



NATIONAL TRANSPORTATION SAFETY BOARD

**Office of Aviation Safety
Western Pacific Region**

COMPONENT EXAMINATIONS & TESTING

**NTSB Accident: WPR16LA056
Accident Date: January 22, 2016**

Examination Date: February 9, 2016

This document contains 21 embedded images

All images courtesy Robinson Helicopter Company

A. ACCIDENT

Location: North Las Vegas, NV
Date: January 22, 2016
Aircraft: Robinson R22, N7020U, Serial # 2837
NTSB IIC: Michael Huhn

B. EXAMINATION PARTICIPANTS:

Michael Huhn	Thom Webster
Air Safety Investigator	Air Safety Investigator
National Transportation Safety Board	Robinson Helicopter Company
Western Pacific Region	Torrance, CA

Several RHC technicians assisted with technical testing of the components.

C. SUMMARY

On 09 February, 2016, at Robinson Helicopter Company (RHC), Torrance, California, an examination was performed on three components (Governor Controller Box, Magneto, and Governor Motor) from the subject helicopter. With one minor exception involving the magneto, all three components satisfactorily met all applicable condition and functionality criteria.

D. COMPONENT EXAM DETAILS

1.0 Governor Controller Box

The first component examined was a Governor Controller Box, part number B286-2, serial number 1274, Rev H, Lot 39. A visual inspection of the box revealed that the box had not been opened or overhauled since its production. No external damage, with the exception of a small area of bubbled paint, was present. The electrical connector was clean and undamaged. A functional test was performed using the production acceptance criteria. The Controller satisfactorily met (passed) all of the test criteria. A copy of the test results is attached.

Rivets that secured the box cover plate were drilled out, and the box was opened. A visual examination found no indication of heat coming from the internal circuitry that would account for the bubbled paint. No abnormalities were observed with the internal components.



