

# TWISTED HOBBYS



## PUDDLE STAR

MOTOR: 2x 19-26g/1450-1750 Outrunner  
ESC: 2x 10-12 amp  
SERVOS: 4x 5-7g  
PROP: 2x 7x3.5dd or 7x6sf  
BATTERY: 3s / 650-850mAh

USA Distributor

**Twisted Hobbys**

[www.twistedhobbys.com](http://www.twistedhobbys.com)

RADIO: min. 4 channel  
WINGSPAN: 39"  
LENGTH: 39"  
AUW: 390 to 420 grams

# SAFETY NOTES

- Before assembling and flying this model, read carefully any instructions and warnings of other manufacturers for all the products you installed or used on your model, especially radio equipment and power source.
- Check thoroughly before every flight that the airplanes' components are in good shape and functioning properly. If you find a fault do not fly the model until you have corrected the problem.
- Radio interference caused by unknown sources can occur at any time without notice. In such a case, your model will be uncontrollable and completely unpredictable. Make sure to perform a range check before every flight. If you detect a control problem or interference during a flight, immediately land the model to prevent a potential accident.
- Youngsters should only be allowed to assemble and fly these models under the instruction and supervision of an experienced adult.
- Do not operate this model in a confined area.
- Do not stand in line with, or in front of a spinning propeller and never touch it with any object.

## IMPORTANT: PRIOR TO ANY ASSEMBLY

Please Note: after removing kit from shipping box, lay each piece flat on a hard surface, this will allow the airframe to straighten out if lightly bent from shipping. Do not worry since EPP is very pliable and can be bent back if out of shape.

# TWISTED HOBBYS

Website: [www.twistedhobbys.com](http://www.twistedhobbys.com) – email: [sales@twistedhobbys.com](mailto:sales@twistedhobbys.com)

**Thank you for your purchasing a Twisted Hobbys' model. Please read through the entire manual before beginning to build this model. If you have any questions please contact us at the above indicated email address.**

## WARNING INFORMATION

This R/C Aircraft is not a toy! Read and understand the entire manual before assembly. If misused, it can cause serious bodily harm and property damage. Fly only in open areas, and AMA (*Academy of Model Aeronautics*) approved flying sites. Do not overlook the warnings and instructions enclosed or those provided by other manufactures' products. If you are not an experienced pilot and airplane modeler you must use the help of an experienced pilot or an authorized flight instructor for the building and flying of this model aircraft.

These instructions are suggestions only on how to assemble this model. There are other ways and methods to do so. Twisted Hobbys has no control over the final assembly, the materials and accessories used when assembling this kit, or the manner in which the assembled model, installed radio gear and electronic parts are used and maintained. Thus, no liability is assumed or accepted for any damage resulting from the use of the assembled model aircraft or from this instruction manual including but not limited to direct, indirect, incidental, special, and consequential damages. By the act of using this user-assembled product, the user accepts all resulting liability. In no event shall Twisted Hobbys' liability exceed the original purchase price of the kit.

## SHIPPING DAMAGE

Twisted Hobbys checks each plane before shipping to ensure that each kit is in fine condition. We have no bearing on the condition of any component parts damaged by use, modification, or assembly of the model. Inspect the components of this kit upon receipt. If you find any parts damaged or missing, contact Twisted Hobbys immediately. We will not accept the return or replacement of parts on which assembly work has already begun. Twisted Hobbys reserves the right to change this warranty at anytime without notice.

## OUR MISSION

To provide the best products and service to our customers at the lowest prices possible. We take great pride in our company, our commitment to customer service and in the products we sell. Our online store is designed to provide you with a safe and secure environment to browse our product catalog.

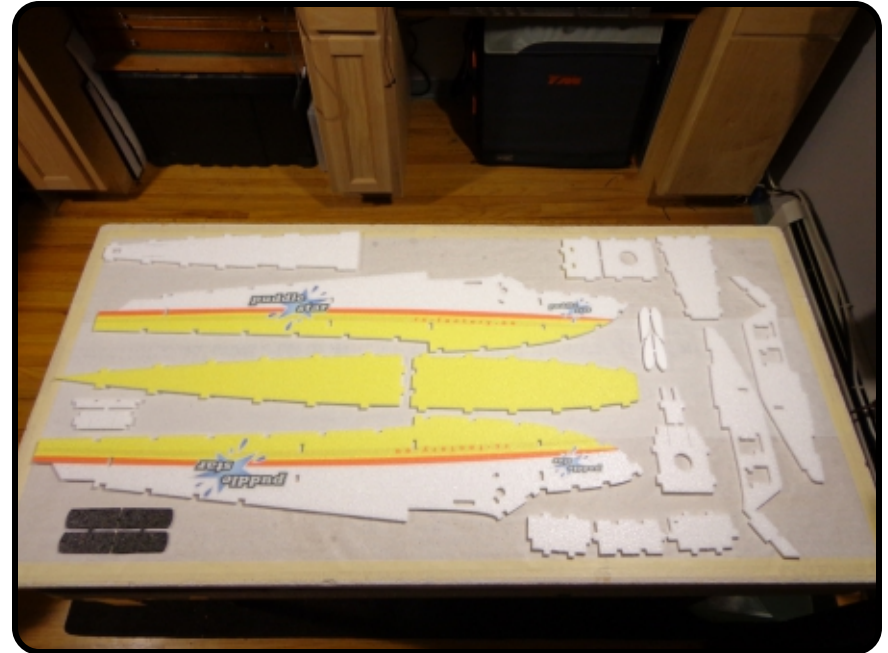
**Thank you for shopping with Twisted Hobbys!**

# KIT CONTENTS



## Wings, SFG's and Tail Surfaces

Double check that you have all the above pictured items. Note - Some kits might have slight deviations from the above pictured items.



## Fuselage Parts

Double check that you have all the above pictured items. Note - Some kits might have slight deviations from the above pictured items.

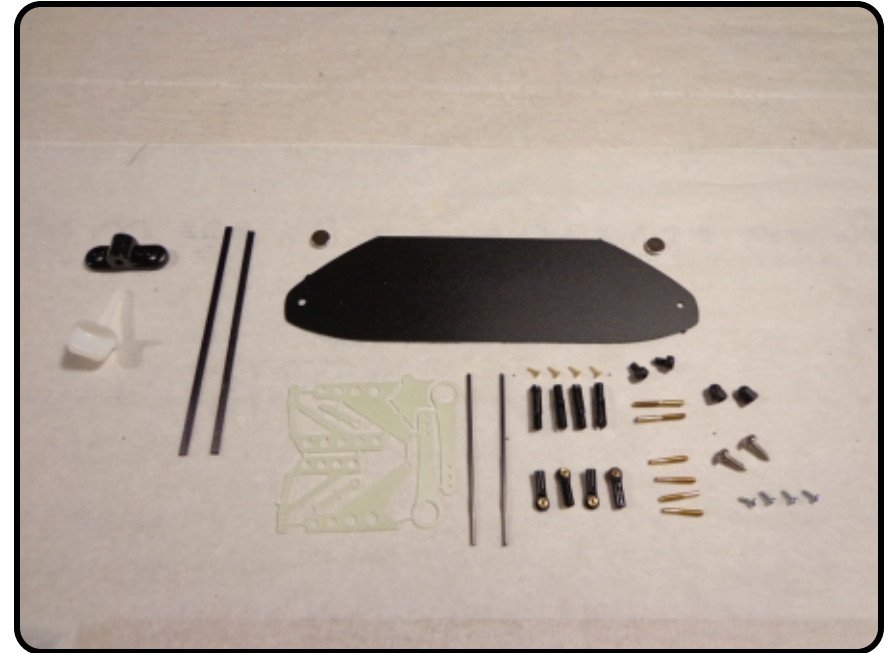


# KIT CONTENTS (CONT.)



## Plywood and Hardware Kits

Double check that you have all the above pictured items. The Hardware kit items are detailed to the right.  
Note - Some kits might have slight deviations from the above pictured items.



## Hardware Kit Detail

Double check that you have all the above pictured items. Note - Some kits might have slight deviations from the above pictured items.

# TOOL AND ADHESIVES NEEDED



Tools shown and listed are suggestions only. Depending on your building technique you may not need everything indicated – and/or – you may find that other tools available to yourself may be of benefit to your Build.

It is also recommended that you have a flat building surface, one that will accept stick pins and push pins. An Acroscopic Ceiling panel from your local hardware store fits this bill nicely, and will lay flat on your work table. Over size / long push pins are available at your local craft store. These two items are by no means required, but will aid in the building process, and can be used for future projects

- **Lighter**
- **Small Drill Bits**
- **Tape Measure and Ruler**
- **Black Sewing Thread**
- **Welders Glue**
- **Hobby Knife w/new Blade**
- **Needle Nose Pliers**
- **Wire Cutters**
- **Low Temp Hot Glue Gun**
- **Course Sand Paper**
- **Scissors**
- **Small Phillips Screw Driver**
- **Thin and Medium CA**
- **CA Applicator Tips**
- **Activator**

# THE BUILD

## CONSTRUCTION METHODS:

Building surface should be at least 2ft x 4ft and flat. Weights or some small heavy objects will be handy for holding things in place during the time glue is setting.

Welders glue is used for FOAM TO FOAM joints. Thin and Medium CA are used on the PLASTIC TO FOAM and CARBON TO FOAM joints. **When using the Welders glue for a butt joint, apply a thin film to each surface, allow to sit for approx five minutes and then assemble.** Note that this method will create a nearly instant bond, so locate carefully when bringing the two pieces together. **If alignment is necessary or a slip joint, do not allow the glue to tack up,** simple apply and join immediately, you will have several minutes to locate the two parts before the glue sets up. In most cases the parts being glued can be handled with care in 30 minutes, full cure is approx 24 hours.

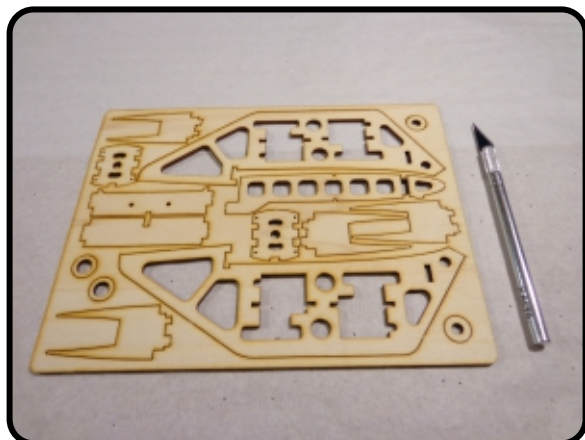


The above picture items will be needed to finish the model. A power combo (Twisted Hobbys' Combo pictured above), a 3s/650-850mAh battery and a fresh tube of Welders. Note - the Battery and Welders are NOT part of the power combo.

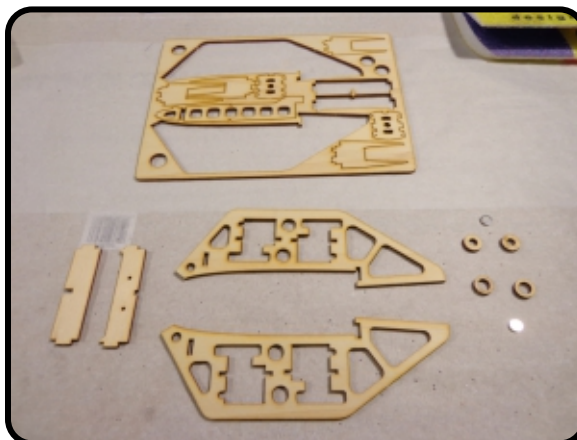


Start the build by locating the two wing halves, the elevator and the rudder. Fold back as shown and weigh them down for about an hour. This will loosen up the hinge line and allow the surfaces to move much more freely. The wing hinge will be stiff... work it slowly so it doesn't tear

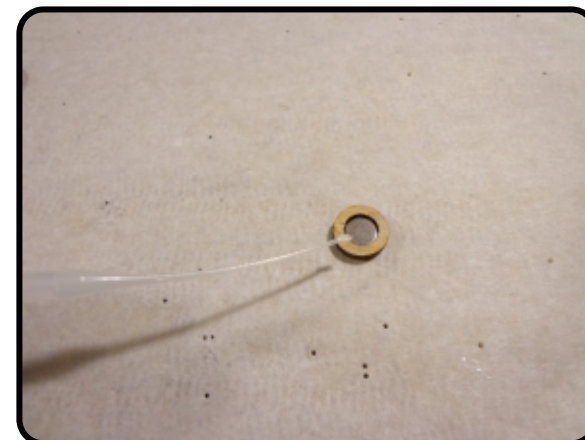




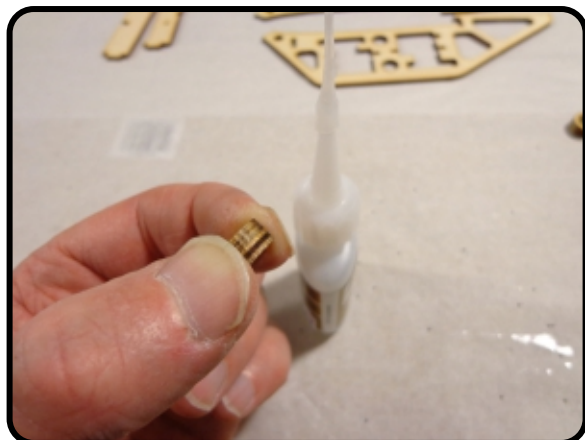
Locate the wood kit and mount a fresh blade into your hobby knife.



Cut out the Fuselage Doublers, the Wing Mount Cross Members and the little round Magnet Holders. Also locate the magnets from the hardware bag.



Press a magnet into the Wood Holder (the one with the larger hole). Make flush with one side. Glue with Med. CA and Kicker.



With thin CA, attach the round piece with the smaller hole to the side you made the magnet flush with.



Repeat for the second side.



The magnet assembly installs with the smaller hole to the OUTSIDE of the fuselage.





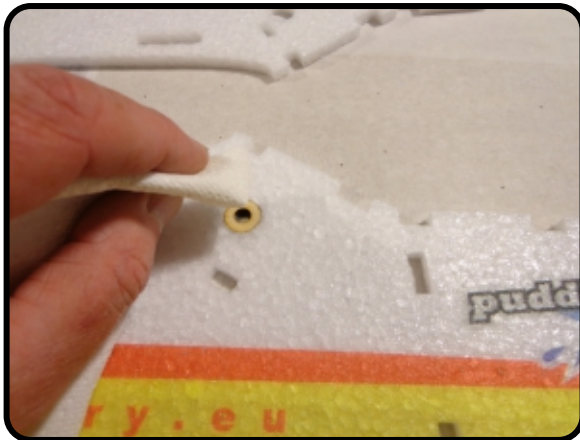
Coat the inside of the magnet hole in the fuselage with a little Welders.



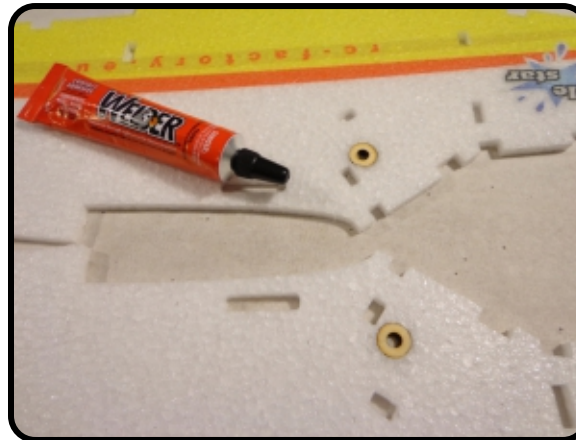
Install as shown, again remembering that the smaller hole is facing out.



