



Brief of Accident (Continued)

MIA00FA030  
File No. 12473

11/27/1999

PHILADELPHIA, MS

Aircraft Reg No. N8144M

Time (Local): 14:45 CST

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missing "red" pitch change horn. The mating grip surface exhibited a blackish residue near the pitch change horn boreholes, and the blackish area extended beyond the boreholes. The crashsite and an extended area back-up the wreckage path were searched extensively, including by Boy Scout parties; the "red" pitch change horn and most of the "red" pitch change link were not found. Examination of the red grip by an NTSB metallurgist showed the surfaces of both the upper and lower holes showed extensive areas of dark deposits and surface damage consistent with repeated small relative movements against mating objects (fretting). Visible fretting areas covered most of the surface of the bushing counter bores and portions of the fractured surfaces of the threads. Energy dispersive x-ray analysis of samples of the black deposits taken from the upper hole found them to mostly contain aluminum and iron and significant amounts of oxygen along with minor amounts for the other constituents of the grip and bushing. Samples from the lower hole were found to be mostly aluminum with large peaks for iron, cadmium, silicon and oxygen. Both bushing counter bores showed localized material removal and enlargement of the diameters. Up to .020 to 0.025 inches of material were removed in localized areas from the bushing bore. In addition, the bores were deformed and distorted adjacent to the grip surface. The surfaces of the holes, particularly the upper one, also contained circumferential marks in the bushing counter bore, the lock ring diameter and on the fractured threads indicating progressive and incremental movement of the mating objects. No other evidence of failure or malfunction of the helicopter structure, flight controls, engine, or rotor and rotor drive system was found. Aircraft records show the rotor head, including the "red" blade grip and pitch change horn, was last removed from the helicopter in March 1998, 162.2 flight hours before the accident, for blade retention strap replacement.

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Occurrence #1:     AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION  
Phase of Operation: CRUISE

Findings

1. ROTORCRAFT FLIGHT CONTROL,PITCH CHANGE HORN - LOOSE PART/BOLT/NUT/CLAMP/ETC
2. (C) MAINTENANCE,INSPECTION - INADEQUATE - COMPANY MAINTENANCE PERSONNEL
3. (C) AIRCRAFT PREFLIGHT - INADEQUATE - PILOT IN COMMAND
4. ROTOR SYSTEM - VIBRATION
5. (C) OPERATION WITH KNOWN DEFICIENCIES IN EQUIPMENT - CONTINUED - PILOT IN COMMAND
6. ROTORCRAFT FLIGHT CONTROL,PITCH CHANGE HORN - SEPARATION
7. MISC ROTORCRAFT,MAIN ROTOR/TAIL BOOM CONTACT

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Occurrence #2:     IN FLIGHT COLLISION WITH TERRAIN/WATER  
Phase of Operation: DESCENT - UNCONTROLLED

Findings

8. TERRAIN CONDITION - GROUND

Findings Legend: (C) = Cause, (F) = Factor

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The National Transportation Safety Board determines the probable cause(s) of this accident as follows.  
The failure of the pilot and company maintenance personnel during preflight and periodic inspections to identify the signs of fretting and looseness in the "red" main rotor blade pitch change horn to main rotor blade grip attachment, resulting in the helicopter continuing in service with a loose pitch change horn, separation of the pitch change horn from the blade grip, and inflight breakup of the helicopter due to the main rotor striking the tailboom. Contributing to the accident was the pilot's failure to respond to increased vibration in the main rotor system and land immediately.