



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

September 21, 2017

ELT SWITCH EXAMINATION SUMMARY

WPR16FA040

This document contains 14 embedded images.

A. ACCIDENT

Location: Superior, Arizona
Date: December 15, 2015
Aircraft: N74317; Airbus Helicopter AS350B3
NTSB Investigator-in-Charge: Andrew Swick

On December 15, 2015, about 1723 mountain standard time, an Airbus helicopter, AS350B3, N74317, was substantially damaged when it impacted terrain while maneuvering near Superior, Arizona. The helicopter air ambulance (HAA) was registered to Air Methods Corporation and was doing business as Native Air Ambulance, under the provisions of Title 14 Code of Federal Regulations Part 135. The commercial pilot, and flight nurse sustained fatal injuries and the flight paramedic sustained serious injuries. Visual meteorological conditions prevailed and a company visual flight rules (VFR) flight plan was filed for the flight. The cross-country positioning flight originated from the Phoenix-Mesa Gateway Airport (IWA), Mesa, Arizona, at 1705 with an intended destination of Globe, Arizona.

According to the operator, the helicopter had transported a patient from the Cobre Valley Community Hospital, Globe, Arizona to the Baywood Heart Hospital, in Mesa, Arizona. The flight originated from their base in Globe, Arizona with a planned return to their base at the conclusion of the operation. After transporting the patient, the helicopter was repositioned to IWA for refueling. It subsequently departed IWA for the return flight to its base in Globe. The flight was being tracked by satellite at the company's national communication center, AIRCOM, in Omaha, Nebraska. The company's operations control center (OCC), located in Denver, Colorado, was monitoring the flight on their Flight Management System. At 1723 mountain standard time, satellite tracking of the helicopter was lost. AIRCOM notified the OCC and a search was conducted by a company aircraft. The wreckage was located as a result of an aerial search at about 2054.

Examination of the accident site revealed that the helicopter impacted mountainous terrain about 10 miles north-northwest of Superior, Arizona. All major structural components of the helicopter were located within the wreckage debris path, which was about 380 feet in length, and oriented on a heading of about 200 degrees magnetic. The wreckage was recovered to a secure location for further examination.

B. SUMMARY

The examination of the ELT switches was conducted on September 21, 2017, at the facilities of Select Controls Inc. (SCI), Bohemia, New York, by the National Transportation Safety Board (NTSB) investigator-in-charge (IIC). Prior to this examination, the ELT was X-rayed by the NTSB materials laboratory. The primary 2.3G switch (+X) and the 12.5G 5-axis G-switch modular was removed at the facilities of ACR Electronics, Inc., in Fort Lauderdale, Florida on August 11, 2017. During the examination, the primary G-switch and four of the modular G-switches did not activate during test procedures. Visual examination of the interior components revealed wear signatures and a black powder residue.

C. DETAILS OF THE INVESTIGATION

1.0 Switch Examination

The white colored silicone mix was removed from the switches and no anomalies were noted during the visual examination. The 5-axis individual G-switches remained attached to the circuit board and were identified and numbered. The primary G-switch was undamaged. There was an audible difference between the accident primary G-switch and an exemplar switch when activated by hand.

