



NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety

Lateral Servo Study Field Notes

April 26, 2022

A. ACCIDENT **WPR20LA211**

Location: Payson, Arizona
Date: July 7, 2020
Time: 1213 MST
Operator: Airwest Helicopters
Aircraft: UH-1H
Registration: N623PB

B. SUMMARY

WPR20LA211

On July 7, 2020, about 1213 mountain standard time, a Bell/Garlick UH-1H helicopter, N623PB, was destroyed when it was involved in an accident near Payson, Arizona. The pilot was fatally injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 133 external load flight.

The helicopter was owned by Airwest Helicopters LLC and operated by the United States Forest Service at the time of the accident supporting firefighting efforts against the Polles Fire in the Tonto National forest 11 nm west of Payson. The fire was accessible only by helicopter due to the rugged terrain and ground crews were largely dependent on helicopters for transportation and support.

According to witnesses, the helicopter was transporting supplies using a long line for a hotshot firefighting crew that were repositioning on the ground. The pilot transported three loads to the new destination uneventfully prior to the accident and had been using an indirect route to the north to avoid a fire area. While transporting the fourth load, witnesses observed the helicopter begin to fly erratically while enroute to its destination. During this time, a witness stated that he observed the helicopter enter a high nose-up pitch attitude and the external payload began to

swing. The helicopter then displayed irregular movements for several seconds before the external payload settled and the helicopter appeared to stabilize. However, after about 3 seconds, multiple witnesses observed the helicopter wobble and bank erratically before it entered a steep nose up attitude and then descended rapidly. Two witnesses reported that the helicopter started to twist to the right as it descended. The witnesses did not observe the helicopter on fire during the accident flight, nor did the pilot report any anomalies over the helicopter crew's common air-to-ground radio frequency or any other assigned frequencies for the fire.



Figure 1: Depiction of helicopter flight path based on witness statements

C. DETAILS OF THE STUDY

A study was performed at Northwest Helicopters in Tumwater, Washington to compare the positions of the left and right lateral servos in the abovementioned accident helicopters to their corresponding cyclic positions using an exemplar UH-1H helicopter.

E.1 Measurements

Strands of wax cord were placed along the lateral and longitudinal axes of the helicopter over the left seat cyclic. The cyclic was then placed in its neutral position using a rigging tool to establish a baseline.

