OZeRES 2 Building Instructions

(Slim Fuselage and V-Tail Version)

You must ensure you have MAAA (or similar) insurance before flying this model.
Only fly in designated areas and in accordance with all council, government, airport, CASA and any governing body rules.
Ensure the model is built correctly and is checked thoroughly before flight. If you are an inexperienced pilot, ensure you have an instructor or experienced pilot with you at all times.
The manufacturer of this model kit takes no responsibility for your actions.

Building is fun but please remember you are responsible for your own health. Almost all adhesives contain solvents and other volatile substances and must be used with adequate ventilation. Ensure you follow all the instructions on the adhesives and equipment being used.
Be careful with CA (superglue) because it can glue your eyelids and fingers together very quickly.
Working with Balsa and Carbon can cause fine dust which must not be inhaled or swallowed.
Always cut and sand Carbon wet and do not blow carbon dust from the building board, remove it with a vacuum cleaner.
Using tools can cause injury.
Operating a model aircraft can cause accidents so you must have insurance before you fly this model aircraft.
Join a club (and the MAAA) and ensure you are properly trained and have an experienced person helping you.
Marcus Stent and Performance Models take no responsibility for any damages and accidents that arise from the construction and operation of this model aircraft. It is the responsibility of the builder and flyer.

Now, on to the fun bit….

Before Starting

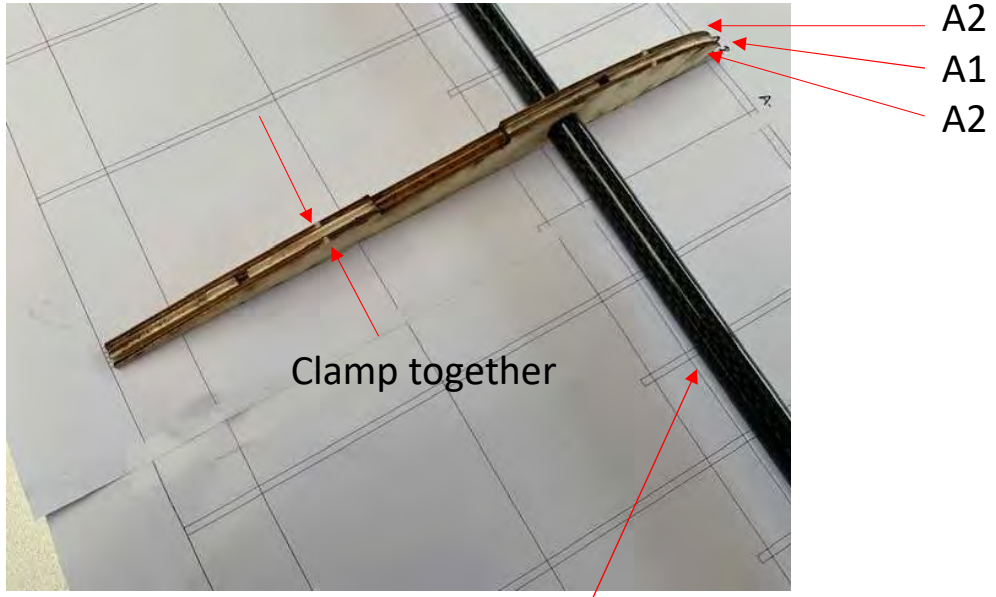
Place Glad Wrap (or similar) over the plan before you start
Use a knife to separate parts form the sheet, do not use your hands.
Trim parts as necessary.

Abbreviations

CA = Super glue
RHS = Right Hand Side
LHS = Left Hand Side
L.E. = Leading edge
T.E. = Trailing edge

Wing Assembly

Start with Wing Centre Panel A
Slide the central ribs A2, A1 A2 on to the 12mm diam. x 700mm Carbon spar and align over the plan. Separate the ribs, apply medium CA and slide together. This must be a secure bond so clamp with pegs or similar. Glue the rib assembly onto the spar.



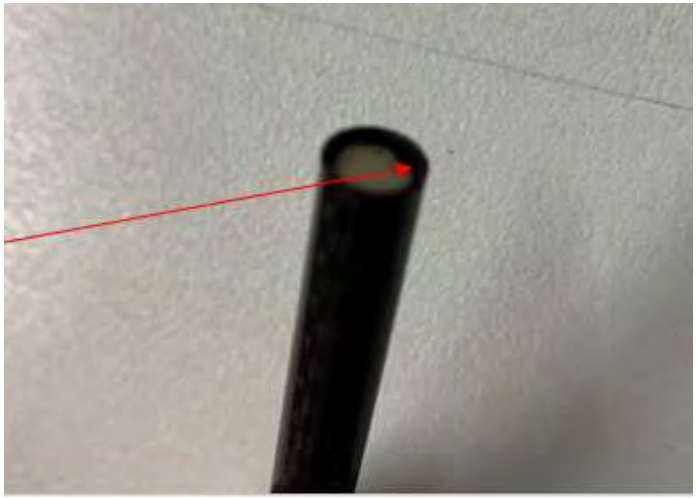
Ensure you have the 12mm diam. X 700mm long spar

Sand a bevel into the trailing edge.
Use the witness line as a guide. Do not sand past the line.
The T.E thickness only needs to be 0.5 - 1mm thick.

