



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

Western Pacific Region

January 31, 2022

AIRFRAME AND ENGINE EXAMINATION

WPR21FA044

This document contains 5 embedded photos.

(7 Pages)

A. ACCIDENT

Location: Grass Valley, California

Date: November 10, 2020

Aircraft: Piper PA-38-112

NTSB IIC: Stephen Stein

B. EXAMINATION PARTICIPANTS

Stephen Stein
Aviation Accident Investigator (IIC)
National Transportation Safety Board
Federal Way, Washington

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Senior Air Safety Investigator
Lycoming Engines
Williamsport, Pennsylvania

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Air Safety Investigator
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C. DETAILS OF THE INVESTIGATION

C.1 Airframe Examination



Photograph 1: Airplane Prior to Wreckage Examination

C.1.1 Flight Controls

Flight control continuity for the elevator and rudder was confirmed from the control yokes to their respective flight control surfaces in the tail. Both the rudder and elevator cables were cut aft of the main cabin by recovery personnel during the wreckage retrieval. Elevator trim was continuous from the trim wheel at the cockpit to the elevator trim tab, but the cable was also separated aft of the main cabin. The elevator trim wheel cable was wrapped twice around the wheel drum, consistent with nose-up trim. Aileron flight control continuity was confirmed from the control yokes to the aileron control surfaces as movement of the yokes triggered movement of the ailerons. The flap handle was in the full UP position, consistent with full flap extension, which correlated with the postaccident position of the flaps.

C.1.2 Fuel System

The airplane had been stored outside in the upright position following the wreckage recovery with the left wing fuel cap removed until the day of the wreckage examination. During the 4-5 months that elapsed during this time, the area had been subject to frequent rain.

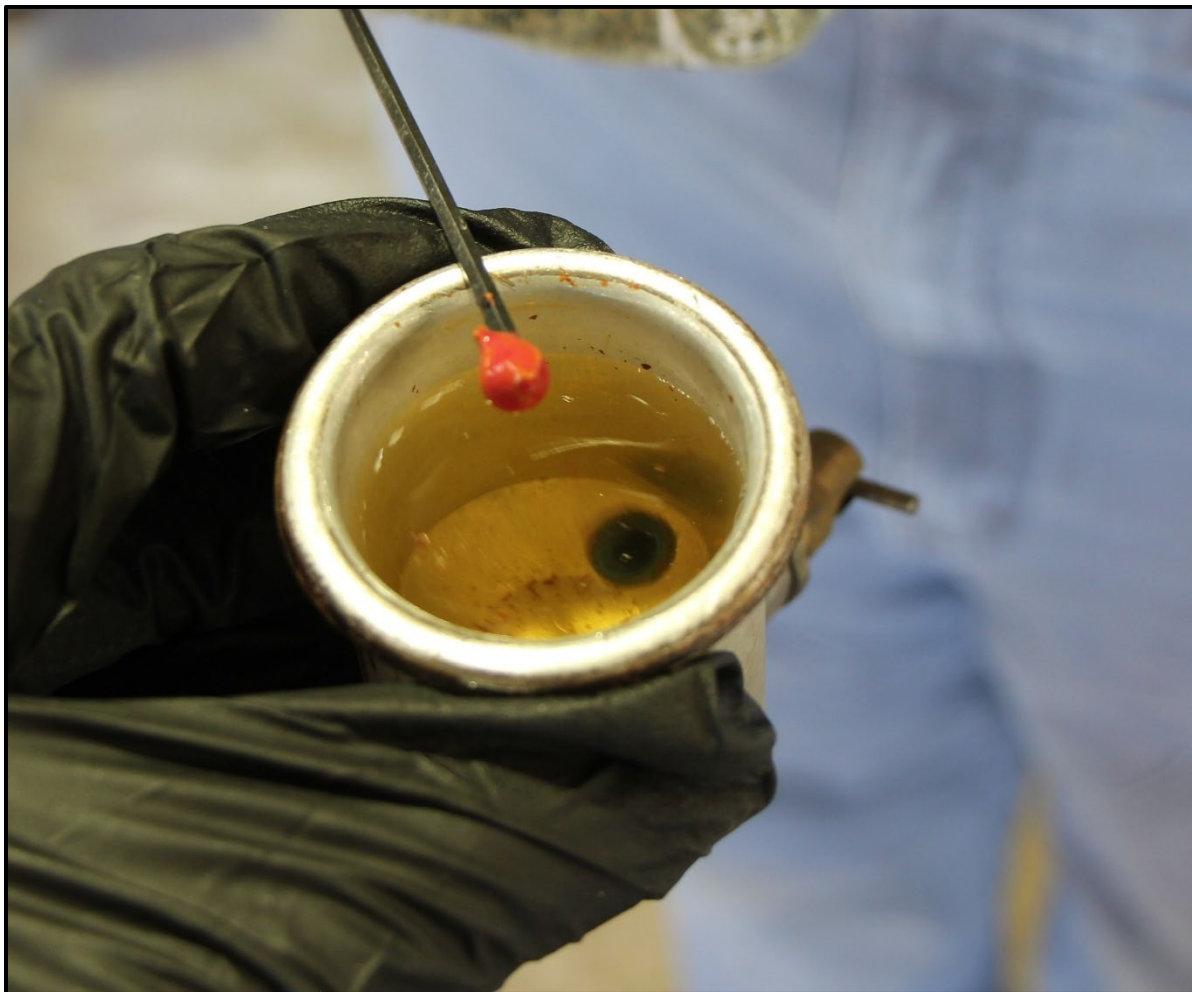
The left wing fuel tank did not exhibit any signs of leakage and the fuel transmitter moved normally from stop to stop. The fuel tank screen was free of debris.

