



NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety

PYLON MOUNTS & FRICTION DAMPER EXAMINATION FIELD NOTES

June 22, 2022

A. ACCIDENT WPR21LA268

Location: Weed, CA
Date: July 7, 2021
Time: 1645 Pacific Daylight Time (PDT)
Operator: Rogers Helicopters Inc
Aircraft: Bell 212
Registration: N911KW

B. PARTICIPANTS

IIC: Eleazar Nepomuceno
National Transportation Safety Board
Federal Way, Washington

Participant: Mona Polson
Party (Bell Helicopters)
Fort Worth, Texas

C. SUMMARY

On July 7, 2021, about 1450 Pacific daylight time, a Bell 212 helicopter, N911KW, was substantially damaged when it was involved in an accident near Weed, California. The pilot was not injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 133, external load flight.

The pilot reported that he was on approach to a lake to retrieve water for a water bucket drop operation. As he continued the approach, about 400 feet above the ground, the instruments scanned normal. When the helicopter crossed the shoreline,

he placed his head in the left door bubble and visualized that the 100-foot line and bucket were slightly trailing the helicopter. Shortly after, he felt a “stronger than typical” lateral “one per” revolution vibration. He aborted the water retrieval and intended to return to base, however, the helicopter began to settle. He applied forward cyclic input and raised the collective, but the helicopter continued to descend. He quickly realized that he would not fly out of the descent, so he concentrated on a forced water landing. After he leveled the helicopter and the skids touched down on the water, he made a last attempt to takeoff, but the helicopter settled in the lake. He reduced both throttle settings to idle in preparation to ditch the helicopter and applied right cyclic as the main rotors slowed. The helicopter rolled right, and the main rotor blades struck the water. He waited for movement to cease and then exited out the left door and swam safely to shore. The helicopter was submerged in the lake.



Figure 1 - Flight Track excerpt of N911KW

D. DETAILS OF THE EXAMINATION

The transmission mounts, to include the aft dampers and the 5th mount, were shipped from Plain Parts, Pleasant Grove, California, to Bell Textron Inc, Fort Worth, Texas, for further testing. The parts were received by Bell Textron Inc and documented for record.

The pylon corner mounts, 5th mount, and aft dampers, manufactured by Parker Lord, use elastomeric technology to isolate helicopter machinery from the helicopter structures, which in turn helps manage the helicopter's vibration energy. When the corner mounts are installed in the helicopter, upward motion of the transmission puts the elastomer in compression; conversely, the downward motion of the transmission puts the elastomer in tension.

1.0 Pylon Corner Mounts and Friction Damper Examination

The corner and 5th mount static and dynamic test were conducted with the load applied along the vertical axis of the mount to put the elastomer in compression and separately in tension axis (tension and compression offset during the dynamic test). The aft damper, using a hydraulic test, were also evaluated for dynamic compression and tension.

1.1 Right Forward Pylon Corner Mount

Bell P/N 204-031-927-007; Lord P/N J-8085-8

Superficial, minor scoring was found on the upper and lower elastomer consistent with mechanical damage. The housing and the mount bolts were found unremarkable. No bonding discontinuities between the outer housing or the inner tube were observed on the lower surface of the mount (surface exposed during testing) while under load.



Figure 2. View of Right Forward Pylon Mount

1.2 Left Forward Pylon Corner Mount

Bell P/N 204-031-927-007; Lord P/N J-8085-8

Superficial, minor scoring was found on the upper and lower elastomer consistent with mechanical damage. The housing and the mount bolts were found unremarkable. No bonding discontinuities between the outer housing or the inner tube were observed on the lower surface of the mount (surface exposed during testing) while under load.

