70" EXTRA 300 EXP V2 ARF

Assembly Manual

Please take a few moments to read this instruction manual before beginning assembly. We have outlined a fast, clear and easy method to assemble this aircraft and familiarizing yourself with this process will aid in a quick, easy build.

Please read the following paragraph before beginning assembly of your aircraft!

THIS IS NOT A TOY! Serious injury, destruction of property, or even death may result from the misuse of this product. Extreme Flight RC is providing you, the consumer with a very high quality model aircraft component kit, from which you, the consumer, will assemble a flying model. It is beyond our control to monitor the finished aircraft you produce. Extreme Flight RC will in no way accept or assume responsibility or liability for damages resulting from the use of this user assembled product. This aircraft should be flown in accordance to the AMA safety code. It is highly recommended that you join the Academy of Model Aeronautics in order to be properly insured, and to operate your model at AMA sanctioned flying fields only. If you are not willing to accept ALL liability for the use of this product, please return it to the place of purchase immediately.
Extreme Flight RC, Ltd. guarantees this kit to be free of defects in materials and workmanship for a period of 30 DAYS from the date of purchase. All warranty claims must be accompanied by the original dated receipt. This warranty is extended to the original purchaser of the aircraft kit only.
Extreme Flight RC in no way warranties its aircraft against flutter. We have put these aircraft through the most grueling flight tests imaginable and have not experienced any control surface flutter. Proper servo selection and linkage set-up is absolutely essential. Inadequate servos or improper linkage set up may result in flutter and possibly the complete destruction of your aircraft. If you are not experienced in this type of linkage set-up or have questions regarding servo choices, please contact us at info@extremeflightrc.com or 770-887-1794. It is *your* responsibility to ensure the airworthiness of your model.

A few tips to ensure success

1. **We are very pleased with the level of craftsmanship displayed by the builders in our factory. Through hundreds of grueling test flights containing maneuvers that no aircraft should be subjected to, our prototypes have remained rigid and completely airworthy. However, it is impossible for us to inspect every glue joint in the aircraft. Take a few minutes and apply some CA to high stress areas such as <u>servo mounting trays , landing gear blocks, anti rotation pins, etc.</u>**
2. **Having survived the journey half way around the world while experiencing several climate changes, it is not uncommon for a few wrinkles to develop in the covering. Fear not! These are not manufacturing defects, and are easily removed with a little bit of heat. Use a 100% cotton tee-shirt and your heat gun and heat the covering while gently rubbing the covering onto the wood with the t-shirt. Be careful not to use too much heat as the covering may shrink too much and begin to lift at the edges. Take your time, and a beautiful, paint like finish is attainable.**
3. **By the time your aircraft arrives at your door step it will have been handled by a lot of people. Occasionally there are small dings or imperfections on some of the surfaces. An effective method to restore these imperfections to original condition is to use a very fine tipped hypodermic needle to inject a drop of water under the covering material and into the ding in the wood. Apply heat to the area with a sealing iron and the imperfection will disappear. Deeper marks may require that this process be repeated a couple of times to achieve the desired result, but you will be surprised at how well this technique works.**
4. **DO NOT SKIMP ON SERVOS! Your aircraft is equipped with very large control surfaces that deflect over 45 degrees. A lot of servo power is required to prevent flutter and to maintain the required deflection for maneuvers.**
5. **Use a high quality epoxy for installing the composite control horns and hinges. We highly recommend the use of Pacer Z-Poxy 30 minute formula.**
6. **You may want to add a bead of RC-56 Canopy glue to the intersection of the plastic canopy/hatch and its wood frame for additional strength and resistance to vibration. DO NOT USE CA here as it will fog the canopy.**
7. **Your aircraft is built using very modern construction techniques and is very light weight for its size. As with any high performance machine, <u>regular inspection and maintenance is a must</u>. While disassembling your aircraft after a flying session, pay close attention and inspect glue joints, linkages and loose covering to be sure the airframe is sound. A few minutes spent doing this will help maintain airframe longevity.**

Congratulations on your purchase of the version 2 Extreme Flight RC 70 inch Extra 300 EXP ARF!
This aircraft was a huge hit among our customer base when it was originally released several years ago and we thought it only fair to bring it up to the modern specifications of our current 30cc aircraft. As such the 70" Extra 300 EXP V2 now shares the ultra lightweight and rugged laminated composite construction of our other current airframes and the 2 mini servos previously used for elevator actuation on the V1 version have been replaced with a single high torque standard size metal gear servo. The V2 version also features the self aligning stab feature that has become so popular on our recent releases.

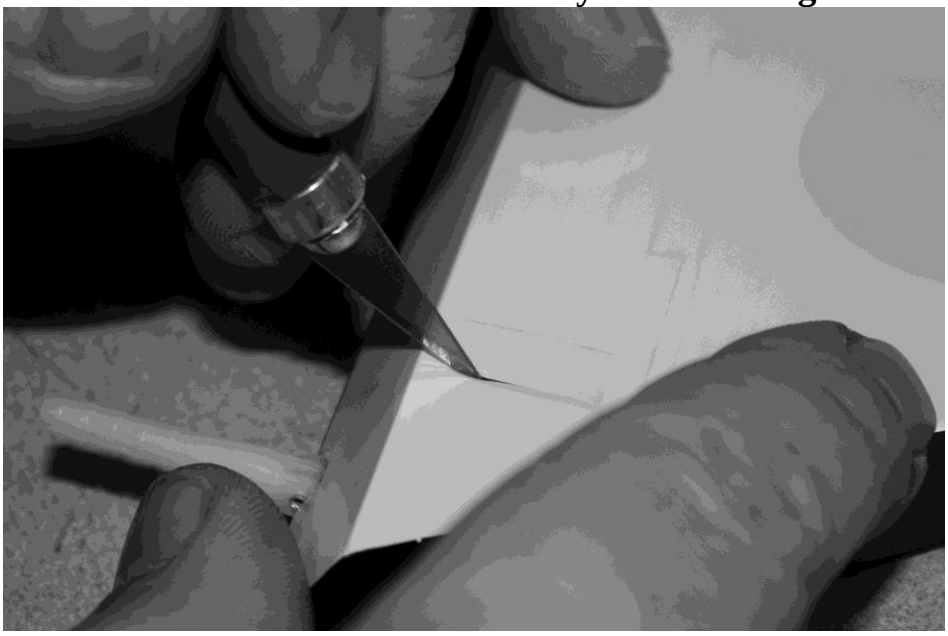
The performance ability of the Extreme Flight RC Extra 300 EXP v2 is phenomenal! This sleek, fast and agile airframe is completely unlimited in its ability to perform the full range of full stall high alpha maneuvers and aggressive gyroscopic tumbling maneuvers. The Extra is also a top notch precision and XA aerobatic machine.
We have spent a great deal of time and effort to provide you, the discriminating aerobatic enthusiast, with the highest quality, most complete package possible. We are very proud of the end result of our labor and wish you great success with the assembly and flying of your Extreme Flight RC 70 inch Extra 300 EXP V2!

Your new Extreme Flight Extra 300 includes most necessary hardware with the exception of a spinner and motor mount. We highly recommend the use of the Extreme Flight 76mm Elite series electric spinner.
You will find a complete pull-pull system, as well as high quality heavy duty ball links and composite control horns, and a carbon fiber tailwheel assembly.

