



Crack Laser & Yak-55 Lite Series Models

MOTOR: 1x 18-20g/1750-1800kv Outrunner
ESC: 1x 10-12 amp
SERVOS: 2x 4-5g / 1x 8-9g
PROP: 1x 8x4.3
BATTERY: 2s 350-600mah Lipo

Twisted Hobbys
www.twistedhobbys.com

RADIO: min. 4 channel
WINGSPAN: 32 inches
LENGTH: 31 inches
AUW: 160 to 190 grams

TABLE OF CONTENTS

	<u>Page</u>
WARNING INFORMATION	3
SHIPPING DAMAGE.....	3
OUR MISSION.....	3
SAFETY NOTES.....	4
IMPORTANT: PRIOR TO ANY ASSEMBLY	4
KIT CONTENTS.....	5
TOOLS & ADHESIVES NEEDED	6
THE BUILD	7
CENTER OF GRAVITY	28
CONTROL THROWS	28
PRE-FLIGHT & TESTING	29
PREFLIGHT CHECKS	29
<i>Motor</i>	29
<i>Flight Controls</i>	29
<i>Batteries</i>	29
<i>Radio</i>	29
<i>Range Check</i>	29
FLIGHT TESTING	29
STORAGE	29
OPTIONAL PARTS.....	30
NOTES & S/U SHEET.....	31
TIPS AND TRICKS	32

TWISTED HOBBYS

www.twistedhobbys.com or email us at info@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 manufacturers' 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!

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.

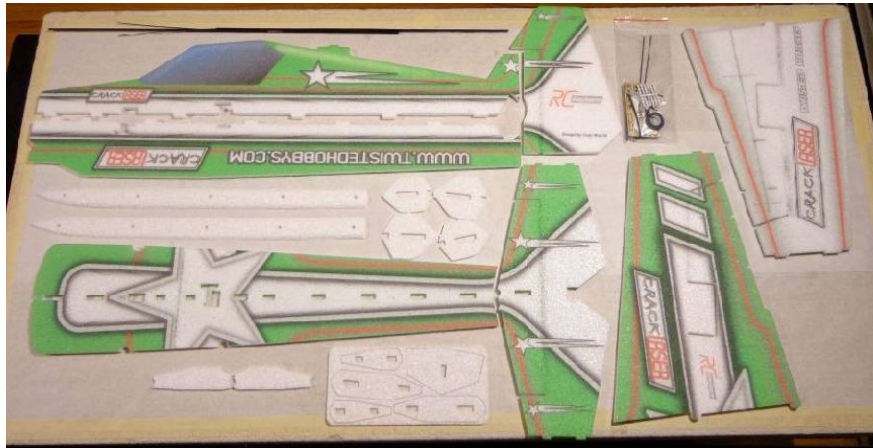
Do not operate this model in a confined area.

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

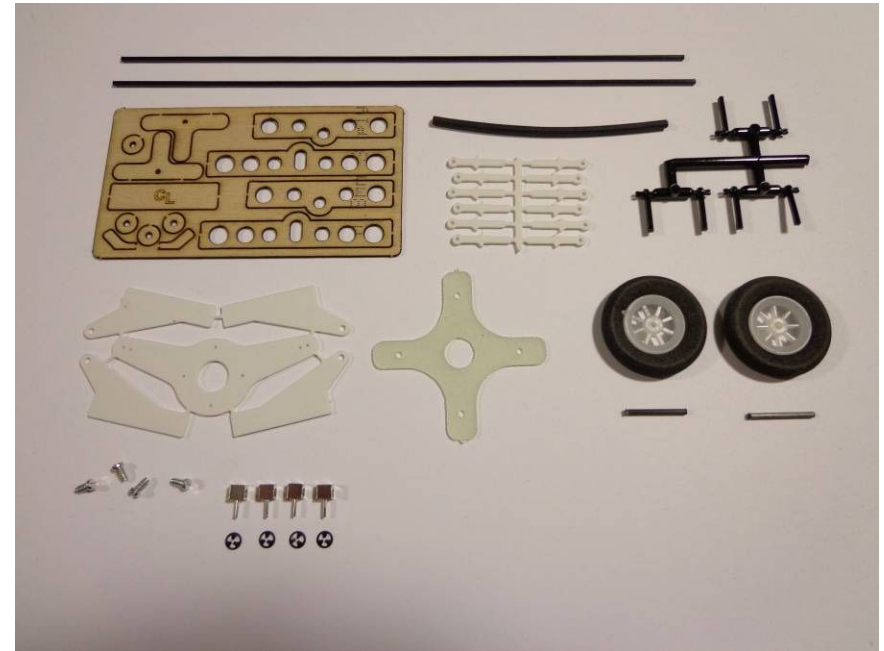
Please Note: after removing kit from shipping box, lay each piece flat on a hard surface, this will allow the airframe to straighten out if lightly bent from shipping. Do not worry since EPP is very pliable and can be bent back if out of shape.

kit contents



MAIN AIRFRAME COMPONENTS AND KITS

Double check that you have all the above pictured items. The Carbon bundle includes tail push rods and wing spars. Also pictured above is the bag with all the small hardware items, see the detail to the right for items it should contain.



HARDWARE KIT DETAIL

Double check that you have all the above pictured items. There are two extra snap links included and the use of the shrink tubing is optional. If any of the airframe or hardware items are missing, contact Twisted Hobbies before starting your build.

Tools & 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 Acoustic 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
- Adhesive Glue (Beacon Foam Tac, Welders, JQ-2118)
- Hobby Knife w/new Blade
- Needle Nose Pliers
- Wire Cutters
- Low Temp Hot Glue Gun
- Course Sand Paper
- Scissors
- Small Phillips Screw Driver
- Thin & Medium CA
- CA Applicator Tips
- Activator

