Aviation Investigation Final Report

Location:	Truckee, California	**Accident Number:**	WPR09LA432
Date & Time:	September 7, 2009, 18:49 Local	**Registration:**	N206ST
Aircraft:	Cessna P206B	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	4 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Witnesses reported observing the airplane take off from the runway and enter a left turn. One witness, a rated pilot, stated that the airplane was climbing about 100 feet per minute or less during takeoff. It appeared that the pilot was executing the left turn noise abatement departure procedure and had completed an estimated 270-degree left turn. The witness further stated that as the airplane was "in line with runway 28," he observed the left wing of the airplane drop about 40 to 60 degrees, followed by a "partial recovery," before entering a "knife edge" and descending toward the ground. The passenger seated in the right front seat reported that, during takeoff initial climb, the airplane suddenly pitched upward. The passenger stated that the pilot leveled the airplane and the "right wing dipped." As the pilot leveled the airplane a second time, the "left wing dipped" and the airplane impacted the ground and nosed over. Examination of the accident site by Federal Aviation Administration inspectors revealed that the airplane impacted an open field adjacent to the airport. Examination of the recovered wreckage revealed that impact signatures on the nose, wings, and fuselage were consistent with a stall and/or spin. No evidence of any preimpact mechanical anomalies was discovered with the engine or airframe. Review of data obtained from a handheld global positioning system (GPS) that was recovered from the airplane revealed that the airplane initiated a left climbing turn after takeoff. The data depicted that during the climb the GPS leg ground speed fluctuated between 77 and 92 miles per hour. The last recorded GPS data track point indicated a leg speed of 89 miles per hour. Using reported and estimated weights of the pilot and three passengers, aircraft empty weight, full fuel, and the weight of the baggage removed from the airplane, the airplane was within center of gravity and maximum gross weight limitations. Testing of the stall warning system revealed contamination in the switch that resulted in intermittent performance of the system.

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 adequate airspeed for flight, which resulted in an aerodynamic stall and subsequent impact with the ground. Contributing to the accident was the intermittent failure of the stall warning system due to a contaminated switch.

Findings

Aircraft	Airspeed - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Aircraft	(general) - Malfunction

Factual Information

History of Flight

Initial climb	Loss of control in flight (Defining event)
Initial climb	Aerodynamic stall/spin
Initial climb	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On September 7, 2009, about 1849 Pacific daylight time, a Cessna P206B airplane, N206ST, was substantially damaged when it impacted terrain after takeoff from the Truckee-Tahoe Airport (TRK), Truckee, California. The airplane was registered to Trolan Enterprises LLC, of Missoula, Montana, and operated by the pilot under the provisions of Title 14 Code of Federal Regulations Part 91. The private pilot and her three passengers sustained serious injuries. Visual meteorological conditions prevailed and no flight plan was filed for the personal flight. The flight was originating at the time of the accident with an intended destination of San Jose, California.

A witness, who was a rated pilot and located on the ramp area of TRK, reported observing the accident airplane take off from runway 19 and was "...not gaining altitude, roughly 100 fpm (feet per minute) or less." The witness stated that it appeared the pilot was executing the left turn noise abatement departure procedure and had completed an approximate 270-degree left turn. The witness further stated that as the airplane was "in line with runway 28," he observed the left wing of the airplane drop about 40 to 60 degrees, followed by a "partial recovery" before entering a "knife edge" and descending towards terrain.

A second witness located adjacent to the accident site reported observing the accident airplane "...very low to the ground. It [the airplane] banked w/left wing down then quickly banked back the other way (right wing down), losing altitude quickly." The witness stated that the airplane impacted the ground on its nose and right side.

A passenger, who was seated in the right front seat, reported that prior to takeoff the pilot performed an engine run-up and did not notice anything irregular with the airplane or engine. The pilot proceeded to take off on runway 19. The passenger stated that the climb was normal until the airplane suddenly pitched upward. The pilot leveled the airplane and the "right wing dipped." As the pilot leveled the airplane a second time, the "left wing dipped" and the airplane impacted the ground.

The pilot stated in post-accident interviews that she did not recall anything about the accident flight or accident sequence.

METEOROLOGICAL INFORMATION

A review of recorded data from the automated weather observation station revealed at 1850 weather conditions were wind from 260 degrees at 10 knots, visibility 10 statute miles, clear sky, temperature 19 degrees Celsius, dew point -2 degrees Celsius, and an altimeter setting of 30.09 inches of Mercury. Using the reported weather conditions and reported airport elevation, the density altitude at the time of the accident was calculated to be about 7,605 feet.

AIRPORT INFORMATION

The Truckee-Tahoe Airport operates under class G airspace. The reported field elevation for TRK is 5,900 feet mean sea level (msl). The airport is equipped with two asphalt runways (10/28 and 1/19). Runway 19 was 4,650-feet in length and 75-feet wide and featured a 0.2 percent gradient.

The Truckee-Tahoe Airport has instituted a voluntary noise abatement program. The Truckee Airport Fly Quiet Pilot's Guide, page 2, states in part "...use best angle (Vx) for first 500 feet...avoid shallow climbs and gain as much altitude as safely possible before leaving the airport environment." The runway 19 departure "alternate left 225 (low powered aircraft in high density altitude conditions)" states in part "...after departure, turn left 225 degrees to a heading of 335 degrees. Then join the Bypass departure." The Runway 28 Bypass Departure procedure states in part "...at the end of runway 28, turn to 300 degrees for 0.8 nm [nautical miles] to a highway 267 bypass/railroad track intersection. Then resume own navigation."

