and
DG Airparts, Inc.

present the

Super XC

Instruction Manual
Version 1.0

READ THIS MANUAL FIRST!

Super XC

Table of Contents

> Note: This is not a beginners sailplane and certain aspects of building the sailplane are left up to the individual preferences of the builder.

Introduction

Congratulations! You now own what we believe to the best and most complete high performance cross country sailplane kit available anywhere today. The Super XC is a high performance cross country sailplane using the latest RnR products molding technologies. The Super XC incorporates full-span camber-changing flaps and ailerons, which provide a maximum speed range from coring the tightest thermals to outrunning the competition. The Super XC utilizes the S2048 F3B airfoil section for an outstanding L/D ratio.

Specifications

Wing Span…….....170 in
Wing Area………1545 in²
Weight………….10.5 lbs
Wing Loading…. 15.6 oz/ft²

Disclaimer

UNDER NO CIRCUMSTANCES SHALL RnR PRODUCTS BE HELD LIABLE FOR INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGES, ALLEGED NEGLIGENCE, BREACH OF WARANTEE, STRICT LIABILITY, TORT, CONTRACT, OR ANY OTHER LEGAL THEORY ARISING OUT OF THE USE OR HANDLING OF THIS PRODUCT.

Parts List
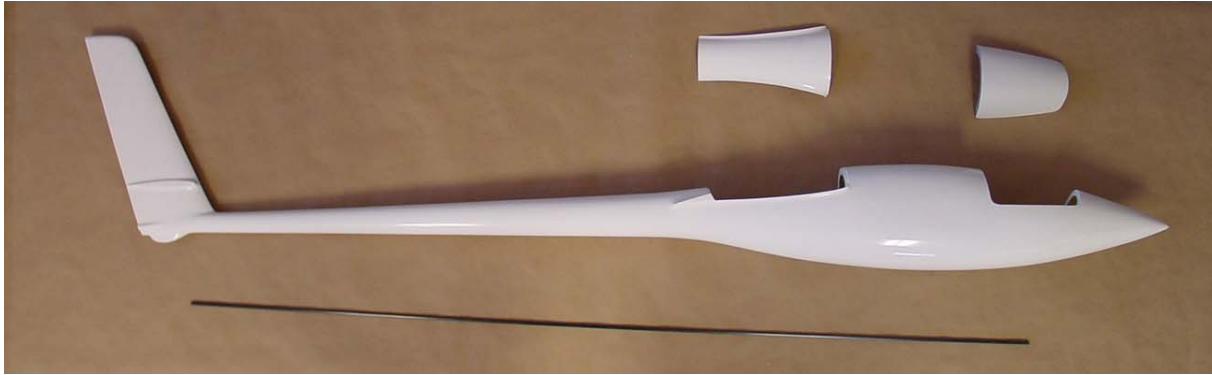
Fuselage

1. Fuselage
2. Wing Cover
3. Canopy Hatch
4. Elevator Pushrod

Left Wing

1. Outer Panel
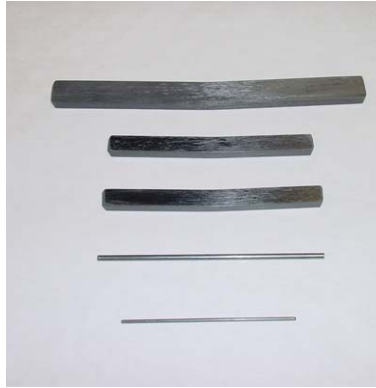2. Inner Panel

Right Wing

1. Outer Panel
2. Inner Panel

Parts List

Tail Group

1. Rudder
2. Left Stabilizer
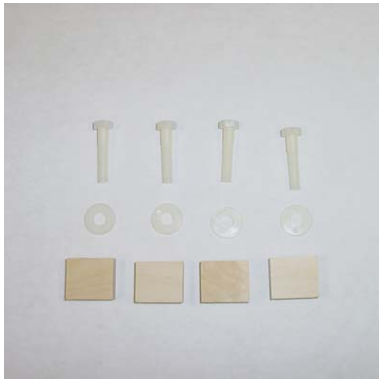3. Right Stabilizer

Joiners

1. Main Wing Joiner
2. Outer Wing Joiner (2)
3. 5/32 Stabilizer Joiner
4. 3/92 Stabilizer Joiner

Elevator Bag

1. 3/16" Elevator Pivot Tube
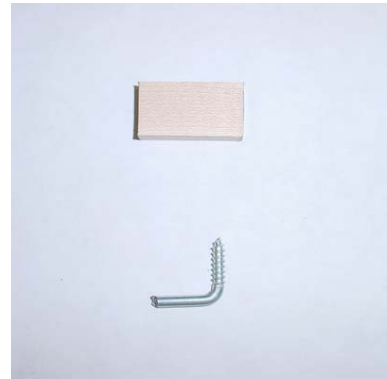2. Elevator Bellcrank

Wing Bolts

1. 5/16" Nylon Bolt (4)
2. 5/16" Nylon Washer (4)
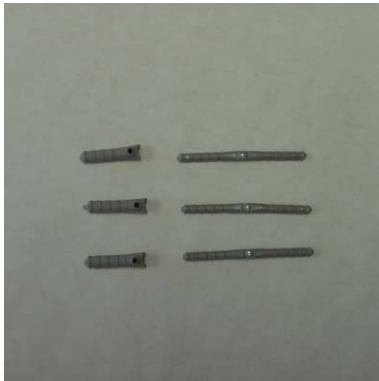3. Wood Retainer Block (4)

Elevator Pushrod Hardware

1. 4-40 Rod Ends (2)
2. 4-40 Jam Nuts (2)
3. 4-40 Clevis and Lock (2)