Press into the hole... should be flush to both the inside and outside of the foam fuselage piece.



Wipe away any extra Welders



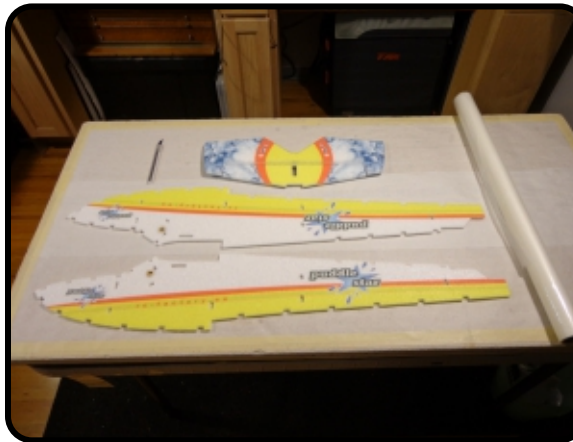
Repeat for the other side.

### **LEVEL OF WATER PROOFING**

At this point in the build you should decide what level of water proofing you will do. If you plan to spend a fair amount of time flying off water, a more robust “waterproofing” (waterbug) build would be in order. The occasional water use... 2 or 3 times a season, the standard (grasshopper) build would be sufficient. If you never intend to fly off the water, omit all the build steps that install film or require water proofing. The only thing you will want to do is coat the bottom of the fuselage with some clear duct tape or similar tape.

## **LAMINATING BUILD TIPS**

There are many different thickness and brands of laminate material out there. You should use a laminate that has a low heat activated glue. As an extra step to insure a robust bond of the laminate to the foam, 3M 77 Contact Spray glue can be used to "dust" the area in which you will apply the laminate to. Note, it does not take a lot, a quick single pass at 10 to 12 inches is plenty, more is not better in this case. Also, it is advised to TEST your procedure and iron temperatures on a scrap piece of foam and not your model.



Waterbug Build Only - Locate the pieces shown, these are the items that will get the laminate. Skip all the steps labeled "Waterbug" if only occasionally flying off the water.



Waterbug Build Only - cut a piece of 1.5mil heat laminate material that will cover the bottom of the elevator



Waterbug Build Only - Cut one piece each for the fuselage sides



Waterbug Build Only - ON A TEST PIECE OF FOAM, IRON ON A SMALL PIECE OF THE LAMINATE (DULL SIDE IS THE STICKY SIDE) AND EXPERIMENT WITH TEMPERATURES



Waterbug Build Only - The laminate material will shrink like monokote and will bow the foam if not careful. Only the bottom of the elevator needs it. Start in the middle and work outward





Waterbug Build Only - Once you are happy with the film application, Trim around the perimeter of the elevator, and cut away the area for the hinge bevel. A fresh blade should be used.



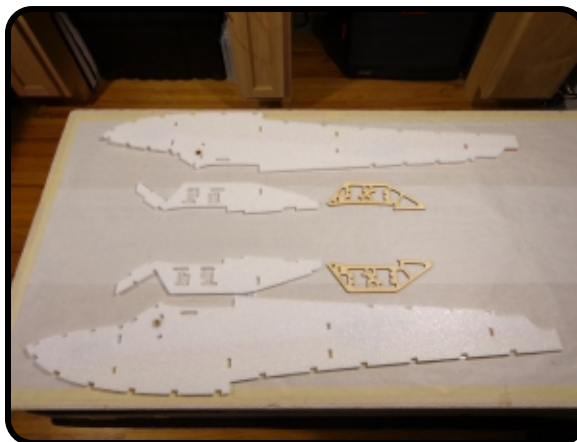
Waterbug Build Only - Once everything is trimmed up, seal all the edges.



Waterbug Build Only - Repeat the process with the outside surface of the two fuselage pieces. Again, starting from the center and SLOWLY working towards the tail and nose



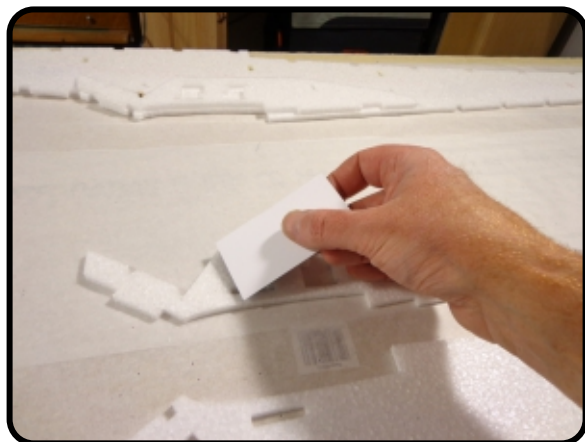
Waterbug Build Only - When complete, trim as with the elevator. NOTE - Do not cut the film away from the notches. Leaving them will provide covering for the mating tabs later in the build



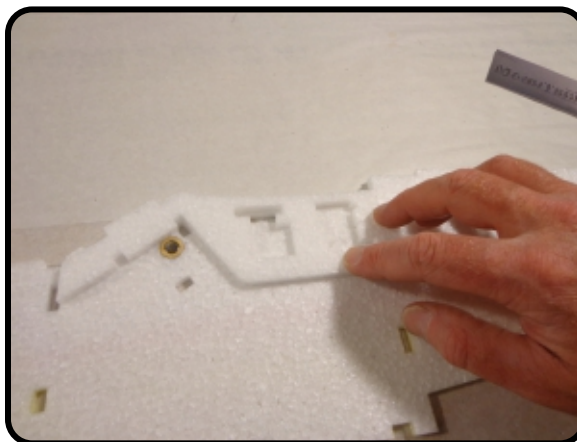
Locate the foam and plywood fuselage doublers as pictured above.



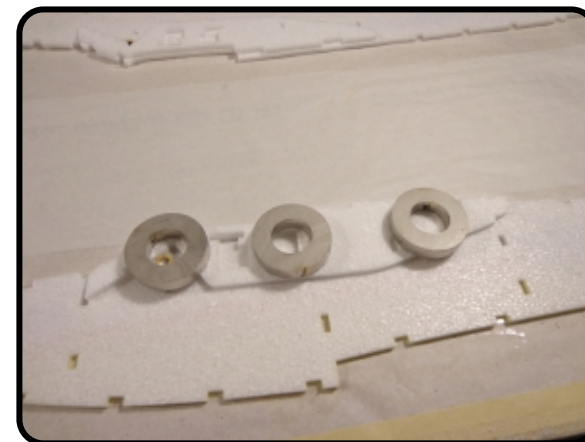
Lay down a small bead of Welders all around the foam doubler.



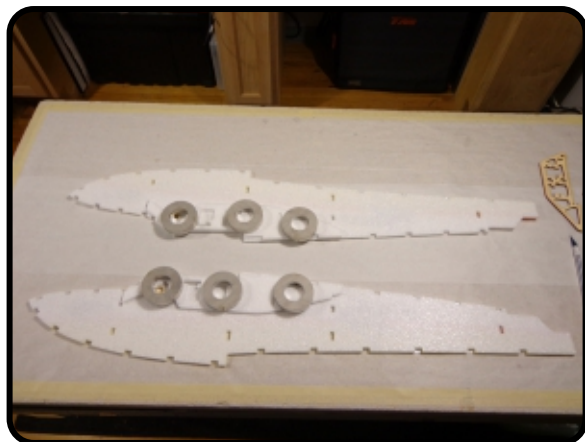
Spread the glue out evenly so that it coats the whole surface. Use an old business card or something as a spreader.



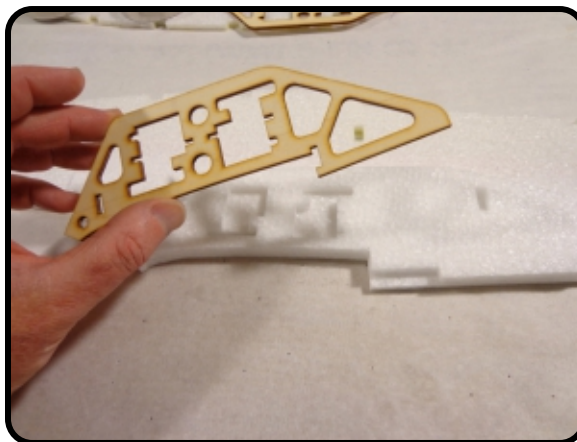
Attach to the inside of the fuselage. NOTE - it is VERY important to line up all the notches and edges of the two pieces.



The foam doubler will curl up a little as the Welders dries, so secure everything flat with some weight for an hour or two.



Repeat for the other side, again, use some weights to keep it all flat while drying.



Locate the wood fuselage doubler. Now is also a good time to verify that your servos fit into the cutouts. If not, file the wood doubler a little until they fit.

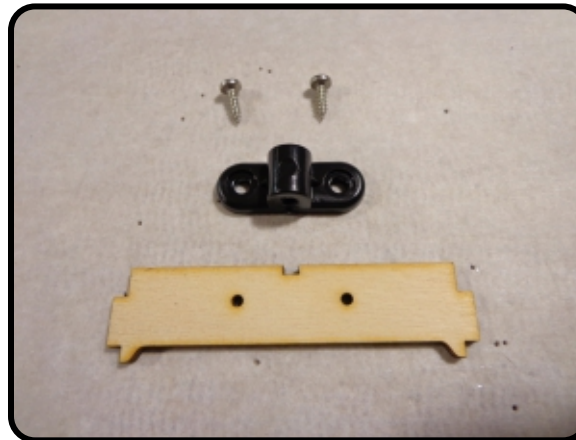


Apply a medium coat of Welders to one side. You can use the tip of the tube to evenly distribute the glue. And as with the foam doubler, make sure the inside edges line up where intended.





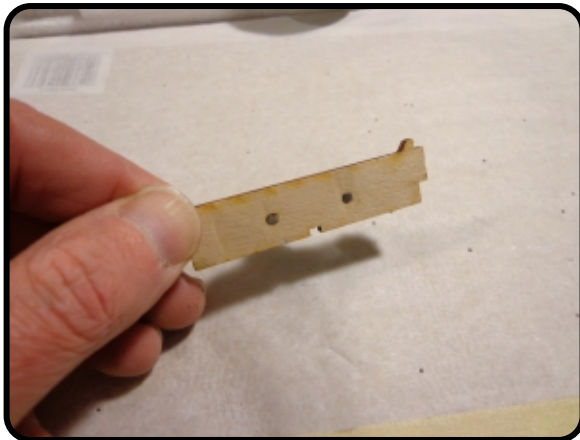
Repeat for the other side and put all the weights back until everything has had time to dry.



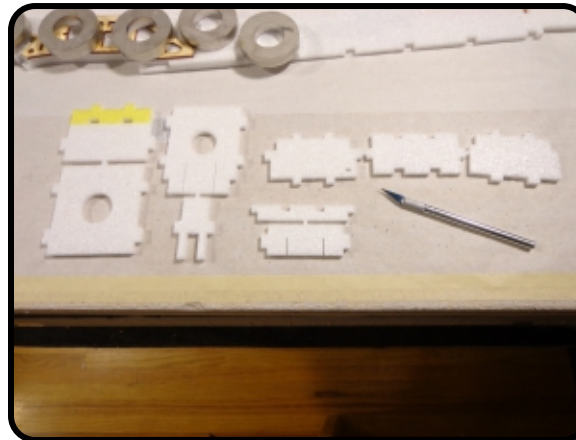
Locate the parts shown above.



Attach them and cut off the extra length of the screws so they are flush



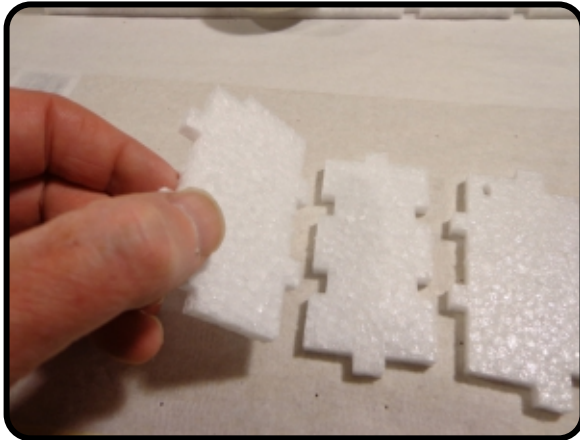
Add a drop of thin CA from this side and hit with Kicker. This will keep the screws from backing out over time.



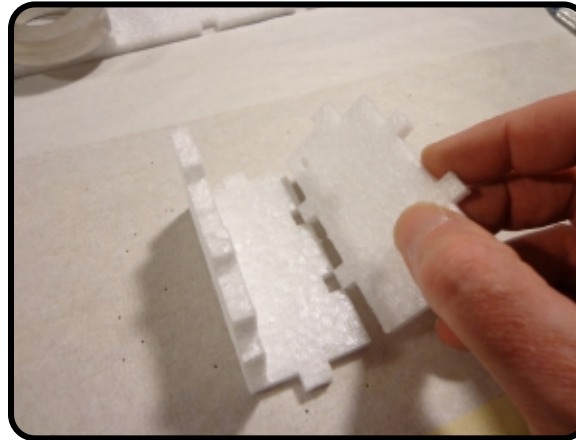
Locate all the internal bulkheads and separate them into their individual pieces.



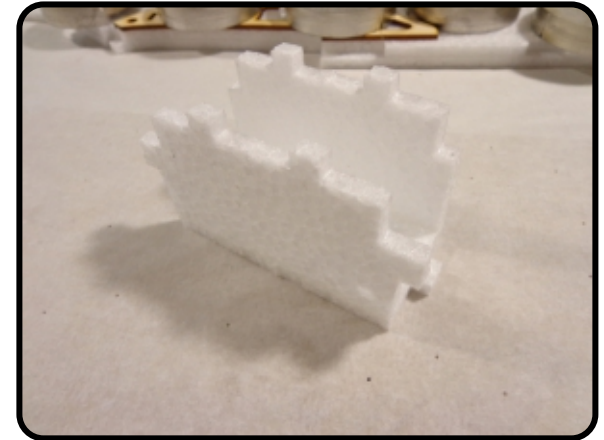
Start with the pieces shown above. This will assemble into the Battery Box.



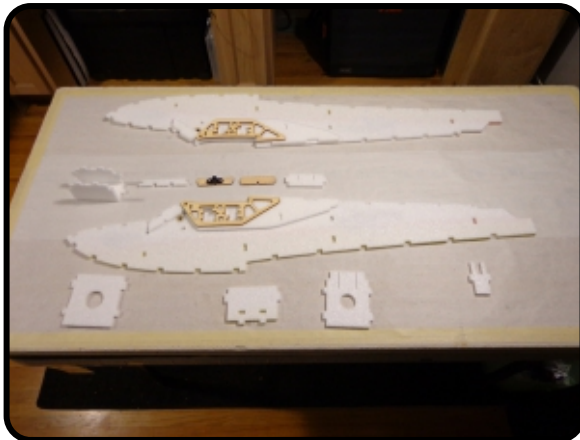
Note the orientation of the parts, Tabs are keyed, but in some cases there is more than one way to put these together. Note the location of the little hole on the piece to the right.



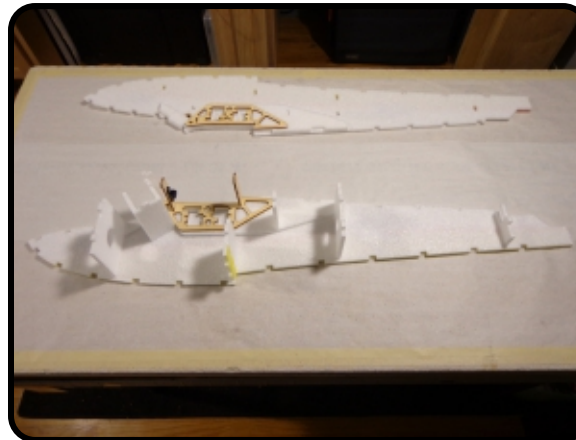
This piece installs as shown. again notice the little hole.



