Aviation Investigation Final Report

Location:	Herriman, Utah	**Accident Number:**	WPR17FA149
Date & Time:	July 13, 2017, 09:40 Local	**Registration:**	N211AM
Aircraft:	AVIAT AIRCRAFT INC A	**Aircraft Damage:**	Destroyed
Defining Event:	Aerodynamic stall/spin	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The flight instructor and pilot receiving instruction, departed on an instructional flight and proceeded toward mountainous terrain. A witness saw the airplane in a box canyon and reported that the airplane made a steep right turn and the nose dropped. To the witness, it appeared that the airplane was trying to escape the box canyon and that the speed of the airplane increased after the nose of the airplane dropped. The witness lost sight of the airplane behind terrain. Shortly thereafter, the witness saw smoke coming from the area where he had last seen the airplane. The wreckage was subsequently located by law enforcement personnel on down sloping terrain.

Examination of the airframe and engine revealed no preaccident mechanical anomalies that would have precluded normal operation.

The density altitude at the departure airport was 7,000 ft mean sea level (msl); the density altitude in the area of the accident site was over 10,000 ft msl. Given the high-density altitude it is likely that the airplane performance was decreased, and there was not enough engine power available for the airplane to climb out of the box canyon. It is also likely that as a result of the turn, the true airspeed increased the radius of the turn, and the pilot would have attempted to compensate and increased the bank angle and exceeded the airplanes critical angle of attack resulting in a stall.

Probable Cause and Findings

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

The flight instructor's decision to conduct a low-altitude flight into a box canyon in high density altitude conditions and his failure to maintain airspeed while maneuvering to escape the canyon, which resulted in an exceedance of the airplane's critical angle of attack and an aerodynamic stall.

Findings

Aircraft	Altitude - Not attained/maintained
Aircraft	Airspeed - Attain/maintain not possible
Personnel issues	Decision making/judgment - Instructor/check pilot
Environmental issues	High density altitude - Effect on operation
Environmental issues	Mountainous/hilly terrain - Decision related to condition

Factual Information

History of Flight

Maneuvering-low-alt flying	Aerodynamic stall/spin (Defining event)
Maneuvering-low-alt flying	Collision with terr/obj (non-CFIT)
Post-impact	Fire/smoke (post-impact)

On July 13, 2017, about 0940 mountain daylight time, an Aviat A1-B airplane, N211AM, impacted terrain while maneuvering near Herriman, Utah. The flight instructor and pilot receiving instruction were fatally injured; the airplane was destroyed during the postimpact fire. The airplane was privately owned and operated by the instructor as a Title 14 *Code of Federal Regulations* (*CFR*) Part 91 instructional flight. Visual meteorological conditions prevailed in the area and no flight plan was filed for the local flight, which departed South Valley Regional Airport (U42), West Jordan, Utah, about 0927.

A law enforcement officer who was driving west at a higher elevation than the accident site saw the airplane flying low up a canyon. He turned away briefly, and when he looked back, the airplane made a steep right turn and its nose dropped, and the airplane appeared to be losing altitude quickly. The trooper also stated that it appeared that they had nowhere to go and was making a last-ditch attempt to escape. He was able to see the tops of both wings while the airplane was in the turn. He did not see any smoke coming from the airplane. As he continued driving, he lost sight of the airplane and eventually pulled over to see if the airplane had climbed out of the canyon. He then drove further up the canyon and saw smoke rising from the bottom of the canyon in the area that he had last seen the airplane.

Radar data obtained from the Federal Aviation Administration (FAA) revealed that, after takeoff, the airplane flew on a southwesterly heading toward and into the box canyon. The radar data indicated that the airplane reached an altitude of 6,000 ft during the last 1.5 minutes of the flight.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	34,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Rear
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine; Helicopter; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	January 19, 2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	1553 hours (Total, all aircraft), 111.5 hours (Total, this make and model), 76.4 hours (Last 90 days, all aircraft), 35.7 hours (Last 30 days, all aircraft)		

Student pilot Information

Certificate:	Commercial; Private	**Age:**	37,Male
Airplane Rating(s):	None	**Seat Occupied:**	Front
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	None	**Last FAA Medical Exam:**	April 18, 2016
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 2887 hours (Total, all aircraft)		

The flight instructor held an airline transport pilot certificate issued on April 11, 2015, and a flight instructor certificate that was issued on December 12, 2011. A review of the instructor's logbook indicated 1,553.1 total hours of flight experience, with 76.4 total hours in the previous 90 days. He had a total of 111.6 hours in the accident airplane make and model. His most recent flight review was completed on April 9, 2013. The pilot held a first-class medical certificate issued on January 19, 2015, with no limitations.

No personal flight records were located for the pilot receiving instruction. He reported 2,887 total hours of flight experience on his most recent medical certificate application with 160 hours in the previous 6 months. Review of his airman and medical certificates revealed that his medical certificate had been revoked by the FAA following an investigation of his failure to report a disability and that his Australian flight certificates had previously been revoked for falsification.

