Aviation Investigation Final Report

Location:	Piggott, Arkansas	**Accident Number:**	CEN15LA233
Date & Time:	May 15, 2015, 08:40 Local	**Registration:**	N164CS
Aircraft:	Cessna T206H	**Aircraft Damage:**	Substantial
Defining Event:	Powerplant sys/comp malf/fail	**Injuries:**	1 Minor
Flight Conducted Under:	Part 91: General aviation		

Analysis

This report was modified on August 28, 2016. Please see the docket for this accident to view the original report.

The airline transport rated pilot reported that, after an en route stop, he planned to continue his cross-country personal flight. The pilot reported that, during takeoff and as the airplane was between about 20 and 30 ft above the ground, he felt the engine surge, and it then lost power. The airplane was traveling too fast to stop on the remaining runway, and it impacted a ditch at the end of the runway.

Examinations of the airframe and engine revealed that the left magneto was malfunctioning. During subsequent examination of the magneto, a section of a drill bit, which approximated the diameter of a timing pin, was found inside of it. A review of maintenance records revealed that the left magneto had been replaced 15.6 hours before the accident.

A review of engine monitor data revealed that the exhaust gas temperature spiked three times; two of the spikes were attributed to the "before takeoff" magneto checks. The third spike occurred during the takeoff and just before a power reduction. The data are consistent with the left magneto failing during the takeoff. The accident is consistent with maintenance personnel improperly using a drill bit as a timing pin to time the magneto before installing it on the engine. Maintenance personnel likely rotated the engine while the drill bit was still in the magneto, which resulted in a section of the drill bit then breaking off and eventually causing the magneto to fail.

Probable Cause and Findings

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

The loss of engine power due to a malfunctioning magneto. Contributing to the accident was maintenance personnel's improper use of a drill bit instead of a timing pin during magneto installation, which resulted in a section of the drill bit breaking off and ultimately to the magneto failure.

Findings

Aircraft	(general) - Malfunction
Personnel issues	(general) - Maintenance personnel
Aircraft	(general) - Incorrect service/maintenance
Aircraft	(general) - Incorrect service/maintenance

Factual Information

History of Flight

Prior to flight	Powerplant sys/comp malf/fail (Defining event)
Takeoff	Loss of engine power (partial)
Takeoff-rejected takeoff	Runway excursion
Takeoff-rejected takeoff	Collision with terr/obj (non-CFIT)

On May 15, 2015, about 0840 central daylight time, a Cessna T206H airplane, N164CS, overran the end of the runway, following a rejected takeoff from the Piggott Municipal Airport (7M7), Piggott, Arkansas. The airline transport rated pilot received minor injuries and the airplane was substantially damaged. The airplane was registered to and operated by Mid Continent Aircraft Corporation, Hayti, Missouri, under the provisions of the 14 Code of Federal Regulations Part 91 as a cross-country flight. Visual meteorological conditions prevailed at the time. The flight was originating at the time of the accident and was en route to the Walnut Ridge Regional Airport (KARG), Walnut Ridge, Arkansas.

The pilot reported that he planned on departing 7M7's runway 18, and the airplane was configured for a no-flap takeoff. About 1,000 feet down the runway, he rotated for takeoff. When the airplane was about 20-30 feet in the air, the engine "surged", and then lost power. The airplane settled back on to the runway; however, it was traveling too fast to stop on the remaining runway. The airplane came to rest in an irrigation ditch near the runway. The airplane was equipped with air bags, and the pilot's airbag deployed during the accident.

The initial examination of the airplane revealed substantial damage to the left wing and fuselage. The airplane was recovered from the ditch; however, the airplane received extensive damage during the recovery, including separation of the empennage from the fuselage.

The airplane was a 2014 Cessna turbo Stationair (T206H), powered by a Lycoming TIO-540-AJ1A, six-cylinder reciprocating engine, rated at 310 hp. The airplane's "hobbs" meter read 113.6 total flight hours. The airplane was equipped with a Garmin G1000 avionics suite; the engine monitoring data was downloaded from the unit. A review of maintenance records revealed the most recent manufacturer's inspection was completed on March 30, 2015 at a hobbs time of 96.1 flight hours.

The NTSB Investigator in Charge (IIC), a Federal Aviation Administration (FAA) Inspector, and technical representatives from the airframe and engine manufacturers, examined the airplane at a salvage yard facility located in Clinton, Arkansas.