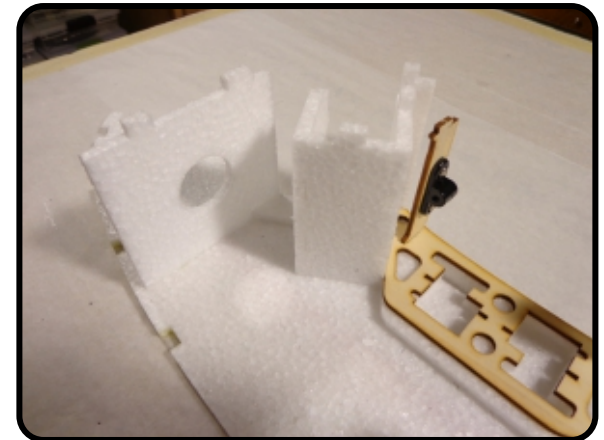
Once you get it all together and you are happy with the fit up, re-assemble with Welders.



After the main fuselage pieces have had time to dry, locate all the parts as shown and notice how they are all laid out, this will be the general position in the fuselage.

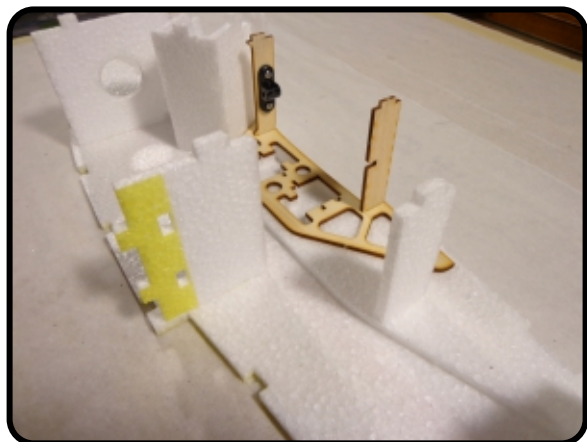


DRY FIT - all the bulkheads to one side of the fuselage as shown.

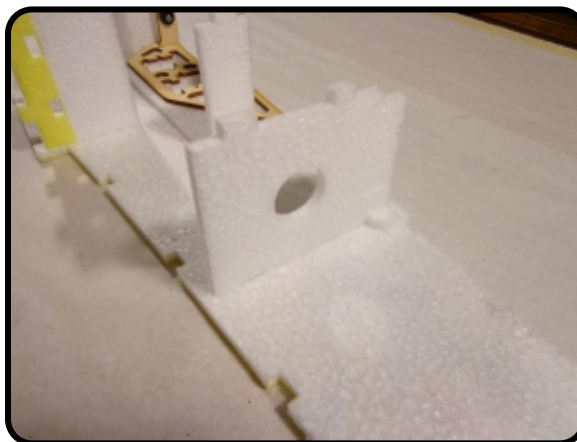


DRY FIT - Notice the orientation of the front bulkhead, the battery box and the forward wing mount cross member.





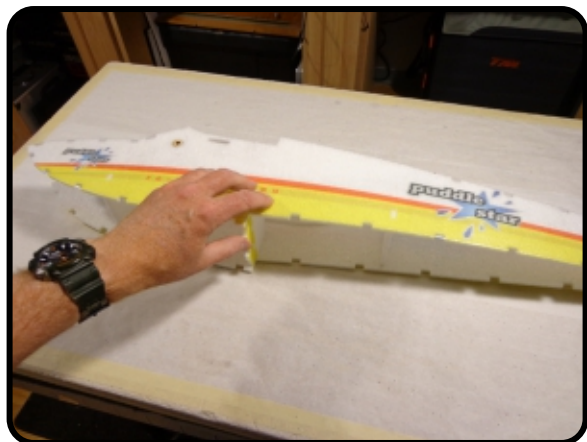
DRY FIT - Notice the orientations of the rear wing mount cross member and bulkheads shown.



DRY FIT - the main rear bulkhead.



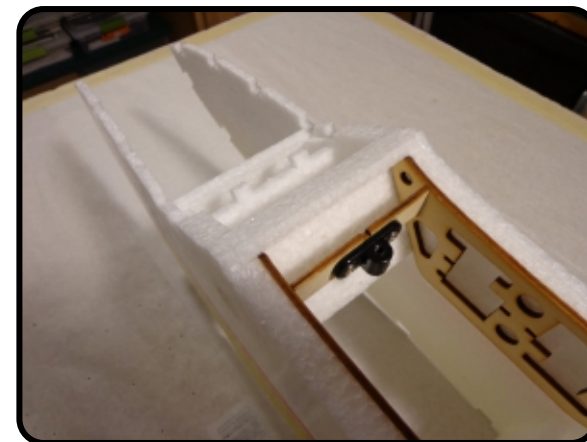
DRY FIT - the tail section bulkhead.



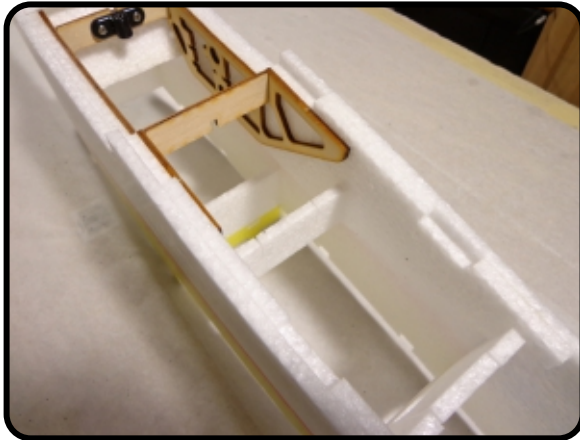
DRY FIT - the other side of the fuselage. Start from the tail and work all the tabs and notches so that they are all engaged and fully seated.



DRY FIT - looking down from the top, everything should be pretty square as assembled if all the tabs and slots have mated up properly.



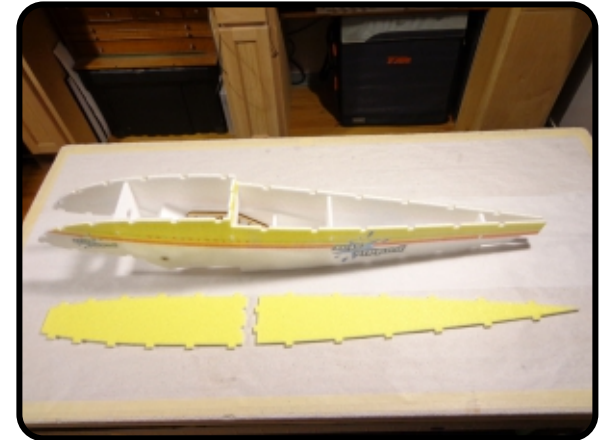
DRY FIT - Close up of the front wing mount cross member installed.



DRY FIT - close up of the rear wing mount cross member installed.



DRY FIT - Close up of the tail section.



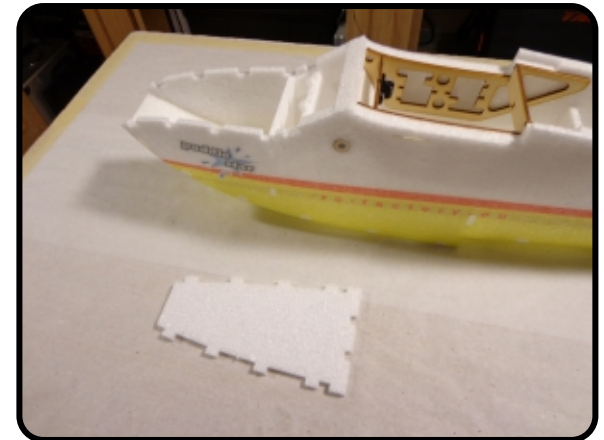
DRY FIT - Locate the belly parts shown.



DRY FIT - the belly pieces into their location. If everything is assembled correctly up to this point there should be no trimming needed.



DRY FIT - the bottom front section.



DRY FIT - the upper nose cover.





DRY FIT - Notice that one side is relief cut so that the part will bend easily and fit the designated area.



DRY FIT - Look carefully at the nose, you will see that there is a little interference were the two pieces come together. Trim an angle onto the lower piece, go slow and test fit often.



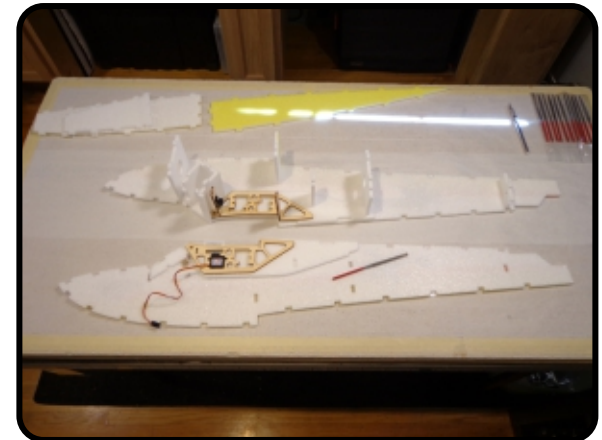
DRY FIT - When you have removed enough material from the edge of the lower piece, the top and bottom nose pieces should fit up as shown.



DRY FIT - Look everything over, make sure that it has all gone together square, that all tabs are fully engaged and that you have correct orientation of all the bulkheads.



If you are satisfied with the fit up of all the parts, take everything apart, remembering how it all went together.



Double check that the servos fit. Do not glue them in at this time, just make sure the fit nice.



Close up of how the servo should be seated into the cut out in the wood. Once you are happy with the fit up, remove the servos from their positions.



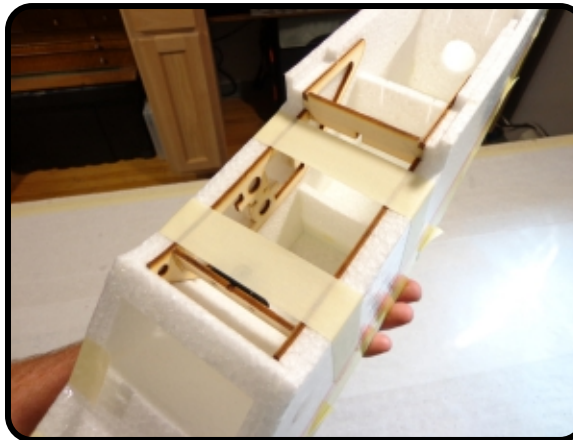
Start the re-assembly of the fuselage by putting Welders on all the mating surfaces between the bulkhead parts and the fuselage sides.



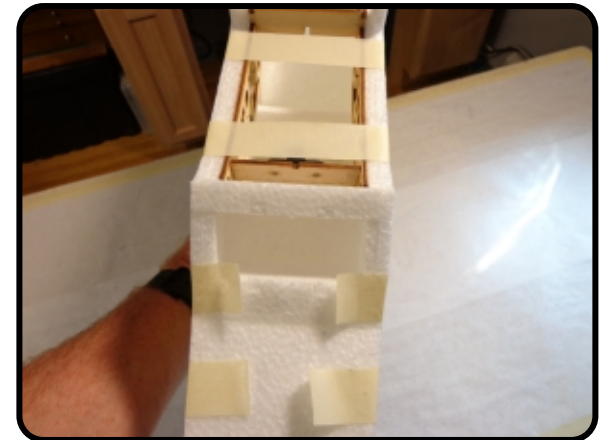
Then install the bottom and use masking tape to hold all the parts in place.



Nose pieces shown, again masking tape being used to hold all the seams together while the glue dries.

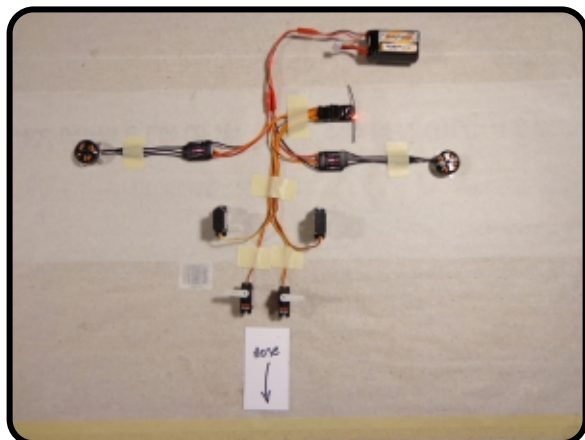


Wing saddle area. Also use some masking tape here to keep all the cross members tight in their slots.

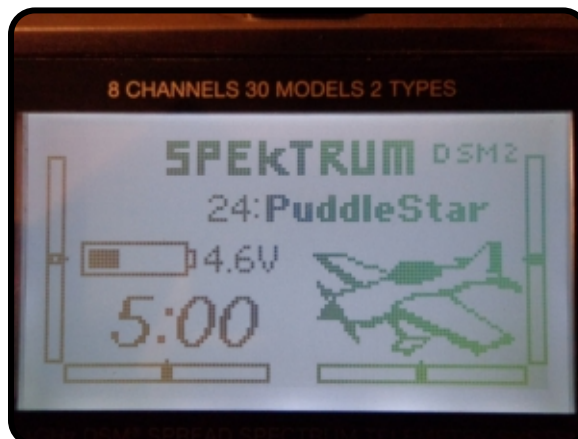


Front section / battery box area shown above, with masking tape holding everything together. Set the fuselage aside now for a couple hours so that the glue can dry.

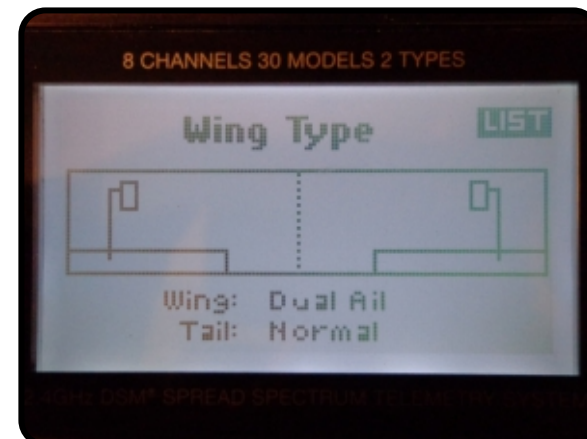




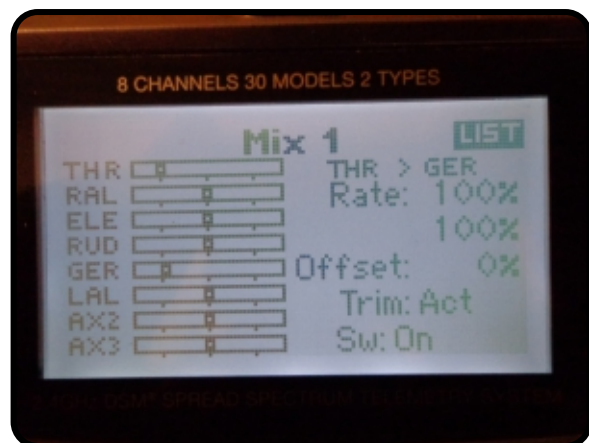
If you have not already done so, now is a good time to test your electronics. Above is a picture of a typical layout for this model.