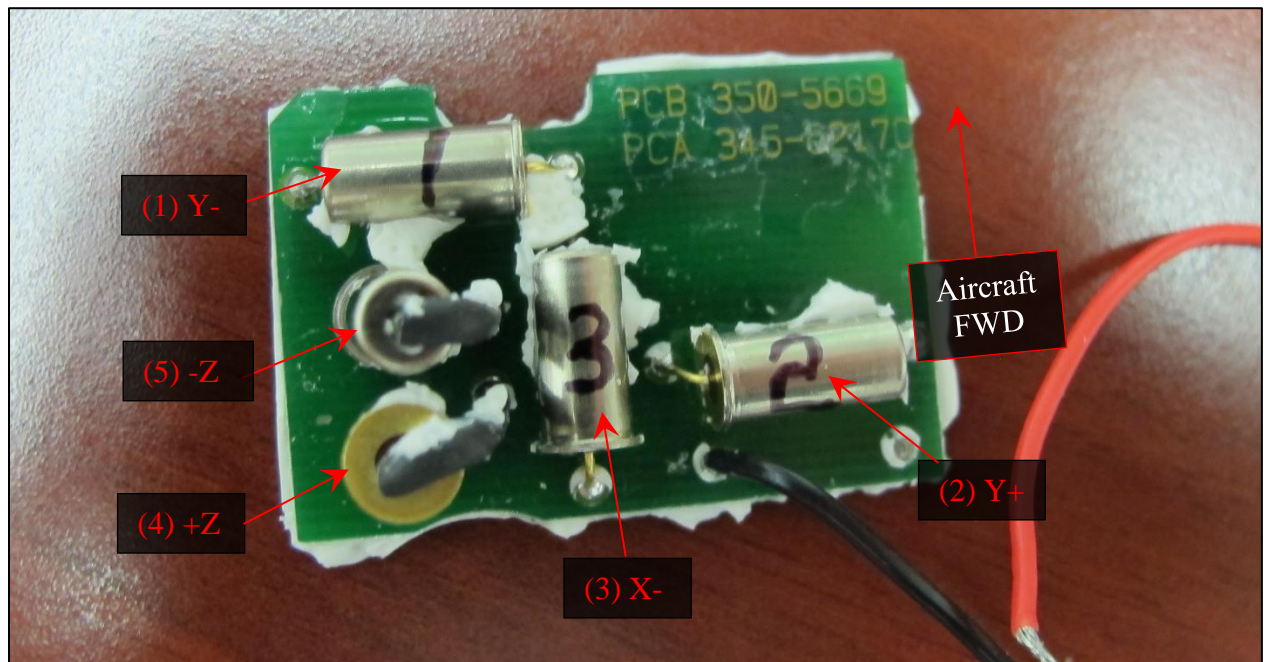


Figure 1, 5-Axis G-Switch Modular

X-ray images of the ELT were created at the NTSB materials laboratory. The examination of the image revealed that the No. 2 (Y+) and 3 (X-) pistons and springs were positioned in their shell [housing] as designed. The No. 1 (Y-) switch piston was in a position which had compressed the accelerator spring to the contact side of the shell. The contact side for the switch is on the flared end of the shell. The side views of the No. 4 (+Z) and 5 (-Z) pistons were not available.

