



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

January 15, 2020

AIRFRAME AND ENGINE EXAMINATION

WPR19FA263

This document contains 19 embedded photos.

A. ACCIDENT

Location: Nixon, NV
Date: September 19, 2019
Aircraft: Cessna 182H, Registration N1891X, Serial #18255991
NTSB IIC: Samantha Link

B. EXAMINATION PARTICIPANTS:

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C. SUMMARY

Examination of the airframe and engine was conducted on January 15, 2020 at the facilities of Air Transport in Phoenix, Arizona. No anomalies were noted with the airframe or engine during the examination.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

- The airplane exhibited significant fragmentation throughout due to the impact sequence; The airframe components were laid out for further examination.
- The forward fuselage was destroyed.
 - The firewall was destroyed and fragmented.
- The cabin area between the firewall and front seats was heavily compressed aft and exhibited thermal damage.
 - All cabin and baggage doors were separated from the airframe and exhibited crush damage.

- The two front seats and seat belts were heavily damaged and present.
 - The aft seats were not present. (According to the flying club, the aft seats were removed before the accident flight.)
- The instrument panel was destroyed, and all the instruments were heavily fragmented.
- Components from two bicycles were present within the wreckage and were significantly fragmented.
- The aft cabin floor was mostly intact and exhibited thermal damage.
- The fuel selector valve remained attached to the fuel line within the cabin area. It was removed from the fuel lines.
 - It was disassembled and the valve was found in between the “both” and left tank positions.
- The right wing was fracture separated from the fuselage. It was destroyed and heavily fragmented.
 - The fuel filler cap was present and remained secured to its chain, however, it was not secured in the fuel cap port.
 - The fuel cap was otherwise unremarkable.
 - The bladder fuel tank was not present and the area where it would be exhibited thermal damage.
 - The inboard about 1/3 of the right wing was heavily fragmented.
 - The outboard about 2/3 of the right wing leading edge was crushed heavily aft almost to the aileron attachment points. It also exhibited thermal damage.
 - The right flap exhibited heavy crush damage and was fractured into two pieces
 - The right aileron was fractured into two but remained secure at most of its attachment points. It also exhibited thermal damage.
- The left wing was fracture separated from the fuselage and fragmented throughout.
 - The inboard portion of the wing exhibited thermal damage
 - The fuel filler cap was present and remained secured to its chain, however, it was not secured in the fuel cap port.
 - The fuel cap was otherwise unremarkable.
 - The bladder fuel tank was not present and the area exhibited thermal damage.
 - The leading edge of the left wing was fracture separated and exhibited aft crush damage.
 - The upper wing surface was fractured into several pieces and exhibited aft crush damage.

- The left flap was fracture separated into two major pieces. The inboard portion of the flap remained attached to the wing, and the outboard portion of the flap was fracture separated.
- The left aileron was fracture separated into two major pieces. The inboard portion of the aileron was fracture separated and curled upward. The outboard portion of the aileron remained attached to the wing.
- The aft fuselage was heavily fragmented and exhibited heavy aft crush damage consistent with impact.
 - It also exhibited thermal damage.
- Empennage was mostly whole but exhibited crush and thermal damage.
 - The vertical stabilizer was mostly intact
 - The leading edge exhibited some aft crush damage.
 - The rudder remained attached to the vertical and exhibited minimal damage.
 - The vertical and rudder exhibited soot and some residue from an unknown fluid consistent with oil.
 - The right horizontal exhibited heavy aft crushing
 - The right elevator remained attached at most of its attachment points
 - It moved when manipulated by hand, but was restricted by crush damage.
 - The elevator trim remained attached along most of its span, and it moved freely when manipulated by hand.
 - The Left horizontal stabilizer remained attached to the empennage, but was fracture separated about midspan
 - The inboard (about half) of the left horizontal exhibited aft crush and thermal damage.
 - The outboard left horizontal was fracture separated about midspan.
 - The elevator remained attached to the outboard portion of the horizontal, but fracture separated from the inboard.
 - The elevator remained whole, but exhibited a tear about midspan.
 - The inboard portion of the elevator exhibited some thermal damage.
- The fuel system was heavily fragmented throughout.
 - The fuel strainer was unable to be located.
- Flight control continuity was established through the airframe.
 - Rudder cables were traced throughout the airframe. The rudder cables remained attached to the rudder pedals and were traced through the aft

fuselage. They were fracture separated just forward of the empennage consistent with overload. Continuing aft from the fracture, the cables remained secured to the rudder.