Aircraft and Owner/Operator Information

Aircraft Make:	AVIAT AIRCRAFT INC	**Registration:**	N211AM
Model/Series:	A 1B	**Aircraft Category:**	Airplane
Year of Manufacture:	2000	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2110
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	December 30, 2016 Annual	**Certified Max Gross Wt.:**	2000 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	871 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	Installed, not activated	**Engine Model/Series:**	O-360-A1P
Registered Owner:	SWGB AVIATION LLC	**Rated Power:**	180 Horsepower
Operator:	SWGB AVIATION LLC	**Operating Certificate(s) Held:**	None

The tandem two-seat, high-wing airplane was constructed of steel tube frame covered with fabric. Flight controls were installed at each seat. The accident airplane received its standard airworthiness certificate on October 20, 2000.

The recording hour meter reading at the accident site was not identifiable.

Examination of maintenance records revealed no unresolved maintenance discrepancies with the airplane before the accident flight.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	U42,4606 ft msl	**Distance from Accident Site:**	11 Nautical Miles
Observation Time:	09:35 Local	**Direction from Accident Site:**	45°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	150°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.18 inches Hg	**Temperature/Dew Point:**	27°C / 15°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	West Jordan, UT (U42)	**Type of Flight Plan Filed:**	None
Destination:	West Jordan, UT (U42)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class G

The automated weather observation station located at U42, about 11 miles northeast of the accident site reported at 0935: wind from 150° at 10 knots, 10 miles visibility, temperature 81°F, dew point 59°F, and an altimeter setting of 30.18 inches of mercury. U42 was located at an elevation of 4,606 mean sea level (msl); density altitude was calculated to be 6,980 ft.

The accident site was located at an elevation of 7,340 ft msl, with a calculated density altitude of 10,313 ft msl based on the reported conditions at U42.

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	40.485553,-112.173614(est)

The airplane came to rest on down-sloping heavily wooded terrain about 12 miles southwest of the departure airport. Multiple broken branches were noted southwest of the main wreckage; the airplane was traveling in a northeast direction on a heading of about 060° with the nose of the main wreckage situated downslope. Investigators stated that the trees that the airplane struck were 30 ft from the main wreckage. Witness marks and broken branches were about 20 ft up from the base of the trees. All the major structural components of the airframe and engine were accounted for and were collocated with the main wreckage. As a result of the postcrash fire, the airplane was destroyed.

The airplane came to rest on its right side, with the airframe tubing that remained mostly intact. The fabric was destroyed in the fire, and exposed the airframe tubing along with the flight control cables. Flight control continuity was established throughout the airplane. The right wing partially separated; visual examination of the fuel cell revealed no obvious holes in the fuel tank. The left wing also partially separated from the fuselage, with most of the wing twisted and was bent under the fuselage. The fuel tank was breached.

The engine came to rest in its relative normal position and sustained thermal damage. A visual examination of the engine revealed no holes in the engine case. Post crash examination of the engine revealed no evidence of a mechanical anomaly that would have precluded normal operation. Additional information is attached to the public docket for this accident.

Medical and Pathological Information

The Utah Department of Health – Office of the Medical Examiner, Taylorsville, Utah, completed autopsies for both pilots. The cause of death for the flight instructor was conflagration injury and head trauma. The cause of death for the pilot receiving instruction was conflagration and blunt force injuries.

The Utah Department of Health, Unified State Laboratories: Public Health Bureau of Forensic Toxicology, Office of the Medical Examiner, Taylorsville, Utah, performed toxicological testing of specimens from the flight instructor. The results were negative for carbon monoxide, drugs of abuse, prescription drug panel, and opiates. The specimens tested positive for ethanol at 0.04 grams per 100 milliliters of blood, which was likely the result of postmortem production.

The FAA Forensic Sciences Laboratory performed toxicological testing of specimens of the pilot receiving instruction. The results were negative for carbon monoxide, volatiles and tested-for drugs. The laboratory did not perform a test for cyanide.

Additional Information

High Density Altitude

The hazards associated with high density altitude operations are outlined in an FAA Pamphlet titled DENSITY ALTITUDE (FAA-P-8740-2). The publication states,

High density altitude will decrease the airplanes performance. *Whether due to high altitude, high temperature, or both, reduced air density (reported in terms of density altitude) adversely affects aerodynamic performance and decreases the engine's horsepower output. Takeoff distance, power available (in normally aspirated engines), and climb rate are all adversely affected.*

Stalls

According to the FAA Airplane Flying Handbook (FAA-H-8083-3A):

At the same gross weight, airplane configuration, and power setting, a given airplane will consistently stall at the same indicated airspeed if no acceleration is involved. The airplane will, however, stall at a higher indicated airspeed when excessive maneuvering loads are imposed by steep turns, pull-ups, or other abrupt changes in its flightpath. Stalls entered from such flight situations are called 'accelerated maneuver stalls,' a term, which has no reference to the airspeeds involved. Stalls which result from abrupt maneuvers tend to be more rapid, or severe, than the unaccelerated stalls, and because they occur at higher-than-normal airspeeds, and/or may occur at lower than anticipated pitch attitudes, they may be unexpected by an inexperienced pilot. Failure to take immediate steps toward recovery when an accelerated stall occurs may result in a complete loss of flight control, notably, power-on spins.

Administrative Information

Investigator In Charge (IIC):	Cornejo, Tealeye
Additional Participating Persons:	Kent Gibbons; FAA; Salt Lake City, UT Troy Helgeson; Lycoming; Milliken, CO
Original Publish Date:	April 13, 2020
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=95563