



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

February 16, 2022

AIRFRAME & ENGINE EXAMINATION SUMMARY

WPR22FA054

This document contains 20 embedded photos.

A. ACCIDENT

Location:	Visalia, California
Date:	December 4, 2021
Aircraft:	Beech V35, N7933M
NTSB Investigator-in-Charge:	Eric M. Gutierrez

B. PARTICIPANTS

Joshua Cawthra
Senior Aviation Accident Investigator
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C. SUMMARY

Postaccident examination of the recovered airframe and engine revealed no anomalies that would have precluded normal operation and the production of power.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

Examination of the recovered airframe revealed that the cockpit area was fragmented, and the forward fuselage structure was mostly destroyed. The engine, engine mount, firewall, nose landing gear, instrument panel, cockpit, flight controls, and seats were separated, and impact damaged. The single throw-over control column was separated and fragmented. The recovery organization had removed the right wing and empennage for transport. The aft section of the fuselage exhibited buckling and compression crushing throughout. Multiple instruments were separated from the instrument panel and exhibited impact damage. One instrument, which was heavily impact damaged, contained a gyro gimble. Rotational scoring and impact damage was observed on the gyro. The cockpit switch/circuit breaker panel was separated and exhibited impact damage.

Flight control continuity was established from the cockpit flight controls to the respective flight control surfaces. All areas of separation within the flight control cables were consistent with overload or cut by recovery personnel to facilitate recovery.



Figure 1: View of airplane cockpit area with impact damage. (Photo courtesy of NTSB)



Figure 2: View of airplane instrument panel with various instruments separated. (Photo courtesy of the NTSB)

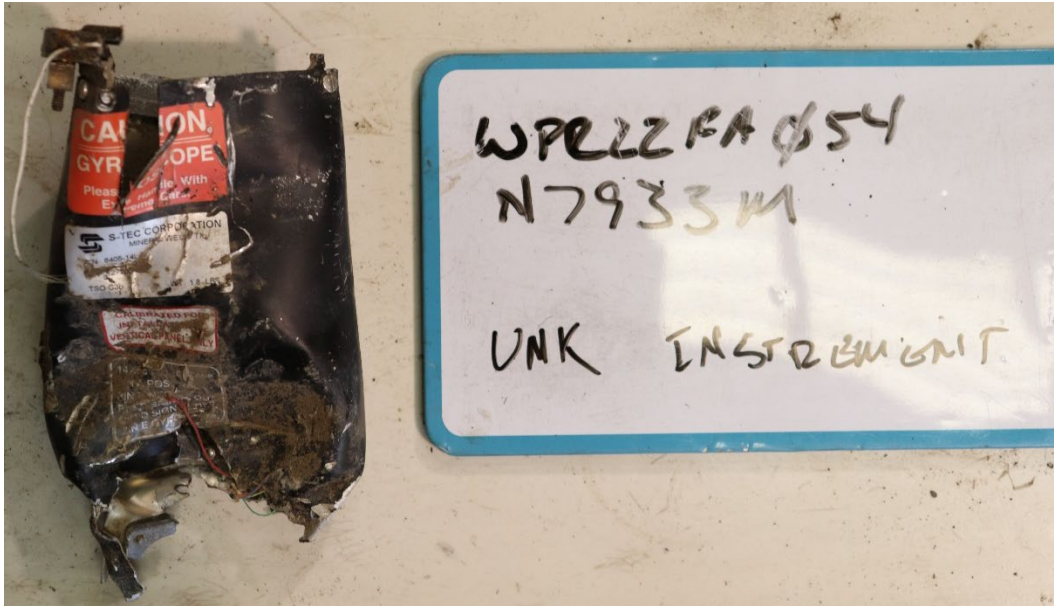


Figure 3: View of unknown instrument with impact damage. (Photo courtesy of the NTSB)



Figure 4: View of unknown instrument gyro gimble with rotational scoring and impact damage. (Photo courtesy of the NTSB)

The left wing separated from the fuselage at the wing root and fragmented into numerous sections. The left-wing aileron separated from the wing attachment points, crushing and bending was observed at both ends. The left-wing flap was separated from the wing attachment points; crushing and bending was observed throughout the flap. The left main landing gear lift strut separated from the left-wing and was impact damaged. A portion of the center section of the left wing was in the wreckage; the fuel cap was found secure and its normal place on the wing.



