Aviation Investigation Final Report

Location:	Cordele, Georgia	**Accident Number:**	ERA11LA503
Date & Time:	September 24, 2011, 19:49 Local	**Registration:**	N3101N
Aircraft:	Cessna 120	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The student pilot was maneuvering and practicing takeoffs and landings in the vicinity of his home airport when the airplane impacted trees and terrain about 1/2-mile from the departure end of one of the runways. An examination of the wreckage revealed signatures consistent with the engine not developing power at impact, and no evidence of any pre-impact mechanical malfunctions or failures was found. Additionally, no evidence of fuel or fuel spillage was observed at the accident scene or within any of the disassembled airframe or engine components. The pilot had most recently fueled the airplane 2 days before the accident flight, and, according to his personal flight logs, he had flown the airplane for 2.3 hours before departing on the accident flight. With a full fuel load, the airplane had an estimated fuel endurance in cruise flight of between 3.6 and 7.8 hours, depending on engine power setting. The exact duration of the accident flight could not be determined; however, based on witness statements, it was likely longer than 0.5 hours.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's inadequate fuel planning, which resulted in a total loss of engine power due to fuel exhaustion.

Findings

Aircraft	Fuel - Fluid level
Personnel issues	Fuel planning - Pilot
Aircraft	Fuel - Fluid management

Factual Information

History of Flight

Maneuvering	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Emergency descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On September 24, 2011, about 1949 eastern daylight time, a Cessna 120, N3101N, was substantially damaged when it impacted trees and terrain near Crisp County-Cordele Airport (CKF), Cordele, Georgia. The certificated student pilot was fatally injured. Visual meteorological conditions prevailed, and no flight plan was filed for the local personal flight, which was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

According to a lineman employed by the fixed based operator (FBO) at CKF, he fueled the accident airplane with 16.3 gallons of fuel at 1000 on September 22, 2011. On the morning of the accident flight, the lineman briefly spoke with the pilot about 1000. When asked if the pilot needed fuel, the pilot stated that he did not. The lineman later observed the pilot performing touch and go landings on runway 5 at CKF, and asked him again via radio if he required fuel, to which the pilot replied, "I'll do it later." The lineman observed the pilot as he secured the airplane following the morning flight and had no subsequent contact with him. A review of fuel receipt information provided by the FBO showed that the airplane had not been fueled following the fueling on the morning of September 22.

On the accident day, about 1915, a witness reported observing the accident airplane as it took off from runway 10 at CKF. After watching as the airplane climbed on the runway heading, the witness lost sight of the airplane when he entered a building. Two additional witnesses heard the airplane during the final moments of the flight. One reported hearing the airplane's engine, and then heard a loud noise similar to the sound of a tree falling.

PERSONNEL INFORMATION

The pilot held a student pilot certificate, which was issued on February 4, 2010. The pilot certificate was endorsed by a flight instructor on October 23, 2010 for solo flight in Cessna 120 model airplanes, and on June 14, 2011 for solo flight in Cessna 150 model airplanes. The pilot was also endorsed to make repeated solo cross country flights in airplanes on October 16, 2010.

Review of the pilot's personal flight log revealed a period of activity between February 23, 2009 and the date of the accident flight. During that time the pilot accumulated 109.7 total hours of

flight experience, 104.3 hours of which were in the accident airplane. The pilot's log was endorsed on April 3, 2010 for solo flight in Cessna 120 model airplanes, and on June 14, 2011 for solo flight in Cessna 150 model airplanes. The pilot's log was endorsed for continued solo flight in Cessna 120 model airplanes on June 10, 2010, October 16, 2010, January 15, 2011, and April 29, 2011.

On September 22 and 23, 2011, the pilot logged two flights of 0.5 and 0.8 hours each, respectively, along with a total of 7 takeoffs and landings during both flights. The pilot then logged two flights of 0.5 hours each, for a total of 1.0 hours logged, on the date of the accident flight. The arrival and departure points noted were CKF and Jimmy Carter Regional Airport (ACJ), Americus, Georgia for the first flight, and ACJ and CKF for the second flight, with one takeoff and landing noted at each airport.

The pilot held a Federal Aviation Administration (FAA) Third Class Medical certificate, which was issued on February 4, 2010. The certificate was issued with the limitation that the pilot shall wear correcting lenses.

