



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

June 9, 2021

AIRFRAME AND ENGINE EXAMINATION

WPR21LA194

This document contains 10 embedded photos.

A. ACCIDENT

Location:	Lake Arrowhead, California
Date:	May 16, 2021
Aircraft:	Cessna, 210, N7350E
NTSB Investigator-in-Charge:	Eric M. Gutierrez

B. PARTICIPANTS

Joshua Cawthra
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C. SUMMARY

Examination of the recovered airframe and engine revealed no anomalies that would have precluded normal operation and the production of power. However, the upper and lower spark plug electrode areas were black in color, consistent with a rich fuel/air mixture.

D. DETAILS OF THE INVESTIGATION

1.0 Aircraft Examination

Examination of the recovered airframe revealed that the recovery organization had removed both wings and empennage for transport. The forward section of the fuselage, near the passenger door post had impact damage and was partially separated. Additionally, the recovery personnel had drained about 2 gallons of fuel from the left tank. The fuel selector lever was in the off position and the master switch was off. The observed tachometer time was 529.47 hours.



Figure 1. View of airplane during examination

The left and right wings exhibited impact damage. The airplane was equipped with bladder fuel tanks. Visual inspection of the right fuel cap revealed that the rubber seal appeared normal and unremarkable. A wrinkle in the right fuel bladder, about 6 inches in length, was noted near the fuel line pick up. The left fuel cap was missing. Both fuel filler ports were normal and unremarkable.

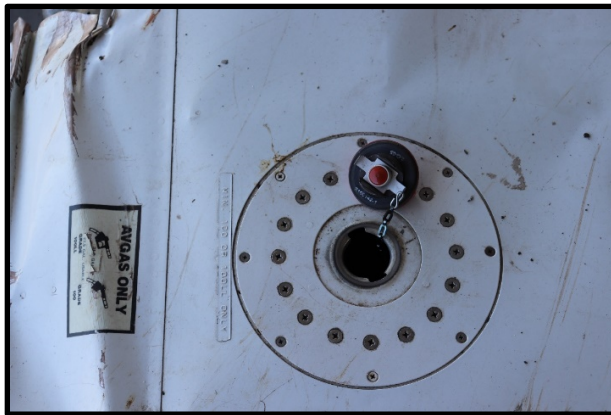


Figure 2. View of right fuel cap



Figure 3. View of left fuel filler port

Throttle and mixture control continuity was established from the cockpit controls to the throttle body. The throttle control cable was fracture separated at the throttle body, consistent with impact damage. The mixture control cable moved from stop to stop when actuated by hand.

Propeller control continuity was established from the cockpit controls to the propeller governor and moved from stop to stop when actuated by hand.

A visual inspection was conducted of the fuel system. Continuity was established from the fuel tanks throughout the fuel system to the throttle body. The fuel selector was placed in the left tank position. Air pressure was applied to the left wing pick up fuel line and fuel was observed coming from a fractured fuel fitting at the throttle body. The fuel selector was then switched to the right tank position. Air pressure was applied to the right wing pick up fuel line and fuel was observed coming from a fractured fuel fitting at the throttle body. The airframe fuel strainer screen was clear and unremarkable.

2.0 Engine Examination

Engine Manufacturer: Continental

Engine Model Number: IO-470-E

Engine Serial Number: 88683-71-E-R

Examination of the recovered engine revealed that the four engine mounts had fracture separated. All six cylinders and all engine accessories remained attached. All fuel and oil lines that were removed were tight. No evidence of any mechanical damage was observed to the engine crankcase.

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 were in place and visually appeared to be undamaged. The upper spark plugs were removed, and all six 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 six cylinders.