The right wing fuel tank contained evidence of a new sealant over an older sealant at the fuel out port and a maroon staining was observed outside of the tank at the fuel outlet. The right wing fuel transmitter moved normally from stop to stop and the fuel screen was free of debris.

Both fuel tanks were equipped with a 10 gallon metal tab.

Each fuel tank was filled separately with 1-2 gallons of water to facilitate a leak test. Prior to the test the fuel selector had been removed and the left and right fuel lines were not plugged. The left tank did not show any evidence of a breach as fuel was expelled through a fuel selector inlet line at cabin. The right fuel tank also showed no evidence of a leak as water was expelled through a fuel line at the wing root that had been damaged during impact.

The fuel gascolator bowl was full of a yellow, rust-colored liquid and a Kolor Kut water finding paste test was positive for water contamination. The nut on the gascolator was noted as finger tight, but the bowl was otherwise sealed. The gascolator filter displayed a trace amount of debris.



Photograph 2: Gascolator Bowl and Kolor Kut Water Finding Paste Test

The auxiliary fuel pump filter was mostly free of debris and the magnet displayed some sediment. The pump functioned normally when connected to a 12v battery.

The fuel selector operated normally through the RIGHT, LEFT, and OFF detents and was not obstructed. The fuel selector shaft was secured to the fuel selector.

The throttle control, mixture control, and carburetor heat were continuous from the cockpit to the carburetor and airbox, respectively. The carburetor heat was OFF, but the carburetor heat flap functioned normally and the airbox filter was not obstructed.

C.2 Engine



Photograph 3: Engine Prior to Examination

The engine was a Lycoming Engines O-235-L2C, s/n L-16209-15, an air-cooled, 115 hp reciprocating engine. The baffling was damaged, the cylinder 2 valve push rods were displaced and the cylinder 2 rocker was damaged.

Mechanical continuity was established throughout the rotating group, valve train and accessory section as the crankshaft was manually rotated with a drive tool. Thumb compression in the proper firing order was observed at cylinders 1, 3, and 4. Cylinder 2 exhibited low compression due to a crushed intake push/pull tube; however, thumb compression was achieved after the intake tube rocker arm was removed. Most of the rocker arms displayed normal lift when the crankshaft was rotated, with exception of the cylinder 2 intake valve rocker. Examination of the interior components using a lighted borescope revealed no indications of catastrophic engine failure.

