



Aviation Investigation Final Report

Location:	Beaver, Utah	Accident Number:	LAX08LA179
Date & Time:	June 12, 2008, 17:00 Local	Registration:	N233GW
Aircraft:	Cessna 172S	Aircraft Damage:	Substantial
Defining Event:	Loss of control in flight	Injuries:	1 Serious, 2 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot obtained the local weather information and observed the windsock. Another airplane had just landed on runway 13, and with the weather information, he determined that he would take off on runway 13. The pilot said that he used a short-field takeoff technique with zero flaps, and the airplane encountered a wind gust and windshear conditions. The engine momentarily lost power and sputtered, and he checked the mixture control to make sure that it was at the full rich position and that the throttle was in. He maneuvered to avoid power lines and a circular agricultural irrigation system. The airplane then quickly lost altitude and the pilot nosed the airplane over to avoid a stall. The airplane impacted terrain about 2,850 feet from the end of runway 13, and approximately 1,000 feet to the right of runway centerline, damaging the firewall, wings, and crushing the fuselage bottom. Examination of the airframe, engine, and its fuel control unit identified no preexisting anomalies. The 4,984-foot-long paved runway had an uphill gradient of 1.5 percent and was at an elevation of 5,863 feet. The reported wind at the airport was from 330 degrees at 8 knots, gusting to 14 knots. The density altitude was calculated at 7,457 feet. The pilot who landed just before the accident said that the winds were variable between 330 to 350 degrees at 5 to 10 knots. He further reported that the sky conditions were clear and that he observed no windshear or hazardous conditions around the airport. The terrain surrounding the airport was flat agricultural land, which was gently rising to the south, about 150 feet per nautical mile. The airplane was near its maximum gross weight. The Pilot's Operating Handbook for the airplane states that prior to takeoff from fields above 3,000 feet elevation, the mixture should be leaned to give maximum rpm in a full throttle, static run up. According to the engine manufacturer, if the engine is properly leaned for a density altitude of 7,457 feet, the normally aspirated engine's maximum output of 180 horsepower (hp) would be reduced to 138 hp. Since the engine was not leaned, but was operating at full rich mixture, its output would have been reduced even further, thus not allowing the airplane to outclimb the rising terrain for the existing conditions.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to attain and maintain an adequate airspeed during the initial climb as a result of his inadequate preflight planning and improper use of the mixture control. Contributing to the accident were the tailwind and high density altitude.

Findings

Personnel issues	Aircraft control - Pilot
Environmental issues	High density altitude - Effect on equipment
Environmental issues	Tailwind - Effect on operation
Personnel issues	Flight planning/navigation - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Mixture control - Incorrect use/operation

Factual Information

History of Flight

Takeoff	Loss of engine power (partial)
Initial climb	Aerodynamic stall/spin
Initial climb	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On June 12, 2008, at 1700 mountain daylight time, a Cessna 172S, N233GW, sustained substantial damage when the airplane impacted terrain shortly after takeoff at Beaver Municipal Airport (U52; elevation 5,863 feet), Beaver, Utah. The commercial pilot and one passenger received minor injuries, and a second passenger was seriously injured. Leading Edge Aviation, Ogden, Utah, was operating the airplane under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed for the cross-country flight, which was originating at the time of the accident. A flight plan had not been filed.

A local law enforcement officer, who was one of the first responders to the scene of the accident, reported that the pilot said he took off "going south, up hill. [The airplane] got airborne. The field was coming at him. As he pulled back on the stick, he pulled the airplane into a stall. The engine stalled and the plane fell nose first back to the ground."

In his National Transportation Safety Board (NTSB) Pilot/Operator Aircraft Accident/Incident Report dated June 20, 2008, the pilot reported that the initial departure for the day was from Ogden, Utah, approximately 1100. The flight to Beaver was uneventful and they landed about 1300. He fueled the airplane "so it had 28 gallons on board" in preparation for their return trip later that afternoon. Approximately 1630, the pilot returned to the airport and prepared the aircraft for departure. He listened to the local Automated Surface Observing System (ASOS) and observed the windsock to determine weather conditions. While he was preflighting the airplane, a Beechcraft King Air Life Flight landed on runway 13. The pilot stated, "All three of these wind aids gave indication to a southern departure."

According to the pilot, he taxied for runway 13 and departed using "a short field takeoff technique with zero flaps." Immediately after takeoff the flight encountered wind gusts and wind shear conditions. The engine momentarily lost performance and momentarily sputtered. He checked the mixture control to make sure it was full rich and the throttle was in. Additionally, he had to maneuver the airplane to avoid power lines and a circular agricultural irrigation system. The pilot said he "never noticed any stall buffet, sloppiness in flight control, stall horn or stall itself." The airplane "sank quickly" and he nosed the airplane over to avoid a stall situation; the next thing he recalled was being "nose down in the dirt."