Towhook Hardware

1. Towhook
2. Mounting Block
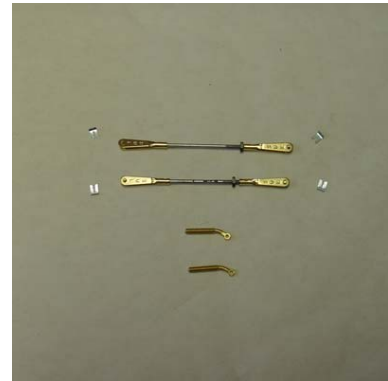
Parts List

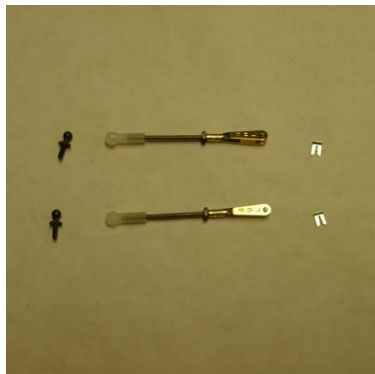Rudder Hinges

1. Hinges (3)
2. Pockets (3)

Rudder Hardware

1. Pull-Pull Kevlar
2. 2-56 Threaded Rod (4)
3. 2-56 Jam Nuts (4)
4. 2-56 Clevis and Lock (4)
5. Control Horns (2)

Flap Hardware

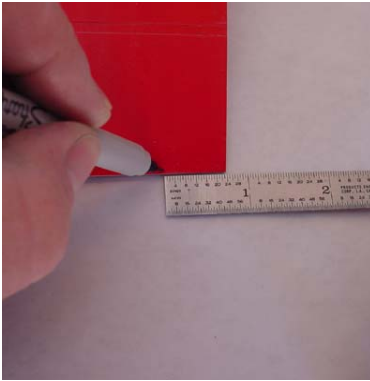1. Flap Linkages (2)
2. Control Horns (2)

Aileron Hardware

1. Aileron Linkages (2)
2. Ball Links (2)

Construction

Wing Part 1

Note: The wing, stabilizer, and rudder skins can be damaged if you lay them on sharp objects or uneven surfaces. You can use a towel on your workbench to prevent this from happening.
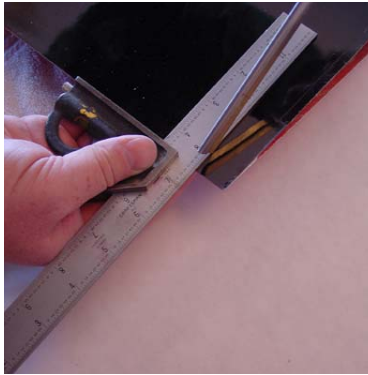
1. Begin the wing inner panel by marking the outboard end of the flap. Measure 3/4" from the outboard end of the wing towards the root of the wing at the trailing edge.

Hint: A Sharpie® Ultra Fine Point Marker works well on the fiberglass pieces.
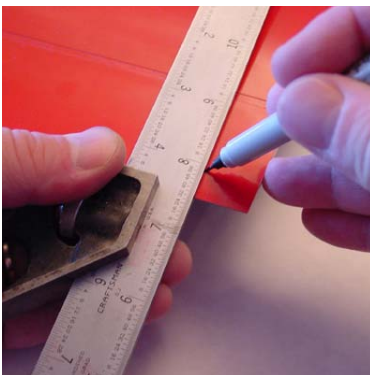
2. Use a square to draw the line from the mark on the trailing edge to the recess line closest to the trailing edge.

3. Flip the wing over and using the mark on the top of the wing as a reference, scribe a line with a razor saw from the trailing edge 1 7/8" long.

Hint: A Zona® saw with the teeth angling towards the handle and pulling the saw towards your body works well for scribing and cutting.
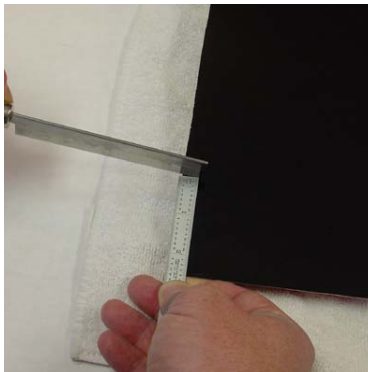
4. At the root of the wing, scribe a mark 2 1/2" from the trailing edge.

5. Clamp a long straight edge at both the root and tip. Be very careful you do not over tighten the clamp. Using the type of clamp pictured, you can clamp only using the bottom skin.

6. Using the saw, start at one end of the wing and slowly cut along the straight edge. The saw cuts better if you keep the angle between the saw and wing small. This allows more teeth to do the work. Also the cut is nicer if you make many light passes only removing a little bit of material on each pass, instead of trying to cut the flap out in a single pass.
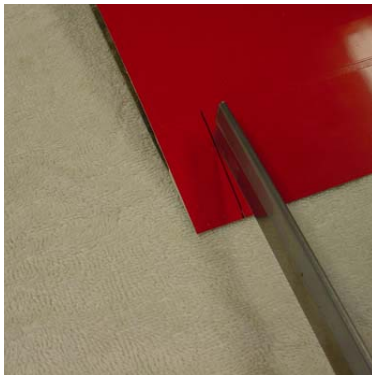
Construction

Wing Part 1 (cont.)

7. Place a piece of masking tape on the cut line to keep the flap from falling out after the top is cut.
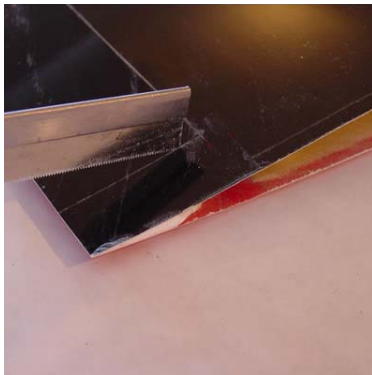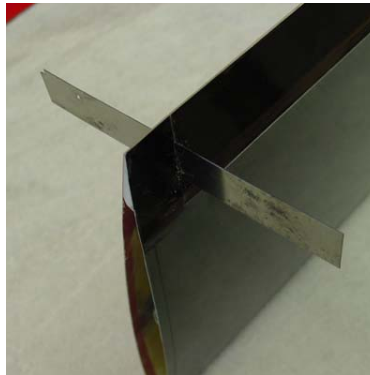

8. Cut the previously scribed line.

9. Flip the wing over and cut out the top of the flap using the pen line.

10. If you are confident in your cutting abilities, you can just run a razor saw along the indentation line closest to the leading edge, otherwise clamp a long straight edge at the tip and root in the same way you did previously on the bottom of the wing.