AIRCRAFT INFORMATION

According to FAA airworthiness and registration information, the airplane was manufactured in 1947. It was originally equipped with a Continental Motors C-85-12 engine, which was removed on March 6, 1989, when a Continental O-200-A engine was installed. The maintenance records also noted that the engine had been originally installed in a Cessna 150J.

According to the airplane's maintenance logs, the most recent annual inspection was completed on June 3, 2011. At that time the airplane had accumulated 3,166 flight hours. Examination of the airplane's tachometer at the accident site revealed that it had accumulated 45 additional flight hours since that date.

The airplane was equipped with two 12.5-gallon fuel tanks. Direct reading fuel quantity gauges were installed in the tank, at the wing root, which the pilot could observe from the cockpit. The gauges operated mechanically and did not feature any provisions for lighting. The gauges were placarded with graduations noting F [full], 3/4, 1/2, and 1/4 tank capacity. The area below the 1/4 marking was shaded red in color with the marking, "NO TAKE OFF."

METEOROLOGICAL INFORMATION

The weather conditions reported at Southwest Georgia Regional Airport (ABY), Albany, Georgia, located about 35 nautical miles southwest of the accident site, at 1953, included calm winds, scattered clouds at 9,000 feet, a temperature of 27 degrees Celsius (C), a dewpoint of 21 degrees C, and an altimeter setting of 29.91 inches of mercury. Sunset occurred at 1929 and the end of civil twilight occurred at 1954.

WRECKAGE AND IMPACT INFORMATION

The wreckage was examined at the scene by a representative of the airframe manufacturer under the supervision of an FAA inspector. Freshly broken tree branches were identified as the airplane's initial impact point, and were observed about 600 feet southeast of the runway 10 departure end, at a height about 45 feet above the ground. Three additional tree strikes were observed at progressively lower heights along the wreckage path, which was oriented 200 degrees magnetic. The final tree strike was about 30 feet above the ground. The airplane came to rest inverted, about 175 feet from the initial impact point, along the wreckage path.

All flight control surfaces remained attached to their respective airframe components, and flight control continuity was traced from each flight control surface to the cockpit. The elevator trim tab was found in a neutral position. The leading edges of both wings and the left horizontal stabilizer displayed concave depressions oriented perpendicular to the surfaces consistent with tree contact.

The fuel strainer bowl had been displaced from its normal mounting position and was absent of water, debris, or fuel. The fuel strainer screen was absent of debris. The fuel selector was found in the left tank position. Both fuel tanks remained intact and were absent of fuel. Examination of the accident scene on the day following the accident revealed no evidence of foliage blight in the immediate vicinity of where the airplane came to rest. The propeller remained attached to the engine, with both propeller blades displaying no evidence of leading edge damage, polishing, or chordwise scratching. Both of the blades were bent toward the non-cambered side, with one blade displaying about 30-degrees of bending and the other blade displaying about 10 degrees of bending.

The engine was intact with all of the accessories attached, with the exception of the carburetor, which was separated. The throttle and mixture controls remained attached and were free to move, and the carburetor heat control was separated.

The cylinders were examined using a lighted borescope. The piston heads and cylinder domes exhibited normal combustion deposits, and all of the valves were in place. The number one exhaust push rod displayed impact damage, and was removed from the cylinder. The crankshaft was rotated at the propeller, and thumb compression was confirmed on each of the four cylinders. Valvetrain continuity was confirmed on all of the cylinders and to the accessory drive gears, with the exception of the number one cylinder exhaust push rod, which had been removed.

The top spark plugs were removed and examined, with all exhibiting normal wear and dark oily deposits in the electrode areas. The magnetos exhibited light impact-related damage, and rotation of both magneto input shafts produced spark at all terminals.

The carburetor was separated from the engine, but was otherwise intact. The air box was crushed against the bottom of the carburetor and the air filter was coated with dirt on its exterior face, consistent with impact. The interior face of the air filter was absent of debris.

The fuel screen was clean and absent of debris. The carburetor was disassembled, and no fuel, water or other contamination were observed in the float bowl. The float and needle valve remained intact and free to move, and the needle valve seat was clean and absent of debris.

