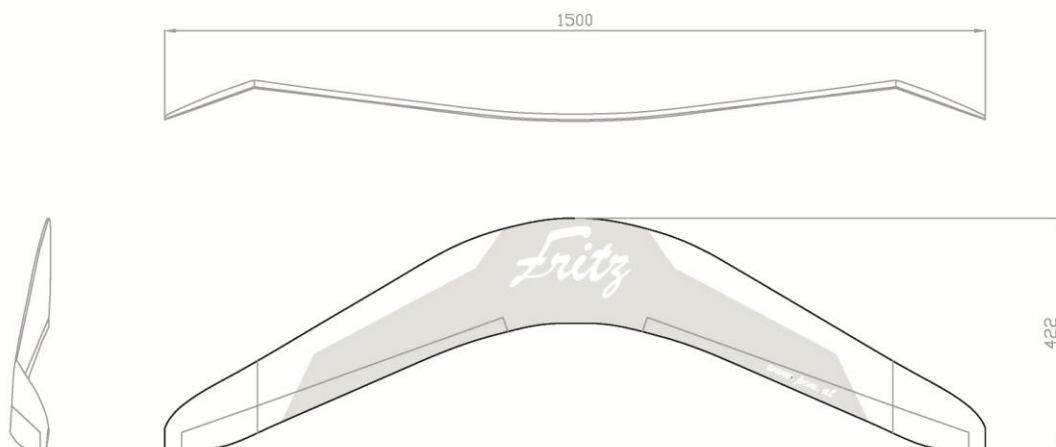


BUILDING INSTRUCTION

Flying wing Fritz

Wing span [mm]:	1500
Wing area [dm ²]:	24
Aspect ratio:	9,4
Take-off weight [g]:	about 550
Wing loading [g/dm ²]:	22,9
Airfoil:	Strake from th=6,5/c=1,5 to sym. airfoil th=5



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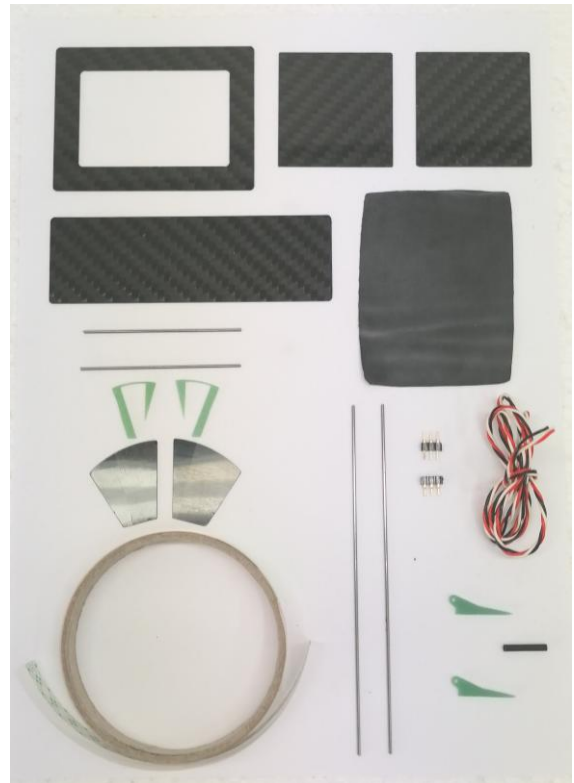
DATA

1. Kit – contents

Flying wing

Lever for controlling ailerons, 2 pc.
 Parts for moving outer controls, 2 sets
 Rods for controlling ailerons 2 pc.
 Contacts 1 pair
 Gap covers for aileron
 Twisted servo cable
 Carbon covers
 Latex skin
 Steel for switch (not in pic)

Building instruction (for download from our website)



2. What else do you need:

Runny CA (cyanacrylat, = super glue)
 Electric equipment (plugs...)
 Electronic equipment
 Epoxy resin or UHU 300 endfest
 Shrinking tube...