11. You can use a razor saw blade that has been removed from the saw to cut the flap free in the corner.
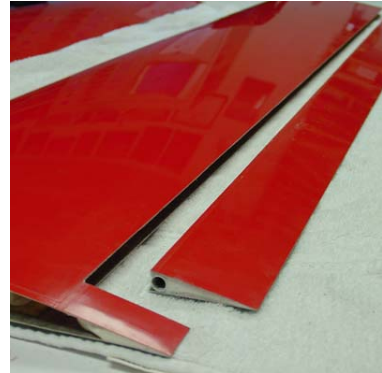
12. Once the flap has been removed, sand all the edges lightly to finish them off. Now repeat steps 1. through 11. for the other wing.
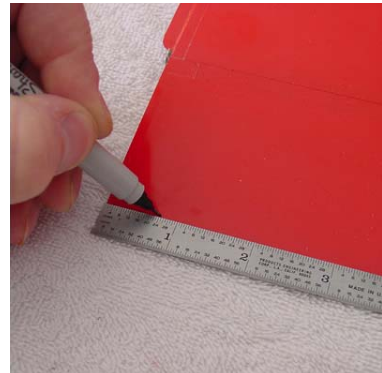
13. Set aside the inner panel and mark 3/4" on the outboard panel closest to the root.

Construction

Wing Part 1 (cont.)
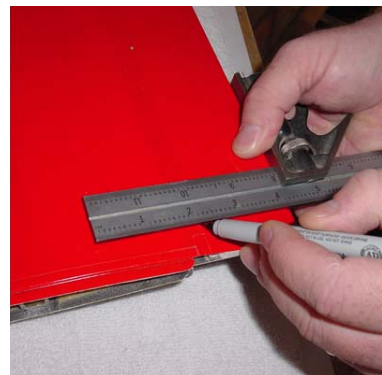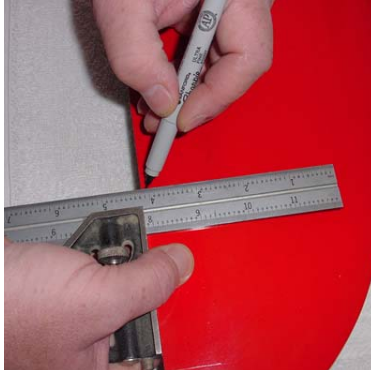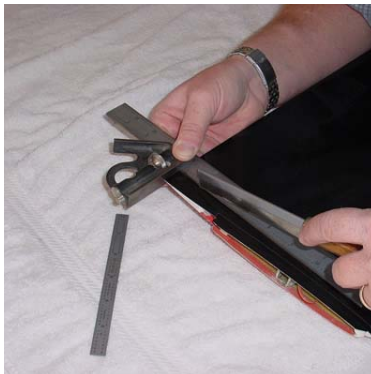
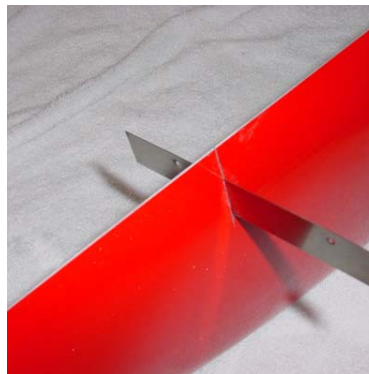14. Draw a line from the mark to the front indentation.

15. Draw a line from the trailing edge to the forward aileron indentation, at the end of the aileron indentation.

16. Flip the wing over and scribe a line using the mark on the top of the wing 2 1/4" long.

17. Scribe another line at the tip using the mark on top of the wing 1 1/2" long.

18. Using a razor saw blade cut both ends of the aileron out using the marked and scribed lines.
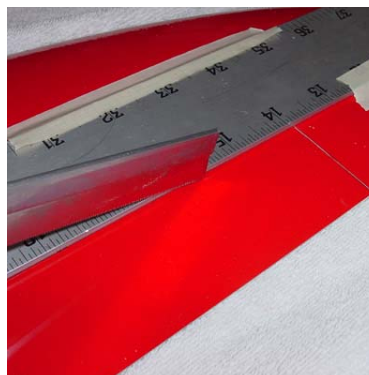
19. Using a straight edge or if you feel comfortable, free hand, cut the top of the aileron free along the front indentation.

20. Repeat steps 13 through 19 for the opposite outer wing panel.
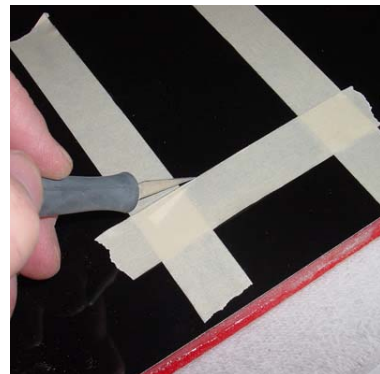
21. Using the markings on the bottom of the wing panels, cut out the servo covers on all four panels. You can use tape to help mark the lines. Either three sides can be cut leaving the front side to act as a hinge, or all four sides can be cut removing the cover completely.

22. Cut out the pushrod opening using a Dremel® tool on all four wing panels.

Construction

Wing Part 1 (cont.)