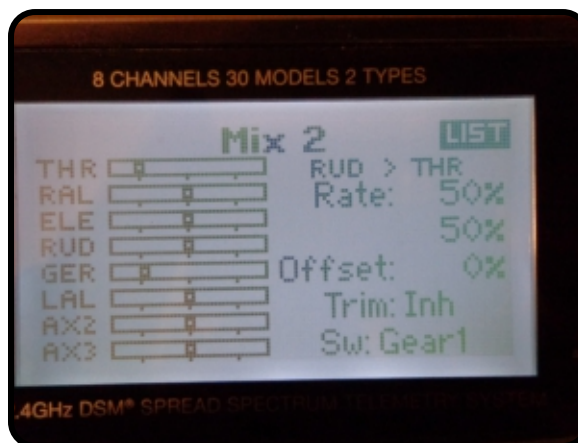
Create a new model on your radio and bind per your mfg's procedures. The next couple steps will show how to mix in another channel for the second motor and which wing conf. to use.



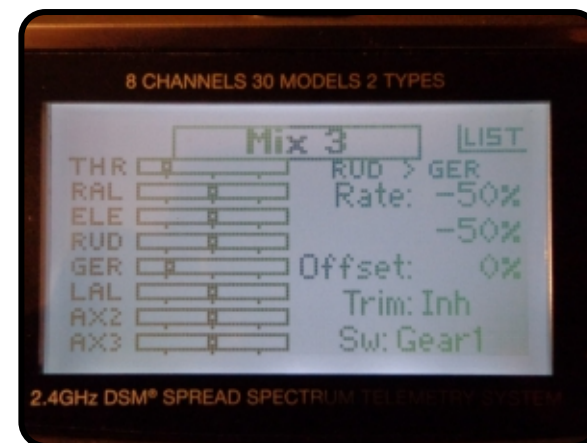
**WING TYPE**  
For this model, pick the "Dual Ail" wing type and "Normal" tail type.



**MIX 1**  
Used to control throttle of motor #2 (gear channel). Right motor (starboard) is plugged into the throttle channel and the left (port) motor into gear channel.



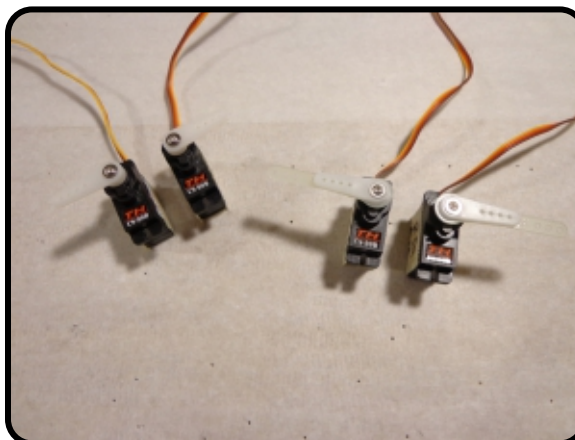
**MIX 2**  
Used to mix right (starboard) motor with rudder, with rudder being the master.



**MIX 3**  
Used to mix left (port) motor with rudder, with rudder being the master.



Glue the arm extenders onto the back side of the single sided servo arms. CA or Welders. Wrap with thread for extra strength. Large hole may need enlarged depending on your servos.



Make sure the servos are electronically centered and mount the arms with their screws as shown. Servos with extenders are for the ailerons, the other two are for the tail surfaces.



If a couple hours have passed already, the fuselage should have dried enough now to handle. Carefully remove all the tape. Check for any loose or open seams.



Waterbug Build Only - remove the plastic covering from the slot in the fuselage where the aileron control arms will protude.



Install the aileron servo as shown, with the arm extending thru the fuselage.



Install the rest of the servos. NOTE - the arms for the tail servos face to the INSIDE. Also, do not glue the servos in at this time.

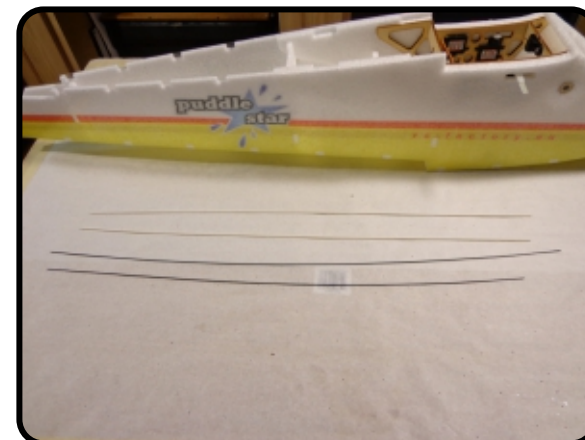




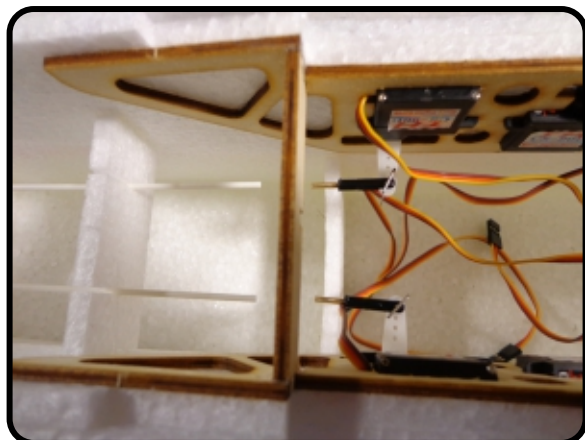
Locate the four small plastic links as shown and the small (1mm ID) threaded ends. Thread the links on so that there is approx 1/8" of THREAD still showing for adjustment if needed.



TEMPORARILY mount the links onto the elevator and rudder servo horn's outer most hole. Use a stick pin or other item that will drop thru the hole of the connector and horn freely.



Locate the 1mm round push rods and the white push rod guide tubes as shown.



Press the push rod GUIDES into their respective bulkhead slots. They should line up perfectly when fully seated. Leave a 30mm gap between the end of the guide and the end of the ferrule.



Secure the rod guides with a drop or two of medium CA at each of the bulkhead points... hit with Kicker.



Locate the upper rear deck of the fuselage.



Feed the push rod guides thru the slots, making sure that they do not get crossed in the process.



Dry Fit and when happy with how everything lines up, remove and add Welders to all the mating surfaces.



Use some small tabs of tape or stick pins to hold things in place while the glue dries.



Locate the tail sections and the G10 kit with the control horn on it.



Cut out the two horns for the tail, the shorter one with the 4 large lighting holes is for the elevator, and the longer one with 5 holes is for the rudder. Cut the partial slit all the way through.



Test fit that you have made the slit long enough.





With the nozzle of the Welders tube, force some glue into the slit, and also apply a thin coat to the mounting area of the horn.



Install the horn, wipe away any extra glue, bend part of the elevator up and use the crease in the foam as a reference to line up the holes in the horn to, as shown above.



Check on the hinge cut out side that the profile of the horn matches the profile of the hinge cut.



Locate the slit on the rudder, should be on the hinge cut side. Make a slit all the way through. NOTE - the horn will get installed from the OTHER SIDE.



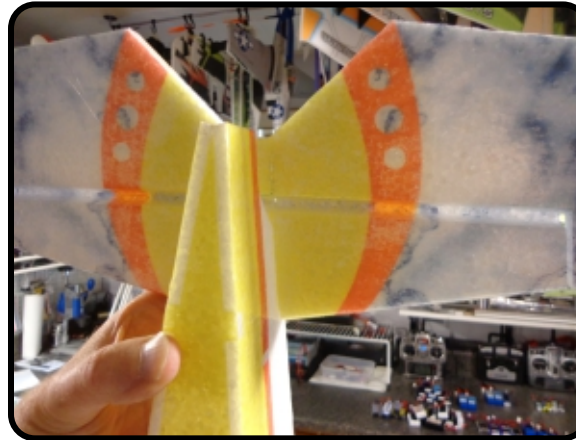
Flip the rudder over so that the smooth side of the hinge area is facing you and with the nozzle of the Welder's, force some glue into the slit and coat the base of the horn...



.... install the horn into the slit and repeat the process of lining it up like was done with the elevator.



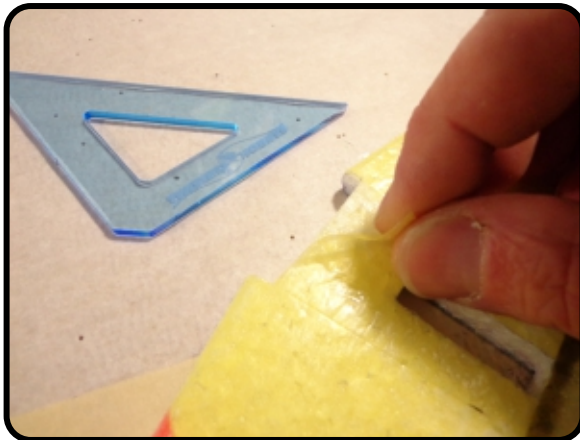
Double check that the profile of the horn is matched up with the profile of the hinge cut.



Waterbug Build Only - hold the elevator up to the fuselage and take note of where the two meet up.



Waterbug Build Only - remove the laminate material in the area noted. This is being done so that there will be a foam to foam joint when the two pieces are glued together.



Waterbug Build Only - Once you have slit/scored the laminate, you can peel it away.

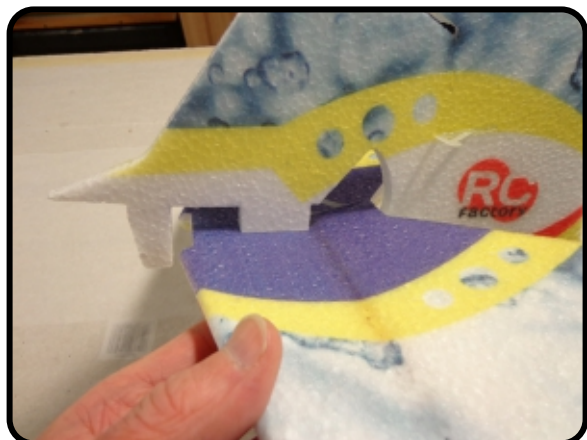


Next... we will glue the elevator and rudder together.



Slide the tab of the rudder into the slot of the elevator... no glue yet.





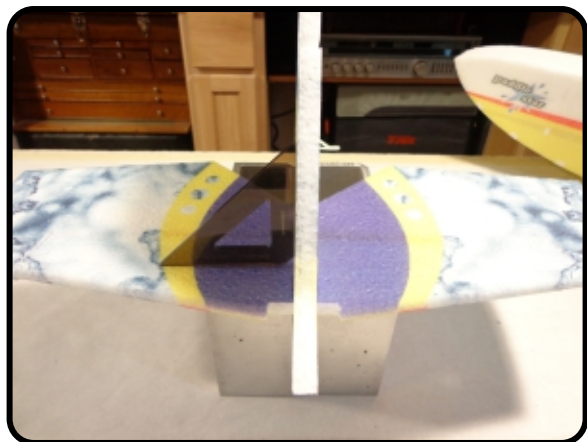
When you get to about an inch of clearance, stop there...



... and add some glue to the areas that will contact each other



Fully engage the two pieces, wipe away any extra glue.



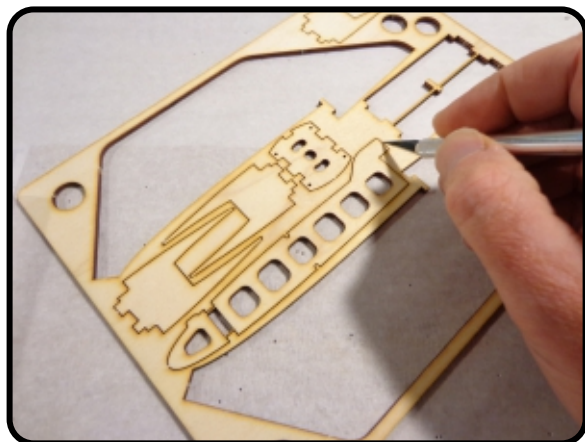
Make sure that the two pieces are square to each other.



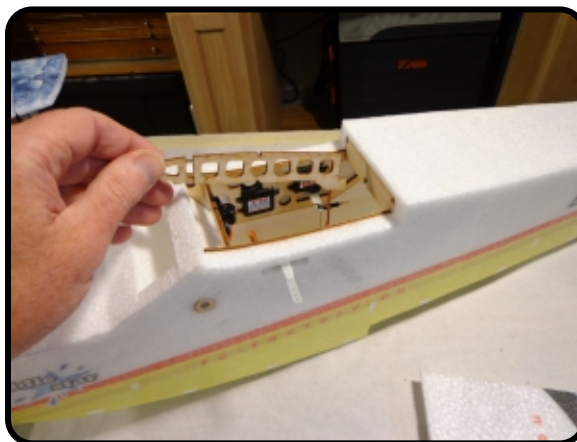
Set aside and let the glue set up.



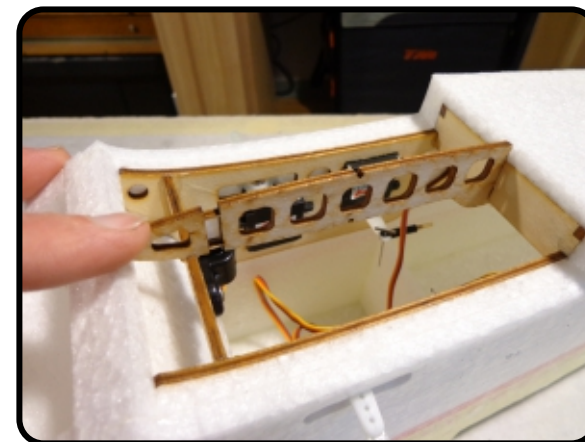
While the tail is curing... locate the two wing halves and the wood parts kit.



Remove the center wing rib from the kit as shown above.



Test fit the rib into the fuselage as shown.



The rear tongue and front tab should both engage without any force.



Note how the open area of the wing rib lines up with the center of the black plastic nut flange. Later, the included plastic thumb screw will pass thru this area and hold the wing in place.



Use the Tack Up Method.... coat one side of the rib and the mating surface of the wing core with a medium skim coat and let sit for about 5 minutes.

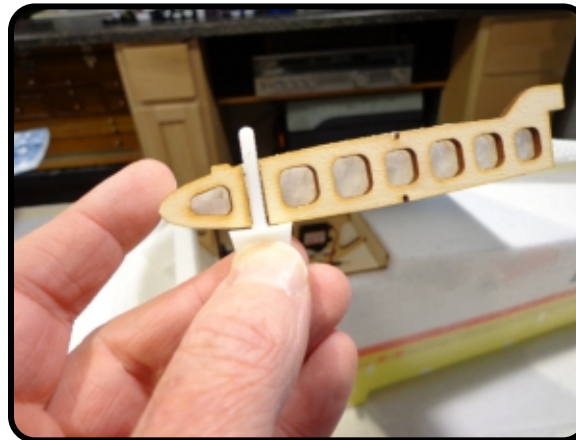


Once the glue has tacked up, attach the two pieces. If the profile or the rib does not match perfectly to the wing, use the REAR and BOTTOM edges as the ones to line up flush with.





Snip away the little connector spacers.



The Wing Mounting Screw should pass through freely.



Using the tack up method again, coat the mating surfaces with a medium skim coat of Welders and allow to tack up.



Once the Welders has tacked up, bring the two pieces together. Make sure to align them as accurately as possible.



Once the tail section has dried, it can be attached to the main fuselage. Test fit everything first, so you know how it all goes together.

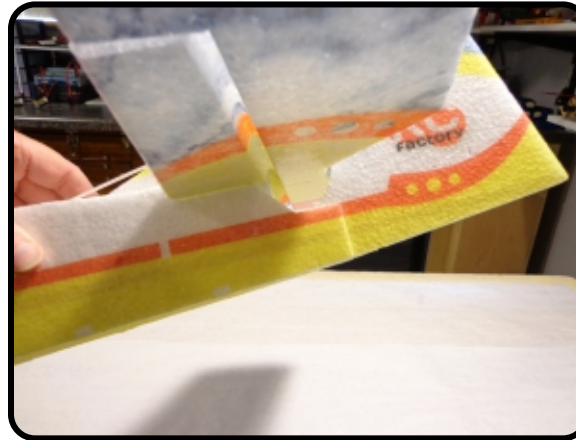


Make sure the push rods are on the TOP of the elevator.

