

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN23LA399

N9522Y - ENGINE EXAMINATION REPORT

March 26-27, 2024

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A. ACCIDENT

Location: Ava, Missouri
Date: September 1, 2023
Time: 1505 Central Time
Airplane: N9522Y, Beech 35-B33

B. N9522Y - ENGINE EXAMINATION REPORT

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C. DETAILS OF THE EXAMINATION

1.0 Factory Engine Examination

The investigative team arrived at the Continental Aerospace Technologies (CAT) factory in Mobile, Alabama, on March 26, 2024. The engine examination started on March 26, 2024, and concluded on March 27, 2024. Randy Bryant, a technician with the CAT Analytical Department, was also present and assisted with the examination work.

The engine was shipped from Missouri Aviation in Leeton, Missouri, to the CAT factory in a wood CAT engine crate. The wood crate arrived with no visible damage and the engine was removed from the wood crate and placed on an examination stand. The propeller was not shipped with the engine.

The engine is a Continental Motors IO-470-K reciprocating engine, serial number 92624-71-K-R.

The owner of Missouri Aviation, Marvin McCanles, was called on March 27, 2024, by the NTSB IIC. He reported to the NTSB IIC that the Hobbs meter in the cockpit of N9522Y showed 1,213.04 hours at the time of the accident. He further reported that when he removed the engine from the airframe, he did not see any anomalies with the engine oil system, and everything was intact and connected. He observed oil all over the engine and the engine compartment, but he did not see any anomalies as to why the oil departed from the engine, outside of the holes on top of the case.

The front right engine mount was found to be fractured from the impact sequence.

The engine was found intact, except for two holes on the top of the case, located aft of the number 2 cylinder.

The number 1 cylinder head was found separated from the cylinder barrel. The piston was found extended further than the normal travel of the barrel.

There were no signs of a fire sustained to the engine.

The engine case was split, and all cylinders were removed from the case. The crankshaft was also removed from the case. Various internal components had sustained corrosion (rust) due to the airplane sitting at the accident site for about a month before it was recovered.

The left magneto was found separated from the case, due to impact from the connecting rod. It was found zip tied in place.

Examination of the engine revealed that it suffered an oil drainage sequence while in flight. Onsite photos of the airplane, in a nose down position, showed oil on the underside of the fuselage and on the lower right side of the engine cowling.

Internal engine damage was observed in multiple areas from a lack of lubrication. Connecting rods #1, #2, #3, and #4 were found damaged. Connecting rods #1 and #2 were found separated from the crankshaft.

An engine oil sample was not obtained.

The oil filler cap was found intact, installed, and was in an airworthy condition.

The oil screen was removed, and no debris was observed in the filter media.

The Eaton Aeroquip E-Z oil drain sump valve, part number AE99950G, was found installed on the engine (located on the lower right, rear area of the engine) and was removed. There was no obvious impact damage from the accident sequence observed on the valve. When initially found, the retaining nut (knurled knob) on the

valve was able to be pushed upward by hand (toward the sump), and it could be rotated into the open position. Machine marks were found on the retaining nut. The nut would lock open, and when attempted to close, it would remain partially open. The o-ring was found exposed, at the top of the valve. The engraved guide area (machined groove) for the retaining nut was found severely damaged. The engine maintenance records, and the FAA historical airworthiness records did not have any listing of this valve being installed on the engine.

The NTSB IIC spoke with Steven Fowler on March 26, 2024, who is the president of American's Aircraft Engines in Collinsville, Oklahoma. He reported that he does not have the historical work order from when the engine was overhauled at his company. He also reported that his company never installs those valves on engines, and when an engine leaves his company after the overhaul work is completed, they never leave with one of those valves installed, only a brass plug.

The Eaton Aeroquip E-Z oil drain sump valve was shipped to the NTSB Materials Laboratory for further examination.

A hardness test was performed on the number 1 cylinder head by a CAT metallurgist and no anomalies were noted during the test.

All the spark plugs were removed from the cylinders and were examined. All spark plugs exhibited a worn normal condition per the Champion Aerospace Check-A-Plug Card AV-27.

The two intact magnetos were bench tested. Both magnetos tested successfully, with spark emitting from all leads, with no anomalies noted. The ignition harnesses were found intact and undamaged.

The intact engine-driven fuel pump was removed from the engine, it was examined, and no anomalies were noted. The pump produced air at the outlet port when actuated by hand. No liquid drained from the pump when it was tilted. It was partially disassembled and no damage to the rubber diaphragms or other internal components was observed.

The flow divider and injector nozzles were found intact and were removed from the engine. No fuel was observed, nor was any contamination observed.

A fuel sample from the engine was not obtained.

The intact propeller governor was removed from the engine. The propeller governor was actuated by hand with no anomalies noted.

Except for the loss of engine oil and the damaged oil drain sump valve, there were no other anomalies noted with the engine.

2.0 Engine Maintenance Records Review

The engine maintenance records shipped with the engine. A review of the engine maintenance record showed that the engine was overhauled on April 28, 2003, by America's Aircraft Engines in Tulsa, Oklahoma. The overhaul occurred at a total time of 3,101.7 hours and 0 hours time since major overhaul.

The last entry in the engine maintenance records occurred on August 1, 2023, which was one month prior to the accident date. The entry was for a 100-hour/annual inspection for the engine. The entry stated that an oil change was not performed, however it stated, "examined screen for metal content - none found." All cylinders were inspected with a borescope and no anomalies were noted. The engine was test run, and the operations check was successful with no anomalies noted. For this entry, the N9522Y tach time was 1,210.12 hours and the total time for the airframe was 5,586.57 hours. The engine total time was 3,775.73 hours and the engine time since major overhaul was 674.02 hours.

An entry in the maintenance records, after the most recent 100-hour/annual inspection, was for January 1, 2023. This entry was at tach time of 1,204 hours and was for an oil change, performed by the airplane owner.

Prior to the work performed on August 1, 2023, the most recent work performed was on June 1, 2022, for a 100-hour/annual inspection.

An area of concern when reviewing the engine maintenance records occurred between two 100-hour/annual inspections for the engine, for one occurring on August 1, 2014, and another occurring on September 14, 2015. In between these two dates, one whole page was found cut out from the engine maintenance records and part of another page was found cut out. The cut-out portions from the engine maintenance records were not reviewed and were not located. It was undetermined why these pages were cut out.

The historical FAA airworthiness and registration records were retrieved and reviewed.

Submitted by:

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Investigator-In-Charge