



National Transportation Safety Board Aviation Accident Final Report

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| Location: | Carlinville, Illinois | Accident Number: | CEN20LA201 |
| Date & Time: | May 31, 2020, 15:46 Local | Registration: | N8991W |
| Aircraft: | Piper PA28 | Aircraft Damage: | Destroyed |
| Defining Event: | Aircraft structural failure | Injuries: | 4 Fatal |
| Flight Conducted Under: | Part 91: General aviation - Personal | | |

Analysis

Position data depicted the airplane in cruise flight on a northeast course toward the destination airport at 5,500 ft mean sea level (msl). Shortly before the accident, the airplane entered a left turn with a gradually steepening bank angle. After completing a 360° turn and returning to a northeast course, the airplane immediately transitioned into a right turn that continued until the airplane again returned to a northeast course. Airplane bank angles reached 50° and 60° in the left and right turns, respectively. As the right turn continued, the airplane entered a descent and the airspeed increased. The bank angle ultimately reached about 110° (right wing down), the pitch attitude reached 63° nose down, and the airspeed increased to over 200 kts during the descent. The maximum computed load factor based on the available data was 4.72 G. The position data ended when the airplane was between 2,000 ft and 2,500 ft msl (1,400 ft and 1,900 ft above ground level). At the end of the data, the airplane was in a steep, spiral dive and about 35 kts above the never-exceed airspeed (V_{NE}). The airplane was established on a southwesterly course away from the accident site at that time.

The wreckage debris path was oriented on a northeasterly course and was about 400 ft long. The wreckage distribution was consistent with a low-altitude inflight break up. In addition, the presence of all airframe structural components and flight control surfaces within the debris path was consistent with the airplane being structurally intact as it approached the accident site. A postaccident examination revealed that the wing structure failed as a result of overstress. No preimpact anomalies with respect to the flight control system were identified. As a result, the steep descent was likely an intentional action by the pilot but for reasons that could not be determined.

The investigation did not have any data from which to determine the flightpath from the final data point to the accident site. However, because the final segment of the flightpath was toward the southwest and the debris path was oriented to the northeast, it is clear that the pilot attempted to pull out of the dive and, in doing so, reversed course. That maneuver, which was initiated from a steep, spiral dive and above V_{NE} , resulted in the pilot inadvertently exceeding

the ultimate load factor for the airframe. The excessive load factor caused the separation of the wings and stabilator, and a loss of control of the airplane.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's attempted recovery from a steep descent which inadvertently exceeded the ultimate load factor of the airframe and resulted in a low-level inflight breakup.

Findings

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| Aircraft | Center wing box (on wing) - Capability exceeded |
| Personnel issues | Decision making/judgment - Pilot |
| Personnel issues | Aircraft control - Pilot |

Factual Information

History of Flight

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| Maneuvering | Aircraft structural failure (Defining event) |
| Maneuvering | Loss of control in flight |
| Uncontrolled descent | Collision with terr/obj (non-CFIT) |

On May 31, 2020, at 1546 central daylight time, a Piper PA-28-235 airplane, N8991W, was destroyed when it was involved in an accident near Carlinville, Illinois. The pilot and three passengers were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to automatic dependent surveillance – broadcast (ADS-B) and Appareo Stratus position data, the flight departed about 1518 and proceeded on a northeast course toward the intended destination, ultimately climbing to an approximate altitude of 5,500 ft mean sea level (msl). About 1543, the airplane entered a 15° banked left turn which continued until the airplane was on a southwest course. About 1545, the left turn steepened to about 50° and continued until the airplane returned to a northeast course. About 25 seconds later, the airplane rolled out of the left turn and immediately into a 60° banked right turn. The airplane reached an altitude of 5,685 ft and had slowed to about 85 kts during the right turn. The airplane then entered a descent, and the airspeed began to increase. At 1545:54, the right turn steepened to about 110° right bank.

By 1546:07, the airplane altitude decreased to 2,850 ft, the descent rate increased to over 18,700 ft/minute, and the airspeed increased to over 200 kts. During this timeframe, the pitch angle recorded by the Stratus unit decreased from +10° (up) to -52° (down) and decreased further to -63° (down) before the end of the data. The data ended about 1546:10. At that time, the airplane altitude was between 2,000 ft and 2,500 ft msl (1,400 ft and 1,900 ft above ground level). During the timeframe covered by the available data, the maximum computed load factor of 4.72 G occurred about 1546:06.

At the end of the data, the airplane was in a steep, spiral dive and about 35 kts above the never-exceed airspeed (V_{NE}) of 171 kts. The airplane was established on a southwest course at that time and oriented away from the accident site located about 0.15 nm north-northeast from the final data point. The investigation did not have any data from which to determine the flight path from the final data point to the accident site.

A witness reported observing the airplane “going up and down,” doing “dips in the air.” She noted five or six “dips” where the airplane would “come back up” each time. She subsequently observed the airplane enter a “nose dive” and begin “spiraling down.” The airplane was initially heading south when it entered the dive and appeared to be intact at that time. As it neared the ground, the airplane “burst into pieces in the air.”

