Aviation Investigation Final Report

Location:	Mancelona, Michigan	**Accident Number:**	CEN13FA069
Date & Time:	November 21, 2012, 17:15 Local	**Registration:**	N5419A
Aircraft:	Cessna 310B	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

A witness saw the airplane depart, however the accident was unobserved. The airplane was discovered 2 days later in a heavily wooded area about 1 mile from the departure end of the runway and about 3/4 mile to the right of the extended runway centerline. The airplane was almost inverted when it impacted the ground. Normal traffic pattern direction at the uncontrolled airport was to the left for this runway and the pilot was known to follow this requirement closely.

The accident site's location relative to the departure runway centerline and the airplane's nearly inverted attitude at impact were both consistent with the pilot's failure to maintain a minimum control airspeed and a subsequent loss of control roll to the right. The right fuel boost pump switch was found in the "on" position, whereas the left boost pump switch was found in the "off" position. Although the right fuel boost pump switch may have moved due to impact, the as-found position was consistent with the pilot attempting to correct for a loss of right engine power during takeoff.

Examination of the airframe, engine, and propeller did not reveal any anomalies associated with a preimpact failure or malfunction.

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 control of the airplane after a loss of right engine power for reasons that could not be determined because postaccident examination revealed no preimpact malfunction or anomaly that would have precluded normal operation.

Findings

Personnel issues	Identification/recognition - Pilot
Aircraft	(general) - Failure
Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Initial climb	Loss of control in flight (Defining event)

On November 21, 2012, about 1715 eastern standard time, a Cessna 310B, N5419A, owned by the pilot, was substantially damaged after impacting terrain near Lakes of the North Airport (4Y4), Mancelona, Michigan. The certificated airline transport pilot, the sole occupant, was fatally injured. The airplane was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Day visual meteorological conditions prevailed for the flight, which operated without a flight plan. The flight was originating at the time of the accident.

A witness living near the airport noticed the airplane depart 4Y4, an uncontrolled airport, on Runway 24 between 1700 and 1715. No witnesses observed the accident. During the morning of November 23, 2012, the wreckage was discovered about 1 mile from the departure end of Runway 24 and about ¾ mile to the right of the extended runway centerline. Normal traffic pattern direction at the uncontrolled airport was to the left for this runway and the pilot was known to follow this requirement closely.

Pilot Information

Certificate:	Airline transport; Commercial; Flight engineer	**Age:**	68
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	May 15, 2007
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	August 10, 2007
Flight Time:	(Estimated) 19310 hours (Total, all aircraft), 500 hours (Total, this make and model)		

The pilot, age 68, held an airline transport pilot certificate with an airplane multi-engine land rating and commercial pilot privileges with an airplane single engine landing rating. The pilot also held an airframe and power plant certificate with inspection authorization privileges. He completed the annual inspections on the accident airplane from 2008 to 2012.

On May 5, 2007, the pilot was issued a Class 3 limited medical certificate, which required corrective lenses be worn. At the time of the medical examination, the pilot reported having 19,310 hours of flight experience. No further medical certificates were available to the investigation. The last documented flight review available to the investigation occurred on August 10, 2007. The pilot was a retired airline

captain, accumulating the majority of his flight time in Boeing 727 aircraft.

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N5419A
Model/Series:	310B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	35619
Landing Gear Type:	Retractable - Tricycle	**Seats:**	5
Date/Type of Last Inspection:	September 15, 2012 Annual	**Certified Max Gross Wt.:**	4700 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	7483 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	C91 installed, not activated	**Engine Model/Series:**	O-470 SERIES
Registered Owner:	CRAWFORD ROGER W	**Rated Power:**	240 Horsepower
Operator:	CRAWFORD ROGER W	**Operating Certificate(s) Held:**	None

The accident airplane, a Cessna 310B (serial number 35619) was manufactured in 1957. It was registered with the Federal Aviation Administration (FAA) on a standard airworthiness certificate. The airplane was certificated for single pilot operation and the logbooks showed a total time of 7,483 hours as of the last annual inspection.