- The control yokes within the cockpit were fracture separated and heavily fragmented.
- The right elevator cable was traced; it was fracture separated within the cabin area and just prior to the empennage. Both fractures were consistent with overload. The control remained attached to the right elevator itself.
 - The elevator trim actuator was measured and consistent with the near neutral position.
- The left elevator cable was traced; it was fracture separated in the cabin area and just prior to the empennage. Both fractures were consistent with overload. The cable remained attached to the left elevator itself despite the elevator being fracture separated from its attachment points.
- The right aileron control was traced from the aileron control surface to the cabin area. Continuity was unable to be established within the cabin due to the severe fragmentation of the cabin area.
- The Left Aileron control was traced from the aileron control surface to the cabin area. Continuity was unable to be established within the cabin due to the severe fragmentation of the cabin area.

1.1 Airframe photos



Figure 1: Cabin Area



Figure 2: Right Wing



Figure 3: Left Wing



Figure 4: Right side of Empennage



Figure 5: Left Side of Empennage



Figure 6: Fuel Selector Valve

2.0 Engine Examination

- The engine was heavily fragmented and covered in an unknown fluid, dirt, and grime consistent with the accident site.
 - The propeller hub, front two cylinders, forward portion of the crankcase, and forward part of crankshaft were fracture separated from the rest of the engine.
 - The camshaft remained mostly intact and was dramatically bent downward and aft.
 - The front camshaft gear was missing and not located.
 - The camshaft was consistent with normal operating signatures.
 - The cam lobes remained oval.
 - The forward portion of the crankshaft was fracture separated just aft of the number 5 and 6 cylinders.
 - The fracture surface was consistent with overload.
 - The crankshaft gear on the aft section of the engine was exposed consistent with impact damage. The gear remained intact and exhibited minimal damage.
 - Most of the accessories were found fracture separated from the engine.
- The forward crankcase was fracture separated and heavily fragmented.
- The inside of the engine was exposed due to the damage and exhibited signatures consistent with normal operations.
- All cylinders exhibited extensive crush damage throughout.

- Fragments of cylinders and crankcase were found within the wreckage.
- Cylinders number 4 and 6 exhibited the most damage.
 - The number 6 cylinder was found fracture separated from the engine and was completely missing its the cylinder head.
 - The number 4 cylinder was found missing most of the cylinder head to include rocker arms, exhaust spring, and push rod.
- The Number 5 cylinder was mostly fracture separated from the crankcase; it remained attached via one through bolt.
- All cylinders were removed the engine. The number 3 and 5 cylinders were borescoped since pistons couldn't be removed.
- The cylinder barrels exhibited corrosion consistent with the airplane sitting at the accident site prior to recovery.
 - Water drained out of the number 1, 2, and 3 cylinders when they were removed.
- The pistons showed normal combustion deposits.
 - The number 6 and 5 pistons remained in the barrels.
 - They were separated from the connecting rods consistent with impact damage.
 - The number 3 piston was unable to be dislodged from the barrel.
- All of the connecting rods exhibited normal operating signatures.
- All valve heads were consistent with normal operating signatures.
 - The number 6 exhaust and intake valves were found fracture separated. All remaining valve heads remained within their cylinder.
- Eight of the rocker arms were present, the remaining four were not located within the wreckage.
 - They all exhibited varying amounts of impact damage and were consistent with normal operations.
- Ten of the spark plugs were located with varying amounts of damage. The remaining two spark plugs were not able to be located within the wreckage.
 - The electrodes that were able to be examined were consistent with normal operations.
- The oil filter exhibited crush damage and was breached.
- The oil cooler exhibited crush damage and was fragmented.
- The exhaust system was crushed, heavily fragmented, and mostly not present.
 - The located pieces did not exhibit any signs of an exhaust leak
- The heat exchanger was located and was significantly crushed.
- The induction system was destroyed and mostly not present.
- The carburetor was fragmented and mostly destroyed.