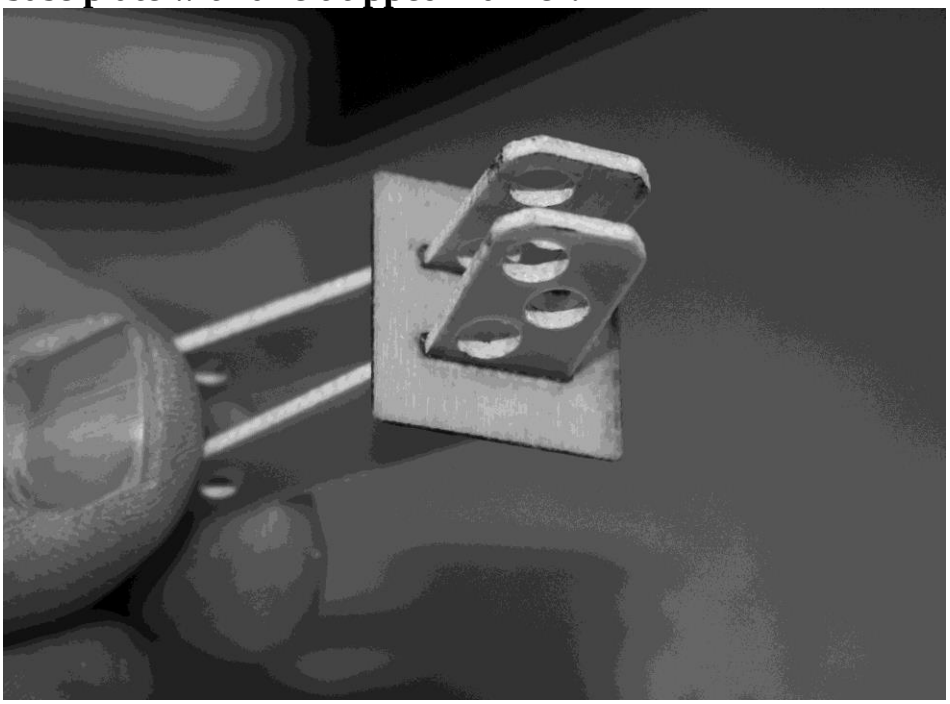
*******Most of the assembly process for the V2 Extra is identical to the V1 version so most of the pictures in this manual will be of the V1 version with updated pictures when the assembly process is different.*******

Elevator-<u>please note the elevator/stab assembly on the V2 version of the Extra is now a single piece unit that is permanently glued to the airframe and uses a single servo for elevator actuation.</u>

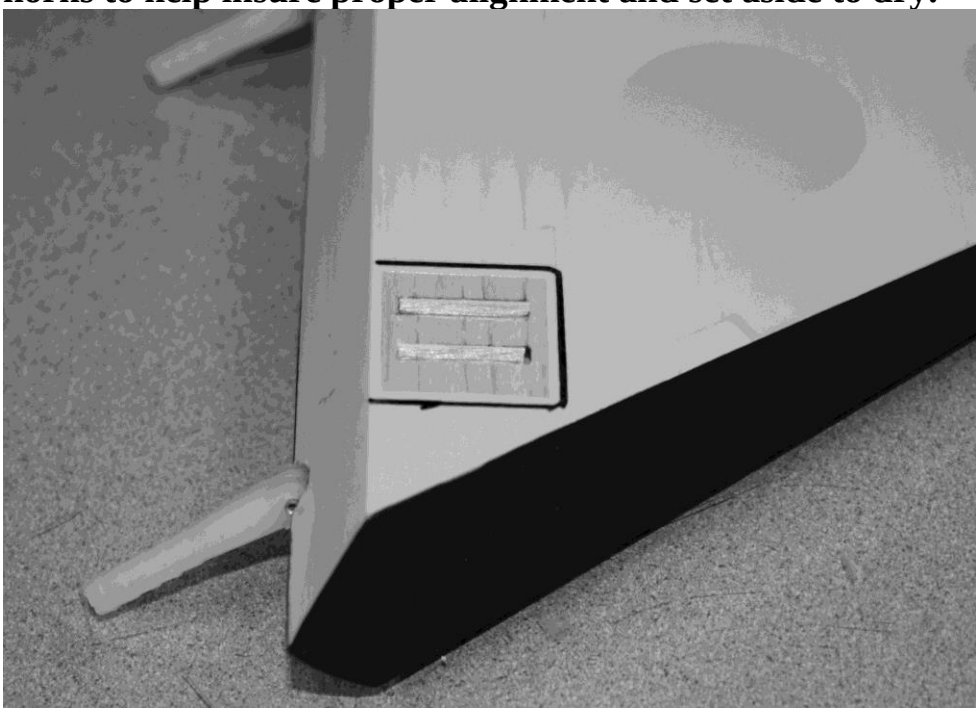
1. Locate the horizontal stabilizer/elevator assembly as well as the composite control horns and base plates from the elevator hardware package. Use a sharp #11 blade to make a cut in the covering over the 2 slots for the elevator control horns on the bottom of the elevator surface. Double check to make sure you are cutting into the <u>bottom</u> of the elevator.

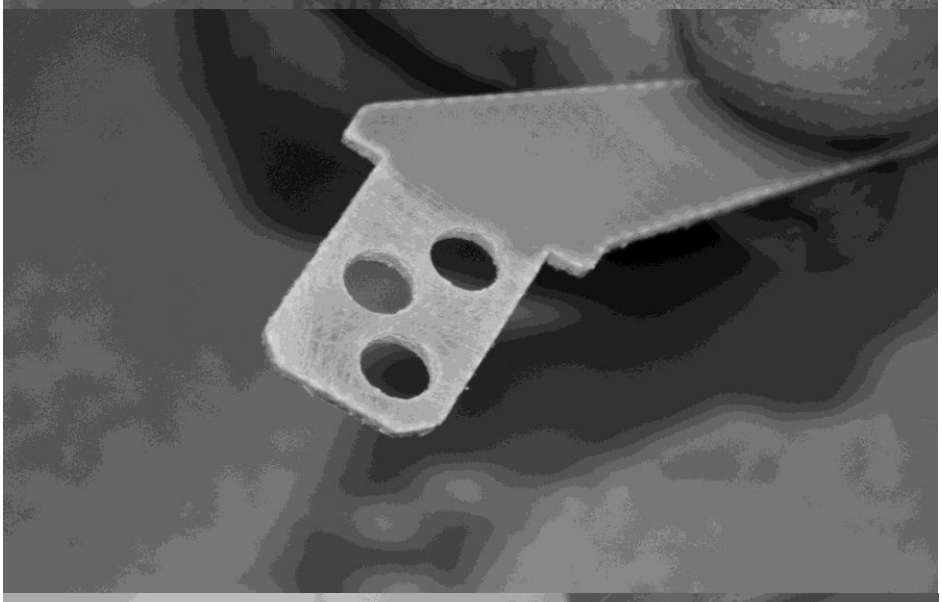


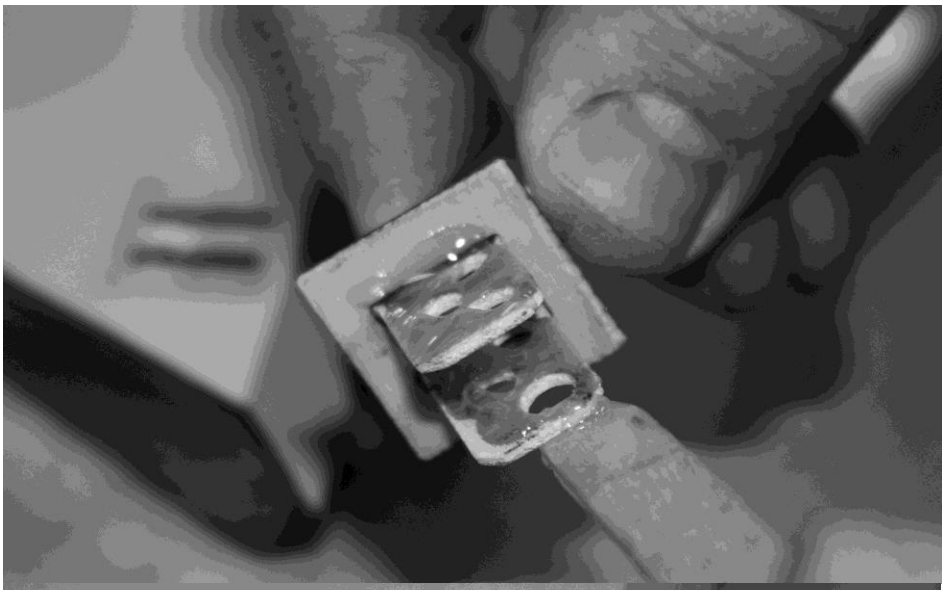
2. Insert the 2 control horns into the base plate and trial fit the horns into the slot and make sure they seat properly against the base and elevator surface. Trace around the base plate with a felt tipped marker.



3. Remove the horn assembly and use your #11 blade to remove the covering from inside the ink line you traced around the control horn base. Wipe away the ink line with a paper towel soaked in denatured alcohol. Scuff the portion of the horns that will be inserted into the elevator with sandpaper. Apply 30 minute epoxy to the slots and thoroughly coat the horns and base plate bottom. Reinsert the assembly into the elevator and wipe away any excess epoxy with a paper towel and denatured alcohol. Place a 3mm bolt through the horns to help insure proper alignment and set aside to dry.





