

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: 6/14/82

Forwarded to:

Honorable J. Lynn Helms  
Administrator  
Federal Aviation Administration  
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-82-52

On January 27, 1982, a Bell UH-1B military surplus helicopter crashed into Kent Lake, California, killing the pilot, the only person onboard. The helicopter was performing sling operations at the time of the accident and had 656.2 hours of civilian use.

The National Transportation Safety Board performed a metallurgical examination of portions of the tail boom and vertical fin assemblies at its laboratory in Washington, D. C. This examination revealed extensive fatigue cracking in the magnesium alloy skin panels of the tail boom at station 194. The fatigue began from multiple rivet holes in the circumferential rivet pattern at station 194. Areas of fatigue were found from the bottom center rivet position, up the left side of the boom, and halfway across the skin at the top of the boom. The area where fatigue first started is believed to be near the lower left corner of the tail boom.

The tail boom of this aircraft is constructed with magnesium alloy skin forward of station 194 and aluminum alloy skin aft of this position. The skin panels were joined at station 194, with the side and lower magnesium alloy skin panels sandwiched between a bulkhead and the aluminum alloy skin panels. Thus, visual detection of cracking in these magnesium alloy skin panels along the station 194 rivet line would be difficult.

A sketch of the tail boom from station 164 to station 227 is shown in Figure 1. Other model helicopters which have the same tail boom construction in the area of station 194 are Bell helicopter models 204B and UH-1D, some of which are military surplus and are in civilian use.

