



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

DATE September 23, 2021

AIRFRAME AND ENGINE EXAMINATION

WPR21FA298

This document contains 20 embedded photos.

A. ACCIDENT

Location: Banning, California
Date: July 30, 2021
Aircraft: Cessna 150
NTSB IIC: Fabian Salazar

B. EXAMINATION PARTICIPANTS:

Name: Fabian Salazar
Duty Position: IIC
National Transportation Safety Board
Federal Way, WA 98003

Name: Andrew Hall
Duty Position: ASI
Organization: Textron Aviation
Wichita, Kansas

C. SUMMARY

Examination of the airframe was conducted at the accident site in Banning, CA. on July 31, 2021. No evidence of preimpact mechanical malfunction or failure with the airframe was noted that would have precluded normal operation. An examination of the engine was conducted on September 23, 2021, at a secure facility. After examination, it was determined that there was no evidence of preimpact mechanical malfunction or failure with the engine that would have precluded normal operation.

D. DETAILS OF THE INVESTIGATION

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest in an open rocky field, on a heading of about 045° magnetic, at an elevation of about 2,253 ft mean sea level (msl). Coordinates: 33° 55.762N 116° 51.197 W. The site was a dumping area for rocks and boulders, which varied in size from fist-size rocks to beach ball size boulders. A debris path extended away from the wreckage about 70 feet, on a bearing of about 020° magnetic. Fragments of sheet metal, engine components, left main landing gear components, and left-wing tip fragments were distributed throughout the debris path. All major components of the airplane were located with the wreckage. A post-impact fire thermally damaged the cabin area, and the right and left wings.

A robust recovery effort was made that disturbed the wreckage layout. The left wing, which had come to rest above the cabin area, was moved, and the seatbelts were cut during the recovery.

FUSELAGE

The fuselage was substantially damaged, and fragmented with partial separation of the engine assembly, wings, and empennage. The aft fuselage and empennage faced about 020° magnetic, with the aft fuselage resting on the right side. The cabin area was thermally damaged and separated from the aft fuselage by the thermal damage. The engine remained attached to the fractured firewall by the mounts, and had rotated about 180°, to face the cabin.

The right door separated from the fuselage with a section of the door frame remaining with the door. The right side of the cabin area of the fuselage was thermally consumed to the aft fuselage area. The aft fuselage exhibited dents and crushing throughout. The empennage separated from the fuselage, and the control cables remained attached. The empennage came to rest inverted. The right and left horizontal stabilizers remained attached to the empennage and exhibited multiple dents and wrinkles to the sheet metal throughout. The right and left elevators remained attached to the horizontal stabilizers and exhibited dents and wrinkling to the sheet metal throughout. The elevator trim tab remained attached to the right elevator. The vertical stabilizer remained attached to the empennage and exhibited dents and wrinkling to the sheet metal throughout. The top of the vertical stabilizer exhibited downward crushing. The rudder remained attached to the vertical stabilizer and exhibited downward crushing at the top. The left side of the aft fuselage exhibited heavy damage with dents and wrinkling of the sheet metal throughout. The left side of the cabin area of the fuselage was thermally consumed. The left door separated from the fuselage and was in the debris area. The door was crush aft from the front to back. The firewall was fractured with segments located in the last half of the debris field.

WINGS

The wings partially separated from the fuselage as a unit and rotated counterclockwise about 90° so that the left wing was displaced over the aft fuselage. The left wing, near the root was thermally damaged. The left fuel tank was located almost over the cabin area and was thermally damaged. The root area of the left wing was thermally damaged. The left wing exhibited heavy aft crushing, displacing the leading edge aft about 45°. The composite left-wing tip was located at the beginning of the debris area, with the trailing edge to the left-wing tip being one of the first items in the debris area. The left fuel cap remained secured to the fuel port and was thermally damaged. The thermally damaged seal remained secured to the cap. The left aileron was fractured into multiple pieces, and partially separated from the left wing. The left flap fractured in two, with the outboard half separated and the inboard half remaining attached to the wing. The left-wing strut separated from the wing and the fuselage.