Figure 4. View of left side of the engine

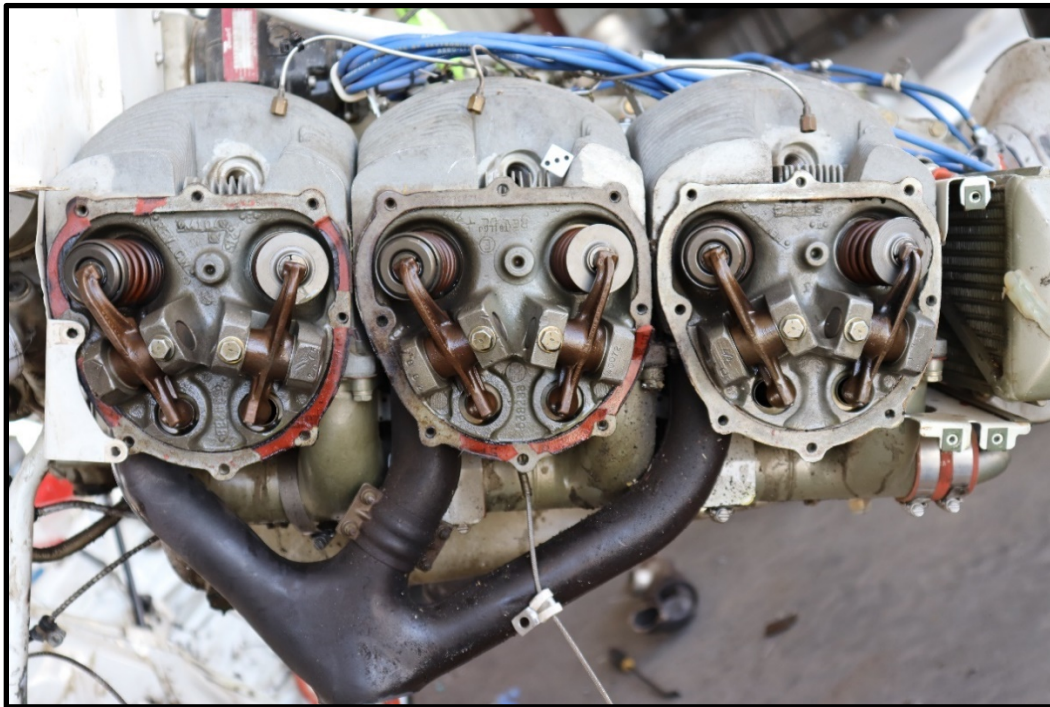


Figure 5. View of right side of the engine

The spark plugs were removed from the engine and they were the massive electrode type. All sparkplugs exhibited black deposits within the electrode area with the exception of the bottom cylinder 2, 4, and 6 spark plugs, which were oil soaked. All of spark plugs exhibited signatures consistent with worn-normal when compared to the Champion Check-A-Plug comparison chart.

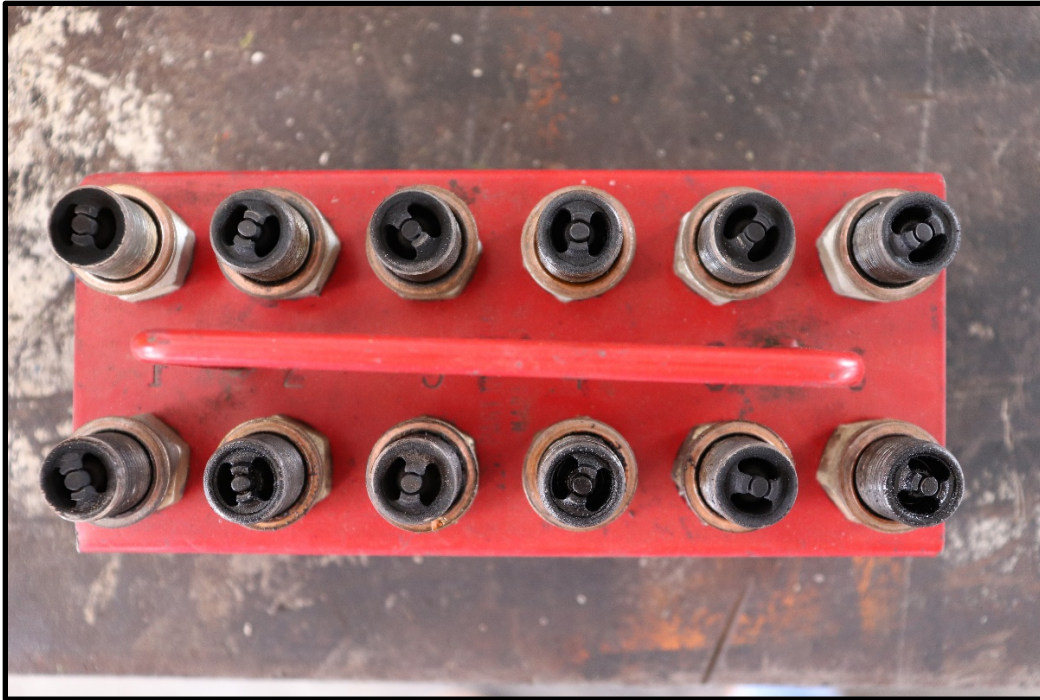


Figure 6. View of spark plugs

The throttle body remained attached to the engine. The throttle plate to fuel control interconnect was removed and visually examined. The throttle lever was intact, moved freely from stop to stop, but the connecting linkage to the throttle cable was fracture separated, consistent with impact damage. The mixture control cable remained attached to the throttle body and unremarkable. The mixture control moved the available length. . The fuel inlet fuel screen was removed, and a slight amount of debris was observed.

