

## Installation instructions for LIMAC Products Hinge Upgrade Kit HUK-3



Last updated  
9/07  
9/14/07 4mm not 3mm Thanks Lawrence

## About the Kit

**Thank you** for purchasing the LIMAC Products Hinge Upgrade kit. This is the kit made by "Pilots" for "Pilots".

The Hinge Upgrade Kit (HUK) arose out of an attempt to increase the precision of aerobatic IMAC style flying. The factory hinging method used on the Comp-ARF line of aircraft is quite good – but like anything else there is always a way to make it better for more discerning aircraft pilot.

On larger 40% sized kits the standard hinging method uses a 4mm Aluminum tube which passes through several phenolic hinge plates. The major concern here is that the aluminum is soft and the bearing area in contact with the tube will allow it to deform slightly over time and use.

This kit increases the surface area in contact with the Aluminum tube and rather than having Phenolic rubbing on Aluminum tubing, you now have a precision engineered non metallic bearing material riding on the Aluminum Shaft.

Properly installed, the kit removes any play laterally and axially and will allow the control surface to take more loading than before.

A word about the Aluminum tube; originally the kit was released with a Stainless Steel (SS) 4 mm tube to replace the Aluminum. This arrangement is considered "ideal". The problem with the kit is that the SS tubing is exorbitantly priced and is more than a \$60.00 adder to the HUK. At LIMAC Products we tried our best to get dealer pricing but the only way to do this was to buy a "mill" run of several hundred meters and only a %10 reduction in price to our customers. This was not enough price savings to justify.

Simply this kit just didn't sell and our customers begged for just the bearing upgrade – so here it is!

The bearing is of the "self captivating" type. What this means is that the bearing is inserted into its bore and prevented from falling through by a flange on the side it is inserted from. Additionally, it has a smaller flange on the opposite side. Normally this smaller flange would prevent the bearing from being inserted, but the bearing also features a relief cut across the axis. This cut allows the bearing to be compressed enough so the smaller flange fits through the hole for installation. Once through the bearing expands and the smaller flange keeps the bearing from coming back out the hole on the inserted side. Moreover, when you install the 4 mm hinge shaft it becomes impossible to compress the bearing again and for it to come out.

Don't discount the drill bit. It was *specifically* chosen for this *exact* application. Using this drill (as described in these instructions) it creates the perfect clearance in the bearing that allows our hinge rod and control surface to have negligible play and still rotate freely. If it's opened too much you introduce slop again, and too tight and it will take excessive power from your servos to operate.

We hope you enjoy your HUK, and please send your comments to [limacproducts@limacproducts.com](mailto:limacproducts@limacproducts.com) and let us know what you think about it. Good Luck, enjoy the flying and be careful!

**Okay – Let's go to installing the kit!**

## Installing the HUK-3 Hinge Upgrade kit

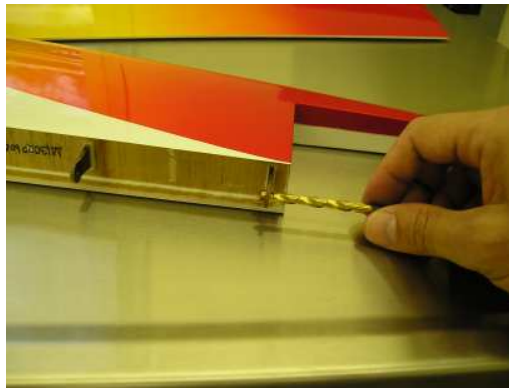
### Step1:



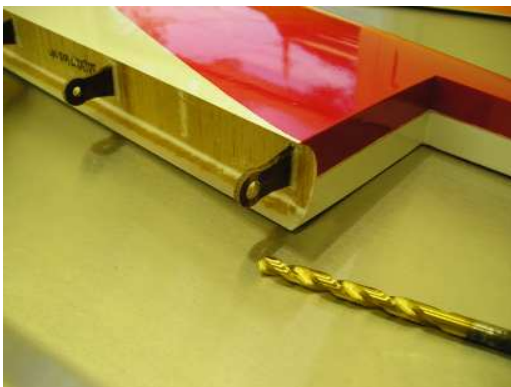
- Disassemble your control surface by removing the Servo control rod and 4mm Aluminum hinge rod which comes with the Comp-ARF kit. Separate the halves and lay them out on your bench.



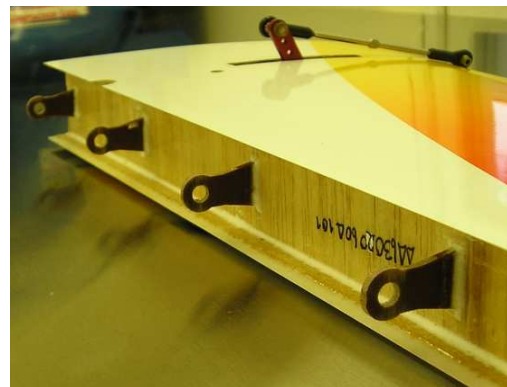
- You will either need a pair of mechanics gloves, or you can wrap some masking tape around the shank of the drill bit to take it easy on your fingers. You must drill this hole by hand and there is no room for a pin vise between the phenolic hinge plates.