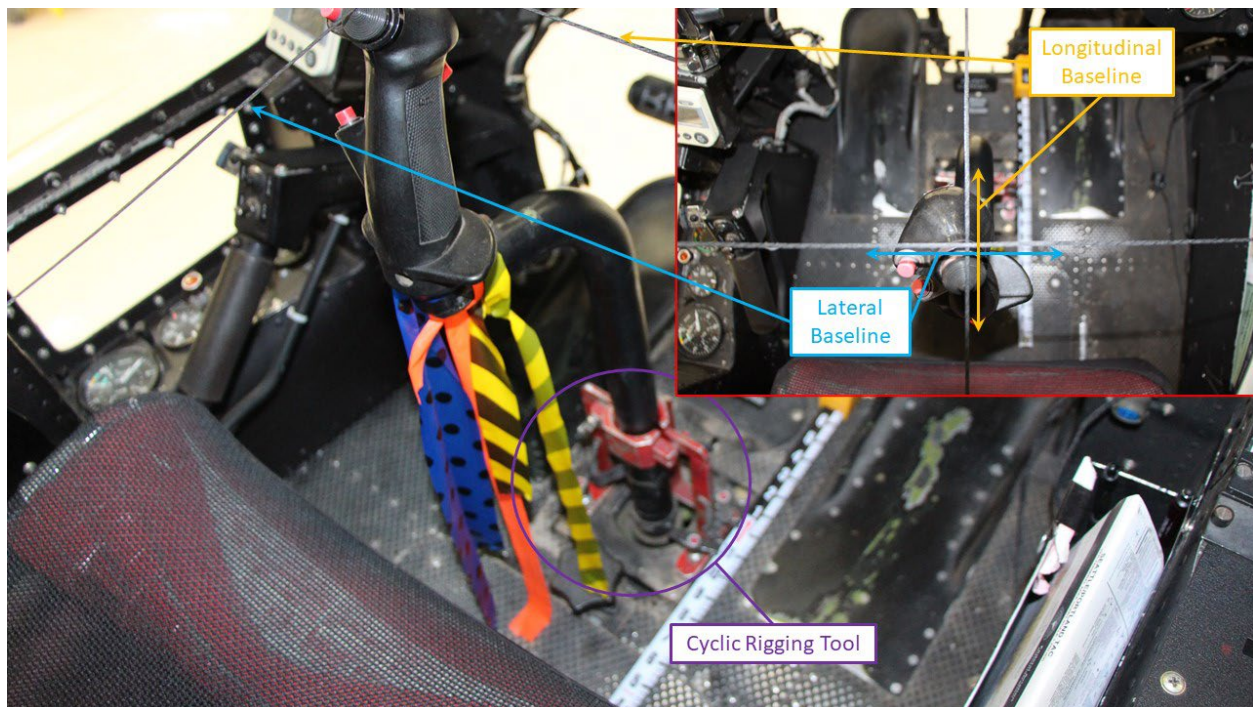
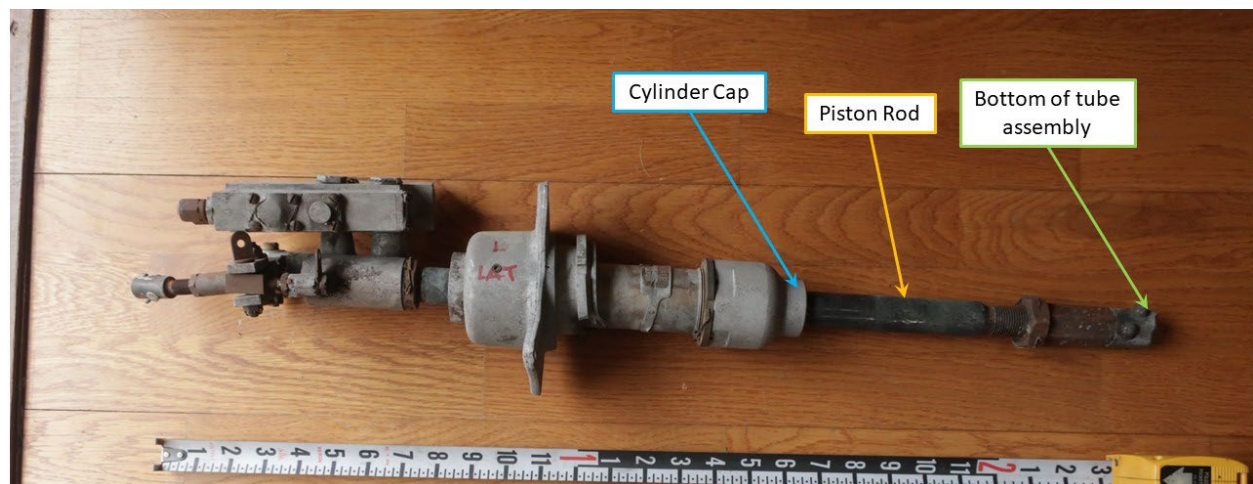


Figure 2: Cyclic control at neutral position

The left and right servo positions were observed from the top of the helicopter forward of the transmission. The length of each extended piston rod was measured from the cylinder cap to the bottom of the tube assembly.



Photograph 1: Left lateral servo from N623PB

Baseline Measurements

The left and right servo pistons both exhibited 7 inches of extension with the cyclic in the neutral position. The collective control was in the full down position for this test. Neither lateral servo moved when the collective control was raised to the full collective position.

Additionally, the following measurements were taken to capture the length of the extended pistons when the cyclic was in the following positions: full forward/full right, full forward/full left, full aft/full right, and full aft/full left.