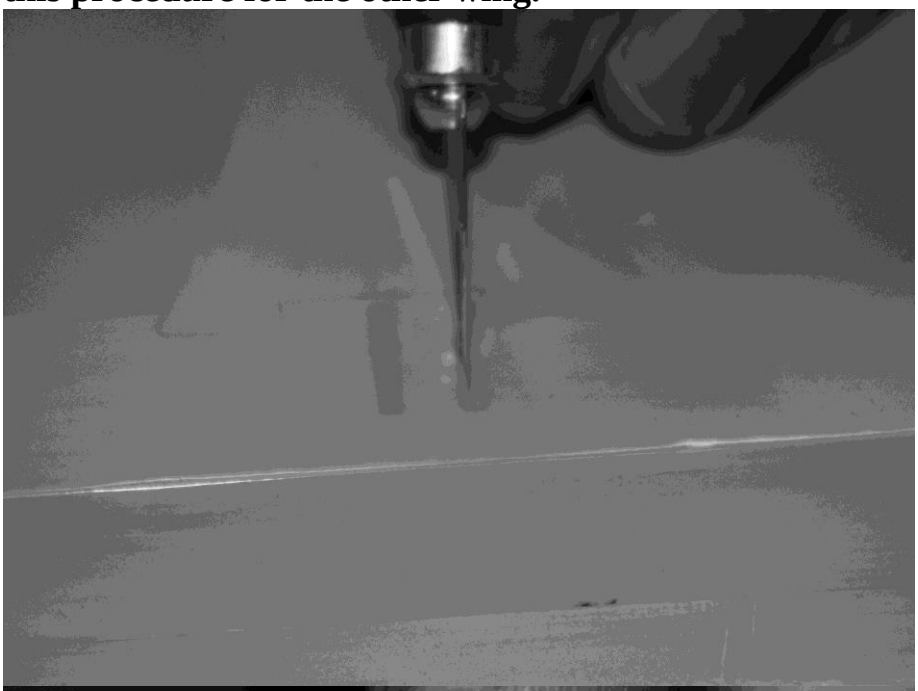


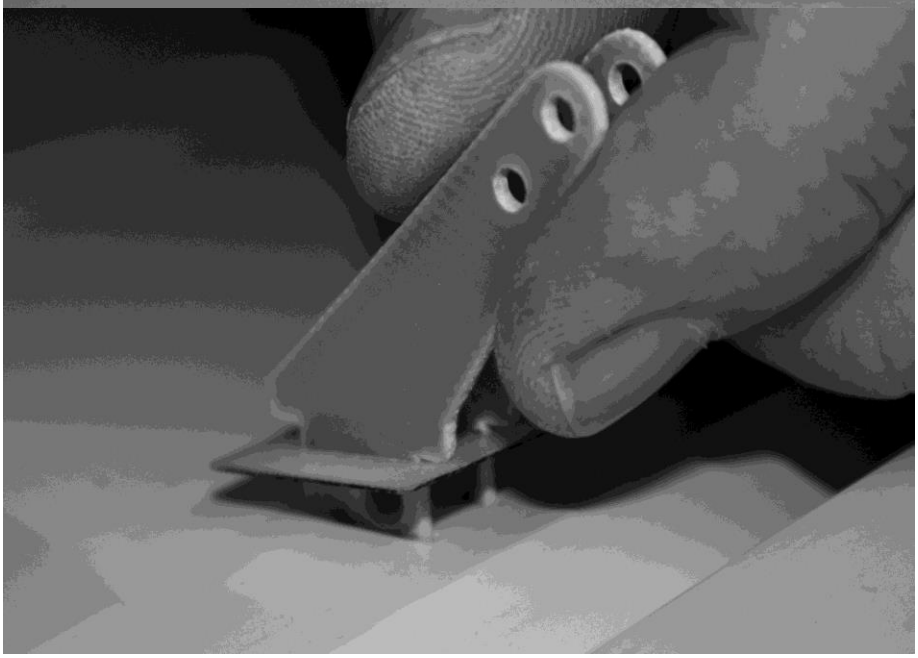
4. In this step I will outline the procedure we use to install the hinges. I have found it best to hinge the elevator/stab before gluing it into position in the fuselage. There are several methods to hinge a model and several adhesives you can use. We will describe the way we do it, as this method has proven itself over many years of model building. If you are new to this type of hinging process then I recommend that you install a single hinge first just to acquaint yourself with this method. Before starting the process get a few items together that will aid you as you proceed. You will need the following items: 30 minute epoxy (we recommend Pacer Z-Poxy), a scrap piece of pushrod or 1/8" dowel, paper towels and denatured alcohol. Locate 3 hinges per elevator half. Mix a generous batch of 30 minute epoxy. Use the pushrod or dowel to thoroughly coat and fill the hinge hole with epoxy, then coat the hinge with epoxy. Push the hinge into its hole until the joint is about a ¼" from its final position and use a paper towel to remove the excess epoxy that has been forced from the hole. Push the hinge the rest of the way in and make sure the hinge pin is centered in the hinge line. Use some denatured alcohol and a paper towel to remove all excess epoxy, especially on the hinge pin. When you are satisfied with the result set the surface aside to dry. Position the drying piece so that any excess epoxy will pool around the rear of the hinge. When you are comfortable with this process you should be able to do one side of a surface per batch of epoxy. Glue all hinges into the stabilizer first. After the glue has set trial fit the elevator to the stab and adjust if necessary. There should be as little gap as possible between the stab and elevator. When satisfied with the fit remove the elevator and repeat the gluing process outlined above. Be sure to wipe away all excess epoxy! Set aside to dry.

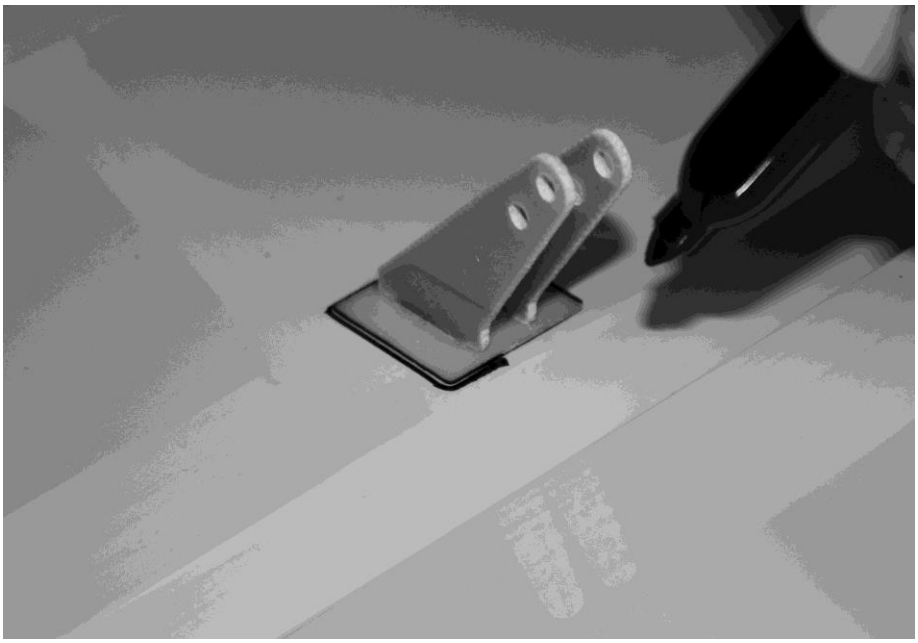
5. After the hinges have dried thoroughly, pull on them to make sure they are properly installed. The hinges will probably feel a little stiff as it is almost impossible to get all of the glue out of the knuckle joint. Use a fine tipped hypodermic needle and place one (only one!) drop of acetone on each side of the hinge pin. Move the elevator back and forth a few times and you will feel it loosen up. Be careful to only use one drop as you don't want to weaken the glue joint! Add a drop of penetrating oil to each hinge pin and you will ensure a smooth operating surface with no binding. Seal the bottom of the hinge gap with a strip of Ultracote or Blenderm tape. Be sure to fully deflect the control surface when applying the tape or Ultracote to allow full deflection once the gap is sealed. Before you set the stabs aside take a moment with your covering iron and go over all of the seams with a medium heat setting, paying special attention to the ends of thin trim stripes.

