

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN23FA130

EXAMINATION SUMMARY

April 19, 2023

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A. ACCIDENT

Location: Dekalb, Texas
Date: March 11, 2023
Time: 1530 central standard time
Aircraft: Robinson R-44, N4164T

B. PARTICIPANTS

Investigator-in-Charge (IIC) Timothy Sorensen
Aviation Accident Investigator
National Transportation Safety Board
Denver, Colorado

Party Coordinator Thom Webster
Technical Investigator
Robinson Helicopter Company
Torrance, California

Party Coordinator David Harsanyi
Air Safety Investigator
Lycoming Engines
Williamsport, Pennsylvania

C. ACCIDENT SUMMARY

On March 11, 2023, about 1530 central standard time, a Robinson R-44 helicopter, N4164T, was substantially damaged when it was involved in an accident near Dekalb, Texas. The pilot and one passenger were not injured, a second passenger sustained minor injuries, and a third passenger was seriously injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 91 aerial observation flight.

D. DETAILS OF EXAMINATION

The NTSB did not respond to the accident site. Post-recovery airframe and engine examinations were completed on April 19th at Garrison Airport, Ashdown, Arkansas. The examinations were conducted by the NTSB investigator-in-charge with technical assistance from the airframe and engine manufacturers.

E. EXAMINATION SUMMARY

1.0 Accident Site

The helicopter impacted a muddy, open field and came to rest on its left side. The aft portion of the tailboom was separated and located adjacent to the fuselage.

2.0 Airframe Examination¹

Robinson R-44 (s/n 1882)

The airframe exhibited damage consistent with impact forces. The cockpit/cabin area was intact. The left windshield was partially broken out. The landing skid attachments and struts were intact; however, the portion of the skids forward of the struts was separated. The main rotor mast appeared intact. The forward portion of the tailboom remained attached to the aft fuselage and was bent to the right. The aft portion of the tailboom and tail rotor were separated.

The main rotor blades remained attached to the mast. Both blades were deformed with multiple chordwise creases along the span. The outboard portion of one blade was partially separated near mid-span. The spar and afterbody (honeycomb and skin) of the blade were fractured. The outboard blade section was retained by the trailing edge doubler. The second blade was fractured near mid-span through the afterbody to the spar. Both elastomeric teeter stops were crushed with no apparent damage to their brackets. The rotor hub and droop stops appeared intact.

Collective and cyclic control continuity was confirmed from the cockpit to the swash plate. One main rotor blade pitch change link was separated consistent with impact. The second pitch change link was intact.

The V-belts remained in place, appeared intact, and displayed normal wear patterns.² The lower and upper sheave grooves exhibited normal wear. The V-belts and both sheaves were saturated with what appeared to be engine oil. Oil and rubber residue was slung in straight line patterns on the frame tube and top of the scroll adjacent to the gaps between the V-belts. The belt tension actuator was disengaged at the time of the exam. It appeared to operate properly when engaged during the exam. The overrunning bearing in the upper sheave operated properly and smoothly. The forward flex coupling appeared undamaged.

The main rotor gearbox appeared intact, and the driveshaft appeared straight. Internal continuity of the gearbox was confirmed by full rotation of the main rotor

¹ Directions related to accident site placement and component damage/deformation are with respect to an intact airframe unless otherwise noted.

² Each V-belt was cut by investigators and removed to facilitate examination of the rotor drive system.

mast and corresponding rotation of the driveshaft. No anomalies were noted. Oil was not visible in the gearbox sight gauge.

The intermediate flex coupling was not present with the available wreckage. Both ears of the clutch yoke were fractured. The surface of the fracture was angular and jagged consistent with overload separation.

A portion of the tail rotor drive shaft was present and both ends were deformed and crushed. The surface of the fractures was angular and jagged consistent with overload separation. The portion of tail rotor driveshaft with the damper bearing was not present with the available wreckage.

