



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

March 3, 2022

ENGINE EXAMINATION SUMMARY

WPR21LA363

This document contains 8 embedded photos.

A. ACCIDENT

Location:	Orcas Island, WA
Date:	September 16, 2021
Aircraft:	Piper PA-32-300, N33022
NTSB Investigator-in-Charge:	Eleazar Nepomuceno
FAA FSDO Inspector:	Donald Bacon
Lycoming Party Member:	Mark Platt

B. DETAILS OF THE INVESTIGATION

1.0 Accident Flight Summary

On September 16, 2021, at 1825 Pacific daylight time, a Piper PA-32-300 Cherokee Six, N33022, was substantially damaged when it was involved in an accident near Orcas Island, Washington. The pilot sustained minor injuries and the 2 passengers were seriously injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight.

The flight originated from Bellingham International Airport (KBLI), Bellingham, Washington. The pilot reported that he planned to fly with the airplane owner over different business project sites in Orcas Island and then stop at Friday Harbor Airport (KFHR), Friday Harbor, Washington to meet a company worker and return him back to their operating base at KBLI. While on climbout from Orcas Island, the pilot and the passenger observed an oily substance on the windscreen and decided to land immediately at KFHR. After landing, oil was found on the cowling and around the propeller hub.

Two mechanics hired by the owner to inspect the airplane following the precautionary landing reported that they did not find any oil on the upper engine cowling. They verified 10 quarts of oil in the engine, as reported by the pilot at the start of the flight. Oil residue was found at the front of the engine, near the crankshaft seal area. The area was then cleaned, and the engine and propeller were respectively started and cycled with no oil leaks detected. Shortly after, the airplane was ferried back to KBLI for further inspection at the mechanics' service facility.

During the climbout from FHR, the pilot and the owner noticed that the needle of the oil pressure gauge in the yellow range, so the pilot leveled off at 2,000 ft mean sea level. The pilot reduced the engine power and set the propeller between 2,200 to 2,300 RPMs and verified all engine parameters and readings were in the green. Shortly after, the engine "hesitated" and then lost all power. The pilot maneuvered the airplane as he configured the airplane for best glide speed. During a turn, the pilot turned the auxiliary fuel pump ON and switched the fuel selector lever the from left to right main fuel tank. As the airplane continued its decent and crossed the shoreline, the engine suddenly restarted without being prompted by the pilot and immediately quit again. When the airplane was about 80 ft above the ground, the owner heard the stall warning horn. The airplane then landed hard on a grass field, bounced, and then came to rest upright

The airplane and engine were recovered and stored at Nu Venture Air Service, LLC in Dallas, Oregon.

2.0 Engine Examination

Examination of the recovered engine was conducted on March 2, 2022, at the facilities of Nu Venture Air Services, LLC. The engine (figure 1), a Lycoming IO-540-K1A5), serial no. L-12770-48 was separated from the airframe during recovery. Per logbook records, the engine had a time since overhaul of 143.77 hours.



Figure 1. Picture of accident engine

The top spark plugs were removed (figure 2), and all spark plug electrodes were intact with carbon build-up; all spark plugs revealed symmetrical wear. The crankshaft was manually rotated using the propeller, thumb compression in all six cylinders and mechanical valve train continuity were established.



Figure 2. Picture of six top spark plugs

The Ignition harness were mechanically cut at the distributor cap during recovery. Ends of harness were found unremarkable.

The left Bendix magneto model no. 10-349370-4, serial no. A117129, sustained impact energy damage and was partially displaced from the mounting pad. The fracture surface signatures at the magneto-mounting flange were consistent with overload forces. The pieces of magneto flange that remained at the mounting pad were securely clamped. Magneto to engine timing could not be ascertained. The impulse coupler drive was found intact and secure. The magneto was removed and manually rotated; it produced sparks at the six leads during hand rotation the drive.