Wing Assembly

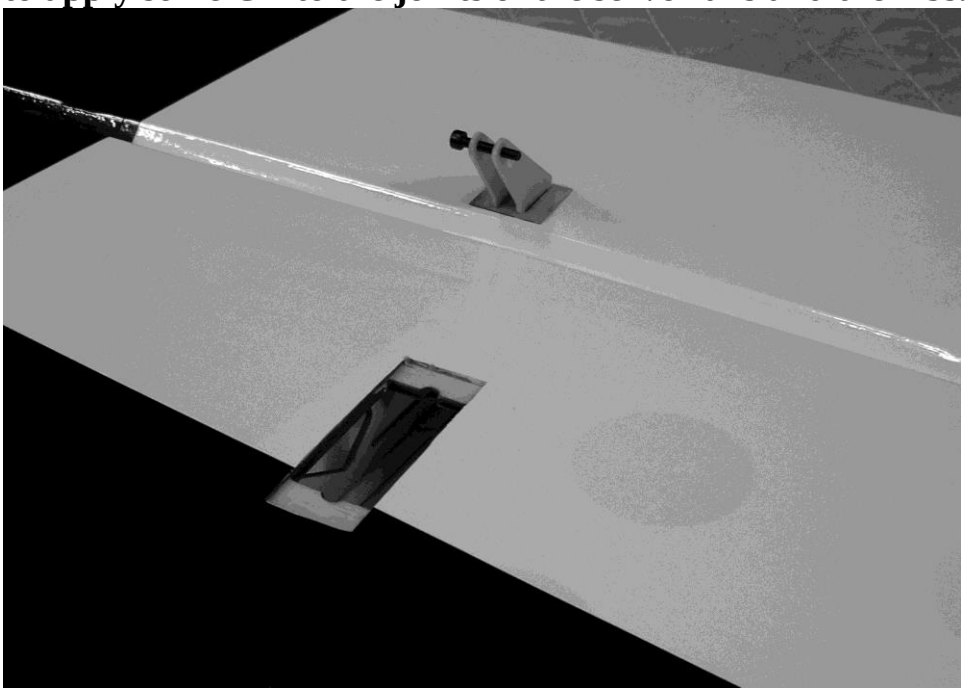
6. The assembly process for the wing is almost identical to that of the stab/elevator. For this reason we will not go into quite as much detail as in the previous procedure. Remove the aileron from the wing panel. Locate the 2 slots for the control horns and remove the covering from the slots with a sharp #11 blade. Follow the same procedure as outlined previously to install the control horns into the control surface and hinge the wing. Repeat this procedure for the other wing.



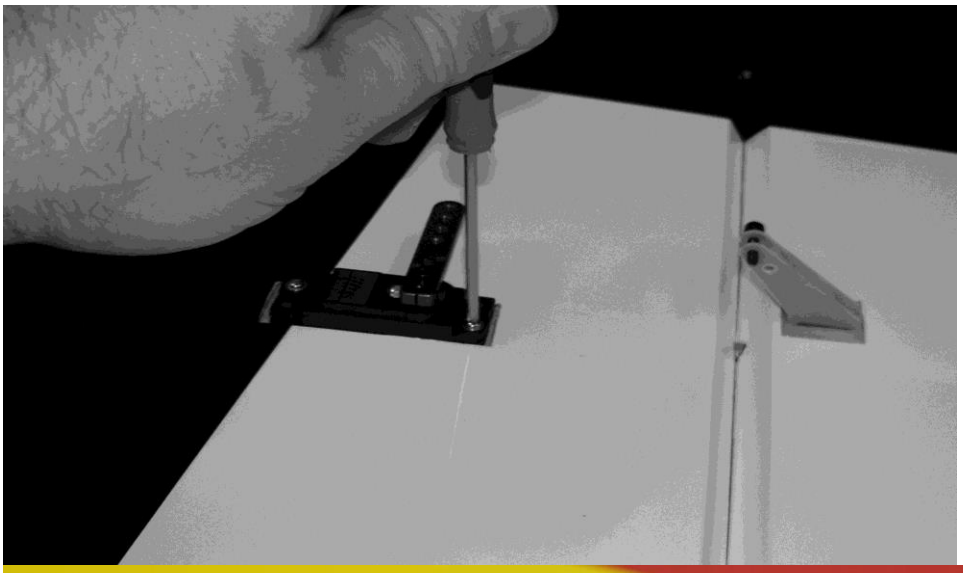


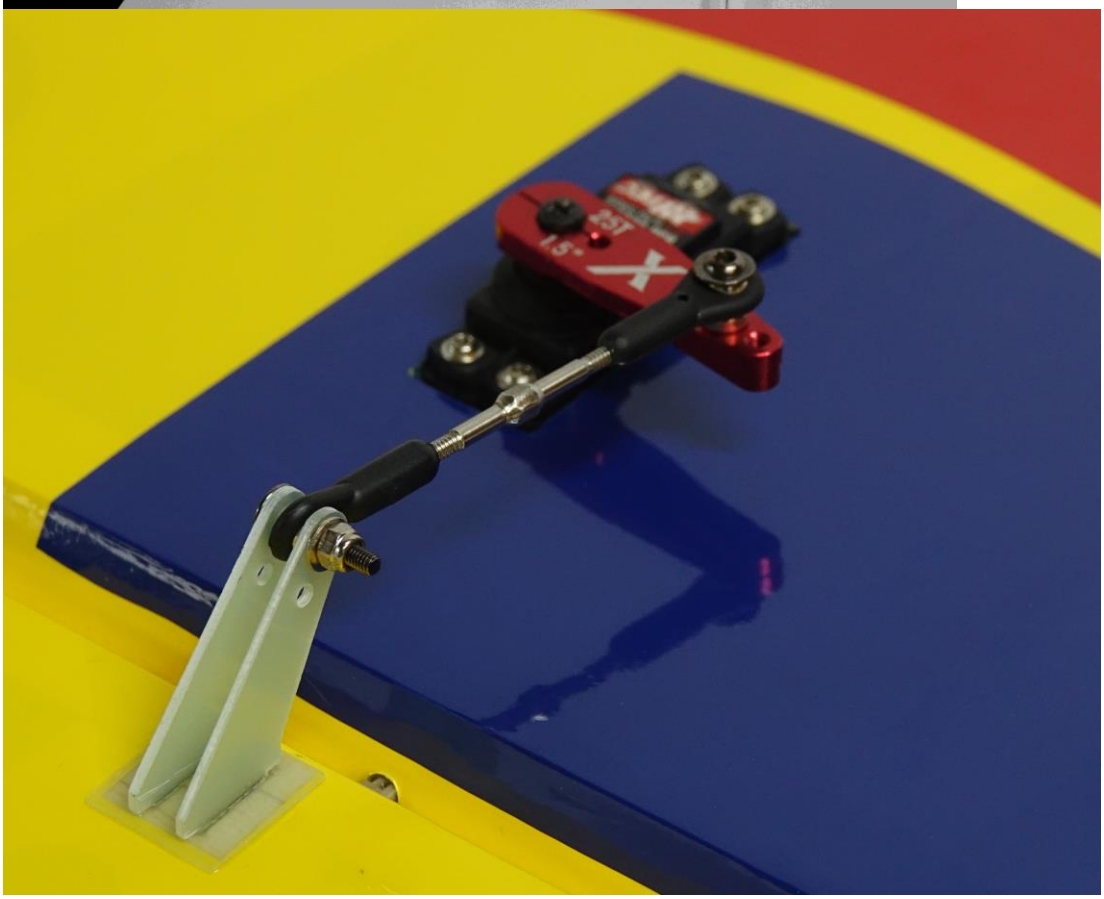


7. Locate the aileron servo mount and remove the covering from this area. Use a sealing iron to seal the edges of the covering to the sides of the servo opening. Take a few minutes to apply some CA to the joints of the servo rails and the ribs.



