Subject: **EXAMINATION OF A 206L1 HELICOPTER TAILBOOM AT WASHINGTON D.C.**

HISTORY AND RELATED DATA

Helicopter
Model: 206L1
Registration: N79SP
Serial number: 45540
Total time: 2898 hours

Operation
Operator: West Virginia State Police

Problem
Type of discovery: Accident
Date: April 4, 1996
Operational area: Charleston, West Virginia

Parts
Name: Tailboom
Part Number: 206-033-004-045A
Serial Number: AOKP 01058

INTRODUCTION

On April 4, 1996, a Model 206L1 helicopter was involved in an accident near Charleston, West Virginia. On April 16, 1996, this writer and Mr. J. Epperson from the National Transportation Safety Board (NTSB) Materials Laboratory were at Charleston, West Virginia to examine components from the helicopter. As a result of that examination, it was determined that a fracture in the tailboom would be sent to the NTSB Materials Laboratory in Washington D. C. for further analysis. During April 23 through April 26 this writer was present during examination of the tailboom by Mr. M. Marx at the NTSB Materials Laboratory in Washington D. C.

Bell Helicopter Textron records indicated that the tailboom S/N AOKP 01058 (P/N 206-033-004-045A) had been installed on 206L1 helicopter S/N 45540 on September 9, 1980 as a new part. Examination of the tailboom revealed that the doubler specified by Alert Service Bulletin 206L-87-47 had been installed. It was not known when the doubler had been installed.

CONCLUSION

Examination of the fractured tailboom revealed evidence that fatigue cracking had been present prior to the accident. The cracking was centered near a nutplate attachment rivet hole on the upper left side at boom station 167. The nutplate was used as an attachment for the 90° gearbox fairing. No material discrepancies and/or deficiencies were found which would have caused the fatigue cracking to occur.

DISCUSSION

Inspection of the tailboom fracture revealed a circumferential fracture had occurred between boom stations 167 and 170. The forward side of the fracture was relatively intact. The aft side of the tailboom fracture had been buckled and torn or "mushroomed" after the fracture occurred. It could be seen that the lower skin had fractured as a result of overstress. However, portions of the fracture surface of the upper skin had been worn smooth and fracture features were no longer visible. Sections which had mated with the forward side of the fracture were missing from the aft side of the fracture in the area around the 90° gearbox fairing retention bolt nut plate at boom station 167 (see Figure 1).

The forward portion of the fracture near the area of the 90° gearbox fairing retention bolt nut plate at boom station 167 had been worn and chafed to a feathered edge by the forward corner of the 90° gearbox fairing. Wear had also occurred where the reinforcement doubler on the inside surface of the driveshaft cover had chafed the upper tailboom skin. Other portions of the upper skin fracture surfaces in that area had been worn smooth and/or damaged so that fracture features were no longer visible. Figure 2 shows the forward side of the tailboom fracture.

One portion of the aft fracture in the tail boom skin was retained at the 90° gearbox fairing retention bolt nut plate and is shown in Figure 3. The forward side of this piece of tailboom skin was flat and worn smooth with no remaining fracture features. The fractures between the holes and the other two edges on this piece were overstress.

Micro-hardness tests indicated the skin material had a hardness of 72 HRB. This met the minimum hardness of 68 HRB specified by BPS 4467 for 2024T3 alclad aluminum alloy. Thickness of the skin material was 0.039 inch (0.99 mm) which met the engineering drawing requirement of 0.040 ± 0.002 inch (1.02 ± 0.05 mm).

