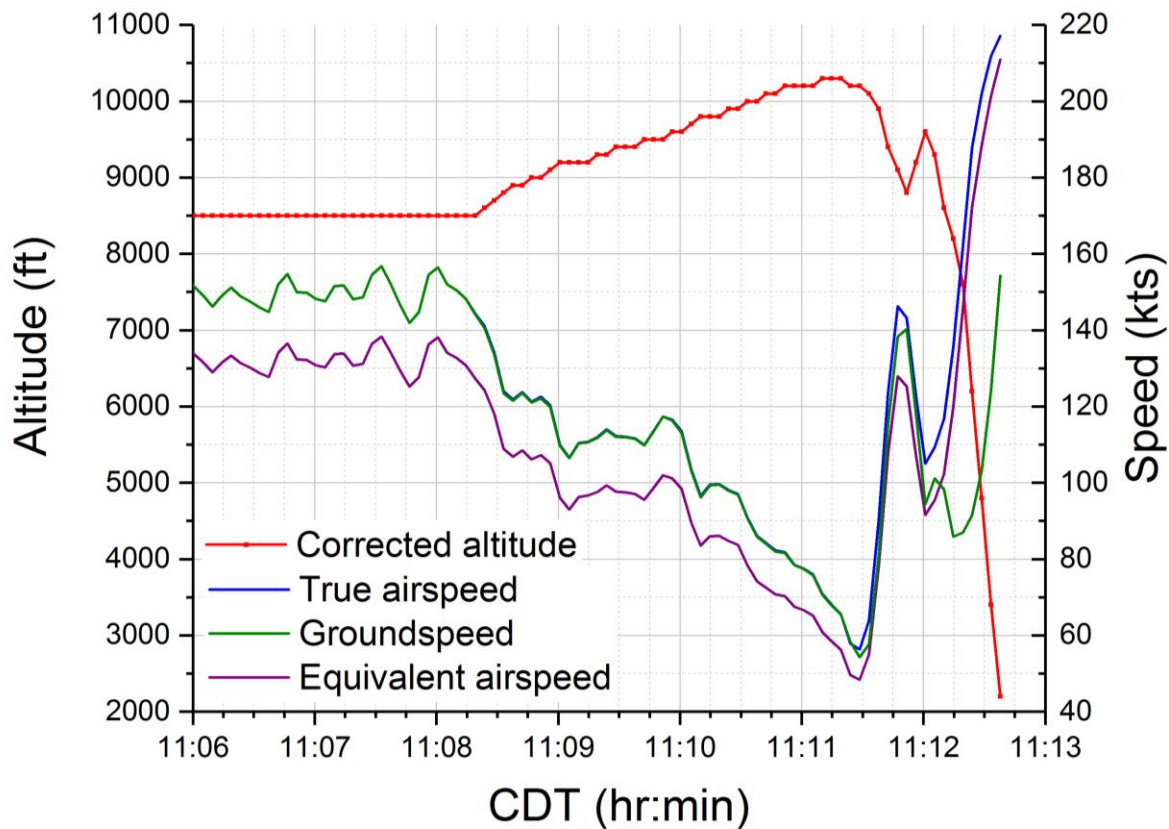


Figure 5. End of flight path. Last point is at 11:12:37.78 and 2200 ft.

The Pilot's Operating Handbook (POH) [1] reported multi-engine full throttle rates of climb (for a calculated density altitude of 9,000 ft at about 11:10 CDT, mid-climb) of 800 ft/min (3,600 lbs gross weight) and 1,200 ft/min (2,800 lbs gross weight). The heavy (3,600 lbs) service ceiling is 18,600 ft. The rate of climb for the accident airplane from 8,500 ft to 10,300 ft was about 600 ft/min. Properly configured, this rate of climb at this altitude was within the capability of the airplane.

Figure 6 shows the calculated pitch and angle of attack for the final climb. These angles are calculated using a simplified aerodynamic model. While the airplane gained altitude but lost airspeed, the angle of attack increased to nearly 20°. The high angle of attack and low airspeed put the airplane at risk of aerodynamic stall.