THE BUILD

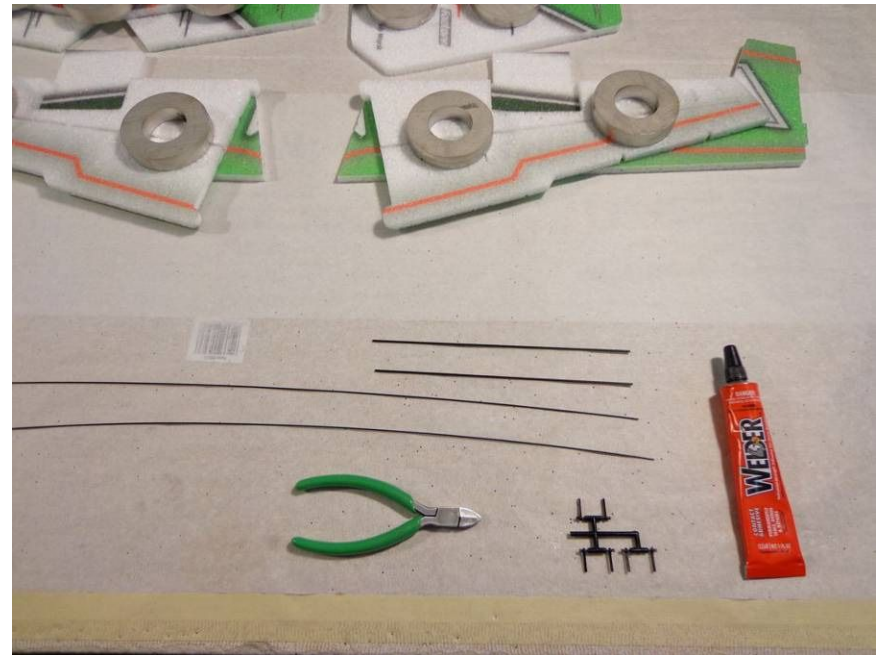
CONSTRUCTION METHODS:

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.

Adhesive 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 Adhesive 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, simply 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.



Locate the hinged items as shown above, bend them back onto each other as shown and let set for an hour or so. This process will help to loosen up the movement of the control surface, and is necessary to prevent servo damage.

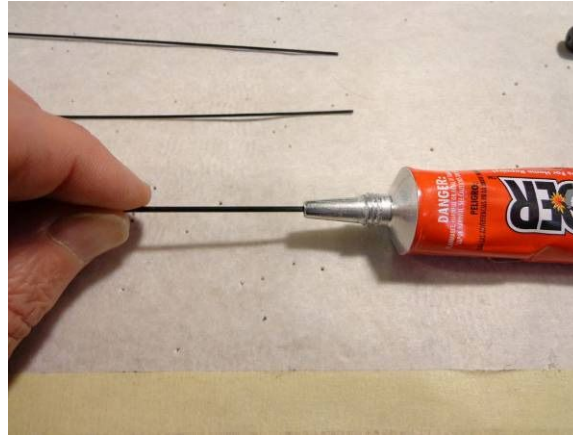


Gluing the snap links onto the ends of the control rods is important to do at this time... the glue will need to cure for at least 24 hours in order to achieve its full strength.

Locate the rods and snap links as shown above.



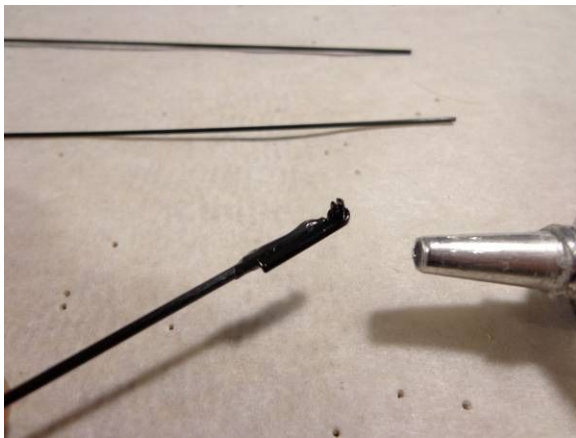
A quick link will be glued to the end of the 4 control rods. Hold the rod with your finger tips...



.... dunk it approx 1/2" into the nozzle of the Welders tube as show and twist a time or two.



Pull the rod out and check that you have a nice even coat of glue as shown, if not, repeat the process



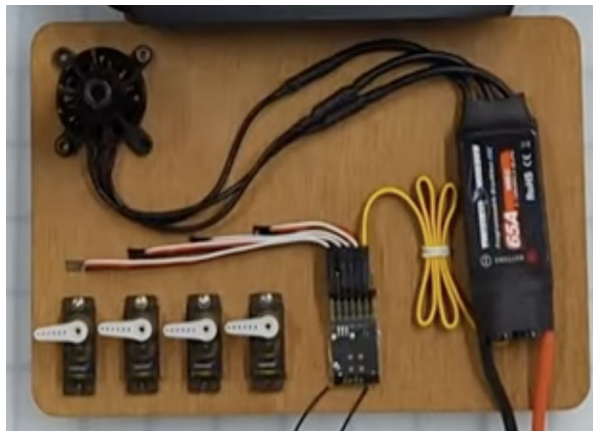
Attach a snap link as shown. Notice that the snap link has a "saddled" area, this should be where you rest the control rod



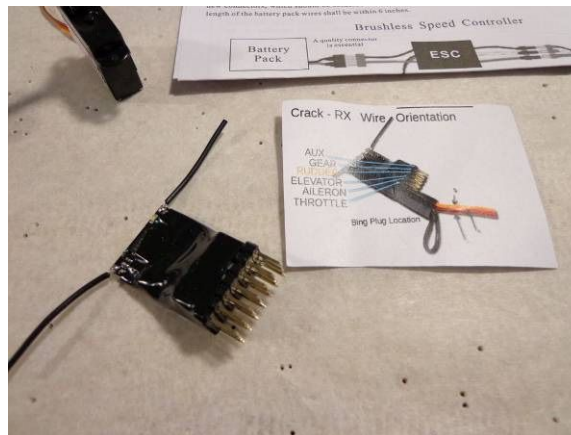
Repeat this for the other three control rods and set aside in a safe place to dry for a minimum of 24 hours



Locate all of the electronics you will be using. Now is a good time to check that everything is working properly



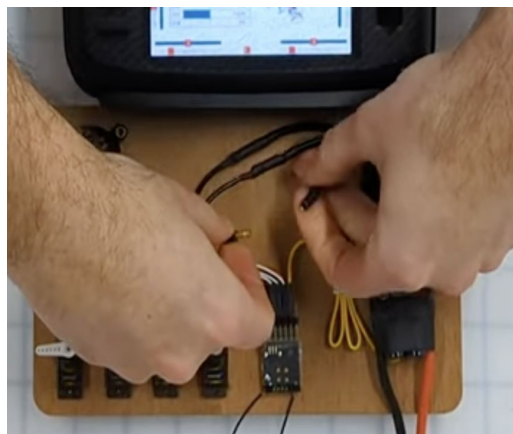
Gather your electronics & receiver



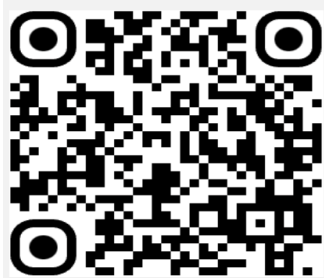
Create a program in your transmitter for this model and bind the receiver as required