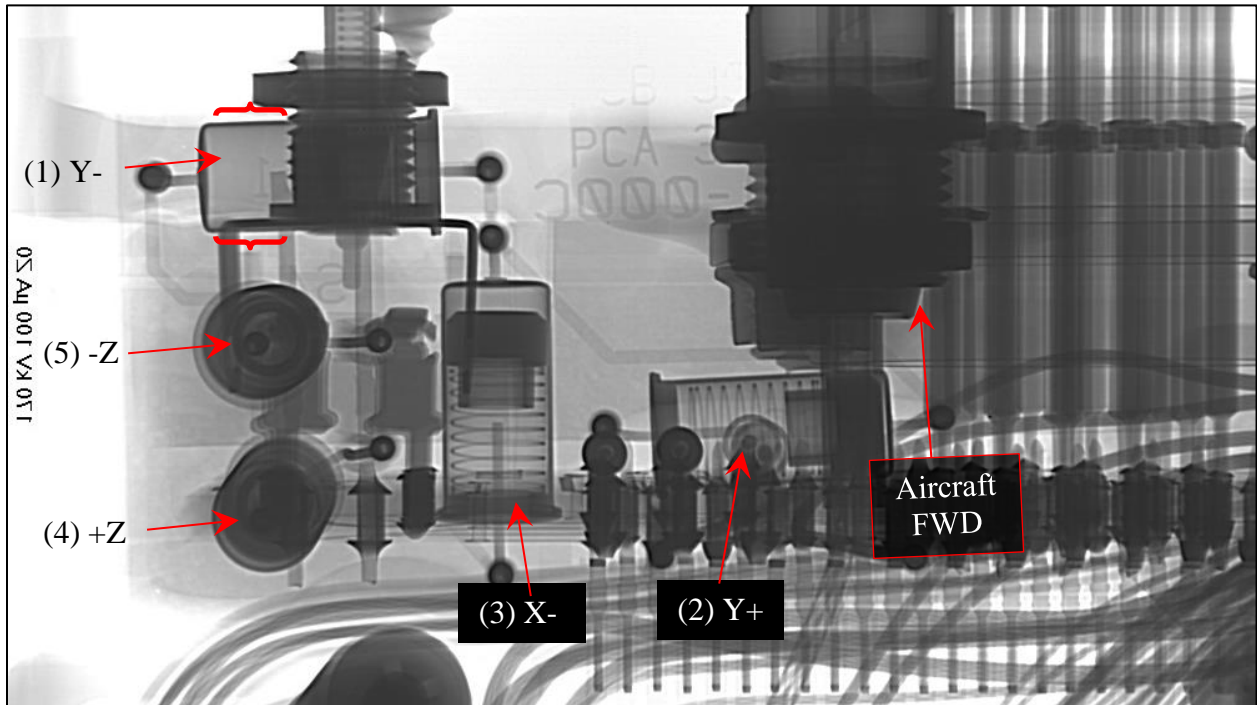


Figure 2, X-ray of 5-Axis G-Switch Modular

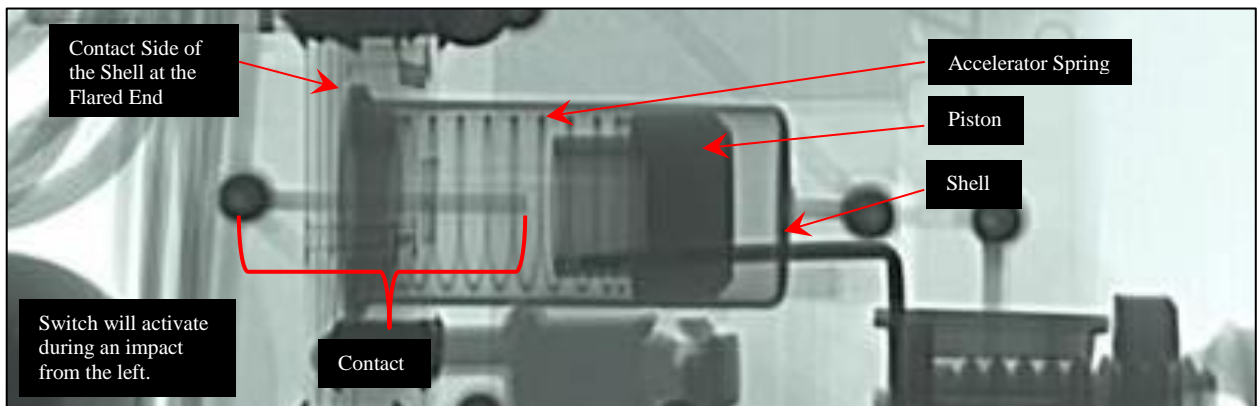


Figure 3, X-ray of 5-Axis G-Switch, Parts Description

The X-ray images of the primary G-switch revealed the acceleration spring was bent to one side of the switch's housing, resulting in the spring not sitting centered on the ball. No other anomalies were noted.