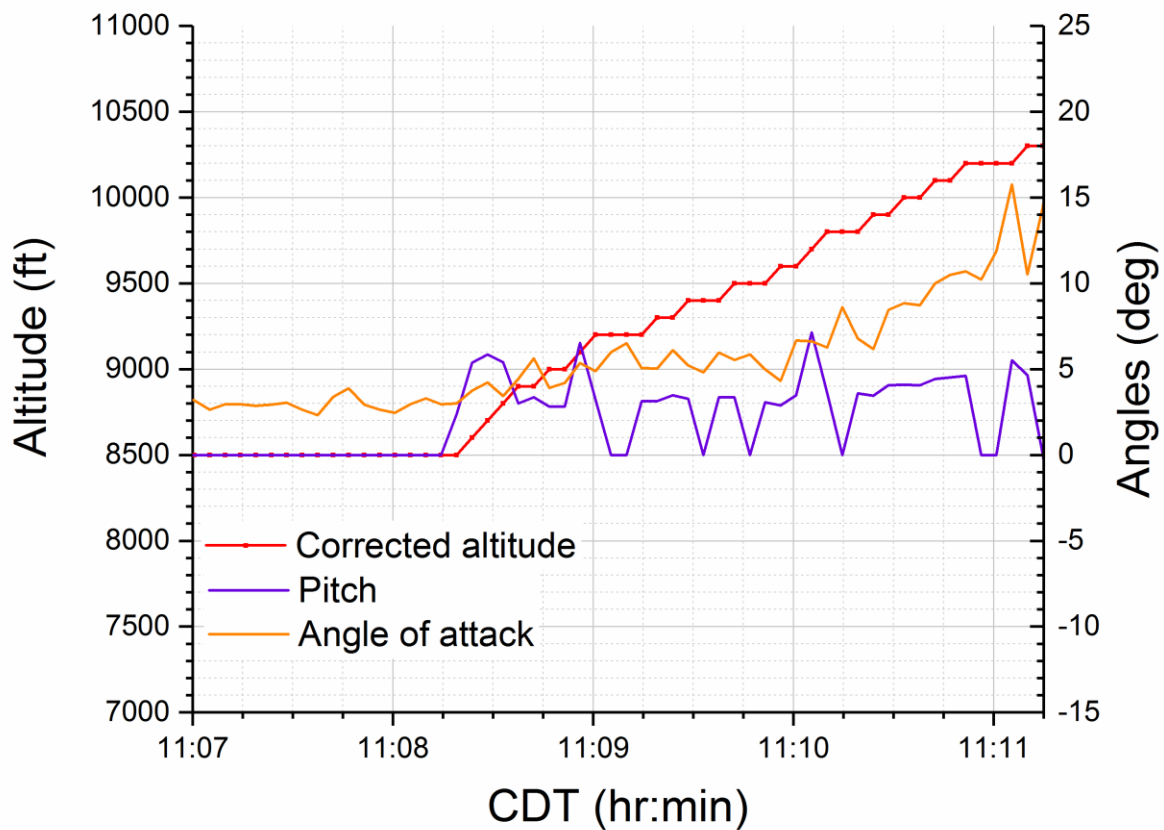


Figure 6. Calculated pitch and angle of attack for climb from 8500 ft to 10300 ft.

The POH reported the gear and flaps up stall speed to be between 76 mph (66 kts) at 3,600 lbs gross weight and 67 mph (58 kts) at 2,600 lbs gross weight¹. The loss of altitude and left turn corresponded with the airplane's calculated airspeeds dropping below the reported stall speed. Figure 7 shows that the airplane lost altitude and began a series of turns, the first to the left, after the equivalent airspeed dropped below 60 kts (last radar point at an altitude of 10,300 ft is noted).

¹ Limits are reported in calibrated airspeed which is within a few knots of the calculated equivalent airspeed.