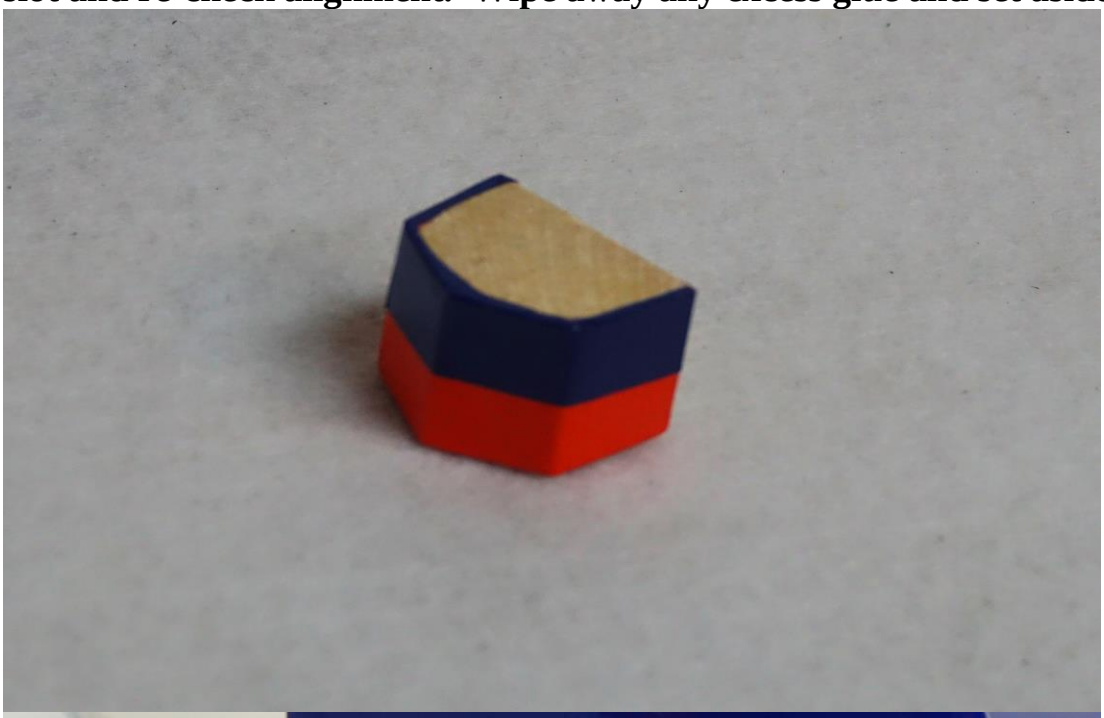
8. Attach a 12" servo extension to your servo and secure with thread or heat shrink tubing. Use the manufacturer supplied mounting hardware and install the servo with the output shaft toward the trailing edge of the wing. Electronically center your servo. Aileron servo arm length should be 1.50". We recommend the Extreme Flight anodized servo arms. Thread 2 ball links onto the titanium turnbuckle pushrod. Secure the pushrod to the control horns and servo arm as shown in the picture using the supplied 3mm bolts and nylon insert locknuts. Make sure to place the conical spacer between the ball link and aluminum servo arm to prevent binding. As always, use blue Loctite on ALL bolts!

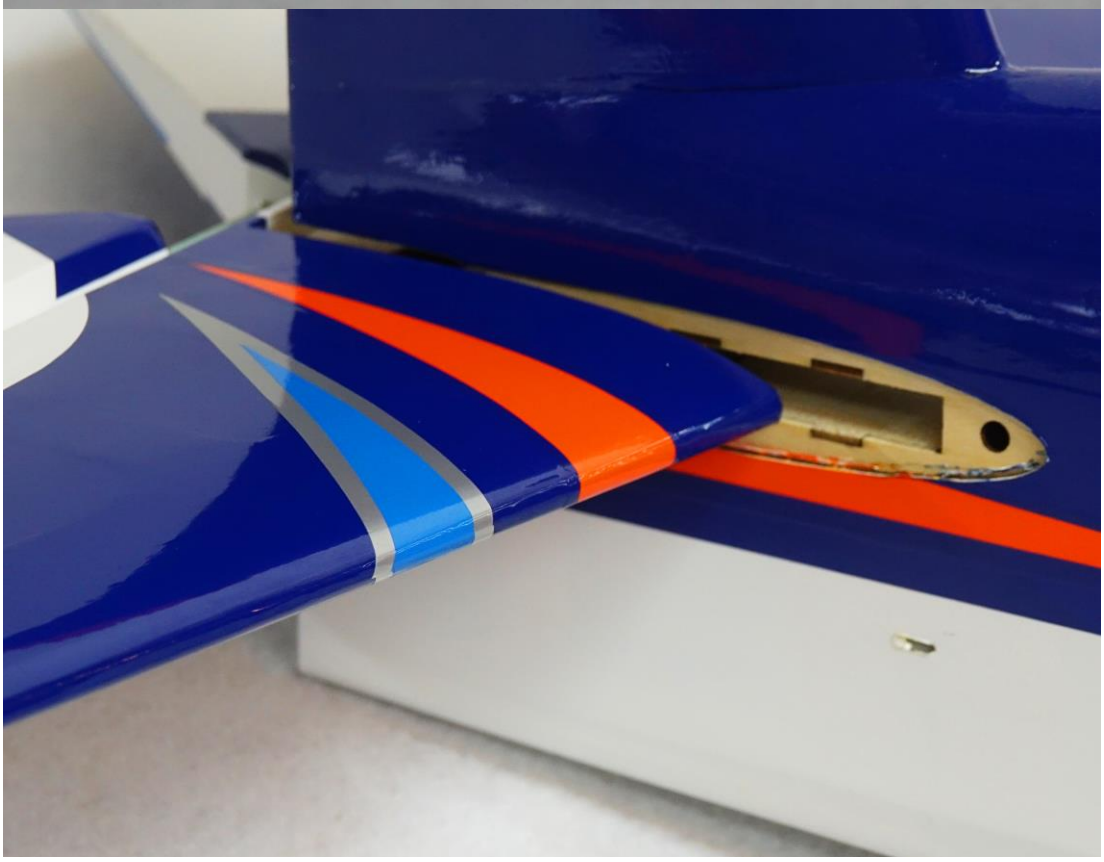


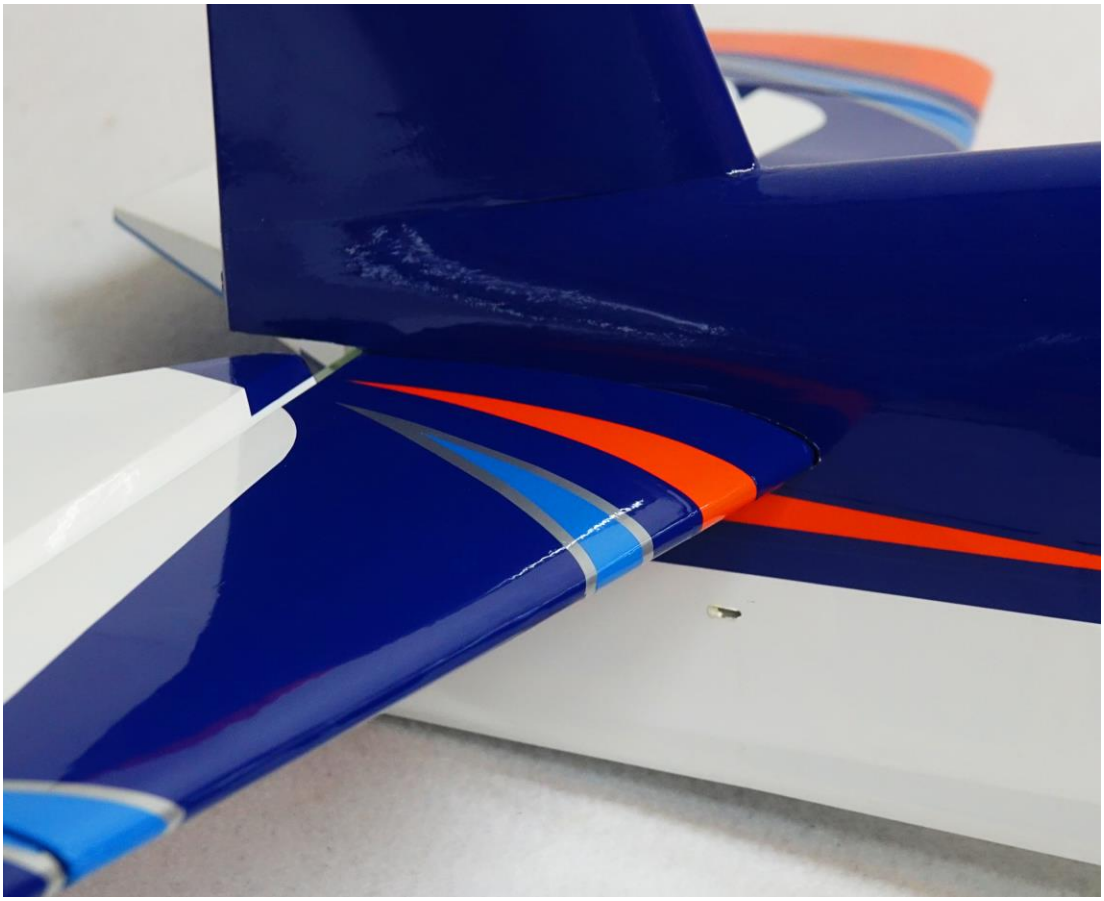


9. Before beginning the next assembly process, take a few minutes with your sealing iron on a medium heat setting and go over all seams, paying special attention to thin trim stripes and the seam at the leading edge of the wing. If there are wrinkles in the covering on the leading edge sheeting use a heat gun with a microfiber cloth to remove them and prevent digging into the wood with an iron. Use caution and avoid excessive heat as you may cause the Ultracote to shrink too much and lift at the seams. Also take the time to seal the hinge gaps with Ultracote or Blenderm tape. Clean the wings with Windex and put them away.