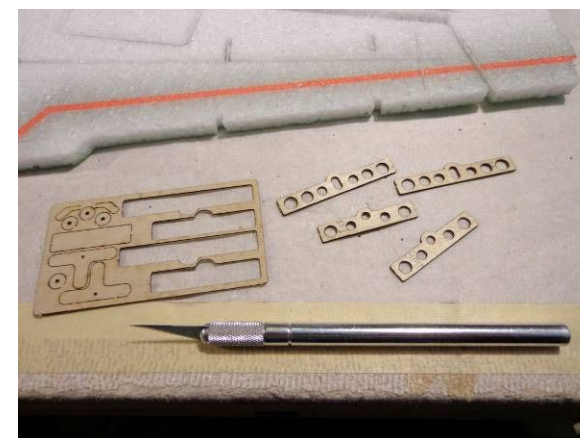
Hook up the entire electronic system as shown. Mount and center the control horns and servos Test for proper operation of all items



Now is also a good time to Calibrate your ESC according to the included manual, for a video link below.



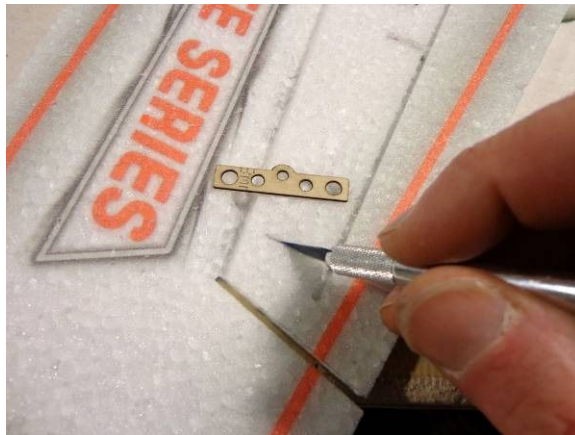
Locate the items shown above and apply a tack coat to the mating surfaces and let sit for approx 5 minutes before joining together



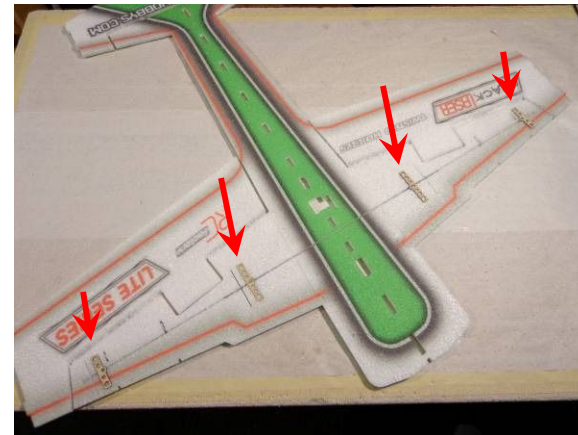
While the glue in the previous step is tacking up, locate the wood kit and remove the 4 wing ribs as shown



Once the glue has tacked up, bring all the pieces together. Note that all the tabs and slots should line up and parts are "keyed" for proper orientation



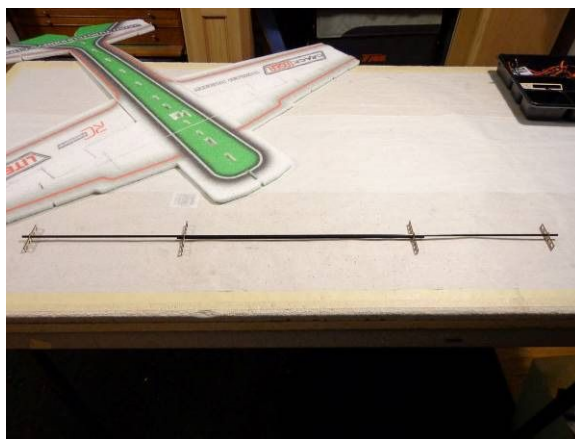
Clean out the slots in the wing where the ribs will be installed. Note that the ribs are the same width as the wing thickness



The bigger ribs are located toward the fuselage and the small ribs towards the wing tip. Note that we are working from the bottom side of the aircraft



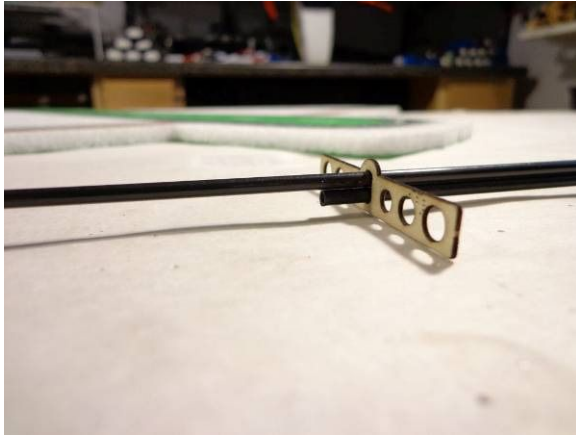
Check the fit of the ribs to the slot in the foam, with the exception of the humped area, the rib should sit flush with both the top and bottom surfaces



Test fit the wing spars and ribs on the bench out side of the wing first, this will give you an understanding of how the pieces go together. No Glue



Close up of the left underside pieces.
No Glue



Close up of how the spars stack up inside the slot of the inner rib. No Glue



Take the whole assembly and lay it into the slots on the bottom side of the wing as shown... still test fitting.... No Glue



Gently lower the spar/ rib assembly into its precut area. Notice that the shorter center spar should be centered and entering the wing first



Make sure that the rib slots you cut and the precut spar slots are deep enough to allow everything to sit flush as shown above