Figure 1 - Governor Control Box Top



Figure 2 - Control Box Data Plate



Figure 3 - Control Box Back Plate

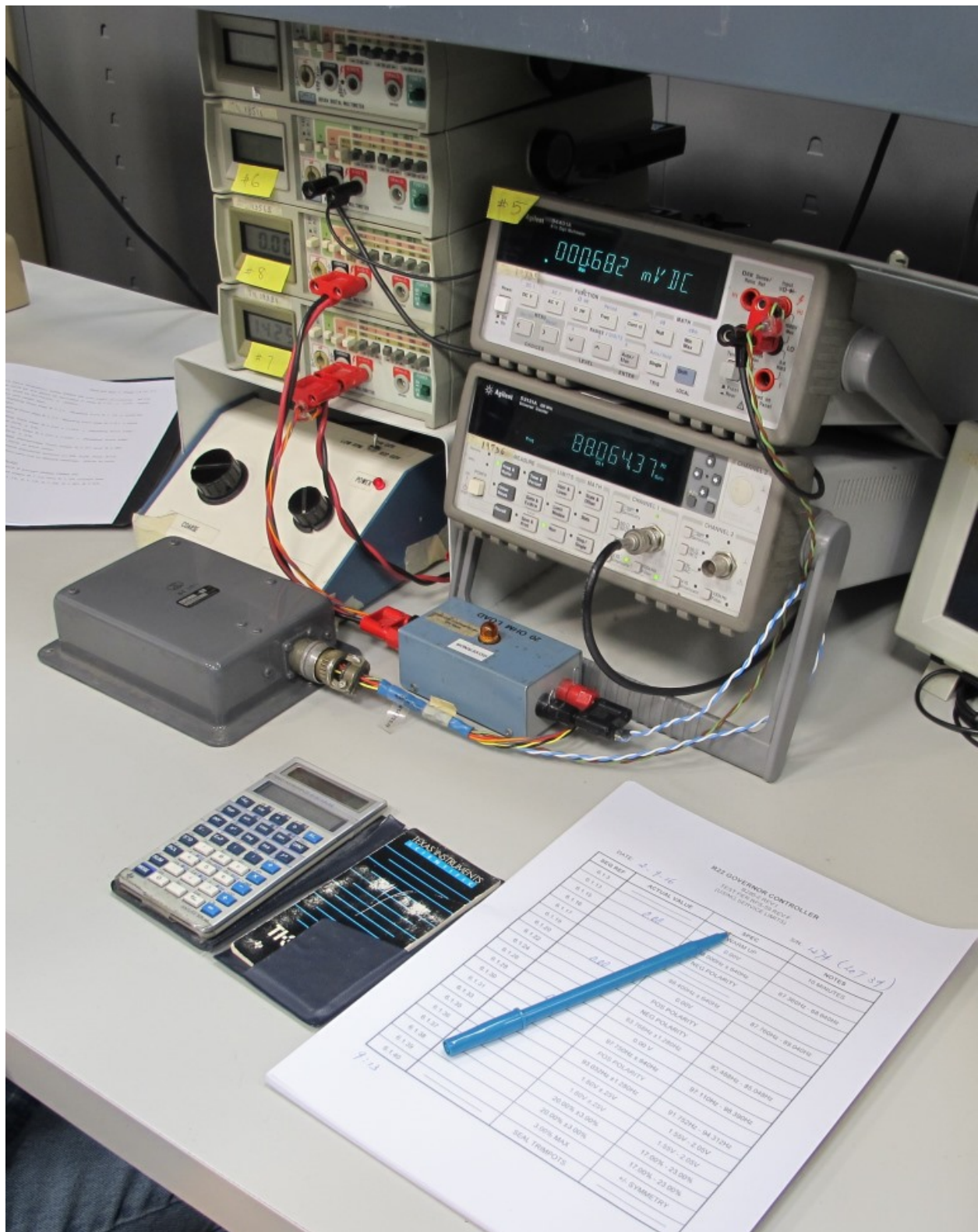


Figure 4 - Control Box Test Setup

R22 GOVERNOR CONTROLLER

B286-2 REV I

TEST PER RPS-59 REV F
(USING SERVICE LIMITS)

DATE: 2-9-16

S/N: 1274 (LOT 39)

SEQ REF	ACTUAL VALUE	SPEC	NOTES
6.1.3 ✓	-----	WARM UP	10 MINUTES
6.1.13 ✓	0.00	0.00V	
6.1.15 ✓	67.694	68.000Hz ±.640Hz	67.360Hz - 68.640Hz
6.1.16 ✓	-12.40	NEG POLARITY	
6.1.17 ✓	14.15	-----	
6.1.19 ✓	88.073	88.400Hz ±.640Hz	87.760Hz - 89.040Hz
6.1.20 ✓	0.00	0.00V	
6.1.22 ✓	+2.46	POS POLARITY	
6.1.24 ✓	-2.76	NEG POLARITY	
6.1.26 ✓	83.391	83.768Hz ±1.280Hz	82.488Hz - 85.048Hz
6.1.28 ✓	0.00	0.00 V	
6.1.30 ✓	97.385	97.750Hz ±.640Hz	97.110Hz - 98.390Hz
6.1.31 ✓	+12.40	POS POLARITY	
6.1.33 ✓	92.726	93.032Hz ±1.280Hz	91.752Hz - 94.312Hz
6.1.35 ✓	1.75	1.80V ±.25V	1.55V - 2.05V
6.1.36 ✓	1.75	1.80V ±.25V	1.55V - 2.05V
6.1.37 ✓	22.26	20.00% ±3.00%	17.00% - 23.00%
6.1.38 ✓	19.84	20.00% ±3.00%	17.00% - 23.00%
6.1.39 ✓	2.42	3.00% MAX	+/- SYMMETRY
6.1.40 N/A	-----	SEAL TRIMPOTS	-----