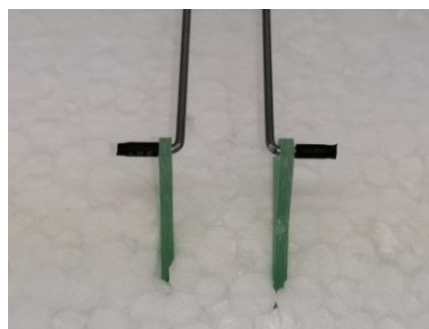


3. Electronic equipment

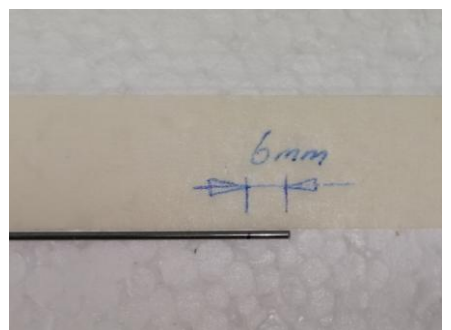
Servo ailerons:	- KST X08 V5 H
Accumulator:	- XCell - X350AAAH 350mA/h - GP NIMH 40AAAM 400mA/h - 2S Lipo with 10mm thickness should also fit.
Receiver:	- for 2 wing servos, 2 antennas are recommended

ASSEMBLING THE MODEL**4. WING****4.1 Controlling flaps and ailerons****Preparing linkages to the ailerons**

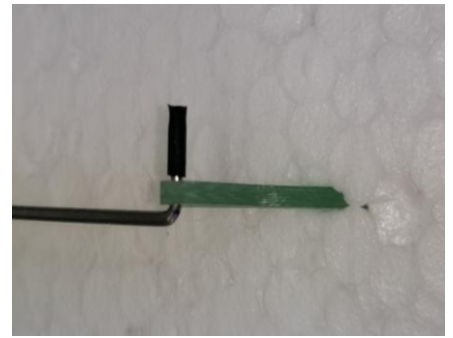
First of all, put a drop of CA into the hole of the horn and drill it again. So you can avoid the bad fit.



Bend the long 1.2mm steel rod at a right angle at 6mm.



Then you can put it into the hole of the lever and save it from falling out with the shrinking tube. This shrinking tube you can also save with a drop of CA.

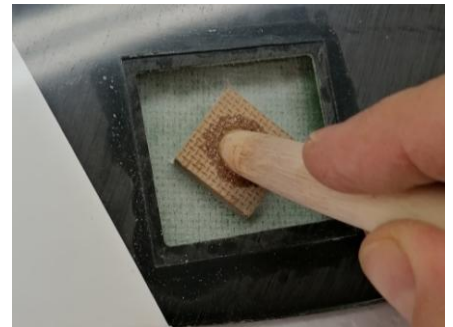


Prepare the lever slot for gluing. Grind it till the lacquer is removed. Then you can glue the lever into the slot with runny CA.

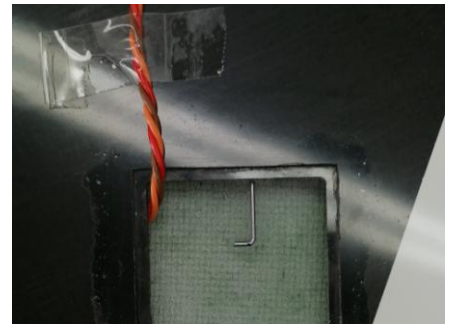
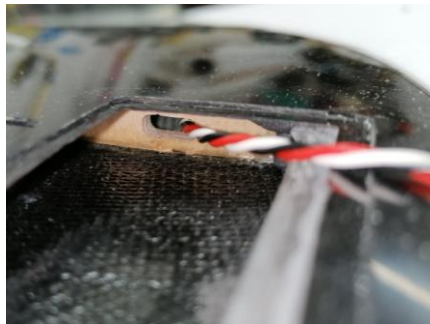


Fixing the servos

First of all prepare the surfaces, which will be glued. Grind them with a rough paper (grain size 80).



