

NATIONAL TRANSPORTATION SAFETY BOARD

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



12/21/17

MATERIALS LABORATORY FACTUAL REPORT

Report No. 17-082

A. ACCIDENT INFORMATION

Place : Pukoo, HI
Date : 11/15/2016
Vehicle : Hughes 369D (500D)
NTSB No. : WPR17FA021
Investigator : Noreen Price

B. COMPONENTS EXAMINED

Bendix cyclic grip, PM 22319 (figure 1).

C. DETAILS OF THE EXAMINATION

The cyclic grip had separated from the control stick. A portion of the control stick remained attached at the base of the cyclic grip. The separated end of the attached portion of the control stick exhibited slant fractures consistent with an overstress fracture. The signal wires from the grip's switches were protruding from the area of the separation. A portion of the cyclic grip's surface on the right-side in the area of the 4-position trim switch exhibited melting.

Partial disassembly of the cyclic grip was performed to carefully remove the 4-position trim switch from the top of the grip (figure 2). The top cap of the trim switch exhibited thermal damage. The trim switch and the attached wires (figure 3) were examined visually using a stereo microscope. The switch had five contacts on the bottom for connection to the signal wires. The signal wires were soldered to the switch contacts. Examination of the soldered connections revealed that four of the five soldered connections exhibited varying levels of disbonding consistent with the wires having been pulled (figure 4). The soldered connection between the signal wire and the switch contact for the nose down trim had completely disbonded and remained attached due to mechanical interference (figure 5).

The 4-position trim switch was tested using a digital multi meter. The operation of the switch in all four positions was verified by measuring the resistance between the common terminal and the terminal for each of the four trim positions when activating the switch. Initial measurements gave varying (orders of magnitude) and inconsistent resistance values depending on the finger pressure applied to the switch. After about a dozen repetitions of pressing the switch the measured resistance between the common and each of the four trim positions was less than 1Ω. The continuity of the signal wires

was tested from the soldered ends to the severed ends. Continuity was verified along all the attached wires.

Joseph Panagiotou
Fire Protection Engineer



Figure 1: Cyclic grip as received.



Figure 2: Cyclic grip after partial disassembly to remove the trim switch.

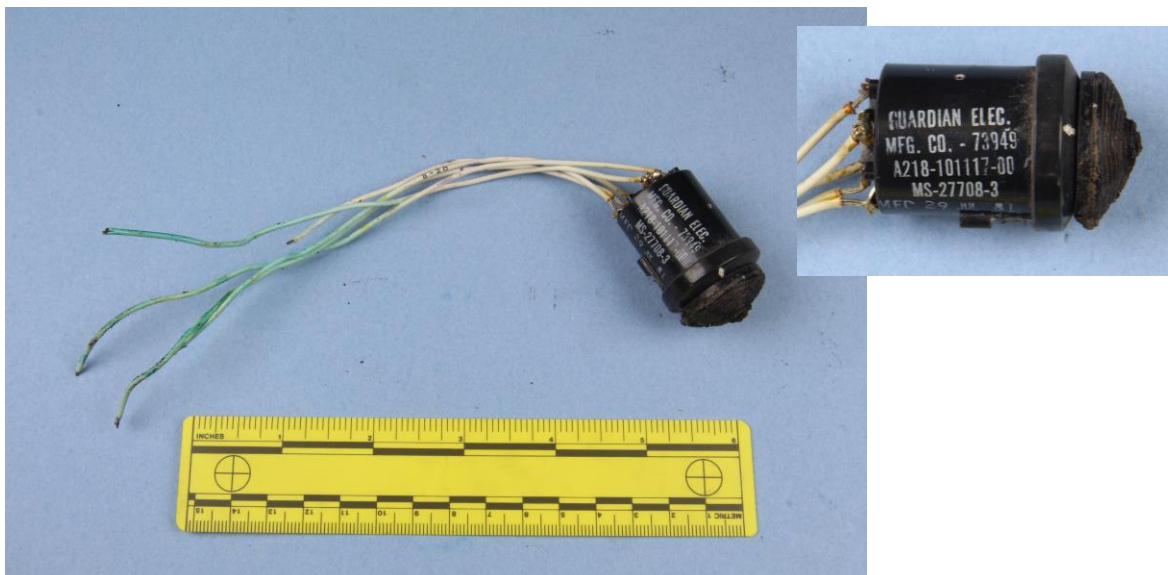


Figure 3: Trim switch after removal from the grip assembly.