The right wing was substantially damaged but to a considerably lesser degree than the left wing. The leading edge exhibited small dents and wrinkles to the sheet metal. The upper surface of the right wing exhibited rips, dents, and wrinkling, but kept its shape throughout. The fuel cap remained secure, and the seal was soft and pliable. The tank retained about 8 to 10 gallons of a

liquid that had the color and smell of 100 low lead aviation gasoline. A label for automotive gasoline was displayed at the fuel cap area. The right-wing strut remained attached to the wing but had separated from the fuselage. The flap actuator exhibited about one quarter to half inch extension of the actuator rod, which equated to retracted/up position. The right flap remained attached to the right wing at the hinges and appeared to be in the up position. The right aileron remained attached to the right wing at the hinges and articulated up and down. The underside of the right wing exhibited dents and wrinkling throughout

LANDING GEAR

The nose gear assembly separated from the underside of the fuselage and was located near the fuselage. The left main landing gear assembly separated from the underside of the fuselage and was located south of the wreckage as the southern-most item in the debris field. The right main landing gear remained attached to the underside of the fuselage. The tire was thermally damaged. The right brake caliper and brake puck were located early in the debris field.

PROPELLER

The propeller remained attached to the propeller flange and was damaged. One blade remained mostly intact and exhibited thermal damage about mid-span to the leading edge and the trailing edge. The tip was present. There was some leading-edge gouging present. The other blade was damaged and bent about 90° aft. The tip was located early in the debris field. There was heavy gouging along the leading edge, and a tear in the trailing edge, at the bend. The spinner was crushed inwards.

SEATS and SEATBELTS.

The seats separated from their tracks. All fabric was thermally consumed, leaving only the metal frames. The seatbelts were cut during recovery but both buckles appeared to be latched with the shoulder straps connected to the buckles.

INSTRUMENTS

The instrument panel was thermally damaged and all instruments, except the airspeed indicator were separated from the instrument panel.

Airspeed: about 185 mph

Vertical speed indicator: 1700 fpm descent

Altimeter:

Throttle: Near full out

Mixture: Near full in

Key: Appeared to be in both but label was burned away

Flight Control Continuity. Flight control continuity was established for the elevator and rudder, from the control surfaces to the cabin floor. Aileron control continuity was established from the

flight controls to the cabin area. Elevator trim was established at the neutral position (1.55 inches extended).

Flaps confirmed to be in the up position based on flap actuator at about $\frac{3}{4}$ to 1 inch rod extension.

ENGINE (Field Examination)

The engine remained partially attached to the fuselage at the engine mount and was in the main wreckage. The engine was inverted with the fractured intake manifold pointing upwards. The carburetor was separated and remained partially attached to the wreckage by the throttle and mixture cables. Segments of the intake tubes and some push rods with associated tubes, were located throughout the debris field. The four cylinders remained attached to the case. One cylinder exhibited impact damage to the front of the cylinder and head. The engine was shipped to a secure facility for further examination.

Engine (Examination at secured facility)

The engine Model O-200-A, Serial Number: 5721-8-A-R. The engine had been in storage upside down. The engine was removed from the airframe by cutting the engine mounts. The gascolator was removed from the firewall and examined. The gascolator was thermally damaged. The bowl contained soot consistent with burned fuel on the inside. The screen was black, and see-through, with no clogs. The end of the fuel hose was attached to the gascolator, and the opposite end held the nipple to the carburetor.

Carburetor. The bowl of the carburetor was separated from the rest of the carburetor, and the rest of the carburetor was not present. The bowl was without the floats, and thermally damaged.

The starter separated from the engine and was thermally damaged.

The generator had separated from the engine and was thermally damaged.

