



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

November 3, 2020

AIRFRAME AND ENGINE EXAMINATION

WPR21LA015

This document contains 13 embedded photos.

A. ACCIDENT

Location: Puyallup, Washington
Date: October 15, 2020
Aircraft: Cessna 152, N6585L
NTSB Investigator-in-Charge: Maja Smith

B. Participants

Joshua Cawthra
Senior Aviation Accident Investigator
National Transportation Safety Board
Federal Way, Washington

Eric M. Gutierrez
Air Safety Investigator
National Transportation Safety Board
Federal Way, Washington

C. DETAILS OF THE INVESTIGATION

1.0 Aircraft Examination

The following was noted on airframe:

- The empennage was removed aft of the cockpit by the recovery company for transport.
- The engine cowling was removed prior to our arrival by unknown personnel.
- The propeller and starter ring gear were removed by the recovery company for transport.



Figure 1. View of airplane during examination

The left and right wings remained attached to the airframe and exhibited buckling and dents throughout. The left and right fuel tank covers were in place and all of the screws appeared corroded. A heavy amount of moss was observed on the bottom side of both wings and fuselage. A visual inspection was conducted on both left and right fuel caps and tanks. Both fuel caps had rubber seals appeared worn, with rust like discoloration. Both fuel tanks had rust discoloration at the fuel filler neck.

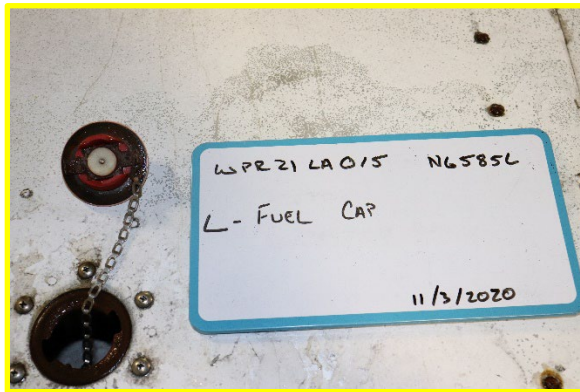


Figure 2. View of left fuel cap



Figure 3. View of right fuel cap

The left wing drain plug was removed, but no fuel was detected. A small pin hole was identified in the left wing's fuel line near the pilot's side floorboard due to impact damage. Compressed air was applied to the left wing fuel vent line and found to be free of obstructions.

The right wing drain plug was removed, about 1.5 gal of liquid was recovered. The liquid resembled a blue color, similar to 100 low lead fuel, along with a clear, brownish color liquid, consistent with water. The liquid was tested for water using SAR-GEL water finding paste, with positive results. Visual inspection inside the right wing fuel tank revealed clear liquid droplets throughout the bottom of the fuel tank, which was consistent with water. Additionally, the bottom edges of the fuel tank exhibited rust discoloration.



Figure 4. A portion of liquid drained from right fuel tank



Figure 5. Total liquid drained from the right fuel tank

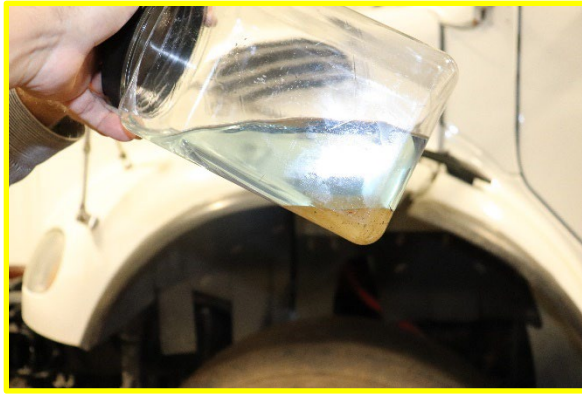


Figure 6. Water and fuel from right fuel tank.

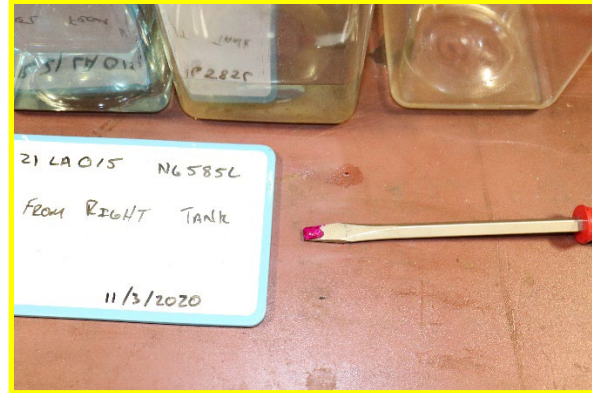


Figure 7. SAR-GEL test results (pink in color).

