



Aviation Investigation Final Report

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

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

Factual Information

History of Flight

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

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

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:	On file	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

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 / None	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

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

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
Last Revision Date:	
Investigation Class:	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) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).