Aviation Investigation Final Report

Location:	Athol, Idaho	**Accident Number:**	WPR17LA181
Date & Time:	August 4, 2017, 09:00 Local	**Registration:**	N519TB
Aircraft:	RANS S9	**Aircraft Damage:**	Substantial
Defining Event:	Loss of visual reference	**Injuries:**	1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

According to a witness who was part of the ground crew for this flight, this was the first flight of the experimental, amateur-built airplane. The pilot conducted a "high speed" taxi test during which the airplane became "light." He then taxied back for takeoff from the turf runway. According to the witness, the airplane accelerated well, and liftoff occurred about 300 to 400 ft down the runway. About 2 seconds after liftoff, the airplane pitched up to a "fairly nose high attitude" of about 15° to 20°. When the airplane was at an altitude of about 150 ft and less than halfway down the runway, another witness observed it descend rapidly. The airplane landed hard and sustained substantial damage; the pilot was seriously injured. Evaluation of the airplane flight control travel ranges and weight and balance information did not reveal any anomalies. The pilot reported that the engine performed normally and that he intentionally attempted a steep climb to ensure that he cleared trees at the end of the runway; however, due to the mid-wing configuration, he lost sight of the horizon in the initial climb and then had difficulty judging his pitch attitude due to the lack of a cockpit attitude indicating instrument. Ground personnel had radioed him about the excessive pitch attitude, and the pilot likely overcorrected due to his uncertainty regarding both pitch attitude and ground proximity, which resulted in the airplane impacting the ground.

Probable Cause and Findings

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

The pilot's loss of pitch attitude and ground proximity awareness, which resulted in an unintentionally steep initial climb and an overcorrection into a steep descent and ground impact.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Pitch control - Not attained/maintained

Factual Information

History of Flight

Initial climb	Loss of visual reference (Defining event)
Initial climb	Attempted remediation/recovery
Initial climb	Abnormal runway contact

On August 4, 2017, about 0900 Pacific daylight time, an experimental, amateur-built Rans S-9 Chaos light sport airplane, N519TB, was substantially damaged in a hard landing during an aborted takeoff from Hackney Skypark (ID05), Athol, Idaho. The commercial pilot was seriously injured. The airplane was registered to and operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Visual meteorological conditions prevailed and no flight plan was filed for the local flight that was originating at the time of the accident.

According to the pilot's son, who was part of the ground crew for the flight attempt, this was the maiden flight of the kit-built airplane. Because the winds were "very light," the pilot decided to use runway 21, which afforded multiple flat fields beyond the runway end. The airplane was fueled with about 12 gallons, and the canopy was left off (a configuration "approved" by the kit manufacturer) for the initial flight. The pilot conducted a "thorough pre-flight and control checks," and radio communication with the ground crew was confirmed. The elevator trim tab was set to neutral, the engine was started and warmed up, and the pilot taxied out uneventfully. He then conducted a "high speed taxi test," which included application of full power, acceleration to about 55 mph, followed by power reduction and rollout. This too was uneventful, and the pilot taxied back for his planned takeoff from runway 21.

The pilot announced his departure on the radio and applied full power. According to the pilot's son, the airplane accelerated well, and liftoff occurred about 300 to 400 ft down the runway. About 2 seconds after liftoff the airplane was observed pitching up to a "fairly nose high attitude" of about 15^{o} to 20^{o}, as it reached an altitude of about 50 ft, prompting the son to radio to the pilot about the excessive pitch attitude. When the airplane was at an altitude of about 150 ft, and less than halfway down the runway, the other ground crew member observed it to be descending rapidly. The airplane landed hard, collapsed the main landing gear, and came to rest upright near the right edge of the turf runway.

The forward and lower fuselage sustained substantial crush damage. There was no fuel leakage or fire. The ground crew helped the pilot exit the airplane. He sustained head injuries despite his shoulder harness, and was taken to the hospital for treatment. The pilot initially reported to the ground crew that he had difficulty controlling the pitch attitude of the airplane, and that the engine performed normally. In a later statement, the pilot reported that he attempted a steep climb in order to ensure that he cleared trees at the end of the runway. Due to the mid-wing configuration, he lost sight of the horizon in the initial climb, and then had difficulty judging his pitch attitude due to the lack of a cockpit attitude indicating instrument.