- The fuel screen was removed and was mostly clear of debris.
- The valve was intact and operated when manipulated by hand.
- The jet and floats were fracture separated; most of the bowl was not present.
- The oil sump was fracture separated and the sump inlet screen was exposed. It was clear of metallic debris. Organic debris consistent with the accident site was present.
- Fragments of both magnetos were located within the wreckage. Given their condition they were unable to be tested.
- The propeller governor was fracture separated and fragmented.
 - The flyweights were visible and remained intact and installed.
 - The drive shaft was fracture separated and not observed.
 - The propeller control rod end fracture separated from the prop governor control arm.
- The ignition harness was unable to be located within the wreckage.
- The alternator was unable to be located within the wreckage.

2.1 Engine Photos



Figure 7: Front of Engine

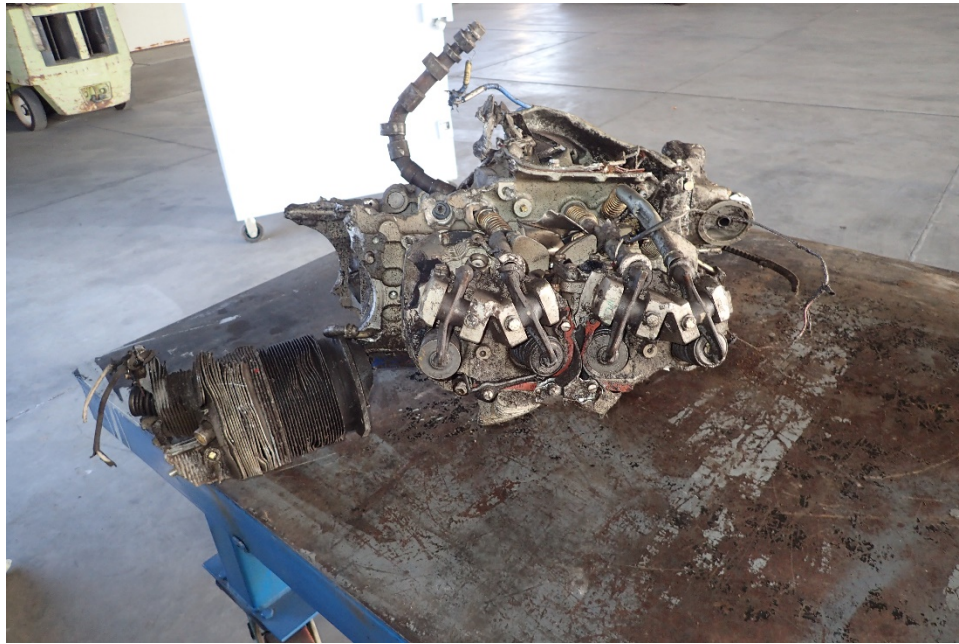


Figure 8: Right Side of Engine



Figure 9: Top of Engine

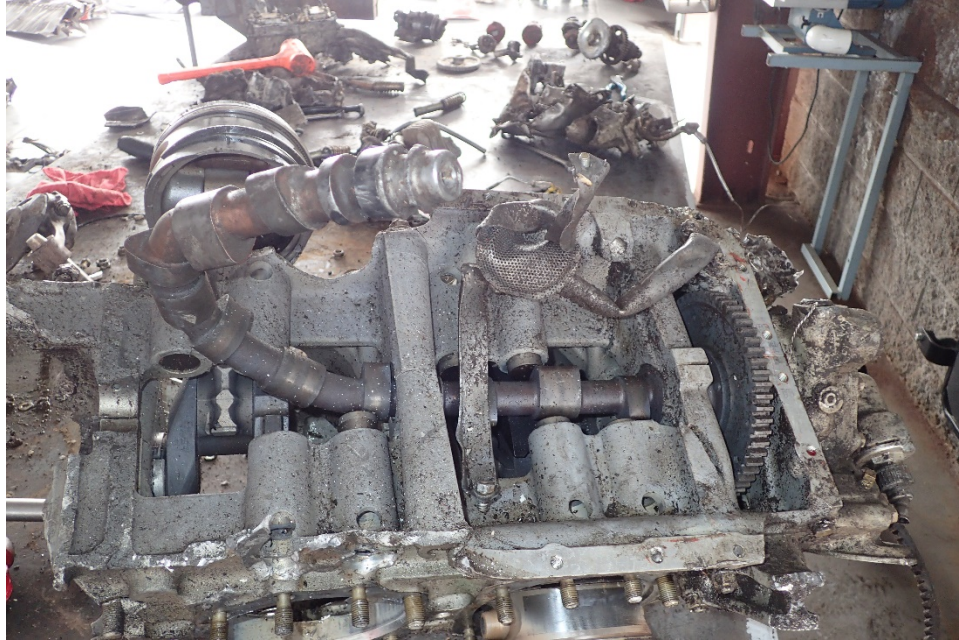


Figure 10: Bottom of Engine



Figure 11: Cylinders from the Right Side of Engine



Figure 12: Cylinders from the Left Side of Engine

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Figure 13: The Carburetor



