

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ANC22LA035

MATERIALS LABORATORY

Factual Report 23-024 Akutat AK aux spar

March 30, 2023

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A. ACCIDENT INFORMATION

Location: Yakutat, Alaska
Date: May 24, 2022
Vehicle: de Havilland Aircraft DHC-3 Otter, N703TH
Investigator: Clinton Crookshanks

B. COMPONENTS EXAMINED

Disassembled auxiliary spars from the right and left elevators from de Havilland Aircraft DHC-3 Otter.

C. EXAMINATION PARTICIPANTS

A group examination of the submitted pieces was held on January 12, 2023, at the Safety Board's Materials Laboratory, Washington, D.C. Follow-up work continued and was completed after departure of the group members:

Group Chair	Frank Zakar NTSB Washington, DC
Member	Edward Komarnicki NTSB Washington, DC
Member	Clint Crookshanks NTSB Aurora, CO
Member	Luke Walker FAA Washington, DC
Member	Dennis Pollard De Havilland Aircraft of Canada Limited Calgary, Alberta, Canada
Member	Mina Nourmansouri De Havilland Aircraft of Canada Limited Toronto, Ontario, Canada

D. DETAILS OF THE EXAMINATION

Figures 1 and 2 show photographs of the disassembled auxiliary spars from the left and right elevator assemblies.

Examination of the right auxiliary spar revealed the forward hinge half which remained attached. The two cracks shown in Figure 2 were found on the right auxiliary spar that extended mostly through the cross section. The cracks were located in the general area of the auxiliary spar that contained severe bending deformation. Bench binocular microscope examination of the fracture faces from the cracks revealed rough texture features on slant planes typical of overstress separation, with no evidence of fatigue cracking.

Examination of the left auxiliary spar revealed a 1-inch portion of the inboard end of the auxiliary spar was cut out (see figure 3). A small crack, measuring approximately 0.05 inches in length, extended from the cut radius portion of the auxiliary spar (see figure 4). A saw cut was made between the curved portion of the auxiliary spar and the end of the crack - to expose the fracture face of the crack. Bench binocular microscope examination of the exposed fracture faces revealed evidence of rubbing (mechanical) damage that obliterated the fracture features and the mode of fracture was not determined. A repair doubler (measuring approximately 4.3 inches in length) was attached to the inboard end the auxiliary spar on the forward side at the location where the 1-inch portion of the spar was removed (see figure 5). A repair corner tab was attached to the inboard end of the repair doubler and auxiliary spar.

The inboard balance weight was stamped with part number "C3-TE 15 13A" and the weight "11.05 ozs" (ounces). The outboard balance weight was stamped part number "C3-TE 15 15A" and the weight "11.0 OZS".

On October 4, 2022, the Federal Aviation Administration issued an Emergency Airworthiness Directive (AD) 2022-21-51 that required operators and owners of DHC-3 airplanes to inspect the left elevator assembly in the area of the inboard end of the auxiliary spar for cracks, corrosion, and previous repair. If any cracks, corrosion beyond Level 1, or previous repair is found during any inspection required by the AD, before further flight, replacement of the left-hand elevator auxiliary spar was required. The repair doubler was located in the area that required inspection by the AD though the AD was not effective at the time of the accident.

Submitted by:

Frank Zakar
Senior Metallurgist

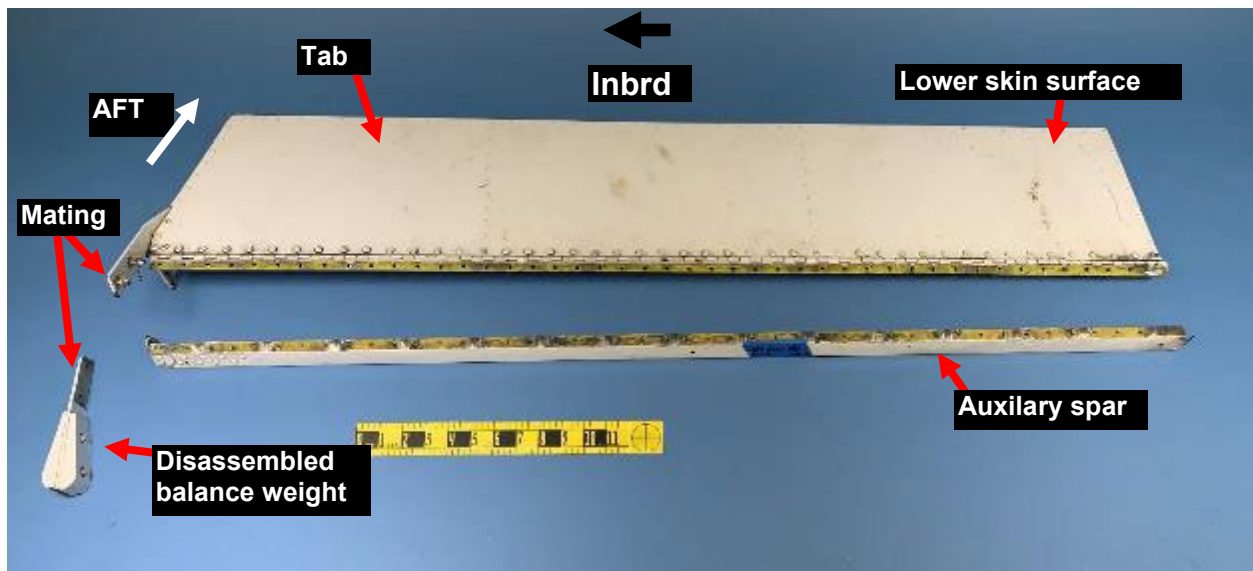


Figure 1. As-received tab assembly; balance weight; and auxiliary spar that were disassembled from the left elevator assembly showing the lower surface.