Pilot Information

Certificate:	Commercial	**Age:**	74,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Single
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Sport pilot Unknown	**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	July 16, 2016
Flight Time:	6000 hours (Total, all aircraft), 2 hours (Total, this make and model), 5800 hours (Pilot In Command, all aircraft), 12 hours (Last 90 days, all aircraft), 4 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

The pilot held a commercial certificate with airplane single-engine, multiengine, and instrument ratings. He had about 6,000 hours total flight experience, including about 2 hours in the accident airplane make and model. He had also successfully built and conducted first flights of two other make and model airplanes. His most recent flight review was completed in July 2016. At the time of the accident, he no longer held a current Federal Aviation Administration (FAA) medical certificate, and was operating under the light sport provisions via his driver's license.

Aircraft and Owner/Operator Information

Aircraft Make:	RANS	**Registration:**	N519TB
Model/Series:	S9	**Aircraft Category:**	Airplane
Year of Manufacture:	2017	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental light sport (Special)	**Serial Number:**	0802177
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	July 1, 2017 Condition	**Certified Max Gross Wt.:**	710 lbs
Time Since Last Inspection:	2 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	2 Hrs at time of accident	**Engine Manufacturer:**	Rotax
ELT:	Not installed	**Engine Model/Series:**	503 DCDI
Registered Owner:	On file	**Rated Power:**	50 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane was equipped with a 52 Hp Rotax 503 DCDI series engine, and airplane construction was completed a few weeks before the accident. The pilot spent a few weeks conducting engine, propeller, taxi, and ground handling tests, and making minor adjustments to correct noted issues. A data sheet that documented the measured flight control travel ranges indicated that all travel ranges were in accordance with the kit manufacturer's specifications.

Prior to the flight, the pilot accomplished multiple weight and balance calculations, including extreme forward and aft CG (center of gravity), as well as the test flight conditions case. The kit manufacturer's CG range was 53 to 62 inches, and the calculated CG for the accident flight was 59.7 inches. For that flight, the airplane was calculated to weigh 677 lbs. The kit manufacturer specified only two maximum takeoff weights; one for airplanes equipped with a 65hp engine (710 lbs) and one for 80/100 hp engines (810lbs). The kit manufacturer did not respond to an NTSB query regarding installation of the lower hp engine. However, the builder/pilot reported that he was told by the kit manufacturer that kit was offered with the 52 hp engine until that engine (Rotax 503) went out of production. The pilot's weight and balance calculations were verified by investigators, but the actual weights and distances were not verified by investigators.

The kit manufacturer recommended that for takeoff, the airplane be flown off the ground in the "three-point attitude" (tail wheel still on the ground) instead of the typical procedure of lifting the tailwheel during the takeoff roll. Post accident, the pilot's son reported that during the final high speed taxi test, the airplane "became light" at about 55 mph; he thought this was unusual because the stall speed was cited as 41 mph, and that the airplane should have begun lifting off at a speed below 55 mph.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	COE,2320 ft msl	**Distance from Accident Site:**	12 Nautical Miles
Observation Time:	08:56 Local	**Direction from Accident Site:**	190°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	80°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	29.88 inches Hg	**Temperature/Dew Point:**	24°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Hackney, ID (ID05)	**Type of Flight Plan Filed:**	None
Destination:	Athol, ID (ID05)	**Type of Clearance:**	None
Departure Time:	09:00 Local	**Type of Airspace:**	

The 0856 automated weather observation at an airport located about 12 miles south of the accident site included winds from 080^{o} at 5 knots, visibility 10 miles, clear skies, temperature 24^{o}C, dew point 12^{o}C, and an altimeter setting of 29.89 inches of mercury.

Airport Information

Airport:	Hackney ID05	**Runway Surface Type:**	Grass/turf
Airport Elevation:	2445 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	21	**IFR Approach:**	None
Runway Length/Width:	3500 ft / 150 ft	**VFR Approach/Landing:**	

ID05 was a private use airport, equipped with a single turf runway that measured 3,500 by 150 ft. Runway orientation was designated 3/21. Field elevation was 2,445 ft.

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	47.956943,-116.677497(est)

Administrative Information

Investigator In Charge (IIC):	Huhn, Michael
Additional Participating Persons:	Chad Anderson; FAA; Spokane, WA
Original Publish Date:	May 28, 2020
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=95767