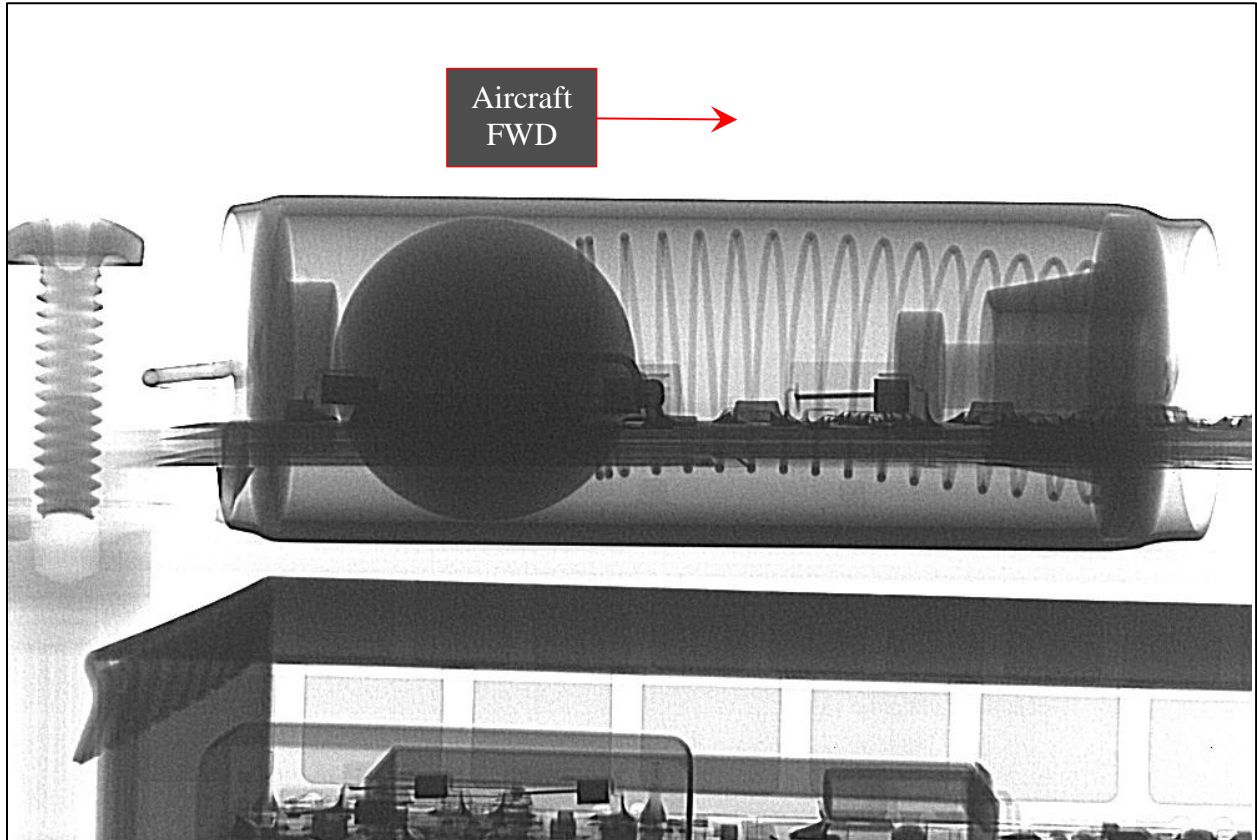


Figure 4, X-ray of Primary G-Switch

2.0 Testing of Switches

The switches were tested on a SCI test box to determine operation. The primary G-switch only activated normally one time out of about 30 tests. The switches on the 5-axis G-switch modular remained on the circuit board during this first set of tests. One switch, the No. 2 (+Y) activated normally and the four others did not activate during the test.

3.0 Internal Examination

The 5-axis G-switches were removed from the circuit board. The primary and 5-axis G-switches were opened with the use of a lathe.



Figure 5, Opening of the Switches

The internal examination of the primary G-switch revealed a black powder residue on the ball, contact area and the housing's internal surface areas. The spring was covered in the black powder residue and was unremarkable. Due to the method on how the switch was opened, the ball could not be removed completely from a small portion of the housing.



Figure 6, Primary G-Switch Internal Ball and Contact End



Figure 7, Primary G-Switch Ball and Spring

The examination of the 5-axis G-switches internal components, revealed wear signatures on the outer circumference of the pistons; Nos. 1, 2, 4 and 5. The No. 3 piston could not be removed from its housing. The No. 3 housing non-contact end had a dark residue.



