



December 12, 2019

Covington Aircraft Engines, Inc.

Work Order:	12637
Customer Information:	Werth Aerial Spraying/NTSB
Engine Information: Model:	Pratt & Whitney R-985 AN-14B
Engine Serial Number:	225708
Type of Incident:	Crash
Previously Overhauled By:	Covington
Reason for Engine Removal:	Airframe Accident

Engine Report

Objective:

Covington Aircraft has compiled this report to provide factual information relating to the condition of the engine in its as received condition, and report any abnormalities, failures, or other damages found during the course of the engine disassembly.

The engine condition as received showed major fire damage to rear section of the engine, with the Accessory section and Magnetos having sustained major fire damage. The Propeller blades were significantly bent and the engine mount was also heavily damaged.



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Engine as received (Front)
Photo # 1



Engine as received (Rear)
Photo # 2



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Propeller as removed
Photo # 3



Engine (Front View)
Photo #4



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Engine Accessory Case with Magnetos attached (Rear View)
Photo #5



Nose Inspection Port – (*Note - Cam Hub Rivets intact)
Photo #6



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Cam as removed
Photo # 7



Power Section with Cylinders and Nose Case removed
Photo # 8



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Crankshaft Assembly as removed
Photo # 9



Master Rod Bearing
Photo # 10

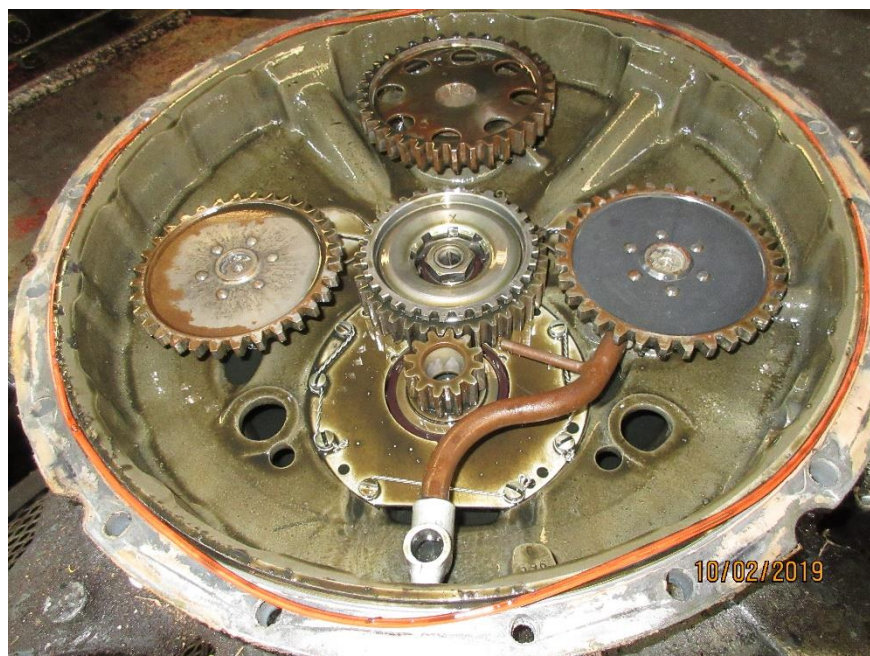


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Cylinders and Pistons as removed
Photo #11



Blower Section as removed
Photo #12



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Blower Section as disassembled
Photo #13



8797 Floating Gear (*Note damage to teeth)
Photo #14



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Main Bearing Race #1
Photo #15



Main Bearing Race #2
Photo #16



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Carburetor (Top half)
Photo #17



Carburetor (Bottom half)
Photo #18



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Summary:

The engine sustained major damage due to the crash and subsequent fire. Most of the heavy damage was confined to the Blower/Accessory section of the engine. The Blower/Accessory section was heavily damaged with the left Magneto almost totally destroyed due to fire and the right Magneto heavily damaged. The Rear Accessory case sustained impact damage in the area of the Carburetor mount pad on the mid to lower section of the case. Upon initial inspection of the engine, it was noted that the crankshaft could not be turned completely through. This condition was present even after removal of all 9 Cylinders. After removing the crankshaft assembly from the engine, it was noted that the master rod assembly moved freely around the crankpin in a normal manner. The Propeller was removed and the engine was disassembled down to the Blower/Rear section. It was found that the difficulty in turning the engine through was caused by the Blower Gear train. Upon closer inspection, it was found that the 8797 Floating Collector Gear had multiple substantially bent gear teeth. The Carburetor had sustained impact damage and was partially disassembled for inspection. No abnormalities were found in the Carburetor. An additional inspection was made of the magnetos.

Crankshaft

Although the engine could not initially be rotated completely through, the master rod assembly could rotate freely on the crank pin once removed from the engine. All components of the Crankshaft assembly indicated normal wear with no indications of a failure. Additionally, the lead and silver coating of the Master Rod Bearing I.D. was intact and showed no signs of excessive scoring or de-lamination. (Photos 9 and 10)

Cam

The Cam Hub assembly was intact with no sign of broken or loose rivets. Additionally, the Intake and Exhaust Cam tracks showed no sign of failure or damage. (Photos 6 and 7)

Pushrods

The ball ends of all pushrods were all tight and showed no indication of failure.

Cylinders

All Cylinders were inspected and no damage was present. A close inspection was made of the Rocker Springs and all were found to be in within specified limits. The pistons were inspected and all rings were intact. No abnormalities were noted with the Cylinders.



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Power Section:

No abnormalities or damage was noted during the disassembly of the Nose/Power section with the exception of the Crankshaft not being able to be fully rotated through.

Blower/Rear Section:

The Rear Accessory case was heavily damaged from fire and impact during the incident. Upon disassembly of the Blower section, it was found that the 8797-gear contained multiple bent teeth. The nature of the damage to the gear teeth was consistent with a sudden stoppage of the engine. These teeth were bent severely enough to prevent the engine from being fully rotated through.

Carburetor:

Although heavily damaged from the fire and impact of the engine to the ground, the inspection of the Carburetor did not reveal any abnormalities that would prevent the unit from functioning.

Conclusion:

No items were found during the inspection of the engine that could be considered as a cause for a partial or total loss of power. Although the engine could not be fully rotated through, it was determined that the root cause of this was the severely bent teeth on the 8797 gear. It is likely that the bent teeth were a result of the Prop Strike/Sudden Stoppage of the engine during the incident. An additional factor that points to a Prop Strike/Sudden Stoppage of the engine is that the 8797 and corresponding gear showed no abnormal signs of wear on the gear teeth which would be present if the engine was operated with bent teeth for a prolonged amount of time.

Regards

Logan Simmons

Chief Inspector

Covington Aircraft, Engines, Inc.