

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR23LA184

INVESTIGATIVE SUPPLEMENTAL MATERIAL

ACCIDENT

Location: Creswell, Oregon
Date: 05.09.2023
Time: 1750 Pacific standard time
Airplane: Rans S-21

INVESTIGATIVE SUPPLEMENTAL MATERIAL

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HISTORY OF FLIGHT

On May 09, 2023, about 1750 Pacific daylight time, a Rans homebuilt airplane, N468MM, was substantially damaged when it was involved in an accident near Creswell, Oregon. The pilot, the sole occupant, was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot and his son had recently finished building the airplane. The accident flight was a series of test flights the pilot was performing after making cowling modifications. After a normal departure, the pilot flew to a test area and was inflight for about 20 minutes. While the pilot was maneuvering at about 700-900 feet above ground level (agl), the engine made “rough” sounds and vibrated. About 20 seconds later, the propeller seized and the pilot made a forced landing in the field below. During landing roll out, the airplane flipped over and came to rest inverted.



Figure 1: Wreckage at the Accident Site

ENGINE

The UI Power 520T engine was intact. The cowlings had been removed. There was trace amount of oil on the bottom cowling and oil collected on the bottom of the Nos. 2,4,6 cylinders. The top spark plugs were removed and all showed signatures that the engine representative stated were consistent with normal operation. The valve covers were removed and clean oil was coated on all the insides.

The turbocharger compressor and turbine wheel could both rotate. The wastegate bango fitting was finger tight at the wastegate and tight at the boost valve.

Removal of the oil sump drain revealed that the magnetic plug was full with ferrous metal. Removal of the oil sump revealed there were pieces of metal in the pan.

Upon applying force to the propeller, the engine would not rotate through. Investigators were unable to rotate the crankshaft by hand utilizing the propeller; it would only rotate a few degrees before binding. Clean, uncontaminated oil was observed at all six rocker box areas. Removal of the cylinders revealed that the combustion chambers and pistons were undamaged. Removal of the oil sump drain revealed that the magnetic

plug was full with ferrous metal and metal pieces were found in the oil sump. The oil pump was disassembled and there was limited metal found inside, with the exception of the bypass spring.

Upon applying force to the propeller, the engine would not rotate through. Removal of the pistons revealed that the crankshaft was fractured at a web, just aft of the journal of the No. 2 connecting rod. The thrust bearing mount was able to move forward and aft.

Disassembly of the crankcase revealed that the six connecting rod journals still had their respective rods and caps attached; all were able to be easily rotated about their respective journals.

The fracture exhibited a half-moon shape, having proceeded through approximately half the web. The fracture surface was relatively shiny and reflective, with some areas of heat tinting on the forward face. The preliminary assessment of the fracture surfaces were consistent with a fatigue fracture at the radius on the connecting rod journal

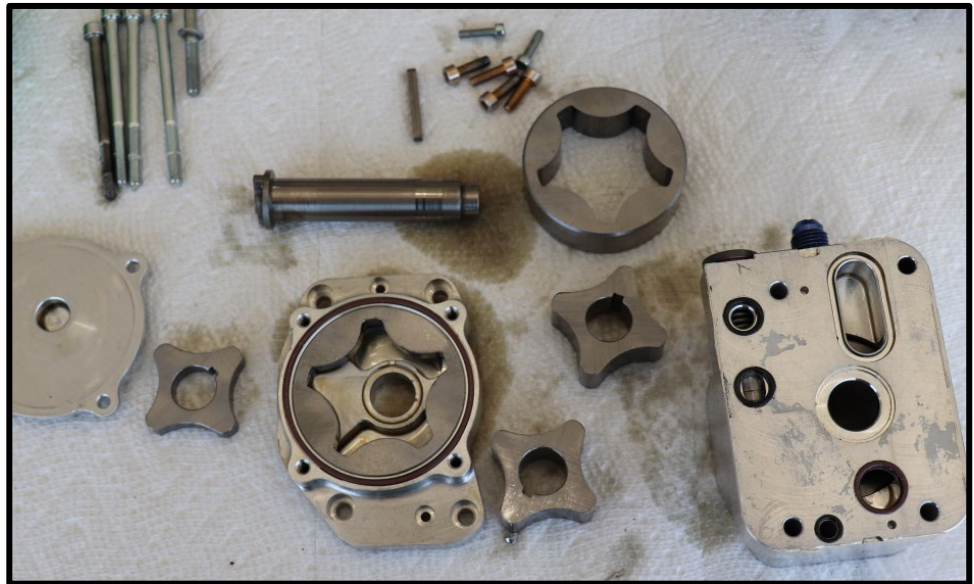


Figure 2: Magnetic Plug and Oil Pump



Figure 3: Crankshaft



Figure 4: Cylinders, Pistons, Tappets, Bearings



Figure 5: Cylinders, Pistons, Tappets, Bearings with Crankshaft



Figure 6: Crankshaft Fracture Surface



Figure 7: Crankshaft Fracture Surface (other side)



Figure 8: Journal Adjacent to Fracture Surface



Figure 9: Turbocharger Housing



Figure 10: Turbocharger

PROPELLER BLADES

The Airmaster AP545CTF controllable 4-bladed propeller remained attached to the engine.