

National Transportation Safety Board

Office of Aviation Safety

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AIRFRAME & ENGINE EXAMINATION REPORT

April 13, 2023

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A. ACCIDENT

Location: Salem, Oregon
Date: January 29, 2022
Time: 1502 Pacific standard time
2302 UTC
Airplane: N9530R -Beechcraft K35 Bonanza

B. AIRFRAME & ENGINE EXAMINATION REPORT

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C. SUMMARY

The postaccident airframe examination was completed on January 30, 2022, with subject matter expert Soderlund. The postaccident engine examination was completed April 13, 2023, with subject matter expert Swick. Postaccident examination of the airframe and engine revealed no evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation. The propeller shaft exhibited rotational scoring, consistent with engine operation at the time of impact.

D. DETAILS OF THE EXAMINATION

1.0 Accident Site Examination

The airplane wreckage was located in the grass area just west of runway 34. The airplane's left wing impacted the ground, about 17 ft to the left of the asphalt runway. The airplane's engine impacted the ground about 32 ft from the edge of the runway and the right wing impacted the ground subsequent to the engine impact. Shards of the red lens cap were found in the grass and marked the initial point of impact. The airplane's nose cone was imbedded in the ground about 10 inches, and the right wing's green position light lens was

found intact, on the right wingtip. The propeller blades were located with the propeller hub. One of the blades separated in a chordwise manner from the propeller hub at the blade root. The main wreckage was comprised of the engine, the fuselage, both wings, and the empennage.

2.0 Airframe & Engine Follow-up Examination

2.1 Fuselage

The engine compartment and the instrument panel remained attached to the airplane's lower fuselage skin, aft of the firewall by avionics wires and the flight control cables. The cabin exhibited uninhabitable space encroachment. The aft left side of the empennage revealed compression signatures emanating from top to bottom, just aft of the rear window.

2.2 Empennage

The empennage did not sustain impact damage. The left and right ruddervator, and the elevator trim tabs did not sustain visual or mechanical damage, and the clear lens anticollision light remained attached and intact. The ruddervator cables were continuous from the cockpit controls to the control surfaces. The elevator trim actuator was 15° in a tab trailing down position.

2.3 Wings

A wing ground scar was observed on either side of the engine impact crater. Both wing leading edges were pushed aft in a nearly symmetrically manner. The left wing sustained leading edge and spar deformation from wingtip to wing root. The ribs and aileron sustained substantial damage, and the left wing flap incurred gross deformation yet remained attached to the trailing edge of the wing. The left wing skin had separated from the trailing edge of the outboard flap bracket, to the just aft of the main spar.

The left wing was fractured chordwise outboard of the left main landing gear. The aileron cables were intact from the wing bellcranks to the control chain sprocket in the cockpit. The aileron chain was separated at the sprocket with evidence of the chain being pulled apart. The left aileron wing bellcrank arm attached to the interconnect cable was fractured at the bellcrank. No evidence of fatigue was observed in the fracture surface. The left and right flap were fully extended to 30°.

The right wing sustained leading edge damage from the wingtip to the wing root, as well as deformation to the spar. The right wing ribs and aileron

sustained substantial damage, and the right wing flap incurred gross deformation yet remained attached to the trailing edge of the wing.

2.4 Landing Gear

The landing gear emergency handle remained in the stowed position. The nose landing gear sustained impact damage, while the right and left main landing gear were extended, locked, and sustained merely cosmetic impact damage.

2.5 Cockpit

The ignition key was observed in the, both position. The airplane's primary instruments were analogue, and the suction gage was digital. The magnetic compass sustained impact damage. The airspeed, attitude indicator and altimeter sustained impact damage. A mark was observed on the airspeed indicator at the 160 knots rotation. The aircraft was equipped with an acceleration meter. One needle was at -3.2 and the other was off scale. The altimeter setting was 30.36 inHg.

The turn coordinator (airplane) indicated a level position, and the turn coordinator ball was in the left position. The heading indicator showed 294° and the heading bug indicated 180°. The vertical speed indicator showed -800 feet per minute. The communication and navigation radios were in the on position, and the transponder was digital. The master battery and alternator were in the on position. The navigation, rotating beacon, landing, and strobe light switches were in the off position. The stall warning vane was checked with an ohm meter and found to be functional. The stall warning bulb was intact.

2.6 Survivability

ELT Manufacturer: ACK Technologies

Model: E-04

Type: AF

Serial Number: 024920

Battery Due Date: 8/14/2023

Armed: Yes

Activated: No

The airplane was not equipped or certified for flight into known icing and the pitot heat was in the off position. The pilot's (left front) seat belt was equipped with a 3-point harness that was intact and not in use at the time of the accident. The passenger seat (right front) was equipped with a 3-point harness, that was in use at the time of the accident and the shoulder harness was cut by first responders. The left and right front seats were forward facing, with the feet

partially intact. The left and right front seat backs were intact, and the base of the seats were partially intact.

