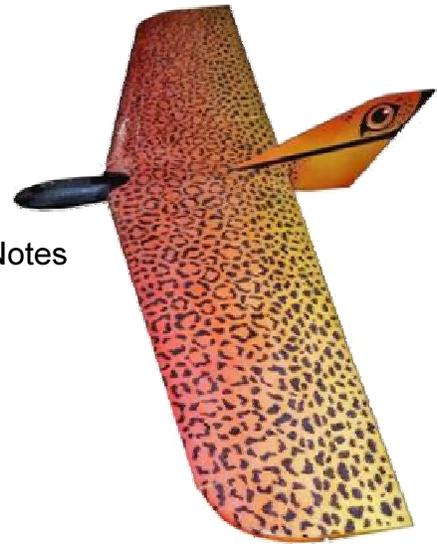


# Zulu



## Standard 48-in EPP Zulu and 72-in Zulu XL Building Notes

Updated 1-8-2015

Wing area: 472 sq.in (30.5 sq.dm)

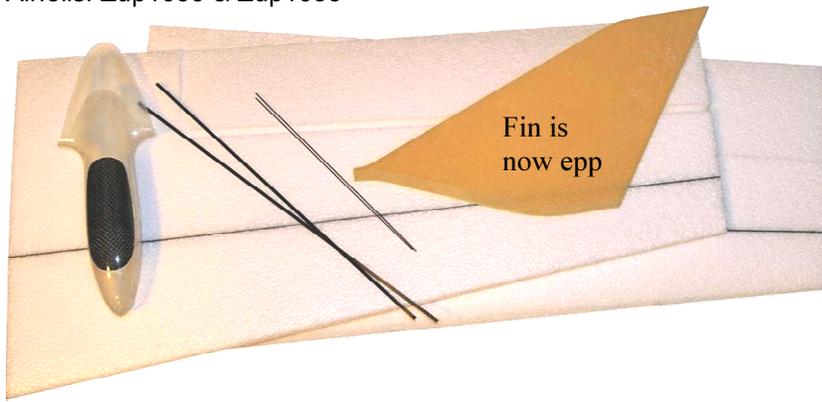
Span: 48 in (1.2 meters)

Aspect Ratio: 5.0

Typical Fling Weight: 11.5oz - 13.0oz (325-370 gm)

Wing Loading: 3.5 oz/sq.ft (10.7 gm/sq.dm)

Airfoils: Zup1060 & Zup1065



### Kit contents:

1. EPP wing cores with 0.5mm x 3.0mm carbon ribbons embedded
2. Fiberglass pod
3. EPP Fin
4. 0.5mm x 3.0mm carbon ribbons for joining the wing halves
5. 1.2mm (.047") wire pushrods

### Recommended building materials

1. Beacon's Foam Tac. Or Welder glue
2. Razor blade, x-acto or box cutting knife
3. Drywall sanding sheet
4. 3 Mil Laminating film (New Stuff) or other covering material
5. G10 / FR4 fiberglass or plywood for making control horns
6. Four Dubro mini E/Z connectors

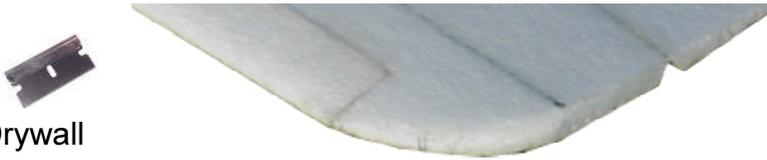
### Recommended radio gear

1. 2+ channel receiver and 2 servos
2. Radio with flying wing / delta wing mixing capability
3. Transmitter with Expo/Dual-rate preferred
4. Battery Options
  - a. NiMH, 480-900 mAh, such as: [www.alofthobbies.com/radio-gear/batteries-nimh.html](http://www.alofthobbies.com/radio-gear/batteries-nimh.html)
  - b. Lipo, 500-800 mAh, 7.4V Lipo + BEC
  - c. 2-Cell 800 mAh , 6.6V LiFePo4
5. Servos Metal geared servos highly recommended
  - a. HS-85mg / HS-65mg – or similar
  - b. Power HD 1711 [www.alofthobbies.com/hd-1711mg.html](http://www.alofthobbies.com/hd-1711mg.html)

## Steps:

1) Round the wing tips.

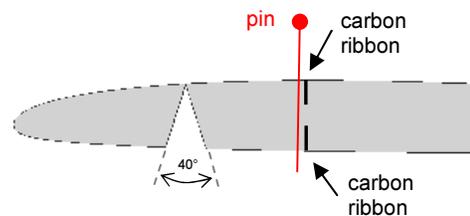
Cut off any excess epp and sand the tip. 120 Drywall Screen can be used for sanding the epp.