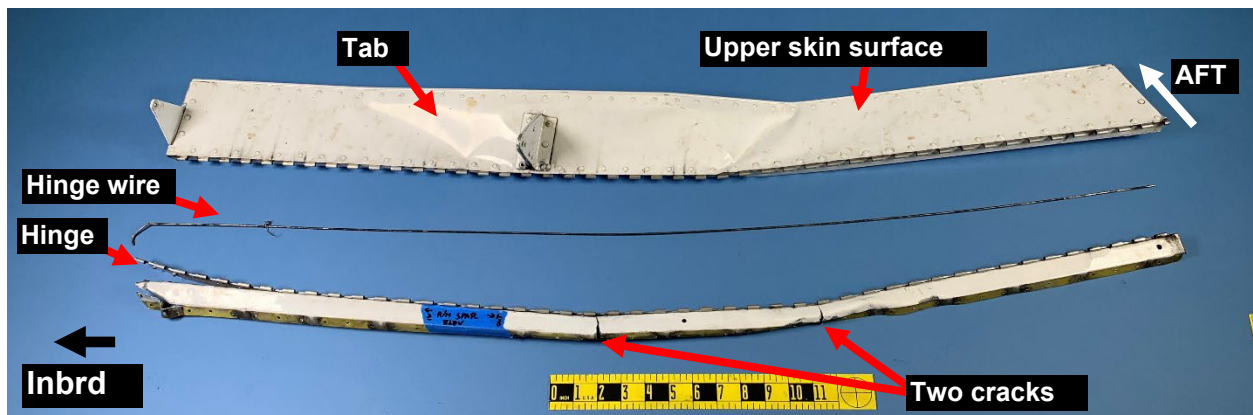


Figure 2 . As-received tab assembly and auxiliary spar that were disassembled from the right elevator assembly showing the upper surface.

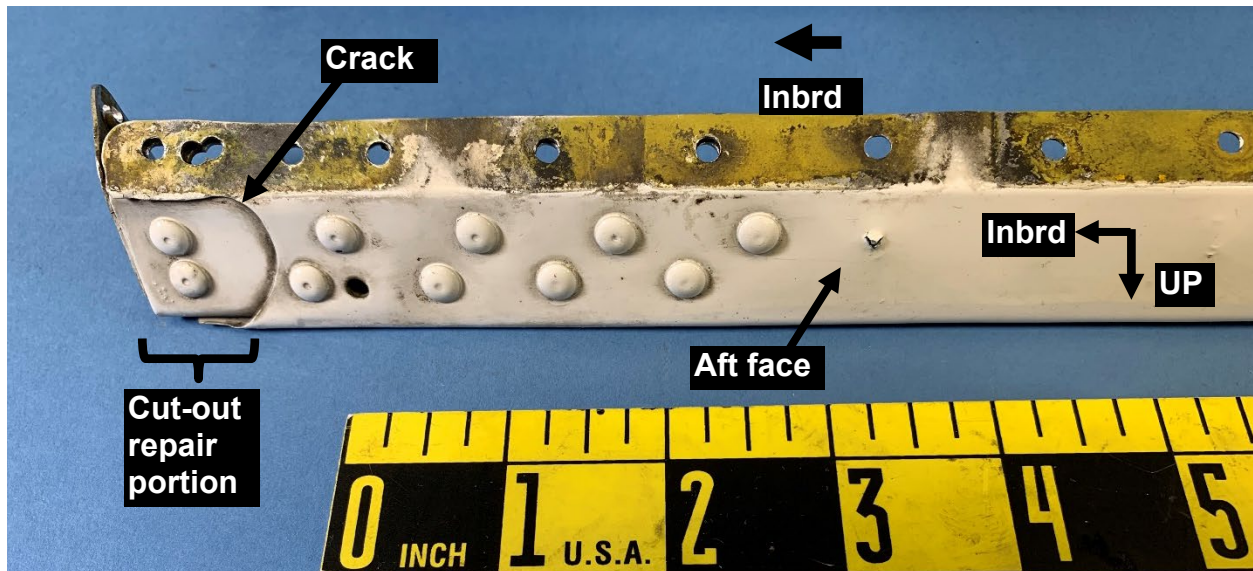


Figure 3. Inboard end of the auxiliary spar from the left elevator assembly showing the lower cap portion (painted green).

