Aviation Investigation Final Report

Location:	Ozark, Arkansas	**Accident Number:**	CEN12LA326
Date & Time:	May 25, 2012, 15:36 Local	**Registration:**	N2159D
Aircraft:	Mooney M20J	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 Minor, 1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that, during cruise flight, he noticed a change in engine sound and that he subsequently scanned the engine gauges, which were all within normal operating parameters. Shortly after, the engine rpm began to drop, the pilot heard a "pop" or "bang," and the propeller stopped rotating. The pilot attempted to glide the airplane to an alternate airport, but the airplane overshot the runway. The pilot then attempted to land on a nearby road, and the left wing of the airplane struck the ground during the maneuver.

Oil streaking was observed on the airplane's exterior. Postaccident examination of the engine revealed that no oil was not present in the engine. During disassembly of the engine, the No. 4 connecting rod cap was found fractured, and pieces of the cap were found within the crankcase. Evidence indicated that the No. 4 connecting rod failed due to frictional heating and impact associated with a bearing failure. The Nos. 1 to 3 connecting rods and connecting rod bolts showed varying degrees of heat discoloration, and the evidence of heating in the Nos. 2 and 4 connecting rods indicated that the No. 4 bearing failure was due to lack of oil in the connecting rod bearings. The cause of the oil starvation could not be determined.

Probable Cause and Findings

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

The failure of a connecting rod due to oil starvation.

Findings

Aircraft	Oil - Fluid level
Aircraft	Recip engine power section - Failure

Factual Information

History of Flight

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

On May 25, 2012, about 1536 central daylight time, a Mooney M20J single engine airplane, N2159D, experienced a total loss of engine power during cruise flight. The pilot subsequently attempted a landing at the Ozark Franklin County Airport (7M5), Ozark, Arkansas. The pilot sustained minor injuries and a passenger was not injured. The airplane sustained substantial damage to the fuselage and both wings. The airplane was registered to Tuttle and associates LLC, and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed and no flight plan had been filed. The flight originated from the Tulsa International Airport (TUL) and was destined for the Tunica Municipal Airport (UTA), Tunica, Mississippi when the accident occurred.

The pilot reported that while in cruise flight, he noticed a change in engine sound. He scanned the engine gauges and all were within the green arcs. The engine RPM began to drop and the pilot heard a bang or pop. The pilot reported that the propeller immediately stopped rotating. The pilot was given vectors to 7M5 by air traffic control. The pilot reported that he circled the airport 4 or 5 times and set up for landing. During the landing approach, the airplane was high and overshot the runway. The pilot turned to avoid buildings and attempted a landing on a nearby road but the airplane's left wing impacted the ground. The airplane sustained damage to its wings and fuselage.

According to maintenance records, the most recent annual inspection was completed on May 11, 2012. At the time of the inspection, the engine had accumulated 258.5 hours since its most recent overhaul. The maintenance entry for the annual inspection of the engine noted that the propeller governor was removed and reinstalled for overhaul. The entry noted that the oil was changed and a ground run accomplished with satisfactory results.

The airplane was powered by a Lycoming IO-360-A3B6D engine, serial number RL-20029-51A, rated to produce 200 horsepower. Initial examination of the airplane revealed oil streaking on the fuselage emanating from the cowl. Examination of the engine after the accident revealed that no oil was present in the engine and the aft connecting rod was protruding from a hole in the top of the engine crankcase. The propeller governor installation appeared to have been accomplished according to the instructions contained in the maintenance manual and leaking from the governor pad was not observed. The crankcase oil drain plug was installed with safety wire and no leaks observed. The source of the oil leak could not be identified. During later disassembly of the engine, it was found that the No. 4 connecting rod cap was missing and the crankshaft end of the connecting rod was deformed and discolored. Pieces of the missing connecting rod cap were found within the debris collected from the engine crankcase. While disassembling the engine it was noted that very little torque was required to remove the intact connecting rod cap bolts, particularly on the No. 3 connecting rod. The No. 1 connecting rod and

bearing showed no evidence of heat discoloration. The No. 2, 3 and 4 connecting rods all showed varying amounts of heat related discoloration with the No. 3 connecting rod showing more discoloration than the No. 2 connecting rod, and the No. 4 connecting rod showing more discoloration than the No. 3 connecting rod.

All of the recovered connecting rod bolts along with the No. 3 connecting rod and cap, and the fractured pieces of the No. 4 connecting rod cap were examined in the NTSB Materials Laboratory. The fracture surfaces on the recovered pieces of the No. 4 connecting rod cap were obliterated by post-fracture damage. A piece of the bolt was trapped in the fractured cap and its fracture surface was almost completely obliterated, but the remaining portions of the fracture surface exhibited features consistent with overstress failure. Heat tinting was observed on the No. 4 connecting rod, the submitted pieces of the No. 4 connecting rod cap, and on the crankshaft end of the No. 3 connecting rod assembly, including the No. 3 connecting rod bolts. No heat tinting was noted on the No.1 and No. 2 connecting rod bolts. The No. 3 connecting rod was intact, but the cap showed impact marks on the inboard face. The cap half of the bearing was present in the cap. The bearing was tinted dark consistent with heat damage, and the edges at the middle of the bearing were extruded outward. Pits, delamination, and smeared material were observed on the interior surface. The pits and delaminations had an orange color consistent with a copper-lead intermediate layer. One of the connecting rod bolts from the No. 1 cylinder exhibited necking deformation in the grip portion of the bolt shank. The connecting rod bolts from cylinders 1 through3 were measured in diameter and length and compared to engineering drawings. One connecting rod bolt from the No.2 cylinder was within the specifications for length and minimum diameter. The other No. 2 connecting rod bolt was 0.001 inch below the minimum diameter but within the length specifications. The remaining bolts were longer and smaller in diameter than the specifications.

Pilot Information

Certificate:	Private	**Age:**	58
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	November 23, 2010
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N2159D
Model/Series:	M20J	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	24-0547
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	May 11, 2012 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	4865 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	IO-360-A3B6D
Registered Owner:	On file	**Rated Power:**	200 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:	FSM,469 ft msl	**Distance from Accident Site:**	28 Nautical Miles
Observation Time:	15:53 Local	**Direction from Accident Site:**	270°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots / 16 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	170°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.87 inches Hg	**Temperature/Dew Point:**	33°C / 18°C
Precipitation and Obscuration:			
Departure Point:	Tulsa, OK (TUL)	**Type of Flight Plan Filed:**	None
Destination:	Tunica, MS (UTA)	**Type of Clearance:**	VFR flight following
Departure Time:		**Type of Airspace:**	

Airport Information

Airport:	Ozark Franklin County Airport 7M5	**Runway Surface Type:**	Asphalt
Airport Elevation:	648 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	22	**IFR Approach:**	None
Runway Length/Width:	3302 ft / 75 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor, 1 None	**Latitude, Longitude:**	35.510833,-93.839447

Administrative Information

Investigator In Charge (IIC):	Brannen, John
Additional Participating Persons:	William Kelly; FAA - Little Rock FSDO; Little Rock, AR
Original Publish Date:	June 11, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=83785