

# NATIONAL TRANSPORTATION SAFETY BOARD

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



January 14, 2016

MATERIALS LABORATORY FACTUAL REPORT

Report No. 15-127

## A. ACCIDENT INFORMATION

Place : Frisco, Colorado  
Date : July 3, 2015  
Vehicle : Airbus Helicopter AS 350B3e  
NTSB No. : CEN15MA290  
Investigator : Jennifer Rodi

## B. COMPONENTS EXAMINED

ACCU TEST switch and collective switches including yaw hydraulic isolation switch

## C. DETAILS OF THE EXAMINATION

The ACCU TEST switch and the remains of the collective switch panel were submitted to the Materials Laboratory for examination. The test switch and the collective switches were heavily damaged by the postcrash fire.

The ACCU TEST switch, a switch that matched the appearance of an exemplar yaw hydraulic isolation switch, a single unidentified toggle switch and the resolidified remnants of the collective were examined by x-ray radiography. Exemplars of the test switch and yaw hydraulic isolation switch were also radiographed for comparison.

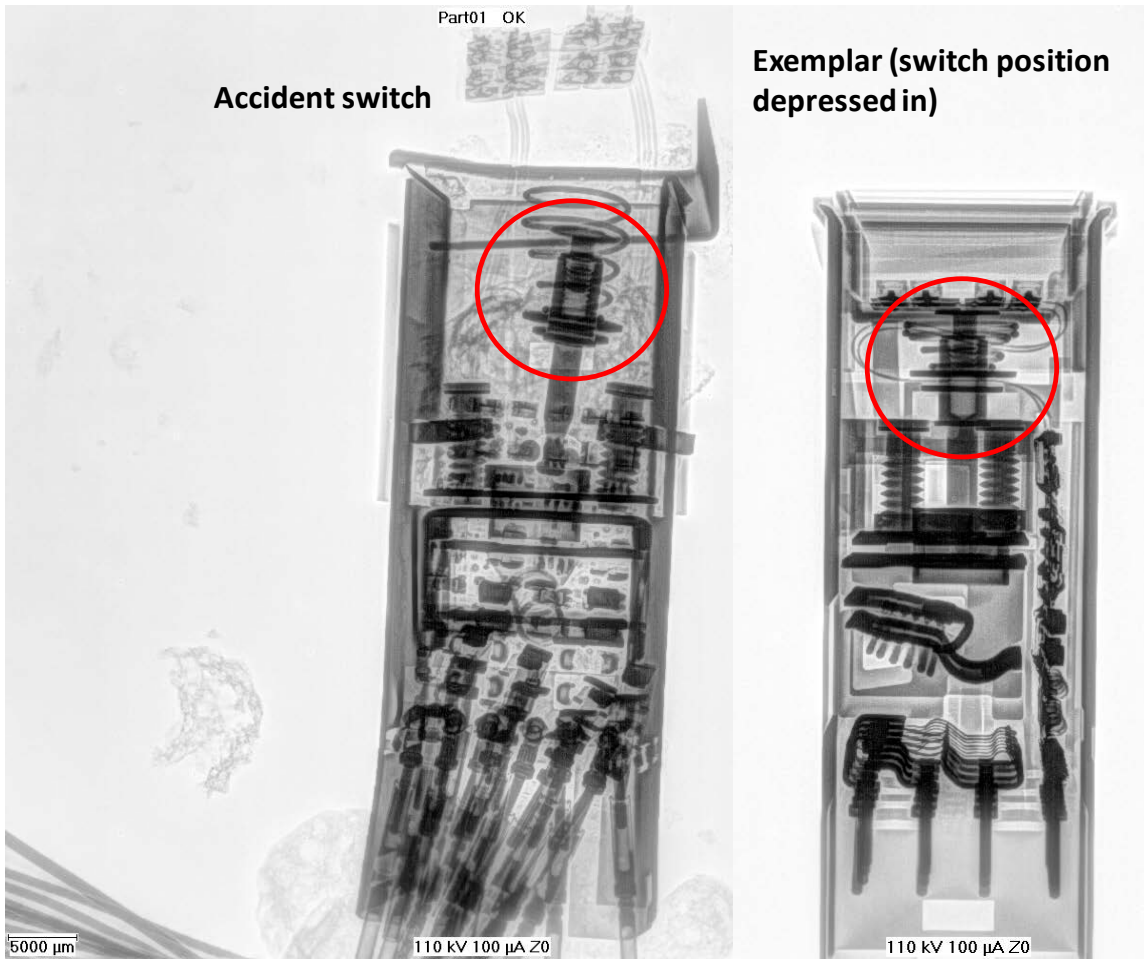
When compared to both switch positions on the known switch radiograph, the accident ACCU TEST switch position did not match either position of the known switch as shown in Figure 1. In addition, the accident switch springs no longer appear to be under compression which is necessary to hold the switch in its selected position. Therefore, the accident switch appears to be too damaged for determination of switch position.

