



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

August 19, 2021

AIRFRAME AND ENGINE EXAMINATION

WPR21LA303

This document contains 8 embedded photos.

A. ACCIDENT

Location:	Yelm, Washington
Date:	June 10, 2021
Aircraft:	Cessna, 172S, N513WF
NTSB Investigator-in-Charge:	Albert Nixon

B. PARTICIPANTS

Eric M. Gutierrez
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C. SUMMARY

Examination of the recovered airframe and engine did not reveal evidence of any mechanical anomalies that would have precluded normal operation.

D. DETAILS OF THE INVESTIGATION

1.0 Aircraft Examination

Examination of the recovered wreckage revealed that the nose landing gear had impact damage, the top section, at the firewall attachments was bent aft. The firewall from exhibited crushing and bending aft. Both wings, horizontal stabilizer, vertical stabilizer, rudder and elevator were removed by recovery personnel. Additionally, the recovery personnel had drained the fuel from both fuel tanks.



Figure 1. View of airplane during examination

Visual inspection of the left and right fuel caps revealed that both fuel caps rubber seals appeared worn. The observed tach / MX hours meter time was 999.5 hours and the hobbs meter time was 9,595.6 hours.



Figure 2. View of right fuel cap



Figure 3. View of left fuel cap

Throttle and mixture control continuity was established from the cockpit controls to the fuel servo, and moved from stop to stop when actuated by hand.

A visual inspection was conducted of the fuel system. Continuity was established from the main fuel tanks throughout the system to the fuel injector nozzles. Visual inspection of the gascolator fuel and minor debris consistent with normal operation. The fuel was tested for water using SAR-GEL water finding paste, with negative results. An external fuel tank was attached to the right-wing fuel line. The fuel lines from the fuel flow divider were disconnected from the fuel nozzles. When the airframe electric fuel pump was turned on, fuel expelled from all four fuel injector lines.



Figure 4. View of SAR-GEL water finding paste

2.0 Engine Examination

Engine Manufacturer: Lycoming

Engine Model Number: IO-360-L2A

Engine Serial Number: RL-7247-51E

Examination of the recovered engine revealed that it remained attached to the engine mounts. All four cylinders and all engine accessories remained attached. All fuel and oil lines appeared attached to their respective fittings and were tight. No evidence of any mechanical damage was observed to the engine crankcase.

