



National Transportation Safety Board Aviation Accident Final Report

Location:	Pine Bluffs, WY	Accident Number:	WPR11LA253
Date & Time:	06/02/2011, 0855 MDT	Registration:	N9496G
Aircraft:	CESSNA A188B	Aircraft Damage:	Substantial
Defining Event:	Loss of engine power (partial)	Injuries:	1 None
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The newly hired commercial pilot intended to conduct a solo practice flight in the piston-engine, agricultural-agent-dispensing airplane. It was the first flight of the day for the pilot and airplane, and his first flight in this particular airplane. Because the airport elevation was about 5,100 feet above mean sea level, the pilot leaned the fuel-air mixture, then conducted an engine run-up. The pilot reported that the run-up was normal and that he set flaps at 5 degrees. The target climb speed was 80 mph. The initial portion of the takeoff roll was normal but then seemed to continue for an “abnormal length of runway.” The pilot did not abort the takeoff because, by the time he recognized that the airplane was not performing adequately, he believed that there was insufficient runway remaining to stop. The airplane lifted off, but then the engine seemed to experience a partial loss of power, and the pilot was unable to fly the airplane out of ground effect after it crossed the departure end of the runway. The pilot jettisoned the payload and conducted a precautionary landing in a field off the end of the runway to avoid a collision with power lines. Review of maintenance records found that the engine exceeded the recommended time between overhaul by 470 hours. However, examination of the airplane and engine did not reveal evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation. The appearance of the engine spark plugs was consistent with the engine being regularly operated with a fuel-air mixture that was leaner than normal, and the possibility that the pilot improperly leaned the engine for the takeoff could not be ruled out. The takeoff performance data in the airplane manufacturer's operating manual was insufficient to determine the expected performance for the airplane's reported configuration and ambient conditions. The available performance data suggested that the airplane should have been able to climb out of ground effect and that the target climb speed used by the pilot might have been too high; however, the available information was inconclusive with regard to both these issues.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A partial loss of engine power during takeoff for reasons that could not be determined because postaccident examination did not reveal any mechanical malfunctions or failures that would

have precluded normal operation.

Findings

Aircraft	Scheduled maint checks - Not serviced/maintained Mixture control - Incorrect use/operation
Personnel issues	Use of equip/system - Not specified
Not determined	Not determined - Unknown/Not determined (Cause)

Factual Information

HISTORY OF FLIGHT

On June 2, 2011, about 0855 mountain daylight time, a Cessna A188B, N9496G, was substantially damaged during a precautionary landing shortly after takeoff from Pine Bluffs Municipal Airport (82V), Pine Bluffs, Wyoming. The commercial pilot was not injured. The aerial application flight was operated under the provisions of Title 14 Code of Federal Regulations Part 137. Visual meteorological conditions prevailed, and no flight plan was filed. The operator, Circle-S Aviation, was based in Pine Bluffs, and reported the event to the NTSB on June 7, 2011.

According to the pilot, he reported that the engine run-up was normal, and he then initiated the takeoff on runway 26. The initial portion of the takeoff roll seemed normal, but the roll then "seemed to continue for an abnormal length." The pilot reported that he did not abort the takeoff because by the time he recognized that the airplane did not seem to be performing correctly, there was insufficient runway remaining to stop safely. The airplane lifted off, but then the engine seemed to experience a partial loss of power, and the pilot was unable to climb the airplane out of ground effect as it crossed the departure end of the runway. At that point, the pilot jettisoned the payload of 40 gallons of water, in order to clear the power lines ahead. The airplane still would not climb, so the pilot elected to conduct an off-airport landing, in order to preclude striking the power lines. The airplane touched down in soft terrain, struck a ditch, and was substantially damaged.

PERSONNEL INFORMATION

Federal Aviation Administration (FAA) records indicated that the pilot held a commercial pilot certificate with an airplane single-engine land rating. The pilot reported a total flight experience of 972 hours, including 4 hours in the accident airplane make and model. His most recent FAA second-class medical certificate was issued in April 2011, and his most recent flight review was completed in March 2011.