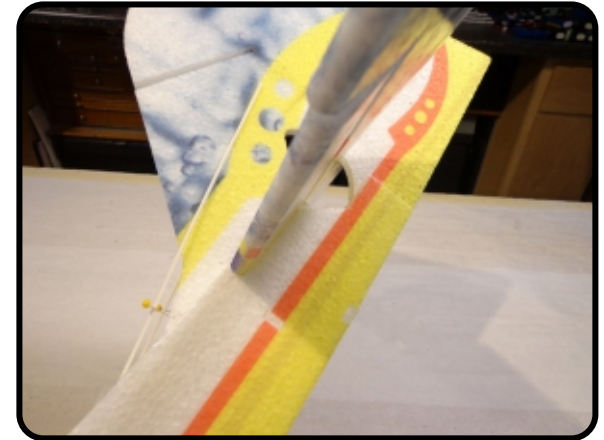




Line up the front rudder tab with the slot in the upper fuselage deck.



Fully engage the tabs of the rudder into the fuselage. Check to make sure all the surfaces are meeting up flush.



Once satisfied with the fitment, remove and add Welders to all the mating surfaces and re-install while the glue is wet.



Check for Squareness



Sight down the fuselage and make sure the tail section is true in all directions.



Round up the thick carbon rounds, a straight edge, a measuring device and a hobby knife with a fresh blade. The tops side will be done first.



The object is to cut a slot in the wing to receive the carbon round. Notice that there is a notch in the wing rib that is provided as clearance for the carbon round.



Using the notch as a reference, line up your straight edge so that it passes thru the notch and is parallel to the wing. If using the leading edge slot as reference it should be approx 8mm.



Adjust back and forth until you have the exact same measurement on both sides of the wing.



Hold the straight edge firm and cut a slot approx 2mm deep that is slightly longer then the round and centered from side to side. Test fit the round into the slot, it should be just below flush.



Remove the rod and force Welders into the slot with the nozzle of the tube. If there is a bunch of built up glue on the nozzle, clean that off first so that the nozzle will "glide" along the slot.



Lay the carbon round back into the slot so that it is just below flush.





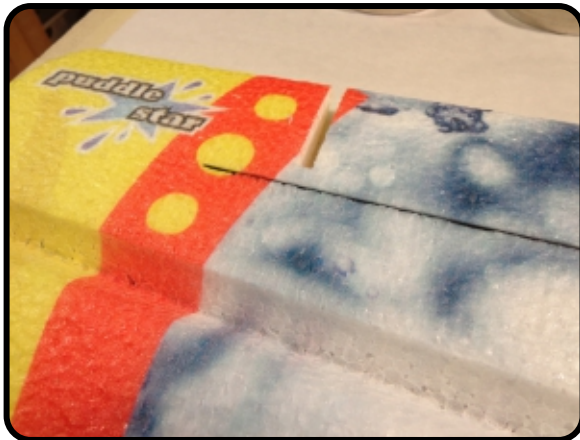
Wipe away any extra glue with a paper towel. Just go over it once. Repeated passes will mess up the printed graphics.



Repeat for the bottom side... cut a slit 2mm deep that is parallel to the wing....



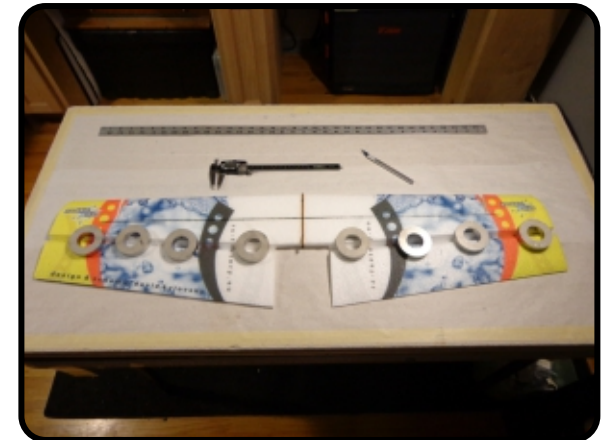
..... squeeze in some Welders....



.... lay in the carbon round to just below flush...

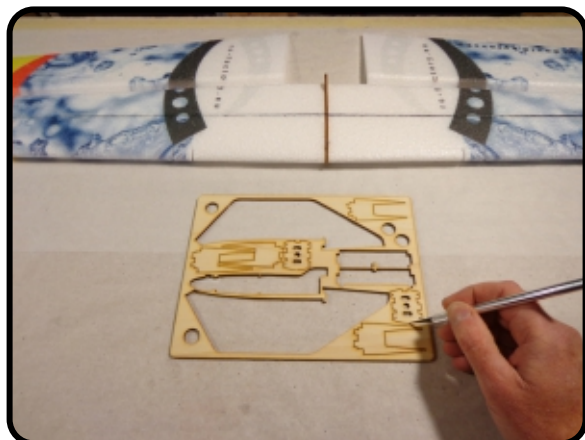


.... and wipe away any extra glue with a single pass.



With the bottom side facing up, make sure the wing lays flat. Add a little weight to the area around the hinge line and let it all dry.





Locate the wood parts kit and remove the remaining parts, which should make up the motor mounts.



Dry Fit - Notice that there is a notch on the firewall part, this is the BOTTOM, locate the wing pieces into their respective slots, so that the firewall can be mounded as shown above.



Dry Fit - Do both sides, making sure that the wing pieces are fully engaged into the provided slots.



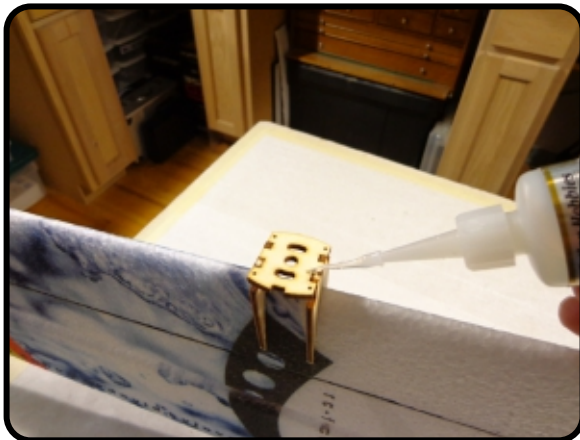
Inspect to make sure that the notch in the firewall is at the bottom.



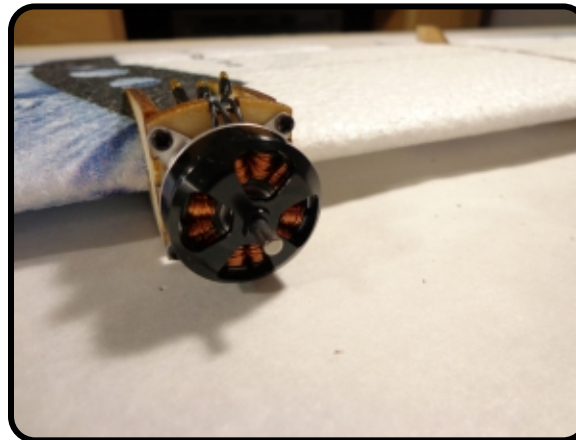
Make sure everything looks good from the front....



... and from the side. Notice that both firewalls are inline with each other. It should also be noted that the firewalls are pointing slightly upward, this is by design and is correct orientation.



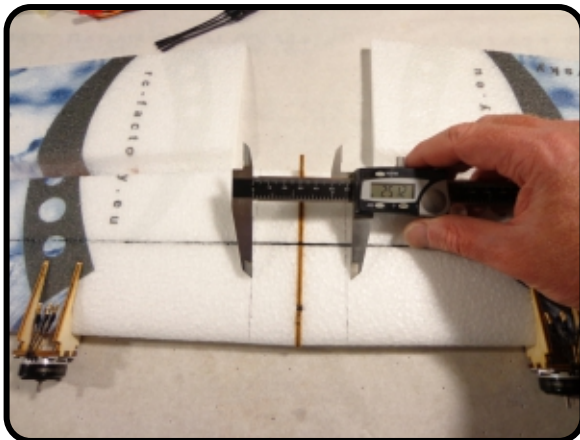
Secure all the parts to one another and to the wing with thin CA and Kicker.



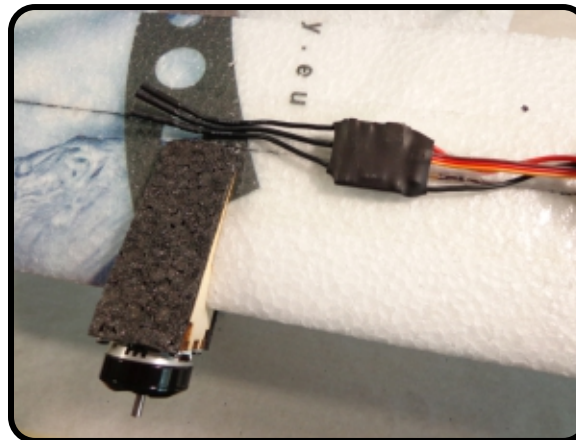
Using the screws provided with the motor, mount the motors to the firewall. If using the TH Power Combo motors, drill the holes out to 1.5mm, this will keep the wood from splitting.



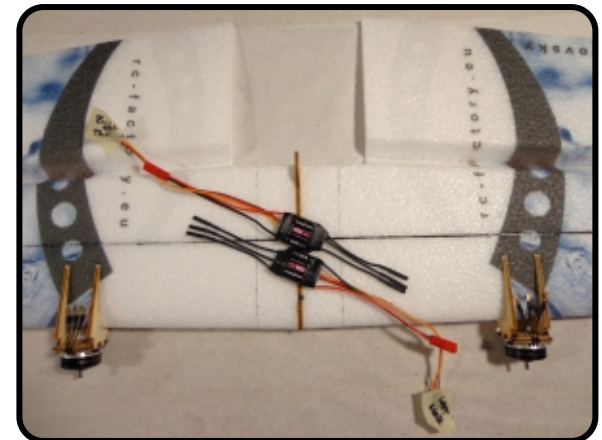
Repeat with the other motor.



From the bottom of the wing, mark off an area that is approx 2.50" wide and centered on the rib. This is the area inside the cabin.

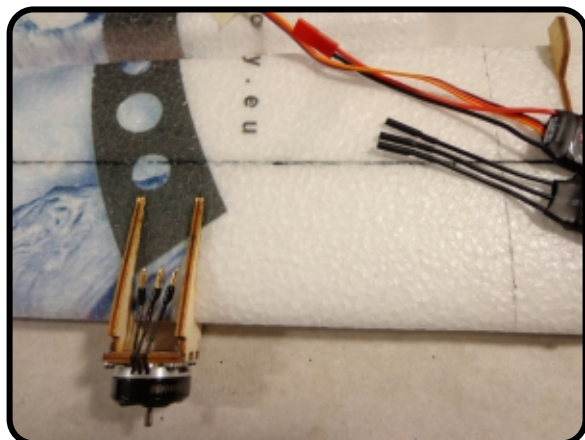


If deciding to mount the ESC's outside the cabin area, no motor extensions would be needed. Water proof them, and make sure the wires are buried where the cross into the fuselage.



As an option, the ESC's could be mounted inside the cabin area, approx as shown above. Extension wires would be needed and for safe measure the ESC's should still be water proofed.





If choosing to mount the ESC's in the cabin area, some short extensions will need to be made up, this will be done shortly in an upcoming step.



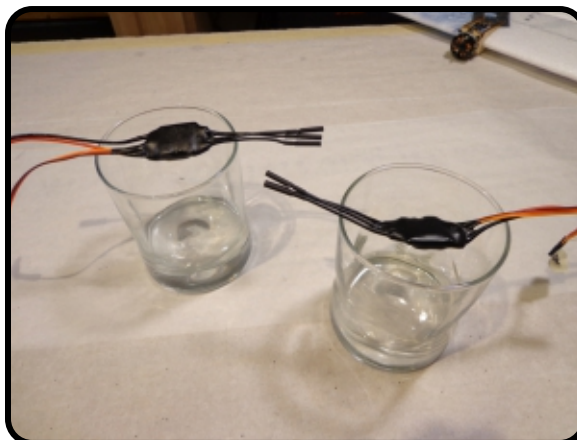
Water proofing the ESC's and Rx is next. Either Plastic Dip or Liquid Electrical Tape will work. In this build, Plastic dip will be used for the ESC's and Liquid Electrical Tape for the RX.



Read the instructions on the Plastic Dip Can. Grab one of the ESC's by the wires as shown, and dunk it into the can.



Let some of the extra material drip off. Set aside for about 30 minutes and dunk a second time, and again, let the extra drip off.



Do both ESC's. Note at first it seems that this is adding a lot of weight, but one it is all dry, added weight of two dunks is only a gram or two.

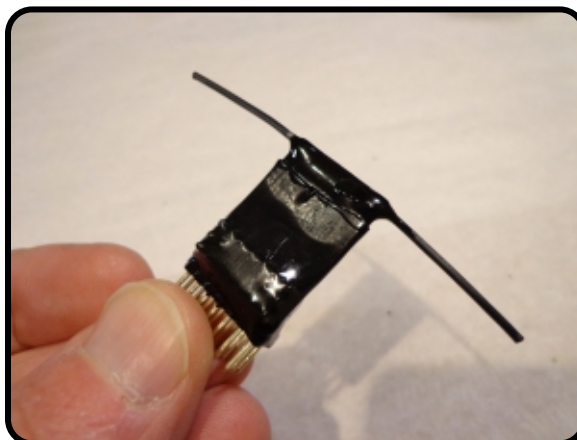


You could also dunk the RX, just keep the pins clear. This build uses Liquid Electrical Tape. Coat the areas where the board is exposed and to cracks where water could get in.

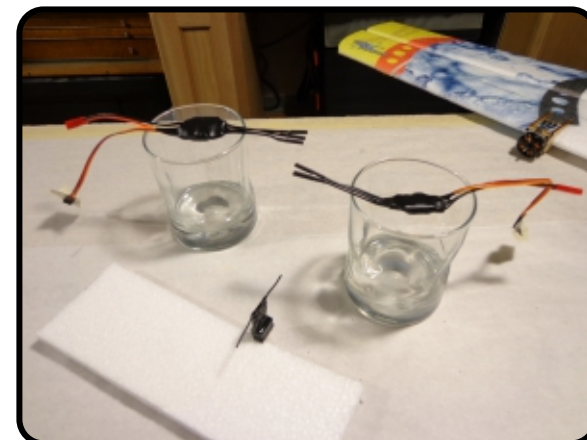




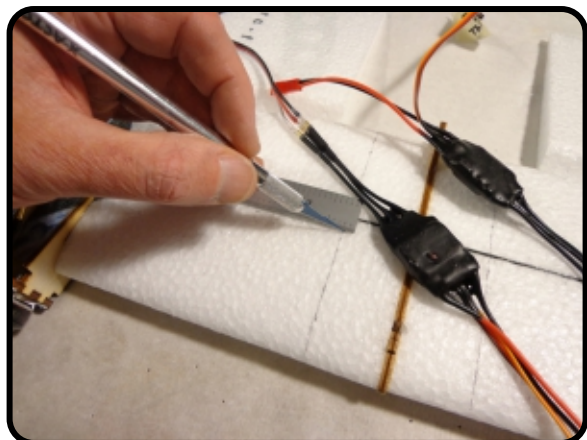
Once the Liquid Electrical Tape has dried, inspect to verify that all the components are sealed and covered.



