National Transportation Safety Board
Aviation Accident Final Report

Location:	Williamson, SC	**Accident Number:**	ERA13LA264
Date & Time:	06/01/2013, 1110 EDT	**Registration:**	N3715K
Aircraft:	GLOBE GC-1B	**Aircraft Damage:**	Substantial
Defining Event:	Loss of lift	**Injuries:**	2 Serious
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The pilot performed a preflight inspection and engine run up with no anomalies noted. He noted the wind favored runway 10. He then taxied to the 2,400-ft turf runway, which had 50-ft tall trees located 1,000 ft from the departure end, and began the takeoff. When the airplane reached climb speed, the pilot lifted the airplane off the runway. He then realized that the airplane was not going to be able to climb above the trees located near the end of the runway. Therefore, the pilot decided to perform a precautionary landing in a nearby field. During the landing roll, the airplane struck a tree and incurred substantial damage. The pilot and pilot-rated passenger, who were both airframe and powerplant mechanics, reported no preimpact mechanical malfunctions with the airplane that would have precluded normal operation.

The wind reported at an airport 10 miles north of the accident location and at other surrounding airports was such that the airplane would have experienced a 5- to 8-knot right-quartering tailwind on runway 10 around the time of the accident. Density altitude was 2,307 feet above mean sea level.

It is therefore likely, that the airplane experienced a reduction in performance during takeoff due to the tailwind, density altitude, and the weight (within about 120 lbs of the maximum gross weight) at which the airplane was being operated.

Probable Cause and Findings

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

The pilot's decision to takeoff with a quartering tailwind at high density altitude, close to gross takeoff weight, on a short turf runway with trees at the departure end.

Findings

Aircraft	Climb rate - Not attained/maintained (Cause) Maximum weight - Not specified (Cause)
Personnel issues	Decision making/judgment - Pilot (Cause)
Environmental issues	Tailwind - Contributed to outcome (Cause) High density altitude - Contributed to outcome (Cause) Tree(s) - Contributed to outcome (Factor)

Factual Information

HISTORY OF FLIGHT

On June 1, 2013, about 1110 eastern daylight time, a Globe Swift GC-1B, N3715K, was substantially damaged during a collision with trees and terrain, while performing a precautionary landing in a field near Oakhill Airpark (SC82), Williamson, South Carolina. The certificated private pilot and pilot rated passenger sustained serious injuries. Visual meteorological conditions prevailed, and no flight plan was filed for the personal flight conducted under Title 14 Code of Federal Regulations Part 91. The flight was originating at the time of the accident.

According to the pilot, he performed a preflight inspection and engine run up with no anomalies noted. He noted the winds favored runway 10, back taxied to the runway, and began the takeoff. As the airplane reached climb speed, the pilot noted that the airplane operation "looked good." Then, he realized that the airplane would not be able to climb above trees near the end of the runway, therefore, he decided to perform a precautionary landing. The pilot landed the airplane in a field, and during the landing rollout the airplane impacted a tree.

According to the pilot rated passenger, during the takeoff and climb, the airplane engine was producing full power according to the engine instruments and engine sound. He also noted "no popping, rough running, or abnormal noises from the engine." The tail came up, and the mains left the ground in what appeared to him to be a normal departure. However, as the plane passed approximately 2/3rds of the usable runway the airplane was not gaining altitude at a normal rate and was not going to clear the trees. The pilot then aborted the "takeoff," throttled back, and brought the plane down in a field off the end of runway 10.

PERSONNEL INFORMATION

According to Federal Aviation Administration (FAA) and pilot records, the pilot held a private pilot certificate with a rating for airplane single-engine land, and an airframe and powerplant mechanic certificate. His most recent application for a FAA third-class medical certificate was dated January 9, 2012. The pilot reported that he had accrued approximately 1068 total hours of flight experience, of which 65 hours were in the accident airplane make and model.

According to FAA and pilot records, the pilot rated passenger held a commercial pilot certificate with ratings for airplane multi-engine land, airplane single-engine land, and instrument airplane. He also held a flight instructor certificate with ratings for airplane single-engine and instrument airplane, and an airframe and powerplant mechanic certificate with an inspection authorization. His most recent application for a FAA second -class medical certificate was dated July 19, 2012.

AIRCRAFT INFORMATION

According to FAA and maintenance records, the airplane was manufactured in 1946 and was initially registered as NC3322K. Between the time it was manufactured to when it was involved in the accident, It was modified from its original configuration with numerous modifications including; modified landing gear doors, an increase in gross weight to 1,970 pounds, installation of control sticks, a sliding bubble canopy, Cessna 150 type seats, a revised occupant restraint system utilizing 4-point harnesses, A Piper type pitot tube, installation of a Lycoming

O-360-A1A, normally aspirated,180 horsepower engine, and a Hartzell constant speed propeller.

The airplane's most recent annual inspection was completed on November 2, 2012. At the time of the inspection, the airplane had accrued 587 total hours of operation.

METEOROLOGICAL INFORMATION

The recorded weather at Donaldson Center Airport (GYH), Greenville, South Carolina, located 10 nautical miles north of the accident site, at 1050, approximately 20 minutes prior to the accident, included: winds 250 at 5 knots, 10 miles visibility, broken clouds at 2,300 feet, temperature 24 degrees C, dew point 18 degrees C, and an altimeter setting of 30.16 inches of mercury.

Then at 1150, the recorded weather at GYH, approximately 40 minutes after the accident, included: winds 240 at 8 knots, 10 miles visibility, broken clouds at 2,700 feet, temperature 26 degrees C, dew point 18 degrees C, and an altimeter setting of 30.15 inches of mercury.