Figure 5: View of left wing with impact damage. (Photo courtesy of the NTSB)

The right wing was partially separated at the wing root, the remaining attachment points were cut by recovery personnel to facilitate recovery. Crushing and bending was observed throughout the wingspan. The wing leading edge was crushed aft from mid span to the wing tip. The bottom side of the wing exhibited buckling and tearing of the skin from about mid span to the wing tip. The right aileron remained attached via its inboard attachment points. The right flap remained attached via its attachment points and was in the fully retracted position. The right main landing gear remained attached via the wing mounts and was in the fully retracted position. The right main fuel tank fuel cap was secure and its normal place on the wing.



Figure 6: View of right wing with impact damage. (Photo courtesy of the NTSB)

The left and right flap actuators remained attached to their respective wing attachment points. Both flap actuators extensions measured to be approximately 1 5/8 inches which correlates to approximate 0 degree. The flap position indicator was recovered with wreckage and displayed 0° position.



Figure 7: View of flap position indicator. (Photo courtesy of the NTSB)

The empennage was cut between fuselage station 207 to 233 by recovery personnel to facilitate recovery. Both left and right ruddervators and flight control cables remained attached to their respective attachment mounts. Crushing was observed on the left ruddervator leading edge near the root. Crushing and bending was observed on right ruddervator from mid span to the tip.

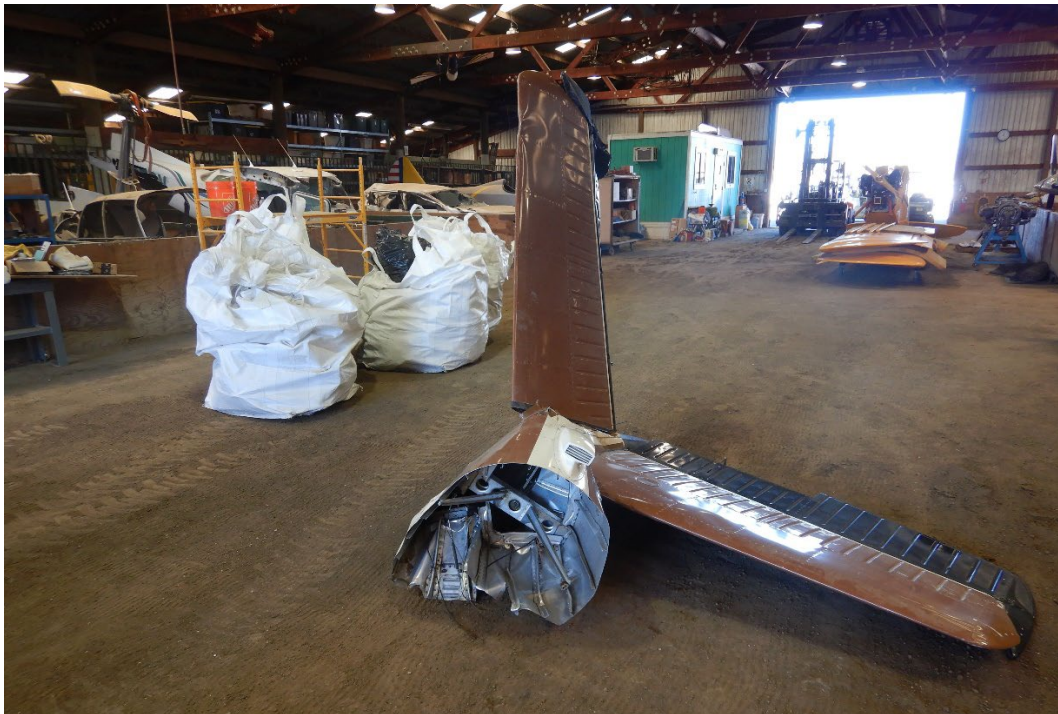


Figure 8: View of empennage with impact damage. (Photo courtesy of Textron Aviation)

The fuel selector valve separated from the cockpit and was impact damage. The fuel selector valve was a 3-position system, right hand (RH), left hand (LH) and OFF. The fuel selector valve was observed in the RH fuel tank position. Shop air was applied to the RH Tank inlet port and air was felt at the port to the engine.; the other LH Tank and OFF ports were closed. The fuel

selector valve was then placed in the LH Tank position and air was felt at the port to the engine. The fuel selector valve was placed in the OFF position. Shop air was applied to the RH and LH Tank inlet ports and no air could be felt at the port to the engine.