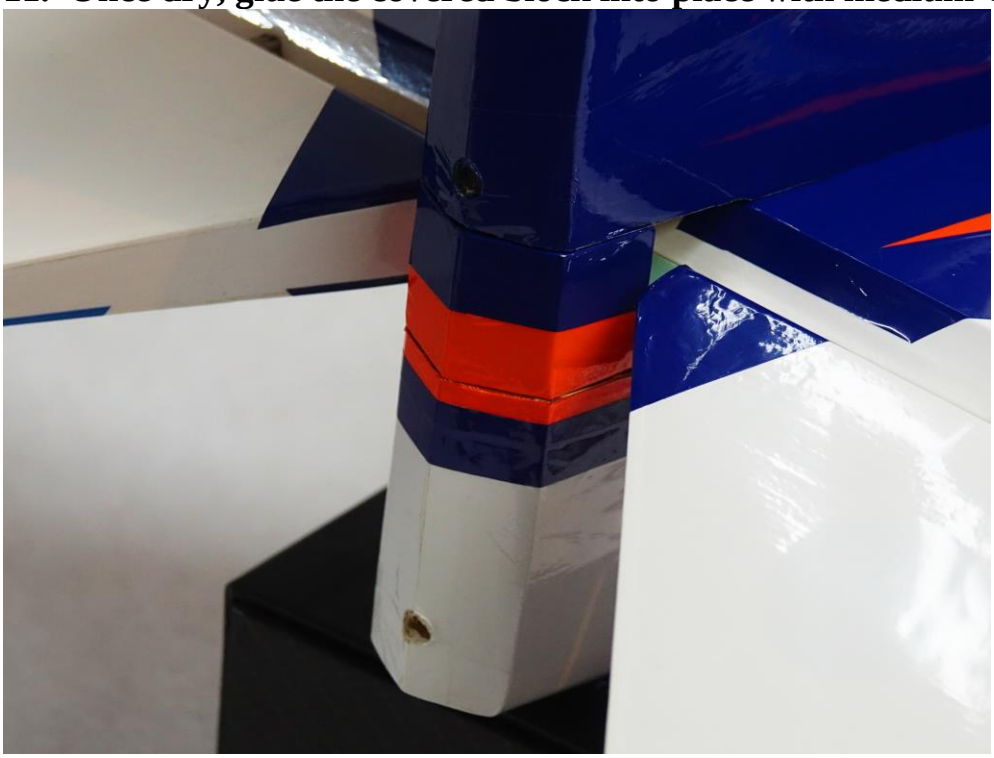
10. Locate your assembled elevator assembly and the fuselage. Remove the covered block from the rear of the elevator slot and set it aside. Slide the elevator assembly into the slot in the rear of the fuselage and check for correct alignment. When satisfied remove the assembly and apply 30 minute epoxy to the center section of the elevator that will mate with the fuselage slot. Slide the elevator into position, as far forward as it will go into the slot and re-check alignment. Wipe away any excess glue and set aside to dry.



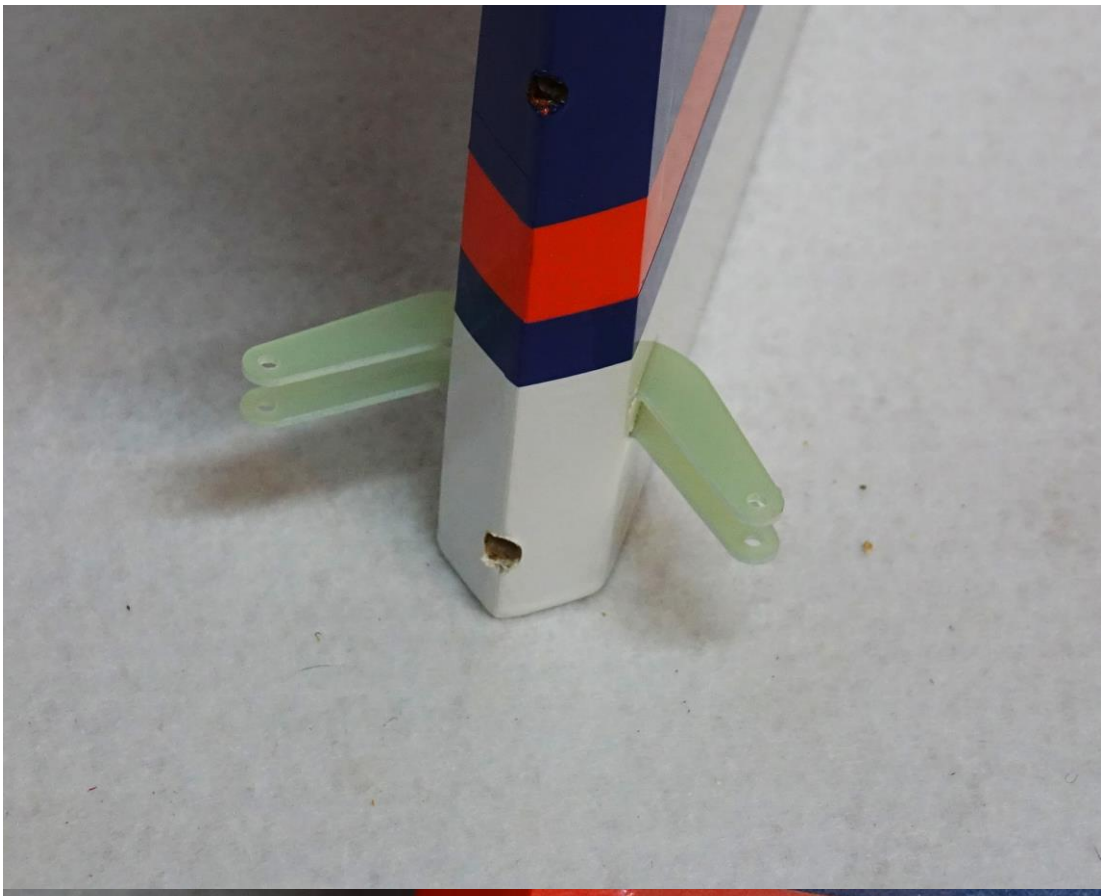




11. Once dry, glue the covered block into place with medium CA or epoxy.



12. Locate the rudder, the rudder control horns and the 2 base plates. Use a sharp #11 blade to remove the covering from the 2 pre-cut slots in the rudder. Trial fit the 2 servo horns through the slots in the rudder and into their proper position. Measure to ensure they are centered and mark with a fine tipped felt pen to make it easy to reinstall properly when epoxy is applied. Remove the control horns and cut away the covering from the area where the base plates will go as done previously with the aileron and elevator. Mix up some 30 minute epoxy and use a small blade to fill the 2 slots with epoxy. Use plenty of epoxy and be sure to completely fill the two slots. Use an epoxy brush to completely cover the areas on the rudder horns and base plate that will glue into the rudder. Slide the rudder horns back into their proper position followed by the base plates and immediately wipe the excess epoxy from the horns. Carefully check and re-check alignment to insure proper positioning. Use some denatured alcohol and a paper towel to remove any excess epoxy. Re-check the alignment one more time and set the assembly aside to dry.