It is easier to put the cable into the wing before you start gluing the servos.



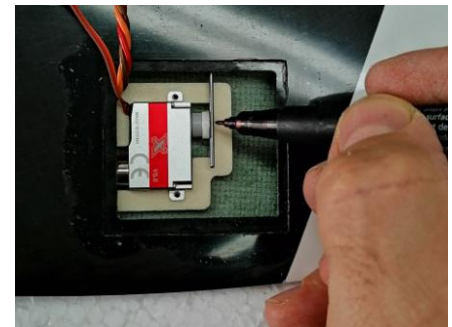
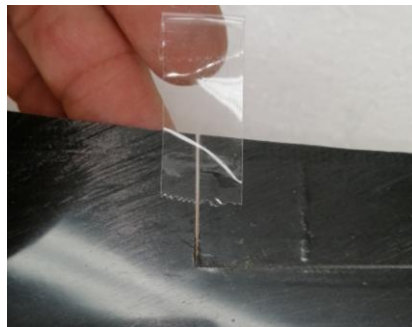
Prepare the servo lever. Use the inner hole and widen it. The easiest and best fitting way is to heat the steel and push it into the hole. Let it cool down and remove it. So the fitting is perfect without using a drill.



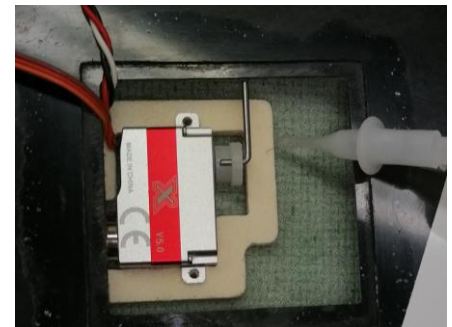
Set the servo to zero position. The real zero position of the X08 servos is 1520 not 1500.



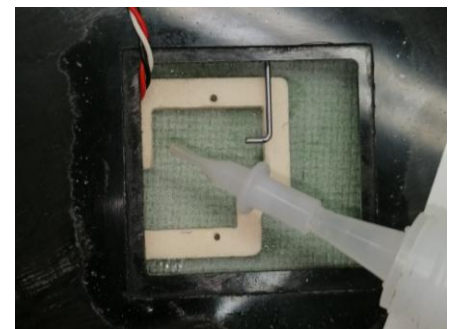
Fix the aileron in zero position and transfer the hole position of the servo lever to the steel rod.



Bend the steel at this point in a right angle, cut it at about 4mm behind and put it into the lever hole. Then fix the wooden frame with just some spots of CA.

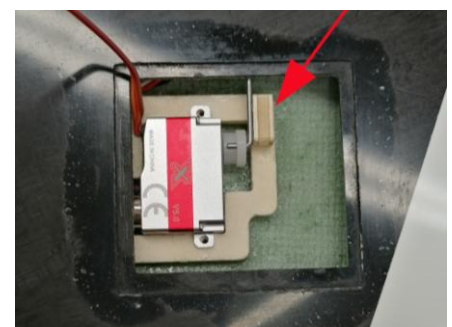


Remove the servo and glue every edge extensively.

