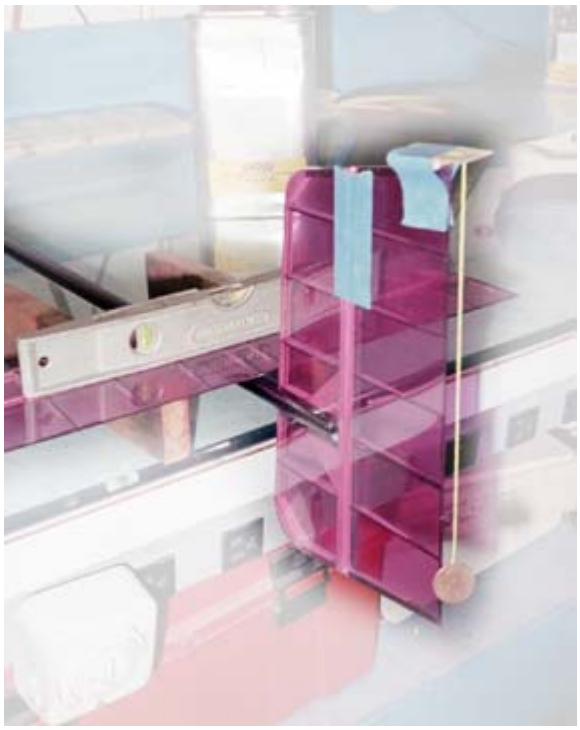
Notes on Construction of Photon II

By Jerry Krainock

There are only 6 structural glue joints on the glider. Take your time. I personally use MGS 285 resin with a small amount of adhesive filler. (West Systems 404) Use1 hr epoxy for the joints on the Fuselage if you don't have MGS or West Systems.

Fuselage

Scuff up the boom where the stab mount and wing pylon are glued in place. Scuff up the inside of the pylon and stab mounts. Slip the wing mount and stab mount onto the tail boom. I like to keep the seam of the boom on the bottom. Bolt on the wing center section and the stab. Glue the wing and stab mounts in place and make sure they are parallel. Using a level to ensure that the wing is level, glue the vertical stabilizer in place using a plumb bob to ensure that it is vertical. After it is dry, take the wing center section off.



I use a Dremel 1-mm engraving bit to cut .75 to .85 long slots 3” in front of the hinge lines of the tail surfaces. Remember, the rudder pushrod must be in tension on launch. If you throw right handed, the rudder comes out on the right side of the boom. The elevator pushrod goes on the opposite side. Once the slots are cut, put the pushrods through the slots and tape them to the rudder so they won't fall out.

Make up 3 pushrod guides. These are made from popcorn foam or other soft foam, silicone tubing and heat shrink tubing. I make a fork tool from a 30” .180 dowel and a couple of pins. The purpose of the guides is to ensure the pushrods are supported and are not twisted. Mount the guide on the pin end of the fork, slip the pushrods through the silicone tubes and push the guide down the tail boom. The first guide is about 3” in front of the elevator slot. Space the other 2 evenly in front of the first guide. If you want to add a guide behind the elevator slot for the rudder, go ahead. Remember that the flap servo wire must exit the pylon in front of the foam guide.

The pod can be mounted vertically or horizontally. If you are a die-hard competitor, mount it horizontally with the hatch on the inside of your swing. This will ensure that the hatch stays in place. If your are more of a sport flyer, mount the pod vertically.

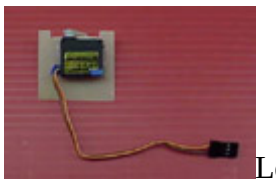
Pushrods

I have included 1mm-carbon pushrods. At the rudder/elevator ends I make a simple connector. I cut a piece of .032 wire 1.75” long and bend one end .25 long at right angles to the shank. Sand the wire and the end of the carbon rods with medium paper. Cut a piece of small shrink tube about .75 long. Slip the heat shrink over the carbon rod and now push the wire down into the heat shrink tubing. The bent end of the wire should be about .25 below the end of the carbon rod. Shrink the heat shrink. Twist the wire around so that the bent end crosses the carbon rod and add a drop to thin CA to the assembly. The CA will wick down into the joint and fix everything in place. The Bent wire goes through the control horn and the carbon rod spring tension will keep it in place. The same keeper can be used at the servo end or you can drill out Sullivan 2-56 threaded ends and use them and nylon mini clevices.

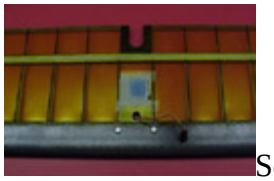
Wing

The flap servo is mounted in the wing. I have used a Pico servo. An HS-55 will work but will stick out the bottom. The gear train will take a beating if the flaps are down on landing. The HS-55 gear train is stronger than the Pico. A Dymond 60 servo will fit and has a strong gear train, but is about 5 gm heavier than the other servo's. A Cirrus 5.4 servo will work and you will have to replace it when the gears strip.


