

**servo  
maintenance  
instructions**

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## **SERVO MAINTENANCE INSTRUCTIONS FOR THE KRAFT PROPORTIONAL SERVO**

### **INTRODUCTION**

After extended system use (75 to 250 flights), the servo feedback potentiometer may require cleaning. The symptoms which show that this maintenance is necessary are a mild hunting of the control surface under engine vibration or a failure of a servo to neutralize accurately while flying. This condition is not dangerous in the sense of control loss but indicates that servo potentiometer cleaning is required.

Unnecessary servo disassembly should be avoided and cleaning of the servo potentiometer should only be done as necessary.

### **SERVO MAINTENANCE**

Remove center screw eye 1 (see figure 1). Remove screws 2 3 4 5 6 from aluminum cover and base. Remove the cover and lift out the servo mechanism from the bottom chassis. Be sure the side plate is held in position to prevent damage to servo contacts. Reinstall screws 3 5 4 & 6 to keep the side plate in place. Carefully remove screws 11 & 12 while holding the circuit board against frame with your thumb. Lift the circuit board carefully away from the frame and rack. The servo feedback potentiometer is shown in Fig. 5. The potentiometer is of the wire-wound type and consists of many closely-spaced turns of 0.0015 in., nichrome wire forming the resistive element. Contact is made with the feedback potentiometer by the outer beryllium copper finger attached to the rack. The inner finger makes contact with the pc board. The flexible small diameter wire soldered to the contact is redundant with the inner contact and is provided because dirt build-up accumulates faster on the pc board wiping area than it does on the feedback potentiometer. Actually, only the outer contact is required and the inner contact merely forms a back-up for safety should the follow wire ever break. This is very unlikely as in our entire production experience we have never seen this wire break. The feedback potentiometer is factory lubricated with a very light application