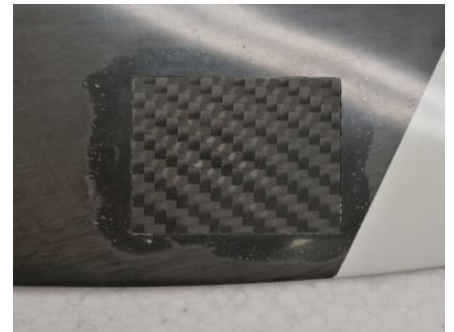
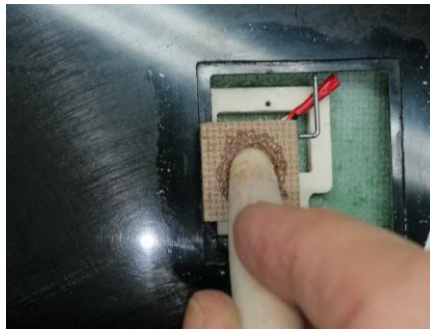


Set back the servo into the frame. Make sure that you have screwed the lever to the servo well. Screw also the servo to the frame. To avoid the steel from falling out of the hole, glue the little plywood block to the servo frame.

The servo cable can now be soldered to the cable, which leads to the receiver.



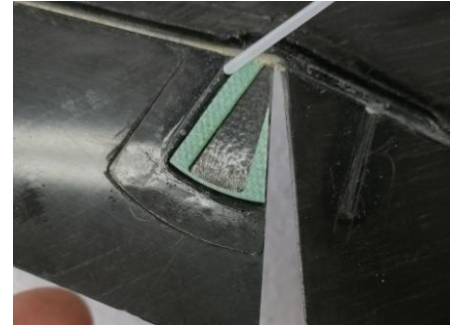
To achieve the best strength of the wing the carbon cover should be glued into the fitting. The leading edge of the wing sometimes dashes against the ground. So it is heavily loaded. To avoid damages, the carbon cover has to be glued to the wing. In the first picture you see the grinding of the depression.



Outer controls

Here you see the parts you need for moving the outer control with the aileron.

First of all, glue the green part into the prepared depression.



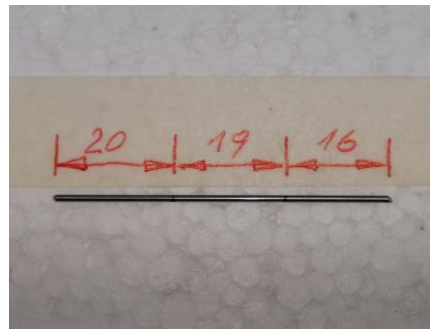
Remove any glue, which is on the green part. The green part gives the emerging pocket its height. If anything is higher, the steel inside wouldn't fit well.



The steel, which joins the two control surfaces, has to be bent at the dimensions you see in the first picture.

Before bending smoothen the end of the 20mm part.

This is the part, which moves in the pocket. To avoid scratching it has to be smooth.



The 16mm end has to be bent rectangular. The 20mm end a little bit less.

To find the right angle just lay your steel on the picture and compare the angles.

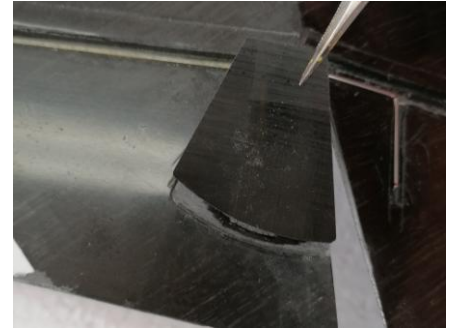
The 20mm end has to be bent also a little bit backwards, as you see in the right picture. This back bending doesn't have to be so exactly, because you can adjust it also when it is already glued to the wing.



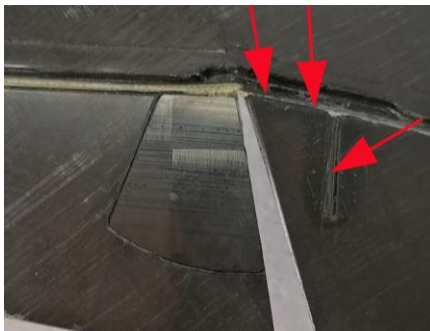
With the help of the second green part you can mark the area, which you have to prepare for the gluing. Grind this area well. Prepare also the areas at the aileron.