The airplane was equipped with two Continental Motors O-470-M engines. The left engine (serial number 81762-1-L-4) had accumulated a total of 3,713 hours, with 248 hours since last major overhaul. The right engine (serial number 52011-7-M) had accumulated 5,856 hours, with 1,335 hours since last major overhaul. Both propellers were installed on April 23, 2000, with no maintenance entries in the propeller log since installation.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Dusk
Observation Facility, Elevation:	KGLR,1328 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	16:53 Local	**Direction from Accident Site:**	60°
Lowest Cloud Condition:	Clear	**Visibility**	6 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	180°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.04 inches Hg	**Temperature/Dew Point:**	9°C / 6°C
Precipitation and Obscuration:	N/A - None - Haze		
Departure Point:	Mancelona, MI (4Y4)	**Type of Flight Plan Filed:**	None
Destination:	Mancelona, MI (4Y4)	**Type of Clearance:**	None
Departure Time:	17:15 Local	**Type of Airspace:**	

The weather observing station at Gaylord Regional Airport (KGLR), Gaylord, Michigan, located 10 miles northeast of the accident location, reported the following conditions at 1653: wind 180 degrees at 10 knots, visibility 6 miles, clear skies, temperature 9 degrees Celsius, dew point 6 degrees Celsius, altimeter setting 30.05.

Airport Information

Airport:	Lakes of the North Airport 4Y4	**Runway Surface Type:**	
Airport Elevation:	1287 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	44.909999,-84.911109

The accident site was located in flat, forested terrain. The airplane impacted about 1 mile from the departure end of Runway 24 and about ¾ mile to the right of the extended runway centerline. The first impact was near the top of a 40 foot tree, and the airplane came to rest about 100 yards beyond this tree. The debris path of airplane components indicated the attitude of the airplane was close to inverted as it impacted the ground.

At the accident site, both cockpit throttle levers were in the idle position and both engine mixture levers were leaned, with the right engine mixture lever leaned more than the left. The propeller controls were both in the full forward position, with the propeller pistons forward and the flyweights in the full RPM position. The carburetor heat control knobs were full forward (no carb heat selected). The right hand fuel boost pump switch in the cockpit was found in the on position, whereas the left hand fuel boost pump switch was found in the off position.

The airplane's instrument panel exhibited the following indications:
Airspeed Indicator – 269 MPH
Attitude Indicator – detached from panel
Vertical Speed Indicator – 200 feet per minute climb
Altimeter – 1,600 feet
Altimeter Kollsman Window – 30.03 inches
Communications #1 Radio – 122.90
Communications #2 Radio – 134.60
Navigation #1 Radio – 111.60
Navigation #2 Radio – 109.10

Both main fuel tanks and the right auxiliary tank were compromised by impact. The right main tank was separated, but still had fuel present. This right main tank fuel had snow present and was not tested for water contamination. The right fuel selector handle and valve were near the right main fuel tank position. The right firewall fuel separator contained approximately one cup of fuel, which tested negative for water contamination. The right firewall fuel separator contained fuel.

The left main tank was separated and breached, with no fuel present. The left auxiliary tank contained about 4 gallons of fuel, which tested negative for water contamination. The left fuel selector handle and valve were near the left main tank position. The left firewall fuel separator bowl was compromised and did not contain fuel. The left fuel valve expelled about one cup of fuel when positioned to the crossfeed position and the fuel tested negative for water contamination. The four fuel tank caps were in place with rubber seals.

Flight control continuity was confirmed to all flight control surfaces. The landing gear were in the 'up' position, with both the gear selector handle and gear linkage also in the 'up' position. The flaps were in the 'up' position. Examination of both propellers determined that neither was feathered at impact.

The attitude gyro was disassembled and exhibited slight scoring. The static ports were unobstructed and the pitot tube was blocked with dirt. The oxygen cylinder mount was empty and the bottle was not observed. The aircraft heater was in the off position.