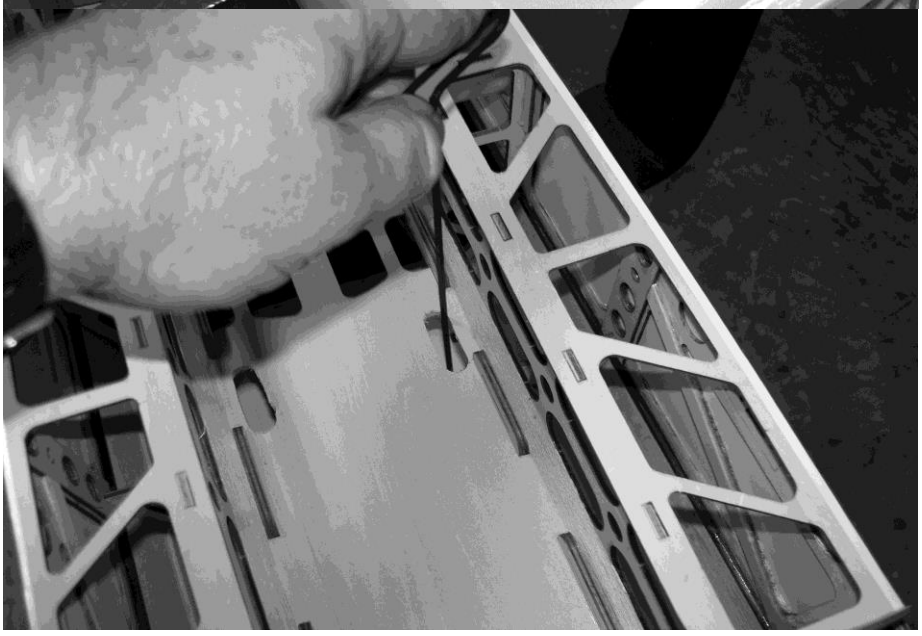


13. Locate a 2mm ball link from the hardware bag. Drill a hole 2 inches back from the leading edge of the rudder on the bottom of the rudder surface to accept the shank on the ball link.

14. Scuff the shaft of the ball link with coarse sandpaper. Mix up a small amount of 5 minute epoxy and apply it to the ball link and the hole in the bottom of the rudder. Push the ball link into the hole as shown in the picture. Use a little excess epoxy to form a fillet around the bottom of the ball link. Make sure the hole in the brass ball is aligned front to rear to accept the tailwheel tiller arm. Go ahead and glue the hinges into the rudder at this time using the procedure outlined previously.

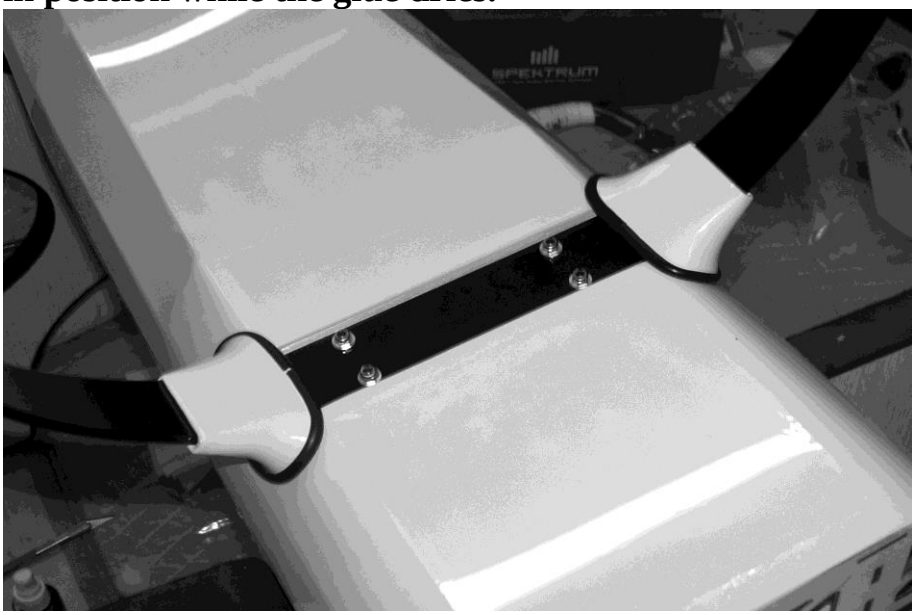
15. Position the tailwheel assembly on the rear bottom of the fuselage and be sure the tailwheel wire is aligned with the rudder hinge line. Secure the tailwheel with a couple of pieces of masking tape while you drill 2 holes with a 1/16" drill bit. Apply a few drops of thin CA to the holes and allow to dry then secure the assembly to the bottom of the fuselage as shown with the 2 provided wood screws.

16. Next we'll install the landing gear. Locate the carbon fiber main landing gear, 4 3mm bolts, lock nuts and washers. Insert the gear into the slot on the bottom of the fuselage and center it in the slot. Secure the landing gear with 4 3mm bolts, washers and nylon insert lock nuts by inserting the bolts and washers into the pre-drilled holes in the aluminum gear mounts inside the fuselage with a long T-handle wrench. Secure with the 3mm nylon insert lock nuts.



17. Locate the landing gear fairings. Slide the fairings over the landing gear and against the sides of the fuselage. You may need to open the hole in the fairing slightly with a rotary tool bit for proper fit. Use a pencil to mark the location of the bottom of the fairing on the landing gear and then remove the fairing.

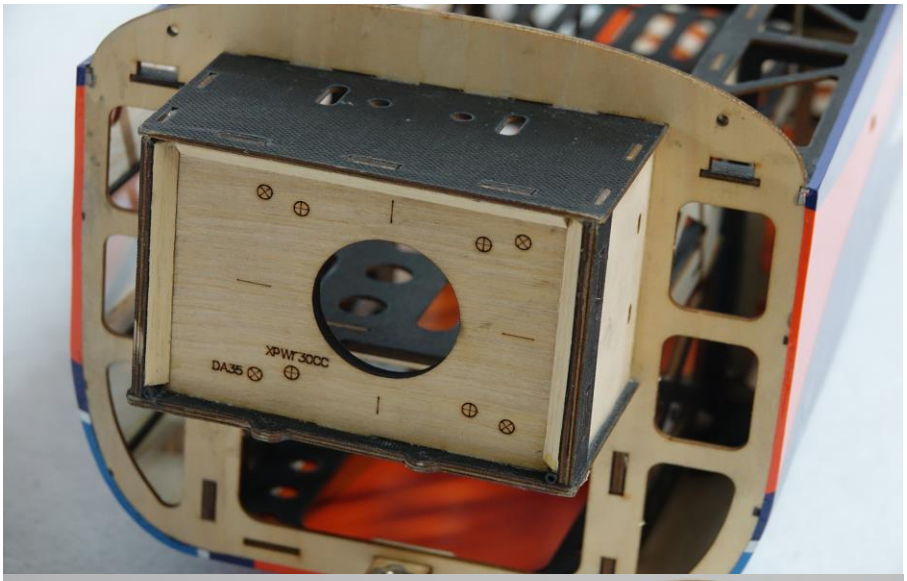
18. Apply a thick bead of silicon glue or epoxy just below your pencil line all the way around the gear. Slide the fairing back into place and apply masking tape to keep it in position while the glue dries.