Put enough CA to the gluing areas and place the carbon part accurately with tweezers.



Grind the next gluing areas well. Don't forget to grind also the areas on the steel.



Save the kevlar hinge with a tape from getting glued.

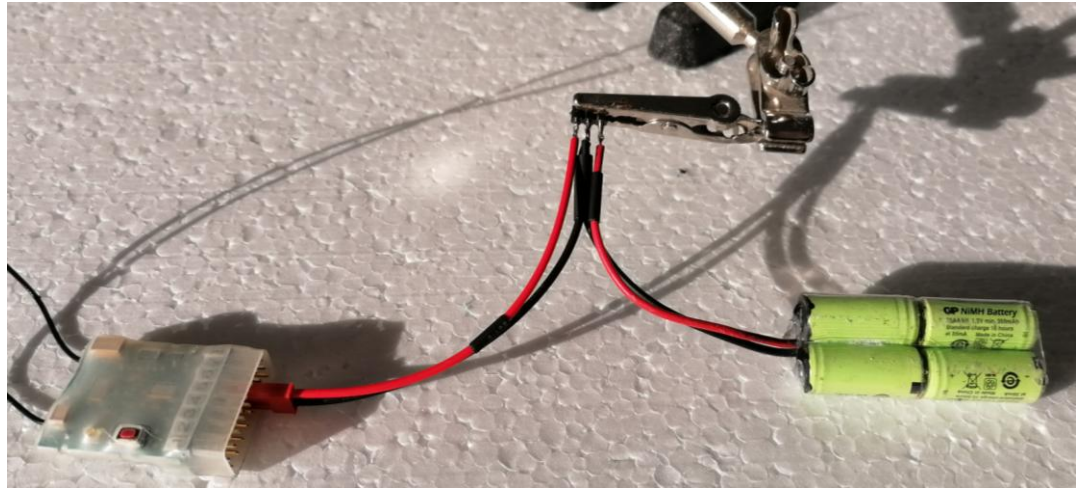


Then you can glue the steel with the help of a snack bag into the outer control.

After curing of the epoxy you should check the accuracy of the controls. When the aileron is in zero position, the outer control should also be in zero position. If it isn't, you can bend the steel a little. To do this without breaking anything, hold the controls strongly, where the steel is inside, and then bend till the deflections are equal.

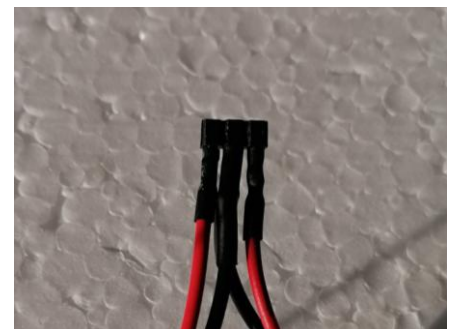


5. SWITCH AND CHARGING PLUG



The space for receiver and cell will also be closed by gluing a carbon sheet over the opening. Therefore we need a small device for switching and loading the battery pack.

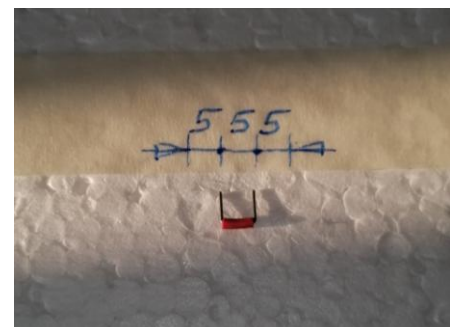
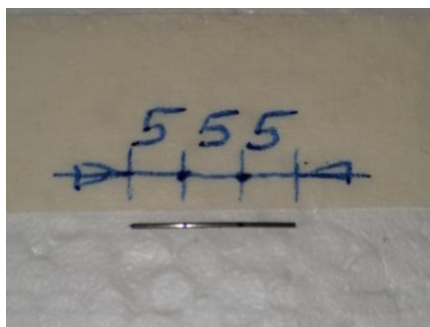
The solution is as follows. Solder the wires as shown in the pictures.