The aft portion of the tail boom, including the tail rotor assembly, was separated and was not with the available wreckage.³ Based on photos provided by the FAA inspectors on-scene, both tail rotor blades remained attached to the hub and exhibited damage consistent with ground contact. The tail rotor gearbox and the blade pitch change links appeared intact. (An examination of the tail rotor gearbox could not be conducted.)

Both fuel tanks remained attached to the airframe. The tanks and bladders appeared fully intact with exception of some dents to the outer tank skins. Both filler caps remained secure to their filler necks. Both tanks appeared to be about half full, and the cockpit fuel gauges indicated the same. Samples taken from both tanks and the gascolator reveal no water present. The fuel was blue in color and had the aroma of aviation 100LL. The gascolator bowl was free of debris. Approximately 30% of the gascolator screen was covered with debris. The fuel vent tubes remained connected to their tanks and were clear when blown through. The main tank drain line was clogged and would not flow fuel. The auxiliary tank drain line operated normally and appeared unobstructed.

The low rotor warning system was not operational at the time of the examination. With electrical power on the helicopter, the warning system did not activate when the collective control was brought off the low pitch stop and increased to full travel. The collective low pitch switch exhibited electrical continuity (was closed) when the collective control was raised off the low pitch stop. When on the low pitch stop, the switch allowed a small amount of electrical current to pass indicating that it was not fully open as required.⁴ The low rotor warning indicator lamp on the cockpit panel was operational; the bulb illuminated when electrical

³ Photos provided by FAA inspectors on-scene depicted the aft tail boom with the tail rotor assembly adjacent to the fuselage at the accident site.

⁴ The operation of the switch as observed during the examination would not be expected to affect operation of the low rotor speed warning system inflight. Although, the defect with the switch may have allowed the warning system to activate even with the collective control on the low pitch stop.

current was applied. The warning horn emitted an audible tone when electrical current was applied. The warning system module was not tested.

The recording hour (Hobbs) meter indicated 2,065.3 hours at the time of the exam.

3.0 Engine Examination

Lycoming O-540-F1B5 (s/n L-26857-40E)

The engine remained secured by the engine mounts and appeared intact and undamaged. The intake and exhaust ducting were secure. The carburetor and air filter assembly were securely attached to the engine and appeared undamaged. The cooling fan remained attached to the engine crankshaft. The oil sump appeared undamaged. Throttle, mixture, and carburetor heat continuity were confirmed from each cockpit control to the carburetor and the air filter assembly.

Both magnetos appeared secure and undamaged. The ignition harness appeared intact. The upper spark plugs, with exception of the no. 6 cylinder, and the lower spark plug on the no. 6 cylinder were removed. Each plug was intact; however, the electrodes were worn.

Internal engine continuity was confirmed via rotation of the crankshaft. Compression and suction were observed on all cylinders. The rocker arms, valve springs, and valve stems appeared intact. Normal rocker arm and valve stem movement were observed during crankshaft rotation.

Fuel samples were taken from the gascolator and both airframe tanks. Each sample was blue in color with the appearance and odor of 100LL aviation fuel. The gascolator screen was approximately 30% contaminated with debris.

Approximately 5 quarts of oil was observed within the engine at the time of the exam based on the engine dipstick. The lower portion of the engine, V-Belts, and lower airframe cowling exhibited a coating of oil.

The engine was test run on the airframe. The engine started normally using the airframe electrical system. Two test runs totaling about 8 minutes were conducted. After warm-up, the engine ran to 100% rpm without any observed anomalies. Oil pressure indications were within normal limits. A magneto check was performed with an approximate 10% drop observed.⁵ The governor appeared operational when engaged during the test runs. With the engine stabilized at approximately 80% power, engagement of the governor resulted in an engine speed increase to about 100% as expected.

⁵ The Robinson Helicopter technical representative noted that a 7% maximum drop is specified.