One of the accident toggle switches was identified as the yaw hydraulic isolation switch due to its resemblance to the exemplar switch. The toggle lever on the accident switch had been pushed into the body of the switch. The radiograph shows the spring that holds the toggle lever into place is no longer in place (under compression) as shown in Figure 2. When compared to the radiograph of the exemplar toggle switch, the contact positions for the accident toggle do not match either position on the exemplar. Therefore, the accident yaw hydraulic isolation switch appears to be too damaged for determination of switch position.

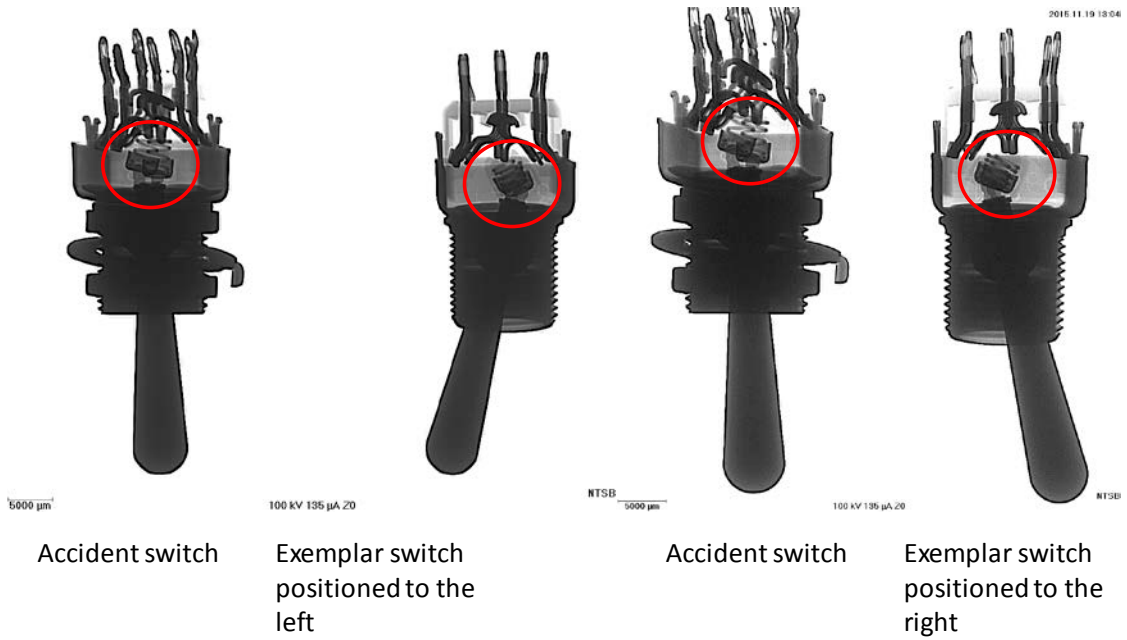
A single toggle switch unidentified switch that had separated from the rest of the damaged collective was examined by x-ray. The radiograph is shown in Figure 3. The switch is missing most of the internal toggle mechanism with only the switch body and toggle lever present. Due to the amount of damage, the position of the switch could not be determined.

The remaining four collective switches (toggle switches) were found encapsulated within melted plastic of the damaged collective. The remains of the damaged collective were examined by x-ray to visualize the contacts on the switches inside. The radiograph is shown in Figure 4. It was not possible to determine the original switch position on the collective and orientation of these switches due to movement that occurred during the melting of the collective. In addition, the switches are heavily damaged by impact and fire. Therefore, switch position for these switches could not be determined.