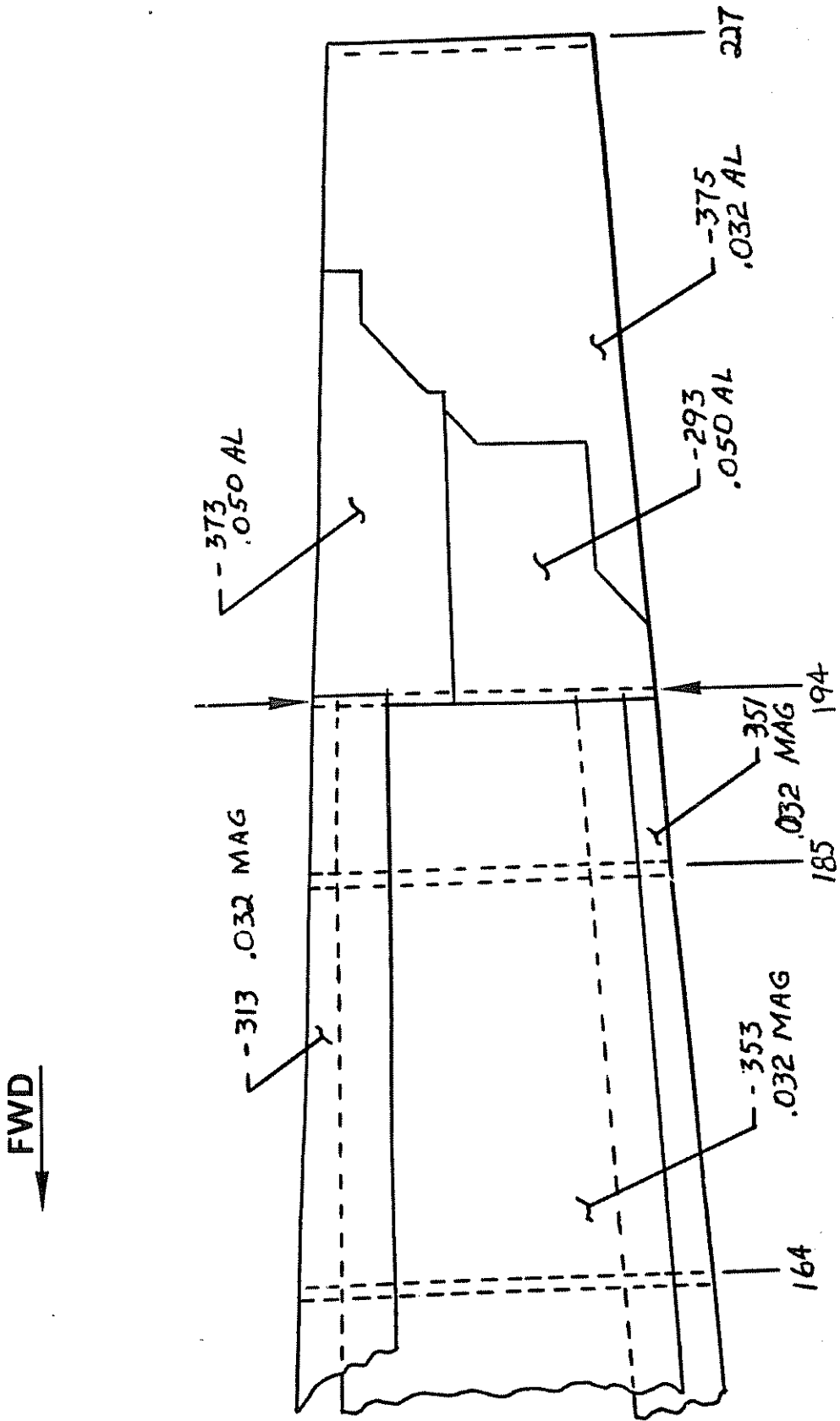


Figure 1. Sketch of the skin panels on the left side of the tail boom of the UH-1B from station 164 to station 227. Part number, thickness and alloy of the various skin pieces are indicated. For example, "-353 .032 mag" indicates that this skin piece is P/N 204-030-800-369-353 and is a magnesium alloy sheet with an 0.032 inch thickness. Arrows indicate the station 194 fracture location.

In addition to fatigue cracking in the tail boom at station 194, fatigue cracking was also found in the left side angle of the vertical fin front spar. The fatigue began from the hole for the lowest rivet which secured the angle to the left side of the housing at the top of the vertical fin and progressed most of the way through the angle cross section.


Although the cracks at station 194 may not have been visually detectable, other signs of distress were evident in the general area. Extensive fretting and cracking were found on and adjacent to an access panel located on the bottom of the tail boom just forward of the station 194 joint. Also, a small plate was found riveted to the skin at the aft end of this access panel. The plate had apparently been installed to repair prior damage to the skin panel.

The National Transportation Safety Board is concerned that other model UH-1B, UH-1D and 204B helicopters may have developed, or might develop in the future, fatigue cracks as found during this investigation. The Board is further concerned that the inspection procedures to detect such conditions are inadequate and need revision.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue an Airworthiness Directive to require (1) that all military surplus Bell UH-1B and UH-1D model helicopters and Bell 204B model helicopters be visually inspected before further flight and at appropriate time intervals thereafter for evidence of fretting on or adjacent to the tail boom aft access panel and the tail boom skin and rivets at station 194, (2) that aircraft found to have fretting or cracking be X-ray inspected before further flight for cracks in the magnesium alloy skin beneath the outer aluminum alloy skin on the left side (180°) of the tail boom at the station 194 rivets and also in the left side angle of the vertical fin front spar along a 1-inch-long area near the top of the spar where the angle first contacts the forward edge of the housing to which the 90° gear box is attached, (3) that aircraft in which the X-ray inspection discloses cracks be repaired before further flight, and (4) that at appropriate time intervals X-ray reinspection to detect newly developing cracks be made of aircraft on which the initial X-ray inspection disclosed no evidence of cracking. (Class II, Priority Action) (A-82-52)

BURNETT, Chairman, GOLDMAN, Vice Chairman, McADAMS and BURSLEY, Members, concurred in this recommendation.

  
By: Jim Burnett  
Chairman

CC: Secretary, Department of Defense  
Secretary, Department of Transportation