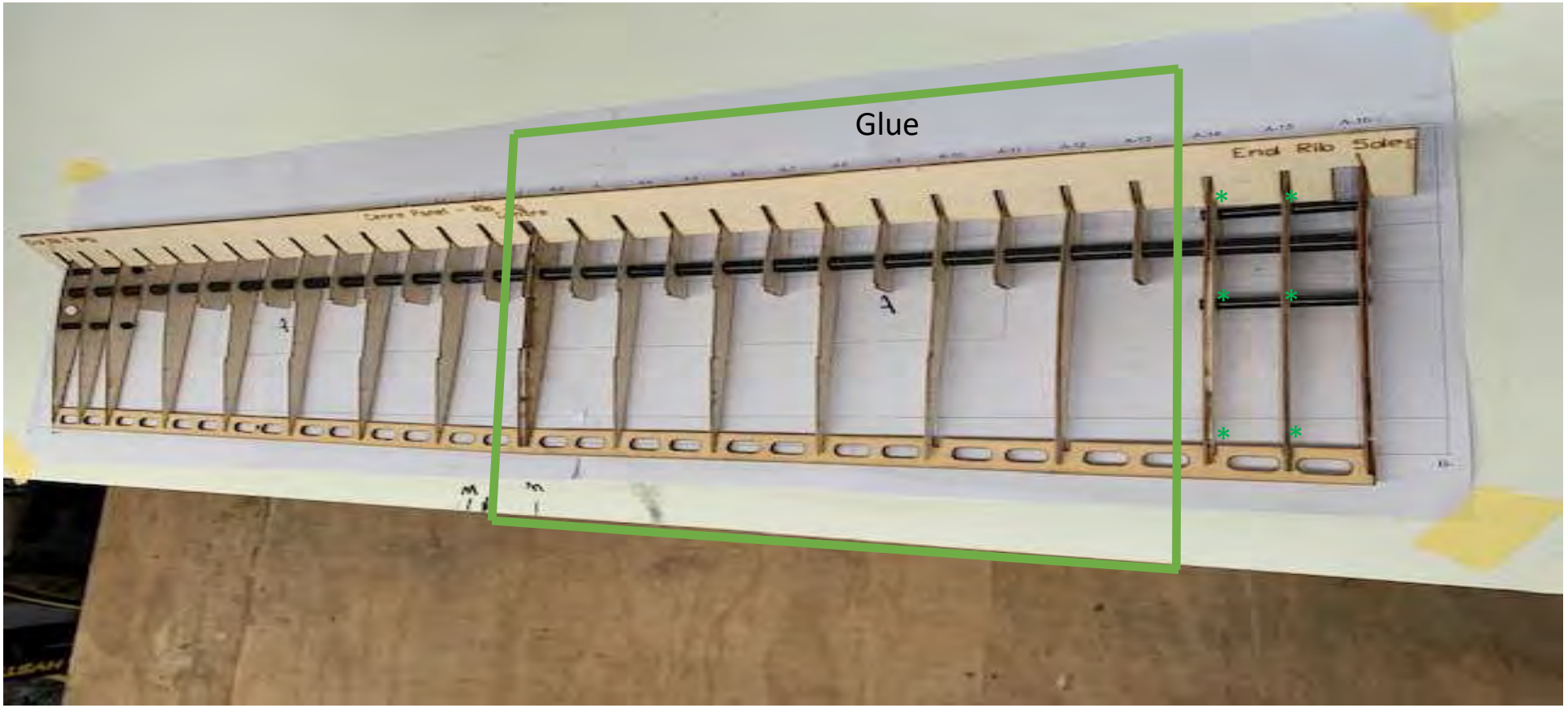
7mm diam. x 58mm joiner tubes x 4 off

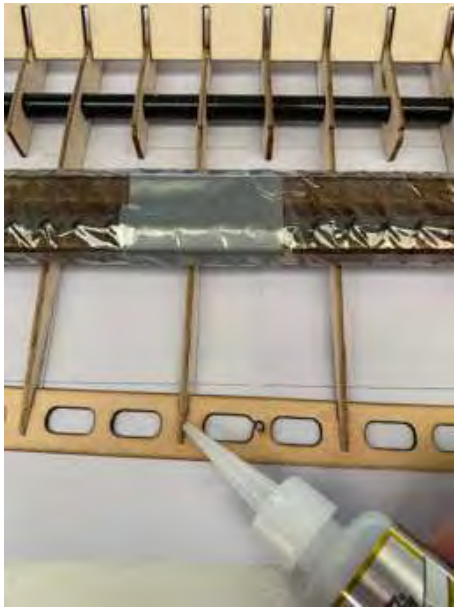
Slide the 6mm joiner onto the 7mm joiner tube to act as a guide/support to hold the plug square at the end. Insert the plug so it is recessed by about 1mm.

Remove the 6mm joiner tube and glue the plug in place with medium CA.

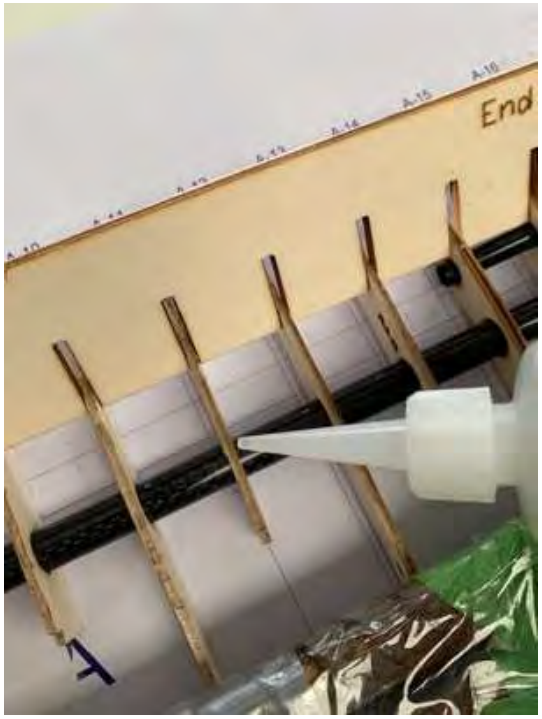


Slide the remaining ribs onto the spar and align over the plan. Add the LE, TE and joiner tubes.
There is slight dihedral in the centre, so hold the RHS flat on the board with weights or pins. Use the rib template to align ribs. Apply thin CA to attach Ribs A1-A13, LE and TE. Tack glue the 6 locations shown with * and do not glue A16.
Always hold parts flat on the board when gluing and ensure the glue is dry before removing.