Pilot Information

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| Certificate: | Private | Age: | 35, Male |
| Airplane Rating(s): | Single-engine land | Seat Occupied: | Left |
| Other Aircraft Rating(s): | None | Restraint Used: | 3-point |
| Instrument Rating(s): | None | Second Pilot Present: | No |
| Instructor Rating(s): | None | Toxicology Performed: | Yes |
| Medical Certification: | Class 3 Without waivers/limitations | Last FAA Medical Exam: | August 7, 2018 |
| Occupational Pilot: | No | Last Flight Review or Equivalent: | December 28, 2019 |
| Flight Time: | 93.9 hours (Total, all aircraft), 28.8 hours (Total, this make and model), 38 hours (Pilot In Command, all aircraft), 11.3 hours (Last 90 days, all aircraft), 8.1 hours (Last 30 days, all aircraft), 0.5 hours (Last 24 hours, all aircraft) | | |

Aircraft and Owner/Operator Information

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| Aircraft Make: | Piper | Registration: | N8991W |
| Model/Series: | PA28 235 | Aircraft Category: | Airplane |
| Year of Manufacture: | 1964 | Amateur Built: | |
| Airworthiness Certificate: | Normal | Serial Number: | 28-10571 |
| Landing Gear Type: | Tricycle | Seats: | 4 |
| Date/Type of Last Inspection: | May 1, 2020 Annual | Certified Max Gross Wt.: | 2900 lbs |
| Time Since Last Inspection: | | Engines: | 1 Reciprocating |
| Airframe Total Time: | 2235 Hrs as of last inspection | Engine Manufacturer: | Lycoming |
| ELT: | C91A installed | Engine Model/Series: | O-540-B4B5 |
| Registered Owner: | | Rated Power: | 235 Horsepower |
| Operator: | On file | Operating Certificate(s) Held: | None |

A weight and balance calculation based on estimated occupant, baggage, and fuel loadings, suggested that the airplane was within the gross weight and center-of-gravity limitations specified by the airframe manufacturer.

The airplane was certificated as a normal category airplane. The applicable limit load factor was 3.8 G's. The corresponding ultimate load factor was 5.7 G's.

Meteorological Information and Flight Plan

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| Conditions at Accident Site: | Visual (VMC) | Condition of Light: | Day |
| Observation Facility, Elevation: | 3LF,691 ft msl | Distance from Accident Site: | 12 Nautical Miles |
| Observation Time: | 15:55 Local | Direction from Accident Site: | 110° |
| Lowest Cloud Condition: | Clear | Visibility | 10 miles |
| Lowest Ceiling: | None | Visibility (RVR): | |
| Wind Speed/Gusts: | 5 knots / | Turbulence Type Forecast/Actual: | / |
| Wind Direction: | 90° | Turbulence Severity Forecast/Actual: | / |
| Altimeter Setting: | 30.26 inches Hg | Temperature/Dew Point: | 24° C / 8° C |
| Precipitation and Obscuration: | No Obscuration; No Precipitation | | |
| Departure Point: | Maryland Hgts, MO (1H0) | Type of Flight Plan Filed: | None |
| Destination: | Charlotte, MI (FPK) | Type of Clearance: | None |
| Departure Time: | 15:19 Local | Type of Airspace: | Class G |

Wreckage and Impact Information

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| Crew Injuries: | 1 Fatal | Aircraft Damage: | Destroyed |
| Passenger Injuries: | 3 Fatal | Aircraft Fire: | None |
| Ground Injuries: | N/A | Aircraft Explosion: | None |
| Total Injuries: | 4 Fatal | Latitude, Longitude: | 39.241664, -89.915557 |

The airplane wreckage was located in an open field adjacent to a storage building and a pond. A portion of the left wing passed through the storage building roof and came to rest within the building. The debris path was about 400 feet long. The main wreckage consisted of the fuselage, engine, and propeller. The fuselage was fragmented, and the cabin was compromised. The engine was damaged consistent with impact forces and the engine mount was fragmented. The propeller remained attached to the engine. Both wings, the vertical stabilizer, and the stabilator had separated from the fuselage. All flight control surfaces were located within the debris field. The wreckage distribution appeared consistent with a low-level, in-flight break up.

A postaccident examination revealed that both wings had separated at the root. The wing spars exhibited upward bending adjacent to the fracture surfaces consistent with positive load factors (pitch up) at the time of the separation. The fracture surfaces exhibited a dull, grainy appearance consistent with overstress. The ailerons, including the counterweights, were

separated from the wings and located within the debris path. Control cable and control rod separations were consistent with overstress.

The stabilator was separated except for the center spar section which remained attached to the aft fuselage hinge points. The balance weight and mast remained attached to the center spar section, and the stabilator control cables remained attached to the mast attachment points. The cables were continuous to the cockpit area. The vertical stabilizer was separated with exception of the aft spar which remained attached to the fuselage. The rudder remained attached to the spar at each hinge point. The rudder control cables were attached to the control surface and were continuous to the cockpit area.

No preimpact anomalies with respect to the flight control system were identified.

Administrative Information

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| Investigator In Charge (IIC): | Sorensen, Timothy | | |
| Additional Participating Persons: | Nicholas L Loftus; FAA Flight Standards; Springfield, IL Damian Galbraith; Piper Aircraft; Vero Beach, FL J. Mike Childers; Lycoming Engines; Williamsport, PA | | |
| Original Publish Date: | March 18, 2022 | Investigation Class: | 3 |
| Note: | The NTSB did not travel to the scene of this accident. | | |
| Investigation Docket: | https://data.nts.gov/Docket?ProjectID=101348 | | |

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).