



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

Mar 24, 2022

ENGINE EXAMINATION SUMMARY REPORT

WPR20L094

This document contains 7 embedded photos.

A. ACCIDENT

Location: Eagle Point, OR
Date: Jan 21, 2021
Aircraft: N322TR
NTSB IIC: James Bledsoe

Preliminary Report:

On January 25, 2021, about 1200 pacific standard time, an experimental Randy Wayne Maloney M1, N322TR, was destroyed when it was involved in an accident near Eagle Point, OR. The pilot and passenger received minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot and ATP rated passenger departed Shady Cove, OR (OG31) enroute to Ashland, OR (S01). While cruising straight and level at 3,000 msl the engine began to sputter and the airplane began to descend. In anticipation of a forced landing, the pilot flew towards farm fields. At approximately 50 feet agl the engine RPM began to increase slightly so the pilot maintained that altitude momentarily. In attempt to avoid stalling the pilot decided to remain low level assuming engine problems would reoccur. While at that low altitude the airplane struck a cable. As the airplane descended the pilot attempted to control the airplane to a suitable area but struck a tree adjacent to an open field. After impacting the ground and with only minor injuries, the pilot and passenger successfully egressed prior to the airplane catching on fire. Airplane was subsequently destroyed with minor property damage to a small grass area surrounding the crash site.

The airplane and engine were retained for further examination.

EXAMINATION PARTICIPANTS:

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SUMMARY

Examination of the recovered engine was conducted on March 29, 2022, at a private hangar at Shady Cove airpark. The engine, a Lycoming O-435-25A, serial no. 1309-27A was separated from the airframe. The engine was separated from the airframe and was placed on a steel worktable just outside a private hangar. The initial survey looking at the overall condition revealed obvious signs of impact and thermal damage from the post-crash fire. Some of the ducting was intact, other parts only had the metal wire pieces remaining because of thermal damage. Black and grey engine components were accounted for and there were no missing components. Impact and crushing deformation were present to parts of the exhaust manifold and carburetor. The crankcase was intact without cracks, holes, or deformation but showed signs of thermal damage. The air intake box was separated from its mount but remained attached by the hose. The engine examination revealed no evidence of preaccident mechanical malfunctions that would have precluded normal operation.

ENGINE EXAMINATION

The propellor was removed and not present for the examination. The propellor flange intact but had a 2 inch in length bend which protruded 1/8 of an inch forward. This minor deformation was most likely caused from a propellor strike consistent with impact damage.

Engine truss was examined and revealed that all tube structure was either broken or cutaway from connections. The crankcase mounting structure was normal and intact with minor cracking of the rubber vibration dampener bushing. The engine truss sustained impact damage. Sections of the engine truss had mechanical cuts sustained during the recovery process.

Exhaust was removed and inspected. Engine exhaust was intact with manifold mating surfaces properly connected except the no. 4, which was breached and separated at the mating flange from impact damage. Surface corrosion was observed but no cracks or deformation except for impact damage on the left side. The exhaust was disassembled and revealed no anomalies or obstructions.

The intake manifold was intact and visually inspected prior to removal. Minimal impact damage to the intake was present but moderate thermal damage was present with the system attached to the manifold.



Figure 1- Intake manifold

All other engine accessory components were installed and appeared normal with thermal damage.

The left magneto was attached and intact to the engine accessory section, however the right magneto was separated from the accessory section, but had thermally damaged wires still attached to spark plug leads. Both magnetos are Slick model 4373. Left is serial number 99030732. The gears showed signs of normal wear without any obvious damage of cracking or missing gear teeth. Normal amounts of surface corrosion on the gear teeth were present on the right magneto. Cover had extensive thermal damage and rotation was limited to 90 degrees.

Right magneto broke at the engine accessory mounting points. Right magneto serial number is 99080784. Cover was removed and inspected. The magneto was seized and showed signs of thermal damage.

The oil cooler was detached from its mounting points but remained attached to the oil sump lines.

The carburetor remained attached to the engine but showed signs of impact and thermal damage. The throttle control moved freely without stiffness or binding. The mixture control was moved from full stop to full stop without resistance or binding. The carburetor heat control was moved from full stop to full stop without resistance or binding. The internal portion of the carburetor was visually inspected and found to be free of debris. No deformation or cracks were present. The finger screen was free of debris or obstruction. The floats were free of deformation but coated with corrosion from thermal damage. Air was lightly blown through the fuel line and free of blockage or obstructions.

All spark plugs were removed and inspected. The leads on the aft cylinders showed signs of thermal damage. Cylinders 1 and 3 bottom leads were attached to left magneto. #1 top lead was attached to magneto. The no. 3 top lead was severed from tension overload consistent with impact damage. No. 2 lead bottom was attached to the right magneto. The number 4 bottom lead was attached to the right magneto. The no. 2 top lead was severed and showed signs of thermal damage. The number 4 top lead

was connected to the right magneto.



Figure 2-Spark Plugs

Crankcase was free of holes, cracks, or discoloration. Oil pan was removed, and residual oil appeared normal. No metal shavings or fragments were present. The filter screen was removed and showed no

debris.

