

**Docket No. SA-522**

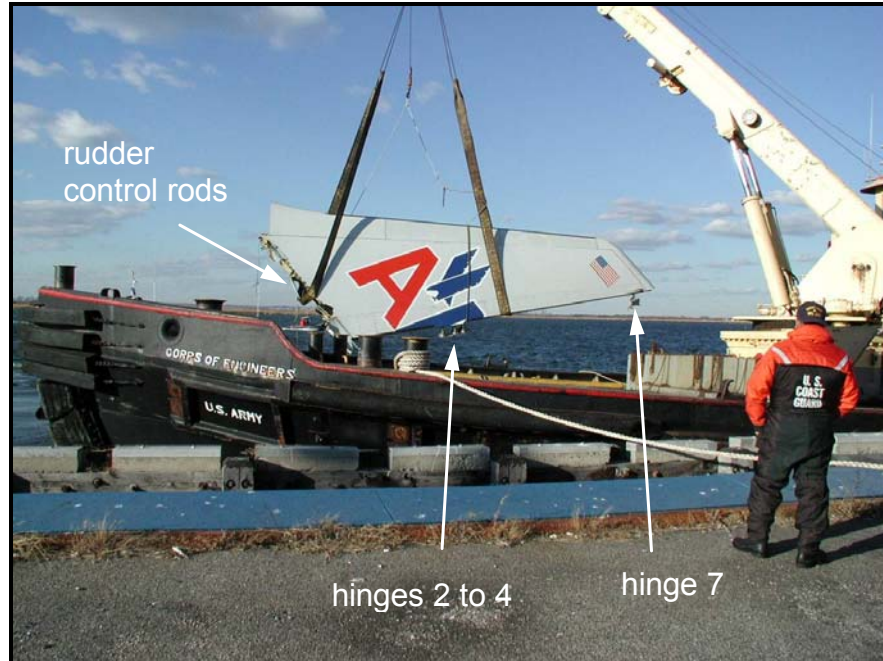
**Exhibit No. 15-A**

**NATIONAL TRANSPORTATION SAFETY BOARD**

**Washington, D.C.**

Materials Specialists' Submission  
Selected Photographs and Drawings of the Damage Areas on  
the Vertical Stabilizer and Rudder

(13 Pages)



ImageNo:208A0112, Project No:A00386

Figure 3. Recovery photo showing the vertical stabilizer being hoisted from the water. Note hinge 5 is not visible and the control rods are swept aft under the strap at the lower end.



ImageNo: 208A0113, Project No:A00386

Figure 4. Another recovery photo showing the right side of the vertical stabilizer. Note the location of the hoist line just above hinge 4.