Figure 9: View of fuel selector lever in the right tank position. (Photo courtesy of the NTSB)

The landing gear motor was found in the retracted position. The left main and nose landing gear torque tube attachments separated from the landing gear motor.

2.0 Engine Examination

Left Engine: Teledyne Continental Motors
Engine Model Number: IO-550-B (6)
Serial Number: 675444

The engine separated from the engine mount and sustained impact damage. The propeller hub assembly and a section of the propeller flange separated from the engine crankshaft. The intake and exhaust systems were separated. The oil cooler remained attached and was impact damaged.



Figure 10: Front view of engine with impact damage. (Photo courtesy of the NTSB)

All six cylinders remained attached and exhibited varying degrees of impact damage. The rocker box cover was separated from the No. 4 cylinder. The rocker box cover, rocker arms, push rod tube, and push rods, and portions of the cylinder head were separated from the No. 6 cylinder. The rocker box covers were removed from the Nos. 1, 2, 3, and 5 cylinders; the intake and exhaust rocker arms were intact and oil coated. The top spark plugs were removed from the Nos. 1, 2, 3 and 5 cylinders. The bottom spark plug was removed from the No. 4 cylinder. All six cylinders were examined internally using a lighted borescope. All the cylinders exhibited a normal amount of combustion deposits within the combustion dome of each cylinder and piston face. The crankshaft was rotated by hand using a hand tool connected to the starter adapter. Rotational continuity was established throughout the engine and valve train. Thumb compression and suction was obtained for cylinders 1 through 5. Due to impact damage to the No. 6 cylinder, thumb compression and suction were not obtained.



Figure 11: View of engine cylinders 2, 4, and 6. (Photo courtesy of the NTSB)



Figure 12: View of engine cylinders 1, 3, and 5. (Photo courtesy of the NTSB)

The top spark plugs from the No. 1, 2, 3 and 5 cylinders and exhibited signatures consistent with worn-normal when compared to the Champion Aviation Check-A-Plug chart AV-27. The bottom sparkplug from the number 4 cylinder, had debris within the electrode area and oil soaked. All spark plugs were massive electrode type.



Figure 13: View of engine spark plugs. (Photo courtesy of the NTSB)

The throttle body separated and was located within the wreckage, and sustained impact damage throughout the throttle body. The throttle plate was in the fully open position. The throttle lever was intact and moved freely. The throttle plate shaft was bent about 15° and both the splines to the throttle body arm and throttle plate shaft were intact and undamaged. The connecting linkage to the throttle cable was fracture separated, consistent with impact damage. The mixture control arm was intact and moved freely. The mixture control shaft was bent about 10° and both the splines to the mixture control arm and mixture control shaft were intact and undamaged. The connecting linkage to the mixture control was fracture separated, consistent with impact damage. The fuel inlet fuel screen was removed, and a small amount of debris observed.



Figure 14: View of throttle body with impact damage. (Photo courtesy of the NTSB)

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.

The No. 5 cylinder fuel injector nozzle was impact damaged. The remaining fuel injector nozzles were removed from the cylinders and found to be free of debris or restrictions.

The engine driven fuel pump remained attached to the engine, and was intact and undamaged. The engine driven fuel pump was removed and disassembled. The drive coupling was intact and undamaged. The fuel pump rotated freely without binding when rotated by hand. All fuel fittings removed were tight. The drive coupling was intact. Debris and corrosion were observed within the fuel pump was consistent with prolonged storage.