- Using the drill bit by hand, insert the drill into the existing hole in the Phenolic hinge plate. Using a clockwise and counterclockwise twisting motion, drill the hole in the phenolic using light pressure. Let the drill do the cutting, this will proceed surprisingly quickly, so be careful. As you near the end of the hole the bit will tend to get stuck and pull itself through rather than cut the last portion of the hole. When you get to this point, use no pressure on the bit and just let the drill rotation take away the last of the hole bit by bit.



One hole drilled – not so bad.....



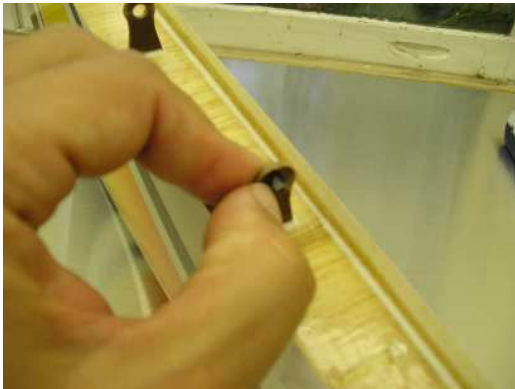
All the holes are drilled open

## Step 2

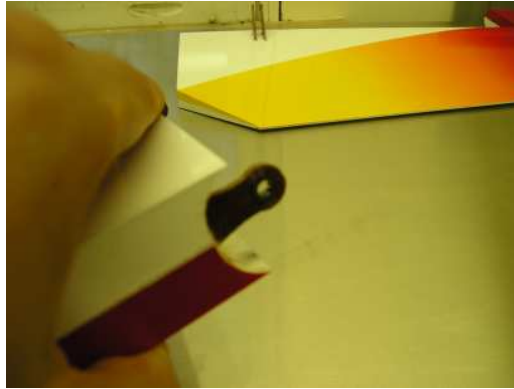


- Using 220 grit sandpaper on a sanding bock remove the drill burrs from the surface of the phenolic. Sand very lightly you only need to knock the burrs off and there is **no need** to chamfer the holes with a hobby knife, please do not do so.

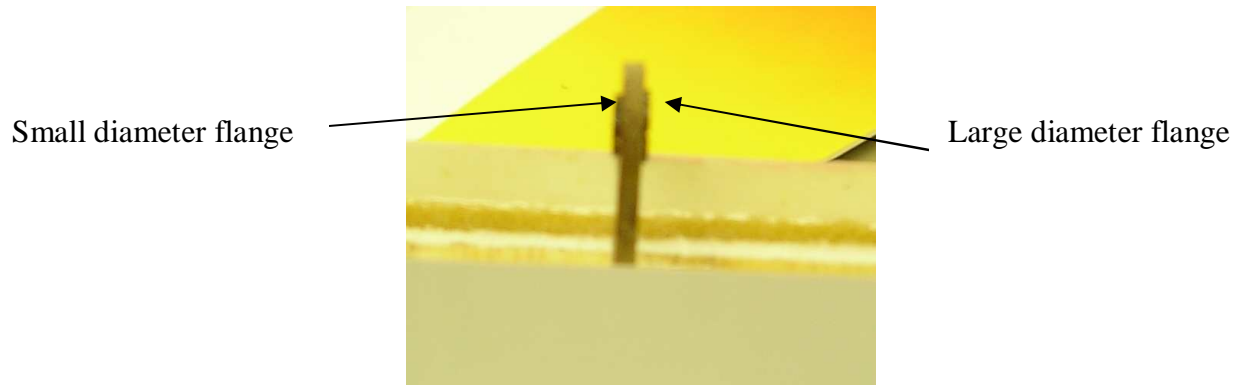
## Step 3



- Insert the Bearing into the drilled hole in the phenolic. No question about it – THIS IS TRICKY. We will do our best to walk you through it. You kind of have to “stretch” it open. The best way to explain this is to think of an extension spring and pull it apart. Essentially that is what we need to do. To help us, the “axial” cut we spoke of earlier is on a helix angle and this will help us greatly.
- Position the bearing over the hole with the smaller diameter flange touching the phenolic. With you thumb as shown push one side through the phenolic allowing the bearing to expand slightly like our extension spring.
- Take your other thumb and continue pressing the bearing down and into the hole. It will snap into place quite easily. When you do it once, the rest will just snap right into place.



- This is what the inserted bearing looks like. You need to make sure the small diameter flange on the opposite side of the hole has cleared the hole and the “axial” helix slot has now relaxed back open.



- Make sure both flanges are now expanded and the bearing is firmly captivated in the axial direction.
- When all of the bearings are installed in the phenolic hinge plates, we like to rotate them so the “axial” helix slot is in a different orientation on every hinge plate.... Just for good measure.

Step 4 - File open the control surfaces.