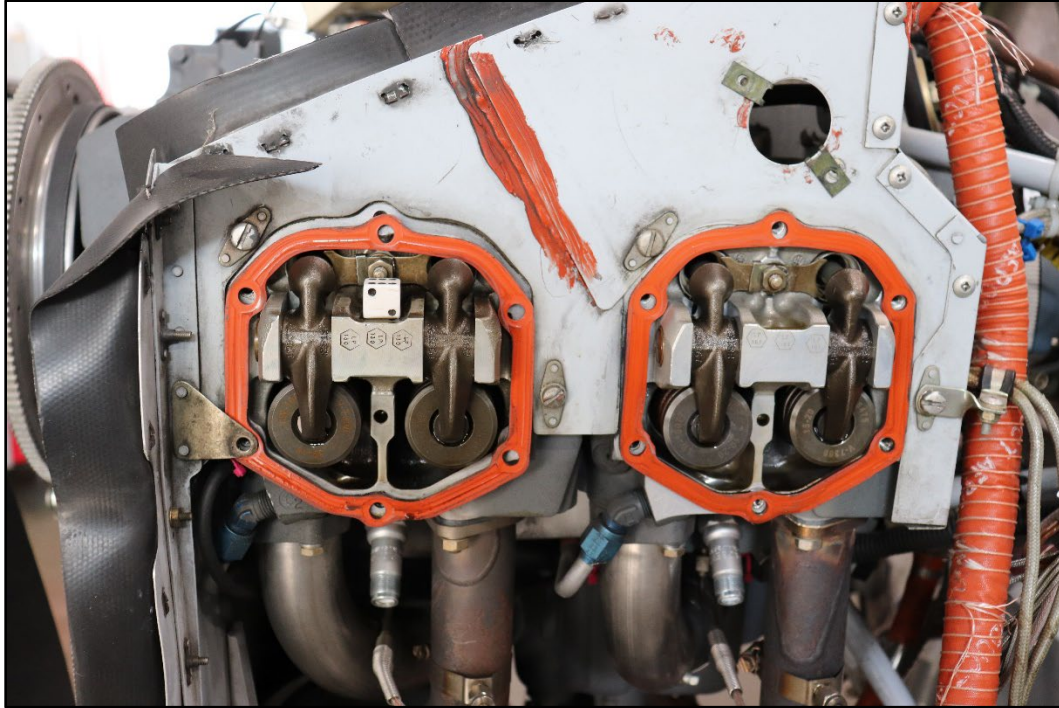


Figure 5. View of left side of the engine

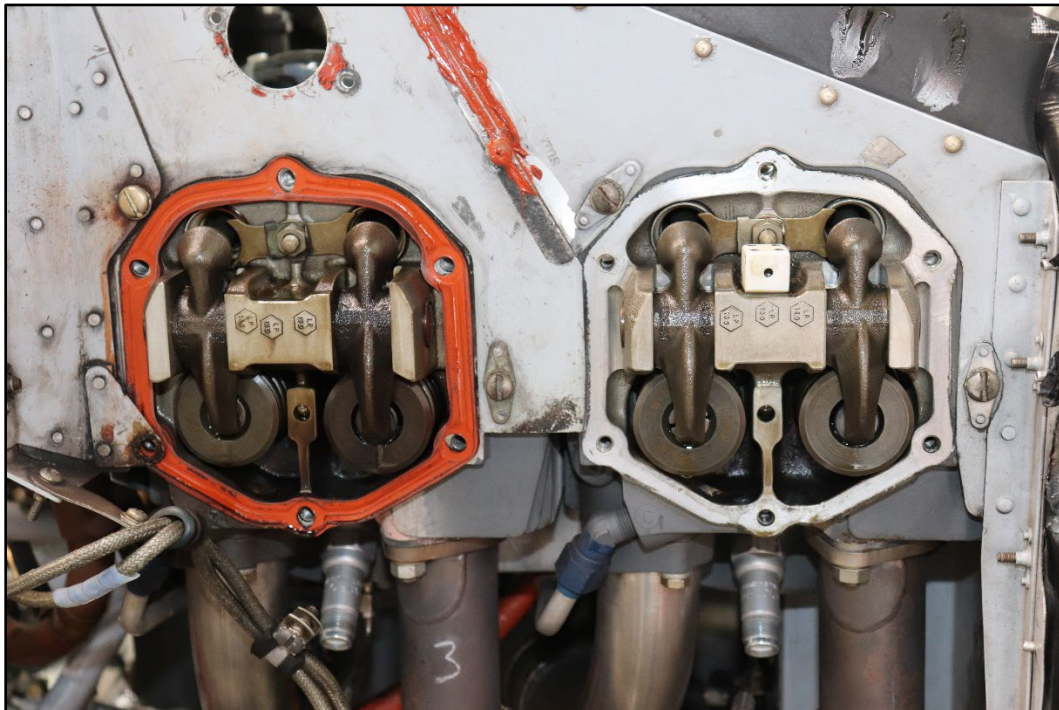


Figure 6. View of right side of the engine

The rocker box covers were removed. The intake and exhaust rocker arms were intact and oil coated on all cylinders. All intake and exhaust valve springs on all cylinders were in place and visually appeared to be undamaged. The upper spark plugs were removed, and all four cylinders were examined internally using a lighted borescope. A normal amount of combustion deposits was observed within the combustion dome of each cylinder and piston face. All of the intake and

exhaust valves were unremarkable. The crankshaft was rotated by hand using the propeller. Rotational continuity was established throughout the engine and valve train. Thumb compression and suction was obtained on all four cylinders.

The top spark plugs were removed from the engine and they were the massive electrode type. Light gray coloration within the electrode areas was observed. When compared to the Champion Check-A-Plug chart, the sparkplugs exhibited NORMAL use signatures.