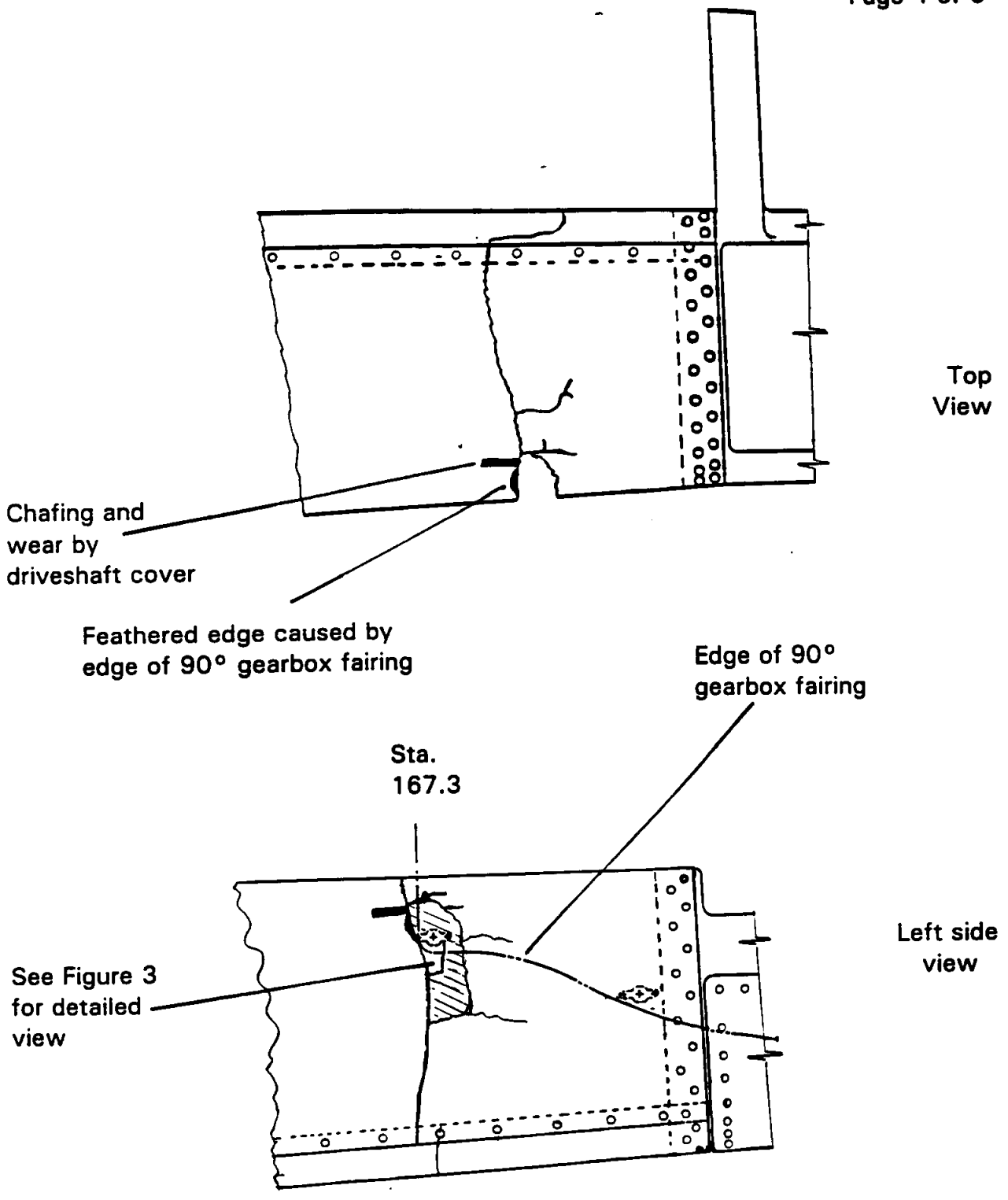

Figure 1
View showing fracture in tailboom.