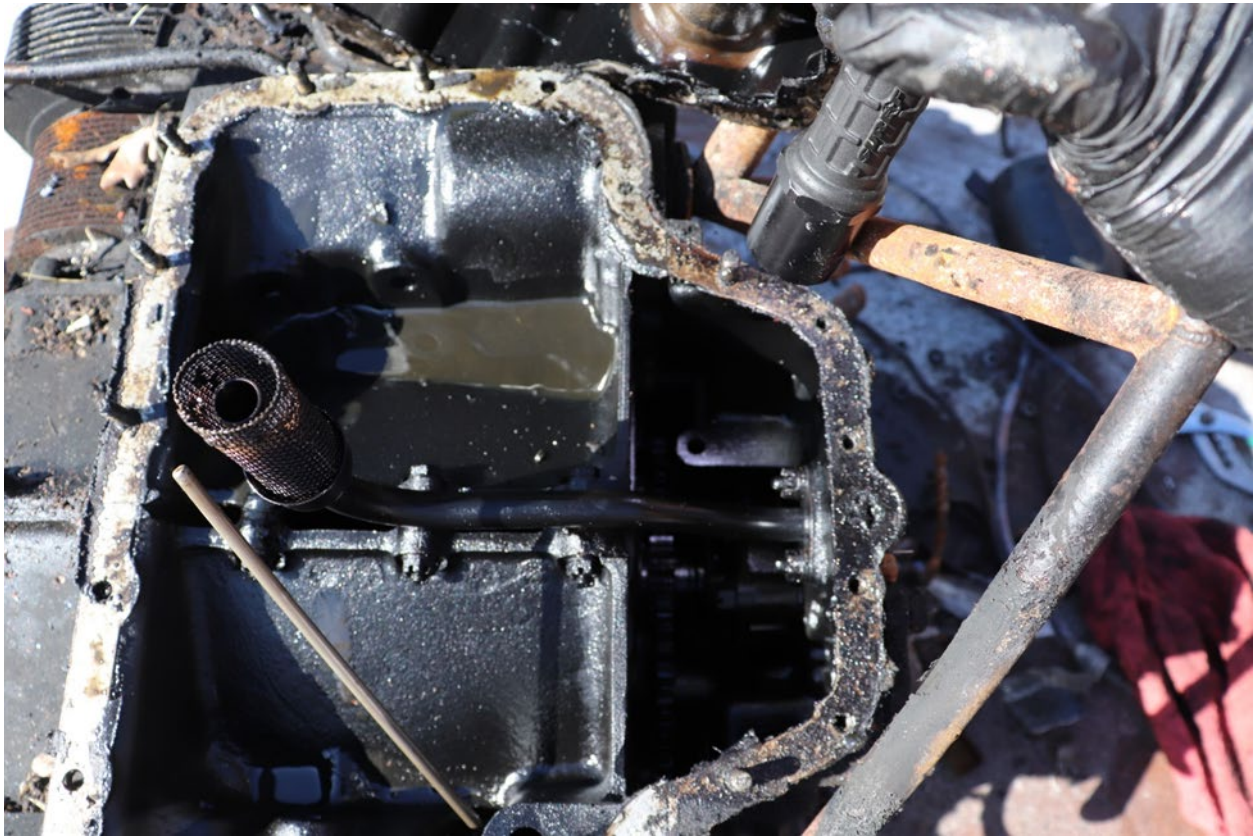


Figure 3-Crankcase

Mechanical continuity of the engine was tested by turning the gear located at the vacuum pump location of the accessory portion of the engine. Initial attempts to turn the engine showed the engine was in a seized condition but broke free as more pressure and torque was applied. It is undetermined which component seized and whether the seize occurred post impact. Once the engine components broke free the engine was rotated without any binding or resistance. There were no abnormal sounds or grinding as the engine was rotated. Mechanical continuity was verified of the crankshaft, push rods, cams, valves and pistons. All intake and exhaust valve rockers moved symmetrical. Each cylinder was visually inspected with a borescope.

A collection of mechanical parts, including a large coil spring, a piston, a connecting rod, and various bolts and washers, laid out on a blue surface. The parts are arranged in a row, showing different components of an engine or machinery. The background is a light blue surface, and the parts are dark and metallic.



Figure 5- Cylinder 1



Figure 6 Cylinder 1-Valve Seat



Figure 7- Piston 1

The initial inspection of the overall engine condition revealed the **cylinders** having bent cooling fins on the number 4 cylinder, most likely from impact. Aft cylinders showed more thermal damage than the others. The number 2 cylinder exhibited oil on the bottom portion of the cylinder. The number 1 cylinder had ground debris from impact and thermal damage. The number 3 cylinder showed signs of thermal damage. All cylinder bolts were intact and were safety wired. Inspection of the push rod tubes revealed thermal damage otherwise in normal condition. No loose, bent, broken or deformed tubes. All oil return lines were intact and normal.

Cylinder 1 Borescope

Oily components were noted most likely from storage. No signs of valve to piston contact. No cracks or deformation. No discoloration. Cylinder walls normal. Carbon buildup on piston top and upper part of cylinder near valve housing. No signs of detonation or pre ignition.

Cylinder 2 Borescope

Oily components most likely from storage. No signs of valve to piston contact. No cracks or deformation. No discoloration. Cylinder walls normal. No signs of detonation or pre ignition.

Cylinder 3 Borescope

Piston top with carbon buildup. Valves showed surface corrosion. No signs of valve to piston contact. No cracks or deformation. No discoloration. Cylinder walls normal. No signs of detonation or pre ignition.

Cylinder 4 Borescope

Piston top with carbon buildup. No signs of valve to piston contact. No cracks or deformation. No discoloration. Cylinder walls normal. No signs of detonation or pre ignition.

Submitted by: James Bledsoe