2) Optional: Glue hinge the drooperons with Welders glue or Beacon's Foam Tac. If you skip this step, the control surfaces can be joined with the covering material. Welders Glue hinge videos: [www.youtube.com/watch?v=q0uK8KIR-OI](http://www.youtube.com/watch?v=q0uK8KIR-OI)

3) Glue the two halves together with Foam Tac or Welder

4) Install the joiner carbon ribbons, using the drawing shown on step 9a as a guide. By setting the cut location with pins that go through the foam, you can make the slits directly in line with each other. Mark the cut location with a fine pen then cut, or cut along a straight-edge as shown to the right. The cut should be just slightly deeper than the depth of 3mm.



5) Glue all ribbon spars and joiners. Although the kits come with some glue holding the carbon ribbons in the slits, they need a little more glue to make a secure bond. Conveniently, the airfoil between the drooperon and the elevon is very flat, making it east to set the twist. Using a very flat surface, starting with the top side, wick thin CA into the slits or use Foam Tac, and let it dry to lock it in place. Let it dry with weights near the ribbons, to lock it in place.



Table



6) Sand the entire wing with 3M Drywall sanding sheet. This will make a nicer final finish and improve the bonding.

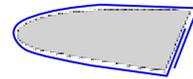
7) Cover the wing. 1.7 to 3 mil New Stuff laminating film works well. DI recommended, but CP works fine also. It can be purchased by the foot here:

<http://www.alofthobbies.com/new-stuff-laminating-films.html>

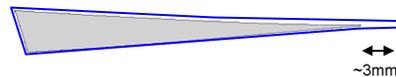
Laminating film instructional video. Fast-forward to around 3:28:

<http://www.rcgroups.com/forums/showpost.php?p=26572343&postcount=23>

- a. Iron the laminating film around the droopers, or as far as you can go if you used glue-hinges.



- b. Do the same for the elevons, but seal the ends together, past the trailing edge. Trim off the excess covering material with scissors. Leave about 3mm past the trailing edge. This adds a considerable amount of stiffness with 3mil laminating film.



- c. Cover the rest of the wing. Use a flat surface to make sure you don't modify the wing twist.



- d. Make hinges with the covering material.

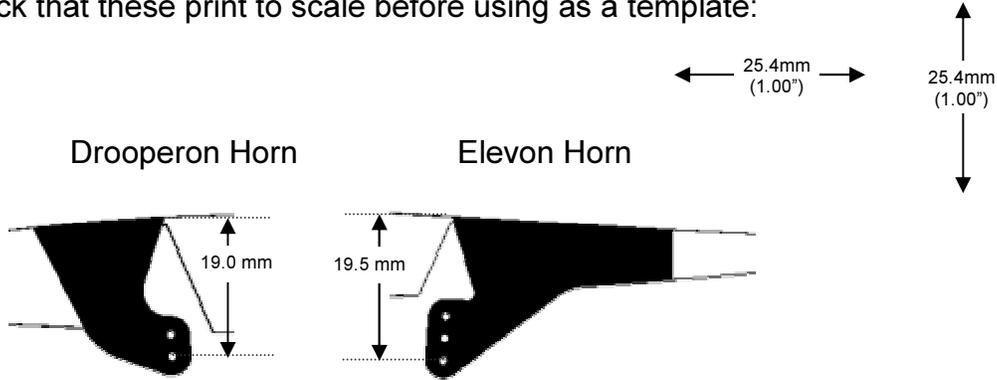


- e. Now fold up the control surfaces up and add a second layer to finish the hinge.



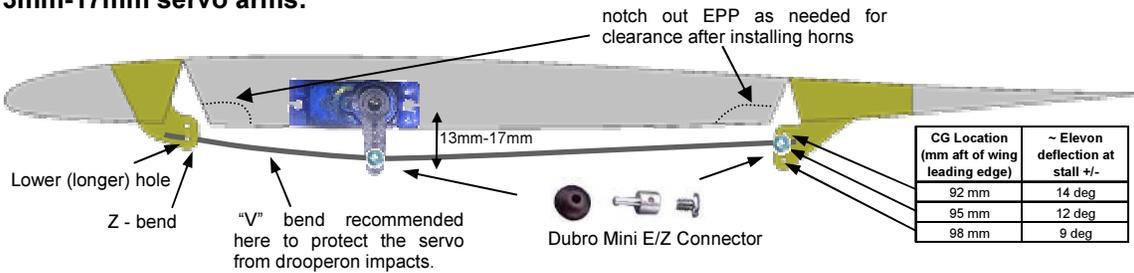
8) Make control horns out of 1/32" (0.8 – 1.0mm) G10 / FR4 fiberglass or plywood. Check that the drawing below prints to scale if you are using this as a template.

