

NATIONAL TRANSPORTATION SAFETY BOARD

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



May 10, 2022

MATERIALS LABORATORY FIRE FACTUAL REPORT

Report No. 21-031

A. ACCIDENT INFORMATION

Place : Santa Monica, California
Date : December 27, 2019
Vehicle : Cirrus Design SF50, Registration N52CV, S/N 0010
NTSB No. : WPR20FA051
Investigator : Elliott Simpson AS-WPR

B. DETAILS OF THE EXAMINATION

An examination of the accident airplane was conducted by investigators including a Materials Laboratory fire specialist at Santa Monica Airport on January 9, 2020.

The examination of the aircraft focused on the right side of the aircraft, particularly the sidewall area of passenger seating area and the underfloor area of the cabin. The photograph is shown in Figure 1. Debris, as shown in Figure 2, was cleared from the cabin area and the floor panels were exposed as shown in Figure 3. The carbon fiber floor panels were intact. The upper surfaces exhibited some thermal damage. The interior carpet was largely missing from these panels and the panels exhibited some light charring and thermal discoloration. The panels were removed. The lower surfaces of the panels were undamaged and exhibited no signs of thermal damage. Inspection stickers and written factory notations were still present and legible on the lower surface of the panels. The compartment under the floor was full of water as shown in Figure 4. The hydraulic lines were visible above the water as shown in Figure 5. Several holes were drilled in the fuselage skin of the aircraft belly to facilitate drainage. Once the compartment was drained, all underfloor wiring and three servos located on the centerline of the aircraft, as shown in Figure 6, were examined. There was no damage to the servos, or the wiring located underneath the floor as shown in Figures 7 and 8. There was also no evidence of thermal damage other than the presence of some fire debris that appeared to have dropped down from the cabin area.

The three wire bundles located on the right fuselage wall were examined from the aft cannon plug junction to the most forward undamaged section as shown in Figure 9. The polymeric wire insulation on these bundles was largely missing except for a few areas. These intact areas still showed thermal damage in the form of partial melting and thermal discoloration. Fiber mats used as anti-chafe protection were still present but exhibited thermal damage and discoloration. The exposed wire conductors were intact and sooted except the section located below the right egress window. In this area, the conductors were bright, shiny, and not sooted-a possible indication of elevated temperatures as shown in Figure 10. In addition, there was evidence of welding and beading on several of the conductors. The bundles were

cut at the aft cannon plugs and within undamaged forward section and removed from the aircraft to facilitate examination of the fuselage wall underneath.

Once the wire section was removed, a line of damage demarcation was noted on the fuselage sidewall where the wire section was located as shown in Figure 11. Below the line, the resin in the carbon fiber was charred on the surface but the damage did not extend further into the composite. In the area directly behind the removed section and above, the resin was largely missing from the carbon fiber cloth. As the damage extended up towards the roof, the intensity of the damage increased. Adjacent to the damaged section of wiring, a copper-colored metallic deposit was found on the aircraft sidewall as shown in Figures 12-14. Also adjacent to this area within the cabin area, an area of melting was found on the seat attachment hardware near the floor as shown in Figure 15. Only the seat structure was damaged, and thermal damage was not found on components and floor structure below this area.

Nancy B McAtee
Fire and Explosion Specialist



Figure 1. Overall photograph of aircraft on day of examination.