Top spark plugs:

- #1. Oil soaked, dark color.
- #2. Dry and light gray, the porcelain is also gray.
- #3. Dry and gray with a white electrode.
- #4. Dry and gray electrode, porcelain near white.

Bottom spark plugs:

- #1. Wet but not oil soaked, dark gray.
- #2. Dry, light gray, porcelain also light gray.
- #3. Wet and dark gray, with the top section fractured and absent.

#4. Dry with corrosion. No electrode present. The top section was fractured and absent.

The bottom of the engine revealed that the four intake tubes were absent, leaving only the intake plenum.

The magnetos were identified as left magneto, and right magneto. Both magnetos were model number 4201. The left magneto, Serial number: 88080025, LAG: 25, ROT: L, REV: D, remained attached at the mount, was thermally damaged and would not rotate. The spark plug leads were thermally damaged and disintegrated when manipulated by hand.

The right magneto, serial number 88120045, LAG: 25, ROT: L, REV: E, remained attached to the mount, was thermally damaged and would not rotate. The spark plug leads were thermally damaged and disintegrated when manipulated by hand.

The oil system was examined. The oil reservoir remained attached to the bottom of the engine and was thermally damaged. The cap and dipstick remained fastened and secure. There was no oil in the reservoir. The oil filter was removed and examined. The filter was cut open and revealed thermal damaged. The pleats were dry and near charred but exhibited no metal. The oil pump was removed and appeared dry due to thermal exposure. No other damage was noted.

The number 1-cylinder head revealed a wet valve assembly interior. The rocker arms remained in place and the two valve assemblies appeared intact. The intake push rod and pushrod tube were dented and displaced aft. The exhaust push rod remained attached and was thermally damaged. The exhaust port was undamaged. The aluminum intake attachment was fractured. The valves and valve seats exhibited normal appearance. The cylinder walls were not damaged. The piston top appeared wet with carbon build up. The piston skirt was smooth. The rings were intact. The piston retention pin and the rod end were smooth. The rod to crank shaft bearing was smooth.

The number 2-cylinder head appeared wet with the top of the head fractured and a section absent. The exhaust attachment was not damaged but the exhaust pipe was crushed into the exhaust port. The aluminum intake attachment was fractured. Both the intake and the exhaust push rods, and push rod tubes remained attached and exhibited denting and displacement. The valves and valve seats appeared normal. The cylinder walls appeared smooth but with rust and corrosion exhibited. The piston top appeared dry with carbon buildup. The piston skirt was smooth. The rings were intact. The piston retention pin and the rod end were smooth. The rod to crank shaft bearing was smooth.

The number 3-cylinder head revealed a wet valve assembly interior, and the top of the head was fractured with a section absent. The intake valve push rod and push rod tube were absent. The

intake attachment was fractured. The exhaust push rod and push rod tube remained attached and was thermally damaged. Several aluminum cooling fins were fractured and several steel cooling fins from the cylinder were dented and pushed inwards. The valves had a normal appearance and were displaced in the open position exposing the valve seats. The cylinder walls appeared smooth. The piston top appeared wet with carbon build up. The piston skirt was smooth. The rings were intact. The piston retention pin and the rod end were smooth. The rod to crank shaft bearing was smooth. The cylinder assembly appeared to have rotated about 5°.

The number 4-cylinder head was dry and fractured with sections absent, and some thermal damage revealed melted aluminum from the head. Most of the mating surface for the valve cover was absent, exposing the inside of the valve assembly. Rust and corrosion covered the valve springs and rocker arms. The intake push rod and push rod tube were absent. The exhaust push rod and push rod tube remained attached and revealed heavy denting and displacement. The intake port attachment was damaged. The valves appeared normal but dry. The smaller valve appeared displaced from the valve seat. The cylinder walls appeared dry but smooth. The piston top appeared dry with carbon build up. The piston skirt was smooth. The rings were intact. The piston retention pin would not move from the piston, consistent with thermal damage. The cylinder assembly appeared to have rotated about 5°.