Nancy B. McAtee  
Chemist



**Figure 1. Radiograph of exemplar and accident ACCU TEST switch.**



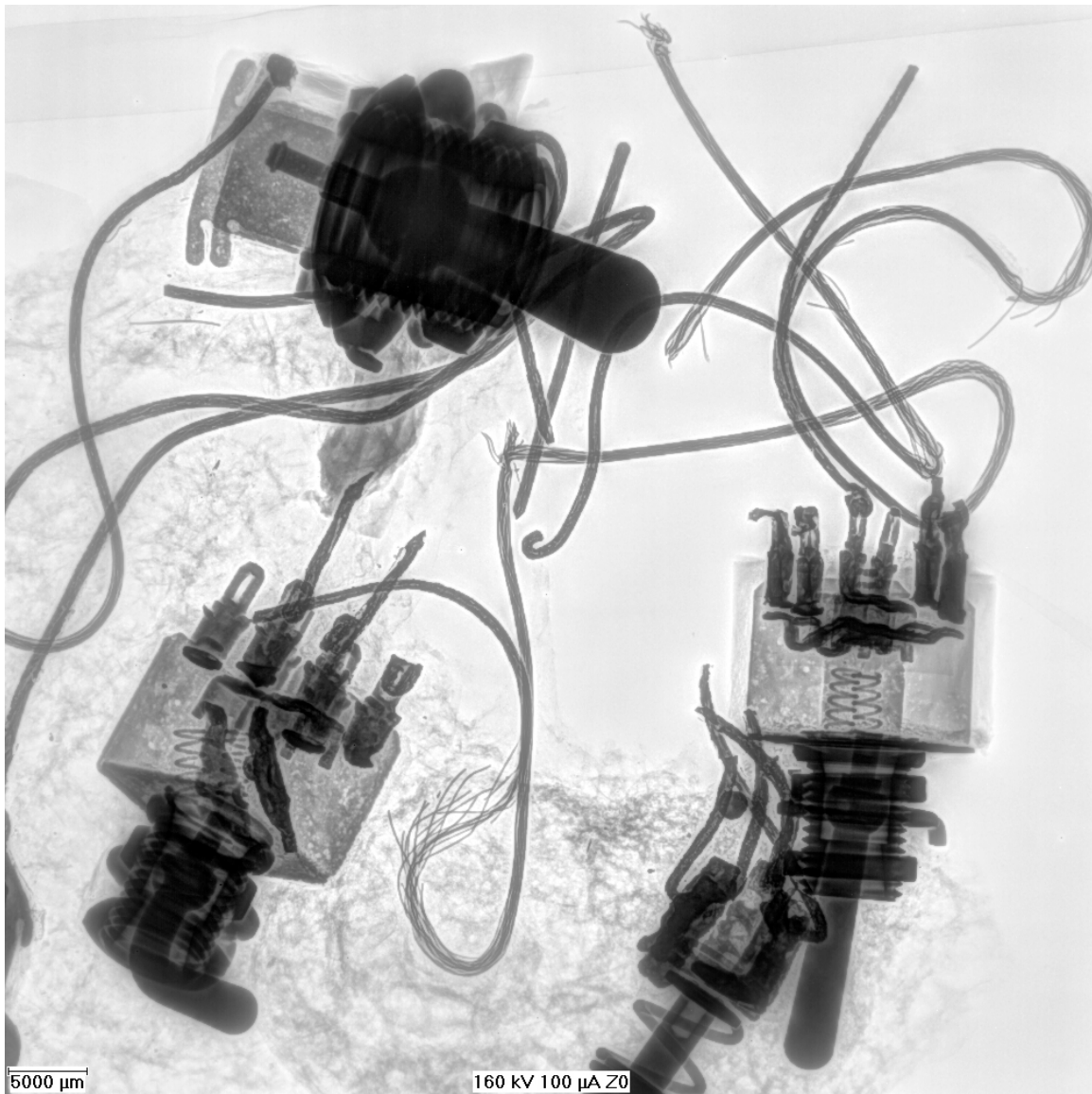
**Figure 2. Radiograph of exemplar and accident yaw hydraulic isolation switch.**



2000  $\mu\text{m}$

160 kV 28  $\mu\text{A}$  Z0

**Figure 3. Radiograph of single unidentified collective switch.**



**Figure 4. Radiograph of switches within damaged remnants of the collective.**