The right Bendix magneto model no. BL-349310-1, serial no. F12FA180-R, was found securely clamped at the mounting pad. The magneto to engine timing was observed at approximately 23° BTDC of the cylinder no. 1. The magneto was removed, and the drive was found intact and properly safetied. The magneto was manually rotated; it produced sparks at the six leads during hand rotation the drive.



Figure 3. Picture of left and right magneto

All cylinders were examined internally with a lighted borescope. All piston heads remained intact with signs of carbon buildup. The cylinder walls revealed minor corrosion on the walls. The intake and piston valves heads were all intact.

The fuel flow divider (figure 4) remained intact. All six output fuel lines to the cylinders remained intact and connected to its respective fuel nozzle. The fuel flow divided cover was removed and revealed that the diaphragm and spring were intact. No water or contaminants were found within the cavity.

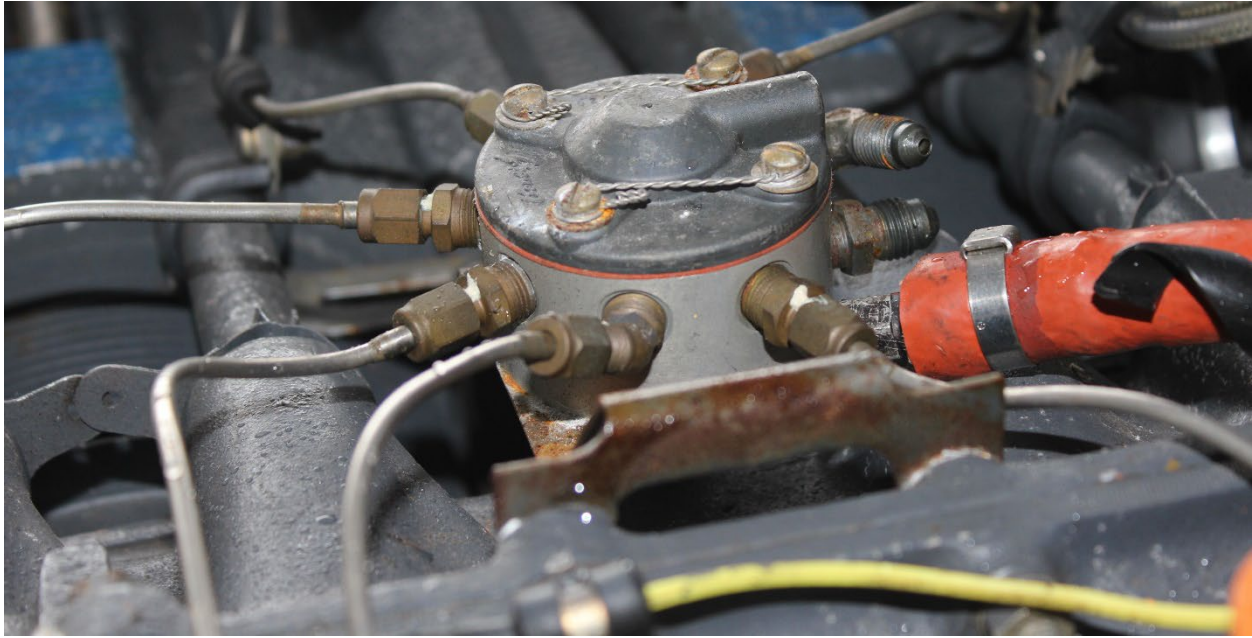


Figure 4. A close-up picture of the fuel flow divider

The fuel flow servo body was intact (figure 5). The mixture mechanism was mechanically cut during recovery. All input and output fuel lines were intact. The fuel line from the output section of the fuel pump to the input section of the fuel servo body was found intact and no fuel was found within the line. Fuel flow servo fuel filter was removed and found unremarkable. Fuel was found within the cavity of the servo and no water was found in the fuel.