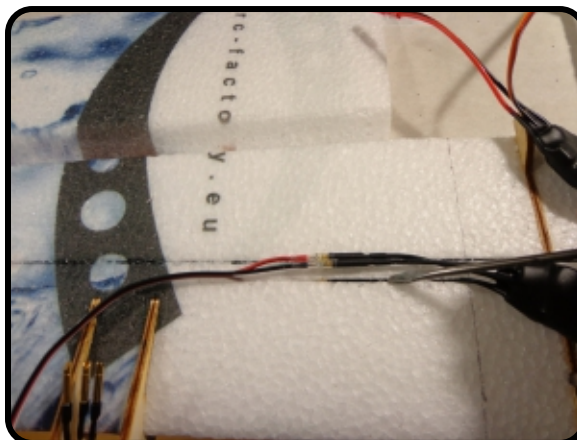
If there is anything exposed, just add a little more of the Liquid Electrical Tape to the area in question.



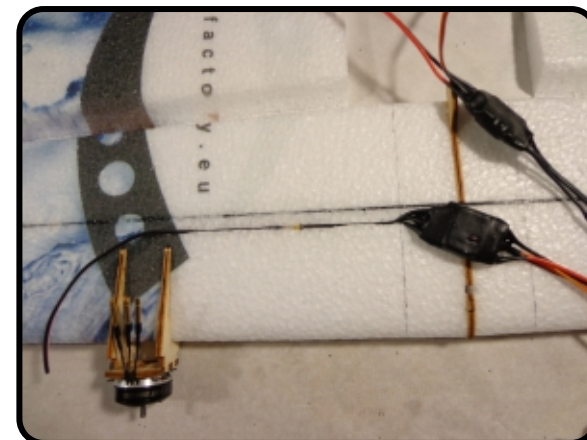
Set everything aside and let dry for the recommended time. While these are drying you can make the extensions needed if you have chosen to mount the ESC's inside the cabin.



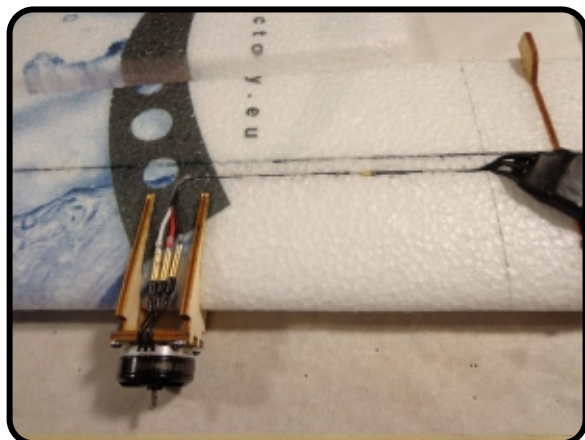
Attach the extensions to the ESC side and cut some slits so that the wires can be buried in the wing. Make sure the ESC's are still within the marks that were made earlier.



Note that the slit to bury the wires will need to be a little deeper in the area where the bullets are.



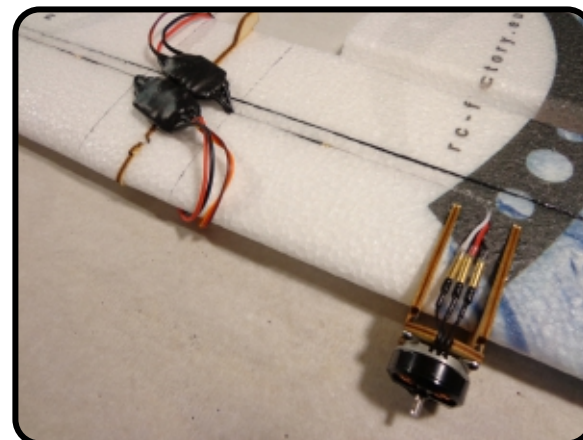
Once the wires are completely buried, the exact length of the wire needed to reach the motor can now be determined.



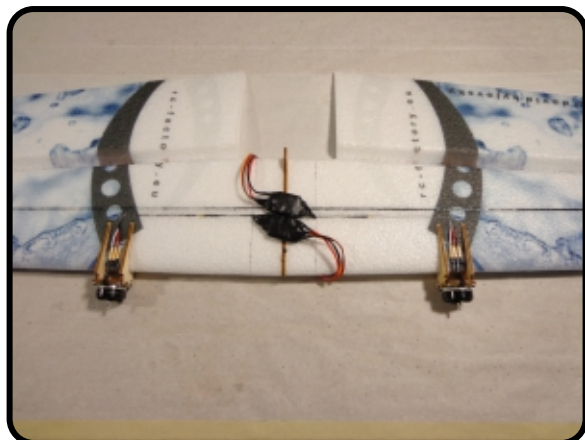
Cut the extensions to length and attach bullets. Protect with heat shrink, clear heat shrink was used in this build, but any color could be used.



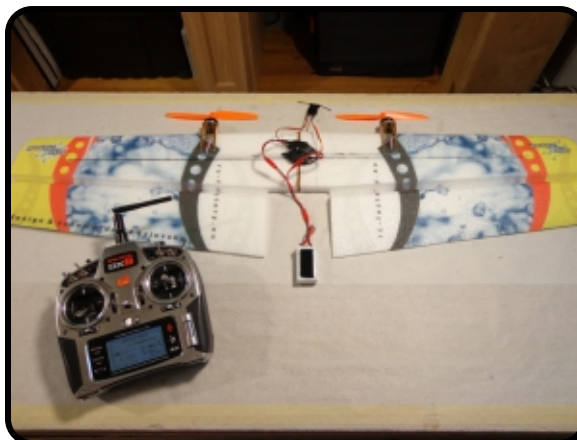
Make sure the wires are buried deep enough to allow the motor pod cover to set flush.



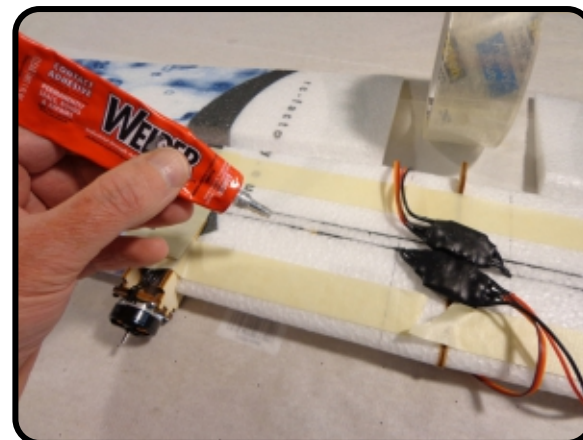
Repeat the process for the other side.



Mount the ESC's in position as shown with a dab of low temp hot glue.

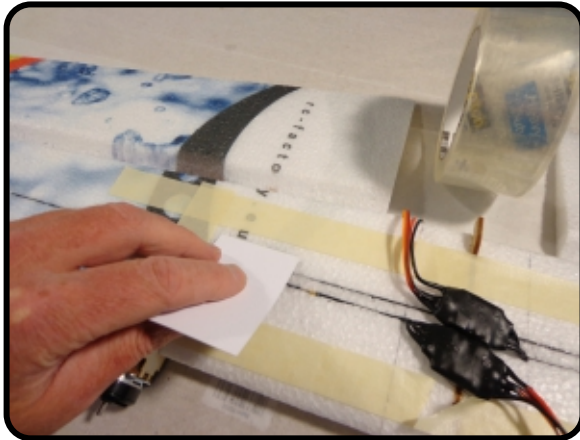


Now is a good time to make sure motor direction is correct. The right motor should be plugged into the throttle channel and the left motor into the gear channel. Pull red wire from left ESC.

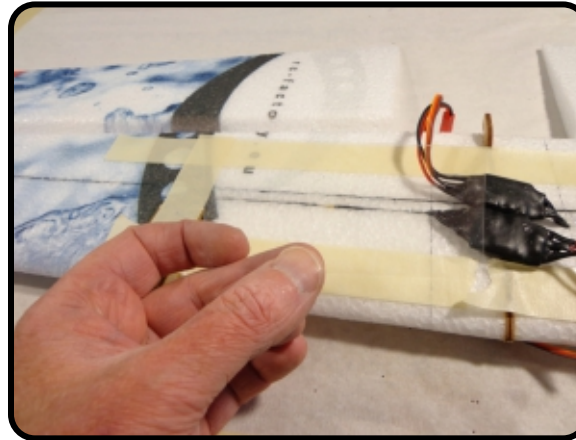


A patch of HD clear tape will be applied over the area where the wires were buried. This will add some strength back. Tape off the area and lay down a couple beads of Welders...

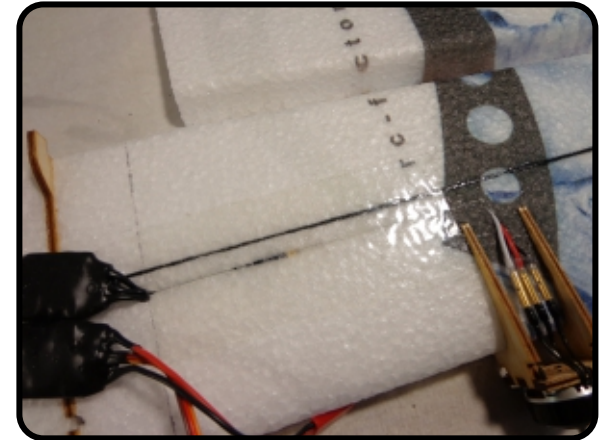




... and with an old business card, spread the Welders out to a skim coat that is about as wide as the HD tape. Allow the glue to tack. Doing this will give the HD tape a stronger grip.



Once the glue has tacked up, cut a piece of clear HD packing tape to fit the area. If you use masking tape to contain the glue area, it can be removed now.



Lay the tape down and press firm to get it all stuck down good. Repeat for the other side.



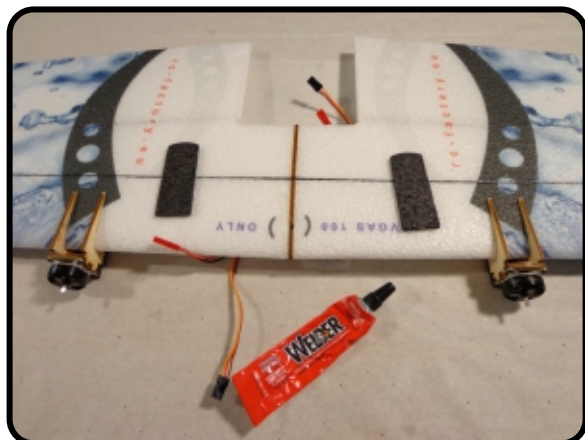
Cut out all the cowling covers as shown above.



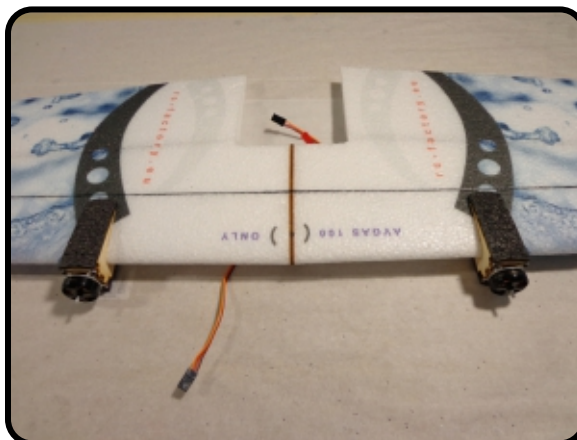
Tack up method will be used to attach these. Apply a skim coat of Welders to each of the mating surfaces. Start with the bottom side.



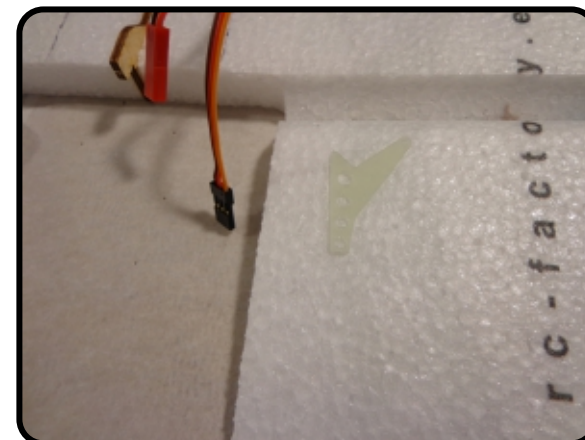
Once the glue has tacked up, attach the covers.



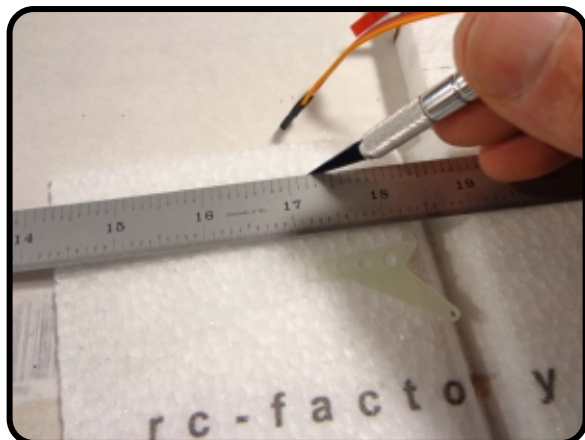
Repeat the process for the top side.



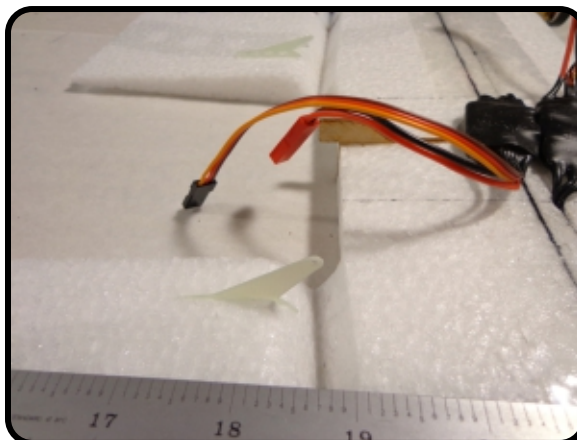
Completed.



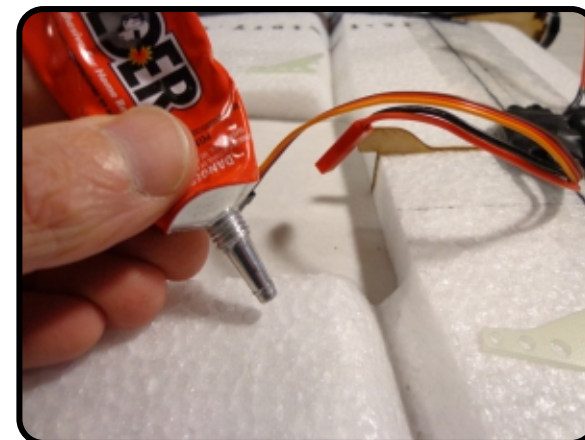
Locate the aileron control surface horns.



20mm in from the edge of the aileron, cut a slit to accept the horn.

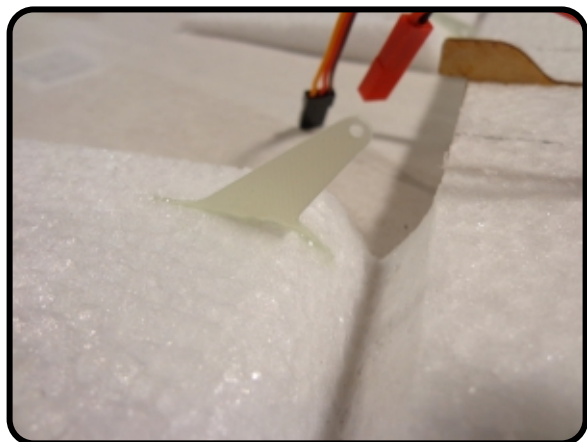


Test fit the horn, make sure the slit is cut so that the hole in the horn is allowed to line up directly over the hinge line.