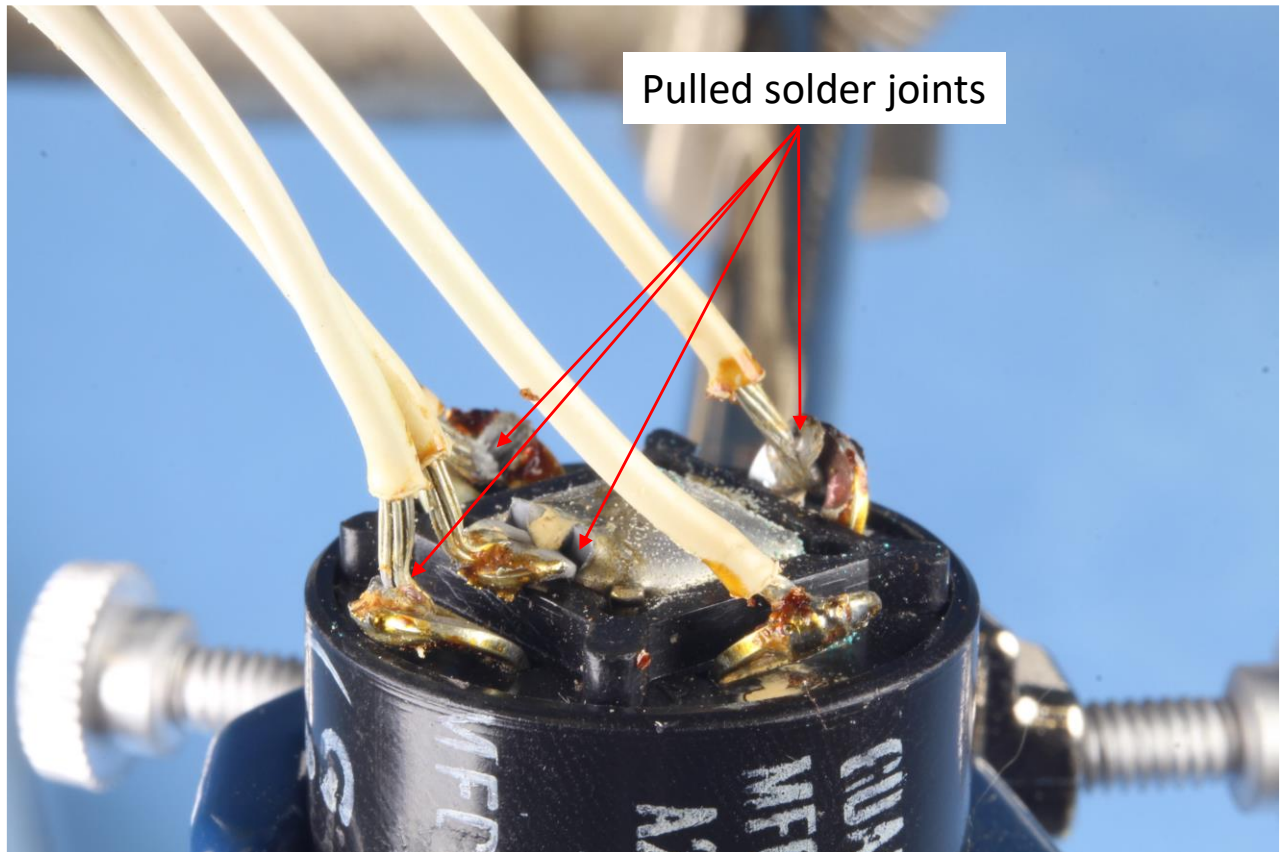


Figure 4: Close-up view of the solder joints for the contacts of the trim switch.