The gascolator was separated from the firewall and not located within the recovered wreckage. The fuel lines on both left and right side of the cockpit, near the floorboards were disconnected and air pressure was applied to both fuel lines. Air was noted expelling from the gascolator inlet fuel line.

The throttle cable remained intact and continuity was established to the carburetor attachment point. Impact damage to the engine and engine mount prevented movement of the throttle cable.

The mixture cable remained intact and continuity was established from the cockpit to the area the cable was separated from the carburetor.

2.0 Engine Examination

Engine Manufacturer: Lycoming
 Engine Model Number: O-235-L2C
 Engine Serial Number: L-14549-15
 Tachometer Hour Meter Time: 7,690.1 hours

The engine remained mounted to the airplane and the following was noted:

- The engine remained attached to the airframe through the top two engine mounts, however, the bottom two engine mounts were damaged due to impact.
- The crankcase remained intact.
- The cylinders remained attached to the crankcase.
- The upper portion of the carburetor was impact damaged, and a portion of it remained attached to its respective mount. The lower portion (carburetor float bowl) was separated and not present within the recovered debris. (see picture 5). The top spark plug leads were disconnected.
- The exhaust was intact, remained attached to all four cylinders, with no anomalies noted.
- The air filter and airbox were not located within the recovered wreckage.
- The induction system was intact with no anomalies noted.



Figure 8. Overview of engine



Figure 9. Carburetor impact separated at the mount

Cylinders and Valve Train

The rocker box covers were removed, and no anomalies were noted. All rocker arms, push-rods, and springs remained in place. The cylinders were examined internally using a lighted boroscope, evidence of corrosion was noted within the cylinder combustion dome of each cylinder along with scuffing along the cylinder walls. All of the intake and exhaust valves were unremarkable. The crankshaft was rotated by hand using a hand tool. Rotational continuity was established throughout the engine and valve train. Thumb compression was obtained on all four cylinders.

Cylinder 2 had impact damage to the intake pushrod tube and pushrod. However, movement could be seen when rotating the engine crankshaft.



Figure 10. View of number 2 & 4 cylinders



Figure 11. View of number 1 & 3 cylinders

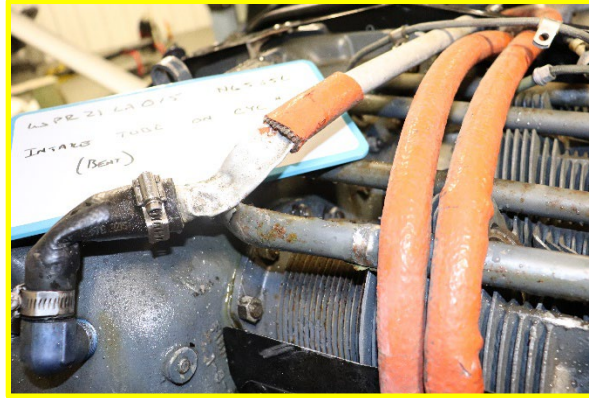


Figure 12. Number 2 Cylinder intake push rod tube and push rod damage

Spark Plugs

All spark plugs were removed from the engine and they were the massive electrode type. Cylinders 1 and 3 had REM40E style spark plugs on top. Cylinders 2 and 4 had REM37BY style spark plugs on top. Cylinder 1 top spark plug when compared to the Champion Check-A-Plug Chart exhibited "WORN OUT-SEVERE". All other top spark plugs were light grey in color and exhibited "WORN OUT-NORMAL" when compared to the Champion Check-A-Plug Chart.

All the bottom spark plugs were REM37BY, cylinder 1 bottom plug showed some lead deposits. Cylinder 2 bottom spark plug had foreign debris. Cylinder 3 bottom spark plug exhibited "WORN OUT-NORMAL" when compared to the Champion Check-A-Plug Chart. Cylinder 4 bottom spark plug was oil soaked.



Figure 53. Overview of spark plugs

The left and right magnetos remained attached to the engine accessory case with no external damage noted. When the engine crankshaft was rotated by hand using a hand tool, spark was produced on all eight ignition leads.

3.0 SUMMARY

The examination of the recovered airframe and engine revealed water in the right wing fuel tank. The number two cylinder bottom spark plug exhibited foreign debris within the electrode area. The remainder of the airframe and engine examination did not reveal any pre-impact anomalies.

Submitted by: Joshua Cawthra