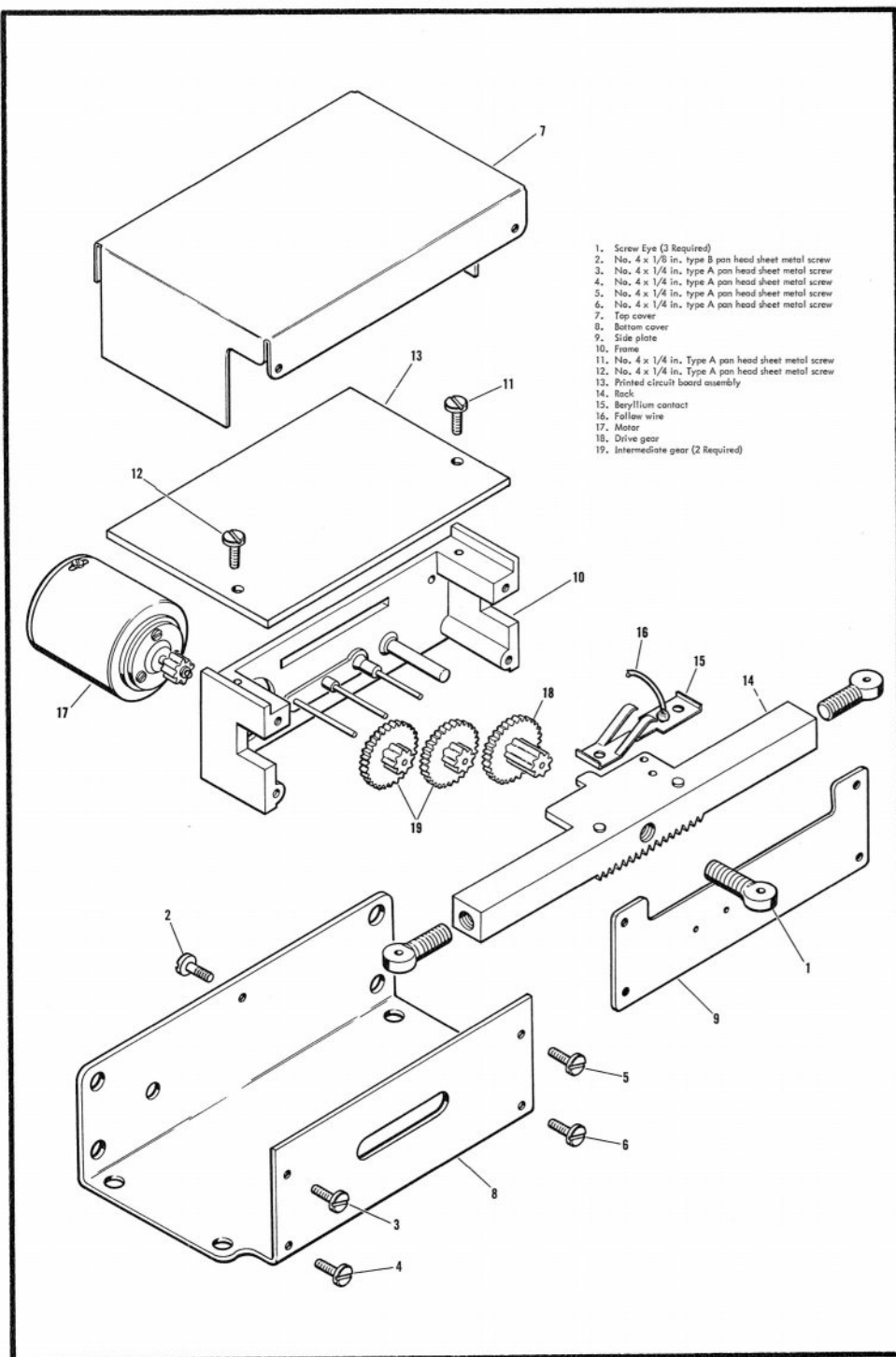


Figure 1. Exploded View with Parts Identified

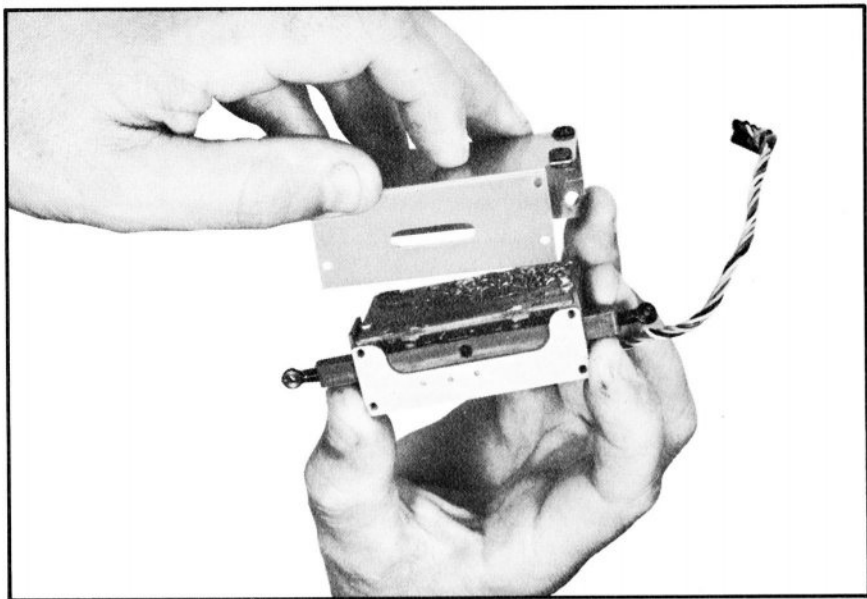
of a special silicone lubricant. Under field conditions, the servo feedback potentiometer can be cleaned by rubbing carefully with a clean linen handkerchief. It is not necessary with this method of cleaning to re-lubricate the potentiometer as the factory lubricant is extremely difficult to remove and enough will remain to prevent wear.

More thorough cleaning can be obtained with an ordinary pink pearl eraser, commonly found on a lead pencil. The eraser should be carefully rubbed lengthwise over the wire-wound potentiometer. Then rub crosswise parallel to winding of wire-wound potentiometer. The process should be repeated until the potentiometer is thoroughly cleaned. It is extremely important to avoid damage to the fine wire of the potentiometer. Keep any sharp metal objects or abrasives away from potentiometer during cleaning and be careful not to accidentally scratch and thereby injure the fine wire. After cleaning carefully blow or brush off (use a fine brush) the accumulated erasings. Re-lubricate the potentiometer by taking a small amount of silicone lubricant and dabbing it lightly in several places on the potentiometer. Then with your finger smear lubricant over the potentiometer and rub in thoroughly. Caution: **ONLY A MINUTE AMOUNT OF LUBRICANT IS REQUIRED.** After the potentiometer is lubricated wipe it with a clean soft cloth to be absolutely sure that no excess lubricant remains.

