Aviation Investigation Final Report

Location:	Swan Valley, Idaho	**Accident Number:**	WPR16FA013
Date & Time:	October 15, 2015, 17:07 Local	**Registration:**	N280TB
Aircraft:	Aviat A-1C-200	**Aircraft Damage:**	Substantial
Defining Event:	Aerodynamic stall/spin	**Injuries:**	1 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The airline transport pilot, and one passenger, were conducting a formation pleasure/sightseeing flight with another airplane in mountainous terrain. The pilot of the second airplane, who was flying in trail behind the accident airplane, stated that the two airplanes flew into a canyon area. As they approached a ridgeline, the second pilot performed a 360° climbing turn to gain altitude prior to crossing the ridgeline. After he completed his turn, he noticed a dust cloud on the ground ahead of him, and realized that the lead airplane had impacted terrain. Postaccident examination of the airplane revealed no evidence of mechanical malfunctions of failures that would have precluded normal operation. The density altitude about the time of the accident was over 10,990 ft.

Data recovered from the airplane's avionics system indicated that the engine was producing full power throughout the 24-minute flight. Before impact, the airplane's airspeed decreased to between 48 and 50 knots. The airplane's published stall speed was between 46 and 55 knots, depending on the airplane's configuration. Signatures at the accident site and the damage to the airplane indicated a near-vertical impact, consistent with an aerodynamic stall. The passenger reported that, before impact, the airplane was in a turn, and that she heard a beeping sound, consistent with activation of the aural stall warning.

Despite the fact that the airplane's engine was producing full power, the high density altitude conditions would have degraded the engine's performance and the airplane's ability to climb. It is likely that, as the pilot was maneuvering the airplane in an attempt to climb over the rising terrain, he allowed the airspeed to decay and the airplane exceeded its critical angle of attack and subsequently experienced 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 failure to maintain airspeed while maneuvering in high density altitude conditions over mountainous terrain, which resulted in the airplane exceeding its critical angle of attack and experiencing an aerodynamic stall.

Findings

Aircraft	Angle of attack - Capability exceeded
Aircraft	Airspeed - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Environmental issues	High density altitude - Effect on operation

Factual Information

History of Flight

Enroute-climb to cruise	Stall warn/stick-shaker/pusher
Enroute-climb to cruise	Attempted remediation/recovery
Enroute-climb to cruise	Aerodynamic stall/spin (Defining event)

On October 15, 2015, about 1707 mountain daylight time, an Aviat Aircraft Incorporated, Husky A-1C-200, N280TB, sustained substantial damage when it impacted mountainous terrain about 13 miles east of Swan Valley, Idaho. The airline transport pilot was fatally injured and the passenger sustained serious injuries. The airplane was registered to and operated by the pilot under the provisions of 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed, and no flight plan was filed for the local personal flight, which departed Alpine Airport (46U) Alpine, Wyoming, about 1646.

During the flight, the accident airplane flew in loose formation with another airplane of the same type. According to the pilot of the second airplane, the pilots had planned to fly over a reservoir and dam, then climb to a higher elevation, to view a few remote lakes; however, the actual routing of the flight was not discussed. The pilot of the second airplane stated that after completing the flight around the reservoir, both airplanes climbed, with the accident airplane in the lead position. As they approached a ridgeline, he radioed the accident pilot and stated that he was going to perform a 360° climbing turn to gain altitude before crossing the ridgeline, and the accident pilot acknowledged. As he completed the turn, he noted a dust cloud near the ground and realized that the lead airplane had impacted terrain. He circled the area, to assist in notifying authorities of the accident and to assist with the recovery effort.

The accident airplane was equipped with an electronic engine display which recorded data on a compact flash card. The recorded times on the card are from a user set parameter, therefore all times from the card are referenced to the user set time and not to mountain daylight time. The data revealed that the accident flight was about 24 minutes in duration and departed at 17:46. Engine power increased to a maximum of 2,670 rpm during takeoff and remained constant about that setting for the duration of the flight. The final minute of data; initially showed the airplane at an airspeed of 76 knots, at a climb rate of 742 feet per minute (FPM). The data then showed a continuous, gradual loss of airspeed and large variations in the airplane's climb rate. During the last 5 seconds of recorded data, the airspeed was between 48 and 50 knots, and the climb rate varied between 7 and 610 fpm. The data stopped recording at 18:06:53 at an indicated pressure altitude of 8,587 ft.

The rear seat passenger in the accident airplane, stated that before impact, the airplane was in a turn, the engine sounded normal, and that she heard a steady, beeping sound.

Pilot Information

Certificate:	Airline transport; Flight instructor	**Age:**	43,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	October 5, 2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 9500 hours (Total, all aircraft)		

Passenger Information

Certificate:		**Age:**	Female
Airplane Rating(s):		**Seat Occupied:**	Rear
Other Aircraft Rating(s):		**Restraint Used:**	4-point
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

The pilot, age 43, held an airline transport pilot certificate with ratings for airplane multi-engine land, single-engine land, and a flight instructor certificate with ratings for airplane single engine, multi-engine, and instrument airplane. The pilot was issued an FAA first-class airman medical certificate on April 02, 2015, with no limitations. The pilot reported on his most recent medical certificate application that he had accumulated 9,500 total hours of flight experience, and had accumulated a total of 400 hours within the preceding 180 days.