The air induction system remained attached to the engine baffle. The air induction body had fractured separated at the throttle body assembly. The air induction conduit was clear of obstructions and debris.



Figure 7: View of throttle body



Figure 8: View of debris on fuel inlet fuel screen

The fuel flow manifold valve was intact, undamaged, removed and disassembled. The screen was clear and free of debris. The spring and diaphragm were intact and undamaged.



Figure 9: View of fuel flow manifold spring and diaphragm

All six fuel injector nozzles were removed from the cylinders, and were found to be free of debris or restrictions except for the number 5 and 6 cylinder nozzles. The number 5 and 6 fuel nozzles were obstructed by oil.

The engine driven fuel pump remained attached to the engine and was unremarkable. The fuel pump was removed and rotated by hand. The fuel pump rotated freely without binding. All fuel fitting removed were tight. The drive coupling was intact.

The left and right magnetos remained attached to the engine accessory case with no external damage noted. The right magneto to engine timing was verified at 19°. The left magneto to engine timing was verified at 20°. When the engine crankshaft was rotated by hand using the propeller, spark was produced on eight ignition leads and impulse coupling engagement was heard.

The exhaust system remained secure to the cylinders. No evidence of any exhaust leaks around the cylinder attach points were observed.

The propeller governor remained attached to the engine and with bending to the control rod bracket. The propeller governor screen and gaskets were intact and free of debris. The propeller governor arm remained attached to the control rod and moved from stop to stop when actuated by hand. The drive shaft was rotated by hand.

The engine oil sump had impact damage and the oil quick drain was partially separated.

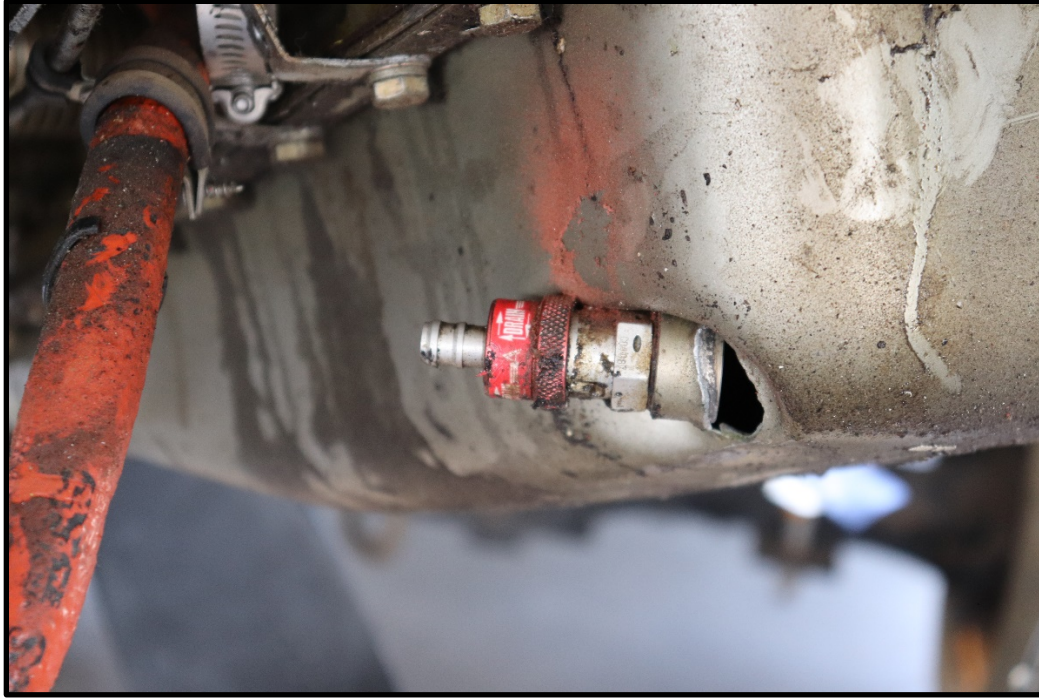


Figure 10: View of oil pan damage

The airplane was equipped with a 2 blade, constant speed propeller. Both propeller blades remained attached to the propeller hub, with slight aft bending about mid span. The blades exhibited various striations on the cambered side of the blade.

The fuel flow manifold valve, throttle body/fuel control, and engine driven fuel pump were retained for further examination.

Submitted by: Eric M. Gutierrez