23. Cut an opening using a Dremel® tool in the rear spar for the pushrods in all four wing panels.
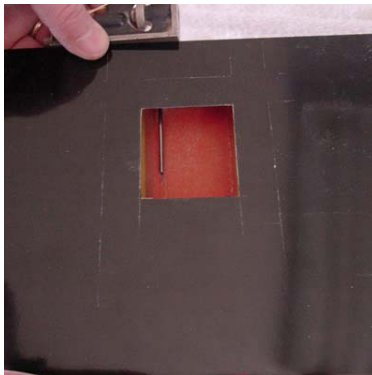
24. Make a mark on the top wing skin to line up the servo arm. One method is to use a combination square with piano wire.

25. Line up the servo control arm with the mark and mount the servos in all four wing panels using your favorite method.
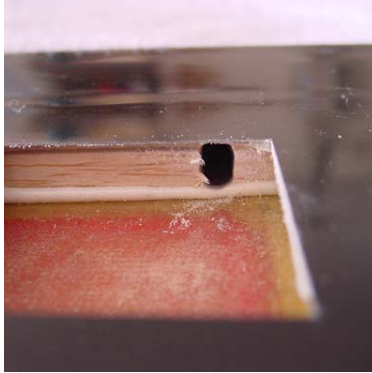
Wing Mount

1. Slide the wing together using the main wing joiner and fit the wing to the fuselage. This may require some custom filing and sanding of the fuselage.

Note: The wing joiners may need to be moved in or out of the joiner socket in order for the wings to slide together properly. This is true for the main joiners and tip joiners.

2. Once the wing fits nicely with the fuselage, slide the main panels apart and mark where the front and rear wing saddles line up with the wing.
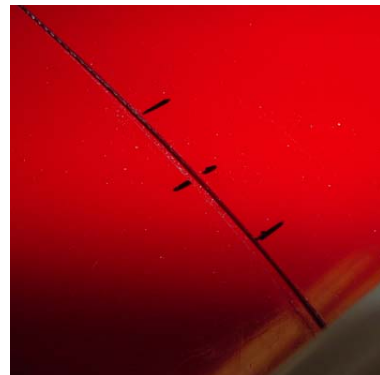
3. Mark the middle of the wing saddle location.

Construction

Wing Mount (cont.)

4. Using a combination square and ruler, make a mark at 1 1/4" for the front hold down bolt and 3/4" for the read hold down bolt. Make sure and not measure from the lip of the right panel.

5. Drill a pilot hole in all four wing bolt locations using a 1/8" or similar sized drill bit.
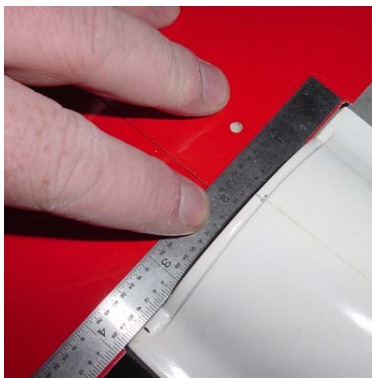
6. Set the wings back in the saddle and center the panels with the fuselage.

7. Mark the wing and fuselage for future reference.

8. Hold the wing down in the proper position and using the same drill bit you used to drill the pilot holes, drill the wing saddle.

9. Remove the drill bit and use it to hold the wing in position

10. Press a push pin along the seam line near the fin and use it to hold a tape measure.

11. Measure to the tip of the inner wing panel and adjust the wing so that both the left and right measurements are the same.

Construction

Wing Mount (cont.)

12. Once the wing is lined up properly, clamp the wing in place and drill out the remaining three pilot holes using a second drill bit of the same size, or the next size up.

13. Remove the wing and glue the wing hold down blocks centered on the pilots holes in the wing saddle . Do not fill the pilot holes in the wing saddles with excess glue

14. Once the glue has dried, place the wing back on the fuselage and line up the holes in the wing with the holes in the saddle and drill through the wood blocks.
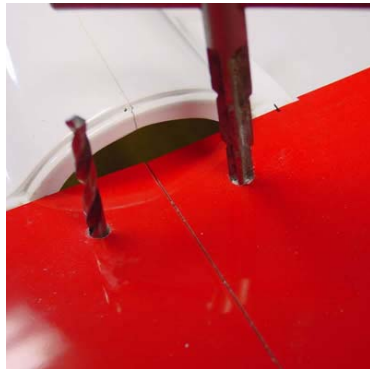
15. Drill and tap one hole at a time. Slowly increasing the size of the drill bits until size 'G' (.261) Some manufactures include a size 'G' drill bit with a 5/16" tap. Using a propeller reamer on the wing skin first helps avoid damage caused by drill bits.

16. After you tap each hole, screw in a nylon wing hold down bolt to help keep the wing lined up properly. Once all they holes are finished, remove the wing and either drill or ream each hole out to 5/16".
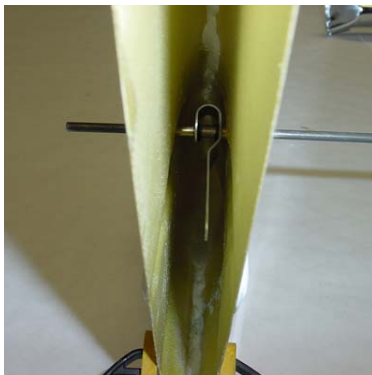
Stabilator

1. Drill out the indentations for the main stabilator joiner rod, use a 1/8" drill bit for a pilot hole then a 3/16" drill bit for the final size.
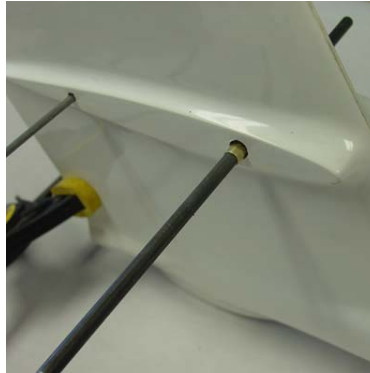
Super XC

Construction
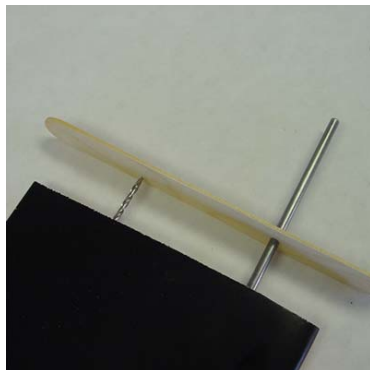
Stabilator (cont.)