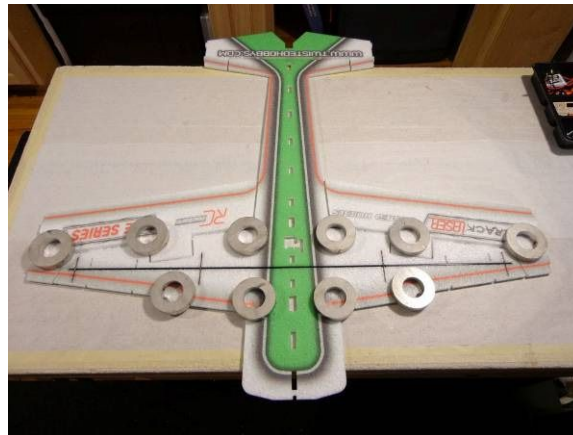
Once you are happy with the dry fit, remove the spar/ rib assembly and fill all the appropriate slots in the wing with Adhesive glue



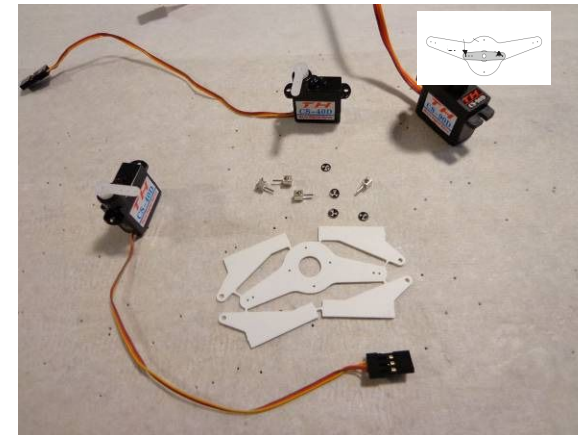
Lower the spar/ rib assy back into the wing like was done on the dry fit. Press down in all areas to fully seat the spars and ribs into their respective slots



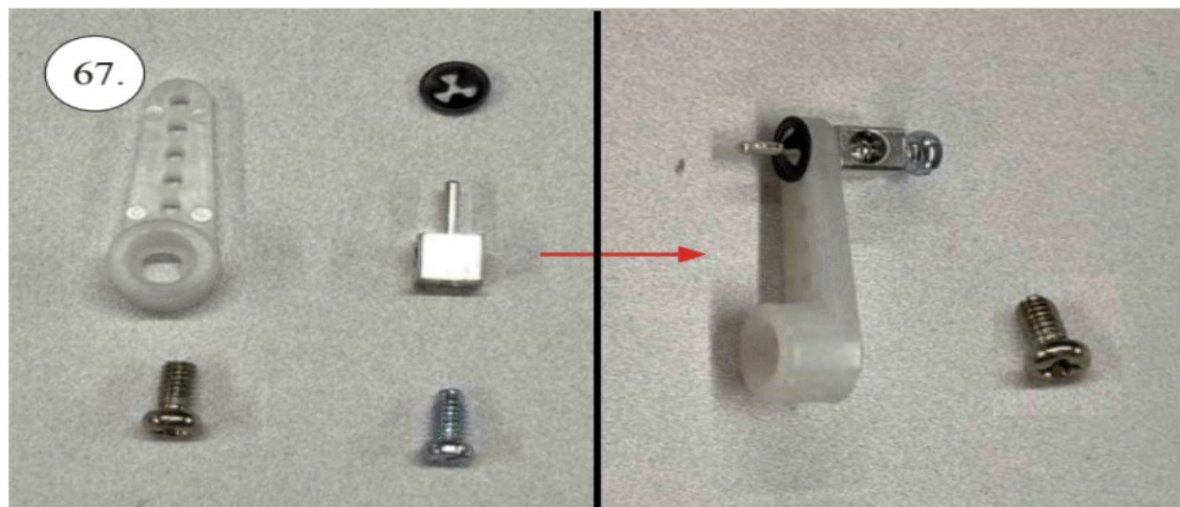
With a paper towel, wipe away any extra adhesive that has squished out



Put some weight on the wing in the area of the spar/ rib assembly as shown and allow to dry for a couple hours

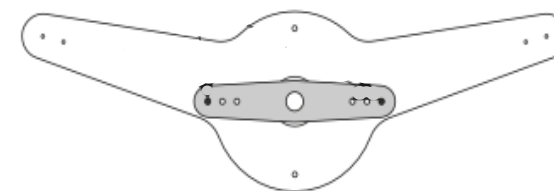


While that is drying, prepare the servos and servo arms



67.
Install one of the adjustable links into the outer most hole of the servo arm, than with the cupped side facing up press the retainer onto the pin

Repeat with the other tail servo arm, double check that your servos are centered and secure the arms with the small screw include with each servo



Locate the aileron servo (largest servo), along with the larger differential control horn and a double sided servo arm that comes with the servo

21.

Diff assembly shown below: This assemble can be done multiple ways. Please note, if you do not have screws & drill, you can use Adhesive glue or CA glue to attach themselves.

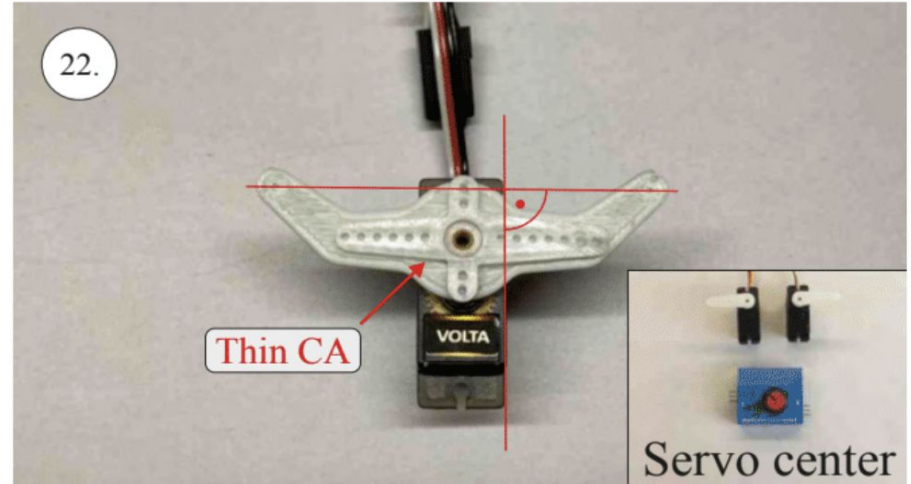


Diff horn shown many look a little different depending on production

22.