The charging cable has to be soldered like you see in the right picture. Keep care of the way you plug it in when you are charging. Most modern charging devices will warn you, when you haven't plugged it in the correct way.



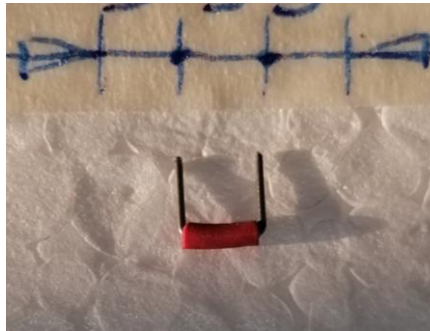
This is how the switch is made. Use a steel with 15mm length and a diameter of 0,5mm and bend it to U shape. Put a shrinking tube on it for better gripping. We recommend making more than one because these little switches like to escape ;-). During flight you can save the U-steel with tape.



Put in the plug into the milled slot of the wing. Let it stand out of the wing surface about 1mm, so that it can be glued well with CA.

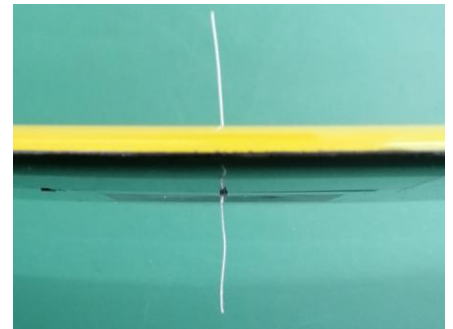
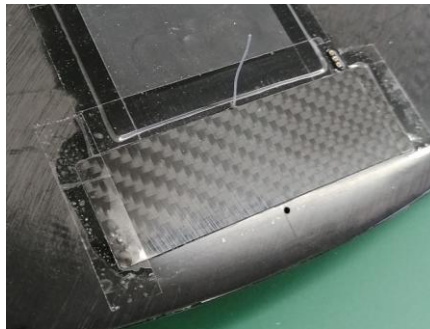


Here the switch is shown again.

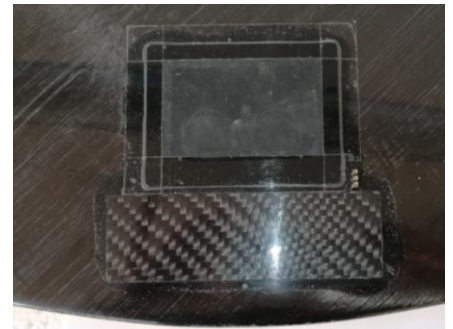
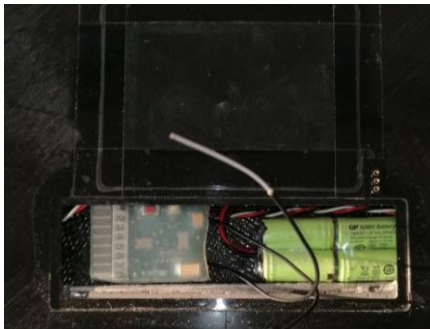


6. RECEIVER ANTENNA

We recommend receivers with two antennas. Drill two holes on the lower and upper side to lead the antennas out.



At last the space for receiver and battery should be closed by gluing the carbon cover to the depression. As told before, this is important to provide a maximum of strength.