2.7 Fuel/Fuel System

The fuel tank quantity gauges were digital. The fuel selector handle and fuel selector valve were in the left tank position. The fuel boost pump was in the off position. The fuel strainer screen was free of debris and presented a clean appearance, while the fuel strainer bowl presented light corrosion. Blue colored fuel was drained from the fuel strainer. Fuel was observed draining from the aircraft during the recovery.

2.8 Other Systems

N/A

3.0 Engine Examination

Make/Model: Continental/IO-470-C

Serial No.: 71788-9-C

Total Time as of last Annual: 6335.1

TSO: 1357.1

The engine, firewall and nose landing gear all remained partially attached and separated from the main wreckage. The propeller and a section of the crankshaft propeller flange remained attached and separated from the engine. The crankshaft separated inside of the oil seal seating area. All the engine mounts were fracture separated. The starter motor separated from the starter adapter and portions of the starter adapter motor mount flange remained attached to the starter motor.

The alternator remained attached to its mount which was bent and disfigured. The drive belt was torn and separated from the drive pulleys.

The forward right side crankcase half had impact damage near the oil seal and crankshaft separation.

The oil cooler had impact damage and the outboard side was pushed aft.

The propeller governor control shaft and linkage separated from the governor. The linkage remained attached to its control cable. The propeller governor was removed from the engine and the drive shaft rotated normally by hand. The propeller governor seal/screen was removed and had a small amount of debris captured in the screen. Trace amounts of that debris were metallic.

The fuel manifold valve was undamaged, disassembled, and no fuel or contamination were noted. The internal components were undamaged.

The fuel pump was intact, and all b-nuts were tight. The fuel pump was removed, and no fuel was present in the pump or the lines. The drive coupling was intact, and the pump drive shaft rotated freely by hand.

The No. 6 rocker cover had impact damage. The rocker covers were removed from the cylinders. The cylinder overhead components were undamaged and had a light residue of oil.

The oil cap was secured on the service port and the cap seal was undamaged. The oil dipstick mount was damaged. The dipstick was removed and indicated no oil.

The upper spark plugs were removed from the cylinders. The spark plug electrode areas had a light amount of combustion deposits and the electrodes had a (normal-worn out) wear condition consistent with the Champion Aviation Service Manual.

The cylinders were boroscoped and the combustion chambers and piston domes had a normal amount of combustion deposits. The cylinder valve heads were undamaged.

The crankshaft rotation was attempted by using an adapter drive through the accessory section and the propeller governor drive. Crankshaft rotation was unsuccessful. The forward through-bolt hardware was loosened and removed, and the crankshaft oil seal assembly was removed. Another attempt to rotate the crankshaft was unsuccessful.

The oil pump was disassembled, and the drive and driven gears oil cavity walls showed normal operational signatures. Signatures of hard particle passage were present in the cavity. The metal oil screen was removed from the oil pump housing and was free of contaminants.

The left magneto separated from its mount and remained attached to its ignition leads. Multiple ignition leads had impact damage. Both magnetos were removed, and their housings were undamaged with exception of the left magneto mounting flange. The magneto impulse couplings engaged, and spark was produced at the ignition lead ends.

The fuel injectors were removed and clear of obstructions. The No. 2 fuel injector had impact damage and was bent to one side.

The fuel flow transducer was removed from the engine and disassembled. The impeller and internal cavity were clear of contamination.

The induction and exhaust assemblies had impact damage. The induction air box separated from the engine and not available for the examination. The throttle body fuel control unit remained attached to the throttle body which separated from oil sump attachment. The fuel control inlet screen was removed and was free of contaminants. The sides of the screen were buckled.

The crankcase and the accessory section were borescoped and the internal gearing and components were undamaged and covered in a residual oil, and no contamination was noted.

4.0 Propeller Examination

Hub Model: PHC-L3YF-1RF
Blade Design: F8468A-6R
Hub Serial Number: FD152A
Blade Serial No.
No. 1: H92072
No. 2: H92075
No. 3: H92071

The propeller blades were in the impact crater. Propeller blade cuts in the ground were noted before the impact crater. One propeller blade separated from the propeller hub. All the propeller blades exhibited chordwise scratches. Two horizontal propeller cut marks were observed in the ground leading to the impact crater.

The engine examination revealed that the propeller assembly sustained impact damage and one blade had separated. The separated blade's shank remained attached to the hub. The spinner was crushed around the hub. One of the attached blades was slightly bent aft with and decreased-pitch-twist to its entire length. This blade had leading edge gouging and chordwise scoring throughout the length of the blade. Missing material was noted near the leading-edge tip of the blade. The other attached blade was relatively straight with leading-edge gouging and missing material at the leading-edge tip of the blade.

Submitted by

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