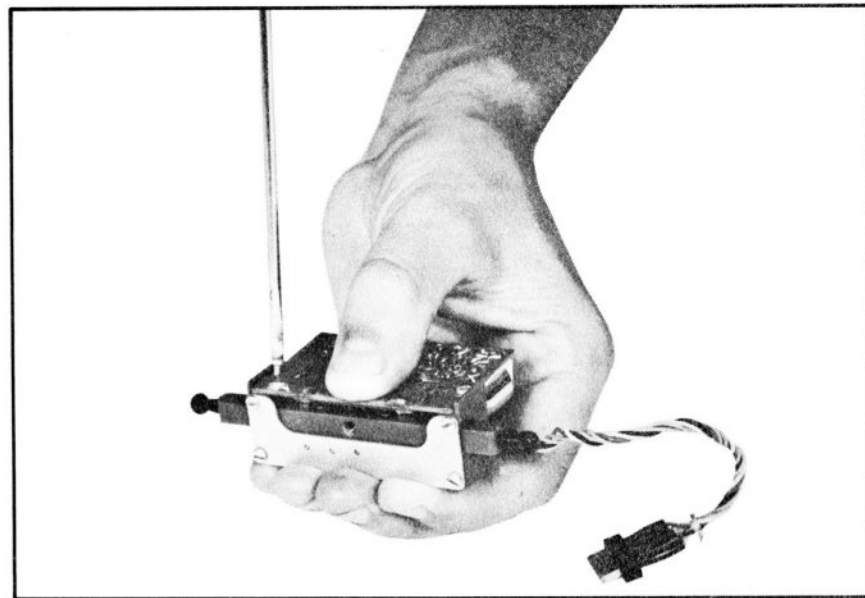
Next, the feedback potentiometer and servo contact should be inspected for wear. Life of the feedback potentiometer is extremely long and in 2 years of production we have only 2 or 3 potentiometers that showed excessive wear. Slight shininess around the center or neutral area of the potentiometer is normal, but if the fine wire appears to be worn over 1/2 thru, the potentiometers should be replaced at the owners earliest convenience. The contact wiper also has a long life but will usually wear through before the wire-wound potentiometers shows excessive wear. Even a small amount of use will wear a groove in the beryllium finger. However once a groove is polished in the surface, the wear rate minimizes and the finger doesn't need replacement until it is worn completely through. After re-lubricating wire-wound potentiometer, reinstall the pc board, reinstall the pc board assembly on the frame.

When reinstalling pc assembly the contact wiper should depress at least 3/32". Be sure this contact pressure is maintained. Bend up contacts if necessary. Reinstall screws 11 and 12 but do not tighten completely. There is some play in the mounting hole of the pc board to permit alignment of potentiometer with contact wiper. This should have been accurately aligned when servo was assembled at factory and therefore it is only necessary to push the assembly so that the potting compound used around the electronic components fits tightly against the servo frame once again.

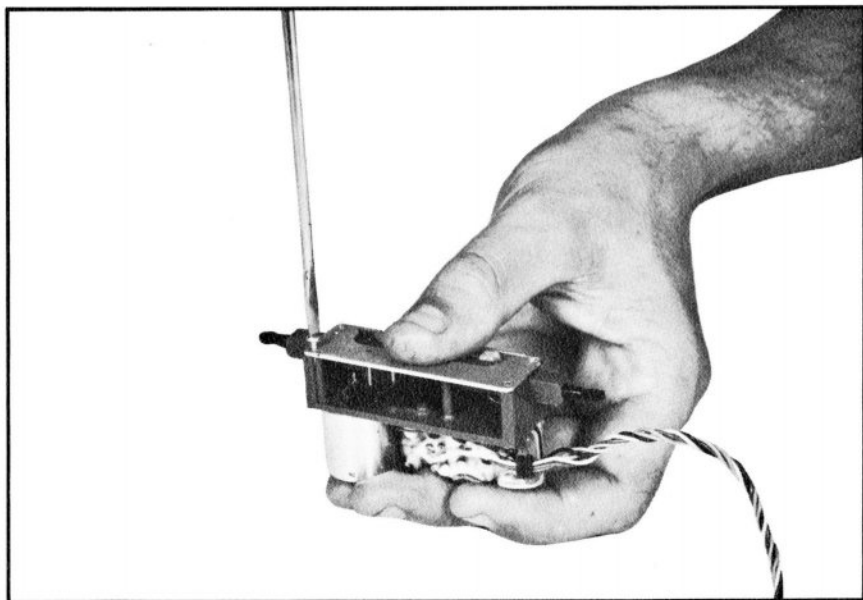
Position the follow wire so it folds upward away from pc board between the rack and frame and is clear of the servo gears.