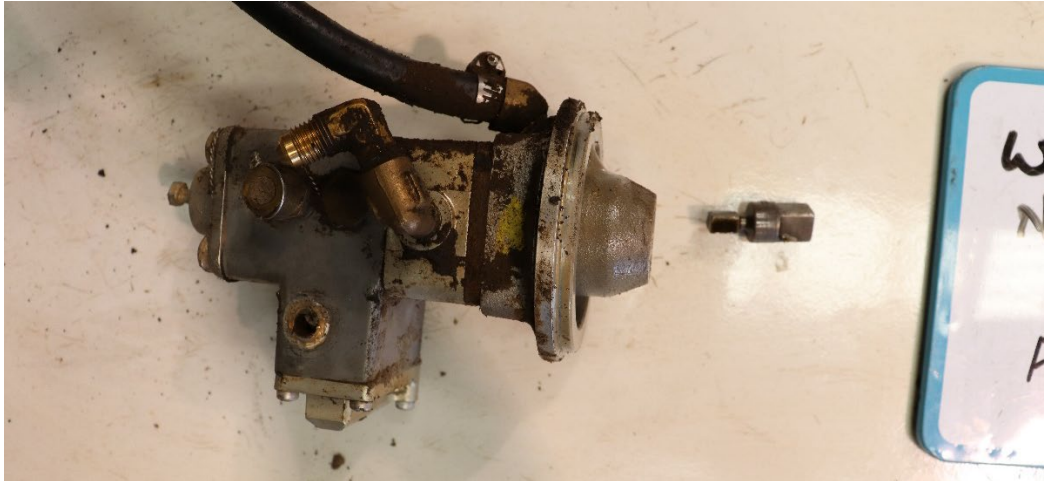


Figure 15: View of engine driven fuel pump with drive coupling. (Photo courtesy of the NTSB)

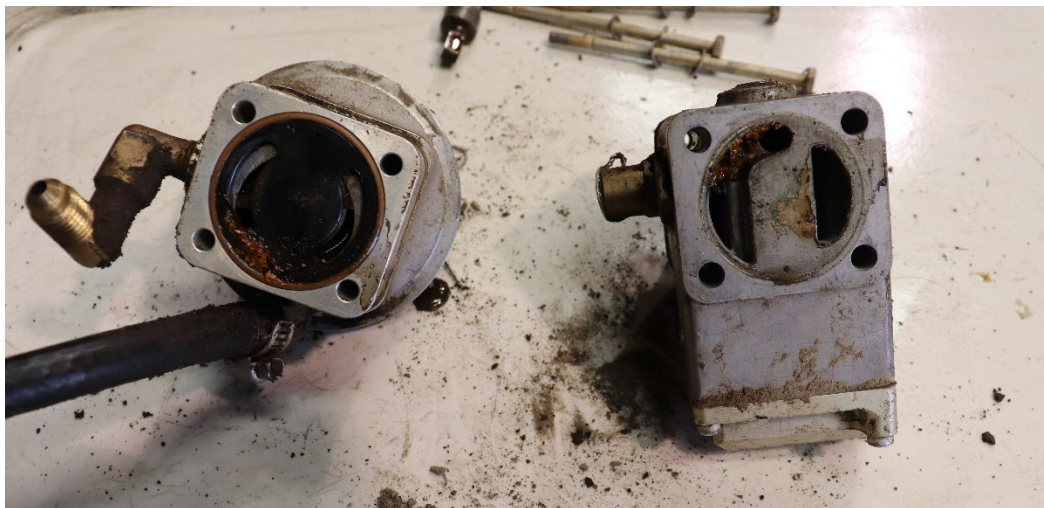


Figure 16: View of engine driven fuel pump with debris and corrosion. (Photo courtesy of the NTSB)

The left and right magnetos remained attached to the engine accessory case with no external damage noted. Both magnetos were removed and utilizing a hand tool the magnetos were rotated, and spark was produced at each ignition lead, and impulse coupling engagement was heard.