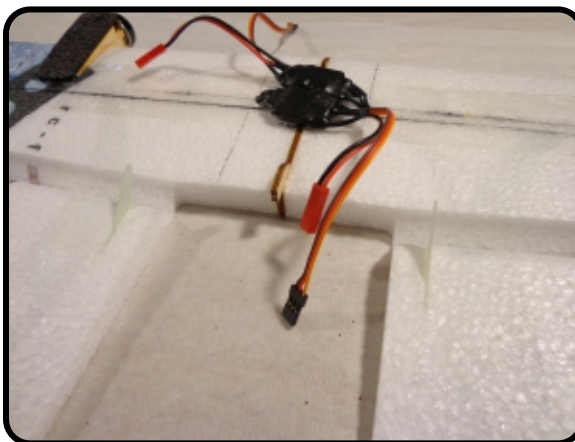


Remove the horn and squeeze in some Welders. Put a skim coat on the mounting area of the horn and install.

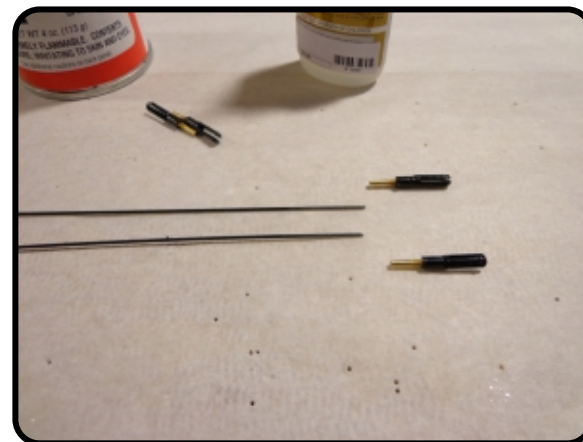




Wipe away any extra glue and double check alignment with the hinge line.



Repeat for the other side.



Locate the brass ferrules, clevises and carbon push rods.



With thin CA, attach the ferrule to one end of each rod.



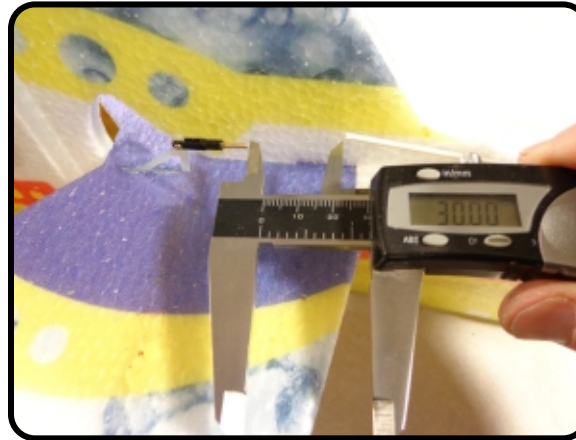
The other ferrule, attaches to the middle hole of the rudder control horn. Install the tiny brass pin in far enough that it snaps into place.



Center the rudder.



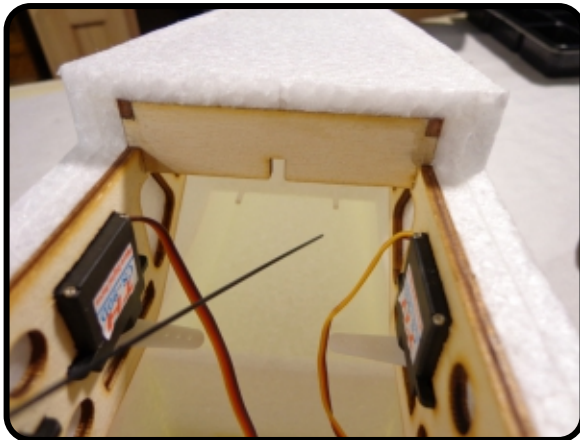
From the end of the ferrule, measure 30mm...



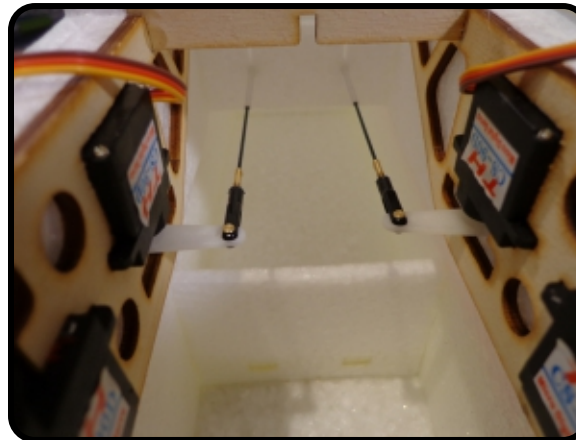
... and cut away the white push rod guide tube.



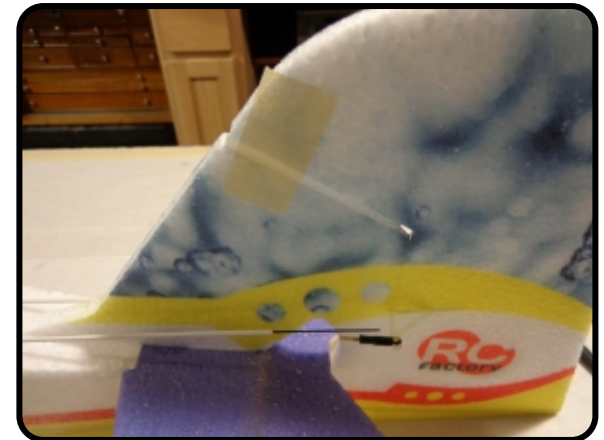
Clean out the end of the tube with the tip of a hobby knife. Repeat this and the pervious four steps for the elevator.



Take the longer of the two rods that you just glued the end to, and slide it into the guide tube for the rudder.



Repeat for the elevator, and snap them each onto their respective servo horns. Use the outer most hole, and make sure the pins are fully engaged.

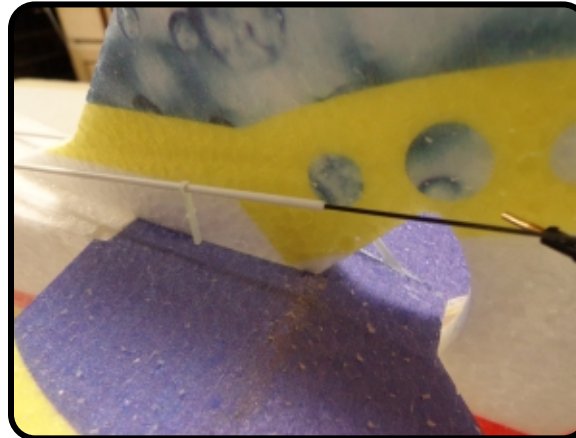


There should be a little extra carbon rod as shown, this will be cut away in a moment.

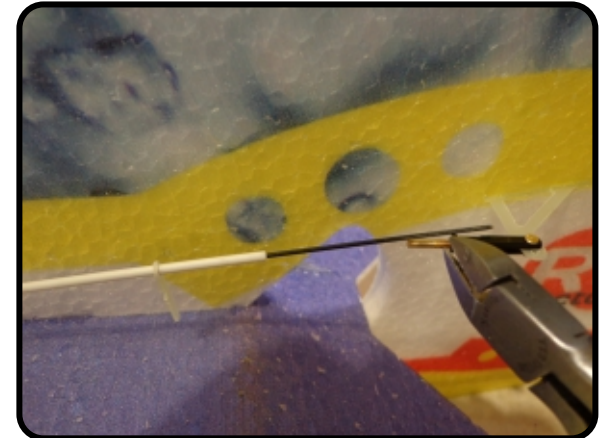




Slide on one of the two push rod guide supports.



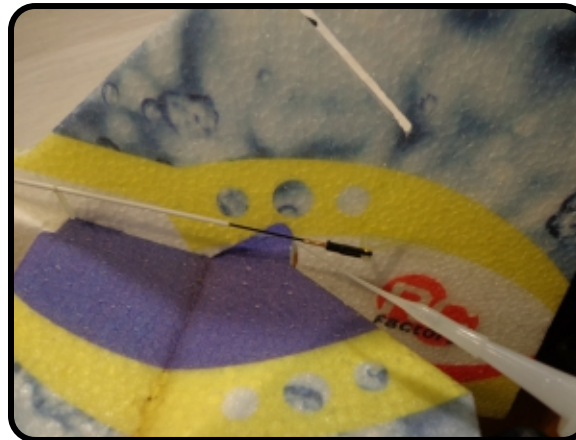
Just let the guide hang freely for now.



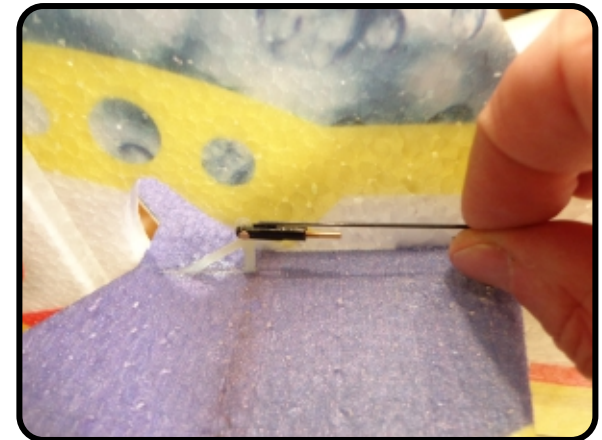
Center the rudder and cut the carbon rod with a pair of sharp side cutters. For reference, once the rod is inside the ferrule, it will extend approx to the area where the threads start.



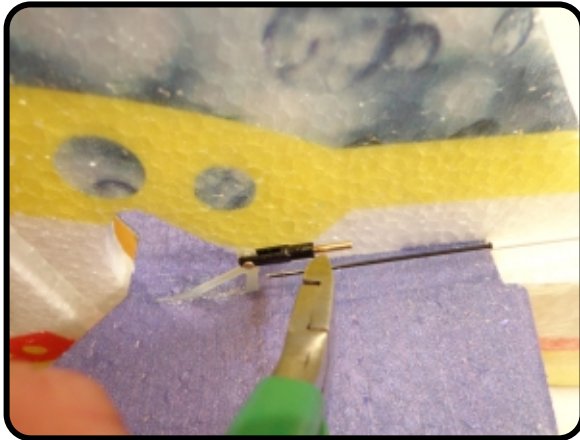
Deburr the end where cut and slide into the ferrule. Make sure that the rudder is still centered.



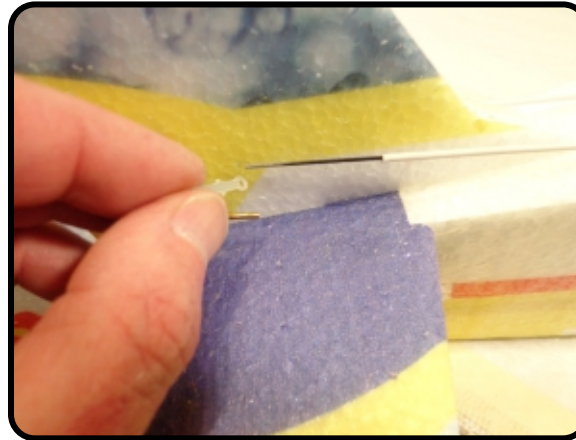
While keeping the rudder centered, apply a drop of thin CA and let it wick/run into the ferrule, hit with Kicker.



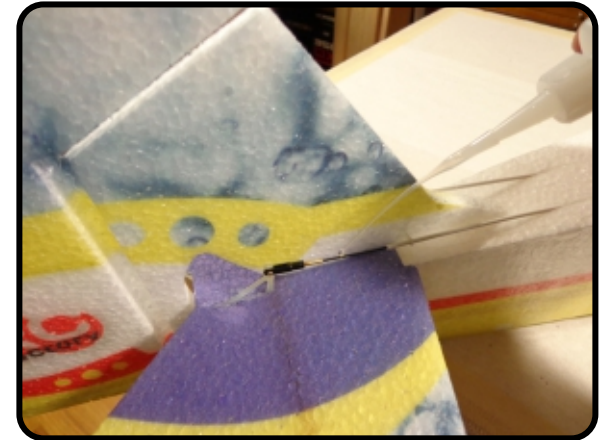
Elevator is next... same basic steps.



Hold the elevator control surface level, and cut the rod so that it is just shy of the threaded area of the ferrule. Slide on the guide support and leave loose for now.



Deburr the end of the carbon rod, and slide onto the ferrule.



Again... while holding the elevator level, apply thin CA and Kicker as was done with the rudder push rod.



Stick the push rod guide support into the pre-cut hole and glue with CA and Kicker. Repeat for the elevator. installing the guides will cause the push rods to bow. this is normal.



Locate all the pieces for the aileron push rods as shown above.

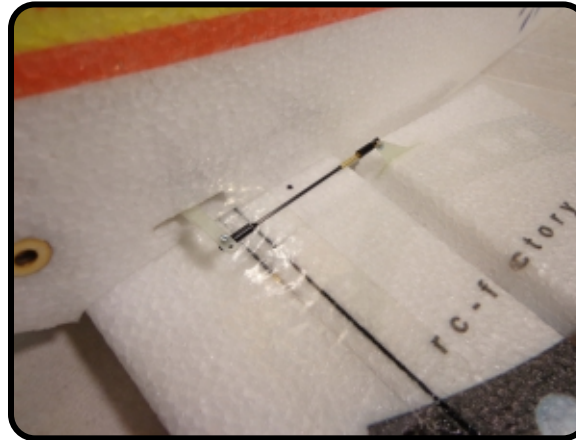


Thread the clevis and threaded ferrule together so that the OVERALL length is 1.00 inches.

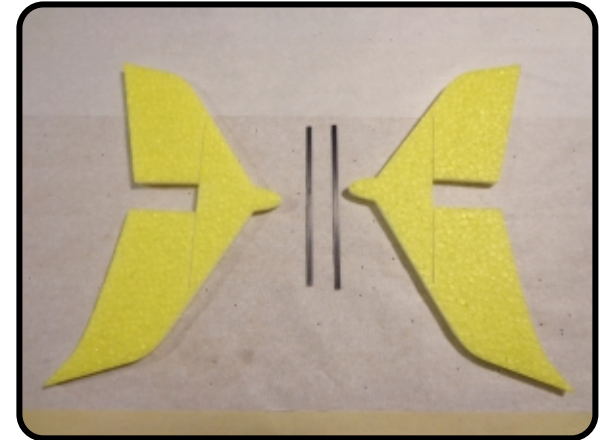




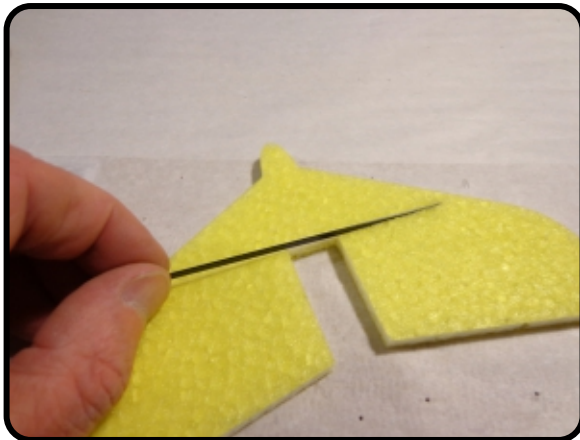
Insert the rod into the ferrule and glue with thin CA and Kicker. Repeat with the CLEVIS ONLY on the other end of the control rod.