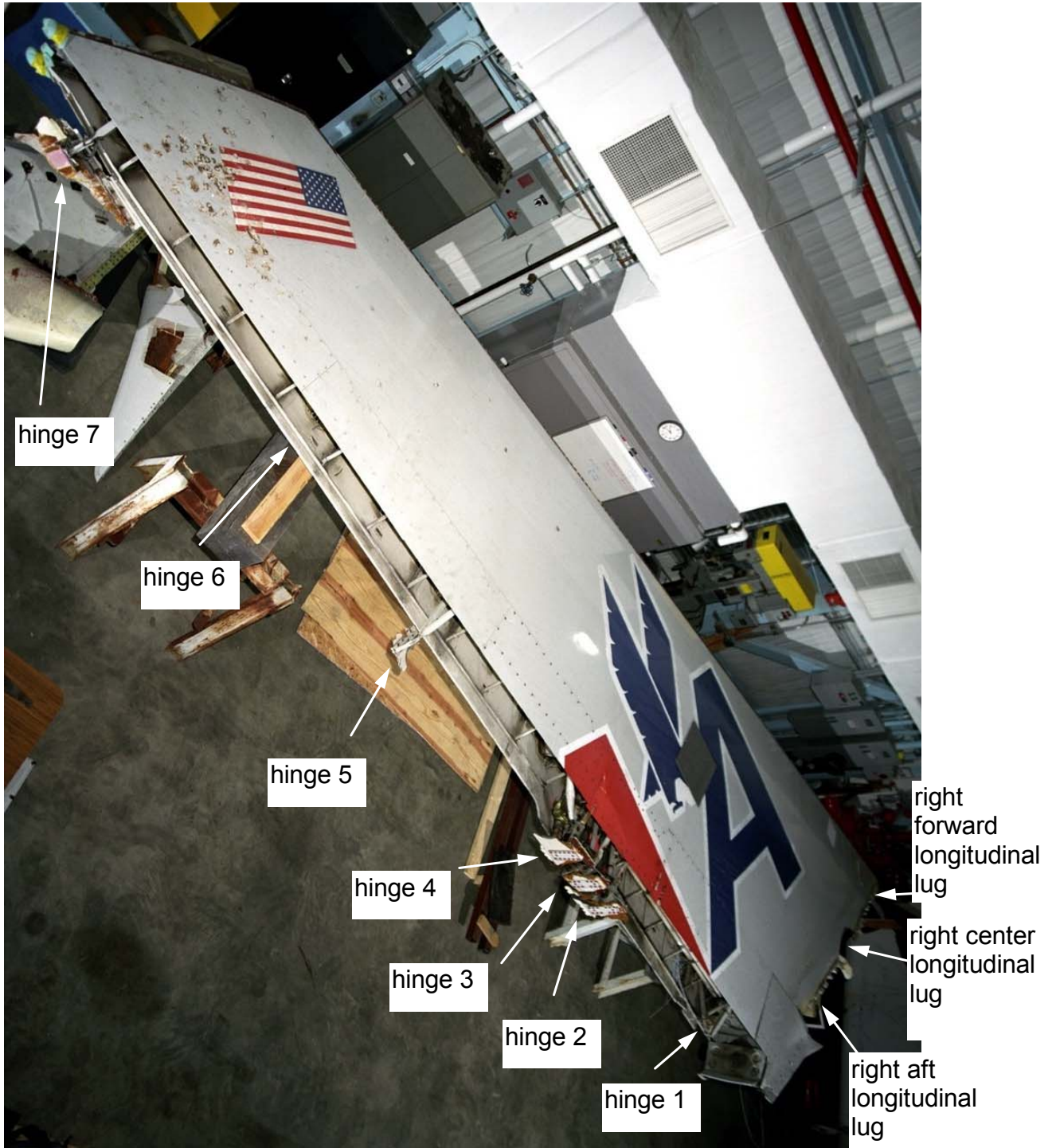
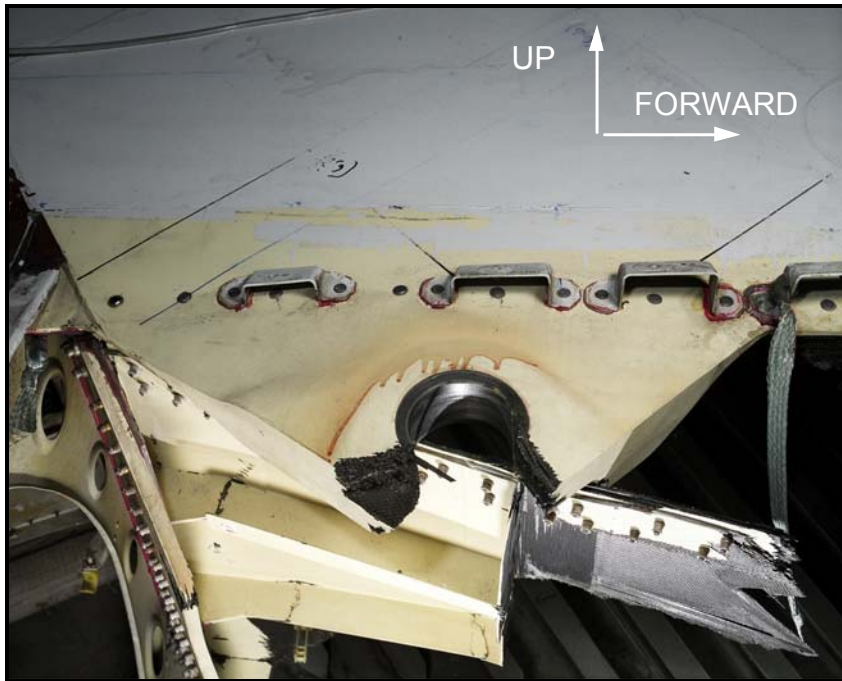
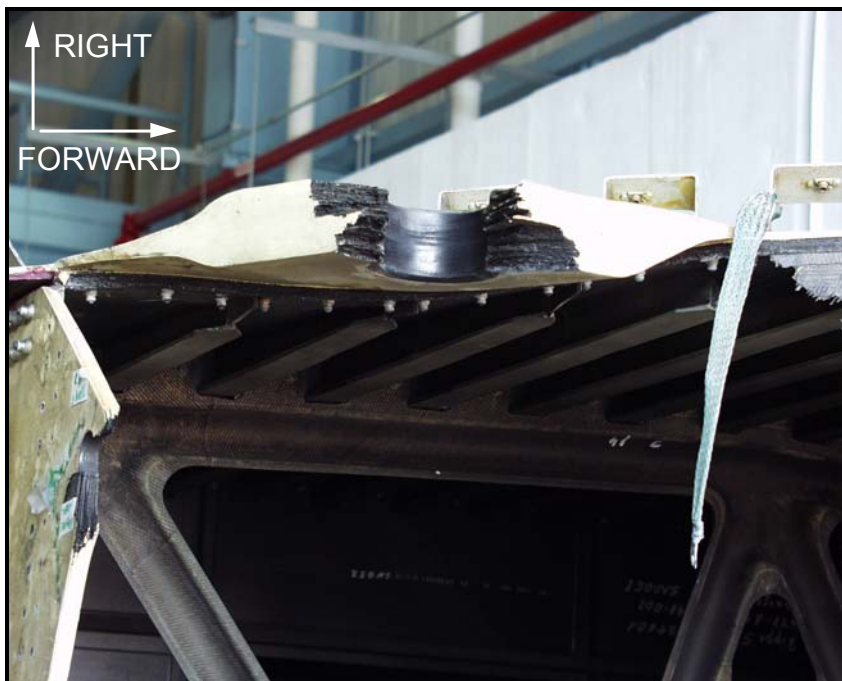