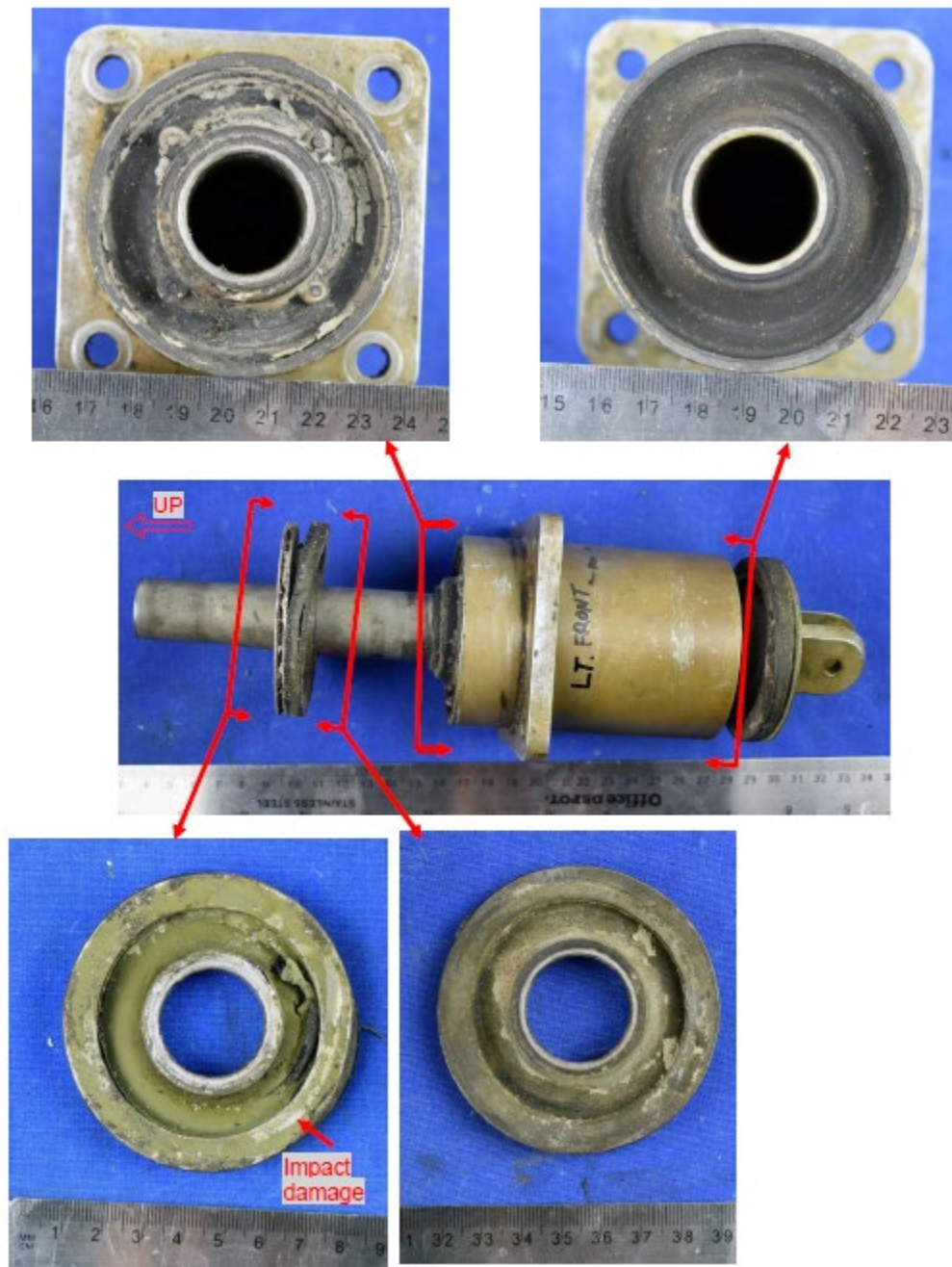


Figure 3. View of Right Aft Pylon Mount

1.3 Right Aft with Pylon Corner Mount

Bell P/N 204-031-927-007; Lord P/N J-8085-8

Superficial, minor scoring was found on the upper and lower elastomer consistent with mechanical damage. The housing and the mount bolts were found unremarkable. No bonding discontinuities between the outer housing or the inner tube were observed on the lower surface of the mount (surface exposed during testing) while under load.



Figure 4. View of Right Aft Pylon Corner Mount

1.3.1 Right Aft Friction Damper

Bell P/N 204-031-920-3 & S/N LK13237

Visual inspection revealed particulates underneath the piston protective boot. The top mounting boss (spherical bearing eyebolt housing) sustained plastic deformation from its principal axis of about 3°. Black residue (smelled like grease and dirt) was observed on damper shaft under the rubber boot. The damper was initially stuck and unresponsive to 600 lbs. of load in compression but broke free when it was loaded in tension. The damper completed cyclical dynamic testing after it could actuate with no anomalies observed. The damper was further disassembled, and corrosion was observed on the inner components. A

subsequent dynamic test was performed, which revealed the aft damper to be out of specifications. The radial play of the right friction damper rod end ball was approximately 0.006 inch, which exceeded the allowed 0.004 inch maximum per the Bell 212 Maintenance Repair and Overhaul Manual.



Figure 5. View of Right Aft Friction Damper

1.4 Left Aft Pylon Corner Mount

Bell P/N 204-031-927-007; Lord P/N J-8085-8

Superficial, minor scoring was found on the upper and lower elastomer consistent with mechanical damage. The housing and the mount bolts were found unremarkable. No bonding discontinuities between the outer housing or the inner

tube were observed on the lower surface of the mount (surface exposed during testing) while under load.



