

**Field Disassembly and Inspection Summary
Continental IO-550-N(50)
Serial Number 691410**

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This engine was involved in an aircraft accident which occurred on August 16, 2020, at approximately 1320 EDT at Osage Beach, MO. The pilot and one passenger were fatally injured in the accident.

Witnesses reported seeing the aircraft take off normally. Shortly after take off, the aircraft began trailing smoke, and initiated a left turn back to the airfield. The aircraft descended nose-down in a near-vertical trajectory, and impacted terrain in a wooded area. Much of the wreckage was consumed by a post-impact fire. Examination of the wreckage at the scene did not find any pre-impact anomalies which contributed to the accident. The engine and associated components were removed to a secure location at Lake Aviation, Camdenton, MO, for examination.

Examination of the engine and components was conducted on August 18-19, 2020, by David S Johnson, Aviation Safety Inspector, GA Maintenance, Kansas City FSDO, assisted by Kenneth Terry, A&P/IA, of Lake Aviation.

Initial Presentation

The engine exhibited severe impact damage of the cylinders, intake and exhaust systems, accessories, and turbochargers. Damage from fire, including discoloration and melted components, was apparent from cylinders 1&2 rearward, and from the engine case downward. The propeller hub remained attached to the crankshaft mounting flange. The composite propeller blades displayed broomstrawing damage consistent with high-energy impact. All engine controls remained attached to their respective engine components.



Cylinders

All cylinders exhibited severe forward impact damage. The head assemblies of cylinders 3, 5, and 6 broke apart on impact. The rocker arm assemblies, including arms, shafts, housings, and covers were found separated from the remainder of the heads. All cylinders were displaced forward, and showed broken mounting studs and through-studs, bent and cracked cooling fins, and severe deformation. Cylinders 1 and 2 exhibited heat deformation consistent with post-impact fire. Cylinder 1 was partially melted on the anterior lower areas, and the cylinder head assembly had expanded and partially melted away from the cylinder assembly. All cylinder components were found, either attached to the engine or at the accident scene.

One set of spark plugs was removed from each cylinder. The spark plugs from cylinders 2, 4, and 6 exhibited dark discoloration, consistent with soot. Several spark plugs were impact damaged, and could not be removed in the field. A borescope inspection of each cylinder was performed, with no remarkable findings. The valve covers were removed from each cylinder where present. No pre-impact defects were found within the valve assemblies.

Cylinders 1, 3, and 5 were removed from the crankcase assembly for examination. The cylinder walls showed damage from the piston assembly's displacement at impact, and oxidation consistent with high-heat fire. The pistons, piston rings, piston pins, connecting rods, pushrods and tubes, and valve components showed no pre-impact anomalies.



Crankcase and Internal Components

After the removal of cylinders 1, 3, and 5, the internal components of the engine were examined. The engine could not be rotated. The crankshaft, camshaft, and lifters remained intact and in place, and exhibited only discoloration consistent with fire. No metal debris was found within the crankcase.



Intake and Exhaust

The intake and exhaust assemblies remained largely intact and attached to the engine assembly. The turbochargers were found at the impact site, separated from the exhaust system and their respective mounting components (see below). The intake and exhaust components were removed from the engine for examination. All components were damaged by impact forces. No pre-impact anomalies were found with the intake or exhaust components.

Fuel System

Much of the fuel system was destroyed by fire, which precluded examination. The fuel filter bowl, fuel selector valve and engine compartment fuel hoses components were not identified, and are presumed to be consumed by fire. The mounting tabs from the engine driven fuel pump were found sheered from their attachment points. The engine driven fuel pump was not found, and is presumed to have been destroyed by fire. The fuel manifold/flow divider remained intact and attached to all related fuel lines. No pre-impact damage was found in the fuel supply line, vent line, or the individual fuel lines between the fuel manifold and each fuel injector. The fuel manifold was disassembled and inspected. All internal components remained intact. The manifold seals were brittle, likely as a result of high heat (fire), but otherwise complete and intact. The filter was free of contaminants. The spring and pintle assemblies moved freely within their housings. The diaphragm was also brittle, but intact and complete.



Ignition System

The left and right magnetos remained attached to their respective mounting pads. Both displayed melting and deformation consistent with post-impact fire. All internal plastic components were melted, which precluded testing. The P-Leads remained attached to their respective studs. All spark plug harness leads remained attached at both the distributor and plug ends. Although much of the harness had melted, the metal shielding remained intact for each lead. No pre-impact anomalies were found with the ignition system.



Lubrication System

Much of the lubrication system was destroyed by fire. The oil pump housing, oil filter, and oil sump housing were largely destroyed by fire, and could not be examined. The oil sump tube within the oil sump remained intact, and displayed only discoloration consistent with post-impact fire. No oil residue was found, and is presumed to have been burned off by fire. No metal debris, pre-impact overheating, scoring, or other evidence of oil starvation was found in any part of the engine.



Turbochargers

The left and right turbochargers were found at the accident site, separated from the remainder of the engine and exhaust system. The left turbocharger remained largely intact. The left impellor and housing displayed scoring and deformation consistent with high-speed rotation at impact. The right turbocharger displayed impact and fire deformation of much of the aluminum housing. The right impellor displayed deformation consistent with high-speed rotation at impact. Both left and right turbochargers remained attached to the exhaust system with V-Band Clamps which remained attached and intact. The lubrication supply and scavenge lines remained attached to both turbochargers. All controller and wastegate components displayed damage consistent with impact forces, and discoloration from fire. No pre-impact anomalies were found with the turbocharger systems.



Conclusion

The scope of this investigation was limited to disassembly and visual examination in the field. NTSB and manufacturer representatives were not on-site for this investigation – coordination occurred through phone calls, text messages, shared pictures, and video conferencing. No pre-impact anomalies were found during the scope of this engine examination which would have caused or contributed to this accident.