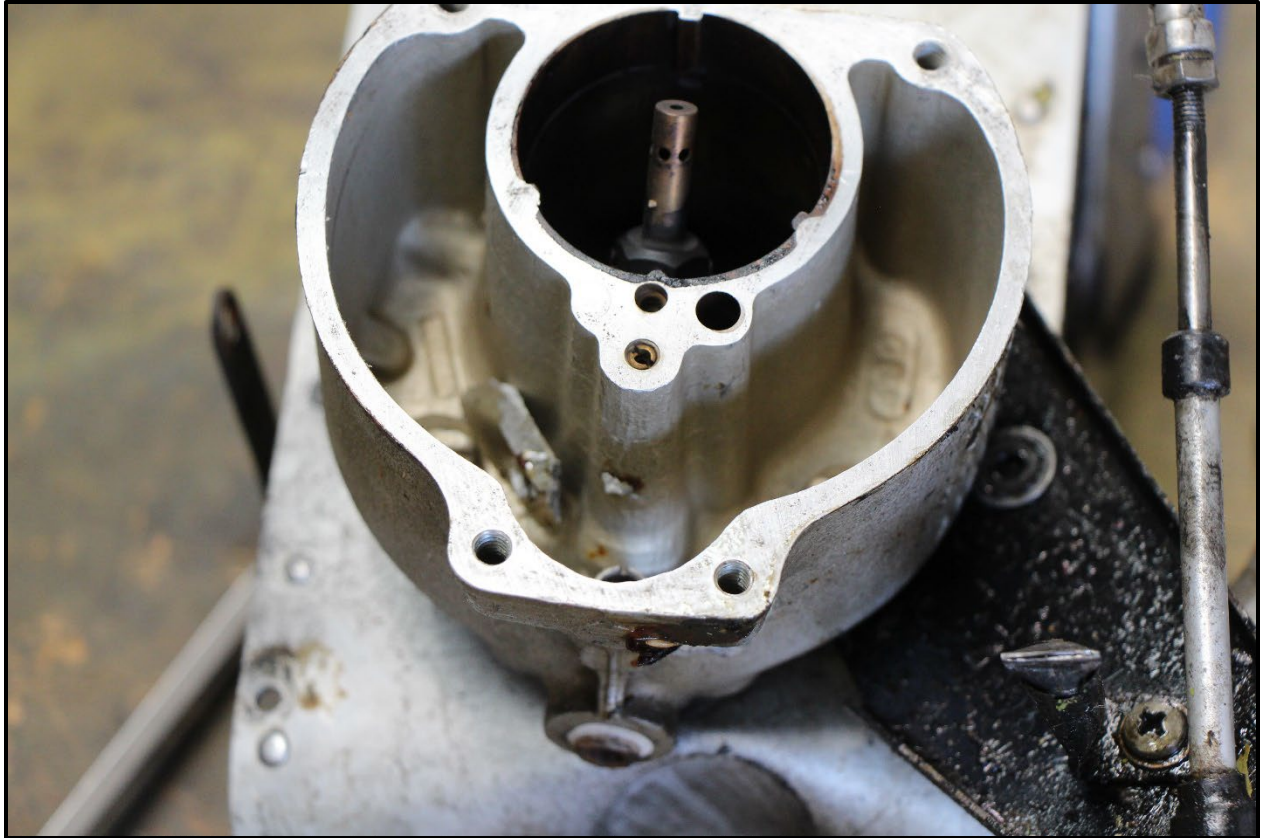


Photograph 4: Cylinder 2 Intake and Exhaust Push Rods

Both magnetos produced spark at all four plug leads when rotated by hand. The ignition harness was unremarkable with exception of the bottom 2 and bottom 4 ignition wires, which were partially separated at the spark plug attachments. Magneto to engine timing was 20° before top dead center.

The top and bottom spark plugs were manufactured by Tempest, model UREM-38S fine wire plugs. Most of the 8 spark plugs were gray in appearance, consistent with normal wear. The top 3 and 4 spark plugs displayed some oil residue and the bottom 3 spark plug was oil fouled.

The carburetor was partially fractured at the mount, but remained attached to the engine. A trace amount of water was contained within a rubber seal at the fuel pressure transmitter, but no water observed inside the carburetor. The fuel bowl did not contain any residual fuel, corrosion, or white residue to indicate water contamination. The carburetor fuel screen was free of debris, the floats were unremarkable with no evidence of hydraulic deformation.



Photograph 5: Carburetor Fuel Bowl

The vacuum pump was rotated by hand without any resistance. The rotor and vanes could be heard moving inside the pump body during rotation.

The fuel pump was intact and did not display any evidence of water contamination when disassembled. The diaphragm was also intact.