Once the rods were removed, the engine rotated freely. The cam appeared undamaged, and all lobes were normal in appearance. All gears at the rear of the engine retained their teeth and meshed easily. The engine drive train timing was established.

The propeller flange was fractured and partially separated from the crank shaft. The case did not reveal any cracks or breaches.

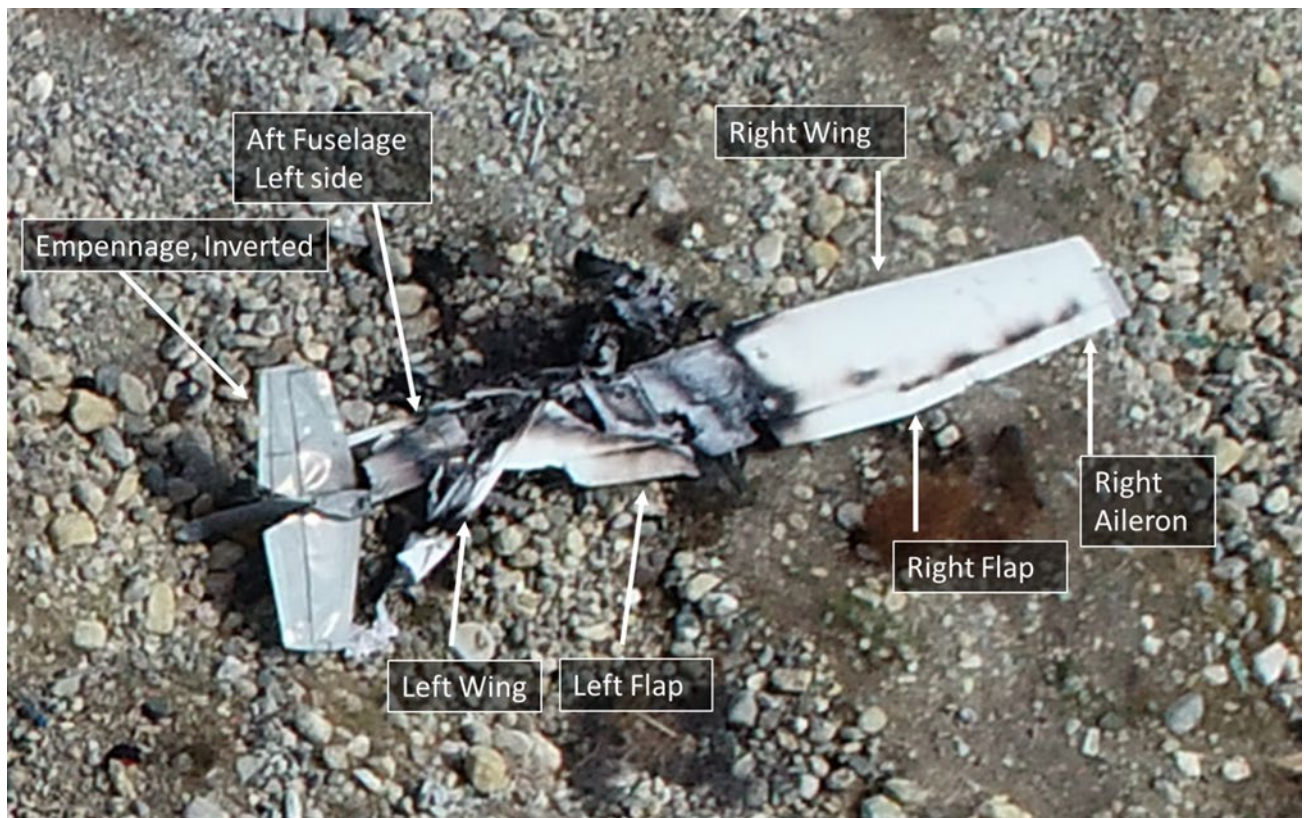


Figure 1. Overheard view looking north.