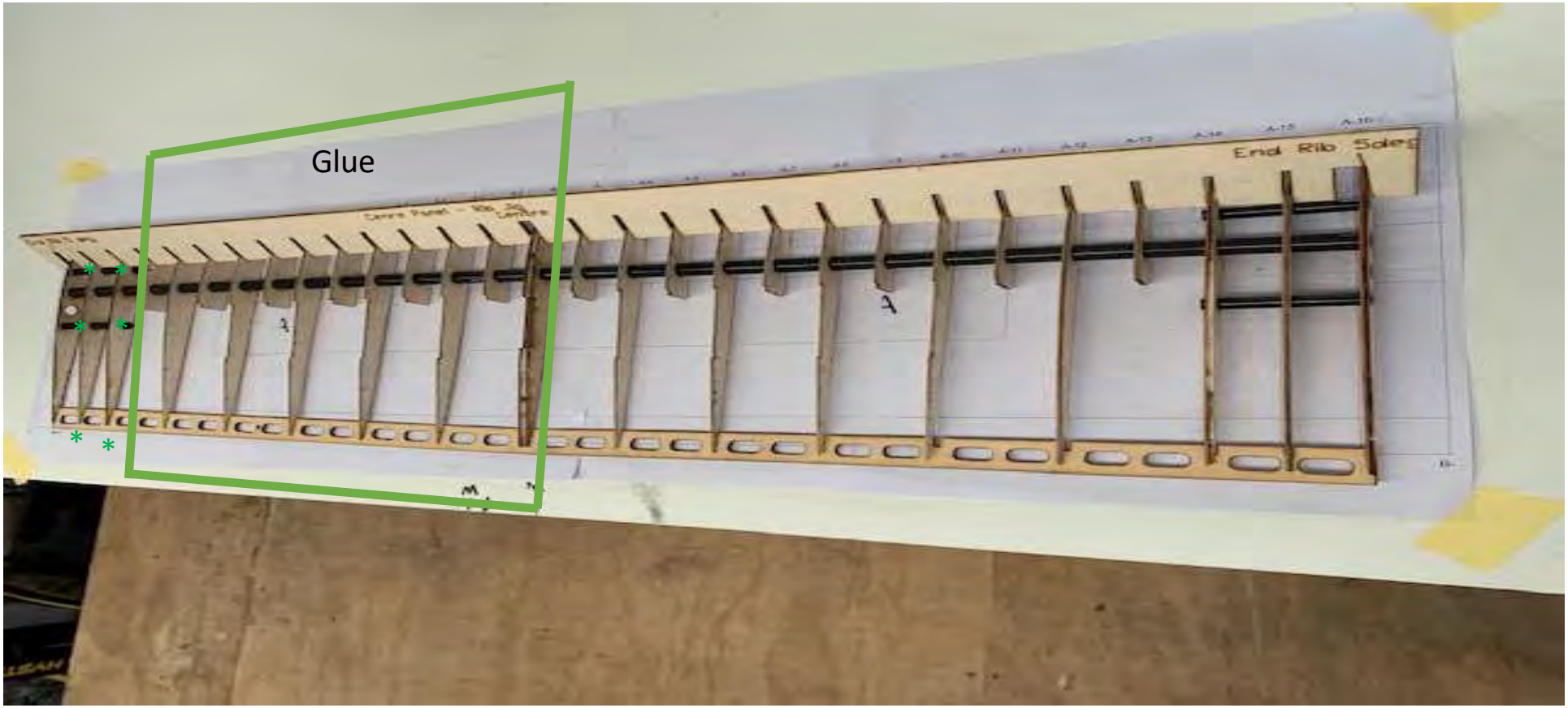


Plywood can be difficult to glue, so use thin CA and then medium CA for additional strength.



Glue the Spar. Use thin CA to wick into the balsa and then apply medium CA to form a filet.

Now hold the LHS flat on the board and repeat the process used for the RHS assembly.



Build Tip Panel B

Slide the ribs in place and align over the plan. Dry fit the joiner tubes at both ends. Hold with weights.

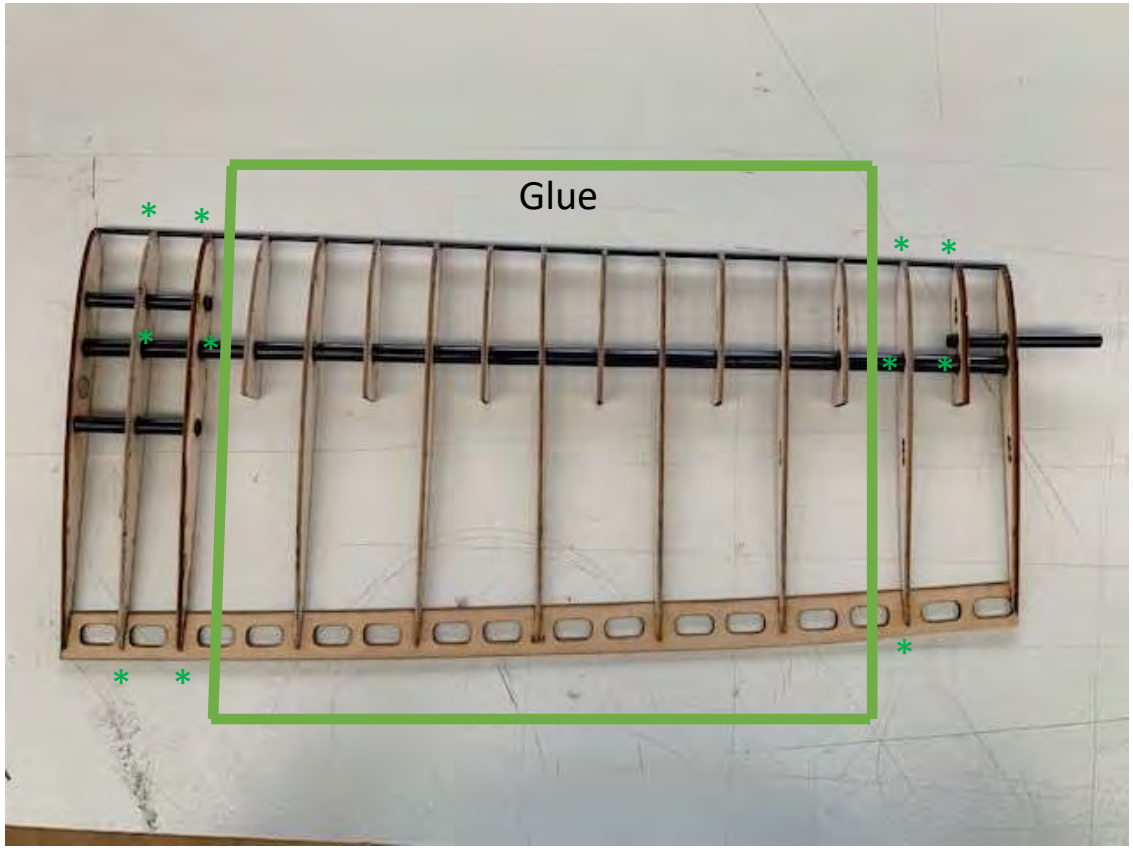
Use the rib alignment template (as used for the centre panel). Glue ribs B4-B15 in place on the spar, L.E and T.E.

Glue the 11 locations shown with *but do NOT glue the ribs B1 and B17, just dry fit.