9:13

Figure 5 - Controller Box Test Results



Figure 6 - Bubbled Paint on Control Box

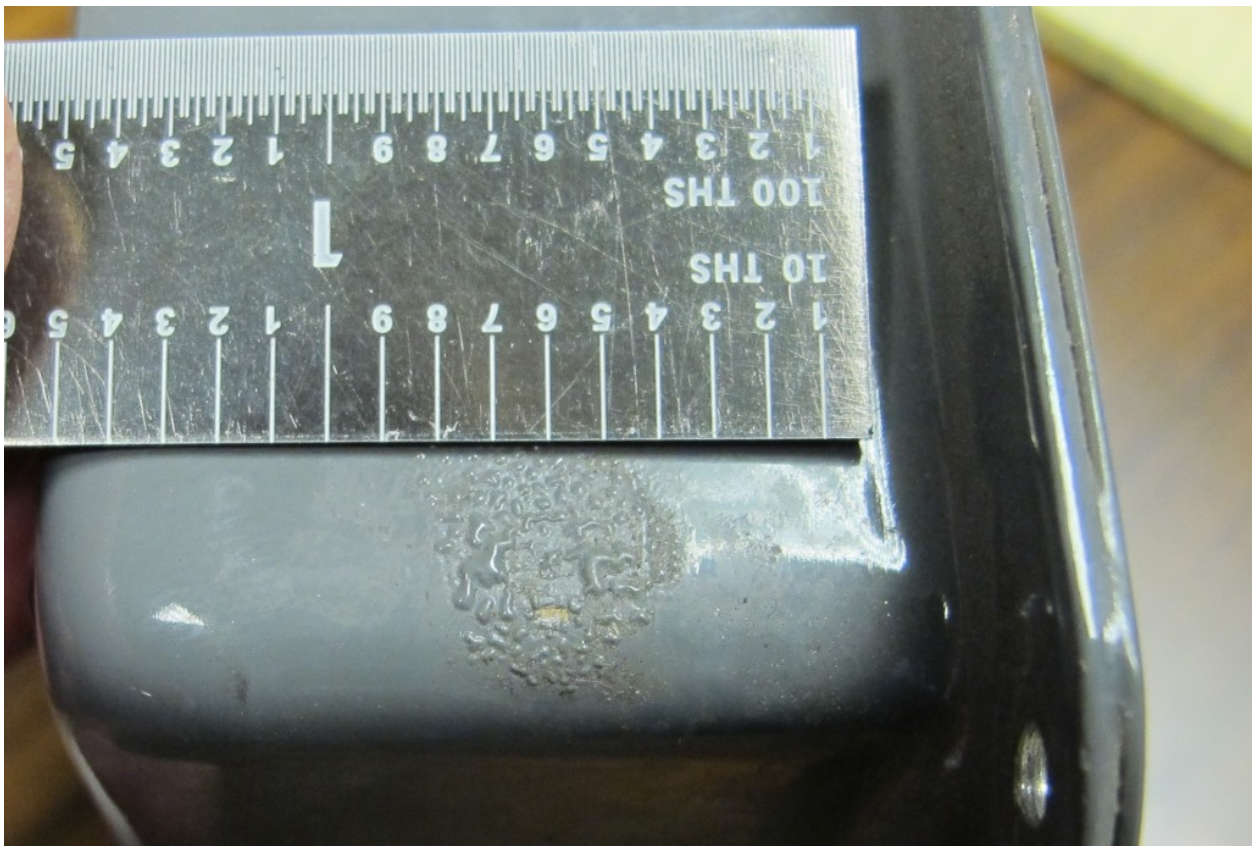


Figure 7 - Bubbled Paint Dimensions



Figure 8 - Control Box Internal Components



Figure 9 - Control Box Interior Behind Bubbled Paint

2.0 Right Engine Magneto

The second component to be examined was the (right) engine (helicopter left) Magneto, part number 10-600644-201, serial number EO7CA142. A visual inspection of the Magneto revealed that the data plate was yellow in color, indicating that it had been overhauled in the field (not by the manufacturer). No external damage was noted. The point cover was removed. There was no oil or grease contamination on or near the points. Although at least one point base holddown screw appeared to be slightly under-torqued, the tachometer ("tach") point base was secure, and all the proper hardware was in place. The points opened and closed on manual magneto rotation. The tach points, which provide a signal to the tachometer and the governor, had a gap between the contact points of less than .012 inches (manufacturers specification is $.019 \pm .003$ inches). The tach points were removed for inspection. The points appeared undamaged and the contact pads were clean and smooth. The insulator spacers were undamaged.