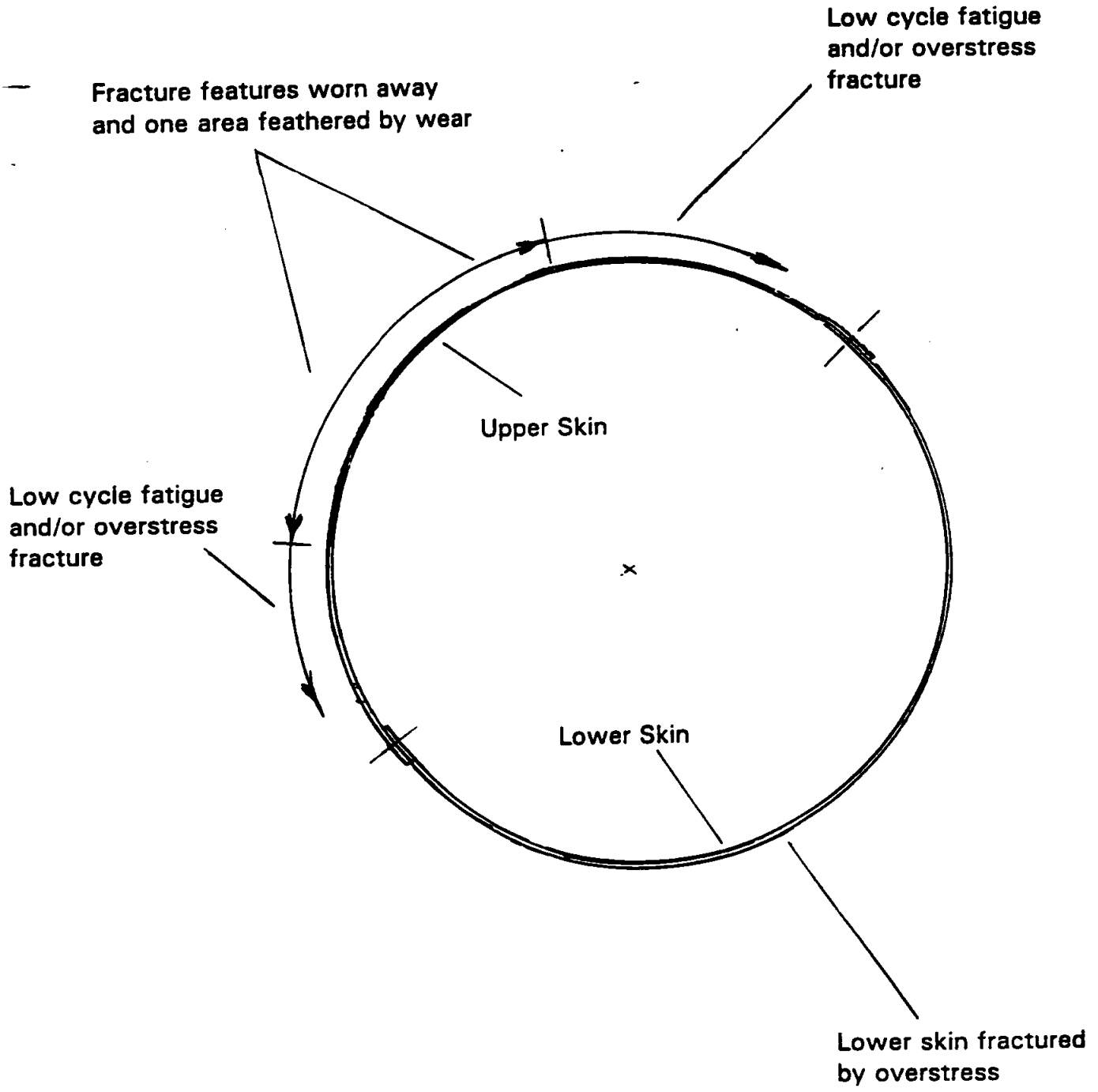

Figure 2
View of forward side of fracture.

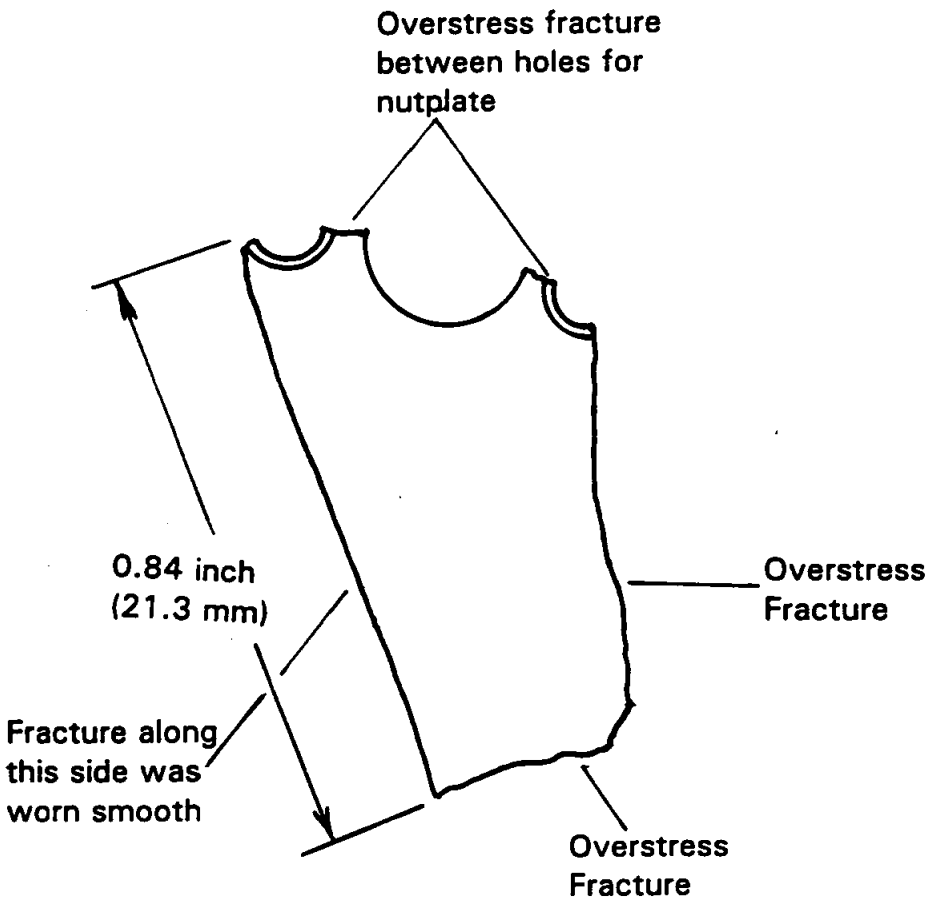

Figure 3
Fragment of tailboom skin from aft side of fracture at the forward 90° gearbox fairing retention bolt nut plate.