Thin CA

Servo center



23.

Drill Ø 1.5mm

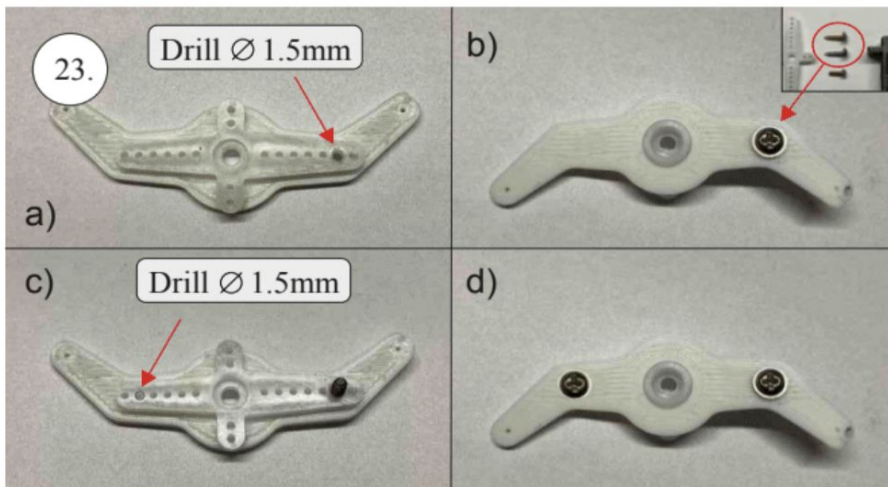
b)

a)

c)

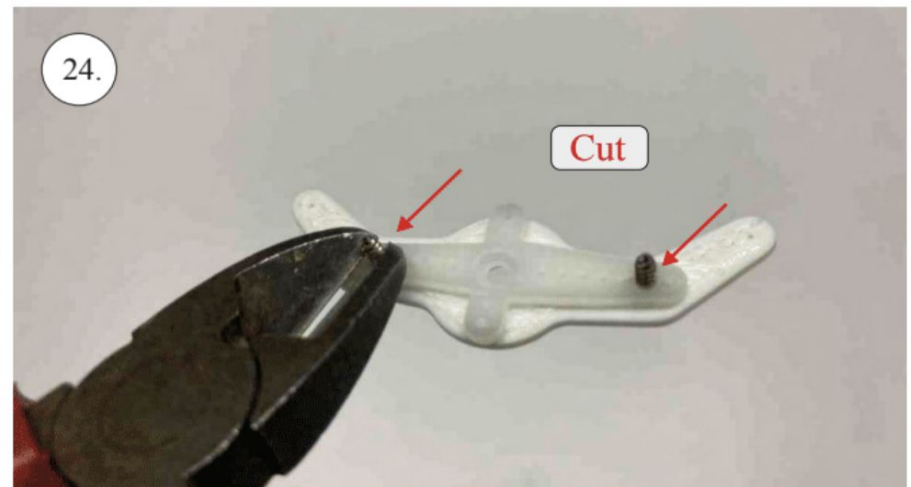
Drill Ø 1.5mm

d)

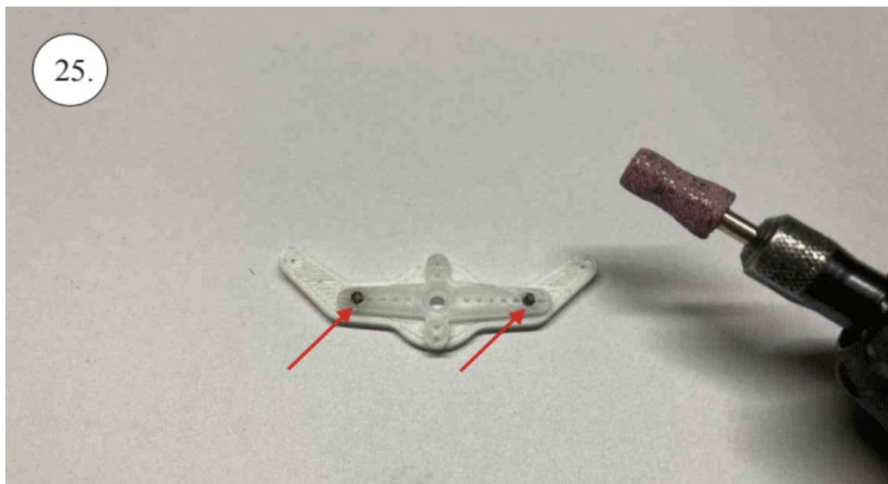


24.

Cut



25.



26.





Building the landing gear struts is next gather up the pieces shown. You will also need some CA, Kicker and thread



Drill out the center of the wheels to fit the small axle stubs, should be approx 1/16" diameter



With a drop of medium CA join the rectangle carbon stut with the small wood piece as shown.



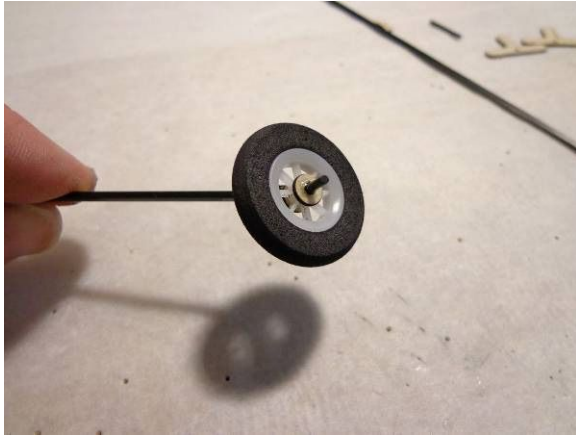
Again with a drop of medium CA attach the stub axle as shown and hit with kicker



Unspool approx. 6 to 8 inches of thread as shown above



Wrap the thread as shown and soak with thin CA and hit with Kicker. Install the inside washer and also CA, slide on the wheel and outside washer



CA the out washer and hit with Kicker. Medium CA works better here than the thin, as it will not run along the axle and freeze up the wheel



Install the wheel pant brace as shown. Make sure that it is spaced out enough to let the wheel spin freely



Align the brace as shown in the picture above and then glue from the outside with medium CA and Kicker



Repeat for the other strut and set aside to be installed in a later step



Install the aileron servo (no glue) as shown and test fit the bottom section of the fuselage, it may need to be trimmed a little around the aileron servo.