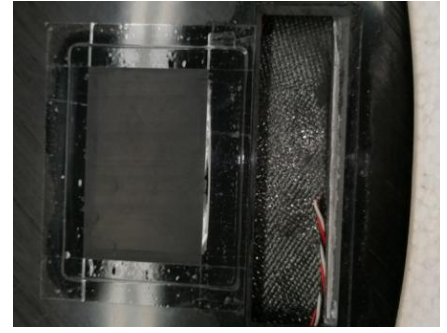
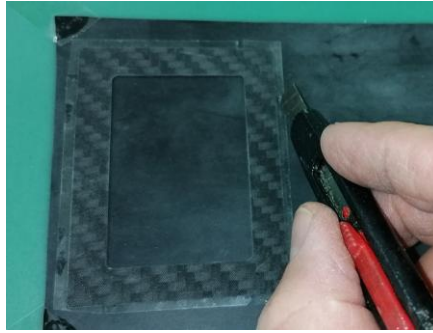
7. TUNING

Cover for throwing holes

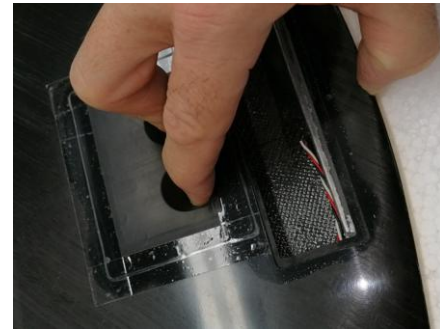
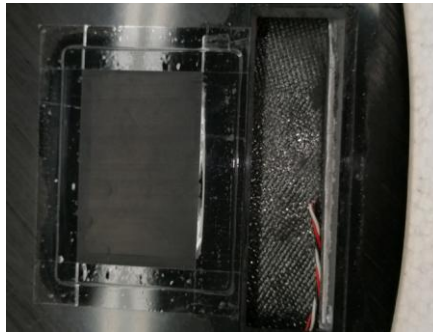
Stretch the latex foil a little bit with the help of four tapes. Cover the frame at the glossy side with thin double sided tape.



Glue the frame to the latex foil and cut it out. We delivered twice as much latex as you need. So leave a piece for changing. Turn the frame with the foil so that the latex is on the upper side and glue it with tape into the depression of the wing.



At the right picture you see the gripping position for a hand start.



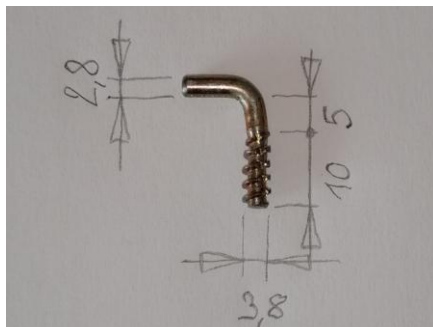
Covering gaps

Cover the gaps with the sealing tape. Also cover the gap between the two controls at the lower side with the broad sealing tape.



Bungee hook

The bungee hook can be screwed into the milled hole in the front of the wing.



8. CG AND AILERON DEFLECTIONS

The CG should be set from 126mm to 128mm.

- **CG at 126mm** is for slower flights (thermal flights). It is besides the safer CG, as Fritz sometimes shows a nod (one to multiple times nose down) at this CG, when you fly too slowly. What you see more often is yawing during aileron deflection when you are too slow.
- **CG at 128mm** is for dynamic flights, for instance at good conditions on a slope. But keep care, at this CG Fritz shows no nod. If you fly too slowly, he gets uncontrollable. He doesn't fall from the sky, but he flies straight ahead. What you still see, is yawing during aileron deflection, when you are too slow.

Set the CG as accurate as possible. Flying wings needs more accuracy in setting the CG than normal configurations.

Accurate measurement of the CG!

Very often the simplest method is the best.

In the right picture you see a CG tool, which is as simple as accurate. Here you lay the model just onto two sharpened wood sticks to check the CG.