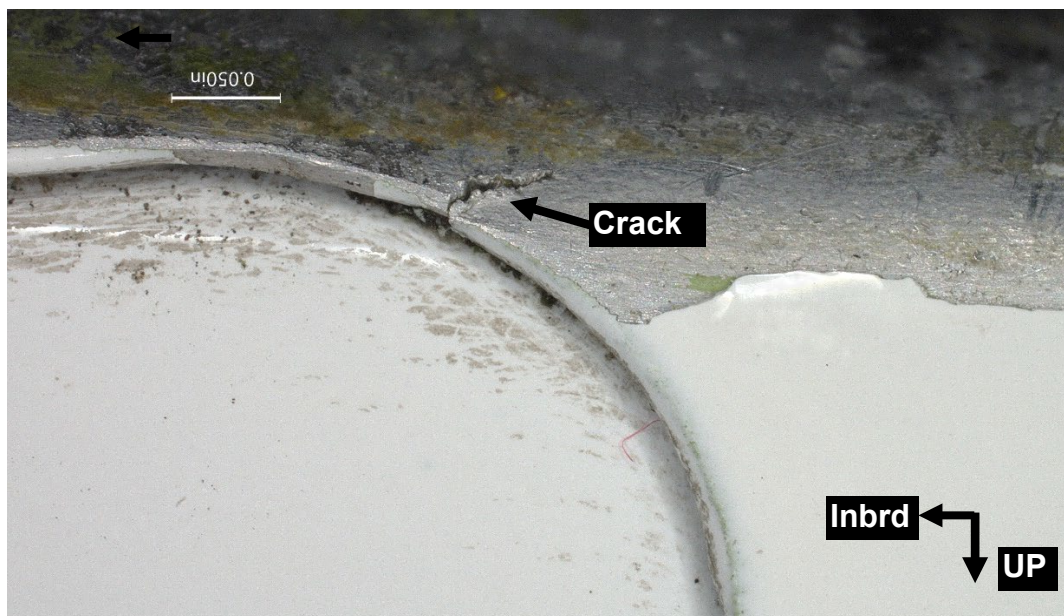


Figure 4. Crack at the cut out lower radius of the auxiliary spar for the left elevator.

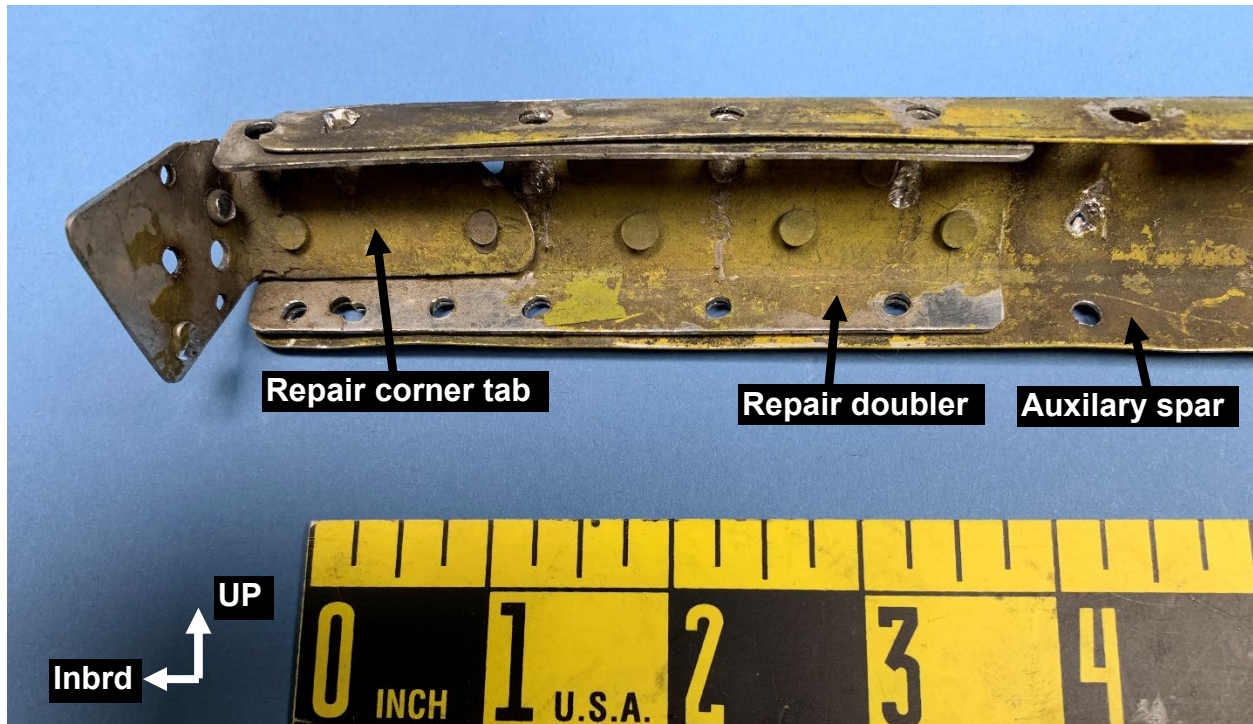


Figure 5. View looking at the inboard forward face of auxiliary spar for the left elevator.