AVIATION INVESTIGATION REPORT
A01P0047

LOSS OF CONTROL—TAIL-ROTOR DRIVE DECOUPLING

SCHWEIZER 269B C-FRHO
VICTORIA INTERNATIONAL AIRPORT, BRITISH COLUMBIA
15 MARCH 2001

Aviation Investigation Report

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Summary

The Schweizer 269B helicopter, C-FRHO, serial number 44-0055, was air taxiing from the north side of the Victoria Flying Club at Victoria International Airport, British Columbia, to the south ramp of the same property when it experienced a loss of anti-torque control. The helicopter abruptly yawed to the right. From a height of about 10 feet, the pilot lowered the collective rapidly and landed hard. A main-rotor blade cut through the upper surface of the tail boom, and the skid gear broke at all attachment points. The pilot was not injured.

Ce rapport est également disponible en français.

Other Factual Information

The helicopter had accumulated about 13 hours since the last maintenance inspection. It had recently been ferried from a maintenance facility in Abbotsford to Sidney, British Columbia. At the time of the occurrence, the pilot/owner, who was not endorsed for helicopters, was flying solo and unsupervised. A private helicopter pilot (the ferry pilot) had given the pilot/owner some flying instruction.

Inspection of the helicopter anti-torque system revealed that the bumper plug (part number 269A5712) was missing from the recently installed tail-rotor (T/R) drive shaft. The bumper plug is mounted internally to the drive shaft end couplings; it restricts the aft movement of the T/R drive shaft and prevents the disengagement of the splined drive of the drive shaft from the T/R transmission input gear.

The helicopter had been partially assembled from an assortment of parts originating from three helicopters of similar type in various conditions. This work was performed at the Island Flight Support maintenance facility under the authority of Starwest Aviation (aircraft maintenance organization [AMO] 136-96) in Sidney. However, Starwest Aviation did not hold a helicopter rating on its maintenance approval. An aircraft maintenance engineer (AME) was hired to perform the assembly work. This AME took direction from the Starwest Aviation director of maintenance. The AME was instructed to install the tail boom assembly onto the helicopter, with its T/R drive components already installed. He was unfamiliar with the helicopter type and model and was unaware of the bumper plug. After installing the tail boom, he provided worksheets indicating that he had inspected the T/R drive shaft.

A&L Helicopter Maintenance (AMO 93-99) in Abbotsford completed the assembly work and signed off on the airworthiness certification. The maintenance logbook records furnished by this AMO were incomplete and lacking details for the extent of the work performed and the components exchanged and installed. There were no airframe log records for the replacement of the tail boom. The work was documented as a 200-hour inspection, and it was supported by worksheets for 25-, 50-, 100- and 200-hour inspections.

On 22 December 1999, A&L Helicopter Maintenance received Transport Canada AMO certification to perform maintenance on 269/300-series Hughes piston-powered helicopters. During the certification inspection/audit, Transport Canada commented on a lack of control of maintenance records and certifications.

The Schweizer 269B maintenance manual outlines a detailed procedure for replacing the bumper plug in the forward and aft T/R drive shaft couplings when the bumper plug fails to meet inspection and measurement specifications. The Schweizer illustrated parts catalogue for the 269B and earlier models does not have a reference for the bumper plug. After receiving the 269 type certificate from Hughes Helicopter, Schweizer made the bumper plug a replaceable part in all models; however, Schweizer elected not to update the parts catalogues for earlier models.

Analysis

The pilot lost yaw control of the helicopter when the T/R drive shaft became uncoupled. The uncoupling occurred because the bumper plug was missing. This allowed the drive shaft to move aft such that the splines of its coupling became disengaged from the T/R transmission input gear.

The contracted AME at Starwest Aviation provided worksheets for the initial build-up to A&L Helicopter Maintenance. These worksheets reflected that he had inspected the T/R drive shaft. However, the drive shaft was not adequately inspected. Because the contracted AME was unfamiliar with the helicopter type and model, he only inspected the visible ends of the T/R drive shaft and did not notice that the bumper plug was missing.

A&L Helicopter Maintenance personnel performed a 200-hour inspection and replaced the tail boom and installed the T/R drive shaft. A 200-hour inspection requires that all preceding inspections be carried out, namely the 100-, 50-, and 25-hour, daily, and special inspections. The 25-hour and daily inspections make specific reference to an end play and backlash check for the T/R drive shaft. Performed correctly, these checks are meant to detect an incorrect installation and a worn or missing bumper plug as per *269 Series - Basic HMI*, sections 10-83 and 10-87. It is probable that these checks were incorrectly performed, and that the missing bumper plug went unnoticed after the installation of the drive shaft.

The Schweizer maintenance manual contains instructions for inspecting and replacing the bumper plugs. The AME at A&L Helicopter Maintenance was unaware of the requirement to check the bumper plug for wear; therefore, it is likely he did not refer to the manuals for this installation.

Findings as to Causes and Contributing Factors

1. The pilot lost yaw control when the tail-rotor drive shaft's splined drive became disengaged from the tail-rotor transmission input gear.

2. The tail-rotor drive shaft became disengaged because the bumper plug was missing from the aft end of the drive shaft.

3. The aircraft maintenance engineer at A&L Helicopter Maintenance likely did not refer to the manuals for this installation and did not detect that the bumper plug was missing. The fact that the bumper plug was not installed was not detected on subsequent inspections.

Other Findings

1. The pilot was not endorsed for helicopters and was flying solo and unsupervised.

2. The aircraft maintenance engineer hired to perform the assembly work under the direction of Starwest Aviation was unfamiliar with the helicopter type. This aircraft maintenance organization was not approved to carry out helicopter maintenance.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 19 December 2001.