UNITED STATES OF AMERICA

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

ISSUED: September 27, 1972

Adopted by the NATIONAL TRANSPORTATION SAFETY BOARD
at its office in Washington, D. C.
on the 13th day of September 1972

FORWARDED TO:

Honorable John H. Shaffer
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATIONS A-72-166 & 167

The National Transportation Safety Board has recently conducted studies of two failed main rotor grips from Bell Model 47G-2 helicopters which were involved in accidents. The studies were made at the request of the two Federal Aviation Administration inspectors who performed the field phase of the investigations for the Board. Our laboratory reports indicate that there is a need for corrective action to reduce the possibility of similar accidents in the future.

The accidents occurred as follows: A Bell Model 47G-2 helicopter, N8426E, crashed near Branchville, New Jersey, on June 8, 1971, after it lost one of its main rotor blades in flight during a spraying operation. The pilot received fatal injuries. On March 20, 1972, at Oskaloosa, Iowa, another Bell Model 47G-2 helicopter, N976B, was involved in an accident just prior to taking off, when one of its main rotor blades separated from its attachment to the main rotor assembly. The pilot received minor injuries as the aircraft rolled over.

In both of these accidents, a wooden main rotor blade separated from the main rotor hub as a result of fatigue cracking and terminal fracture of one of the metal grips of the rotor blade. Metallurgical examination of the two failed grips, parts Nos. 47-120-135-1 and -2, respectively, revealed that the grips failed from fatigue which originated in an improperly machined fillet area, an extremely critical area of the grip. Neither of the blade grips was originally installed on the two aircraft at the time of delivery by the manufacturer. Our investigation revealed that both blade grips were manufactured prior to 1956 and are considered old and outmoded by the manufacturer. The service records of both grips were incomplete. The grips might have been involved in prior main rotor stoppage, which could have contributed to the fatigue cracking and subsequent grip failure.

The Maintenance and Overhaul Instructions for the Bell Model 47G-2 state that the inboard radius and bottom of the grip fillet should be inspected at 1,200-hour intervals and must have a smooth finish, free of nicks and tool marks. The instructions refer to a drawing that illustrates proper machining contours in the area of the grip fillet. The grip which failed on N976B was returned to service after at least two 1,200-hour inspections even though machining errors were present in the area illustrated in the drawing. The fatigue failure in that grip propagated directly from a machining defect in the grip fillet. We do not have maintenance records for the N8426E grip, but we understand that it was installed on the aircraft less than 35 hours before it failed in flight.

The Illustrated Parts Catalog for the Bell Model 47G-2 lists the correct blade grip for the installation utilizing wooden main rotor blades as part No. 47-120-135-3. As noted previously, the grips which failed were of the 47-120-135-1 and -2 configuration.

In view of the circumstances discussed above and the serious consequences of a main rotor grip failure, the National Transportation Safety Board recommends that the Federal Aviation Administration:

1. Require the removal from service of all main rotor grips identified by parts Nos. 47-120-135-1 or -2 from Bell helicopters equipped with wooden main rotor blades.

2. Issue a Maintenance Bulletin to assure that the owners and operators of Bell Model 47 helicopters do not install main rotor grips with incomplete service records. In addition, they should be made aware of the importance of checking for proper machining contours and surface finish in the fillet area of grips for Model 47D-1, 47G, and 47G-2 helicopters.

These recommendations will be released to the public on the issue date shown above. No public dissemination of the contents of this document should be made prior to that date.

Reed, Chairman, McAdams, Thayer, Burgess, and Haley, Members concurred in the above recommendations.

By: John H. Reed
Chairman