PERSONNEL INFORMATION

The 23-year-old pilot's most recent first-class Federal Aviation Administration (FAA) medical certificate was issued on January 16, 2008. He held a commercial pilot certificate with single and multiengine land airplane ratings, and an instrument airplane rating. He was a flight instructor in single and multiengine land airplanes, and in instrument airplane. The pilot reported on his NTSB Pilot/Operator Aircraft Accident/Incident Report that he had a total of 231 hours of flight experience in all aircraft, with 175 hours as pilot-in-command. Approximately 100 hours had been accumulated in single engine aircraft, of which 17 hours were in the make and model airplane involved in the accident. The pilot successfully completed his check ride for his flight instructor certificate in single engine airplanes on May 25, 2008.

The operator reported that the pilot received a checkout in the airplane the day before the accident from one of his flight instructors. The flight instructor stated that as part of the checkout, he asked the pilot to perform some weight and balance calculations for his planned flight to Beaver the next day. The pilot had originally planned to take three passengers to Beaver, but after working the calculations, he decided to take only two passengers.

AIRCRAFT INFORMATION

The airplane was a single engine, propeller-driven, four seat airplane, with dual flight controls, which was manufactured by Cessna Aircraft Company in 2002. It was powered by a Lycoming IO-360-L2A reciprocating, direct drive, air-cooled, fuel injected engine, which had a maximum takeoff rating of 180-horsepower (hp).

The airplane was equipped with two wet wing fuel tanks. Each tank held 28 gallons of fuel, with 26.5 gallons usable. The airplane's maximum takeoff gross weight was 2,550 pounds, and its empty weight was 1,717 pounds. The flight instructor provided weights for the pilot and passengers from the previous day's calculations. Using the pilot's estimated fuel on board of 28 gallons, the airplane's takeoff weight was calculated at 2,486 pounds. Using the estimated fuel drained from the airplane of 44 gallons (less 3 gallons of unusable fuel), the airplane's takeoff weight was calculated at 2,564 pounds.

The airplane manufacturer's Pilot Operating Handbook (POH) states: Prior to takeoff from fields above 3,000 feet elevation, the mixture should be leaned to give maximum rpm in a full throttle, static runup. Additionally, in the engine manufacturer's published Operator's Manual, a table for engine performance shows that when properly leaned for a density altitude of 7,457 feet, the normally aspirated engine's maximum output of 180 hp would be reduced to 138 hp.

The airplane manufacturer's POH, in the normal procedures section, states: SHORT FIELD TAKEOFF

A. Wing Flaps-----10 degrees

- B. Brakes-----APPLY
- C. Throttle-----FULL OPEN
- D. Mixture-----RICH (above 3000 feet, LEAN to obtain maximum RPM)
- E. Brakes-----RELEASE
- F. Elevator Control---SLIGHTLY TAIL LOW
- G. Climb Speed-----56 KIAS (until all obstacles are cleared)

METEOROLOGICAL INFORMATION

At 1652, the weather conditions at Milford Municipal Airport (MLF; elevation 5,039 feet), Milford, Utah, located 290 degrees and 19 nautical miles (nm) from the accident site, were as follows: wind from 020 degrees at 11 knots, gusting to 16 knots; clear of clouds; temperature 72 degrees Fahrenheit; dew point 14 degrees Fahrenheit; altimeter setting 30.14 inches of Mercury. The density altitude was calculated to be 6,851 feet.

Beaver Municipal Airport's ASOS has weather data storage capability. At 1700, the weather conditions at Beaver Municipal Airport were as follow: wind from 330 degrees at 8 knots, gusting to 14 knots; visibility 10 nautical miles; clear of clouds; temperature 66 degrees Fahrenheit; dew point 23 degrees Fahrenheit; altimeter setting 30.20 inches of Mercury. The density altitude was calculated to be 7,457 feet.

The wind was variable during the pilot's preflight preparation and departure:

- 1640---340 degrees at 5 knots
- 1645---360 degrees at 7 knots
- 1650---350 degrees at 11 knots
- 1655---360 degrees at 11 knots, gusting to 14 knots
- 1700---330 degrees at 8 knots, gusting to 14 knots
- 1705---360 degrees at 12 knots, gusting to 19 knots
- 1710---310 degrees at 12 knots, gusting to 19 knots
- 1715---300 degrees at 9 knots, gusting to 19 knots
- 1720---030 degrees at 3 knots

An FAA inspector interviewed the pilot of the King Air that arrived during the accident pilot's preflight inspection. The King Air pilot reported that at the time he landed (approximately 1643), the winds were variable between 330 to 350 degrees at 5 to 10 knots. He further reported that the sky conditions were clear and he observed no wind shear or hazardous conditions around the airport.