Aircraft and Owner/Operator Information

Aircraft Make:	Aviat	**Registration:**	N280TB
Model/Series:	A-1C-200	**Aircraft Category:**	Airplane
Year of Manufacture:	2015	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	3238
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	2250 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	41.2 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	C126 installed, activated, aided in locating accident	**Engine Model/Series:**	IO-360-A1D6
Registered Owner:	On file	**Rated Power:**	200 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The two-seat, high-wing, fixed-gear airplane, was manufactured in 2015. It was powered by a 200-horsepower Lycoming IO-360-A1D6 reciprocating engine. The engine was also equipped with a Hartzell model HC-C2YR-1N, constant speed propeller.

The airframe and engine logbooks were not located during the investigation. The airplane's weight and balance was determined to be within operating limits during the accident flight.

The airplane's flight manual stated that the stall speed is 50 knots at 0° bank, 54 knots at 30° bank, and 60 knots at 45° bank. With 30° of flaps extended, the stall speed is 46 knots at 0° bank, 50 knots at 30° bank, and 55 knots at 45° bank. The Aviat Aircraft Instructions for Continued Airworthiness stated that the airplane's stall warning detector should register a stall at 53 mph. The stall warning consists of a steady audible tone.

The airplane's flight manual also stated that at 10,000 ft, the best angle of climb is 61 knots and the best rate of climb is 59 knots.

Given the atmospheric and airplane loading conditions the day of the accident, the airplane's maximum climb would have been about 400 fpm. The airplane's service ceiling was 17,500 ft mean sea level (msl).

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	JAC,6451 ft msl	**Distance from Accident Site:**	25 Nautical Miles
Observation Time:	16:51 Local	**Direction from Accident Site:**	48°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.3 inches Hg	**Temperature/Dew Point:**	20°C / -1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	ALPINE, WY (46U)	**Type of Flight Plan Filed:**	None
Destination:	ALPINE, WY (46U)	**Type of Clearance:**	None
Departure Time:	16:46 Local	**Type of Airspace:**	Class G

The 1651 recorded weather observation at Jackson Hole Airport, Jackson Hole, Wyoming, located about 25 miles northeast of the accident site, reported calm wind, visibility 10 statute miles, clear skies, temperature 20 Celsius, dew point -1 Celsius, and an altimeter setting of 30.31 inches of mercury.

Weather modeling for the area of the accident site indicated a horizontal wind speed of 6 knots or less and the vertical wind speed less than 400 ft per minute. Additionally, no significant weather advisories were active or forecast at the time of the accident.

Given the atmospheric conditions present at the time of the accident, the density altitude at the accident site was about 10,992 ft.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 Serious	**Latitude, Longitude:**	43.223331,-111.061386(est)

Examination of the accident site revealed that the airplane impacted terrain at an elevation of about 8,800 ft. The airplane was located near a ridgeline near the top of the summit. Debris remained within about 50 ft of the main wreckage. The first identified point of contact (FIPC) was an area of disturbed dirt that measured about 1 foot in length, 8 inches wide, and 6 inches deep, located to the west of the main wreckage. About 10 feet from the FIPC was another area of disturbed dirt, co-located with one of

the propeller blades.

The fuselage came to rest upright on a heading about 4° magnetic, about 50 ft from the FIPC. The wings remained partially attached to the main fuselage. Flight control continuity was established to the empennage. All major structural components of the airplane were located at the accident site. Fuel was observed leaking from a perforation in the left wing, and the right wing fuel quantity sight gauge displayed 1/8 full.

The left wing was partially attached and orientated about perpendicular to the fuselage. The outer portion of the left wing was crushed. Horizontal scratches were observed on the leading edge of the wing. The wing tip was relatively intact except for the leading edge. The left wing forward strut was bent upward about mid span and the outer strut was bent downward about the mid span. The left aileron and flap were attached at all their respective points. The flap appeared to be extended.

The right wing was partially attached and the inboard half leading edge was crushed upwards, aligning it about perpendicular to the fuselage. The outboard half sustained impact damage at mid-span and sustained crush damage. Half of the wing was twisted back and facing the opposite direction. The forward right wing strut was bent upwards about a foot from the wing attach point. The aileron and flap were partially attached. The flap appeared to be extended.

The main cabin area sustained impact damage. The front and top portions of the windscreen were shattered and the side portion of the fuselage was wrinkled. Some of the support structure on the left side of the fuselage and in front of the cockpit control column, were cut away by the medical and recovery personnel.

The engine was angled about 45° to the right from the main fuselage. Both propellers blades had separated but were located at the accident site.

The empennage was relatively intact. The rudder and elevators remained attached. Only the right horizontal stabilizer and elevator sustained impact damage.

Examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

Medical and Pathological Information

The Bonneville County Coroner's Office, Idaho Falls, Idaho, conducted an autopsy on the pilot. The medical examiner determined that the cause of death was "blunt force trauma."

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing on the pilot. Testing was negative for carbon monoxide, cyanide, volatiles, and tested for drugs.

Additional Information

A FAA Safety Publication on Density Altitude (Adapted from Pamphlet P-8740-2):

"The important thing to understand is that density altitude is an indicator of aircraft performance. 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." Consequently, an increased density altitude, results in a reduced rate of climb.

Administrative Information

Investigator In Charge (IIC):	Nixon, Albert
Additional Participating Persons:	Stephen Grover; Federal Aviation Administration; Salt Lake, UT Stuart Horn; Aviat Aircraft Inc.; Afton, WY Mark Platt; Lycoming Engines; Williamsport, PA
Original Publish Date:	May 31, 2017
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=92185