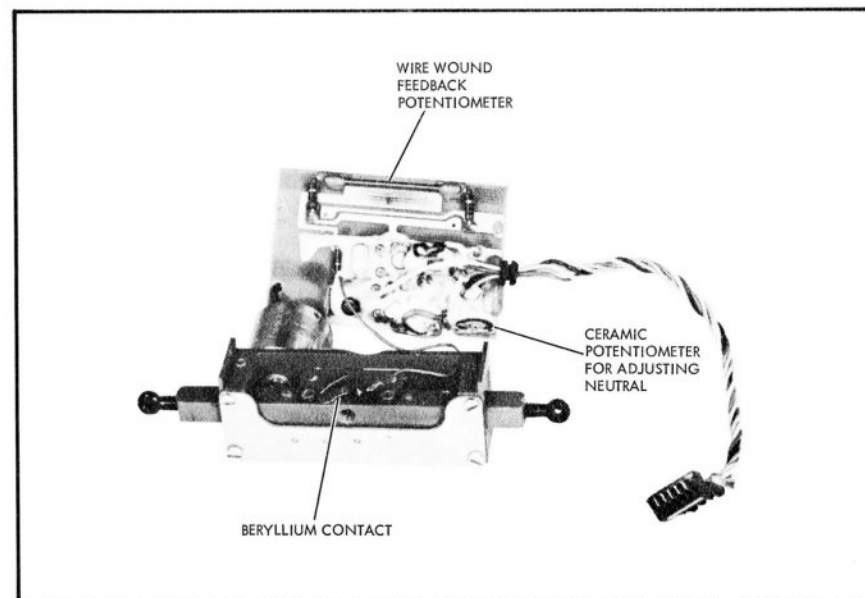
**Figure 2. Removing Servo Mechanism**



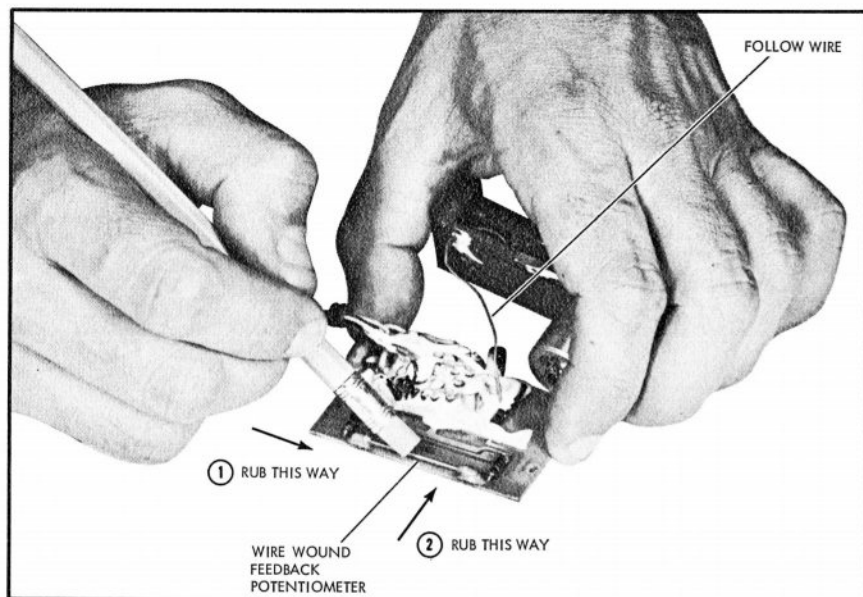
**Figure 4. Removing Printed Circuit Board Assembly**