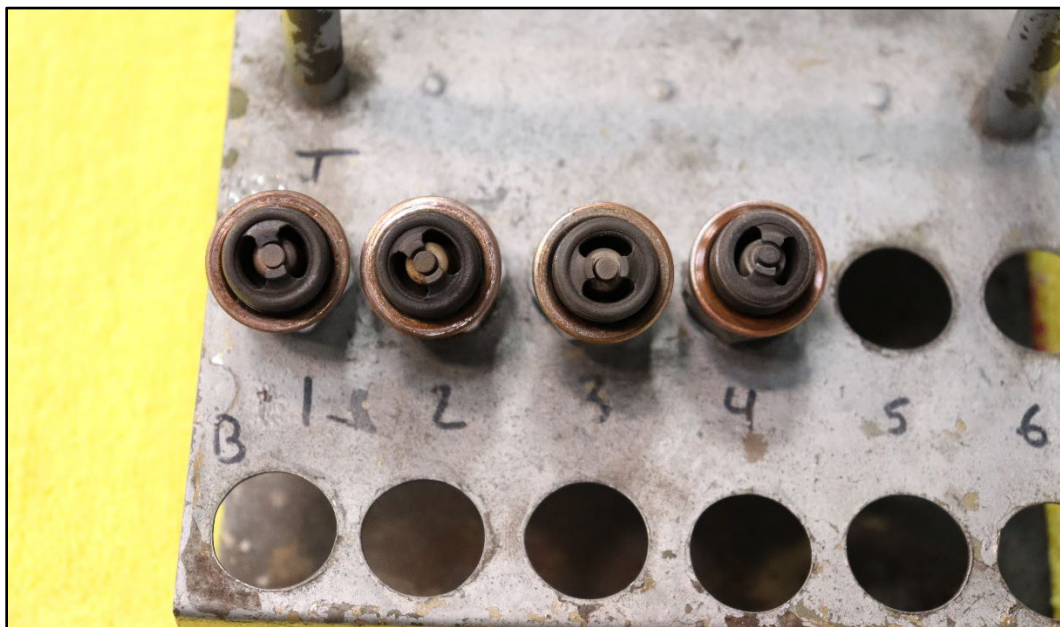


Figure 7. View of top spark plugs

The induction system was examined internally using a lighted borescope. The induction system was free of obstructions and undamaged. The air filter was not present during examination.

The exhaust system remained secure to the cylinders. No evidence of any exhaust leaks around the cylinder attach points were observed. The exhaust system was examined internally using a lighted borescope and the internal baffles were intact and unremarkable. A two inch section of the exhaust exhibited crushing, consistent with impact damage. The damaged portion of the exhaust stack was cut off to facilitate an engine run.

The left and right magnetos remained attached to the engine accessory case with no external damage noted. The right engine to magneto timing was verified at 25°. When the engine crankshaft was rotated by hand using the propeller, spark was produced on four ignition leads from the right magneto and impulse coupling engagement was heard. The left magneto was equipped with an electric ignition system.

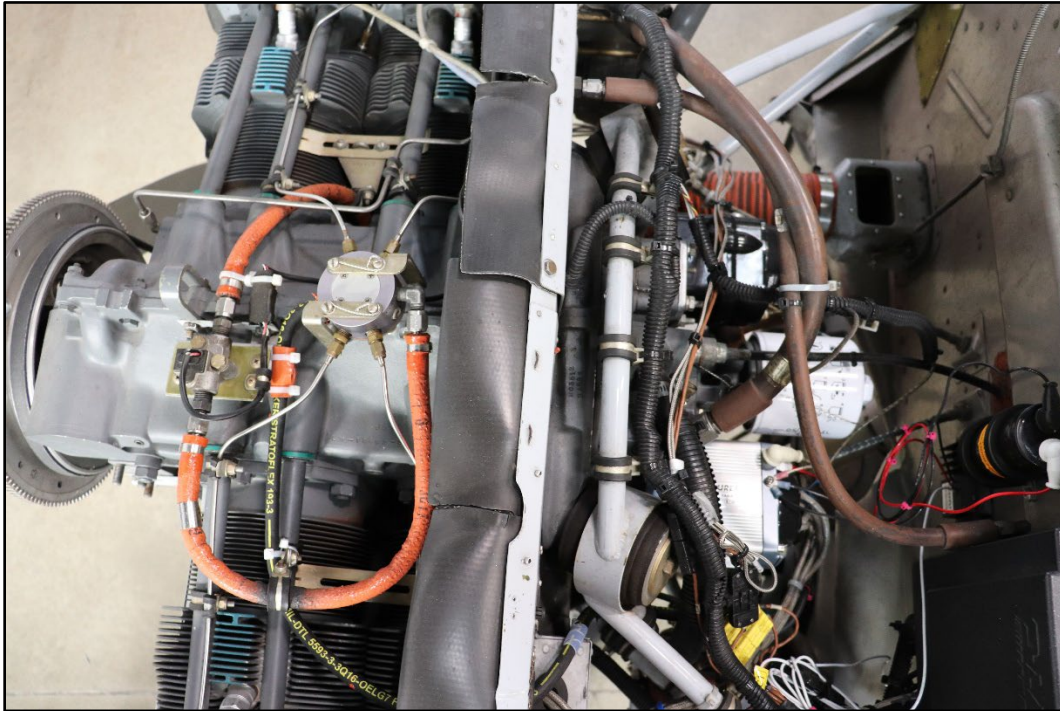


Figure 8: Overview of magnetos

An external fuel tank was attached to the right wing fuel inlet line. During an initial attempt to start the engine, the engine ran for a moment before it shut down. Additional fuel priming was conducted using the airframe electric fuel pump, the engine was started a second time. The engine ran throughout various power settings uneventfully for about 10 minutes. A functional check was conducted of the magnetos while the engine was at 1800 RPM. Both left and right magneto checks showed a decrease of about 50 RPM. When the throttle was advanced to the full forward position, the engine produced a static RPM of 2300.

Submitted by: Eric M. Gutierrez