Cyclic Position	Servo
Full forward/full right	Left: 7.5 inches Right: 5.5 inches
Full forward/full left	Left: 5 inches Right: 7.5 inches
Full aft/full right	Left: 9 inches Right: 10 inches
Full aft/full left	Left: 10.5 inches Right: 8 inches

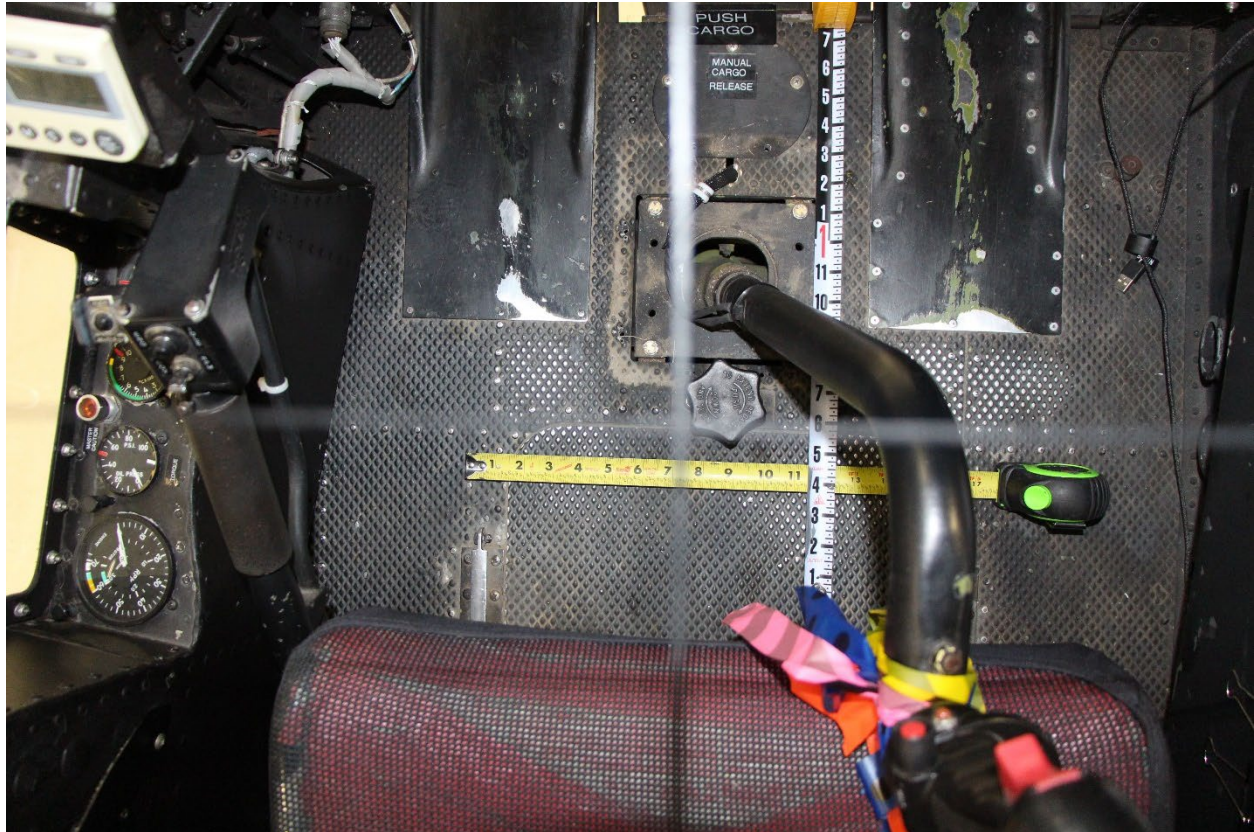
N623PB Servo Positions

The servos from the accident helicopter were found with 7 inches of extended piston on the right lateral servo and 10 inches of extended piston on the left lateral servo. The study was unable to recreate these specific measurements with the exemplar helicopter's lateral servos despite several attempted movements at the cyclic control. When cyclic inputs were made to reach 7 inches of extended piston for the right lateral servo, the left lateral showed 9 inches of extended piston. The right servo exhibited 8.5 inches of extended piston when cyclic inputs were made to reach 10 inches of extended piston for the left lateral piston.

During both inputs, the cyclic was at full right deflection with the cyclic aft of the lateral baseline.



Photograph 2: Cyclic position of exemplar UH-1H when right servo shows 7 inches, left servo 9 inches



Photograph 3: Cyclic position of exemplar UH-1H when right servo 8.5 inches, left servo 10 inches