2. Drill out the hole for the rear joiner rod using a 3/32" drill bit.

3. Slide the 3/16" brass tube through the holes placing the elevator bellcrank over the brass tube.

4. Mount the wing to the sailplane and using the wing as a reference line up the main joiner wire with the wing. It is also helpful to slide the stabilator halves on the joiners to get a better view. If necessary enlarge one of the holes using a round file to line up the wing with the stabilator. One the stabilator if even with the wing verify the stabilator fairings are parallel with each other. This may require a clamp at the trailing edge of the fin. Glue the brass tube in using thin CA or thick CA as needed.

5. Make a slot guide by taking a popsicle stick or similar piece of wood and drilling out a 3/16" hole and sliding the popsicle stick over the joiner rod. The insert a 3/32" drill bit in the stabilator and mark the popsicle stick. Drill a hole at the mark.
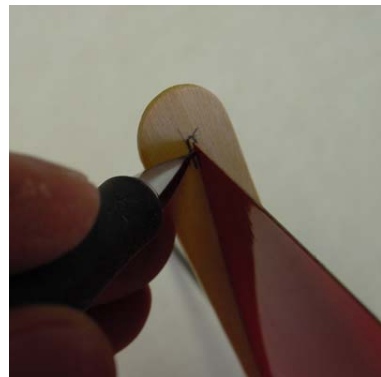
6. Mark around the trailing edge of the stabilator and cut the popsicle stick off at the mark.
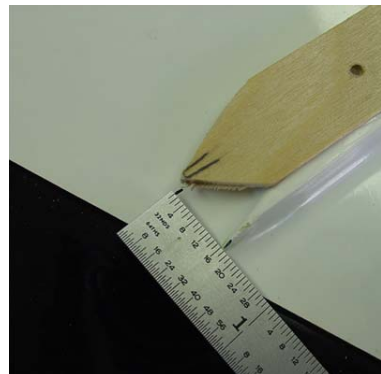
7. Measure 1/2" up and 1/2" down elevator throw and make a mark.

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Construction

Stabilator (cont.)

8. Using the popsicle stick as a guide, cut out the stabilator slot. If you feel comfortable you can do it directly with a Dremel® tool.


9. Glue one of the rod ends into the carbon fiber elevator pushrod with epoxy. Once you slide the rod end into the pushrod, tape the rod end to the pushrod and suspend the pushrod vertically with the rod end down, so the epoxy can flow back down and fill the voids in the rod end.

Fuselage Part 1
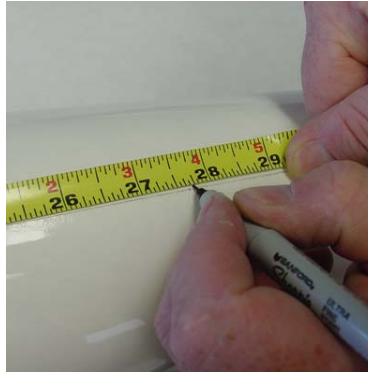
1. Hook a tape measure to the nose of the fuselage and mark the tow hook location at 27 3/4"
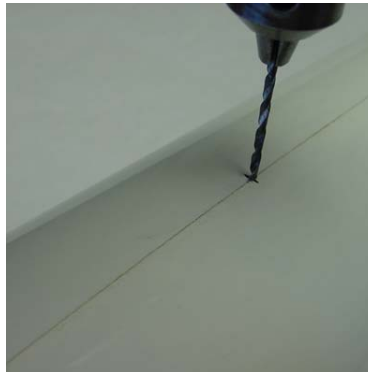
2. Drill a hole at the mark using a 9/64" drill bit.
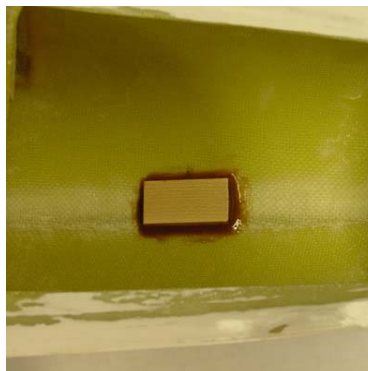
3. Glue the tow hook block in using epoxy and filler centered over the tow hook hole.

4. Drill a 9/64" hole through the tow hook block using the previously drilled hole as a guide. Screw the tow hook in and glue it in using a few drops of thin CA.

5. Cut out the servo mounting plate to fit the servos you have chosen for the rudder and stabilator.

Construction

Fuselage Part 1 (cont.)

6. Glue the servo mounting plate and forward equipment plate in place with epoxy and filler.

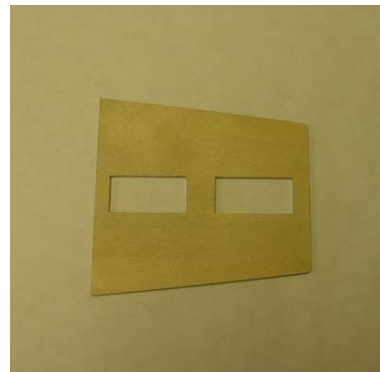7. Install the elevator servo, note how spruce spacer blocks have been installed on the servo tray to keep the elevator servo above the rudder servo. Temporarily install the stabilator pushrod and the servo control arm with the rod end installed. With the servo arm centered and the stabilator centered, mark the pushrod. Remove the pushrod and cut it to length. Glue the rod end using the same method described earlier.