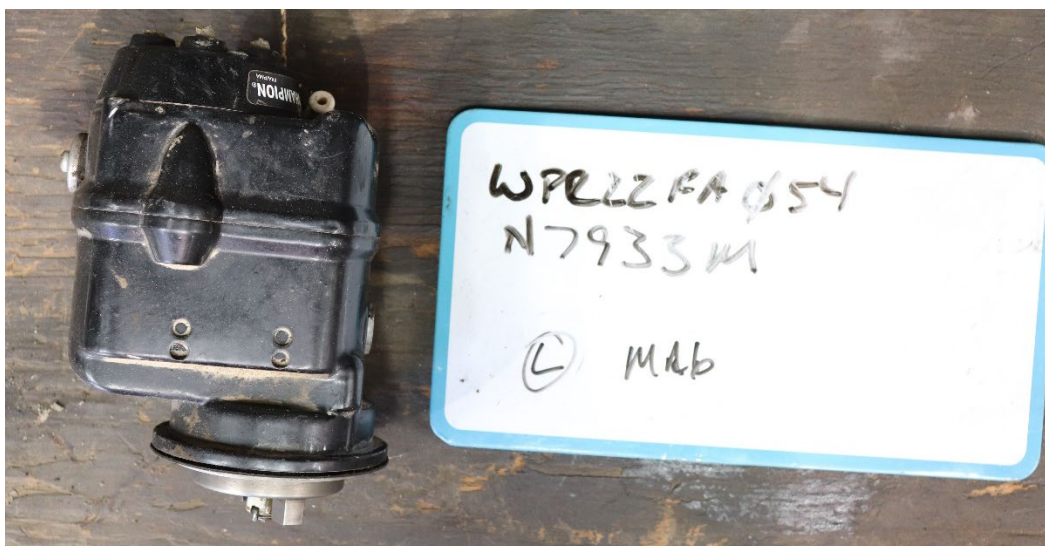


Figure 17: View of left magneto. (Photo courtesy of the NTSB)

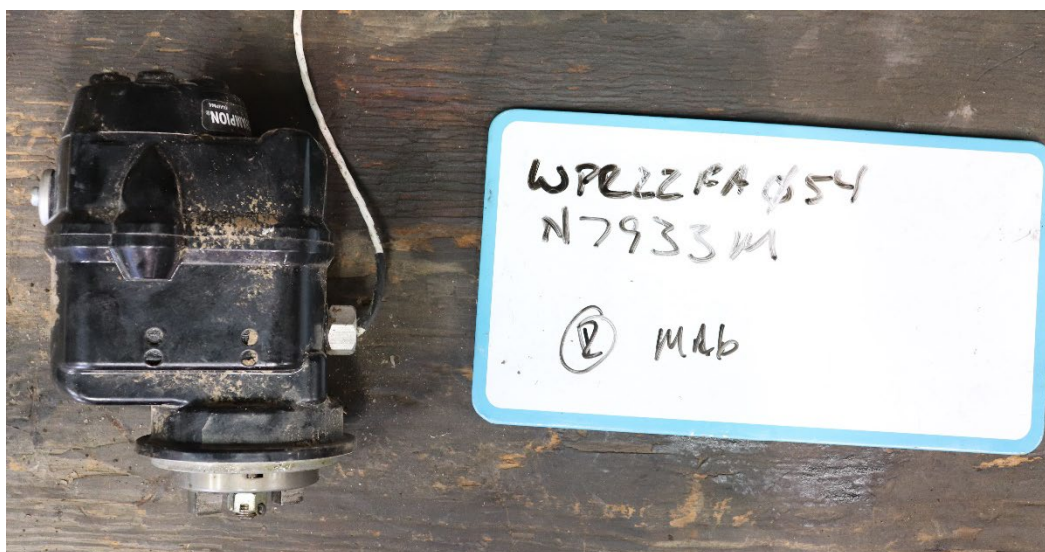


Figure 18: View of right magneto. (Photo courtesy of the NTSB)

The propeller governor separated and was located with the wreckage. Damage consistent with impact damage was observed throughout the propeller governor. The drive shaft would not rotate when rotated by hand.