Once happy with the fit up apply a thin coat of **glue** to the mating surface of the horizontal fuselage section



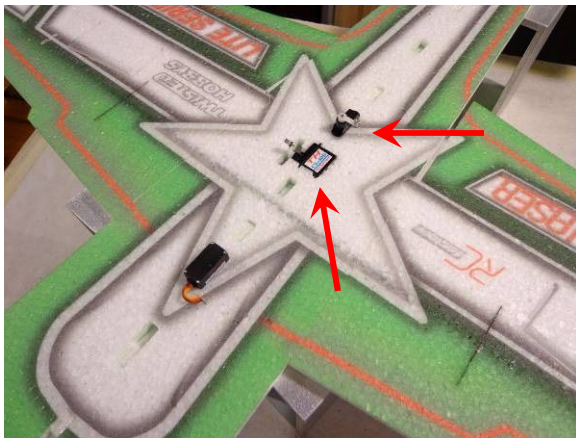
Immediately apply a thin layer to the mating surfaces of the lower vertical fuselage....



Bring the two pieces together. You will have a little time to work with and adjust for squareness



Make sure pieces are true to each other, and fully seated to one another, apply pressure for approx 15 min. before moving



Install the tail servos. Just set them in place. Do Not Glue them at this time.



As with the bottom fuselage, check the fit of the upper fuselage and make additional cuts as needed



Apply a thin layer of Welders to the mating surface as shown



Also apply a thin layer to the upper vertical fuselage piece. Note avoid the areas that come into contact with the servos



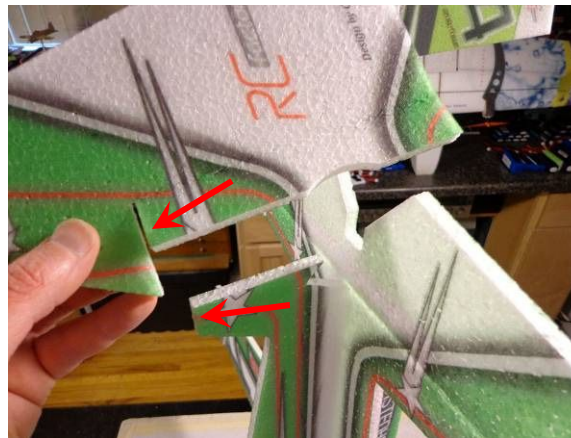
Avoid glue in these areas. The goal is for no glue to come into contact with any part of the servo



Join the pieces together and make sure they are fully seated to each other



While the glue is still wet, make any adjustments as needed for squareness. Let the glue set up for 15 or 20 minutes before handling



Use adhesive glue to attach the rudder. Note it is more important to link up the relief cut on the rudder than it is to line up the bottom edges



Use adhesive glue to attach the trusses. to do this apply a medium bead of Welders to the beveled area of the truss....



.... position the truss in place and then remove immediately. This transfers some of the glue... let it tack up then install



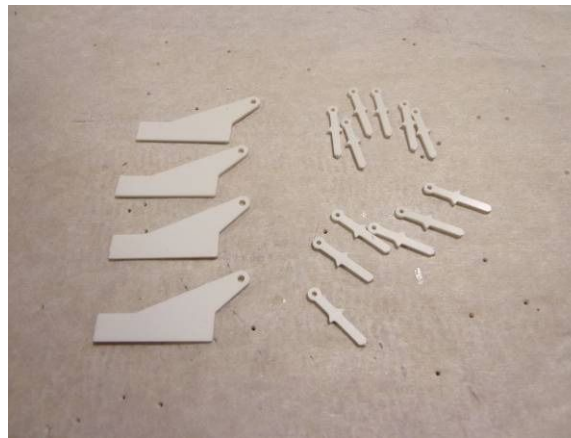
Repeat for the other side but leave the last 3 or 4 inches (as shown above) free of glue



Motor mount is next... roughen up the glue side of the mount and coat with a medium amount of adhesive and let tack up.



Apply a medium coat of adhesive to the mating area of the fuselage nose and let tack up as well



While the motor mount parts are tacking up locate all the above pieces and break them from their plastic trees



Using the pre-cut slots for the aileron horns as a guide, increase the depth so the horns will fit flush to the bottom surface



squeeze some glue into the slit, and put a skim coat of glue on the horn



Install the aileron horn so that it is flush with the under side of the wing, and so that the hole is in line with the pivot point of the control surface



By now the motor mount should have had time to tack up. Install it to the nose of the aircraft



Back to the horns... Do the same thing with the slot on the elevator, squeeze some glue in and apply a skim coat of glue to the mating area of the horn



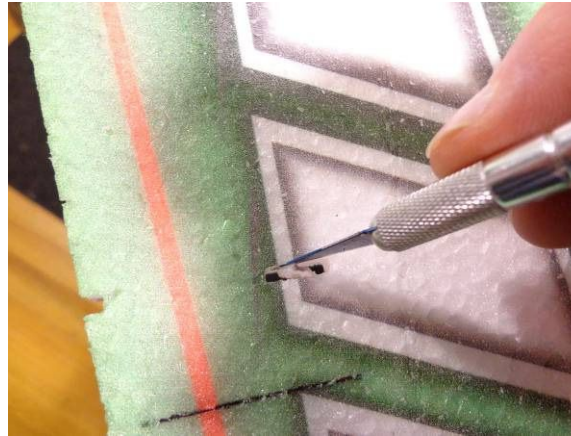
Install the horn from the TOP side of the elevator, and make sure the hole in the horn is in line with the pivot point of the elevator



Repeat the process with the rudder, install from the flat side as shown



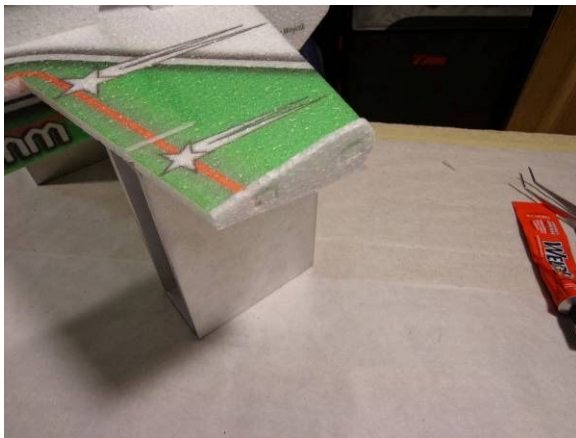
Cut all the shown parts from there EPP foam trees, split the rear of the 4 inboard SFGs as shown



Clean out the slots on the wing for the SFGs, test fit them before applying the glue.