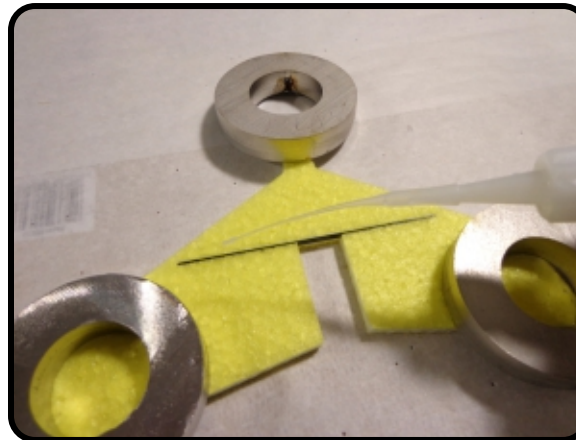
With the wing attached to the fuselage, attach the control rod as shown, use the middle hole on the extended servo arm. Repeat for the other side.



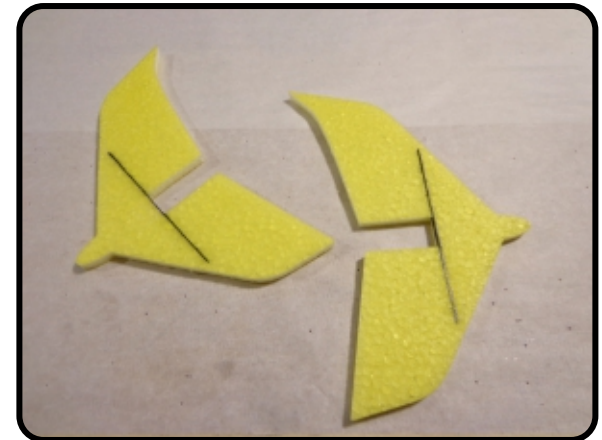
Locate the two thin carbon strips from the hardware bag and the SFG,s/Wing Skids.



Insert the carbon strip into the pre-cut slit.



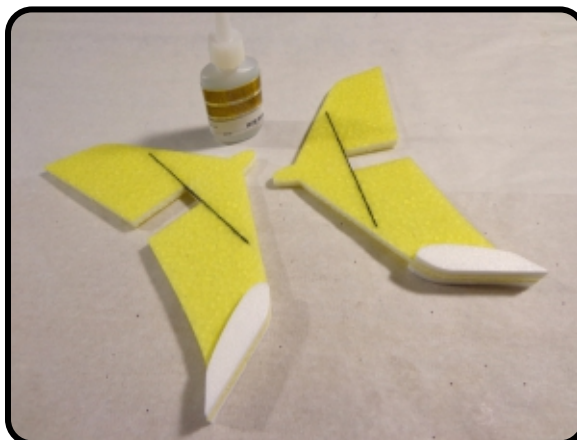
In a flat, constrained condition, glue the spar in with thin CA and Kicker.



Repeat for the other side.



Tips are next. It should be noted that these parts are Depron and FOAM  
SAFE glue MUST be used when attaching them to the Wingtip Skids.



Attach as shown. Apply a couple small beads of CA to the white part, spray the tip of the skid with Kicker and join the two pieces. Parts are cut so their common edges match and will line up.



Next the Wingtip skids will be attached... start by applying a bead of Welders to the slot in the wing and other mating surfaces



While the Welders is still WET, slide the skid on, with the carbon facing inward.



Make sure it goes all the way in, and that it is square to the wing.



Wipe away any extra glue.

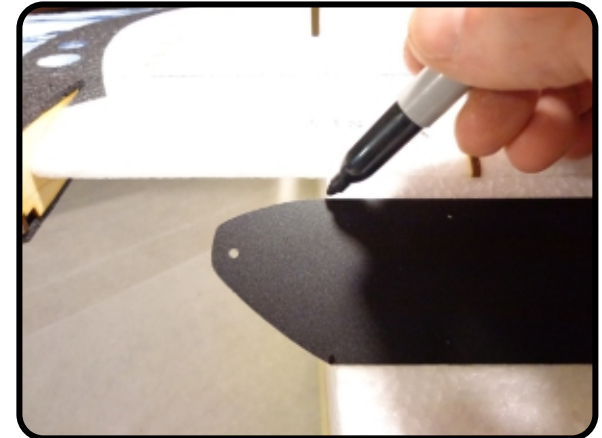




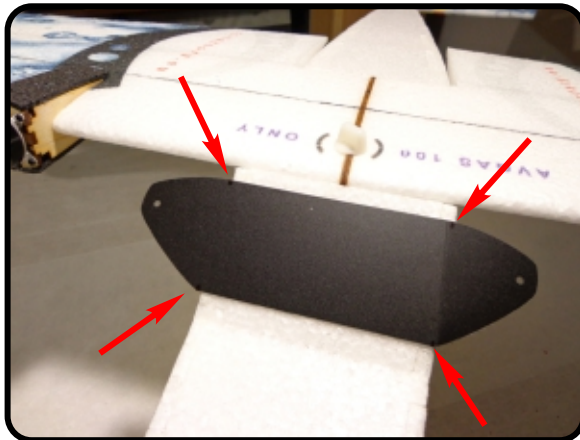
Repeat the process for the other side.



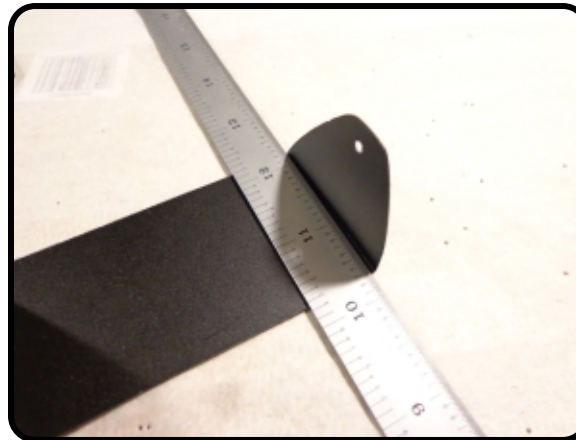
Locate all the windscreen parts as pictured above.



Hold the windscreen up to the fuselage as shown. NOTE THE ORIENTATION. With a Sharpe, mark where the edges of the fuselage are.



Make a mark on the other end as well. There should be four small marks in the positions as indicated above by the arrows.



With a straight edge, line up on the marks and fold the plastic.



Attach the allen head screw and plastic nut as shown. Head of the allen head screw should be facing INWARD. Repeat for the other side.



Install the windscreen. The heads of the screws should engage into the little round wood washers, and held in place by the magnets.



If you have not already attached all the wires inside the cabin, you can do that now. Double check that all the controls are going the right direction. Don't worry yet about the amount of throw.



Double check that the motors are rotating in the proper direction.



Don't forget that when you remove the wing you **MUST REMOVE AT LEAST ONE END OF THE AILERON CONTROL ROD.**

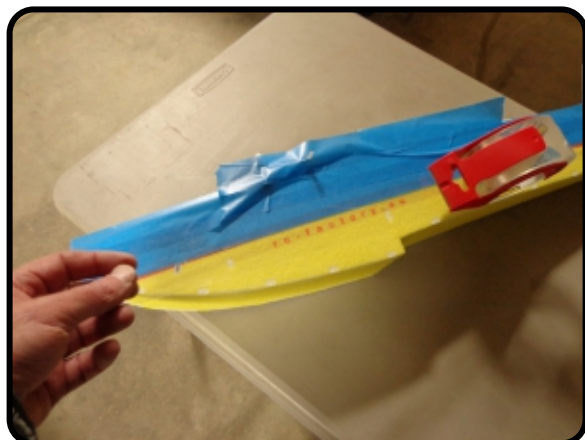


Grasshopper Build - If you skipped the Waterbug Build waterproofing steps at the beginning of the manual, but intend to occasionally fly off water, you will need to do these next couple steps.



Grasshopper Build - Mask off the sides as shown in the previous picture and mist the side and bottom with 3M 77 Spray Contact Glue.





Grasshopper Build - Cover the sides with clear packing tape and trim flush.



Grasshopper AND Waterbug Build - with Heavy Duty or clear Gorilla tape, cover the bottom surfaces. Trim flush and seal the edges with Welders



Hook up all the electronics inside the Cabin again, and re-check that everything is functioning normally.



If using independent throttle channels for each of the motors, a mix can be setup to augment rudder control with differential thrust.



Make sure and set up a mix so that the second motor is also controlled by the throttle cut condition.



Now is also the time to set the control throws.... Aileron should be set to approx  $\pm 40$  degrees



Elevator - set for approx  $\pm 45$  degrees.



Rudder - set for approx  $\pm 45$  degrees



If using the Twisted Hobbys' CG Machine, locate the CG approx 3.50 inches from the LEADING edge of the wing OR approx 1.00 inch BEHIND the wing spar.



Double check everything one last time. Find some pristine snow, a grassy park, or ultimately a pond of water and have some fun.

This completes the basic build. There are several online resources available for this specific model, and EPP foamies in general. One of the best online resources for this model is the RC Groups thread that was started specifically for the Puddle Star.

**[RC Groups Puddle Star Build and Discussion Thread](http://www.rcgroups.com/forums/showthread.php?t=2279304)**

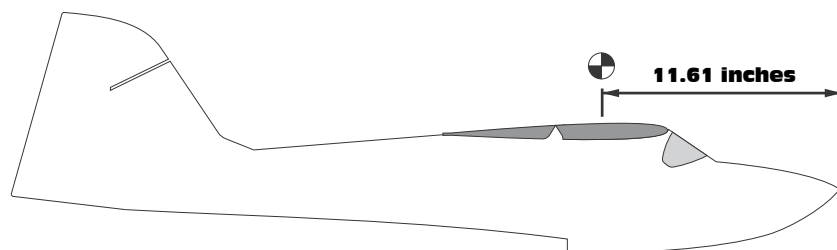
**<http://www.rcgroups.com/forums/showthread.php?t=2279304>**

This model is sure to impress your flying buddies, a 3D capable, twin engine seaplane, and if you decide to create some mixes for differential thrust, there is a whole new set of maneuvers waiting for you.



# CENTER OF GRAVITY

**C.G. - 11.61in from nose of aircraft**



Locate all the electronic to achieve indicated CG point. Using slightly different sized batteries can also help with achieving proper CG.

For best 3D performance, balance for level flight upright and inverted with little to no elevator input. Also power off down line should be straight down without any pull or tuck.

# CONTROL THROWS

## Extreme & 3D

Ailerons: +/- 40 deg  
Rudder: +/- 45 deg  
Elevator: +/- 45 deg  
Expo to suit

## Beginner & Sport

Ailerons: +/- 20 deg  
Rudder: +/- 25 deg  
Elevator: +/- 25 deg  
Expo to suit

In order to achieve the control throws as described for "Extreme and 3D, it is imperative that the control surfaces, linkages, rod ends, etc, all move freely over the entire range, including range end points.

Failure to do so will result in damage to either the servos or mechanical components



# PRIE-FLIGHT & TESTING

## PREFLIGHT Checks

**Motor:** Should run smoothly at all stick positions, and transition smoothly from low to high RPM. If the motor is turning backwards, reverse two of the three wires between the motor and ESC. Check that the screws holding the motor to the airframe are tight and secure.

**Flight Controls:** Set all to neutral or level positions with sticks in the neutral positions. Ensure that all controls and linkages move freely. Double check that all hinged areas are free from rips or tears. Verify proper control surface directions. Right Roll is – right aileron up, left aileron down, Left Roll is left aileron up and right aileron down.

**Batteries:** Should be fully charged prior to each flight. Watch transmitter battery level and follow manufactures recommendations. Motor battery should not be drained any further than recommended by the manufacture, use a timer to prevent an over discharged condition.

**Radio:** All trims should be set to neutral and throttle in the low position. Check that rate switches and mixes are set properly.

**Range Check:** With and without the motor running per radio manufactures instructions. If there is insufficient range or significant reduction with the motor running, resolve and re-test before flying.

## PREFLIGHT Checks

The first flights should be done with the CG at the recommended position, and reduced control rates until comfortable with your handling of the aircraft. As your experience with the aircraft grows experiment with different CG points and control rates. After all flights, check the aircraft over for damage and/or other items that may adversely affect flight performance.

This Extreme 3D Plane is a full performance aircraft and will provide hours of entertainment, including the occasional crash. If, as the result of a crash, the foam tears, simply glue with Welders or CA. Many pilots prefer Welders because it remains flexible after drying. CA however, is more suited for the “quick” repair.

This aircraft can be flown indoors or outdoors. It is however designed specifically for flying outdoors off of water. Landing on grass or snow is also an alternative, hard surface landings should be avoided.

## STORAGE

This EPP plane should be stored resting it's landing gear or hung from the prop. Storing in other fashions that put stress on the airframe could cause the airframe to distort. Storage in a hot car could also cause damage.

*Be safe and enjoy, thank you again for purchasing a Twisted Hobbys' Product!*



# NOTES AND S/U SHEET

## Setup Sheet

Transmitter -

Receiver -

Model

Weight -  g  oz

CG Point -  mm from wing leading edge

timer -  min

### Travels and Exponential

|                      | low rate             | high / 3D            |
|----------------------|----------------------|----------------------|
| right aileron up -   | <input type="text"/> | <input type="text"/> |
| right aileron down - | <input type="text"/> | <input type="text"/> |
| left aileron up -    | <input type="text"/> | <input type="text"/> |
| left aileron down -  | <input type="text"/> | <input type="text"/> |
| aileron expo -       | <input type="text"/> | <input type="text"/> |
| rudder right -       | <input type="text"/> | <input type="text"/> |
| rudder left -        | <input type="text"/> | <input type="text"/> |
| rudder expo -        | <input type="text"/> | <input type="text"/> |
| elevator up -        | <input type="text"/> | <input type="text"/> |
| elevator down -      | <input type="text"/> | <input type="text"/> |
| elevator expo -      | <input type="text"/> | <input type="text"/> |

### Electronic Components

Aileron Servo -

Rudder Servo -

Elevator Servo -

Battery -

motor -

ESC -

Propeller -

# TIPS AND TRICKS

---

A good building surface is “drop ceiling” panel from a local hardware store on a nice flat board

Use parchment paper between the areas being glued and your work surface

Heavy flat objects (like books, batteries, etc.) could be used to hold everything flat

When resetting your radio, start with all the ATV's or throw volumes at 100%.

Make sure you have set the direction of the servos correctly before attempting to trim for zero position.

If possible try the servo horns in different locations to determine which position will require the least amount of sub trim.

Installing the servo horns in their final location and attaching quick links to the servos may make servo installation much easier later.

On the Orange Rx, the negative pin is the one closest to the flat side of the circuit board.

Keep a good supply of sharp knife blades handy when building a foamie airplane.

Use low temp hot glue for gluing electronics, this will allow for easy removal later if necessary. The low temp hot glue can be “released” by painting” the glue bead with an alcohol soaked cotton swab a couple times.

A business card with the corners clipped off can be used as a small square.

Allowing the Welders glue to set for five minutes before assembly will shorten the tack up time, just be sure if doing it this way that you get the parts into position quickly, as the glue will start to bond on contact. Any joints that you feel are going to require adjustment, it is best to assembly the pieces while the glue is wet. The Green (high tack) masking tape works the best when used to clamp things together on an EPP foam airplane.

When gluing the rudder to the fuselage, stick pins could be used to hold in position if wanting to handle the airframe before it is completely dry

A rotary tool with a cutting wheel could be used to produce grooves in fiber glass parts instead of coarse sand paper. Use a hatch pattern. This creates more bonding area for the glue.