- You will now need to make a small “file”. We took a scrap piece of 3/32” balsa wood approximately 3 1/2” long and 1/2” wide and applied 150 grit sand paper to both sides with spray adhesive. Let this get good and dry.
- Due to the fact that the new bearings are wider then the phenolic you must open up the slots in the control surface. We like the following method. Additionally, the flanges on the bearings will now allow us to control the “Axial” slop in the control surface. We must be careful not to open the slots too much and introduce too much play.



- The “file” we made will be too wide to fit in the slot. We like to “wiggle” it in and pull it out at first. Stick the file into the slot and wiggle it back and forth a few times until you can get it all the way in. Pull it out and repeat as necessary.

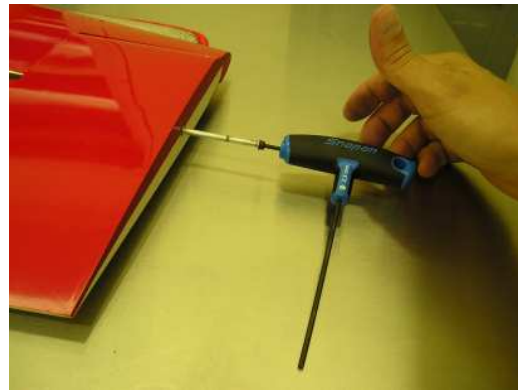


- Once you have no problem getting the file into the slot use reciprocating motions applying pressure to the top and bottom of the slot. The file is a sort of Go No-Go gauge. Once it is working into and out of the slot well you are getting close and should do some trials with the phenolic hinge plate to avoid removing too much material. Open all the slots in this manner.

## Step 5 – Install the control surface



- This is straightforward. Just install the control surface in the same manner as before. However, we left the slots kind of tight so take care that you do not dislodge the bearing flanges when you install the control surface. If this happens you will destroy parts when you go in insert the hinge rod.

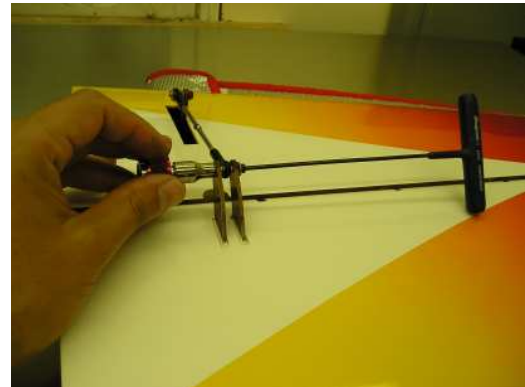
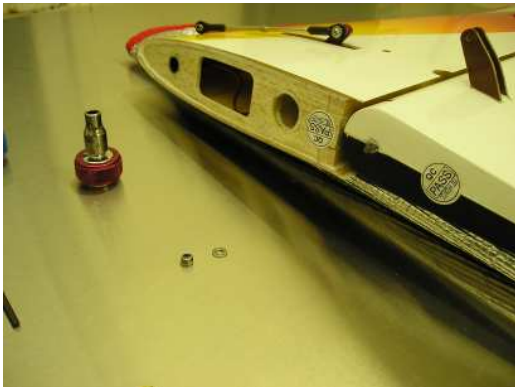


- Insert the hinge rod. In our hinge rods we like to epoxy a M3 socket head cap screw into the hinge rod. We epoxy M3 threaded rod in the other end (a 35mm long screw with the head cut off). If you retain your hinge rod in this way it really makes it easy to install.
- If you are retrofitting an existing air frame your rod may have become deformed slightly as ours has above. This makes getting through the bearings a little arduous.
- Ensure the rod passes cleanly through the first bearing by working the surface in and out while rotating the hinge rod. You will have to do this again for the second bearing as well. Once you have two bearings through your surface should be well aligned for the rest of the installation.
- As you get past more bearings inserting the rod may become alarmingly difficult. You *MUST* take care not to bend the Aluminum rod! *Always use a twisting* motion to allow the rod to drive in. **Do not press the rod in**, you risk catching the edge of a bearing flange and bending the hinge rod.

- Our hinge rod retaining method comes in really handy here. As you get near the bottom, twisting the rod will become difficult. We nearly take a T-handle 2.5mm wrench and it provides a nice handle to twist the hinge rod in.



- With our hinge retainment method we finish by putting a little loctite on the threaded end of the hing rod and installing a washer and lock nut on the side that faces the fuselage. This creates a nice finish on the outside of the airframe, the nut is hidden on the inside.



- Reinstall your servo control rod, use your preferred method, we use loctite and locknut.

Step 6 – Enjoy the finished product.



- Enjoy the new assembly. It may be a little “stiffer” at first and may no longer just flop down as you may have been accustomed to. Consequently, be sure to check your battery consumption as you fly. This will loosen up with usage, just be sure to check your battery packs to be sure for the first few flights.
- Please repeat this process for the other stabilizer and Rudder assembly in the same manner as above.

If you have any questions or comments regarding the usage of this kit please do not hesitate to contact us. We sincerely hope you enjoy this product.

Regards,  
LIMACProducts.com

[limacproducts@limacproducts.com](mailto:limacproducts@limacproducts.com)

<http://www.LIMACProducts.com>

42 Eagle Lane  
Levittown, NY 11756

(516) 244-7186 (Cell)