Check that these print to scale before using as a template:

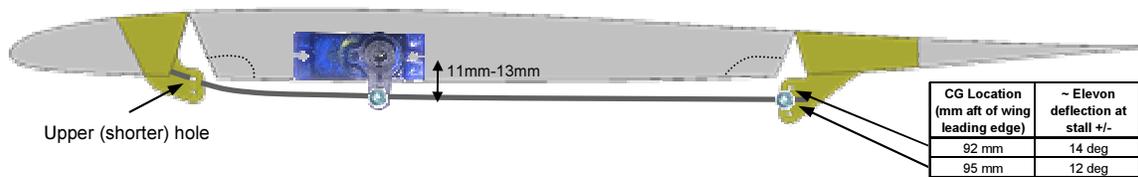


9) Install radio gear. Longer (~13-15mm) servo arms recommended, but arms as short as 11mm work OK. The proper mix of drooperon and elevon depend on CG location, as shown below:

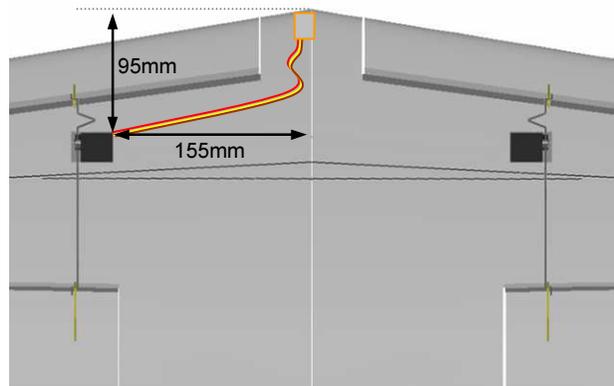
**13mm-17mm servo arms:**



**11mm-13mm servo arms:**



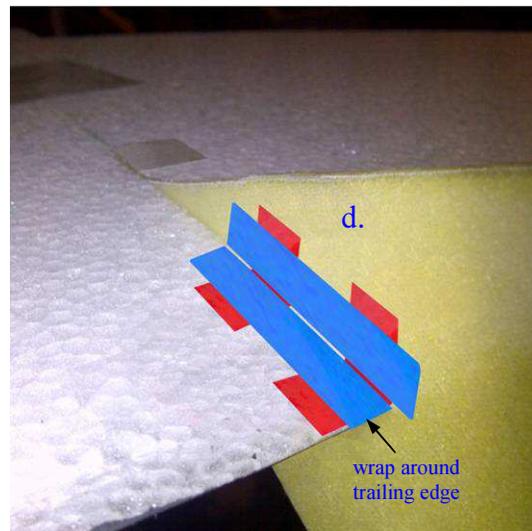
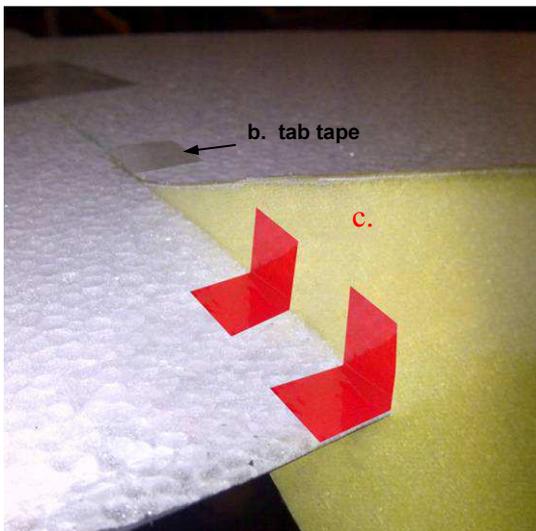
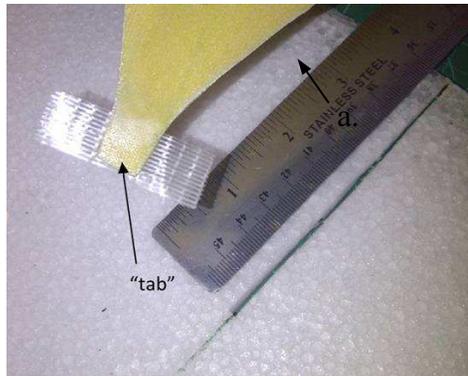
- a. Place the servos near the inboard edge of the elevon. Most servos won't need wire extensions to reach the receiver.