Figure 10 - Magneto Data Plate



Figure 11 - Magneto Drive End

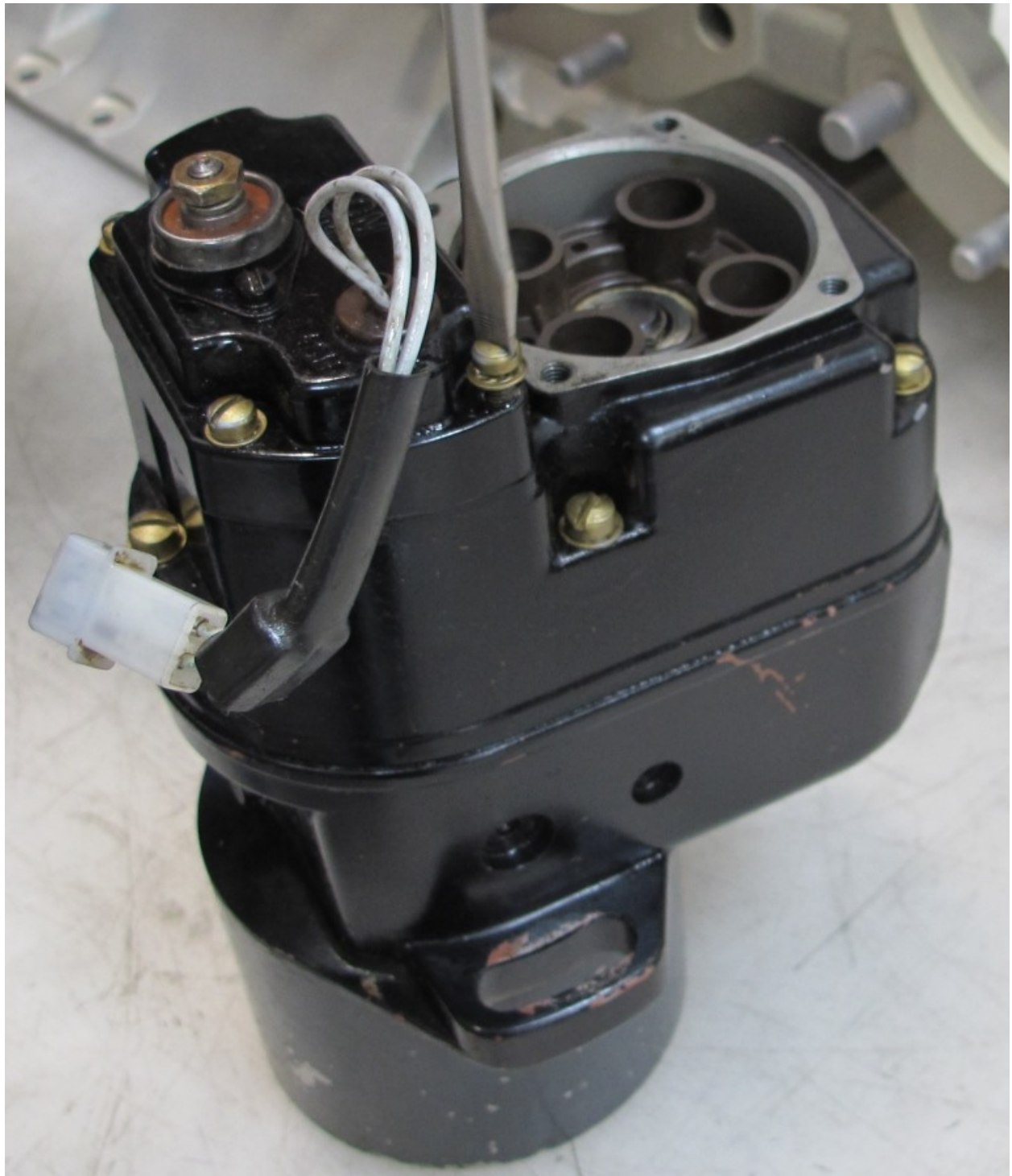


Figure 12 - Magneto

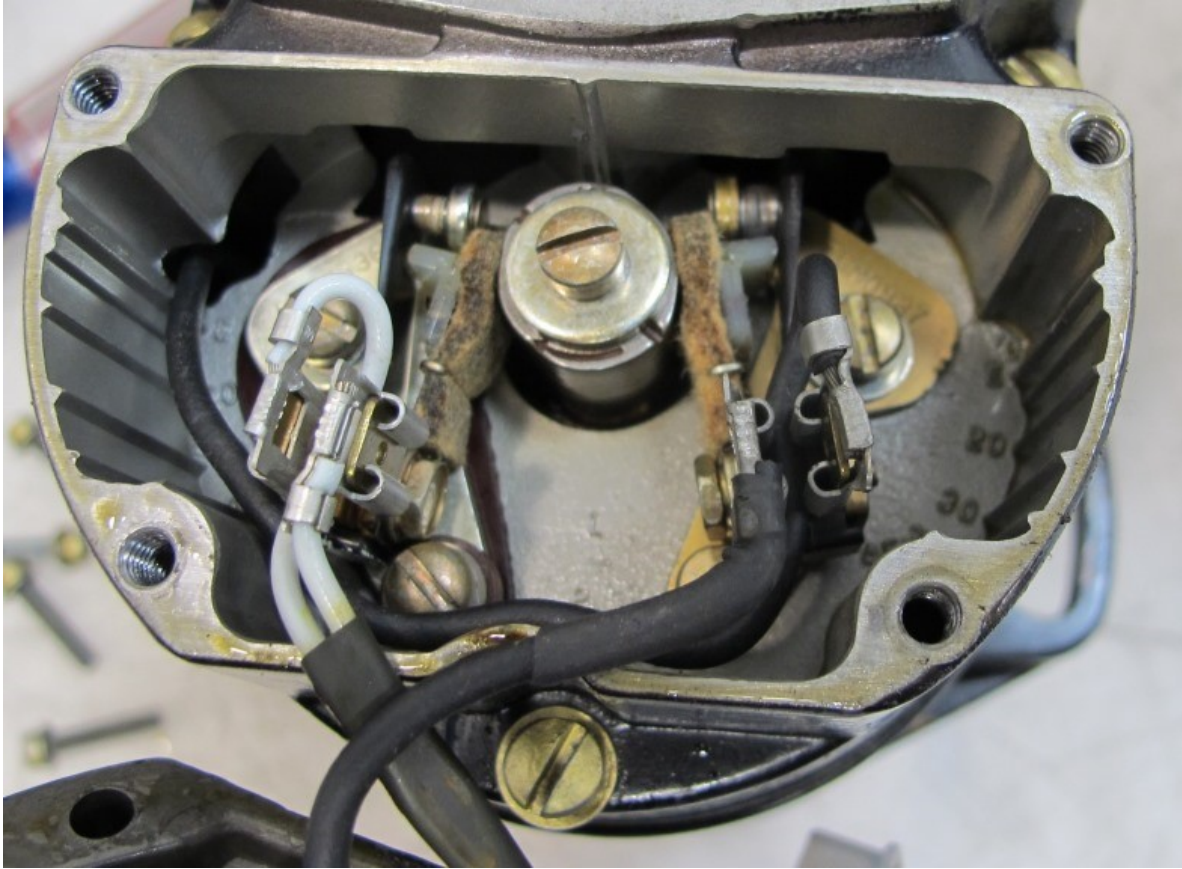


Figure 13 - Magneto Points (Tach points on left side)



Figure 14 - Tach Point Gap



Figure 15 - Intact Insulator/Spacers



Figure 16 - Opened Tach Points

3.0 Governor Motor

The third component to be examined was a Governor Motor, part number B247-5, Lot 50. Visual inspection revealed no external damage. A functional test was performed on the motor with satisfactory results when compared to production specifications. The functional test included directionality, and appropriate "friction disc slippage," as indicated by motor current draw with a jammed actuator link at two power settings, 100% and 20 %. Maximum allowable draw was 0.7A; observed maximum values were typically 0.23A.