8. Once the pushrod has dried, reinstall the pushrod permanently making sure to lock the clevis at the elevator bellcrank end.
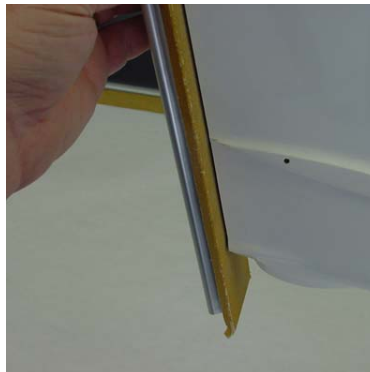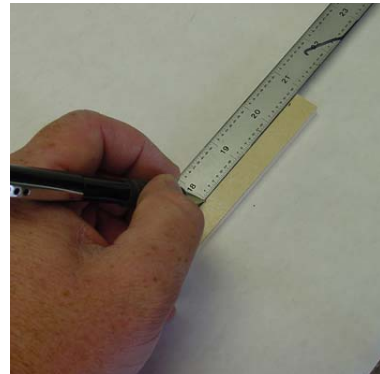
9. Square up the back of the fin using a large sanding block.
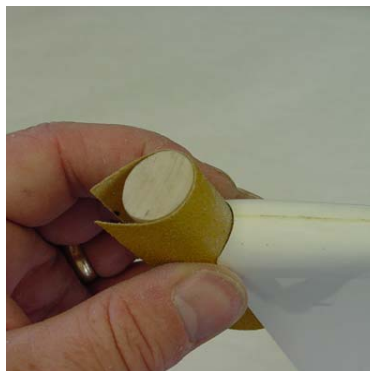
10. Sand the top of the fin using a dowel or something similar to allow room for the rudder.
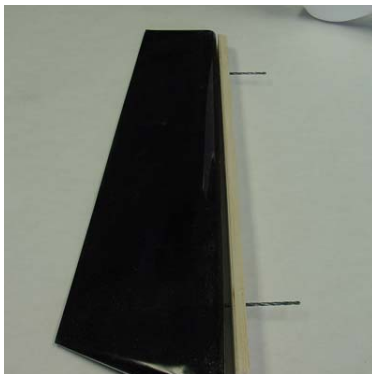
Rudder

1. Mark the centerline of the fin post.

2. Mark the top of the fin post 3/8" on each side and cut the extra material off. Sand the fin post as needed to seat it about 1/2" from back of the fuselage.

Construction

Rudder (cont.)

3. Lay the fin post down in front of the rudder keeping the difference in height of the fin post and rudder about even on the top and bottom.   Locate the small hinge location indentations on the leading edge of the rudder and mark the fin post at approximately the same location. The bottom indentation is approximately 1/2" too high, so mark the fin post 1/2" below the bottom indentation. Drill 1/8" holes in the fin post at each mark.

4. Place the fin post up to the rudder and drill holes in the rudder using the holes previously drilled in the fin post. After you drill each hole, use another drill bit or music wire to keep the fin post aligned.
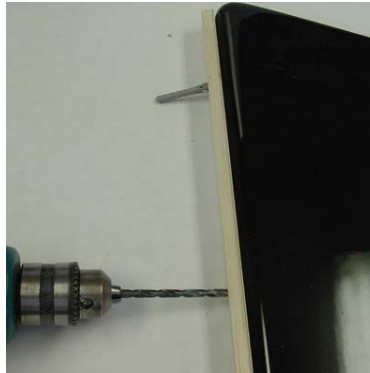
5. Drill out each pilot hole with a 3/16" drill bit. Use the hinges to hold the fin post in place while drilling the second and third holes.
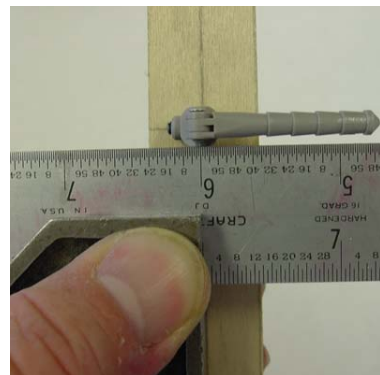

6. Place two pieces of masking tape above and below each hole in the rudder.

7. Using the masking tape as a guide, cut out a rectangular shape large enough to allow the hinge to move approximately 45° to each side.
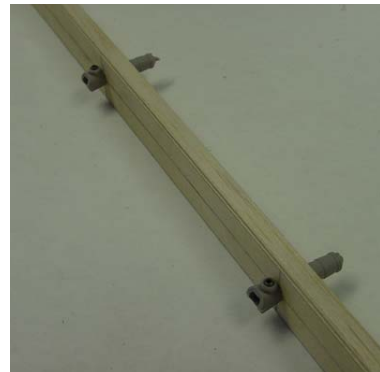

8. Drill out each hole in the fin post to 1/4" and place the hinge pockets in the holes.

Construction

Rudder (cont.)

9. Insert the hinges into the pockets and verify the hinge pins are vertical by using a combination square. Make sure the pockets are inserted fully into the rudder post and the setscrew part of the pocket is pressed up against the fin post. When are you satisfied everything is aligned properly CA the pockets into the fin post.
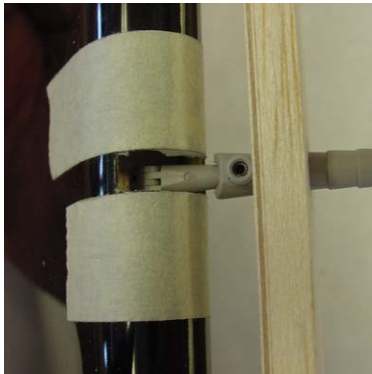
10. Reinsert all three hinges into the balsa rudder spar and verify the rudder pivots freely. You may need to undo the setscrew in the pocket and pull the hinge out slightly so the rudder clears the pocket Once you are satisfied with the fit, CA the hinges in the rudder. Put a drop of CA near the hinge on the balsa wood and let it wick into the hinge to avoid gluing the hinge pin by mistake.