A visual examination of the engine did not reveal any anomalies, so an engine run was planned; however, damage to the airplane's engine mount and propeller limited the test run to low power settings. During the test run, a malfunctioning left magneto was discovered. A review of the engine's maintenance records revealed the left magneto had been replaced at a hobb's time of 98.0 hours.

The engine was separated from the airframe and shipped to Lycoming's engine facility located in Williamsport, Pennsylvania. The engine's left magneto was replaced with a factory test unit and the engine was prepped, and placed in an engine test cell. The NTSB IIC and technical representatives then conducted an engine test run. No abnormalities were noted during the engine test run.

The engine's fuel injection servo unit was removed and sent to Precision Airmotive, LLC, for examination. The examination was conducted under the supervision of the NTSB, with technical representatives from the airframe and fuel servo manufacturers. The fuel servo was bench tested; the unit tested satisfactory, with no performance abnormalities noted. Disassembly of the unit revealed two separation areas on the fuel diaphragm, which failed to show up during the bench test.

The original left magneto and the replacement magneto, which was on the engine at the time of the accident, were shipped to Champion Aerospace facility in Liberty, South Carolina. The NTSB IIC and technical representatives from Textron Aviation (Cessna) and Slick Ignition systems examined the magnetos. The original magneto was placed on a bench test machine; the magneto appeared operational with no abnormalities noted. The magneto on the engine at the time of the accident was then bench tested. The magneto initially displayed normal ignition spark; however, as the rpm increased, the spark became erratic and failed at times to produce spark on all (six) terminals.

The failed magneto was then disassembled; small bits of plastic like material was found inside the magneto consistent with the magneto's rotor. The rotor arm attached to the plastic rotor was out of position and could turn independent of the rotor. The contact points inside the magneto cap showed abnormal wear. Parts from inside the magneto were laid out on a table. A section of a drill bit, about 3/8 inch long, was among the pieces found inside the magneto.

During maintenance and prior to installation of the magneto to the engine, a timing pin (Slick T-118 Magneto Locking pin) is used to time the magneto. The section of drill bit approximated the diameter of the timing pin.

The accident data from the engine monitor was reviewed. Three areas of EGT (exhaust gas temperature) spikes were noted. Two spikes before the takeoff roll were attributed to the pilot conducting the 'before takeoff' magneto checks. The third spike happened during the takeoff and just before a reduction in engine rpms. The data is consistent with the left magneto failing during the takeoff.

Pilot Information

Certificate:	Airline transport	**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):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	January 7, 2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	23020 hours (Total, all aircraft), 800 hours (Total, this make and model), 20650 hours (Pilot In Command, all aircraft), 50 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N164CS
Model/Series:	T206H	**Aircraft Category:**	Airplane
Year of Manufacture:	2014	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	T20609132
Landing Gear Type:	Tricycle	**Seats:**	
Date/Type of Last Inspection:	March 30, 2015 AAIP	**Certified Max Gross Wt.:**	3605 lbs
Time Since Last Inspection:	18 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	113.6 Hrs at time of accident	**Engine Manufacturer:**	LYCOMING
ELT:	C126 installed	**Engine Model/Series:**	TIO-540-AJ1A
Registered Owner:	Mid Continent Aircraft Corp	**Rated Power:**	310 Horsepower
Operator:	Mid Continent Aircraft Corp	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	K4M9	**Distance from Accident Site:**	23 Nautical Miles
Observation Time:	07:35 Local	**Direction from Accident Site:**	270°
Lowest Cloud Condition:	Unknown	**Visibility**	10 miles
Lowest Ceiling:	Unknown	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	140°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.07 inches Hg	**Temperature/Dew Point:**	19°C / 18°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Piggott, AR (7M7)	**Type of Flight Plan Filed:**	None
Destination:	Walnut Ridge, AR (KARG)	**Type of Clearance:**	None
Departure Time:	07:40 Local	**Type of Airspace:**	

Airport Information

Airport:	Piggott Muncipal 7M7	**Runway Surface Type:**	Asphalt
Airport Elevation:	275 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	18	**IFR Approach:**	None
Runway Length/Width:	2550 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor	**Latitude, Longitude:**	36.374721,-90.166114

Administrative Information

Investigator In Charge (IIC):	Hatch, Craig
Additional Participating Persons:	Lynn Braswell; FAA FSDO; Little Rock, AR Judson Rupert; Lycoming Engines; Williamsport, PA John Butler; Lycoming Engines; Arlington, TX Ricardo Asensio; Textron Aviation; Wichita, KS
Original Publish Date:	September 7, 2016
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=91186