Figure 9. Overall view of the vertical stabilizer as it was examined at NASA Langley.



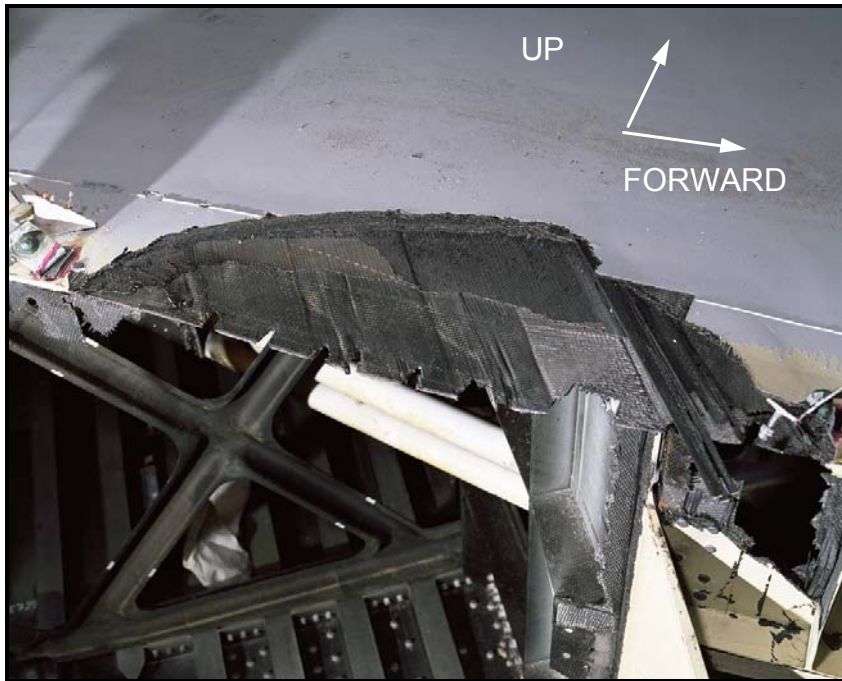
ImageNo:208A0259, Project No:A00386

Figure 12. View of the right aft longitudinal lug on the vertical stabilizer.