L.E. Diam. 3mm

Spar Diam. 8mm

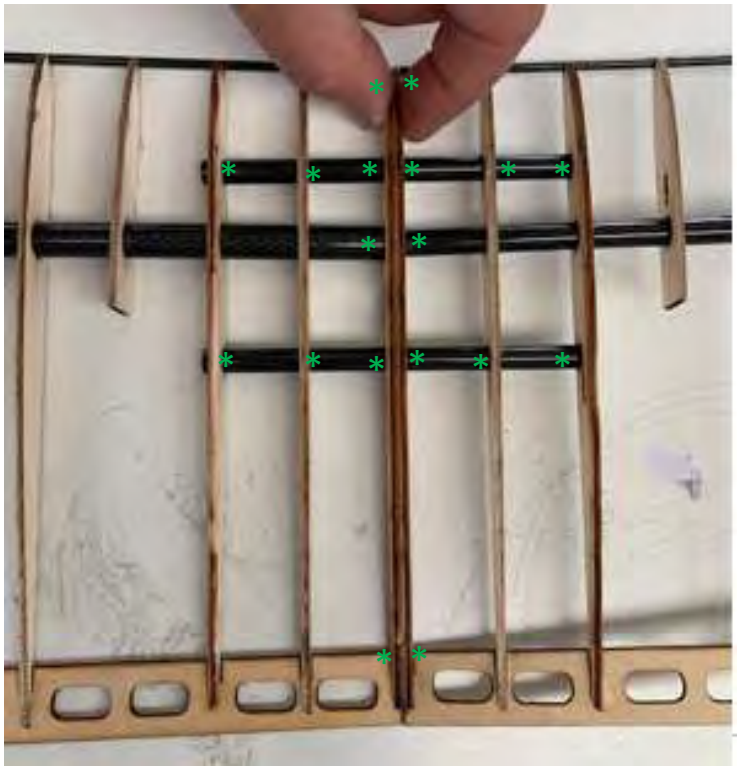
Joiner tubes
2 x 7mm x 58mm



Joiner tube
6mm x 64mm

Repeat for the LH Panel B

1. Slide Centre Panel A and the Tip Panel B together using the 2 x 6mm diam. x 104mm joiners.
2. The entire assembly should self align as shown.
3. Use the dihedral spacers to hold the dihedral correctly.
4. Slide the panels apart again and check the tubes are fully engaged in the ribs. Adjust if necessary.
5. Slide the panels back together again. Repeat until happy.
6. Squeeze the 2 end ribs A16 and B1 together as shown until they are flush with each other. A small gap in the L.E or T.E. is OK.
7. Use MEDIUM CA, not thin CA, to tack the system in place, only glue in the locations shown *. This avoids glue getting Into the joiners.

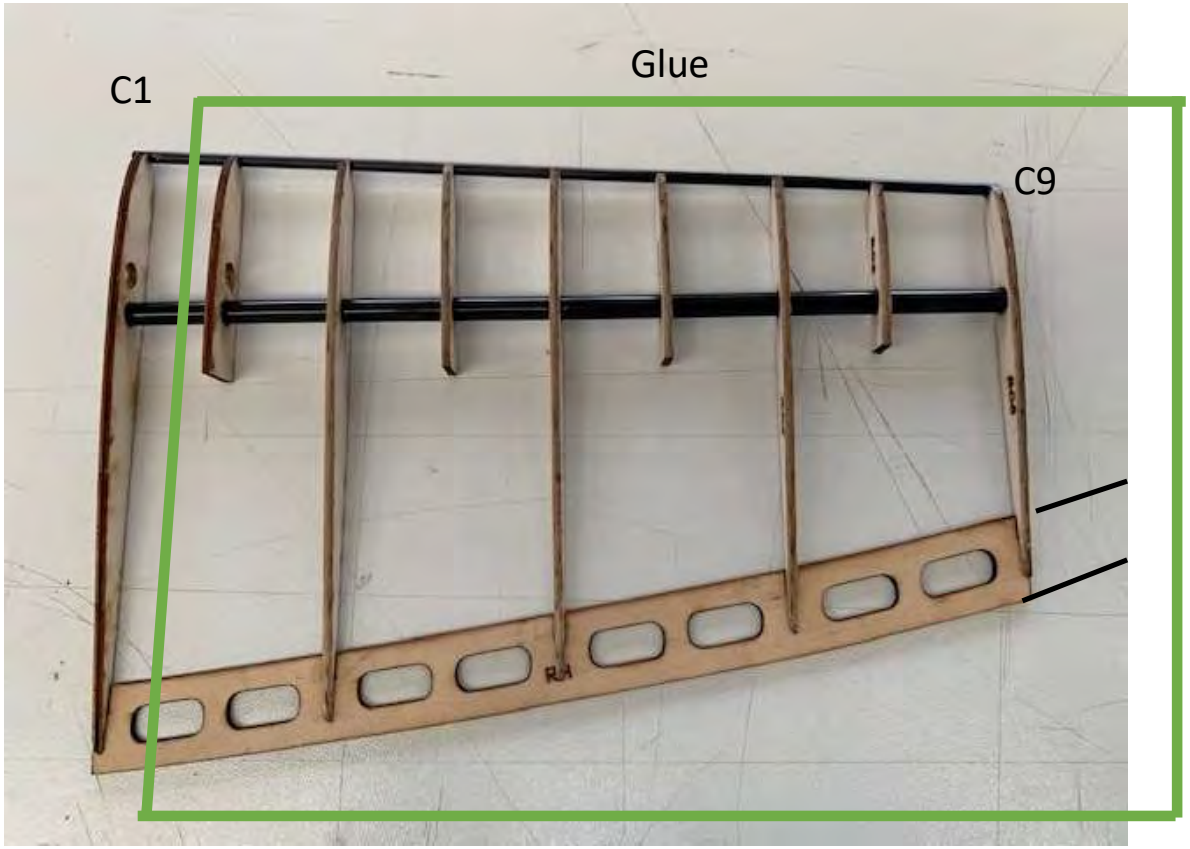


7. Allow to dry
8. Separate the panels and remove the joiners. Add more medium CA if required to the tubes and ribs for a good bond.

Build Tip Panel C

Slide the ribs in place and align over the plan. Use the rib alignment template (as shown on the centre panel) and hold with weights or pins. Glue ribs C2-C9 in place on the spar, L.E and T.E.

Do NOT glue the spar to C1, just dry fit.

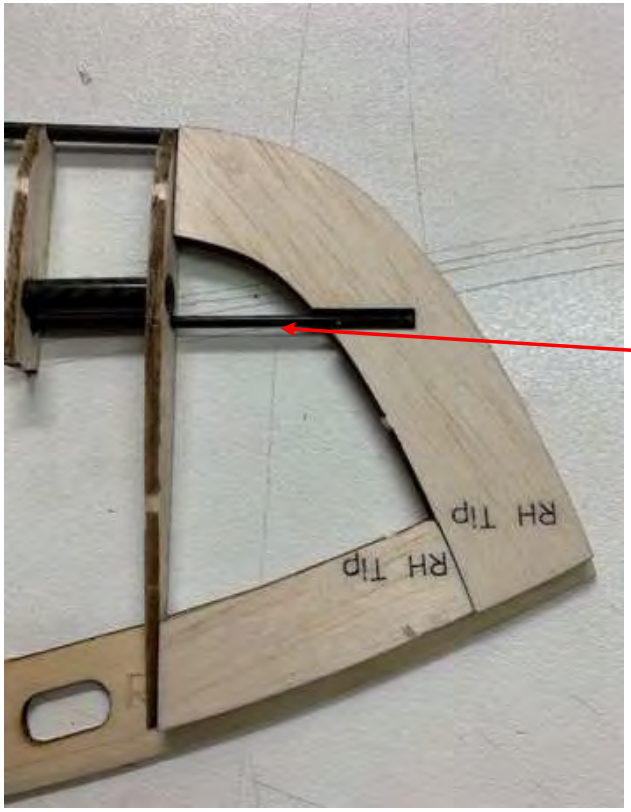


Update - on later kits the T.E. extends past C9 as shown below.

C9

Tip construction

First add the ply tip and glue in place. It sits flush on the building board.



