

National Transportation Safety Board

Office of Aviation Safety

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AIRFRAME AND ENGINE EXAMINATION REPORT

August 15, 2024

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A. ACCIDENT

Location: Herriman, Utah
Date: July 13, 2024
Time: 1035 MDT
Helicopter: Robinson R-44 II / N6960

B. AIRFRAME AND ENGINE EXAMINATION REPORT

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C. SUMMARY

On July 13, 2024, about 1035 mountain daylight time, a Robinson Helicopter R-44 II, N6960, was substantially damaged when it was involved in an accident near Herriman, Utah. The instructor and student pilot were not injured. The helicopter was operated as a Title 14 Code of Federal Regulations Part 141 instructional flight.

On August 14, 2024, the voluntary investigator in charge, FAA, and the party member for the engine manufacturer travelled to Utah Helicopters, Spanish Fork, Utah to conduct the airframe and engine examination and test run of the accident helicopter. At the conclusion of the test run and examination it was determined that the manual fuel pump and the fuel servo would be retained for further examination. Two memory cards were recovered from the Garmin instruments for data download.

D. DETAILS OF THE EXAMINATION

1.0 Airframe Examination

The helicopter was located at one of the operator's hangars at the Spanish Fork Municipal Airport (SPK), Spanish Fork, Utah. The helicopter was upright on its skids and appeared normal except for the separated empennage.

1.1 Fuselage

The fuselage exhibited a normal and non-damaged appearance except for slight squatting displacement at the rear crosstubes. The ground handling tires were difficult to install due to the displaced skids.



Figure 1. N6960 at the operator's hangar, right-side view.



Figure 2. Left-forward view.

1.2 Pylon and Main Rotor Drive Assembly

The pylon was visually examined and exhibited a normal appearance; however, when the collective and cyclic controls were manipulated, noise was heard inside the pylon consistent with collective and cyclic push-pull tube contact with the skin of the pylon.

The swashplate and associated main rotor control rods, pitch horns, and blade grips exhibited no damage and manipulated the main rotors normally.

The main rotor blade number 1 remained attached to the hub and exhibited two fractures of the blade from the trailing edge to the spar. The tip and inboard to about two ft were displaced aft about 10°. The tip to about 1 ft inboard exhibited red color transfer consistent with the red color of the registration numbers on the tail cone.

The main rotor blade number 2 remained attached to the hub and exhibited damage to the trailing edge just inboard of the trim tab. The #2 blade tip exhibited no damage.

1.3 Tail Cone and Tail Rotor Drive Assembly

The tail cone remained installed to the fuselage but exhibited a separated about ten ft outboard of the base/root of the tail cone. The separated section was fractured into multiple sections. All sections were recovered and exhibited signs consistent with contact from the main rotor blades.



Figure 3. Rear view.



Figure 4. Aft tail cone components, tail rotor gearbox and tail rotor assembly.

The tail rotor drive shaft was separated from the tail cone, possibly during recovery. The driveshaft was fractured into a long section and a short section. The fractured area exhibited a flattening of the drive shaft and separation fractures consistent with the main rotor blade contact. Both ends of the driveshaft contained a damaged flex coupling.

The tail rotor gearbox remained installed at the end of the tail cone and exhibited no damage. The tail rotor hub remained installed at the tail rotor gear box and exhibited no damage. Both tail rotors blades (identified and blade 1, and blade 2) remained installed at the hub and exhibited minor damage. The tail rotor assembly articulated fully throughout its limits and was smooth with no binding. The tail rotor control rod was separated from the tail cone and exhibited multiple bends.

1.4 Transmission, Overrunning clutch, and Hydraulics

The transmission rotated freely without binding. The overrunning clutch (sprag clutch) performed normally in both directions. The hydraulics were not examined.

The four engine-to-transmission drive belts exhibited no damage. After examination, the belts were cut in preparation of an engine test run.

1.5 Landing Gear

As mentioned earlier in this report, the rear struts exhibited a squatted, outward displacement. The forward struts appeared normal. The left skid exhibited a normal appearance. The right skid exhibited a fracture at the forward saddle area.



Figure 5. Fracture at the right skid near the forward saddle area.

1.6 Cockpit

The cockpit exhibited a normal appearance with no damage. The instrument panel held two Garmin instruments. Both units held a data memory card. The memory cards were recovered for data download.



Figure 6. Instrument panel.

1.7 Fuel/Fuel System

The two fuel tanks remained installed in the fuselage and contained about ½ full load of blue colored fuel. A sample taken revealed clean, bright, clear fuel consistent with 100 low lead aviation gasoline. The gascolator remained installed in the engine area

and held a full amount of fuel. The filter gascolator screen was clear. The electric fuel pump remained installed in the engine area and operated when the clutch engage switch was on. The mechanical fuel pump remained installed to the engine. The fuel servo remained installed to the engine. The throttle and mixture control assembly remained installed to the fuel servo and articulated throughout their full range. After the test runs, the mechanical fuel pump and the fuel servo were removed and recovered for further examination.



Figure 7. Gascolator filter



Figure 8. Fuel Servo filter screen.

2.0 Engine Examination

The engine remained installed to the airframe by the undamaged engine mounts. The engine exhibited very minor damage. The air filter was clean. The oil filter was not removed. All cylinders exhibited thumb force compression. The bottom spark plugs were removed, and all exhibited a slightly dark/rich appearance when compared to the Champion Check-A-Plug chart.



Figure 9. Lower sparkplugs.

3.0 Test Run

The helicopter was placed outside of the hangar. The battery held 26 volts and was deemed adequate for a start attempt. The engine started easily but required manipulation of the mixture control to start. It then ran normally for about 30 seconds to 1 minute, then would suddenly lose all power. This occurred multiple times and prompted coordination with the party member for Robinson. It was determined that the clutch switch should be in the engage position and the cannon plug to the clutch motor should be disconnected. The engine started and ran normally to 100% engine RPM. A magneto check revealed that both the manual magneto and the electronic ignition were working; however, during the magneto check, the engine RPM droop was significant and greater than expected. When the clutch switch was turned to disengage, the engine would lose total power until the switch was placed in the engage position. It was understood that the electric fuel pump's power was disrupted when the clutch switch was to disengage. Without the electric fuel pump the engine mechanical fuel pump was the only fuel pump to provided pressurized fuel to the fuel servo. After the test run, the mechanical fuel pump was removed from the engine and examined. The pump lever was difficult to manipulate but pushed fuel of the pump,

consistent with normal operation. The fuel servo was removed and exhibited no damage.

4.0 Recovered Items

- Fuel Servo, Serial number: AV55917827, model number: LFR-NNSH10
- Mechanical fuel pump: 62826931
- Data memory card #1: 010-02045-41
- Data memory card #2: 010-03716-21



Figure 10. View of removed fuel servo



Figure 11. View of removed fuel pump



Figure 12. View of removed Garmin data cards

Submitted by:

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