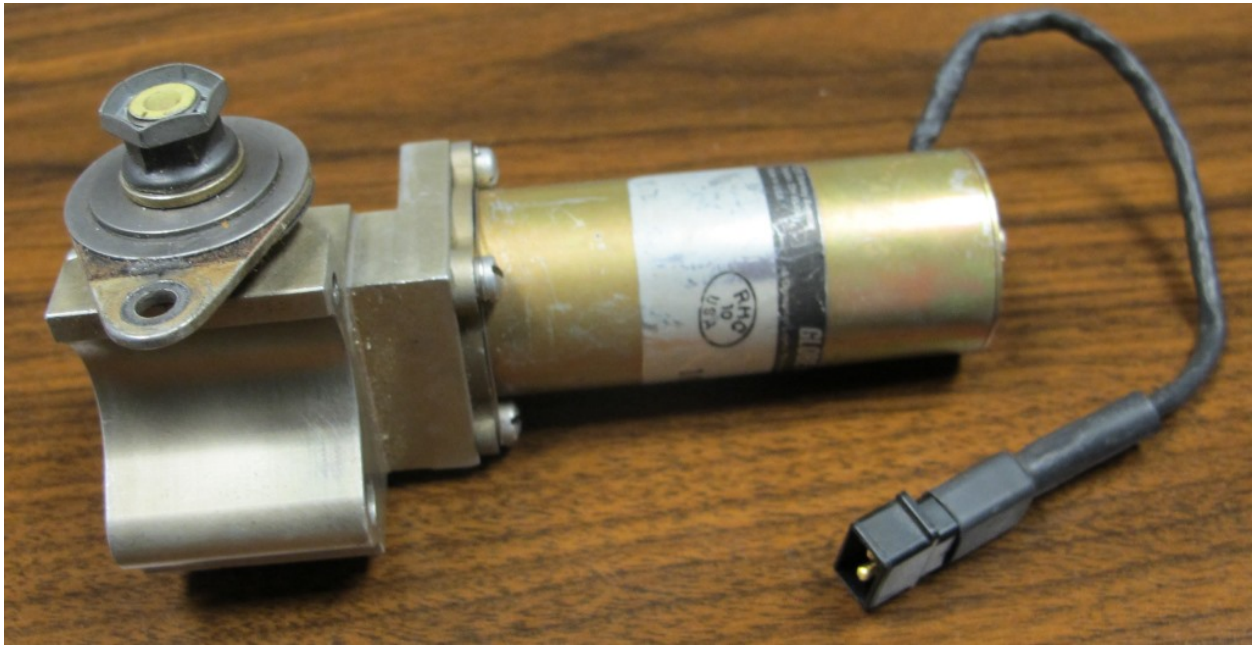


Figure 17 - Governor Motor

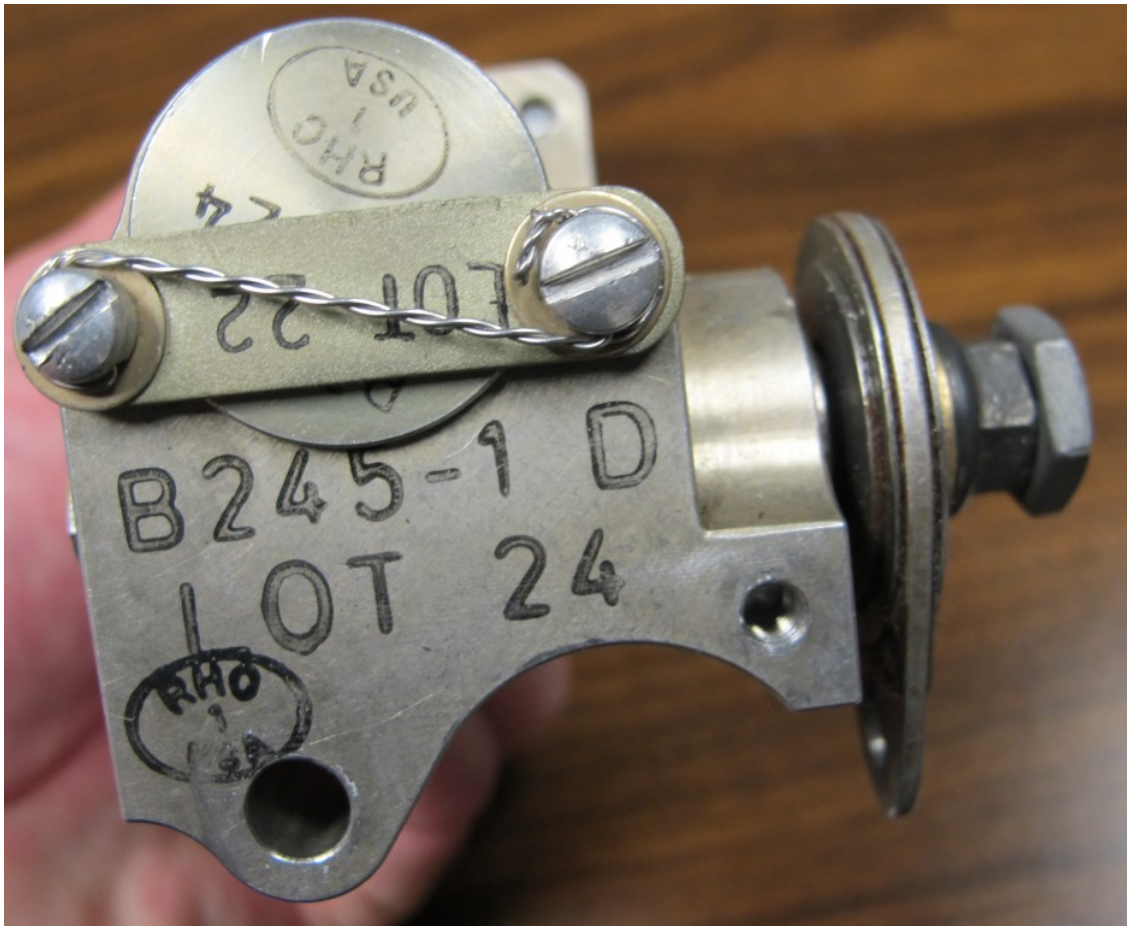