Add the supplied carbon rod

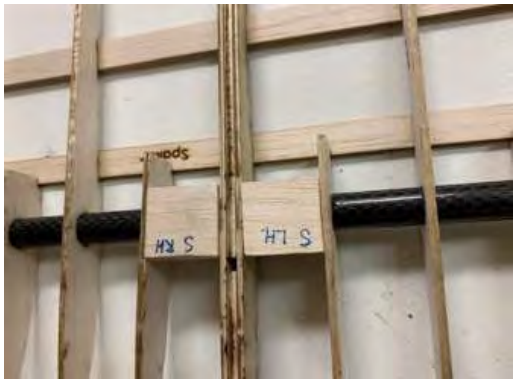
Add the 3mm balsa pieces as shown.

Sand the tip to shape.

1. Slide Tip Panel B and Tip Panel C together using the 6mm diam. X 104mm carbon tube.
2. The entire assembly should self align as shown. Use the dihedral template at the very tip of the wing to ensure the dihedral is correct.
3. Squeeze the 2 end ribs B17 and C1 together until they are flush with each other.
4. Slide the panels apart again and check the tubes are fully engaged in the ribs. Adjust if necessary.
5. Apply medium CA between B17 and C1 and slide the panels back together again. Hold until dry.
6.Glue all locations

Glue all the triangle support pieces in place as shown on the plan. These add significant stiffness and strength to the wing.

Repeat for the left hand wing panels.



Glue in S RH and S LH in the wing. These will need to be trimmed to size for a good fit. These stop the wing rocking on the fuselage.

Shave the height of S RH and S LH to be flush with the bottom of the wing.

Turn the wing over and drill the hold down bolts at the
front and rear

Add the supplied supports at the end of the centre panel and end of the tip panels. This prevents the covering from distorting the end ribs

Add magnets to the end of the centre panel and tip panels ensuring the magnets are in the correct orientation for attraction.

Covering

If you are using a transparent or clear covering film then you can wipe about 50% of the burn mark from the ribs using a microfibre cloth. You can also give the entire wing a light sand with a 300 or 400 grit sandpaper on a long sanding block to remove the remaining burn marks.

When covering, wrap the film from the T.E. around the L.E. and back to the T.E.
Do not apply the iron to the carbon L.E. or the film may not shrink properly around the L.E. edge afterwards.

Tack seal all edges on medium heat first.
Then seal all the edges with high heat.
Then carefully shrink with the base of an iron or a heat gun set on low. Move carefully and apply minimum heat to shrink the film to the final shape.

Spoiler Servo Installation

Thin spoiler servos can be mounted on the supplied spoiler plate. However, if a MKS113MG or similar 12mm thick servo is used then the spoiler plate is discarded and balsa supports are made using scrap balsa as shown. Remove the mounting tabs from the servo and wrap the servo in 2 layers of masking tape and CA in place. Ensure the servo arm is in the correct position for closed and open positions.

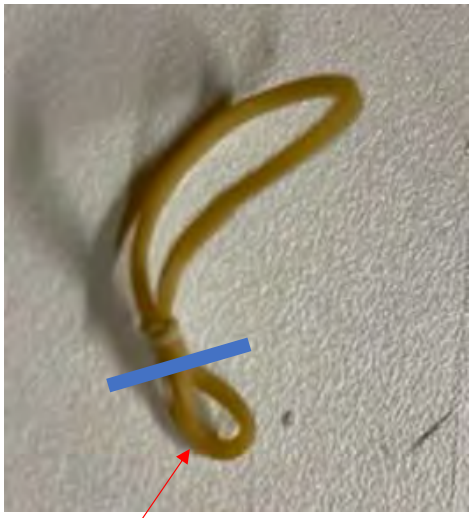
A1

Balsa supports

Open position

Closed position

Tie 2 x supplied rubber bands into approx. 2/3 and 1/3 loops.
Cut and discard the 1/3 loop.

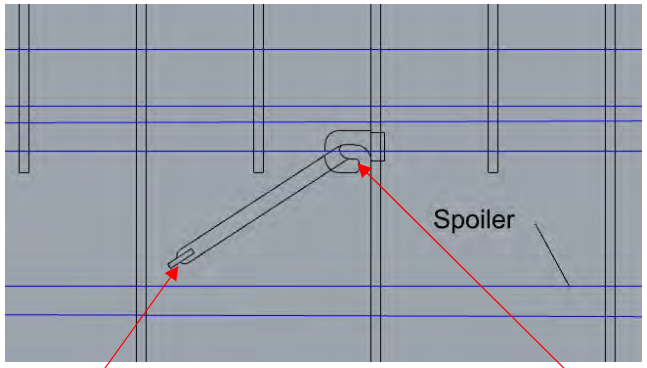


Discard

This shows the LH rubber band position with the spoiler open. Only light tension is required when closed.

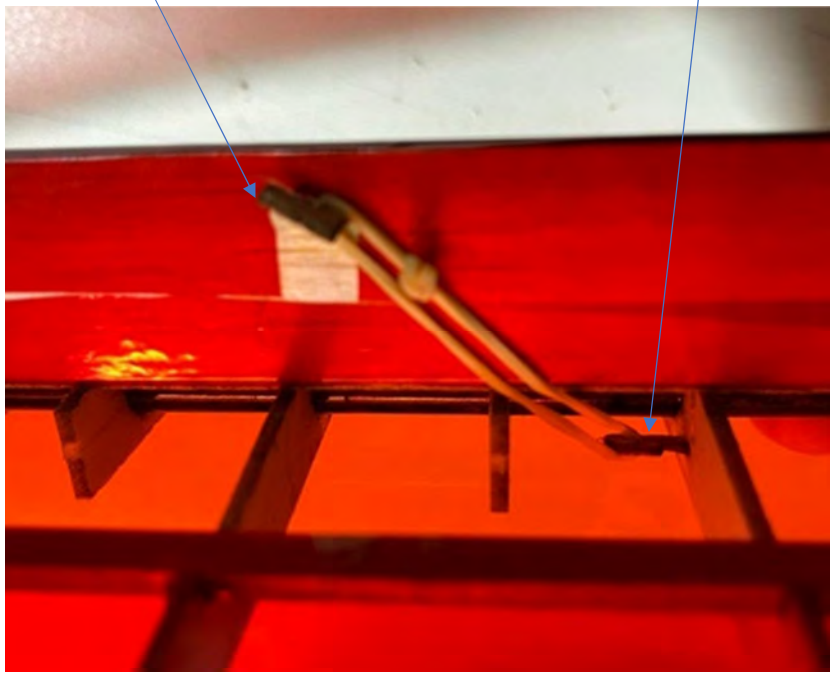
Repeat for RHS side

Plan view, spoiler closed. LHS shown.



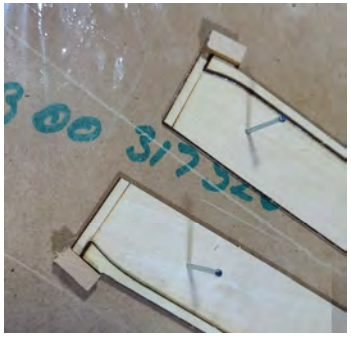
Spoiler Hook 1

Spoiler Hook 2



Fuselage Assembly

Glue the 1.5mm ply reinforcements to the fuselage.



