



National Transportation Safety Board Aviation Accident Final Report

Location:	Danbury, CT	Accident Number:	ERA17LA261
Date & Time:	07/30/2017, 1025 EDT	Registration:	N612DF
Aircraft:	CESSNA 172	Aircraft Damage:	Substantial
Defining Event:	Aerodynamic stall/spin	Injuries:	1 Fatal, 2 Serious
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The private pilot and two passengers were departing in the airplane from the 4,422-ft-long asphalt runway. A witness reported that, while still over the runway, the airplane began to lose altitude, then entered a nose-high attitude. The airplane subsequently entered a left-turning descent consistent with an aerodynamic stall. Examination of the wreckage did not reveal any preimpact mechanical anomalies; although the ignition key was found in the left magneto position, the preimpact position of the key could not be determined.

Performance calculations revealed that the airplane should have used less than half the available runway distance to clear a 50-ft obstacle at maximum gross weight with flaps extended to 10°. Weight and balance calculations revealed that the airplane was operating about 59 lbs over its maximum allowable gross weight at the time of the accident, and the flaps were found in the retracted position. It is likely that the pilot noticed the airplane's degraded climb performance after takeoff and attempted to compensate by increasing the airplane's pitch attitude, which resulted in decaying airspeed, an exceedance of the critical angle of attack, and an aerodynamic stall.

Probable Cause and Findings

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

The pilot's exceedance of the airplane's critical angle of attack during initial climb, which resulted in an aerodynamic stall. Contributing to the accident was the pilot's decision to operate the airplane above its maximum gross weight, which likely reduced its takeoff performance.

Findings

Aircraft	Angle of attack - Not attained/maintained (Cause)
-----------------	---

Personnel issues	Aircraft control - Pilot (Cause)
	Decision making/judgment - Pilot (Factor)

Factual Information

On July 30, 2017, about 1025 eastern daylight time, a Cessna 172S, N612DF, was substantially damaged when it impacted terrain shortly after takeoff from Danbury Municipal Airport (DXR), Danbury, Connecticut. The pilot died from his injuries 4 days after the accident, and the two passengers received serious injuries. The airplane was owned by a private company and was being operated by Arrow Aviation LLC as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Visual meteorological conditions prevailed, and no flight plan was filed for the flight, which was originating at the time of the accident.

The rear-seat passenger was a certificated pilot with about 1,500 hours of flight experience. He stated that, when the airplane was cleared for takeoff, the pilot taxied to the runway and applied what sounded like full engine power. The rear-seat passenger could not see the instruments or flight controls from where he was seated. After a short ground roll, the airplane took off, but from what he could see out the side window, it seemed that the airplane was not gaining altitude normally. Less than 1 minute later, the pilot stated, "we're going in."

According to an air traffic controller at DXR, the airplane lost altitude after takeoff while still over runway 26, a 4,422-ft-long runway. He then observed it "appearing to correct" as it had assumed a more nose-up attitude. It then began a left roll, followed by a "full nose up attitude, rolling to the left," before it descended and impacted the ground.

Another witness, who was in a dog park near the accident site, stated that he heard a small airplane "lumbering" and sounding under-powered. He saw the airplane appear to turn sharply 180°, then impact the ground.

According to Federal Aviation Administration records, the pilot held a private pilot certificate with ratings for airplane single-engine land and rotorcraft-helicopter. His most recent FAA third-class medical certificate was issued June 14, 2016, at which time he reported 582 hours of total flight experience. The pilot's logbook was not recovered.

Review of the airplane's maintenance records revealed that the most recent annual inspection was completed on July 21, 2017, about 17 flight hours before the accident. At that time, the airframe had accrued about 4,013 hours and the engine had accrued 656 hours since overhaul.

According to fuel records and statements from the operator, the airplane was fueled to capacity on the afternoon of July 28. The accident flight was the first flight since that fueling. The airplane's maximum gross weight was 2,550 lbs. The airplane's estimated weight at the time of the accident, including full fuel and the three occupants (not accounting for any baggage), was about 2,609 lbs. Review of takeoff performance data revealed that, at 2,550 lbs, a pressure altitude of 500 ft mean sea level, and a temperature of 20°C, the airplane required about 1,770 ft to clear a 50-ft obstacle. The data assumed no wind and flaps extended 10°.

At 1053, the reported weather at DXR included wind from 350° at 9 knots, the temperature was 23°C, and the dew point was 12°C.