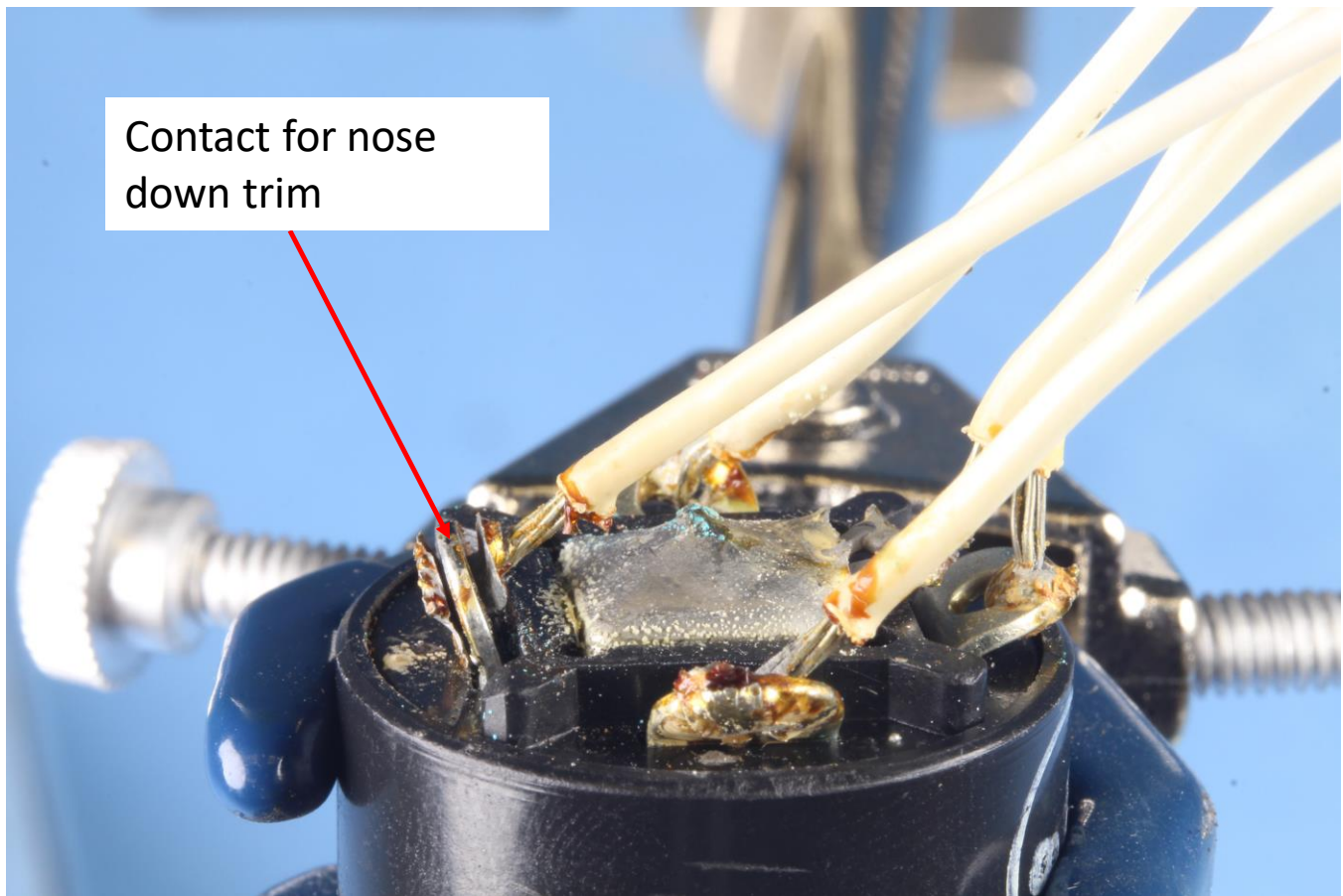


Figure 5: Close-up of nose down trim contact.