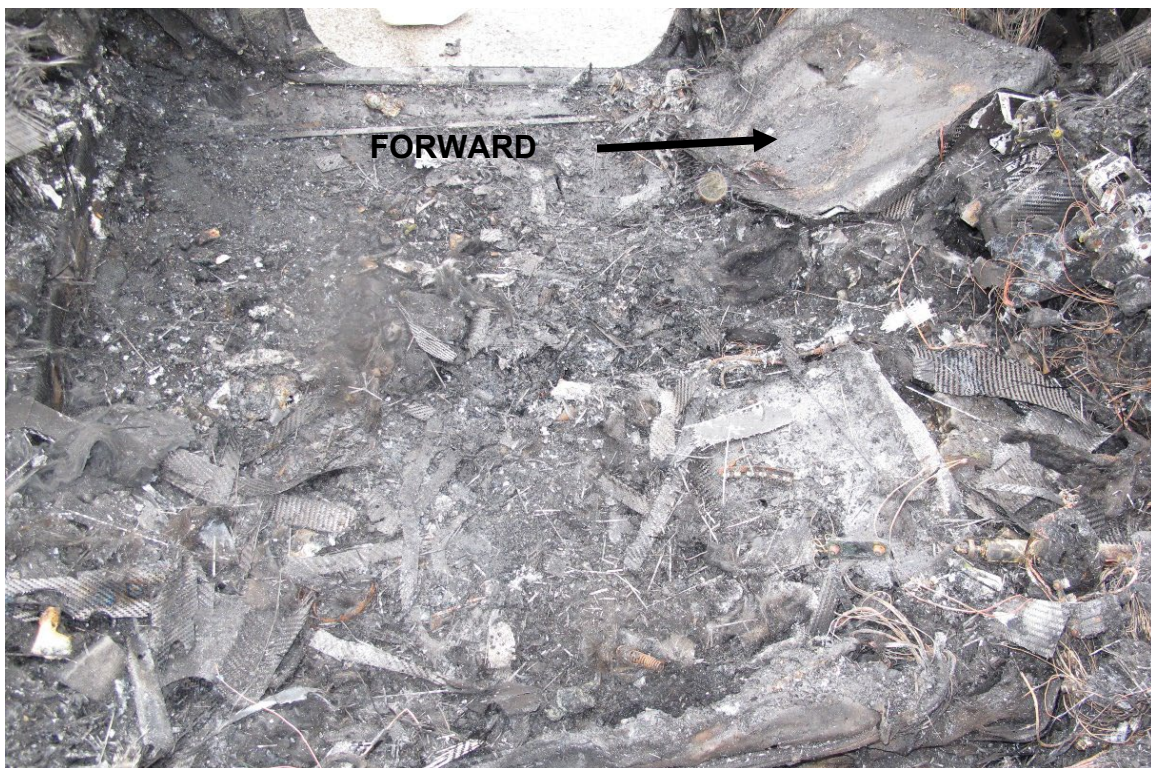


Figure 2. Cabin floor prior to debris removal.



Figure 3. Floor area after debris removal.



Figure 4. Area under cabin floor prior to water removal.



Figure 5. Close-up of hydraulic lines on left side of aircraft.



Figure 6. Servo located centerline under floorboards.



Figure 7. Wiring under left side floorboard.



Figure 8. Close-up of underfloor wiring.



Figure 9. Section of wiring on right side wall under right egress window.

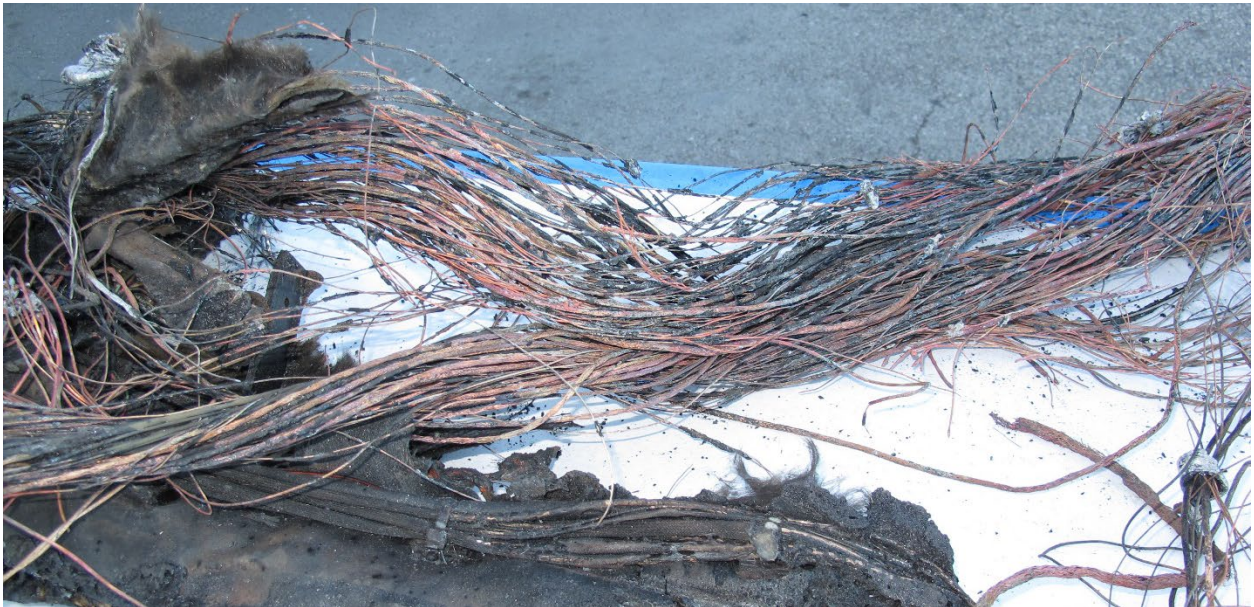


Figure 10. Closeup of damaged section of right-side wire bundles.



Figure 11. Damage demarcation line on right sidewall after wire bundle removal.



Figure 12. Close-up of demarcation line on right sidewall. Copper-colored residue (close-up shown in Figure 13) highlighted by black circle.



Figure 13. Close-up photograph of copper-colored deposit on right sidewall.



Figure 14. Copper-colored deposit with scale.



Figure 15. Area of thermal damaged seat structure (highlighted by black circle).