At the salvage location, damage and gouges to the right engine propeller housing/cable were observed.

A bracket (near the firewall) for the right engine propeller housing/cable was not present, with no evidence of separation due to impact.

Medical and Pathological Information

On November 24, 2012, an autopsy was performed on the pilot by the Antrim Country Medical Examiner. The cause of death was attributed to blunt force injuries. The autopsy revealed mild coronary artery disease but no significant preexisting pathology. The FAA's Civil Aeromedical Institute in Oklahoma City, Oklahoma performed toxicology tests on the pilot. No carbon monoxide, cyanide, or ethanol was detected during testing. Friends of the pilot stated he flew regularly and was in extremely good health, both physically and mentally.

Tests and Research

Both engines were transported to Continental Motors in Mobile, Alabama, and both carburetors were transported to Precision Engines in Everett, Washington, for further examination.

Left Engine Examination

The external surfaces of the engine were impact damaged. The carburetor, number one and six cylinder valve covers, oil sump, and induction system risers for the number six cylinder were impact damaged and replaced for the engine run. The engine was fitted with thermo couplings, pressure lines, and test pads for test purposes only.

Pre and post engine run compression tests were performed with the following results: Cylinder 1 – 61/58 PSI, Cylinder 2 – 25/40 PSI, Cylinder 3 – 40/57 PSI, Cylinder 4 – 40/38 PSI, Cylinder 5 – 35/58 PSI, Cylinder 6 – 63/49 PSI

The engine experienced a normal start on the first attempt without hesitation or stumbling in observed RPM. Throughout the test phase, the engine accelerated normally without any hesitation, stumbling, or interruption in power and demonstrated the ability to produce rated horsepower.

Right Engine Examination.

The external surfaces of the engine were impact damaged. . The carburetor, top spark plug for cylinder number 1, valve cover for cylinder number 6, induction system risers, and exhaust stacks were impact damaged and replaced for the engine run. The engine was fitted with thermo couplings, pressure lines, and test pads for test purposes only.

Pre and post engine run compression tests were performed with the following results: Cylinder 1 – 16/27 PSI, Cylinder 2 – 70/75 PSI, Cylinder 3 – 45/63 PSI, Cylinder 4 – 18/72 PSI, Cylinder 5 – 11/52 PSI, Cylinder 6 – 60/56 PSI

The engine experienced a normal start on the first attempt without hesitation or stumbling in observed RPM. Throughout the test phase, the engine accelerated normally without any hesitation, stumbling, or interruption in power and demonstrated the ability to produce rated horsepower. The complete engine operational test reports for both engines are located in the public docket.

Examination of carburetors

Both carburetors were assembled correctly and their fuel inlet screens were free of any significant contamination. The gaskets, diaphragms, venturis, metering valves, and acceleration pumps for both carburetors were in good condition, with no anomalies noted. All other components not damaged in the crash were in good condition. Due to impact damage from the accident sequence, the carburetors were not able to be bench or flow tested. There were no abnormalities noted that would have prevented either carburetor from functioning normally.

Additional Information

According to 14 Code of Federal Regulations Part 23, velocity minimum control (Vmc) speed is the calibrated airspeed at which, when the critical engine is suddenly made inoperative, it is possible to maintain control of the airplane with that engine inoperative. The Federal Aviation Administration Airplane Flying Handbook contains a comprehensive discussion of Vmc and engine inoperative flight principles and is available at faa.gov.

Administrative Information

Investigator In Charge (IIC):	Folkerts, Michael
Additional Participating Persons:	Amanda Thieson; Federal Aviation Administration; Grand Rapids, MI Bob Eldridge; Federal Aviation Administration; Grand Rapids, MI Jan Smith; Cessna Aircraft; Wichita, KS Mike Council; Continental Engine; Mobile, AL
Original Publish Date:	January 30, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=85649