Attach the three different SFGs to each wing as shown with adhesive glue



Elevator Tip... install one on each side. Again, with adhesive glue



Lastly the T-Canalizer. Make sure all the add-ons are all perpendicular to their respective surfaces



The next couple steps are optional, but **HIGHLY** recommended. Blenderm will be added to the motor mount and hinge line stress points

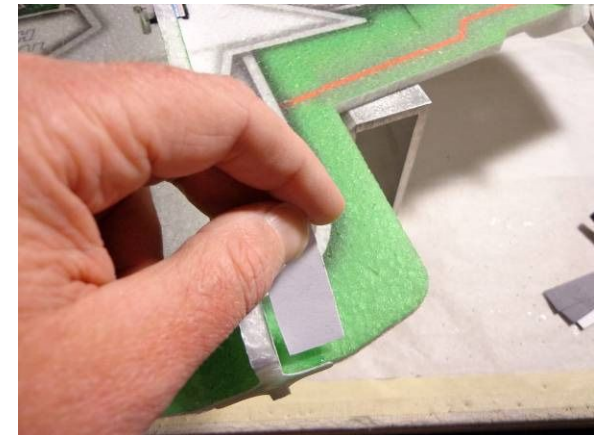
Optional Motor Motor Durablity Method shown above, Not Required



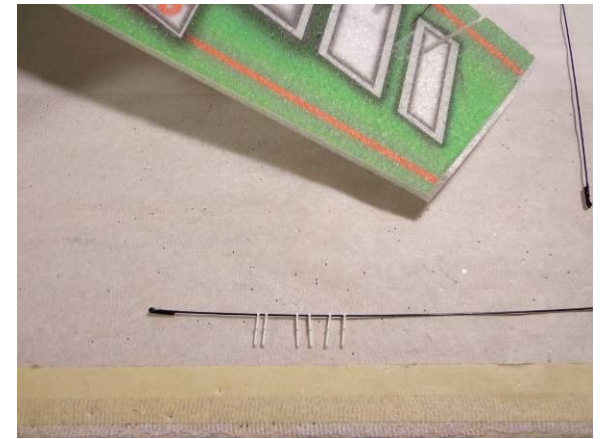
Cut 4 pieces approx 1-1/2 inches long and 8 pieces approx 3/4 inches long. Stick them aside for a moment



Apply a small bead of Welders directly behind the motor mount arms, top and bottom, left and right sides.....



... spread the beads out to a skim coat thickness. This is the area you will apply the tape to. The adhesive skim coat will help the tape stick.



With airframe assembled, its time to instead assembled push rod assemblies. The long to 1mm rods used for the elevator and rudder now require push rod guids as show, slide them onto the 2 rods as shown above.



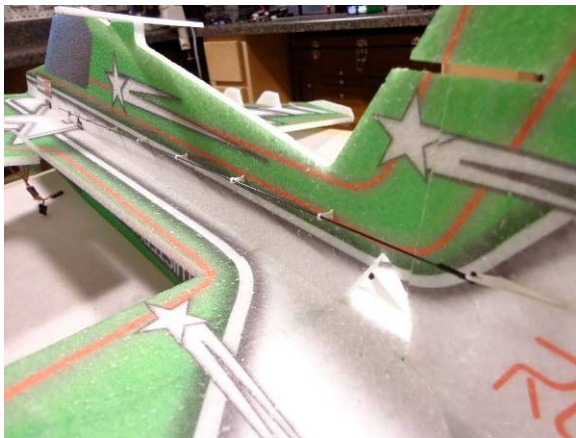
Slide the free end thru the hole in the elevator servo's adjustable link. Don't worry about any extra at this time



Snap the Snap Link into the elevator control horn. For this model snapping from the inside will yield a straighter line for the control rods



Locate the precut holes for the guides and install the base of the guides into each hole. Align them straight and then apply a drop of CA at the base of each



Repeat the process for the rudder pushrod. Note that the snap link installs from the bottom of the rudder control horn



The next couple steps are for installing the landing gear if not wanting the gear, skip past them. Locate the holes and open up the area in between them



Opening should look like what is pictured above when complete



While holding the small rectangle wood bulkhead up for reference, slit either end of the opening so the bulkhead can install in the center of the opening



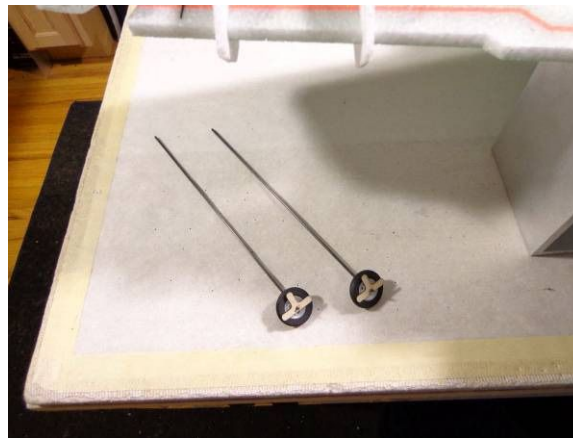
Squeeze some Glue into the upper and lower slits ONLY. Keep the center area of the opening free of glue at this time



Slide the bulkhead into position and make flush with both sides of the fuselage



Wipe away any extra glue. Notice that the wider, center area is open and free of glue



Locate the gear struts that were assembled earlier



Slide one of the struts in from the left to the right. There is a small pre-cut hole in the horizontal fuselage piece that will receive the raw end



From the right, slide the other strut in, make sure it is on the opposite side of the bulk head from the other strut



Adjust the position of the struts where they cross the fuselage to ensure that once glued in that the plane will sit level



Flip the plane back over, remove the ends of the struts from the Horz Fuse section, put some glue in the hole and re-install



Squeeze some Glue into the area of the fuselage where the struts cross. Do this from both sides, don't worry about extra glue at the moment



Once you are sure there is plenty of glue in and around the struts where they cross thru the fuselage, wipe away any extra glue



Flip the airframe back onto it's wheels and adjust so that it is level again like when the dry fit was done. Flip back over so the struts are facing up and let them dry