ImageNo: 208A0230, Project No:A00386

Figure 13. Another view of the right aft longitudinal lug on the vertical stabilizer shown after the piece of rib 1 that covered part of the fracture was removed.



ImageNo:208A0221, Project No:A00386

Figure 14. View of the right center longitudinal lug area on the vertical stabilizer.



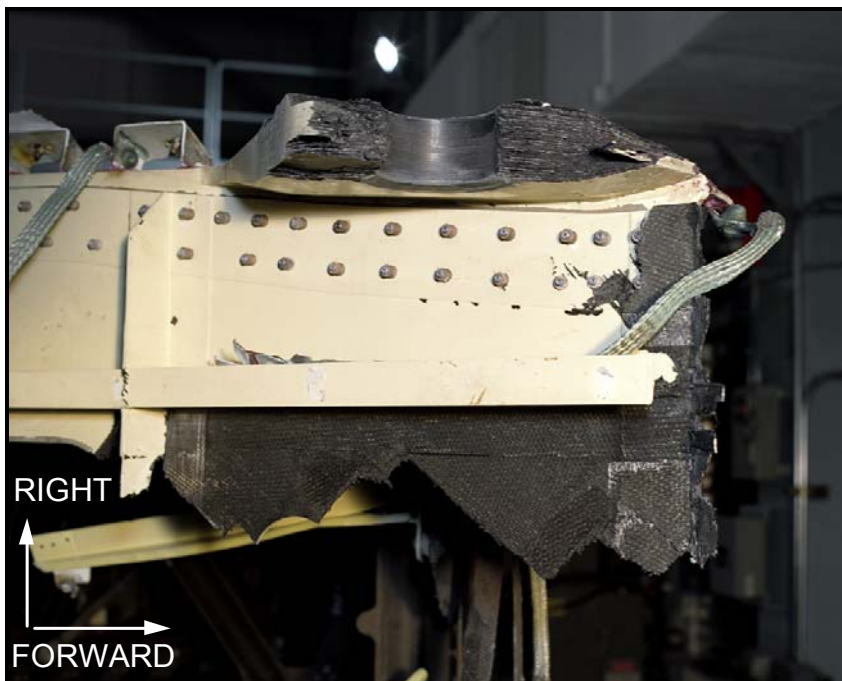
ImageNo: 208A0254, Project No:A00386

Figure 15. View of the mating piece of the right center longitudinal lug that remained attached to the fuselage.