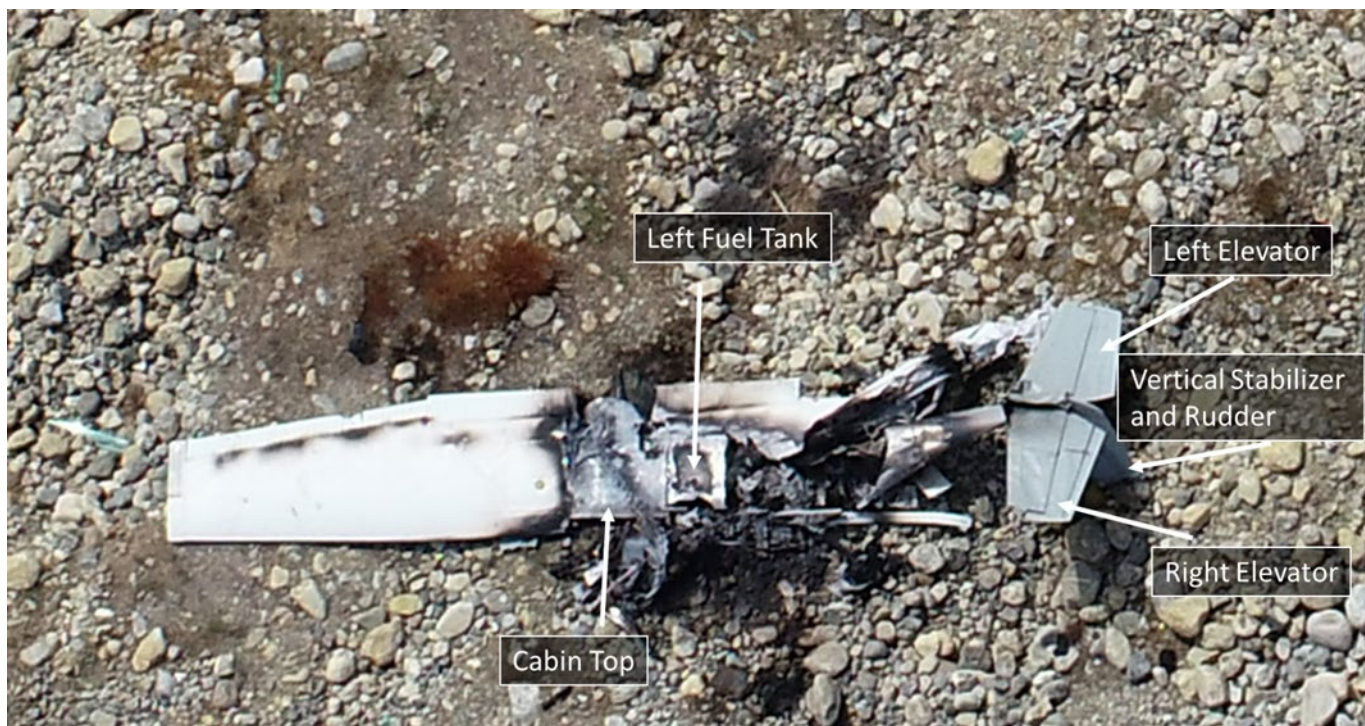


Figure 2. Overhead view looking south.



Figure 3. Empennage and left wing.



Figure 4. Instrument panel, door, and left wing.



Figure 5. Engine and seat frame.

