

PH Aviation Services, Inc.  
Flap Actuator  
p/n PHA-14P  
Installation & Operating Instructions

SPECIFICATIONS:

Input Voltage: 12 VDC  
Current: 5A at full load  
Load Capacity: 75 pounds  
Stroke length: 5 inches  
Speed: Approximately 1 inch per second  
Internal Limit Switches: Full stop at ends  
Potentiometer: Built in position sensing  
Hole to Hole Length: 11 ½ " (Retracted)  
Weight: 2 lbs. (+9 oz. over stock actuator)

Overview – The PHA Flap Actuator was developed to be an improvement over the standard actuator found in most RVs. It has the same stroke and speed, however, it has built-in stops and an internal potentiometer that can transmit the flap position to an indicator or EFIS display. Because it comes to a complete stop at both extremes, there is no need for the safety wire bulletin that is mandatory in the stock actuators. Furthermore, external flap limit switches are not necessary to stop the flap motor, so you can use a locking control switch for the UP position thus avoiding the use of the spring-loaded position to raise the flaps. You can just flip your flap switch to the UP position and forget about it!

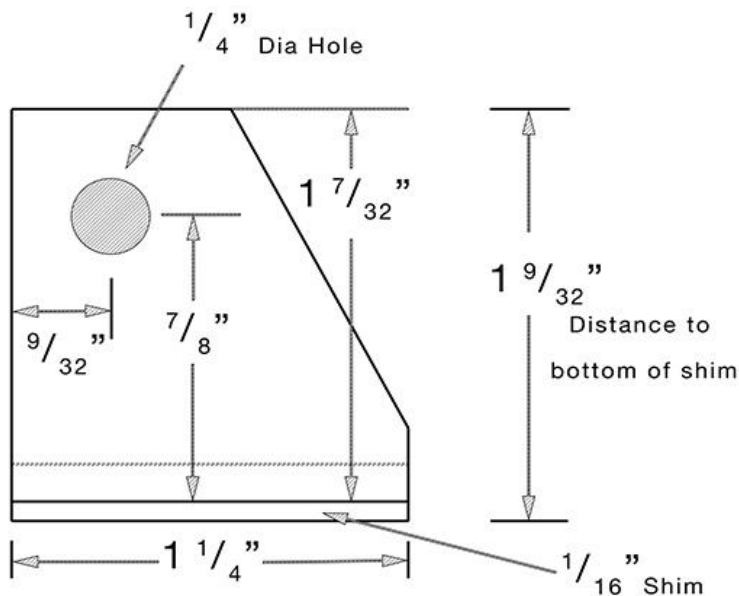
It should prove to be extremely reliable. We have been operating three prototypes in our own RV for the past 6 months without incident. These actuators are made for us by a reputable manufacturer to our spec and we believe them to be top quality.

Installation – the PHA actuator is not a drop-in replacement for the stock RV actuator. It is actually about 1.375" longer and a little taller, so it will require some modification to your current installation. We consider the changes to be minor, however. Following is a detailed description of the installation of the PHA actuator in our RV-6. Your airplane may vary.



In the picture above, we show you the stock RV-6 installation next to the new flap actuator. We ordered a new flap actuator channel from Vans for a few bucks to facilitate the changeover. We also made a couple of the new brackets seen here from 1 ½ X 1 ½ by 0.125", 2024 T3 angle we had lying around. Because the new actuator is centered in the channel, you are able to move it back about an inch closer to the end from the old position. This has the added advantage of compensating for about an inch of the 1.375" of added length of the new actuator. The other 0.375" of length was adjusted for by increasing the length of the F-659 flap link by about a half inch or so. The actuator actually sits nicely in the center of the channel and mates with the flap control weldment squarely as opposed to the stock actuator coming in at a slight angle.

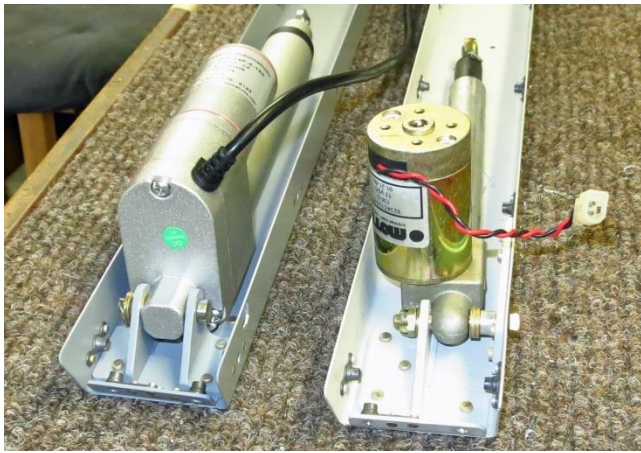
Here is a detailed sketch of the dimensions of the new brackets that we made:



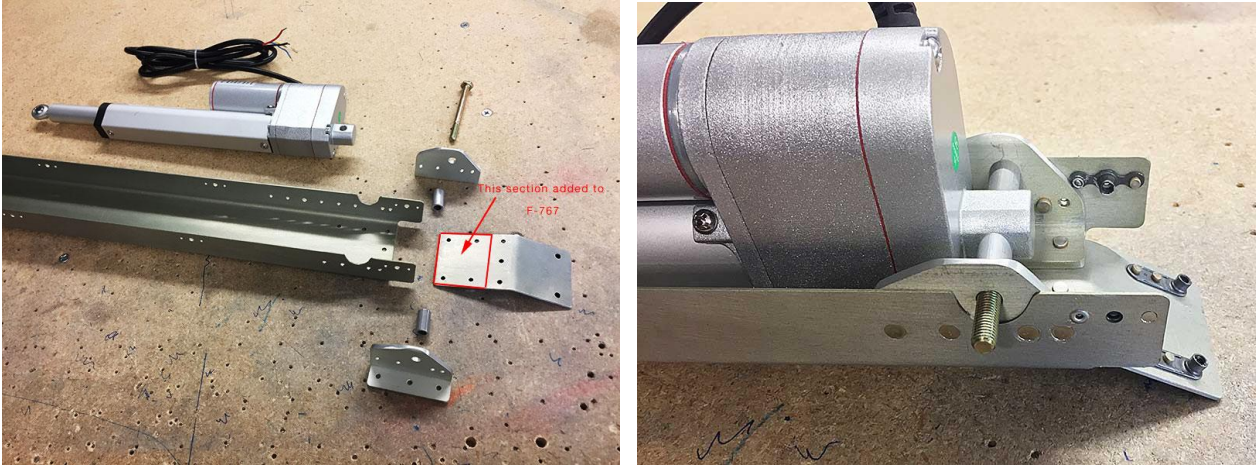
The brackets are approximately ¾" wide. The shim is necessary because of the attachment angle that is riveted to the channel. Everything else is pretty much the same as the original installation. If you do not have enough adjustment available in the rod ends on the F-659 flap link, it may be necessary to make a couple of new links that are slightly longer.

We used a 1" clevis pin to secure the new actuator. We had to drill a hole in the side of the channel for clearance of the clevis pin head.

Here are some additional photos of our installation:



RV-7 Installation – One of our customers sent us photos of his RV-7 installation which we are including here:



RV-8 Installation – An RV-8 customer sent us these photos:



## **CAUTION – CAUTION – CAUTION**

To protect your actuator from damage please observe the following precautions: do not allow your motor to stall for any reason—internal damage may result! Make sure your flap assembly moves smoothly throughout its range without binding. Make sure that there is no interference between the actuator and its bracket or any part of the airplane structure. And, finally, make sure that the flaps don't reach the end of their travel before the motor stops—to do so will cause the motor to stall and possibly strip internal gears. Adjust the flaps so that the actuator reaches its stops just prior to, or simultaneously with, the flaps' physical stops; for example, the flaps touching the bottom of the fuselage when they are fully up.

Electrical Hookup – The preferred wiring method for the PHA Flap Actuator is through a relay deck. However, the existing wiring in your airplane will work just fine. The advantage of using relays is that only a few milliamps go through your flap switch, which will allow you're switch to last a very long time. Otherwise, if the full load of the flap motor goes through your switch (up to 5 amps), it will result in a diminished switch life. You will probably want a switch that locks UP and spring loads DN. When the flap actuator gets to the end of its stroke, the flaps stop. The red and black wires are the motor power inputs.

Flap position indicators – the pot inside the actuator is a standard setup much like is found in the conventional trim actuators in your airplane. There are two reference wires (white and yellow), and the blue wire is the signal (wiper). In our Garmin GEA 24 hookup, the yellow wire connects to the 5v excitation voltage, the white wire to LO, and the blue wire to the signal input. Be sure to recalibrate your indicator for the new sensor.

If you have any questions, please email us at [pat@phaviation.com](mailto:pat@phaviation.com).

Thanks for purchasing our product!

### **Disclaimer & Warranty:**

This part was manufactured by PH Aviation Services, Inc. and should NOT be installed in Certified Aircraft. It is intended for use only in Experimental Aircraft and to be installed by the builder. There are no warranties expressed or implied and purchaser assumes all risk for the operation of this part. However, the purchaser may return this part for repair, replacement, or a full refund if it fails to operate as intended at any time during the first 12 months after the date of purchase.

### **Return Policy**

Normally we accept returns only if the part fails to perform as advertised. We will consider a request for a return on an individual case basis, and, if we agree to accept a return, we will charge for shipping costs and a 10% restocking fee.