An initial examination of the airplane by a Federal Aviation Administrator (FAA) inspector revealed that the fuselage came to rest upright in a nose-down attitude in an area of heavy brush about 1,000 ft from the departure end of the runway. The left wing was partially separated from the fuselage and exhibited leading edge crush damage from the root to the tip. The outboard one-third of the right wing was bent upward and aft. The fuselage was buckled on both sides aft of the rear window, and the left rear pillar was crushed and separated from the roof. The nose section, including the engine, was crushed and displaced upward and aft. The empennage, vertical and horizontal stabilizers, rudder, and elevators were largely undamaged. The ignition key was found positioned to the left magneto; however, the preimpact position of the key could not be determined.

Several branches were found severed at a 45° angle in the westerly path leading up to the airplane consistent with propeller contact. Both propeller blades exhibited leading edge gouges and chordwise scratches. Fuel samples from both tanks were blue in color and absent of water. Oil was present in the engine, but the quantity could not be determined due to the resting position of the engine.

The wreckage was transported to a recovery facility and examined again. Flight control continuity was confirmed from all control surfaces to the cockpit area. Measurement of the elevator trim jackscrew corresponded to a 5° tab up (nose down) elevator trim. Measurement of the flap actuator revealed that the flaps were in the fully retracted position.

The engine crankshaft was rotated by means of a tool inserted in the vacuum pump drive pad and continuity of the crankshaft to the rear gears and to the valve train was observed. The interiors of the cylinders were examined with a lighted borescope and no anomalies were noted. The fuel servo, engine-driven fuel pump, flow divider, and injector nozzles remained attached to the engine and were removed and partially disassembled. The fuel servo regulator section was partially disassembled and no damage was noted to the rubber diaphragms or other internal components. The fuel servo fuel inlet screen was absent of debris. The flow divider was partially disassembled. No debris was noted inside and no damage to the rubber diaphragm was noted. The two-piece fuel injector nozzles were unobstructed. The engine-driven fuel pump was partially disassembled and no damage was noted to the rubber diaphragms or the internal check valves. Liquid with an odor consistent with aviation gasoline was observed in the engine-driven fuel pump, the hose from the pump to the servo, in the servo and in the hose from the servo to the flow divider. Both magnetos were removed and produced spark from all electrode towers when rotated by hand.

A GPS data card, and three personal electronic devices were forwarded to the National Transportation Safety Board Vehicle Recorder Laboratory, Washington, DC. No performance data were recovered for the accident takeoff.

According to the Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25B) Chapter 10, Weight and Balance, excessive weight reduces flight performance in almost every respect. Some of the most important performance deficiencies of an overloaded aircraft include higher takeoff speed, longer takeoff run, reduced rate and angle of climb, and higher stalling speed.

History of Flight

Prior to flight	Aircraft loading event
Initial climb	Aerodynamic stall/spin (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Private	Age:	63, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 3 Without Waivers/Limitations	Last FAA Medical Exam:	06/14/2016
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	582 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	Registration:	N612DF
Model/Series:	172 S	Aircraft Category:	Airplane
Year of Manufacture:	2006	Amateur Built:	No
Airworthiness Certificate:	Normal; Utility	Serial Number:	172S10201
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	07/21/2017, Annual	Certified Max Gross Wt.:	2550 lbs
Time Since Last Inspection:	17 Hours	Engines:	1 Reciprocating
Airframe Total Time:	4013 Hours as of last inspection	Engine Manufacturer:	LYCOMING
ELT:	Installed	Engine Model/Series:	IO-360-L2A
Registered Owner:	CESSNA 616DF LLC	Rated Power:	180 hp
Operator:	Arrow Aviation LLC	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	KDXR, 457 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	1053 EDT	Direction from Accident Site:	69°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	9 knots /	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	350°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.03 inches Hg	Temperature/Dew Point:	23° C / 12° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Danbury, CT (DXR)	Type of Flight Plan Filed:	None
Destination:	Danbury, CT (DXR)	Type of Clearance:	None
Departure Time:	1025 EDT	Type of Airspace:	Class D

Airport Information

Airport:	DANBURY MUNI (DXR)	Runway Surface Type:	Asphalt
Airport Elevation:	456 ft	Runway Surface Condition:	Dry
Runway Used:	26	IFR Approach:	None
Runway Length/Width:	4422 ft / 150 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	2 Serious	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal, 2 Serious	Latitude, Longitude:	41.368056, -73.493056 (est)

Administrative Information

Investigator In Charge (IIC):	Douglass P Brazy	Report Date:	09/10/2019
Additional Participating Persons:	David S Willson; FAA/FSDO; Enfield, CT		
Publish Date:	09/10/2019		
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=95695		

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](#).