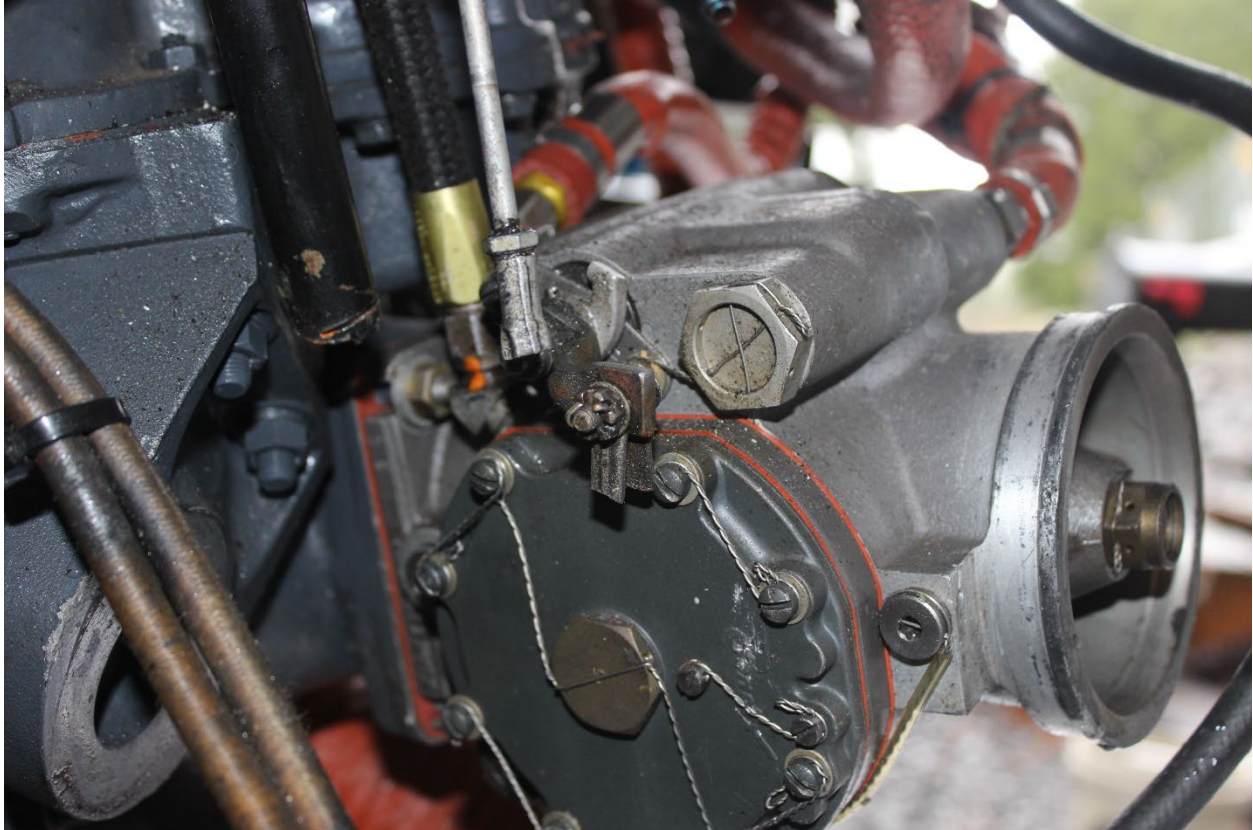


Figure 5. A close-up of Fuel Flow Servo

The fuel pump (figure 6) was removed and found intact. The fuel pump gear was found intact and unremarkable; gear was manually rotated and freely spun.



Figure 6. A picture of the fuel pump and fuel flow servo fuel filter

The muffler sustained impact damage; its internal metal lining (figure7) was intact but sustained impact damage.



Figure 7. A picture of muffler and its internal metal lining.

3.0 Propeller Examination

The spinner, propellor hub, and 3 blades were still attached to the hub. One blade was bent aft midspan (figure 8). The other blades were intact with minor chordwise scratches.



Figure 8. Two viewpoint pictures of propeller blades and hub assembly

Submitted by: Eleazar Nepomuceno