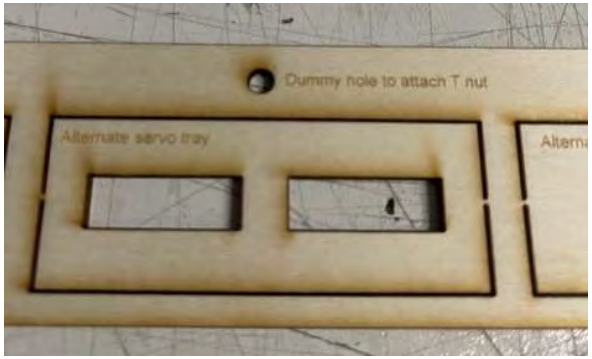
Glue the 5mm square spruce pieces in place, top and bottom.

Glue the magnet into F2.

Select an F1 former option to suit the bolt pattern of your motor.

For the LDARC 1806, ensure the F1 marking ‘IN’ is on the inside of your fuselage. Dry fit the motor to be sure. The ESC should fit through the access hole

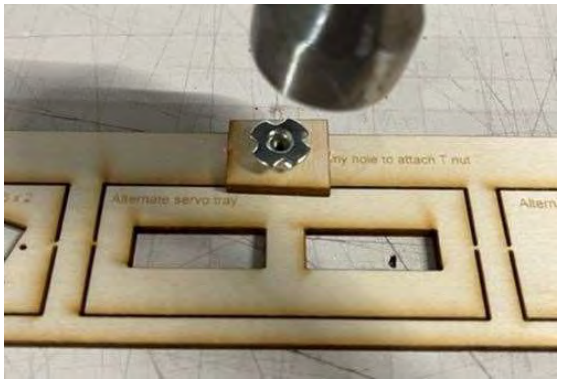
Attach the T nut to the ‘Rear Hold Down Former’



1. Use the dummy hole

2 Line up the rear former

3. Apply thick CA or Epoxy then line up the T nut



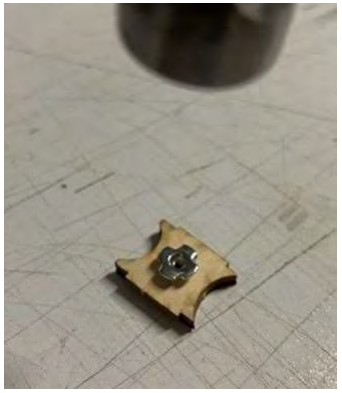
4. Hammer in the T nut

5. The T nut passes Through the former

6. Cut off the T nut that passes through the former

Attach the T nut to the ‘Front Hold Down Former’

1 Prepare the pieces

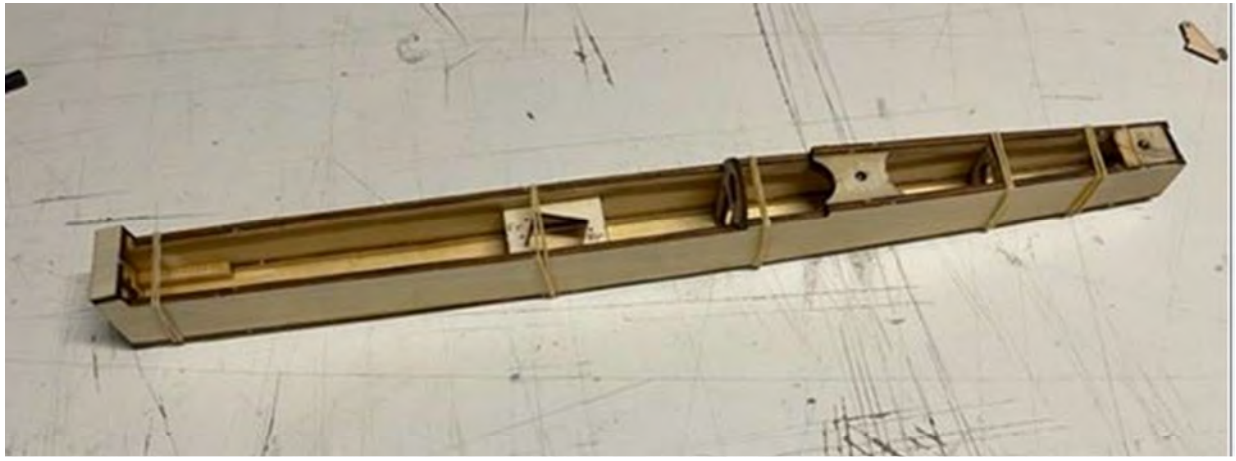


2 Apply glue between the ply pieces and to the T nut.

3 Hammer the T nut in place

4 This is the top side

Assemble the fuselage



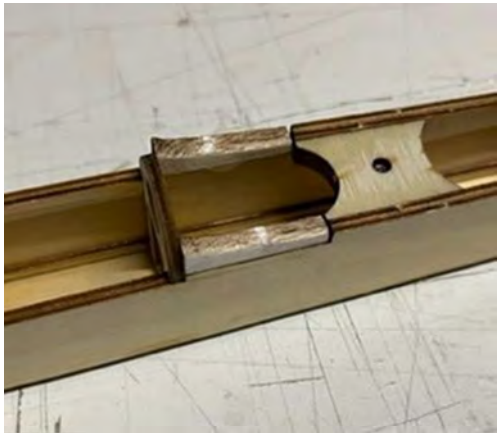
Apply glue to F1, F2, F3, F4, the ‘Front Hold Down Former’ and the ‘Rear Hold Down Former’ and place between the fuselage sides and fuselage bottom. Use rubber bands or tape to hold everything in place while the glue dries.

Do NOT glue in the servo tray, use it to hold the fuselage sides.

Note, the ‘Front Hold Down Former’ slots into the fuselage sides

Add the top ply piece F0 that fits between the canopy and the nose cone

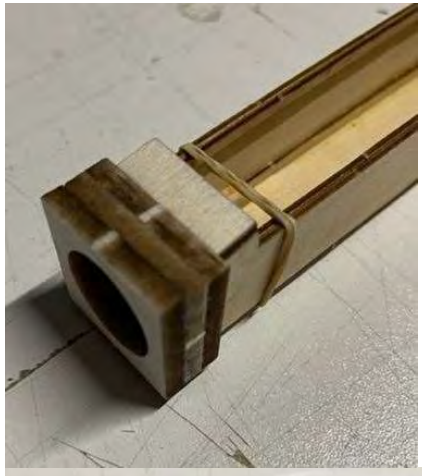
Add both thin CA and then medium CA inside the entire fuselage for extra strength



Glue the balsa fairings in place

Glue the canopy pieces together in order from 1 to 6.
Ensure they are square.

Add the magnet to the rear of the canopy. Ensure the magnet is in the CORRECT orientation so it attracts to the magnet in F2



Glue the 3 x nose cone piece together at 90 degrees to each other.