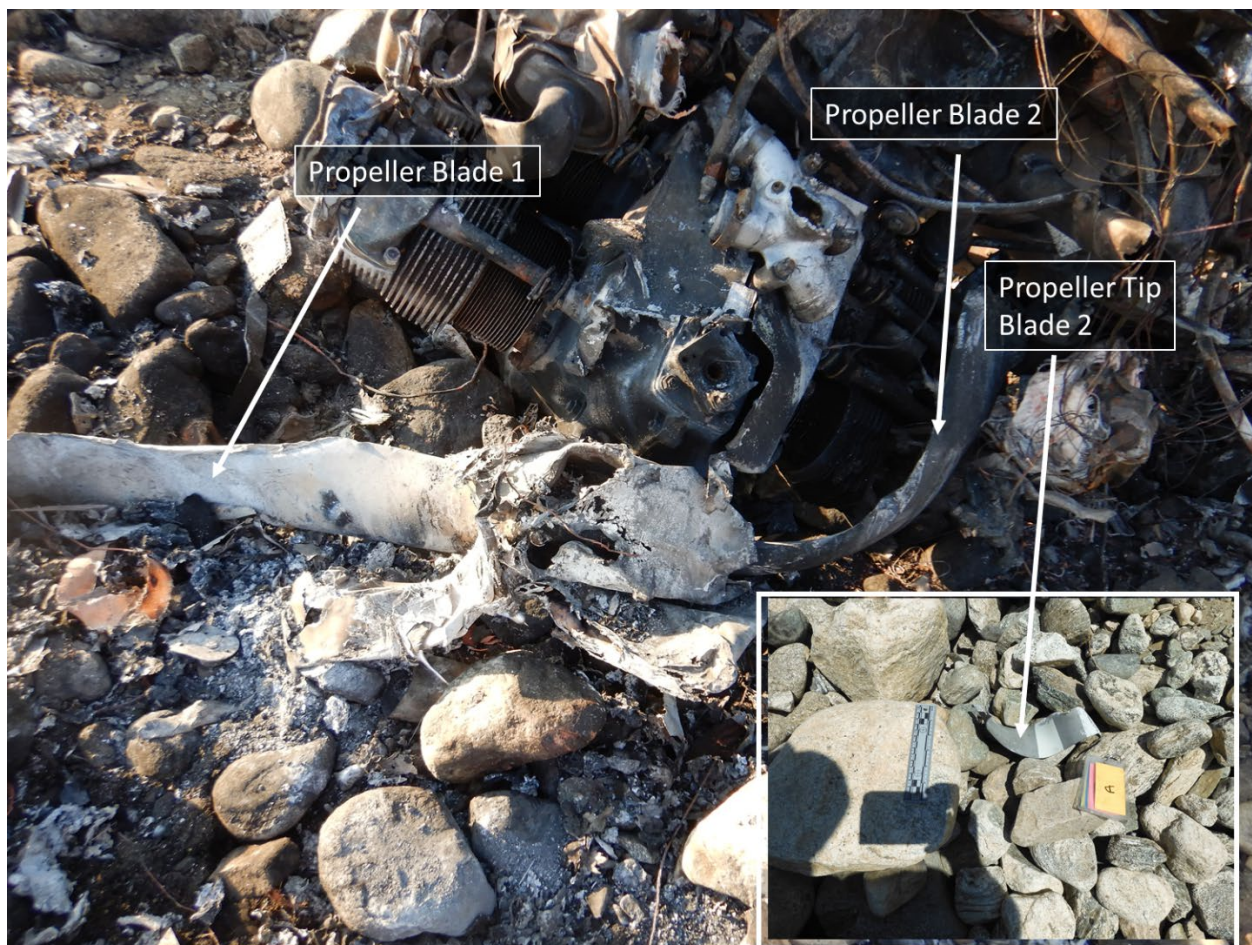


Figure 6. Propeller.



Figure 7. Engine at recovery facility.



Figure 8. Engine prior to examination.



Figure 9. Rear view of the engine.



Figure 10. Right-side view of engine.



Figure 11. Gascolator.



Figure 12. Carburetor bowl.



Figure 13. Top sparkplugs.



Figure 14. Bottom sparkplugs.



Figure 15. Oil filter.



Figure 16. Left magneto.



Figure 17. Right Magneto.



Figure 18. Right-side view from underneath, showing cylinders 1, and 3.



Figure 19. Left-side view from underneath, showing cylinders 2, and 4.



Figure 20. Cylinders 1 through 4 from left to right.