Examination of other surrounding airports also indicated that the reported winds about the time of the accident were coming from the southwest at 8 to 9 knots and that approximately 20 minutes after the accident began to shift so that they were coming from approximately the south-southwest.

Approximately 2 hours after the accident, they began to gust and a pilot who departed the airport about that time, after the accident noted that the wind "had been changing directions all morning." In addition, when he departed the airport, he reported that his airplane "experienced…a severe change in wind direction on the takeoff roll therefore hurting [the] aircraft performance."

AIRPORT INFORMATION

Oakhill Airpark was an uncontrolled private use airport. The field elevation was 837 feet above mean sea level (msl). It had one runway, oriented in a 10/28 configuration. Runway 10 was turf, in good condition. The total length was 2,400 feet long and 100 feet wide. Obstructions in the form of 50 foot tall trees existed 1,000 feet from the departure end.

Density altitude at the airpark at the time of the accident was approximately 2,307 feet msl.

WRECKAGE AND IMPACT INFORMATION

According to the pilot rated passenger the vertical impact in the field was "significant," and the forward momentum carried the airplane to a tree line where the airplane impacted the tree.

Examination of the airplane by a federal aviation administration inspector revealed that the fuselage and wings were substantially damaged. The engine was displaced up and to the right by 20 degrees from its normal orientation. The engine mounts were bent and broken, the firewall was wrinkled and exhibited tearing, the forward fuselage exhibited crush and compression damage, and the wings exhibited multiple areas of impact, crush, and compression damage.

TESTS AND RESEARCH

Weight and balance calculations were performed using weight and balance documents that

were submitted by the pilot, the weights of the occupants, and the reported amount of fuel at takeoff. Calculations revealed the airplane weighed about 1,850 pounds at takeoff. The manufacturer's maximum allowable gross weight was 1,970 pounds.

ADDITIONAL INFORMATION

FAA-H-8083-25A

According to The Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25A), density altitude is defined as pressure altitude corrected for nonstandard temperature.

Density altitude is an indicator of aircraft performance and the term comes from the fact that the density of the air decreases with altitude. A "high" density altitude means that air density is reduced, which has an adverse impact on aircraft performance. Published performance criteria in the Pilot's Operating Handbook (POH) are generally based on standard atmospheric conditions at sea level (59 degrees Fahrenheit or 15 degrees Celsius. and 29.92 inches of mercury). Therefore, an aircraft will not perform according to "book numbers" unless the conditions are the same as those used to develop the published performance criteria. For example, if an airport whose elevation is 500 MSL has a reported density altitude of 5,000 feet; aircraft operating to and from that airport will perform as if the airport elevation were 5,000 feet.

A tailwind component can also affect takeoff and climb performance, as a tailwind component has almost 5 times the performance effect as a comparable headwind component. Therefore, taking off with a tailwind will significantly impair performance.

A change in an aircraft's weight also produces a twofold effect on climb performance. First, a change in weight will change the drag and the power required. This alters the reserve power available, which in turn, affects both the climb angle and the climb rate. Secondly, an increase in weight will reduce the maximum rate of climb, but the aircraft must be operated at a higher climb speed to achieve the smaller peak climb rate.

History of Flight

Initial climb	Loss of lift (Defining event) Off-field or emergency landing
Landing-landing roll	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Private	**Age:**	44
Airplane Rating(s):	Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With Waivers/Limitations	**Last Medical Exam:**	01/05/2012
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	10/21/2012
Flight Time:	1068 hours (Total, all aircraft), 65 hours (Total, this make and model), 778 hours (Pilot In Command, all aircraft), 14 hours (Last 90 days, all aircraft), 6 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	GLOBE	**Registration:**	N3715K
Model/Series:	GC-1B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	1408
Landing Gear Type:	Retractable - Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	11/02/2012, Annual	**Certified Max Gross Wt.:**	1970 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	587 Hours	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	O-360 Series
Registered Owner:	On file	**Rated Power:**	180 hp
Operator:	On file	**Air Carrier Operating Certificate:**	None

Meteorological Information and Flight Plan

Observation Facility, Elevation:	GYH, 956 ft msl	**Observation Time:**	1050 EDT
Distance from Accident Site:	10 Nautical Miles	**Condition of Light:**	Day
Direction from Accident Site:	360°	**Conditions at Accident Site:**	Visual Conditions
Lowest Cloud Condition:		**Temperature/Dew Point:**	24°C / 18°C
Lowest Ceiling:	Broken / 2300 ft agl	**Visibility**	10 Miles
Wind Speed/Gusts, Direction:	5 knots, 252°	**Visibility (RVR):**	
Altimeter Setting:	30.16 inches Hg	**Visibility (RVV):**	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Williamson, SC (SC82)	**Type of Flight Plan Filed:**	None
Destination:	Woodruff, SC (SC00)	**Type of Clearance:**	None
Departure Time:	1110 EDT	**Type of Airspace:**	

Airport Information

Airport:	Oakhill Airpark (SC82)	**Runway Surface Type:**	Grass/turf
Airport Elevation:	837 ft	**Runway Surface Condition:**	Dry
Runway Used:	10	**IFR Approach:**	None
Runway Length/Width:	2400 ft / 100 ft	**VFR Approach/Landing:**	Precautionary Landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Serious		

Administrative Information

Investigator In Charge (IIC):	Todd G Gunther	**Adopted Date:**	06/02/2014
Additional Participating Persons:	Steven J Petrossian; FAA/FSDO; Columbia, SC		
Publish Date:	06/02/2014		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=87054		