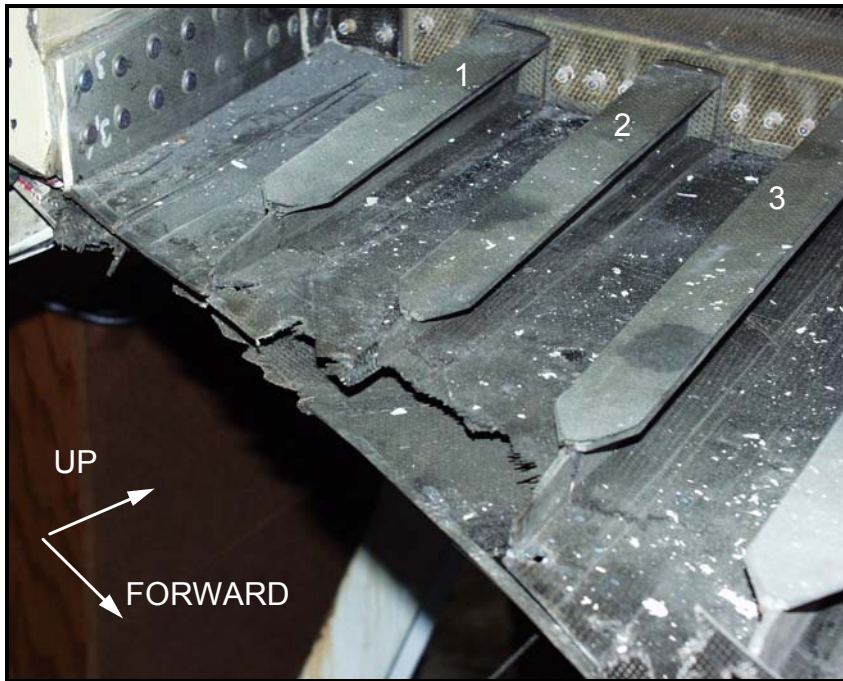
ImageNo:208A0260, Project No:A00386

Figure 16. View of the right forward longitudinal lug on the vertical stabilizer.



ImageNo: 208A0218, Project No:A00386

Figure 17. Another view of the right forward longitudinal lug on the vertical stabilizer.



ImageNo:208A0226, Project No:A00386

Figure 18. View of the left aft longitudinal lug area on the vertical stabilizer. Stringers 1, 2, and 3 are labeled.



ImageNo: 208A0256, Project No:A00386

Figure 19. View of the mating left aft longitudinal lug piece that remained attached to the fuselage.



ImageNo:208A0253, Project No:A00386

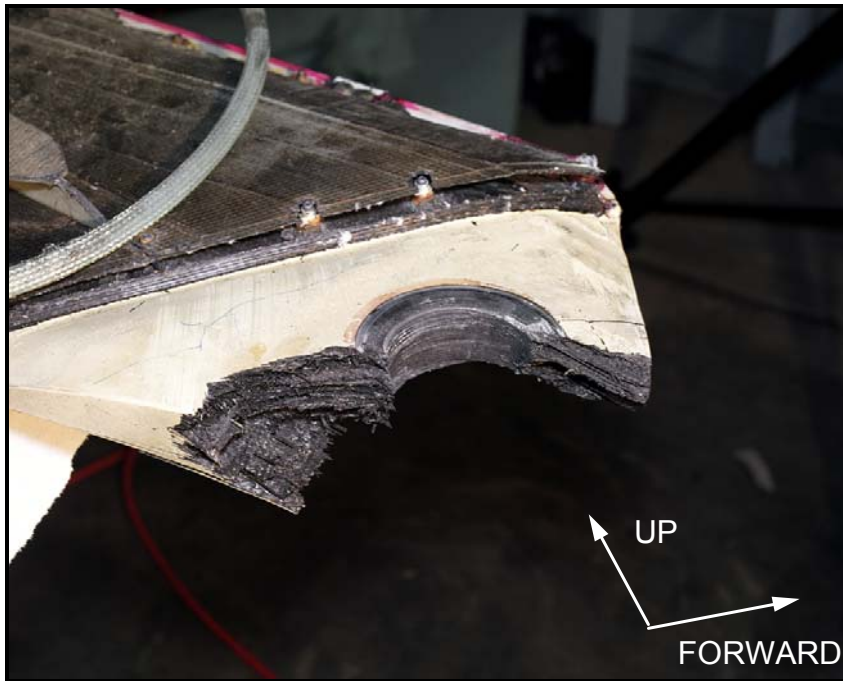
Figure 20. View of the translaminar fracture for the left center longitudinal lug.