Figure 8, Modular G-Switch No. 5 Piston

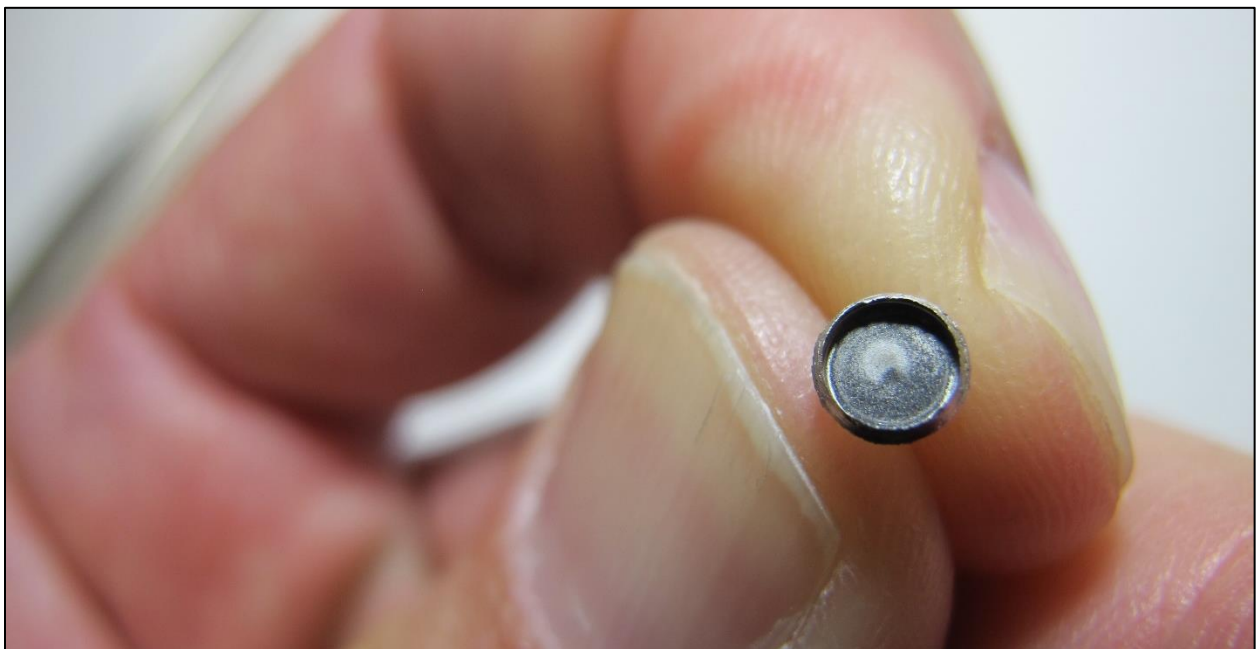


Figure 9, Modular G-Switch No. 3 Shell