Aviation Investigation Final Report

Location:	West Memphis, Arkansas	**Accident Number:**	CEN15LA015
Date & Time:	October 15, 2014, 17:25 Local	**Registration:**	N731QV
Aircraft:	Cessna P210N	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Shortly after takeoff, the manifold pressure dropped. The private pilot then turned the airplane back to the airport. He saw smoke coming from under the engine cowl, and the engine stopped producing power while the airplane was on short final and about 800 ft above ground level. The airplane impacted power lines before landing in a grassy area short of the runway.

Holes were observed in the top of the engine crankcase. Disassembly of the engine revealed all the crankshaft's connecting rod journals and connecting rods displayed signs of thermal distress and discoloration associated with engine operation without sufficient oil. All six cylinder bays exhibited mechanical damage consistent with an oil starvation event. The engine and component examinations did not identify any anomalies that would have precipitated an oil starvation event and subsequent engine failure. The No. 2 piston was fractured into numerous pieces. The area adjacent to the broken connecting rod displayed surface coloration and oxide formation consistent with exposure to very high temperatures. The engine had experienced a previous "hydraulic lock" event about 1 1/2 years before the accident, but it could not be determined if damage sustained during that event caused the catastrophic failure of the No. 2 piston.

Probable Cause and Findings

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

A catastrophic engine failure due to an oil starvation event for reasons that could not be determined based on the available evidence.

Findings

Aircraft	Recip eng oil sys - Not specified
Environmental issues	Wire - Contributed to outcome

Factual Information

History of Flight

Enroute-cruise	Loss of engine power (total) (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)

On October 15, 2014, about 1725 central daylight time, a Cessna P210N airplane, N731QV, sustained substantial damage following a forced landing and impact with terrain after a reported loss of engine power during initial climb out from West Memphis Municipal Airport (AWM), West Memphis, Arkansas. The pilot, who was the registered owner and sole occupant of the airplane, was not injured. Visual meteorological conditions prevailed for the local flight, which was being operated as a personal flight in accordance with 14 Code of Federal Regulations Part 91, and no flight plan had been filed.

The pilot reported he was departing for a local training flight. After takeoff, about 10 minutes into the flight while climbing through 4,500 feet MSL, the manifold pressure dropped and the pilot made a turn to return to AWM. Smoke was observed coming from under the engine cowl and the engine stopped while on short final about 800 feet AGL. The airplane impacted power lines before landing in a grassy area short of the runway and on airport property.

A JPI EDM-830 engine data module was recovered and subsequently downloaded by a recorder specialist and the NTSB's Vehicle Recorder Laboratory. Data indicated the flight took off about 1714 and about six minutes after takeoff engine RPM began to fluctuate and one minute later the exhaust gas temperatures increased. By 1723, engine RPM decreased, voltage decreased, and manifold pressure increased.

The airplane was powered by a six-cylinder Continental Motors IO-550-P6B, serial number 1006549, that was assembled at the Continental Motors factory on May 9, 2012, as a new IO-550-P6B. The engine was shipped to Vitatoe Industries, Inc. on May 14, 2012, where the engine was modified utilizing Vitatoe Supplemental Type Certificate (STC) SA02918CH, converting the engine to a turbo-normalized induction system. According to the maintenance records, the modified engine was installed on the accident airplane on August 7, 2012 (the tachometer time was not reported).

The electric boost pump was removed and replaced on April 5, 2014. After the fuel boost pump was replaced, the operator reported he attempted to start the engine after running the boost pump. The crankshaft/propeller rotated but came to an abrupt stop and could not be rotated through (a condition consistent with hydraulic lock). The operator reported that the starter could not rotate the propeller through on consecutive attempts. The operator left the aircraft and returned a couple days later with a battery charger. The engine started on the first attempt without need for battery charging. The operator continued to operate the airplane with no anomalies up until the time of the accident.