The engine oil filter was removed, and examination of the filter element showed no evidence of any metallic particles.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the Crisp Regional Hospital, Cordele, Georgia.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing on the pilot. The testing was negative for the presence of ethanol. Testing for the presence of carbon monoxide, cyanide, and drugs could not be conducted given the quantity of samples provided.

ADDITIONAL INFORMATION

Global Positioning System Unit Data

A Lowrance AIRMAP 2000c handheld global positioning system (GPS) unit was recovered from the accident site and forwarded to the NTSB Vehicle Recorders Laboratory for further examination. The unit was capable of storing trail data composed of up to 10,000 latitude-longitude points per trail, and once the limit had been reached for recording continuously updated trail data, older latitude/longitude points were overwritten with new data on a first-in, first-out basis. The unit could be programmed to update trail data in one of three ways: automatically, by time, or by distance traveled. The default ‘automatic’ mode only updated trail data when the unit sensed that position has changed by at least 0.1 miles, or that direction had changed by 2 degrees or more. Recorded data were stored internally in non-volatile memory. The manner in which the unit wrote trail data points to internal memory was such that a power interruption could result in a loss of data.

The unit was successfully operated and data were extracted, which included 1,203 trail points. The trail points consisted of latitude and longitude, and were recorded chronologically. The trail data contained no date/time stamp or altitude information, and the trial update mode was set to automatic.

A comparison of the recovered data and the pilot's flight log coincided with the departure and destination airports, as well as the number of landings detailed by the pilot's flight log beginning at some point during the flight logged on September 23, continuing through the two flights logged earlier on the date of the accident flight, and the initial portion of the accident flight. The established track direction of the final recorded points, in addition to their proximity to the accident site, suggested that a loss of data likely occurred.

Review of the track data correlated to be the accident flight began at the CKF hangar area, and tracked along the taxiway to runway 10. The track then departed from the runway and departed from the downwind leg of the traffic pattern to a point about 8 nautical miles southwest of the airport. After maneuvering, the track continued to a point located about 4 nautical miles east of the airport, before returning to the airport for an overhead entry to the left base leg of the traffic pattern for runway 10. After tracking down the length of runway 10, the track began a turn to the northeast, about 0.5 nautical miles beyond the runway 10 departure end, and was the final track recorded.

Fuel Consumption Information

According to the 1969 Cessna 150(J) Owner's Manual, the equipped Continental O-200-A engine consumed between 3.2 and 7.0 gallons of fuel per hour while flying at an altitude of 2,500 feet msl, with the variation depending on an engine rpm setting between 2,100 and 2,750. The manual also estimated the fuel used during takeoff and climb to be 0.6 gallons, which included allowances for engine warm-up and takeoff.

Pilot Information

Certificate:	Student	**Age:**	63,Male
Airplane Rating(s):	None	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	February 1, 2010
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	April 29, 2011
Flight Time:	109 hours (Total, all aircraft), 104 hours (Total, this make and model), 90 hours (Pilot In Command, all aircraft), 43 hours (Last 90 days, all aircraft), 17 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N3101N
Model/Series:	120	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	13359
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	June 3, 2011 Annual	**Certified Max Gross Wt.:**	1450 lbs
Time Since Last Inspection:	45 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3166 Hrs as of last inspection	**Engine Manufacturer:**	Continental Motors
ELT:	C91A installed, not activated	**Engine Model/Series:**	O-200-A
Registered Owner:	On file	**Rated Power:**	100 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Dusk
Observation Facility, Elevation:	ABY,196 ft msl	**Distance from Accident Site:**	35 Nautical Miles
Observation Time:	19:53 Local	**Direction from Accident Site:**	240°
Lowest Cloud Condition:	Scattered / 9000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.9 inches Hg	**Temperature/Dew Point:**	27°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Cordele, GA (CKF)	**Type of Flight Plan Filed:**	None
Destination:	Cordele, GA (CKF)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

Airport Information

Airport:	Crisp County-Cordele Airport CKF	**Runway Surface Type:**	
Airport Elevation:	310 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Traffic pattern

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:**	31.984443,-83.763885

Administrative Information

Investigator In Charge (IIC):	Diaz, Dennis
Additional Participating Persons:	Tommy Bush; FAA/FSDO; Atlanta, GA Steve Miller; Cessna Aircraft Company; Wichita, KS John Kent; Continental Motors; Mobile, AL
Original Publish Date:	August 15, 2012
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=81886