Non-Contact End



Figure 10, Modular G-Switch No. 1

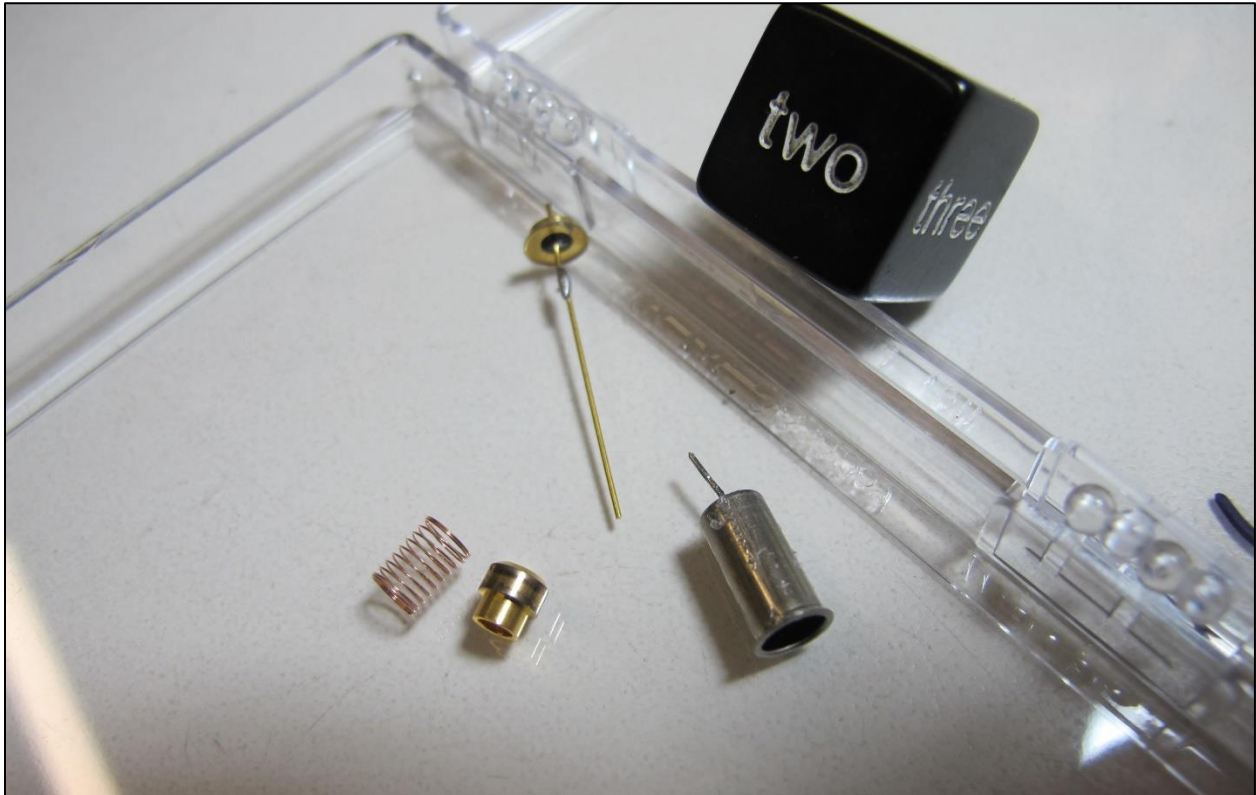


Figure 11, Modular G-Switch No. 2