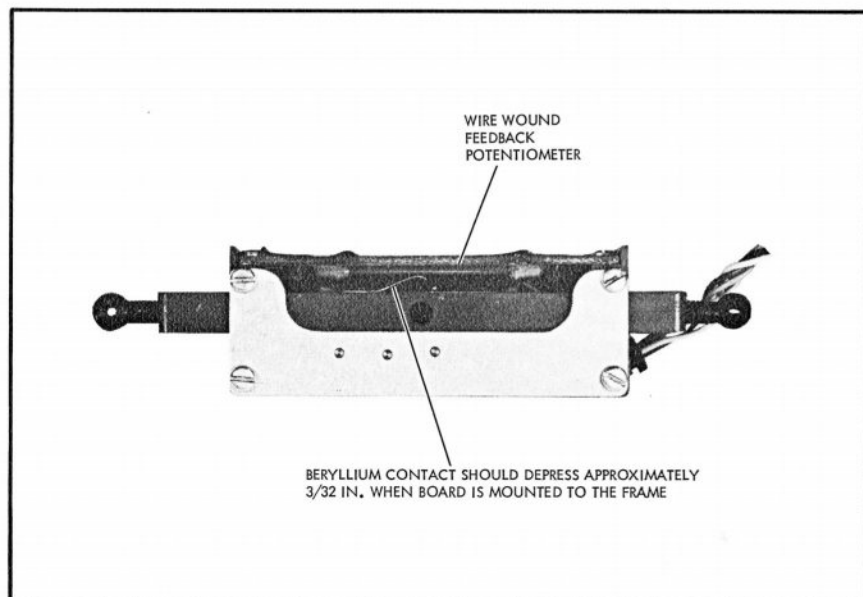
**Figure 3. Replacing Side Plate**



**Figure 5. Wire Wound Potentiometer and Ceramic Potentiometer Location**



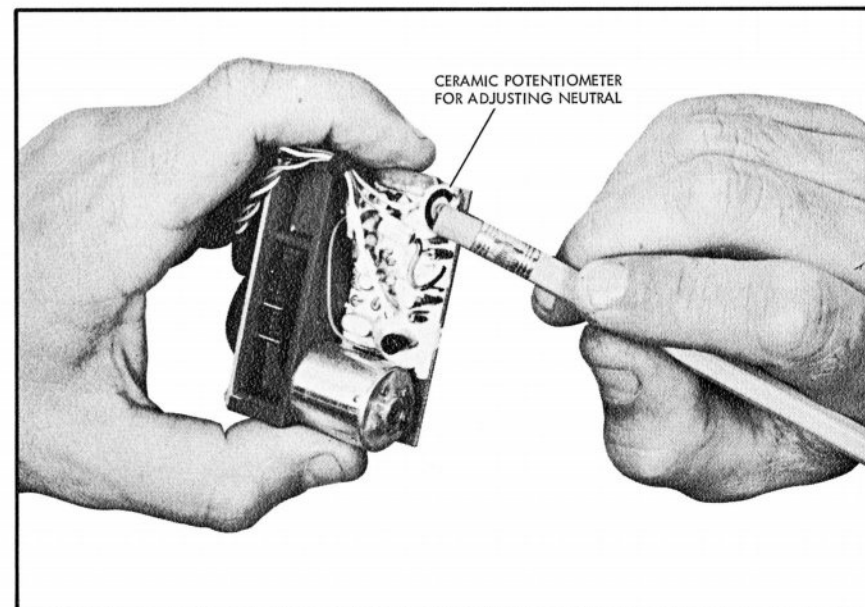
**Figure 6. Method of Cleaning Wire Wound Potentiometer**



**Figure 7. Side View of Beryllium Contacts in Position on Feed Back Potentiometer**

As a final check, plug the servo into the receiver and slowly run it back and forth to check operation before reassembly into the can.

Another unusual but possible cause of the servo shifting neutral slightly under vibration or G loads in the aircraft is the small ceramic neutral adjusting potentiometer. Vibration can sometimes cause the wiper arm of the potentiometer to develop a slight pit on point of contact with the carbon element of the potentiometer. This unlikely possibility can be checked by pushing very lightly against the wiper arm of the potentiometer with a rubber pencil eraser while the servo is plugged into receiver with transmitter and receiver on. If the servo moves when the potentiometer is pushed on with the eraser, it could cause servo movement during aircraft maneuvers, which subject the equipment to high G loads. This can usually be cured by moving the contact arm very slightly to a new position on the potentiometer. This will shift the servo neutral slightly, but providing the wiper arm of the potentiometer is not moved too far, it will not interfere with normal operation of the servo. If this doesn't correct the condition, return to factory for potentiometer replacement.



**Figure 8. Checking Ceramic Potentiometer for Pitting**

Remove screws (with thumb holding side plate securely) 3 5 4 6 and reinstall servo mechanism in the can base. Fasten servo frame to base with screws 4 & 6 and reinstall lid being careful to align rubber grommet protecting the wiring cable with the slot in servo lid. Install short screw 2 in proper place and finish assembly with screws 3 & 5.

Should you encounter any problems we are at your service.

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