Figure 6. View of Left Aft Pylon Mount

1.4.1 Left Aft Friction Damper

Bell P/N 204-031-920-3 & S/N LK11634

Visual inspection revealed particulates underneath the piston protective boot. The top mounting boss (spherical bearing eyebolt housing) sustained plastic deformation from its principal axis of about 3°. The

damper was initially stuck and unresponsive to 1,000 lbs. of load in compression but broke free when it was loaded in tension. The damper completed cyclical dynamic testing after it could actuate with no anomalies observed. The damper was further disassembled, and corrosion was observed on the inner components. A subsequent dynamic test was performed, which revealed the aft damper to be out of specifications. The radial play of the left friction damper rod end ball was approximately 0.016 inch which exceeded the allowed 0.004 inch maximum per the Bell 212 Maintenance Repair and Overhaul Manual.

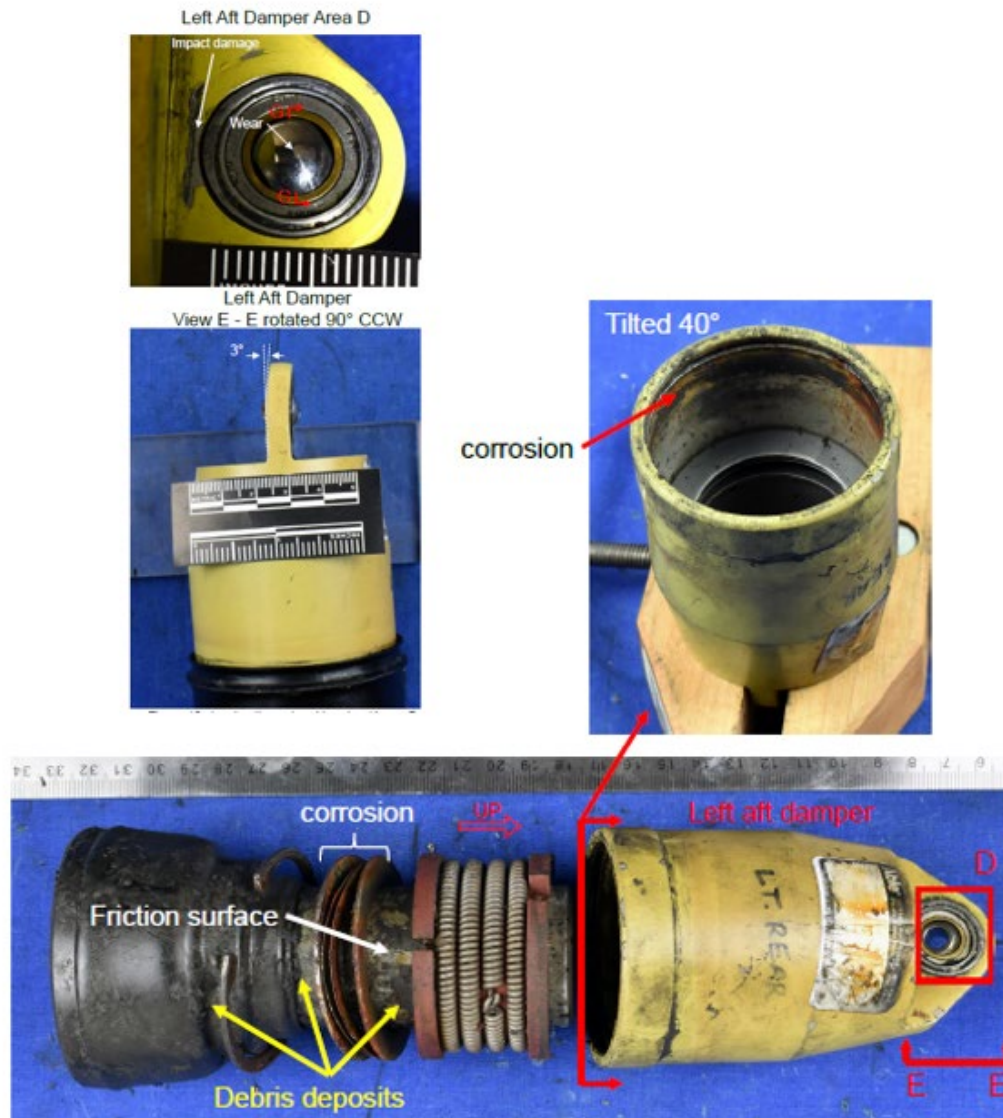


Figure 7. View of Left Amp Friction Damper

1.5 5th Mount and Supporting Fitting Assembly

Bell P/N 204-031-927-5; Lord P/N J-8085-6

Visual exam revealed that the upper circular housing sustained superficial impact damage. Moderate circumferential scoring was found on both upper and lower elastomer. The eyebolt sustained plastic deformation consistent with impact damage. Due to the housing damage, the static and dynamic test was not performed. Instead, the 5th mount was CT scanned and it revealed no anomalies to the elastomer.