The pilot was recently hired by the operator, and the accident flight was his first flight in the accident airplane. His previous time in type was acquired in the operator's other C-188, and some of those flights were supervised checkouts. All the previous flights were from the same airport and same runway direction as the accident flight. The pilot stated that on those previous flights, the airplane "always climbed away nicely;" he had no problems breaking ground or maintaining the target climb speed while simultaneously gaining altitude.

AIRCRAFT INFORMATION

According to FAA information, the restricted category airplane was manufactured in 1974, and was first registered to the operator in 2010. It was equipped with a Teledyne Continental Motors (TCM) IO-520 series engine, which was rated for 300 hp takeoff power for 5 minutes. The airplane was equipped with a liquid dispersal system, and a constant-speed propeller. According to information provided by the operator and pilot, the takeoff weight for the accident flight was about 3,083 lbs, and the airplane weight and balance was within the FAA-approved envelope. Maximum certificated gross weight was 3,300 lbs in the normal category, and 4,200 lbs in the restricted category.

The most recent annual inspection was completed in May 2011, when the airframe had a total time in service (TT) of about 6,590 hours, and the engine had a TT of about 1,670 hours.

According to TCM Service Information Letter (SIL) 98-9A "TIME BETWEEN OVERHAUL PERIODS," the recommended time between overhaul (TBO) for the IO-520-D engine was 1,700 hours or 12 years, whichever occurred first. The SIL contained the following additional guidance: "For aircraft used in aerial spraying, overhaul the engine after the accumulation of 1200 hours or twelve (12) years whichever occurs first."

METEOROLOGICAL INFORMATION

The pilot reported that weather conditions included winds from 190 degrees at 11 knots with gusts to 15 knots; visibility 10 miles, clear skies; temperature of 19 degrees C; dew point 0 degrees C; and an altimeter setting of 30.16 inches of mercury. Use of these wind speed values for a runway 26 takeoff resulted in headwind component values of 4 to 5 knots, and crosswind component values of 10 to 14 knots.

AIRPORT INFORMATION

FAA information indicated that 82V was at an elevation of 5,152 feet above mean sea level, and that the paved runway measured 5,336 feet long and 75 feet wide. Based on the reported ambient conditions, the density altitude was calculated to be 6,607 feet, and the pressure altitude was calculated to be approximately 4,900 feet.

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest upright in a flat, soft field, about 1 mile west of the departure runway. The right main landing gear fracture-separated from the fuselage, the propeller tips were bent, the cowling was wrinkled, and the right wing sustained substantial damage. There was no fire.

The airplane was recovered to a secure facility, where it was examined by one of the facility's technicians. No evidence of any preimpact mechanical malfunctions that would have precluded normal operation was noted. Examination of the engine spark plugs revealed that their appearance was consistent with the engine being regularly operated with a fuel-air mixture that was more lean than normal.

ADDITIONAL INFORMATION

Pilot's Flight Procedures

The pilot reported that the flight was to be a practice flight with two objectives; to get the feel of the airplane when the cargo/load was jettisoned, and to practice operations at a higher elevation airport. He reported that the only load was 40 gallons of water in the hopper tank, which had a capacity of 280 gallons.

The accident flight was the first flight of the day for both the pilot and airplane. The pilot reported that during taxi out, he thought he heard an unusual "clicking" noise emanating from the engine. He opted to continue with the run-up and flight, and attributed the noise to his

heightened awareness based on a previous magneto problem with the airplane.

Due to the elevation of 82V, the pilot leaned the engine for the run-up and subsequent departure. He leaned the engine at 1,700 rpm, and ran the engine to 2,000 rpm to confirm that it would operate at a higher rpm in that leaned configuration. The pilot reported that he set the flaps to 5 degrees for takeoff, in accordance with the guidance in the airplane, and had a target climb speed of 80 mph.