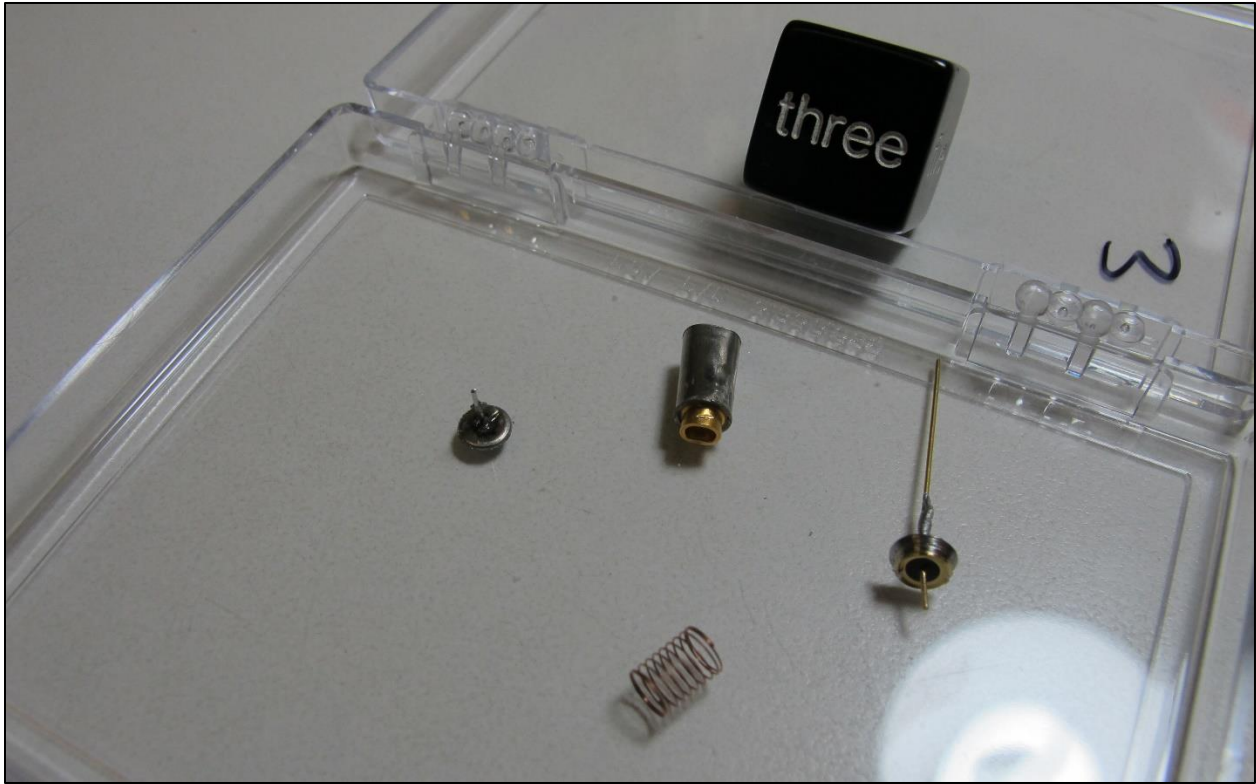


Figure 12, Modular G-Switch No. 3

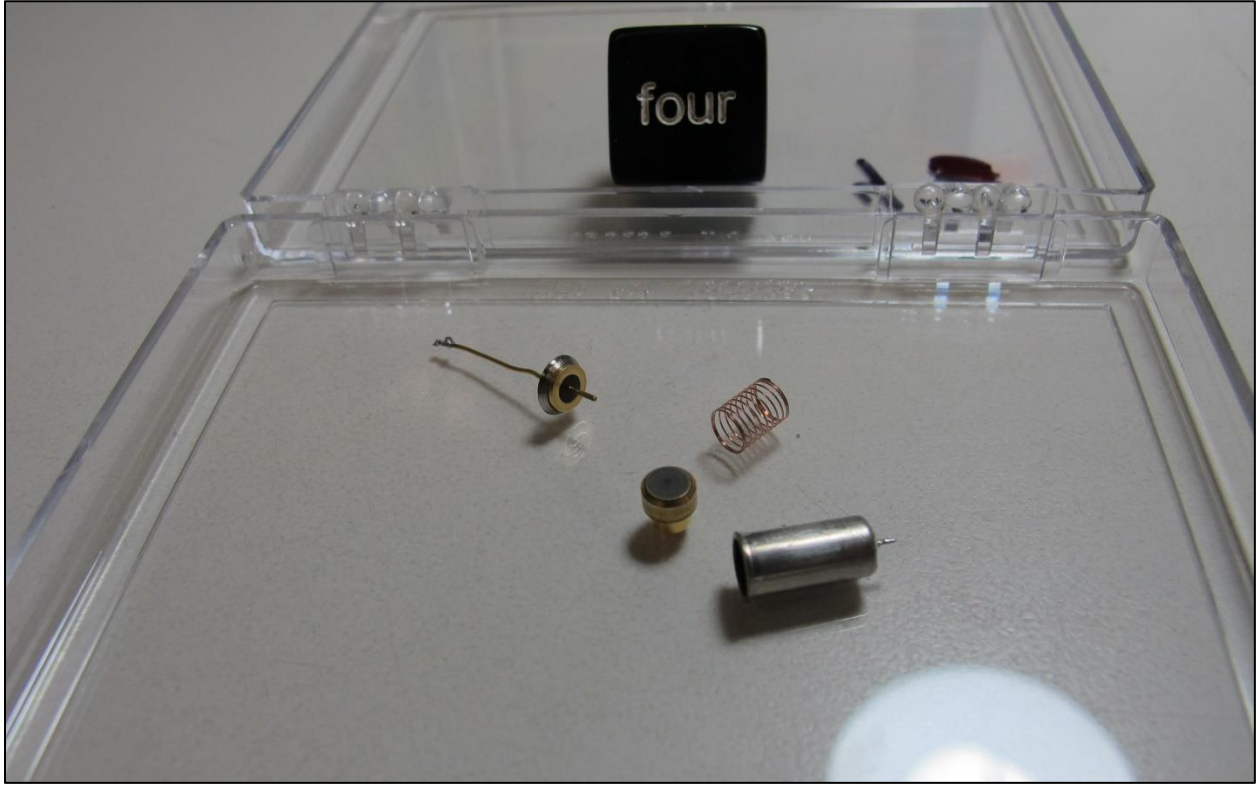