11. Insert the fin post into the fin and verify the rudder swings at least 2" to each side freely. The top of the fin might need to be sanded further with the round sanding block.
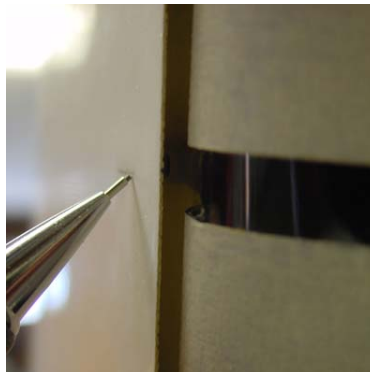
12. Pull the rudder to one side and make a mark in line with the setscrew on all three pockets.

13. Measure from the center of the setscrew to edge of the fin.
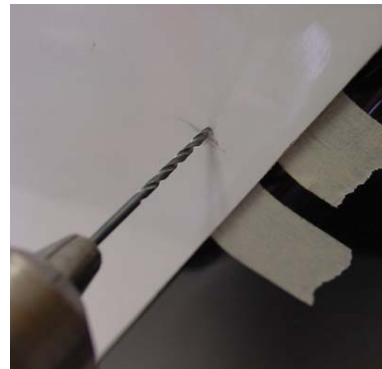
14. Transfer the measurement to the line on the outside of the fin and drill a 1/16" hole. Repeat the measurement and drilling for all three hinge pockets.

Construction

Rudder (cont.)

15. Once all three holes have been drilled, keep the fin post-clamped, loosen the setscrews and remove the rudder. Add additional clamps and popsicle sticks to hold the fuselage firmly against the fin post. Glue the fin post in with thin CA. Once the thin CA has dried remove the clamps and use thick CA to create a filet around the perimeter of the fin post.

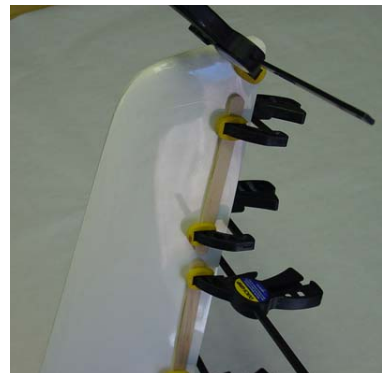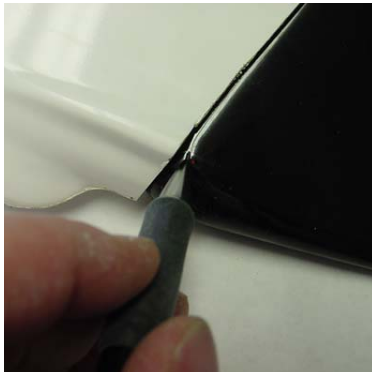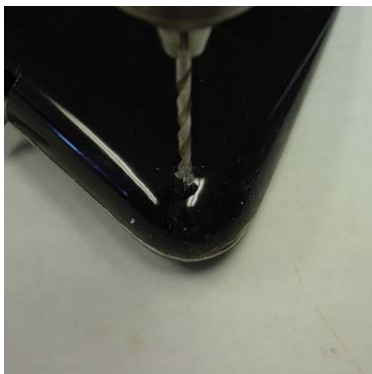16. Reinstall the rudder and mark the control horn location using the middle of the rudder fairing as a reference.

17. Drill a 7/64" hole in each side of the rudder. The hole should be even with the rudder hinge line and on the mark drawn in the previous step.

18. Using a Dremel tool grind out enough space for a clevis to be removed easily. You will need to remove enough of the threaded portion of the control horn so the hole in the control horn is even with the rudder skin on each side. Once you are satisfied with the clearance CA the control horns into the holes.
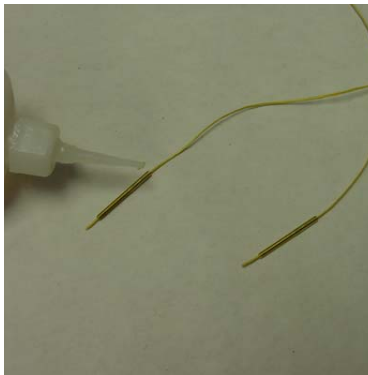
19. Pull the Kevlar® pull-pull thread through the brass threaded rods and wick thin CA on the end.

20. Screw the threaded rods into the rudder clevises and lower the Kevlar® thread into the fuselage. Install the rudder and tighten the setscrews. Pull the string taut and cut the Kevlar® thread evenly when the rudder is centered.

21. Screw the hollow threaded rods into the clevises so that the same amount of threaded rod is exposed on each side of the clevis. Install the clevises on the servo arm. Once the rudder is centered and the servo arm is centered, slide the Kevlar thread into the hollow threaded rods and wick CA on the Kevlar® thread. Adjust the tension as required.

Construction

Wing Part II (cont.)
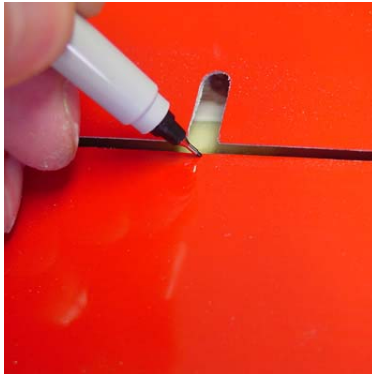
1. Place the flap back into position and mark the center of the flap linkage opening.