Figure 18 - Governor Motor End



Figure 19 - Governor Motor Data Plate

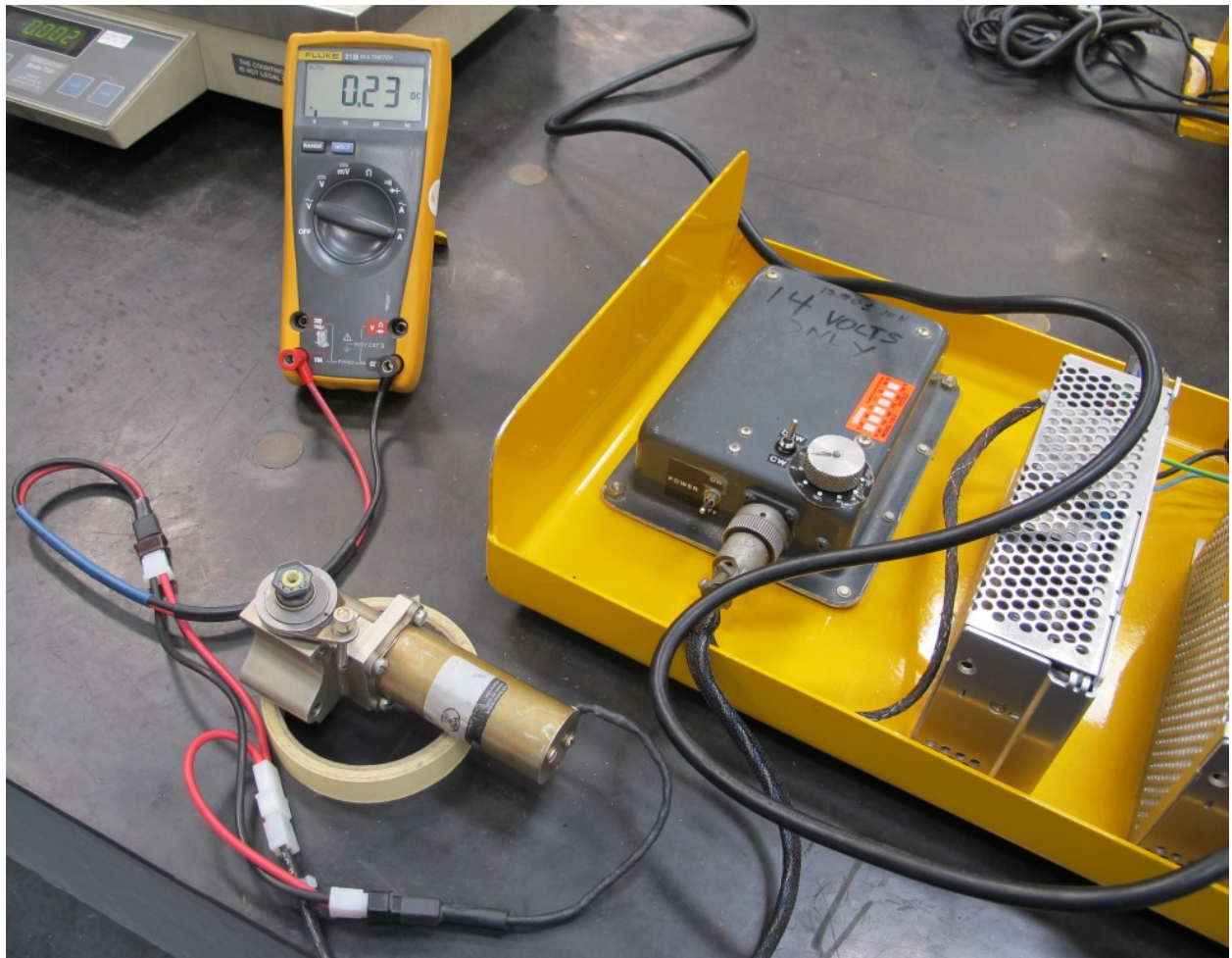