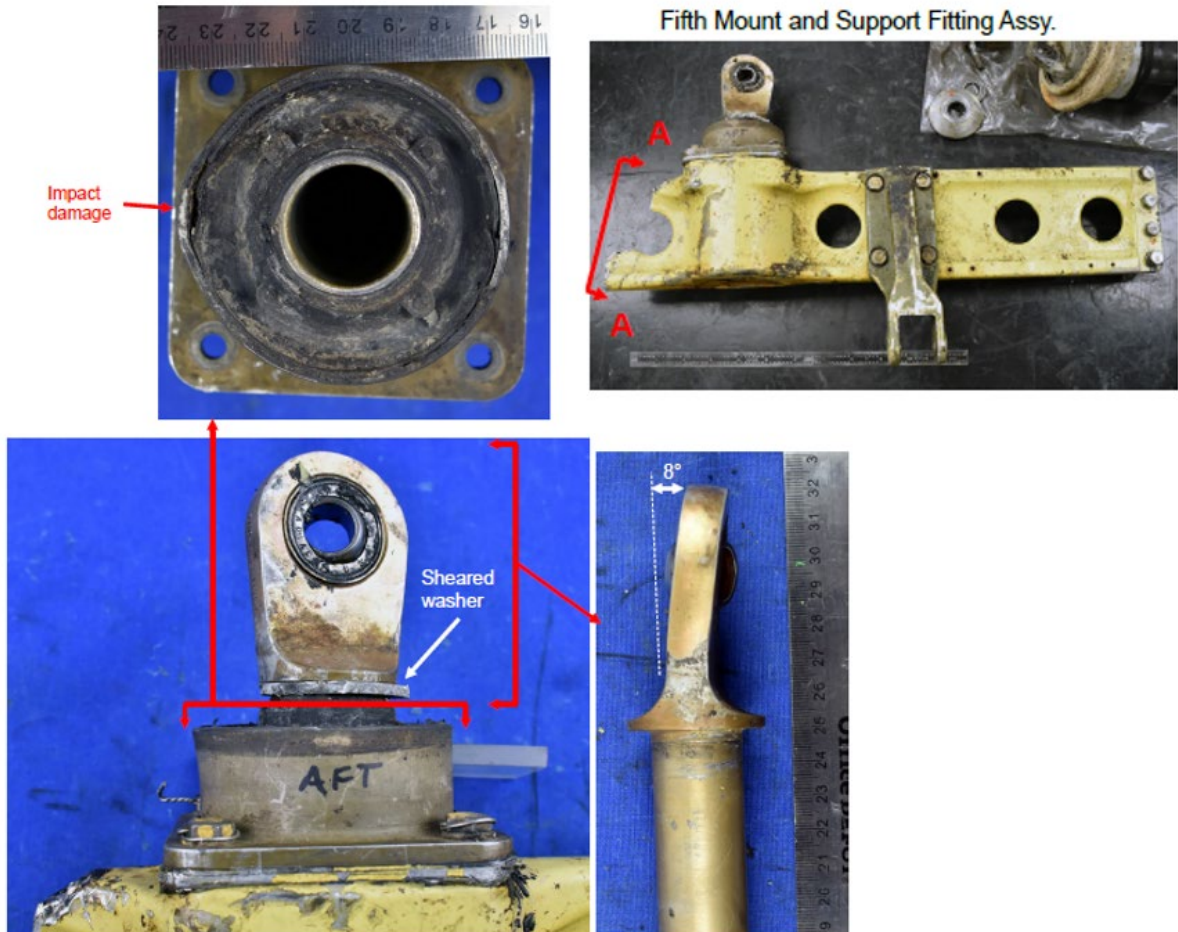


Figure 8. View of 5th Mount and Supporting Fitting Assembly

E. Conclusion from Bell Textron Lab Report

"Excessive radial clearance in the pylon damper rod end bearing has been found as the assignable cause for a high vibration incident on the 412 model, which uses the same damper. The worn rod end bearings reduce the amount of damper stroking to counteract vibratory motions of the pylon after they initiate."