- b. Mark the control horn locations and cut slits for them.
- c. Cut out the servo wells. You can cut all the way through, and then replace the foam on the top surface, or use the scratch and peck method to create the servo wells from the bottom side. A video for this method can be seen here:  
<https://www.youtube.com/watch?v= wf0jb2eK2M>
- d. Use Welder Foam Tac to hold the servos and control horns in place.
- e. Cut a slit for the servo lead and press the wires into the foam. Tape over to cover the slit.

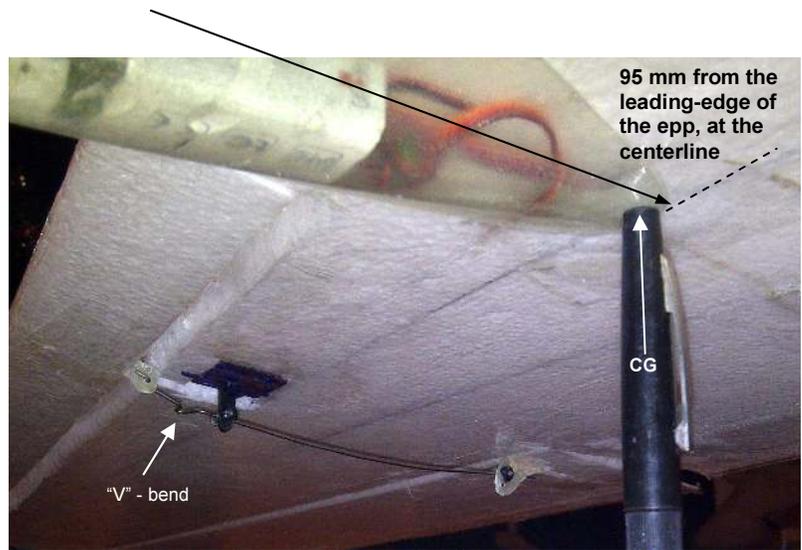
10) Attach the fin

- a. Cut a 4" long channel to the trailing edge, the approximate width of the fin.
- b. Wrap fiber tape or clear packing tape around the tab on the front of the fin, and tape the fin to the wing.
- c. Use clear packing tape to secure the fin as shown below. Make sure the tape goes all the way to the corner, making a nice 90-deg turn
- d. Then tape over the first layer, to keep it from peeling apart at the fin/wing intersection. Wrap the lower strip around the trailing edge. Repeat for all four corners.



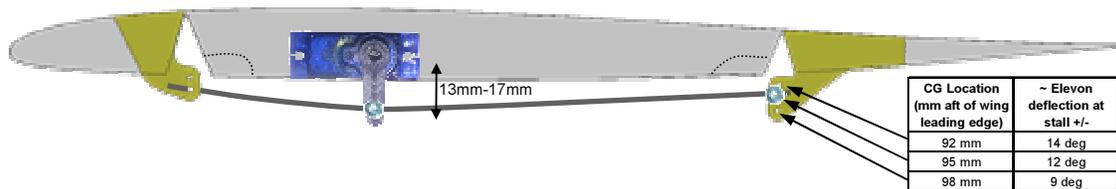
## 11) Final assembly and radio setup

Tape on the pod and add nose weights as needed to get the cg to ~95mm aft of the leading edge (5mm forward of the end of the pod). With this CG location, the wing should be trimmed with close to zero deflection on all surfaces. Typical pitch inputs should only be +/- 15 degrees (see table below), and roll deflections of +/- 30 degrees.



To enter the deep-stall mode (very nice for top-landings) the Zulu needs around 20 degrees (just past stall) of upward deflection. Higher descent rates can be reached with more deflection.

Neutral Position



With the controls set to neutral, CG at 95mm, and rates set low, give the Zulu a toss on a lawn. After trimming with your radio, set the droopers back to the neutral position by adjusting the V-bend with pliers, while keeping the flight-trimmed elevon deflections.

## Zulu XL

Wing area: 634 sq.in (41.0 sq.dm)  
Span: 72 in (1.83 meters)  
Aspect Ratio: 8.17

- 1) Control setup is the same as the regular Zulu. Starting-point CG is 98mm aft of the leading edge instead of 95mm
- 2) Optional: extend the elevon 75mm towards the center of the Zulu. Without this modification, the Zulu will deep-stall with a few degrees of nose-down attitude. Although it is very stable in this configuration, the descent rate is a little high for soft top-landings. You may want to try it first before making this modification.