ImageNo: 208A0255, Project No:A00386

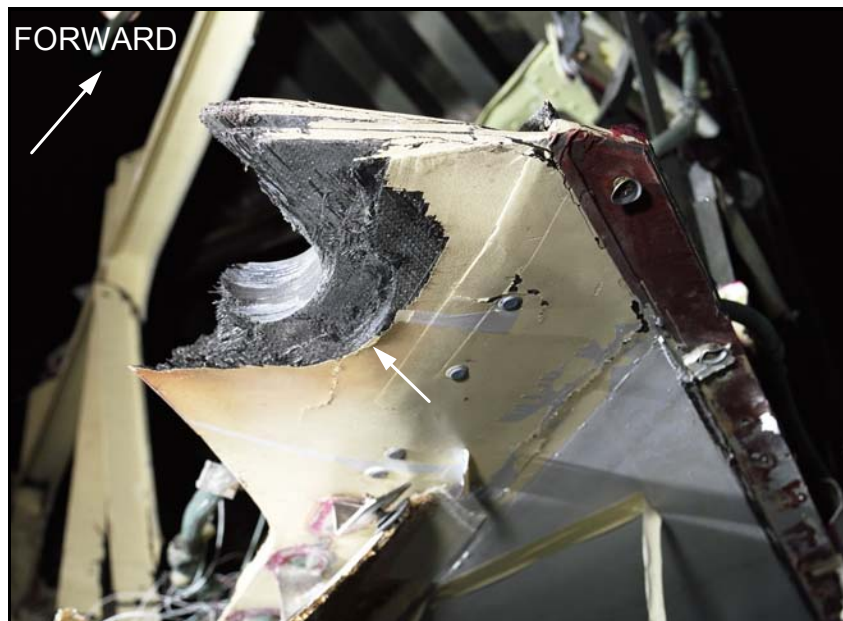
Figure 21. View of the left center longitudinal lug that remained attached to the fuselage. Repair rivets with square angle shims are visible on the surface.





ImageNo:208A0219, Project No:A00386

Figure 22. View of the left forward longitudinal lug on the vertical stabilizer.



ImageNo: 208A0252, Project No:A00386

Figure 23. Another view of the left forward longitudinal lug on the vertical stabilizer showing the left side. An unlabeled arrow indicates an area of crushing damage corresponding contact with the upper end of the metal fuselage attach fitting lug.

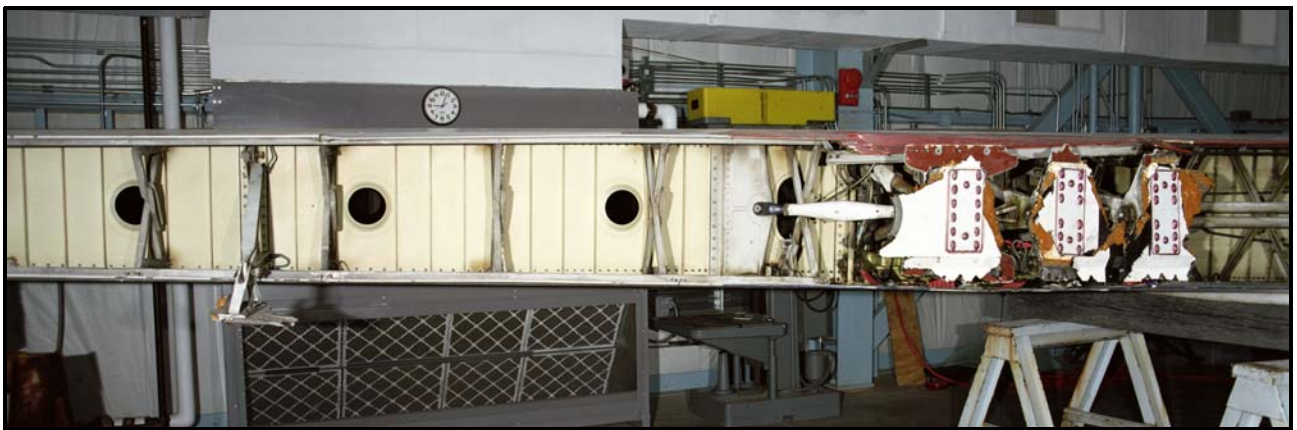


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Figure 24. View of the lower piece of the left forward longitudinal lug that remained attached to the fuselage.