Temporarily fit the motor to align the nose cone pieces.

Glue the nose cone pieces to the front of F0 so there is an even gap around the perimeter of the motor.

Glue the 4 x tail piece together at 90 degrees to each other.

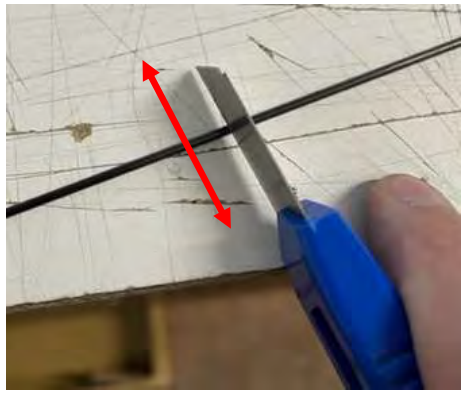
Temporarily fit the tailboom.

Glue the tail cone pieces to the rear of F4. Be careful not to glue in the tailboom. Remove the tailboom.

Sand the fuselage to shape

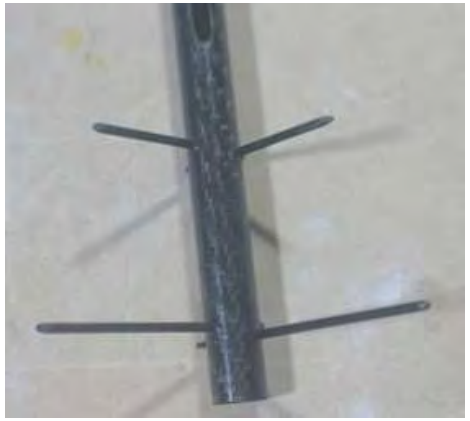
Tailboom and V Tail Assembly

The oval marked on the tape is the **top** of the tail boom. **This is important to get the correct V tail angles.**
Open up the hole marked on the tape. This is for the pushrods to exit.
The holes for the 2mm V tail carbon rods are predrilled.



Cut the 4 x V tail rods to length using a rolling motion with a blade. Remove any burs.

The 2 x front rods are **40mm** long and the 2 x rear rods are **55mm** long.



Insert the V tail carbon rods into the tailboom. They should protrude 1mm through the other side of the tailboom.

Glue in place with thin CA.

V Tails

Trim the 0.6mm plywood strips to length.

Place the tailplane on a sheet of glad wrap or plastic.

IMPORTANT - Press the ply strips down so they are flush with the bottom surface

Apply thin CA to fix them in place.

Cut the aluminum tubes to length. **30mm** for the front tubes and **45mm** for the rear tubes.

Cut using a rolling motion with a blade (like the 2mm Carbon). Smooth the ends of the tubes and remove any burs with a file. Test fit on the carbon v tail rods.

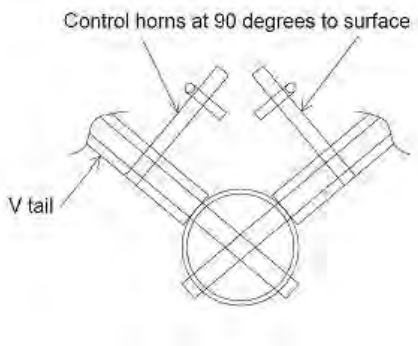
Rough up the tubes and apply thick CA to the tubes.

Press into position and add the top 0.6mm plywood pieces. Add thin CA to glue the ply in place.

Sand both sides of the TE of the elevator so the T.E. is 1mm thick.

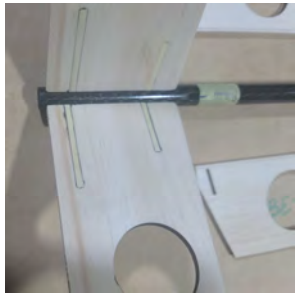
Sand the L.E. round.

Place a drop of CA on the pivot point of the V tail horn, and once set, drill out with a 1mm drill bit.



Install the servo horns into the V tail at right angles to the surface.

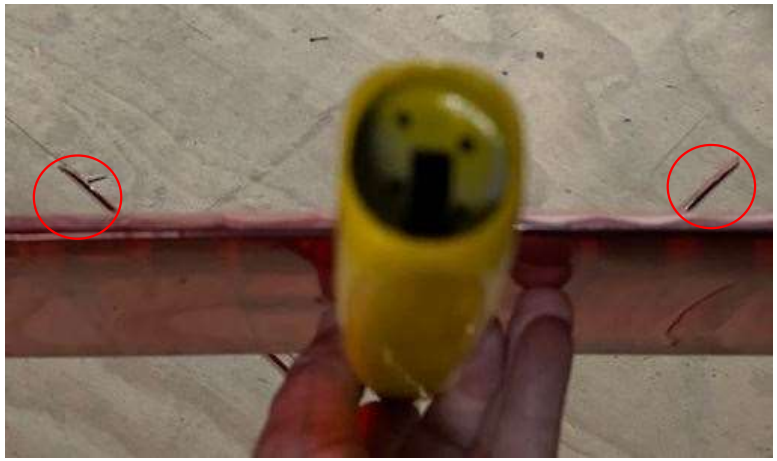
Do not shorten the V tail horns for visual reasons. Having a short servo arm and long V tail horn is essential for good control and resolution and gives improved handling characteristics of the plane.



Insert the V tails onto the boom

Slide the tailboom into the fuselage pod until the boom is 10mm past F2.

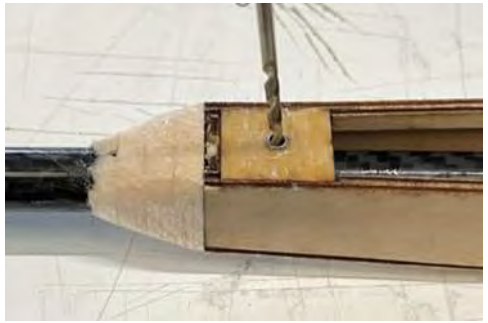
Attach the wing to the fuselage.



For correct alignment, sight down the front of the fuselage tilting it upwards until both V tails disappear behind the wing at the same time. Adjust the rotation of the boom if needed until square.

Alternatively, you can set the plane up on the bench with the wings level and measure the height of each V tail. Adjust until both are the same height.

Once happy, run a small amount of CA into the tail cone to tack the boom in place. Remove the wing and glue the boom permanently into the fuselage at F2 and F3.



Drill through the rear T nut with a **2.5mm** drill bit to make clearance for the rear hold down bolt to pass into the tailboom.

Pushrods

Bend the 1mm wire into a L shape 20mm long x 6mm wide.
Sleeve the carbon tube and wire with heatshrink tubing.
Add a small drop of thin CA at each end of the heatshrink tubing.
Apply heat to the heatshrink tubing until it is a tight fit.
CA should ooze out both ends.

For both pushrods, assemble one end of the pushrod only.

Bevel or round the end of the wire so it does not damage the control horn when inserted.

