

# NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering  
Materials Laboratory Division  
Washington, D.C. 20594



October 18, 2021

## MATERIALS LABORATORY FACTUAL REPORT

Report No. 21-079

### A. ACCIDENT INFORMATION

Place : Parker, Colorado  
Date : June 16, 2021  
Vehicle : Antenor Velazco Lancair Evolution, N704AK  
NTSB No. : CEN21FA272  
Investigator : Michael Hodges, AS-CEN

### B. COMPONENTS EXAMINED

Right flap piece, Left flap piece, and flap actuator.

### C. DETAILS OF THE EXAMINATION

An overall view of the submitted components is shown in figure 1. The right flap and the actuator were blackened and degraded consistent with exposure to heat and fire. Rod ends, control rods, and arms attached to the actuator were fractured and had rough features in slant planes consistent with overstress fracture including fractures under relatively high temperatures.

The flap control attachment bracket at the inboard end of the left flap is shown in figure 2. The flap control rod end and associated attachment bolt were missing from the assembly. However, threads for fastening the missing flap control rod attachment bolt were observed intact in the attachment bracket as shown in figure 3. The area around threaded hole was rubbed consistent with off-axis contact with the outboard end of the flap control rod attachment bolt. Corresponding off-axis contact deformation was observed at the edge of the control rod attachment bolt through-hole on the inboard side of the bracket.

The aft attachment bolts for the flap control attachment bracket were secured with safety wire (see figure 2). The free end of the safety wire at the lower aft attachment bolt was bent over and both wires had a straight flattened end face consistent with a cut end.

The flap control attachment bracket at the inboard end of the right flap is shown in figure 4. A piece of the right flap control rod remained attached to the bracket with an intact control rod attachment bolt. Similar to the left attachment bracket, the aft attachment bolts for the right flap control attachment bracket were secured with safety wire as shown in figure 4. The free end of the safety wire at the lower aft attachment bolt was bent over and both wires had a straight flattened end face consistent with a cut end.

While the head for the right flap control rod attachment bolt was drilled for use with safety wire, no safety wire was observed attached to the control rod attachment bolt.

On October 4, 2021, Evolution Aircraft Company issued Service Advisory SA016-0036 regarding inspection of Evolution aircraft attach points. Service Advisory SA016-0036 includes an illustration of the flap control system from the Evolution Build Manual that states, "Safety wire bolt through bearing" associated with arrows pointing to the right and left flap control attachment brackets. The service advisory also shows a photograph of a proper flap control rod attachment with safety wire securing the control rod attachment bolt to the upper aft attachment bolt for the bracket. In the photograph, the lower aft attachment bolt has a torque stripe for detecting bolt head movement but does not have safety wire.<sup>1</sup>

Matthew R. Fox, Ph.D.  
Senior Materials Engineer

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<sup>1</sup> For the flap actuator attachment bracket, the aft attachment bolts are threaded into self-locking nut plates. Safety wire is not required for either of the aft attachment bolts and is only required for the control rod attachment bolt.



Figure 1. Overall view of the submitted flap pieces and the flap actuator.