Figure 14: Oil Filter

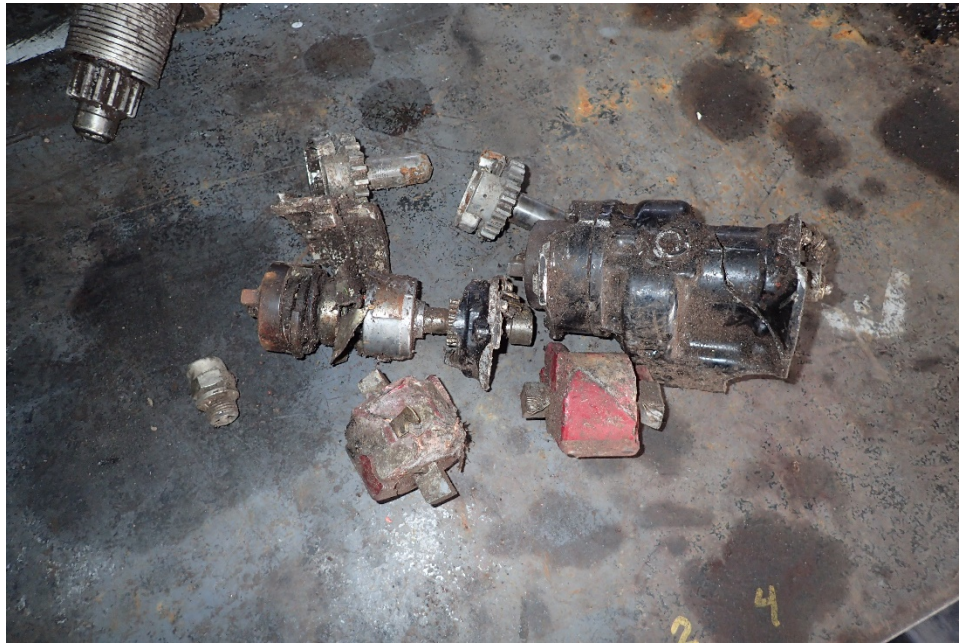


Figure 15: Both Magnetos



Figure 16: Exhaust System



Figure 17: Intake System

3.0 Propeller Examination

- The two propeller blades were fracture separated from the hub and found within the wreckage.
 - The propeller hub was heavily fragmented and only a few pieces were located
 - The front of propeller piston housing was crushed aft and mostly flat.
- One blade was mostly whole and exhibited a slight S-bend.
 - The outboard tip was fracture separated, and it had a slight aft curl to it.
 - The blade exhibited chordwise scratching and gouging throughout.
 - The face side of the blade exhibited mostly longwise scratching with some minor chordwise scratching.
- The second blade was separated from the hub and fracture separated into three pieces.
 - The inboard portion of the blade exhibited large leading edge dents/gouging
 - The middle section of the blade was missing and was not located within the wreckage.
 - The outboard portion of the blade was curled aft.
 - The face side of the blade exhibited some longwise gouging.

3.1 Propeller Photos



Figure 18: Propeller Blades, Hub Fragments, and Front of piston cylinder

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Figure 19: The Face Side of the Blade

END.

Submitted by: Samantha Link