WRECKAGE AND IMPACT INFORMATION

Examination of the airplane by a Federal Aviation Administration (FAA) inspector revealed that the airplane came to rest inverted. All major structural components of the airplane were located at the accident site. The empennage, wings, and forward area of the fuselage were structurally damaged. The left and right main landing gears were bent upwards near the fuselage structure. The inspector further reported that 20 items were removed from the baggage compartment and seating area. The items were individually placed on a scale and weighed a total of about 321 pounds.

TESTS AND RESEARCH

Examination of the recovered airframe revealed that the fuselage was significantly bent and buckled upwards throughout its length. The left and right wings were removed by wreckage recovery personnel to facilitate wreckage recovery. The right wing was intact and was buckled at the flap aileron junction. The left wing exhibited buckling throughout the upper portion of the wing.

Flight control cable continuity was established from the ailerons to the left and right wing roots and from the doorposts to the controls. Flight control cable continuity was established from

the rudder and elevators forward to where they were cut by wreckage recovery personnel. Flight control cable continuity was confirmed from the aft portion of the fuselage, where the empennage was separated from the cockpit controls, forward to the pedestal. All areas of cable separation were made by wreckage recovery personnel to facilitate wreckage recovery. The flap actuator was measured at 0 degrees, which equated to the full "UP" position.

Power was applied to the wiring for the stall warning horn at the doorpost. When the power was applied, the horn functioned normally. When power was applied to the stall-warning switch, the stall warning horn did not actuate. Rock and dirt debris was observed within the stall-warning switch. The stall-warning switch was retained for further examination.

The stall-warning switch was examined at the facilities of Cessna Aircraft, Wichita, Kansas, under the supervision of a Federal Aviation Administration (FAA) inspector. The stall-warning switch produced erratic electrical performance when operated manually in the lab. The internal switch contacts showed some presence of debris and dark discoloration. The examination concluded that the erratic electrical performance "may be attributed to the presence of low conductivity dirt particles adhering to the contact button surfaces within the switch."

No anomalies were noted that would have precluded normal operation of the recovered airframe.

Examination of the recovered engine revealed that the engine was intact and undamaged. The top spark plugs, fuel pump, and rocker box covers were removed. The engine crankshaft was manually rotated by hand using the propeller. Rotational continuity was established throughout the engine and valve train. Thumb compression was obtained on all six cylinders. The left and right magneto produced spark on all ignition harness leads when the engine crankshaft was rotated. The propeller was intact and all propeller blades exhibited multi directional scratches and gouges. All of the blades had leading edge damage and decreased pitch twists.

No mechanical anomalies were noted during the examination of the recovered engine that would have precluded normal operation and production of power.

Using reported and estimated weights of the pilot and three passengers, aircraft empty weight, full fuel, and the weight of the baggage removed from the airplane, a Cessna Aircraft Company representative calculated the weight and balance. The representative stated that the airplane was within center of gravity limitations. The estimated weight of the airplane at the time of the accident was about 3,396 pounds. The maximum gross weight for the airplane was 3,600 pounds.

A hand held global positioning system (GPS), Garmin GPSMAP 496 was recovered from the accident site. The unit was sent to the National Transportation Safety Board Office of Research and Engineering Recorders Laboratory for data extraction. The data revealed a flight

track from the day of the accident showed that following a taxi to runway 19, the flight remained within the run-up area for about 2 minutes, 22 seconds. The track depicted the airplane taxiing onto runway 19 and proceeding to take off. The data further depicted the airplane entering a climbing left turn to an altitude of 6,363 feet mean sea level (msl). During the climb, GPS data depicted a leg speed that fluctuated between 77 and 92 miles per hour. The last GPS data position recorded was located about 0.31 miles southwest of the accident site at an altitude of 6,363 feet msl and a leg speed of 89 miles per hour.

Pilot Information

Certificate:	Private	**Age:**	51,Female
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	January 7, 2008
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	April 30, 2009
Flight Time:	257 hours (Total, all aircraft), 166 hours (Pilot In Command, all aircraft), 95 hours (Last 90 days, all aircraft), 21 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N206ST
Model/Series:	P206B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	P206-0356
Landing Gear Type:	Tricycle	**Seats:**	6
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	3600 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Continental
ELT:	Installed, not activated	**Engine Model/Series:**	IO-520-D
Registered Owner:	Trolan Enterprises LLC	**Rated Power:**	285 Horsepower
Operator:	Karen Trolan	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	TRK,5900 ft msl	**Distance from Accident Site:**	
Observation Time:	18:50 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	260°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.09 inches Hg	**Temperature/Dew Point:**	19°C / -2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Truckee, CA (TRK)	**Type of Flight Plan Filed:**	Unknown
Destination:	San Jose, CA	**Type of Clearance:**	None
Departure Time:	18:49 Local	**Type of Airspace:**	

Airport Information

Airport:	Truckee-Tahoe Airport TRK	**Runway Surface Type:**	
Airport Elevation:	5900 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	3 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 Serious	**Latitude, Longitude:**	39.319999,-120.139442(est)

Administrative Information

Investigator In Charge (IIC):	Cawthra, Joshua
Additional Participating Persons:	Don Morgan; Federal Aviation Administration; Reno, NV
Original Publish Date:	December 20, 2010
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=74661