ImageNo:208A0291, Project No:A00386



ImageNo: 208A0292, Project No:A00386



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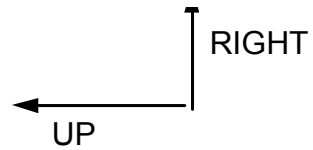
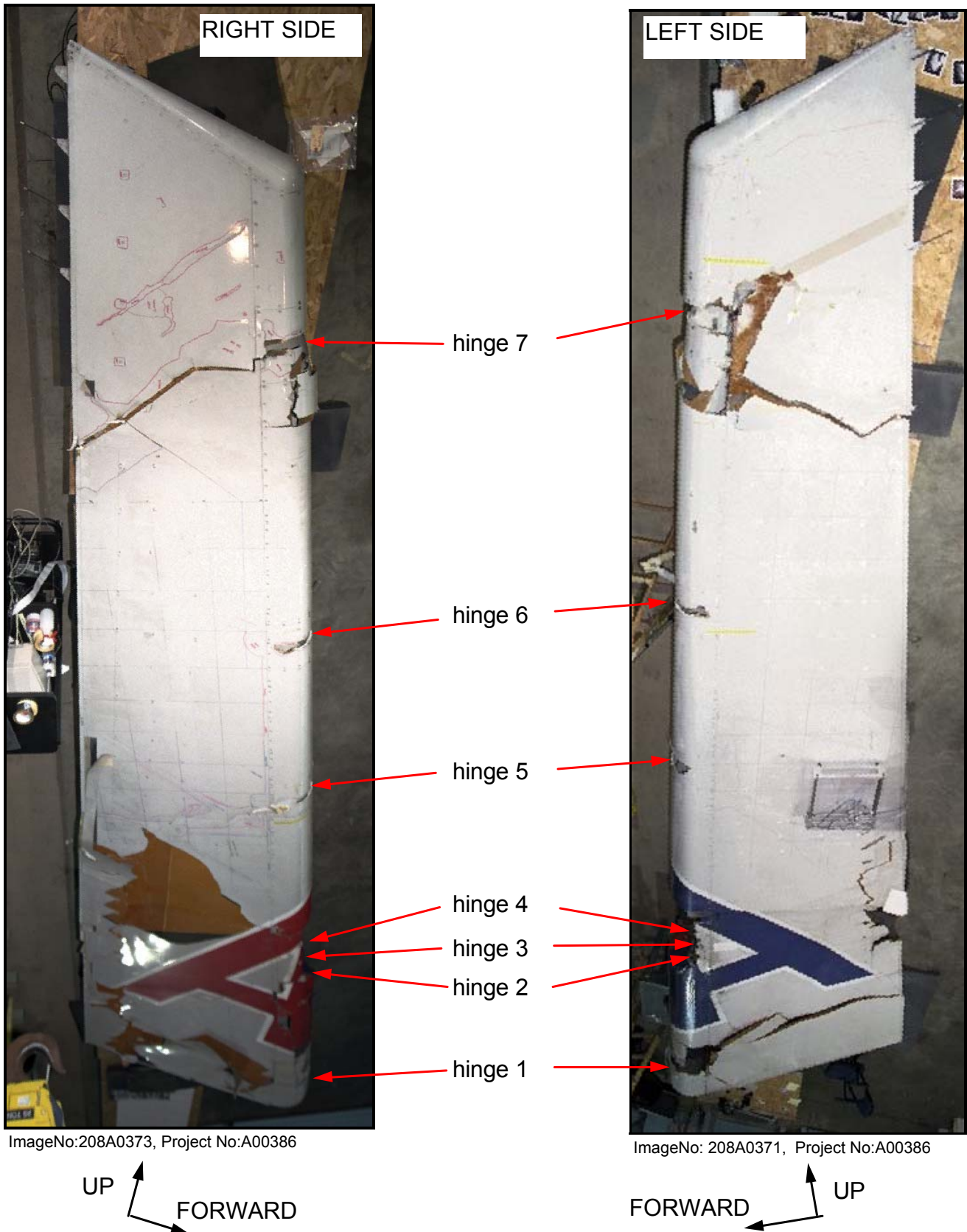


Figure 29. Overall views of the vertical stabilizer trailing edge.



ImageNo:208A0373, Project No:A00386

ImageNo: 208A0371, Project No:A00386

Figure 46. Overall view of the right and left sides of the rudder as viewed from above. With this perspective, the upper and lower ends appear larger and smaller, respectively. Lamb wave equipment used for nondestructive examination is shown on the left skin panel.