Cessna Flight Procedures

The checklist section of the Cessna operating manual "Normal Procedures" for the "Restricted Category Take-Off (Dispersal Equipment Installed)" recommended a flap setting of "5 to 10" degrees, and the recommended climb speed was 80 to 90 mph. However, the "Performance" section of the manual provided a climb speed of 67 mph for 10 degrees flaps with dispersal equipment installed, and did not contain any guidance or performance data for the 5 degree flap configuration.

Derived Performance Estimates

The most complete takeoff performance data, in terms of parametric variables, was provided for airplanes that were not equipped with dispersal equipment, and was only available for the 20-degree flap setting configuration. Limited takeoff performance data for airplanes equipped with dispersal equipment was available, and specified the use of 10 degrees of flaps. Since the pilot reported that he used 5 degrees of flaps for the takeoff, predicted values for takeoff performance could not be determined.

The available performance data was utilized to determine estimated takeoff and climb performance for the presented configurations, in order to provide some indication of expected performance for the actual accident flight configuration and conditions. Predicted performance for an airplane not equipped with dispersal equipment, and using a takeoff flap setting of 20 degrees, yielded a takeoff distance over a 50-foot obstacle of 1,124 feet, and a climb rate of about 695 feet per minute (fpm) at a climb speed of 67 mph. Predicted performance for an airplane equipped with dispersal equipment, using a takeoff flap setting of 10 degrees, but without altitude or wind corrections, yielded a takeoff distance over a 50-foot obstacle of 1,000 feet. The available data specified a climb speed of 67 mph, but did not enable a determination of corresponding climb rate. Predicted performance for an airplane equipped with dispersal equipment, using a takeoff flap setting of 20 degrees, but at a weight of 3,300 lbs, yielded a climb rate of about 345 fpm, and a climb speed of 77 mph. The available data did not enable a determination of corresponding takeoff distances.

History of Flight

Initial climb	Loss of engine power (partial) (Defining event) Off-field or emergency landing
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Pilot Information

Certificate:	Commercial	Age:	52, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Single
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 With Waivers/Limitations	Last Medical Exam:	04/09/2011
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	03/31/2011
Flight Time:	972 hours (Total, all aircraft), 4 hours (Total, this make and model), 932 hours (Pilot In Command, all aircraft), 43 hours (Last 90 days, all aircraft), 28 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	CESSNA	Registration:	N9496G
Model/Series:	A188B	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Restricted	Serial Number:	18801501T
Landing Gear Type:	Tailwheel	Seats:	1
Date/Type of Last Inspection:	05/10/2011, 100 Hour	Certified Max Gross Wt.:	4200 lbs
Time Since Last Inspection:	24 Hours	Engines:	1 Reciprocating
Airframe Total Time:	6594 Hours	Engine Manufacturer:	Continental
ELT:	Not installed	Engine Model/Series:	IO-520
Registered Owner:	Circle-S Aviation	Rated Power:	300 hp
Operator:	Circle-S Aviation	Air Carrier Operating Certificate:	

Meteorological Information and Flight Plan

Observation Facility, Elevation:	82V, 5152 ft msl	Observation Time:	0840 MST
Distance from Accident Site:	1 Nautical Miles	Condition of Light:	Day
Direction from Accident Site:		Conditions at Accident Site:	Visual Conditions
Lowest Cloud Condition:	Clear	Temperature/Dew Point:	19° C / 0° C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	11 knots/ 15 knots, 190°	Visibility (RVR):	
Altimeter Setting:	30.16 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Pine Bluff, WY (82V)	Type of Flight Plan Filed:	None
Destination:	Pine Bluff, WY (82V)	Type of Clearance:	None
Departure Time:	0855 MDT	Type of Airspace:	

Airport Information

Airport:	Pine Bluffs Municipal (82V)	Runway Surface Type:	Asphalt
Airport Elevation:	5152 ft	Runway Surface Condition:	Dry
Runway Used:	26	IFR Approach:	None
Runway Length/Width:	5336 ft / 75 ft	VFR Approach/Landing:	Precautionary Landing

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	Michael C Huhn	Adopted Date:	07/18/2013
Additional Participating Persons:	Mike Maglione; FAA-FSDO; Casper, WY		
Publish Date:	07/18/2013		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=79328		

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