Locate your motor and its mounting hardware. Install with the wires facing the side in which the ESC will be installed on to



Lay out all your electronics and determine the best place for mounting each of them



Above is an example where things could be placed, this is however very much up to the builder



Now that all the wiring is done, install the aileron push rods



Install the set screw. Be very careful, there are not many threads and it is easy to cross thread. Only snug up, a ton of pressure is not needed. Make sure the servo is centered



Do the same for the rudder push rod, again not a lot of pressure and make sure the servo and control surface are centered



Repeat for the elevator push rod. Servo and control surface centered when snugging up the set screw



Trim all the control rods so there is only about 1/4" beyond the servo horn. Keep the longest piece of the tail rods to make a tail skid



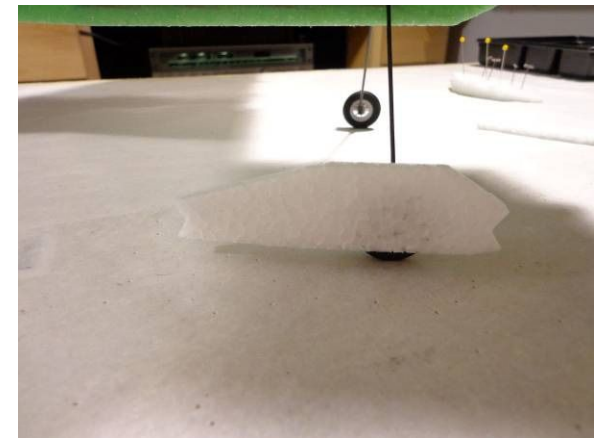
With the scrap from the previous step, poke (and glue) one of the skinny pieces into the tail as shown to help keep the rudder off the ground



With Low Temp Hot Glue (or 'Adhesive as seen in the next picture) lay a bead of glue down in two places on each servo, this should be enough to hold them in place



If deciding to use Adhesive instead of hot glue, do three or four "dabs" in two different places of each servo



Fit and glue the Wheel pants on. Poke the end of the stub axle into the foam at the approx above position. With the wings level, the bottom of the pant should be level as well. CA or 'Adhseive



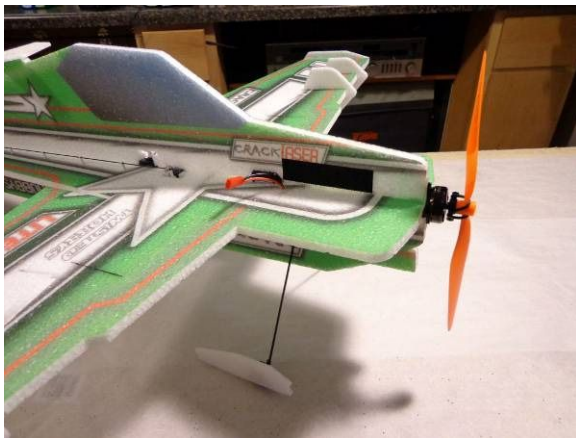
Repeat for the other wheel pant, double check that they are lined up and if having used Welders let dry for a bit



Plug everything in. Check directions and prop rotation. Make sure the servos are not overloaded by trying to reach extreme throws



Balance the props you will use... small pieces of clear packing tape on the back side of the light blade. This will make everything run much smoother



With the TH power combos and battery, location of the battery will be somewhere directly in front of the aileron servo. It is best to use velco and fly the model before cutting a hole

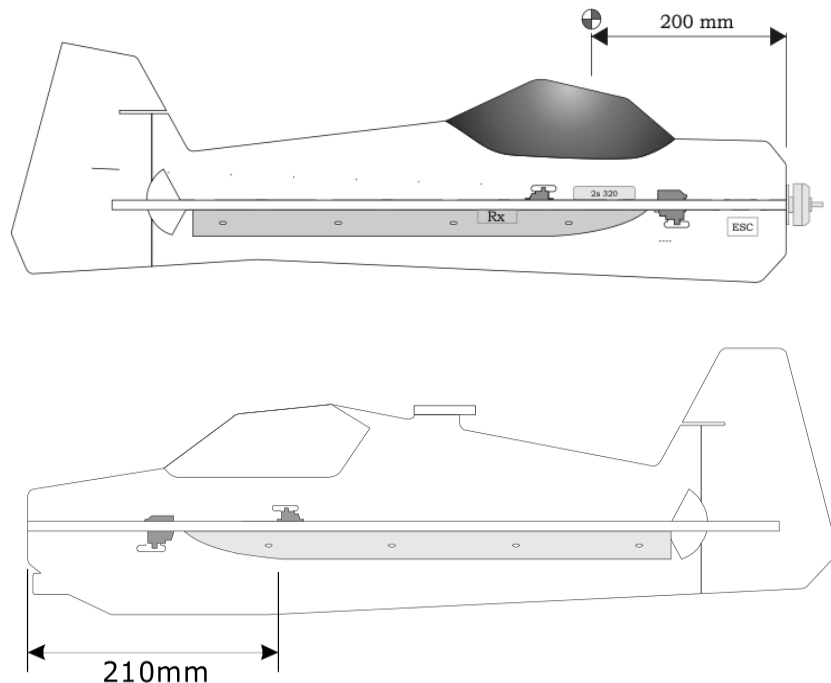


Battery shown in location to achieve the cg which is recommended on next page



Set up your radio per the suggestions given a little later in this manual, check all the control directions and motor rotation.

Center of Gravity



Locate all the electronics to achieve indicated CG point. Use Velcro for initial flights for battery mounting and experiment with it's position until you have determined the best spot for your flying style. For best 3D performance balance for level flight upright and inverted with no elevator input, also power off down line should be straight down without any pull or tuck

Control Throws

Extreme & 3D:

Ailerons - approx +/- 45 deg
Rudder - approx +/- 45 deg
Elevator - approx +/- 45 deg
Expo to suit

Beginner & Sport:

Ailerons - approx +/- 20 deg
Rudder - approx +/- 20 deg
Elevator - approx +/- 20 deg
Expo to suit

In order to achieve the control throws as described for "Extreme & 3D", it is imperative that the control surface, 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



P R E - F L I G H T & t e s t i n g

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.

Flight Testing

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 indoor flying and will be right at home in the local gymnasium or other similar sized venue.

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!

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.