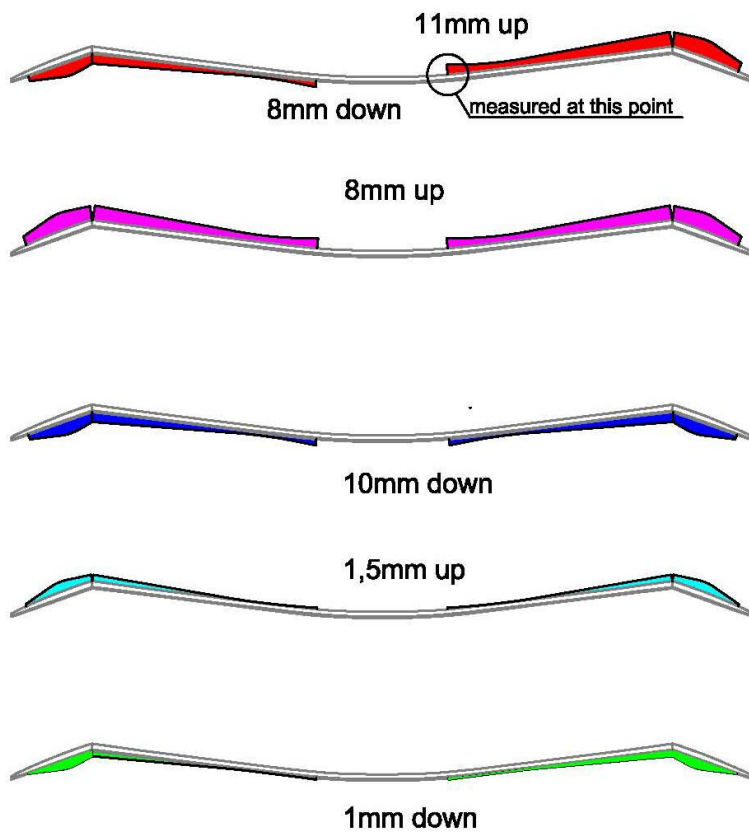
This tool has no friction or electronic parts, which could be incorrect. You could improve this tool by adding additional sticks in front and behind the two existing poles to avoid the model from tilting.

At the right picture you see, that the CG has to be measured from the middle of the wing and then get marked. These marks have to be transferred to the right and to the left.

While using modern electronic CG scales, we didn't have such accurate results. Furthermore there is the possibility to make more measure mistakes when docking the nose to the zero points, see pictures on the right.

Keep care, also mechanical CG tools could have these kind of zero points. In this way you always have to correct the dihedral.



Aileron deflections**Aileron**

Expo.: -50%

Max. elevator up

Expo.: -50%

Max. elevator down

Expo.: -50%

**Thermaling and
slow flight****Speed**

9. NOTES FOR USE

Things Fritz hates:

- Starting with backwind. With the bungee it is possible, but not when starting with the hand.
- Flying through turbulances, for instance behind trees. You have to be quick to do this without getting problems.
- Flying into a lee side. With enough speed it is possible, but keep care.
- Landing on the wingtips. Pay attention during landing. The wing has to be always parallel to the ground. His wingtips are strong but he doesn't like landing on them.
- Laying too long in the sun without covers. Or laying long in a sun heated car during summer.

Fritz is a flying wing, due to that he has not so much aerodynamic stability as the normal configurations. So keep in mind that he needs always a little bit more airflow around his wings to feel good.

9.1 Starting with a bungee

This is a very simple and safe way to start. Just hook in the bungee, hold the Fritz at the trailing edge and then stretch the bungee as long as you can hold the Fritz at the trailing edge. When you release Fritz, the wing should be in level and the elevator should be slightly pulled. The first flights I always started with the thermal flaps position to avoid touching the ground. But then you have to push down soon when he gets into a very steep climb. Till now I didn't try starting without the thermal flaps position. Maybe it also works without. We used the rubber (without rope) of the "Bungeeset HLG plus" from EMC Vega.

We hope you have a lot of fun flying your Fritz. Keep care of him and he will be a good friend for a long time.

Best wishes,
Markus & the PCM Team