AIRPORT INFORMATION

Beaver Municipal Airport is a non-towered airport that uses a Common Traffic Advisory Frequency (CTAF) of 122.9 Mhz for pilots to communicate and announce their intentions. The airport has one paved runway, runway 13/31, which is 4,984 feet long and 75 feet wide; runway

13 has an uphill gradient of 1.5 percent. The terrain surrounding the airport is flat agricultural land, which gently rises to the south (at approximately 150 feet per nautical mile). There is an ASOS weather station on the field and pilots can retrieve current conditions on frequency 119.925 Mhz. The airport is equipped with a segmented circle windsock indicator located approximately 975 feet from the transient parking area and approximately 875 feet from where the taxiway joins the runway.

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest in an alfalfa field approximately 2,850 feet from the end of runway 13, and approximately 1,000 feet to the right of the runway centerline. An FAA inspector estimated the ground scar to be approximately 100 feet in length on a course of 180 degrees. The nose landing gear and the engine were separated from the airplane. The outboard sections of the right and left wings were bent upward, the left wing's rear spar was separated, and the bottom of the fuselage was crushed upwards.

The operator sent personnel to the accident scene to retrieve the airplane. The mechanic who removed the wings for transport reported that he filled four to five 5-gallon containers with fuel from each wing; he estimated that he removed a total of between 44 to 48 gallons of fuel from the wings.

Representatives of the engine manufacturer and the airframe manufacturer performed an examination of the wreckage under the supervision of an FAA inspector, on June 19, 2008, at Logan, Utah. The engine's fuel control unit was examined and tested in Marysville, Washington, on July 24, 2008, under the supervision of a Safety Board investigator. These examinations revealed no preexisting anomalies that would have precluded normal operation of the airplane or its engine.

ADDITIONAL INFORMATION

In a telephone interview with the Safety Board investigator-in-charge, the pilot reported that he used a dipstick to determine the amount of fuel on board the airplane. The airframe manufacturer stated that they do not manufacture or sell dipsticks for the airplane. The manufacturer further stated that there is wing rib structure in the wet wing fuel tank and inaccurate readings are possible. Manufacturer safety personnel estimated that if a pilot used the dipstick method to determine the amount of fuel in a tank, and it rested on the rib instead of the bottom of the tank, there could be 2 to 3 gallons more fuel in the tank than the dipstick reading.

Pilot Information

Certificate:	Commercial; Flight instructor; Private	Age:	23, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	Toxicology Performed:	No
Medical Certification:	Class 1 With waivers/limitations	Last FAA Medical Exam:	January 16, 2008
Occupational Pilot:	No	Last Flight Review or Equivalent:	May 25, 2008
Flight Time:	231 hours (Total, all aircraft), 17 hours (Total, this make and model), 175 hours (Pilot In Command, all aircraft), 109 hours (Last 90 days, all aircraft), 12 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N233GW
Model/Series:	172S	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	172S9233
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	May 9, 2008 Annual	Certified Max Gross Wt.:	2550 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	2153 Hrs as of last inspection	Engine Manufacturer:	LYCOMING
ELT:	Installed, activated, did not aid in locating accident	Engine Model/Series:	IO-360-L2A
Registered Owner:	Zoom Inc.	Rated Power:	180 Horsepower
Operator:	Leading Edge Aviation	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	U52,5863 ft msl	Distance from Accident Site:	2 Nautical Miles
Observation Time:	17:00 Local	Direction from Accident Site:	340°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	8 knots / 14 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	330°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.2 inches Hg	Temperature/Dew Point:	19°C / -5°C
Precipitation and Obscuration:	In the vicinity - None -		
Departure Point:	Beaver, UT (U52)	Type of Flight Plan Filed:	None
Destination:	OGDEN, UT (OGD)	Type of Clearance:	None
Departure Time:	17:07 Local	Type of Airspace:	

Airport Information

Airport:	Beaver Municipal Airport U52	Runway Surface Type:	Asphalt
Airport Elevation:	5863 ft msl	Runway Surface Condition:	Dry
Runway Used:	13	IFR Approach:	None
Runway Length/Width:	4984 ft / 75 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	1 Serious, 1 Minor	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Serious, 2 Minor	Latitude, Longitude:	38.230556,-112.675277

Administrative Information

Investigator In Charge (IIC):	Struhsaker, James
Additional Participating Persons:	Scott Hartly; FAA FSDO; Salt Lake City, UT Ricardo Asensio; Cessna Aircraft Company; Wichita, KS Troy Helgeson; Lycoming; Milliken, CO
Original Publish Date:	June 11, 2009
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=68223

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