

NATIONAL TRANSPORTATION SAFETY BOARD
DEPARTMENT OF TRANSPORTATION
WASHINGTON, D. C. 20591

SEP 22 1969

Honorable John H. Shaffer
Administrator
Federal Aviation Administration
Department of Transportation
Washington, D. C. 20590

Dear Mr. Shaffer:

The Board's investigation of two Bell Model 47G-2 helicopter accidents revealed failures of the tail rotor pitch control bearings as a result of overtightening of the tail rotor delta hinge bolt.

The nonfatal first accident occurred in Bell Model 47G-2, N8423E, at Oswego, New York, on June 16, 1967, during an aerial application operation when the pilot encountered a binding anti-torque control problem coming out of a right turn. A normal landing attempt was made, rather than an autorotation, due to the low altitude. However, as the helicopter was rotating to the right, substantial damage occurred to the aircraft during the landing.

The second accident occurred in Bell Model 47G-2, N710K, at Astoria, New York, on January 10, 1969, during a radio broadcast highway traffic observation flight. Witnesses reported seeing the helicopter flying low, sparks emanating from the tail, the helicopter rotating or revolving about its horizontal axis, and the pilot's body falling out of the aircraft prior to its crashing into a three-story apartment building. The pilot received fatal injuries and the aircraft was destroyed by impact and fire.

The metallurgical examination of the tail rotor gearbox parts from these two accidents disclosed the tail rotor pitch change bearings in each gearbox, one of the single row bearing, P/N 47-611-146-1, type installation and the other of the dual matched set, P/N 47-611-130-1, type installation, failed as a result of inadvertent overtightening of the delta hinge bolt, P/N 47-611-031-1 or MSB 467-5-36, rather than from inadequate lubrication. The pitch change sleeve in each installation contained longitudinal abrasion and scoring damage in mating areas on the outside surface of the sleeve and the inside surface of the tail rotor shaft. Overtightening of the delta hinge bolt produced binding of the sleeve in the shaft and created abnormal thrust loads on the bearings, which resulted in subsequent failure of the bearings and loss of tail rotor control.

Honorable John H. Shaffer (2)

Based upon the identical findings and cause of these two accidents, we believe that a serious potential for this type of tail rotor control failure exists. The Board therefore recommends that the Federal Aviation Administration issue an Airworthiness Directive requiring a one-time inspection of the tail rotor pitch change bearings, sleeve and mating drive shaft, and the delta hinge bolt. We also believe that a Maintenance Alert Bulletin should be issued to remind all owners/operators of the affected aircraft and Certificated Repair Stations of the adverse effects of overtightening the delta hinge bolt, especially since the FAA-approved Bell Service Instruction No. 31451 does not contain the specific overtightening warning that is included in the Bell Maintenance and Overhaul Instruction Manuals.

Personnel of your Eastern Region are aware of these two accidents. If our staff can be of any further assistance in this matter please contact us.

Sincerely yours,

John H. Reed
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

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WASHINGTON, D.C. 20550



OFFICE OF
THE ADMINISTRATOR

8 OCT 1969

Honorable John H. Reed
Chairman, National Transportation Safety Board
Department of Transportation
Washington, D. C. 20591

Dear Mr. Chairman:

This is in reply to your letter of 22 September 1969 concerning Bell Model 47G-2 helicopter accidents at Oswego, New York, on 16 June 1967 and at Astoria, New York, on 10 January 1969. You indicated that the tail rotor pitch change bearings had failed on these helicopters due to overtorquing of the tail rotor delta hinge bolt and you recommended that a one-time inspection be required by an airworthiness directive and that a maintenance alert be issued cautioning operators against overtorquing.

We are presently issuing an inspection aid which will caution operators that the delta hinge bolt must be torqued in accordance with the maintenance manual instructions. We believe that this action is appropriate to ensure that the delta hinge bolt is not overtorqued in future operations. We are also concerned with the possibility of bearing failures from other causes as we have received reports of failures which were not attributed to overtorquing the delta hinge bolt. Prior to your letter we were processing a notice of proposed rule making for an airworthiness directive which would specify a mandatory retirement life for the duplex pitch change bearings. In accordance with your recommendation we will include in this proposal a requirement for a one-time inspection of the pitch change bearing, sleeve, and delta hinge bolt.

Sincerely,

A handwritten signature in dark ink, appearing to read "J. H. Shaffer".

J. H. Shaffer
Administrator

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