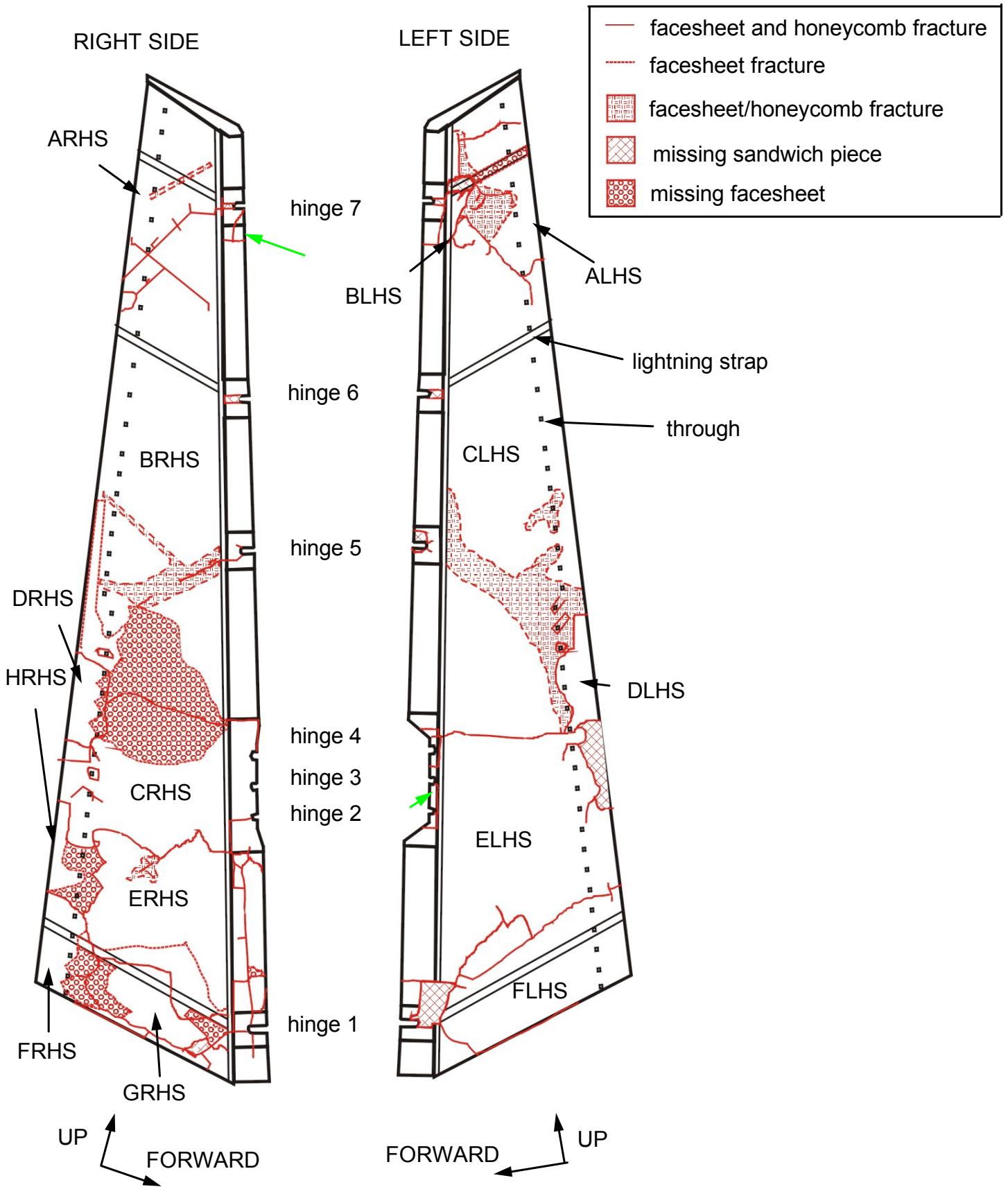


Figure 47. Drawings of the right and left sides of the rudder showing the approximate locations of fractures and missing pieces. Unlabeled green arrows indicate fairing pieces that were found on land. Piece GRHS was also found on land.