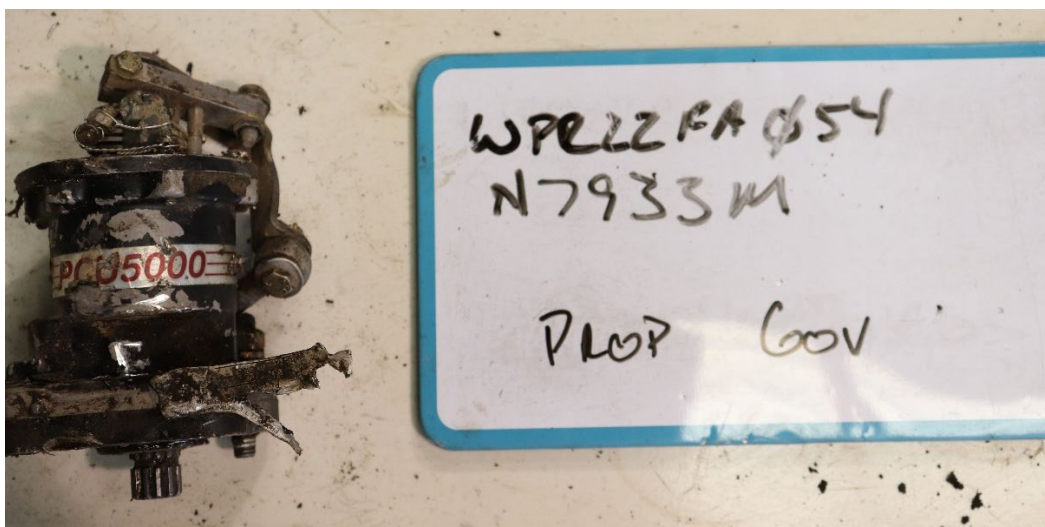


Figure 19: View of propeller governor with impact damage. (Photo courtesy of the NTSB)

The engine oil pump remained attached to the engine with no external damage noted. The oil pump was removed, disassembled and free of debris. The oil pump drive shaft rotated freely when rotated by hand.

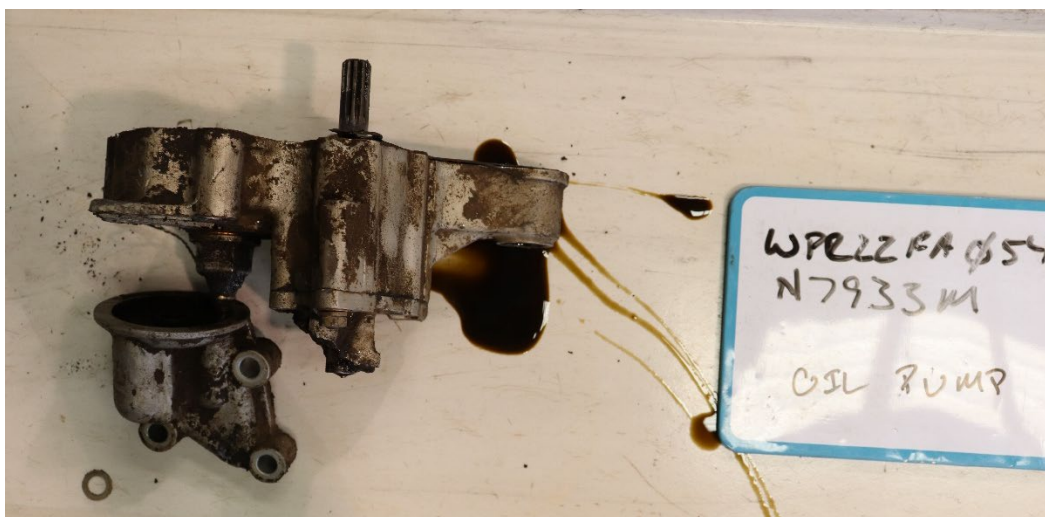


Figure 20: View of engine oil pump. (Photo courtesy of the NTSB)

The airplane was equipped with a three blade Hartzell propeller; for the purposes of this report the propeller blades were labeled A, B, and C. The propeller hub along with all three blades separated from the crankshaft. Blade A exhibited S-bending about mid span, with polishing along the leading edge, as well as unidirectional striations on the cambered side of the blade. Additionally, blade A exhibited two distinct striations on the cambered side of the blade about mid span. Blade B exhibited aft bending about mid span, with unidirectional striations on the cambered side of the blade. Blade C was fracture separated about mid span, with polishing along the leading edge and chordwise striations on the cambered side of the blade. The separated section of the propeller exhibited polishing along the leading edge and chordwise striations on the cambered side of the blade.

Submitted by: Eric M. Gutierrez