Figure 13, Modular G-Switch No. 4

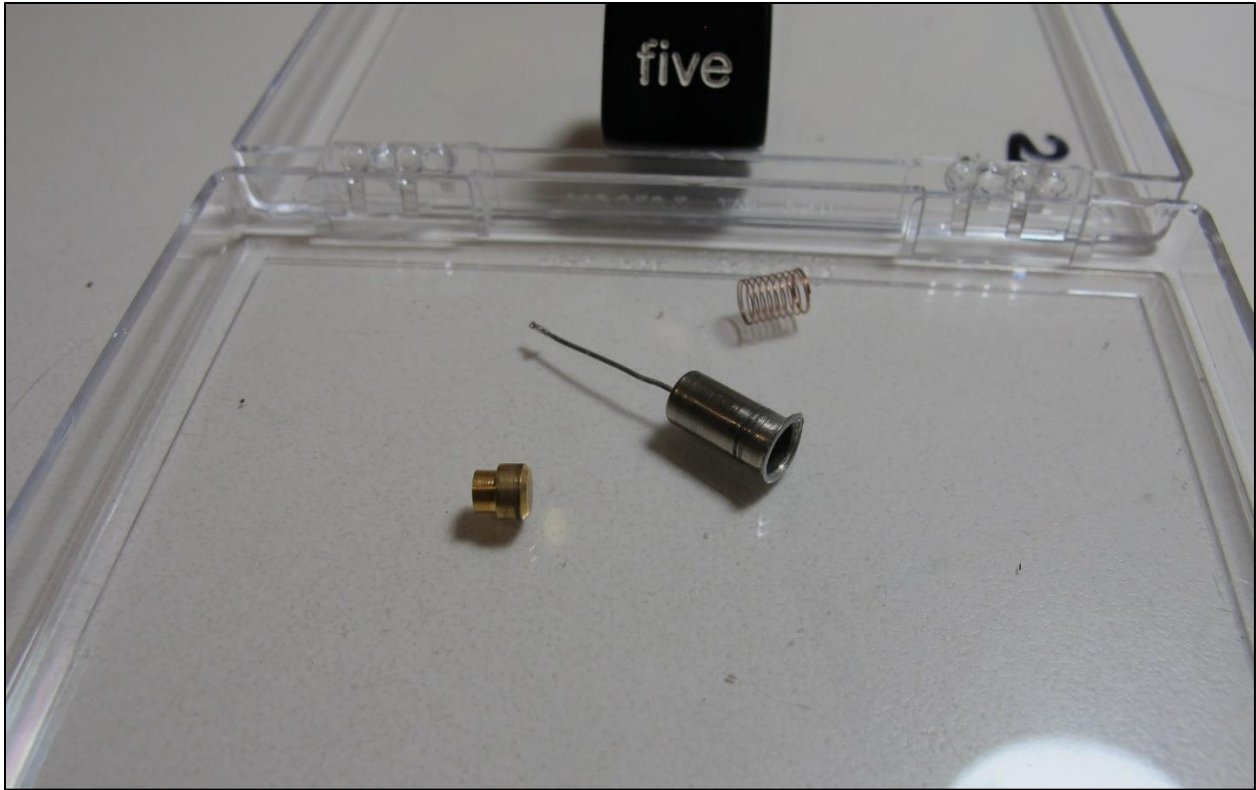


Figure 14, Modular G-Switch No. 5