

# **NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Aviation Safety  
Aerospace Engineering Division  
Washington, DC 20594



April 29, 2022

## **COMPONENT EXAMINATION REPORT**

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### **A. ACCIDENT INFORMATION**

Place : Robinson Helicopter Company, Torrance, CA  
Date : April 29, 2022  
Vehicle : Robinson R-44 II / N442VB  
NTSB No. : ERA22FA098  
Investigator: D. Boggs

### **B. COMPONENTS EXAMINED**

Main Gear Box, part number (PN) C006-7 Rev AL, serial number (SN) 10151

### **C. DETAILS OF THE EXAMINATION**

#### **Visual Exam**

The main gear box and mast assembly was intact (Photo 1) with the mast tube extending from the top (Photo 2). The mast tube exhibited paint scrapes but appeared straight. The drive shaft was contained within the mast tube and appeared straight. No major damage was evident on the hub attachment area. The sump pan had a 1.5 inch long hole towards the bottom of the sump at the base of a rib; it appeared to be impact damage. The rotor brake exhibited slight impact damage, pushing it into the gear box housing. The right-side isolation mounts were in place, the left side isolation mounts were not present. The hydraulic pump was in place, forward tube fitting had been removed, aft tube elbow in place.



Photo 1 - Main gear box with mast tube attached.



Photo 2- Mast tube with drive shaft extended out the top.

### **Teardown Examination**

The input yoke and driveshaft could not be rotated by hand. The oil drain plug/chip detector was removed. The chip detector had black 'sludge' with metal chips observed. The oil fill cap was removed, and the ring gear teeth were visible thru the oil filler port. The rotor brake assembly & bearing seal were removed. The sump pan was removed. There were 3 silver flakes found in oil residue on bottom of drive gear. There was a slight drive gear movement experienced when applying torque to the input pinion by hand. The ring gear and carrier were pulled out of the gearbox case. The power input pinion had been shoved forward, damaging the bearing support flange, and pushed out the support bearing (Photos 3 and 4). There were 7 sequential teeth that exhibited damage on the ring gear (Photo 5). There were numerous pinion teeth that exhibited damage (Photo 6). Metal chips were observed along the interior base of the MGB housing.



Photo 3 - Input pinion, support casting, and main rotor drive shaft.



Photo 4 - Input pinion support casting showing cast retaining flange separation.



Photo 5 - Area of damaged ring gear teeth.



Photo 6 - Damaged input pinion teeth.

The drive shaft was pulled out of the mast tube, it did not have any visible damage. When rolled on a table it did not exhibit any eccentricity or bowing. The power input pinion was pulled out. Damage to 3 teeth were observed. There was no visible rotational damage or discoloration in any of the bearings or their races.

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