Hydraulic lock is most common in reciprocating engines and occurs when the amount of liquid introduced into the cylinder is greater than the available volume when the piston head is at the top of its stroke. It typically results in breaking or bending of the connecting rod, but can also damage the pistons and

crankshaft. When an engine experiences hydraulic lock, damage to the engine connecting rods, crankshaft, piston heads, bearings, etc., might not be apparent without an engine inspection.

The engine was removed and taken to the Continental Motors facility in Mobile, Alabama, for examination. Holes were observed in the top of the crankcase. Disassembly of the engine revealed all of the crankshaft's connecting rod journals and connecting rods displayed signs of thermal distress and discoloration associated with engine operation without sufficient lubricating oil. There were no signs of an oil leak on any of the engine's components; however, the remote oil filter lines were removed by maintenance personnel for crate shipment and were not observed as part of the examination. Disassembly of the engine revealed that all six cylinder bays sustained mechanical damage. The damage observed was consistent with an engine oil starvation event. However, all bearing saddles were in place and there was no sign of bearing slip or matting surface fretting. All the oil galleys were free from obstructions. In addition to the oil starvation event, the No. 2 piston was fractured into numerous pieces. The face of the piston was fractured into multiple pieces. The No. 2 connecting rod, piston pin, and fractured piston pieces were sent to the NTSB Materials Laboratory for further evaluation.

The No. 2 piston pieces examined at the NTSB's Material Laboratory comprised the entire head and estimate 50% of the skirt. The majority of both pin bosses were also present. The entire upper compression ring was also received. Visual and magnified optical examinations revealed features and patterns indicative of overstress separation on all of the received piston fractures. Some of the pieces were darkly colored consistent with baked on oil deposit while other mating pieces were clean. The crown of the piston was clean and had small valve dents corresponding to the intake and exhaust valve locations.

The No. 2 piston pin was intact, but the aluminum pin plugs were mechanically damaged. The No. 2 connecting rod was fractured through both main bearing straps. The fracture features were partially obscured by post fracture mechanical damage but the visible fracture features were consistent with bending overstress separations. The adjacent area of the rod displayed surface coloration and oxide formation consistent with exposure to very high temperatures. The bearing surface of the rod showed heavy flow and smearing of the material.

The engine and component examinations did not identify any anomalies that would have precipitated an oil starvation event and the subsequent engine failure.

Pilot Information

Certificate:	Private	**Age:**	58,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; 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:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	September 29, 2014
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	August 18, 2013
Flight Time:	4000 hours (Total, all aircraft), 2000 hours (Total, this make and model), 4000 hours (Pilot In Command, all aircraft), 36 hours (Last 90 days, all aircraft), 5 hours (Last 30 days, all aircraft), 0.5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N731QV
Model/Series:	P210N N	**Aircraft Category:**	Airplane
Year of Manufacture:	1980	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	P21000534
Landing Gear Type:	Tricycle	**Seats:**	5
Date/Type of Last Inspection:	April 5, 2014 Annual	**Certified Max Gross Wt.:**	4001 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	4196 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed, not activated	**Engine Model/Series:**	TSIO-520 SER
Registered Owner:	On file	**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KAWM,214 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	21:53 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	300°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.87 inches Hg	**Temperature/Dew Point:**	20°C / 10°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	WEST MEMPHIS, AR (AWM)	**Type of Flight Plan Filed:**	None
Destination:	WEST MEMPHIS, AR (AWM)	**Type of Clearance:**	VFR;Traffic advisory
Departure Time:		**Type of Airspace:**	Class B

Airport Information

Airport:	WEST MEMPHIS MUNI AWM	**Runway Surface Type:**	Concrete
Airport Elevation:	212 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	35	**IFR Approach:**	None
Runway Length/Width:	6003 ft / 100 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	35.134998,-90.234443(est)

Administrative Information

Investigator In Charge (IIC):	Liedler, Courtney
Additional Participating Persons:	Brian Love; FAA FSDO Nicole Charnon; Continental Motors, Inc.
Original Publish Date:	March 5, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=90268