Figure 20 - Motor Test Setup

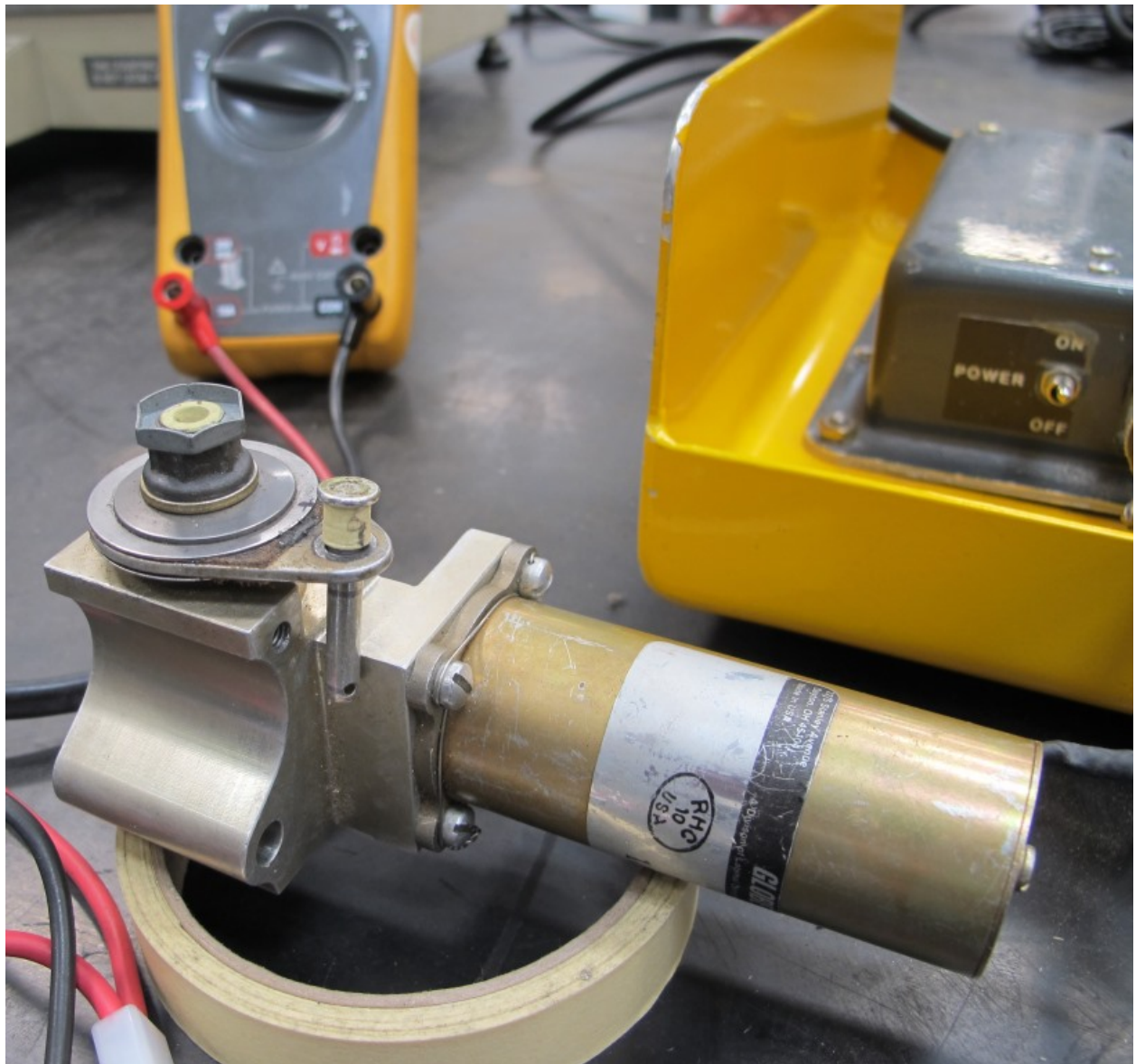


Figure 21 - Pin to Jam Actuator Link