Servo mounting plate


Low tack tape on Servo, servo glued to plate

 Oracover is ironed down into the opening

 Servo taped into place

 Complete installation with pushrod

The Aileron cutouts are prepared the same way as the flap servo cutout. I add 22" wire extensions into the servo leads for the ailerons and a 7" extension for the flap servo. I plug each servo directly into the receiver. When you are running the servo leads from the wing into the pod (receiver), I find it easiest to remove the servo lead pins from the plastic case.

Glue in the Blade using 5 min epoxy or thin CA.

Control throws and CG

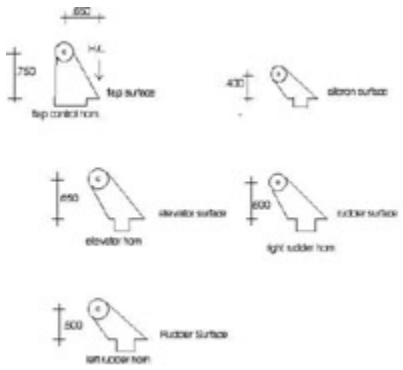
The CG is located at 3” behind the LE at the center. CG range is 40 to 42% of the MAC. Elevator throw is 15 degrees +- and rudder throw is 25 degrees +-. Don't make the rudder throw more than that or you just stall the rudder.

A good place to start with aileron throws is 5/16" up and 1/8" down. If you use the flap control horn I have drawn, flap travel will be limited to about 45 degrees.

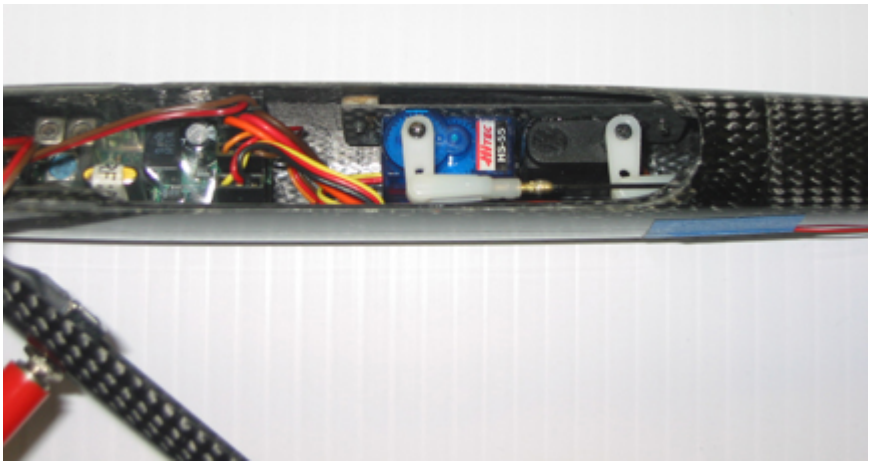
Control horns

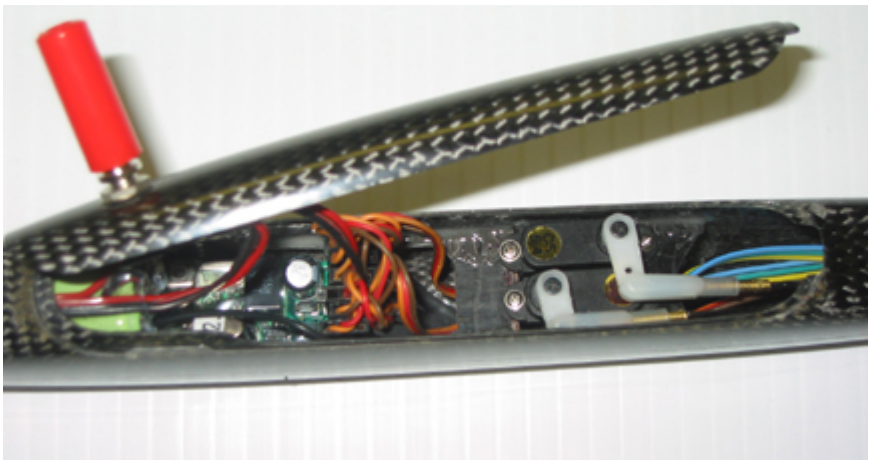
Make your control horns from .020 G20 or 3 layers of 6oz carbon cloth. BVM sells G 20 in Hobby shops. The drive point for the elevator is .600 from the hinge line. For a left handed thrower the drive point is .600 from the hinge line. For a right handed thrower the drive point is .500 from the hinge line. Save the following diagram to a file on your PC/Mac and then

print it to ensure proper sizing of the control horns.



Radio Installation





I have recently built 4 customer models using Cirrus 5.4 servos on all surfaces and so far as I know, none of the gears have stripped. Don't use a gyro, its is not needed and can cause serious problems. I currently mount the battery pack in front, then an M-5 receiver, and then the 5.4 servos. You can modify the servo trey and mount the equipment as you wish.

In General

Neatness counts. Don't drip glue everywhere. Fix damage immediately. I use oracover to fix small tears. Check wiring connections every week. Check pushrods and make sure they are sound. Above all, don't mid air other Photon's.