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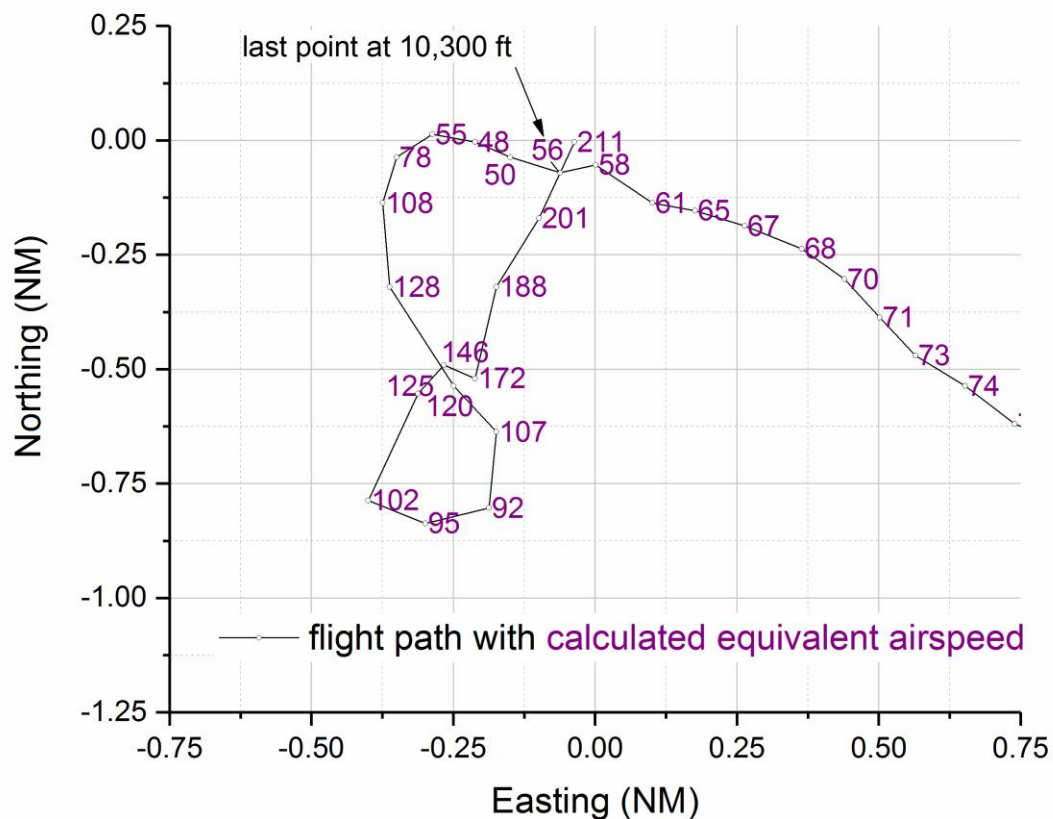


Figure 7. End of flight path in Northing versus Easting with equivalent airspeed for each point.

The airplane picked up speed after it began descending and rolled left, reaching a maximum calculated equivalent airspeed of over 200 kts before the radar data ended. The flight manual reported the never exceed speed to be 230 mph (200 kts). The maneuvering speed was reported as being between 135 mph (117 kts) at 2450 lbs gross weight and 162 mph (140 kts) at 3600 lbs gross weight. The airplane exceeded airspeed restrictions while rolling left and right during its descent, putting it at risk of structural failure. This is consistent with the wreckage pattern indicative of in-flight breakup.

E. CONCLUSIONS

At 1108, the airplane began to climb from 8,500 ft to 10,300 ft while losing airspeed. The rate of climb at that altitude was within the airplane's multi-engine, full throttle performance capabilities. For a heavy configuration (3,600 lbs gross weight), the POH lists the service ceiling as 18,600 ft. The airspeed dropped below the reported stall speed and at 1111:23 it began to lose altitude and roll left, behavior consistent with aerodynamic stall. The airplane gained speed as it descended, exceeding both the maneuvering speed and never exceed speed, putting it at risk of structural failure. This is consistent with the wreckage pattern indicative of an in-flight breakup.

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F. REFERENCES

1. Pilot's Operating Handbook and FAA Approved Airplane Flight Manual, PA-30 Twin Comanche, Second Issue. Aircraft Publications, Austin, Texas. 1996.