2. Drill a 7/64" hole on the mark at the back recess line at approximately 45°

3. Install the clevis on the control horn and verify the fit. The control horn should be positioned so that the clevis rests on the leading edge of the flap and the control horn is resting on the flap. Once the control horn fists in the proper position, epoxy the control horn into the flap.
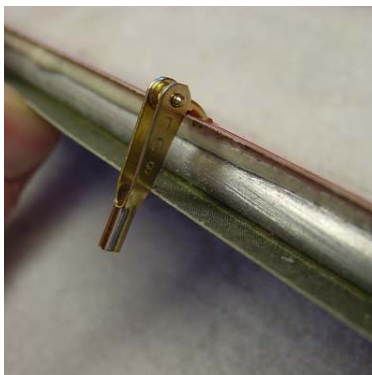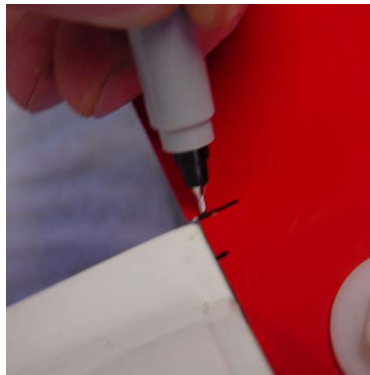

4. Reinstall the wing and mark the end of each flap remembering to allow approximately 1/16" clearance.

5. Temporarily set the flaps into position and transfer the mark from the wing to the fuselage.
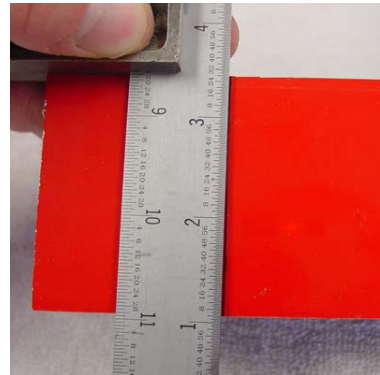
6. Use a combination square to mark a line and cut each flap to length.
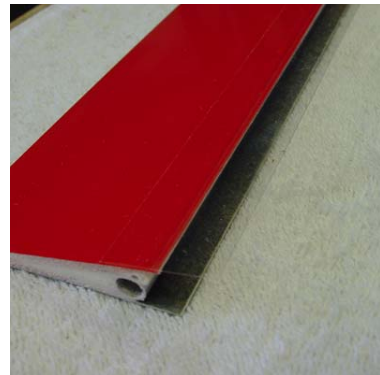
7. Install the gap seal tape on each flap or at this time install the plastic gap seal strips on each flap. Use the information below to help you decide which one to use.

    Gap Seal Tape Advantages (easier to install, easier to replace if needed, more aerodynamic)

Disadvantages (cannot lower flaps to 90°)

    Plastic Gap Seal Strip Basically just the opposite of above.

Construction

Wing Part II (cont.)

8. Sand the upper skin of the inner wing panel to a sharp taper. This will allow the gap seal to slide under the wing easier.

9. Tape the flaps onto the wings and install the flap linkages. Hook up the servos and the wing inner panels are almost completed.

10. Slide a piece of sandpaper between the aileron and top skin and sand until the aileron leading edge and the top skin are fairly sharp edges.
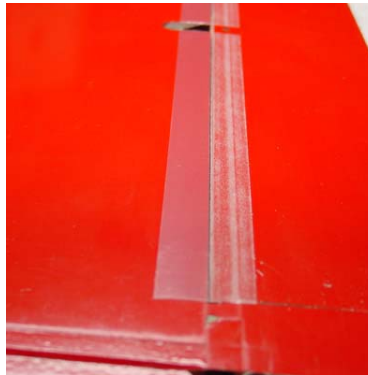

11. Install the aileron gap seal tape. Pull down on the aileron and slide the gap seal tape under the wing skin using the tip of your finger.

12. Install the threaded ball link into the aileron and install the aileron linkages. Hook up the aileron servos and the outer panels are almost completed.

Fuselage Part II

1. Cut the excess material off the hatch and sand up to but not touching the outer raised line.

2. Keep sanding and fitting until the hatch fits snuggly on the fuselage.

3. Put three dabs of 5 minute epoxy on the rear hatch bulkhead and place the bulkhead 1 1/2" away from the back edge of the hatch.

Construction

Fuselage Part II (cont)

4. Set the hatch on the fuselage and verify the fit, basically you have to hold the hatch in place until the 5 minute epoxy is cured enough to hold the bulkhead in position. Repeat steps 3 and 4 with the front bulkhead.

5. Once the 5 minute epoxy has dried use slow cure epoxy and a structural filler to create a fillet on each bulkhead. You can also glue in a eyebolt for a rubber band to retain the hatch.
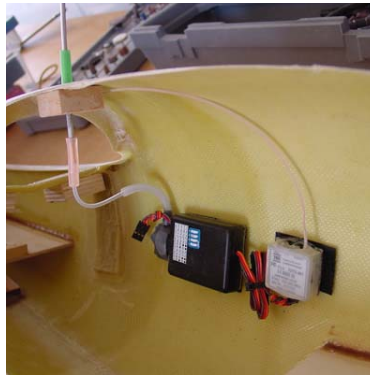
6. A Skymelody variometer installation is shown here as an example of how to mount a variometer. In this installation a fuselage mounted total energy probe is being used.

7. Since there are so many battery , switch, and receivers being used, it is left up to you to decide how you would like to mount yours.

Time to go fly!

Setup

CG Location

The initial CG should be set at 27 1/2 inches from the fuselage nose. The final CG location can be adjusted to your flying preferences through flight testing.

Control Throws

Ailerons: 5/16" up
                3/16" down

Flaps: 1/8" up
                90° down (as much as possible with gap seal tape)

Elevator: 1/2" up
                1/2" down

Rudder: 1 1/2" left
                1 1/2" right

Suggested Settings

Flaps: Mixed 25% of aileron travel
                Lowered 1/4" for thermal camber
                Lowered 1" for start/launch mode
                Raised even with wing bottom for speed mode

Ailerons: Mixed 100% with flaps for thermal camber
                Lowered 3/16" down for start mode
                Raised even with bottom of wing for speed mode

Elevator: Mixed 3/16" down with 90° flaps for landing mode

Rudder: Mixed 100% to aileron

Conclusion

The Super XC is a very competitive sailplane and has won many cross country contests. We hope you are very satisfied with your Super XC. If you have any questions or suggestions about the sailplane or this manual, please feel free to contact us.

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