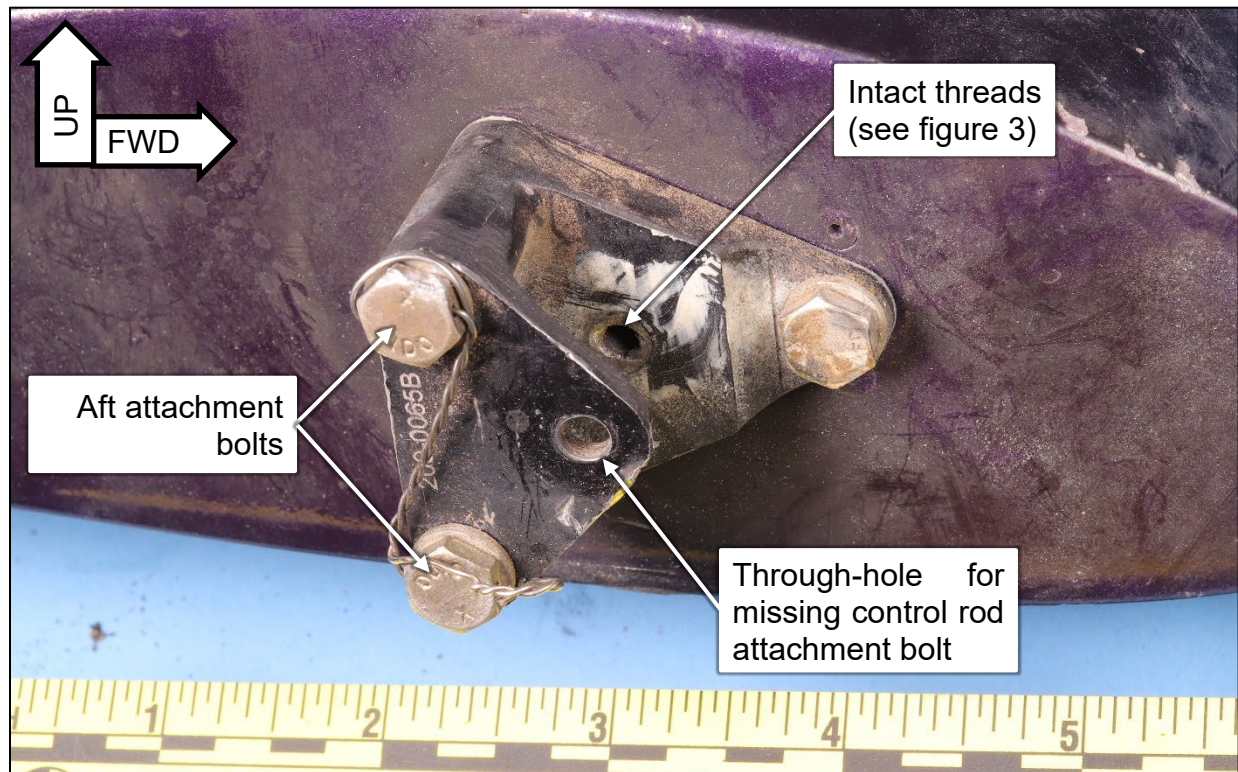


Figure 2. Flap control attachment bracket on the inboard end of the left flap showing a missing flap control attachment bolt.



Figure 3. Intact threads in the left flap control attachment bracket associated with the missing flap control attachment bolt.

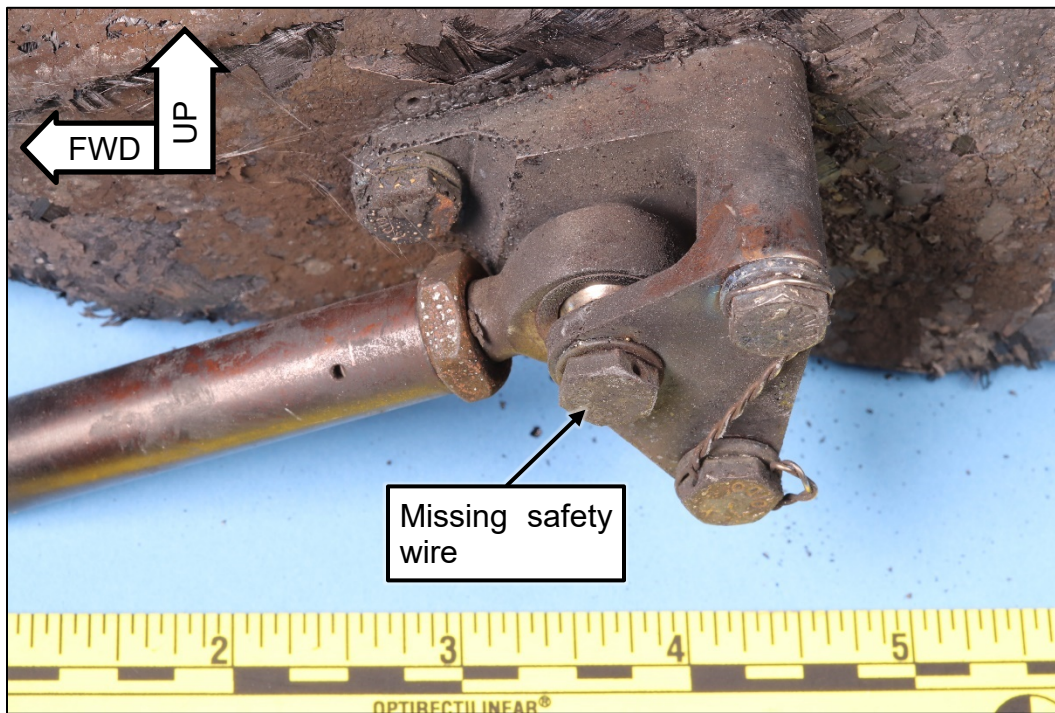


Figure 4. Inboard end of the right flap showing the control attachment bracket with attached rod end and missing safety wire from the flap control attachment bolt.