Slide the Carbon pushrods and plastic pushrod tubes into position.

Hook the pushrods into the V tails. The natural flex of the pushrods should hold them in the V tail horns. Check this is the case and adjust if necessary.

Once assembled as shown, glue the pushrod tubes into the tailboom.

Tape the V tails onto the tailboom on the underside of the tailboom. This ensures they are secured for flight.

Install the motor, battery, receiver and dry fit the servos until the C.G. is at 78mm (the most rearward C.G). Move the servos backwards and forwards to find the ideal position. When set, glue in the servo tray and complete the pushrods in the same way as the tails.

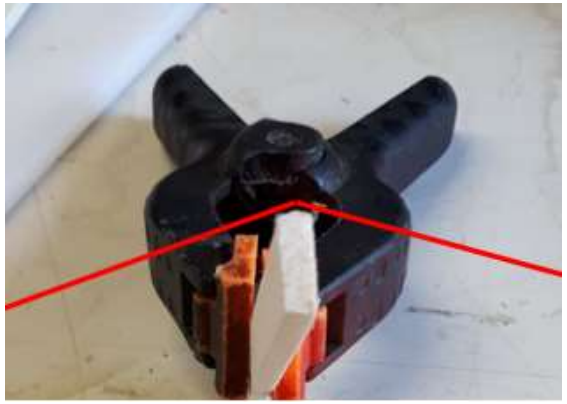
Use the inner most servo horn holes for good torque and resolution of the V tail. This is important for good flight characteristics.

Glue the plastic pushrod tubes at the front end of the tailboom.
<u>THIS IS ESSENTIAL TO STOP SLOP IN THE V TAILS.</u>

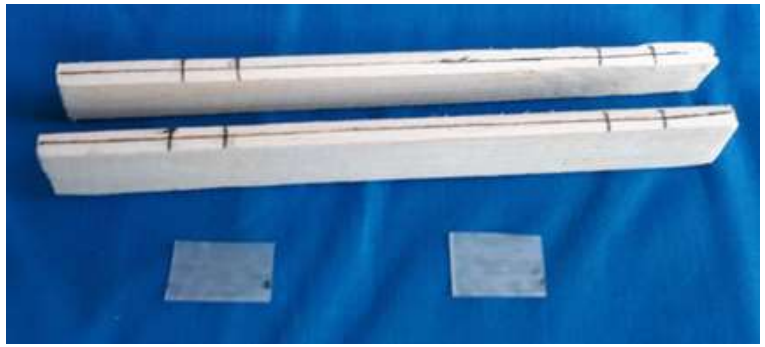
Typical installation example. The ESC can sit on the fuselage floor under the battery.

Optional method for hinging the V tails.

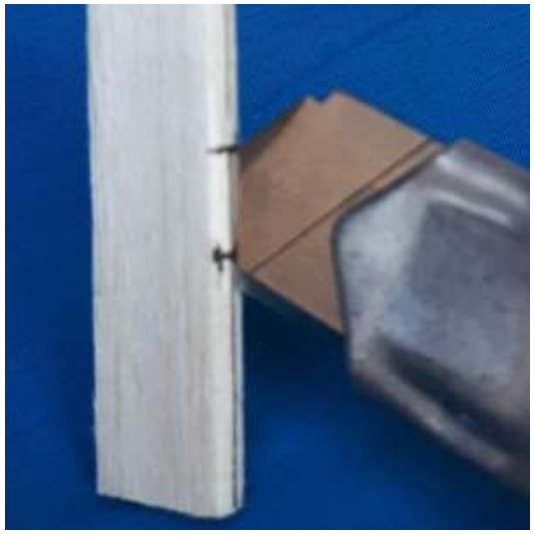
Use 4 hinges on each of the ruddervators.



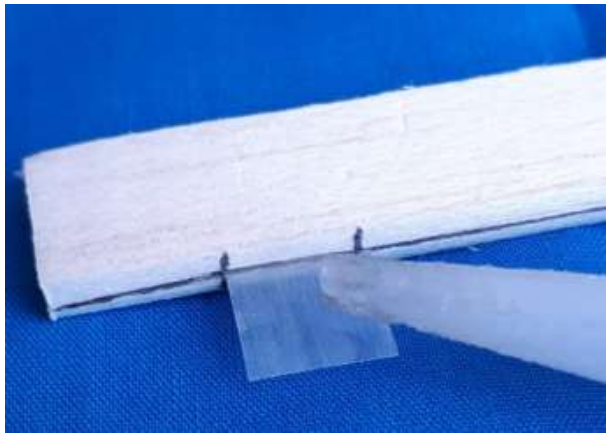
Bevel edges of balsa to allow for hinge movement



Mark the centreline and hinge positions.
Cut supplied mylar hinges 10mm wide x 15mm long.
Sand lightly with 400 grit.



Cut slots 5mm deep (half the width of the mylar) with an 18mm snap off blade style knife



Glue the mylar into one side of the job using 1 drop of thin CA on the top and 1 drop of CA on the bottom.

Once dry, trial fit the other side of the surface.

Flex the hinge to allow for movement. This will create a 1-1.5mm gap.

Glue the hinge in the other side of surface with 1 drop of CA. Remove excess CA with the edge of paper towel.

Turn job over and complete the same process for the other side.

Now you have a nice strong, flexible hinge

Starting Setup

The V tail total throw (limit) is +/- 25mm. Elevator throw is +/- 15mm. Rudder throw is +/- 15mm.
I like to run 30% Exponential on both Rudder and Elevator to give a slightly smoother response in the middle of the stick.
Check all your throws are in the correct direction before flying.

Balance the model at 75mm from the L.E. of the wing.
For no wind conditions I like the C.G. at 78mm. For very windy conditions I like the C.G. at 72mm, but please experiment and find your own ideal settings. The further forward the c.g. the better the natural penetration of the glider. For me 75mm gives excellent all-around performance and a good balance between float and penetration.

Ballast can be added in the centre spar for windier conditions. Remove a tip panel, add/remove ballast and re assemble. Use a combination of 10mm diam. Galvanized Steel and Aluminum rods cut to 100mm lengths. Locate the steel rods over the middle of the wing. The Aluminum rods are just spacers so other materials like balsa can be used.

These combinations keep the steel rods in the middle of the wing. From tip to tip the combinations are:
1. For 60g ballast use 3xAl, 1xSteel and 3xAl for a total of 7 rods.
2. For 120g ballast use 2xAl, 1xSteel, 1xAl, 1xSteel and 2xAl for a total of 7 rods.
3. For 180g ballast 2xAl, 3xSteel and 2xAl for a total of 7 rods.

This also moves the C.G. forward to 72mm so some minor elevator trimming is required for this C.G., but the result gives excellent penetration and performance in the wind. Higher ballast combinations can be used if needed, again experiment.

I hope you enjoy flying your OZeRES 2!! For any feedback or questions please email Marcus at performance@mailzone.com