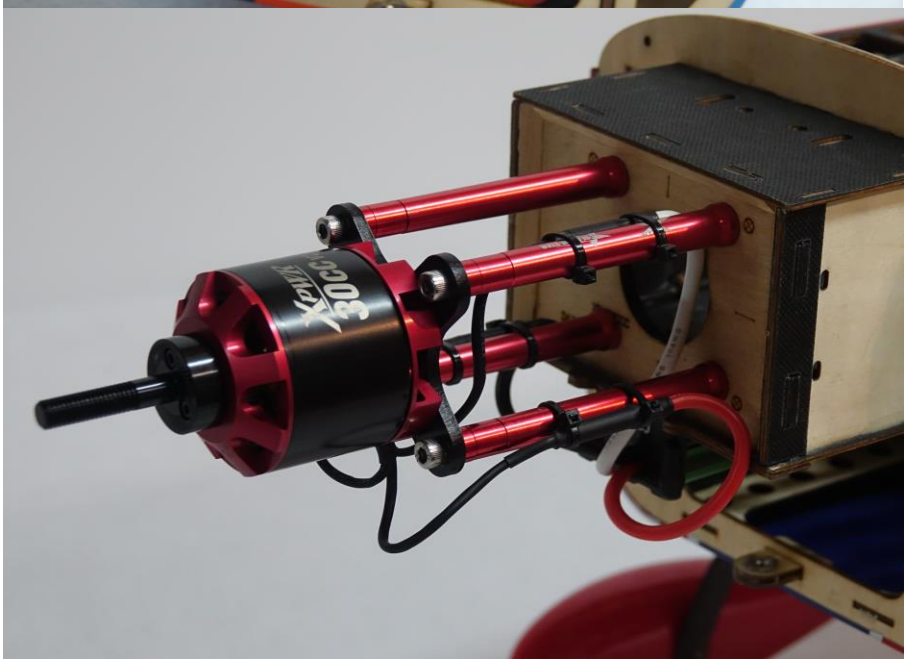


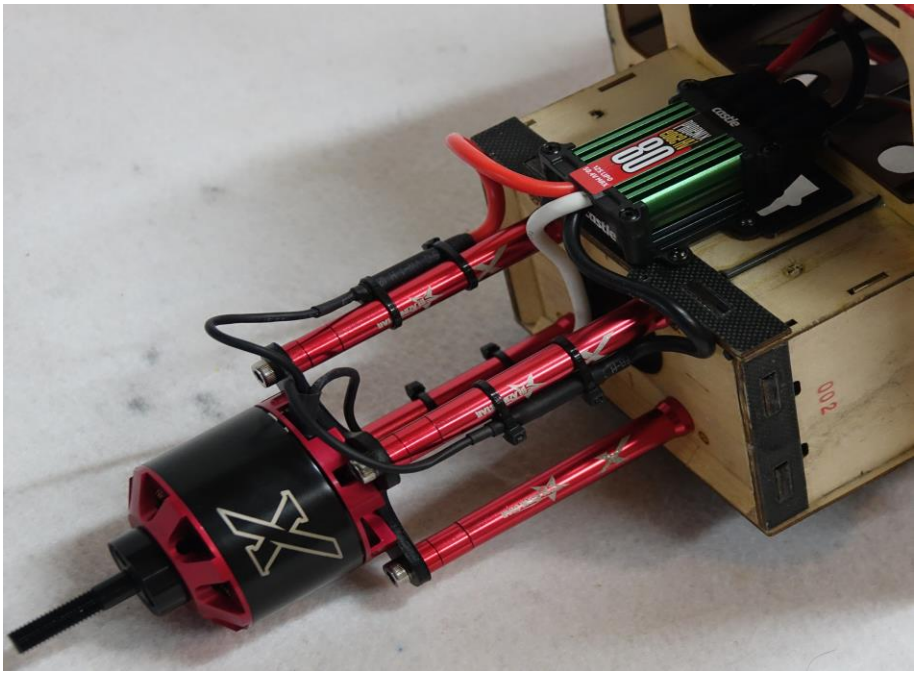
19. Locate the 2 axles, 2 locking nuts, 2 wheels, 2 wheel collars and 2 wheel pants from the hardware package. Place the wheel onto the axle and secure with a wheel collar. Place the threaded portion of the axle through the hole in the landing gear and screw the lock nut onto the axle, but do not tighten completely. There is a slot pre-cut in the wheel pant to allow it to fit over the axle. Slide the wheel pant into position over the axle and tighten the nut on the axle, taking care to make sure the wheel pant is positioned properly. When satisfied with the position of the wheel pants, drill a 1/16" hole though the plywood plate that is glued inside the pant at the location of the hole in the landing gear. Secure the pant in position with a single wood screw. Repeat this process for the remaining wheel pant.

20. While the Extra is still upside down let's install the rudder and finish up the tailwheel installation. Apply 30 minute epoxy to the holes in the rudder post and to the rudder hinges. As you position the rudder onto the vertical fin, be sure the tailwheel tiller arm is inserted into the ball link. Push the rudder into position and wipe away any excess epoxy with a paper towel and denatured alcohol.

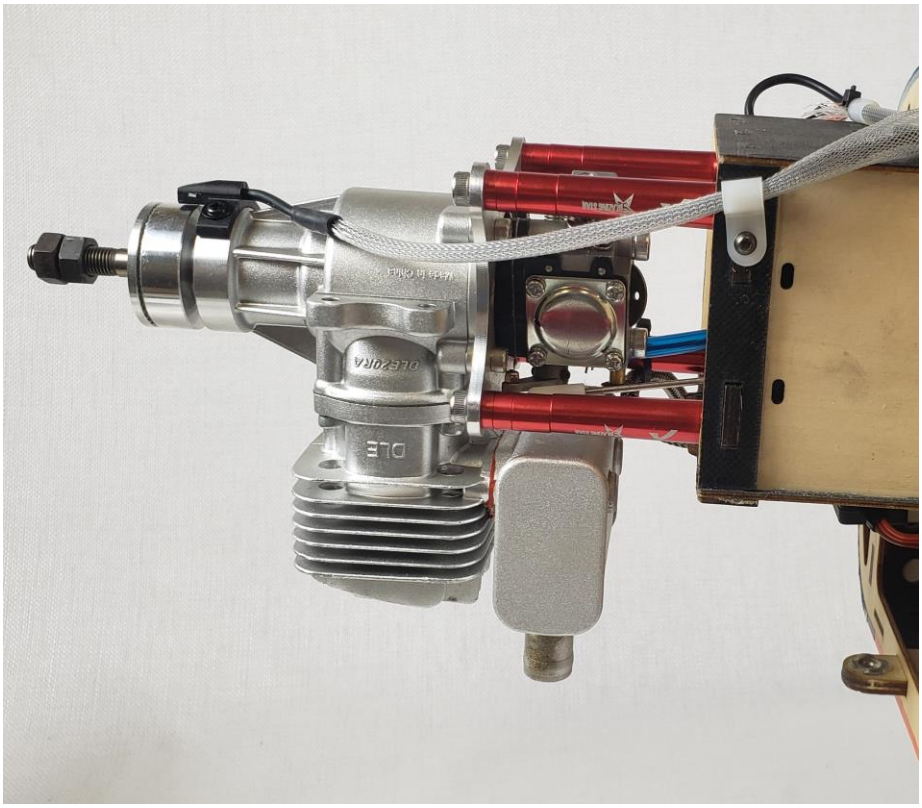
21. Next let's install the motor/engine. We have made this process very easy. If using the Xpwr 30 or DA-35 the positioning marks are already laser scribed on the firewall. Simply drill at the designated locations. If using another make or size of motor, the center and offset marks have been scribed into the front of the firewall with a laser. Use the marks on the firewall in conjunction with a mounting template to determine proper motor position. Most manufacturers will provide a mounting template for their motors on their website or include one with the motor. Use standoffs to space the motor so that there is 3mm clearance between the front of the cowl and the spinner backplate. This distance should be 6.35" (161mm). If using the Xpwr 30 the Blazing Star Standard XL Standoff set will make motor installation fast, easy and accurate. I highly recommend mounting the ESC on the bottom of the motor box which will place it directly in the path of the airflow entering the opening in the cowl just below the spinner.

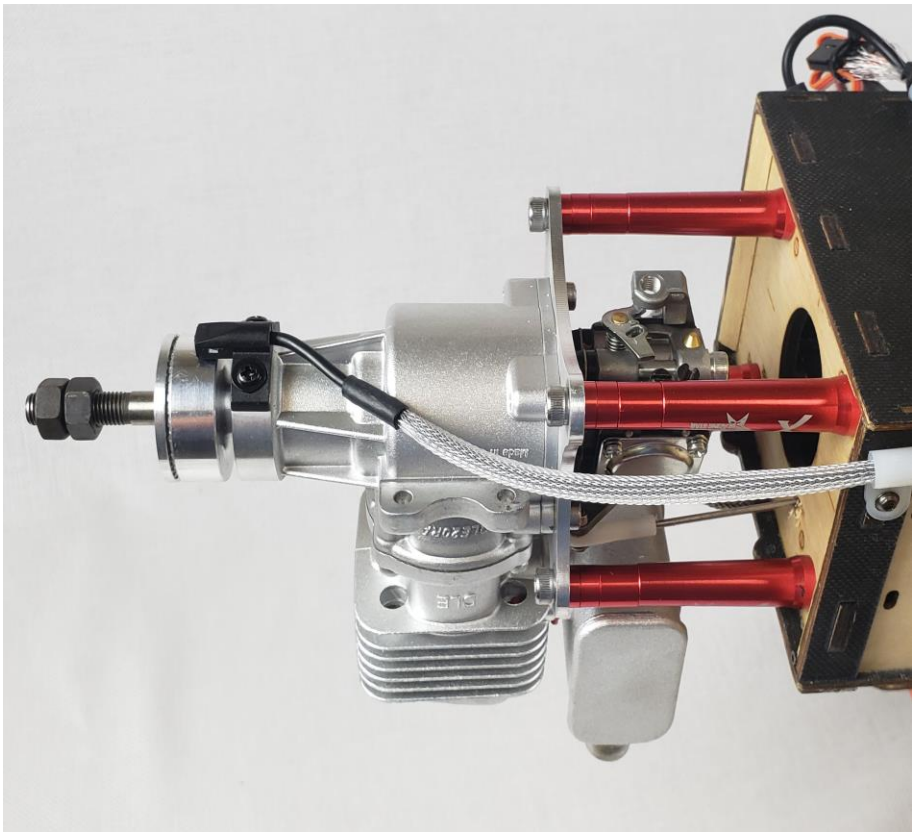


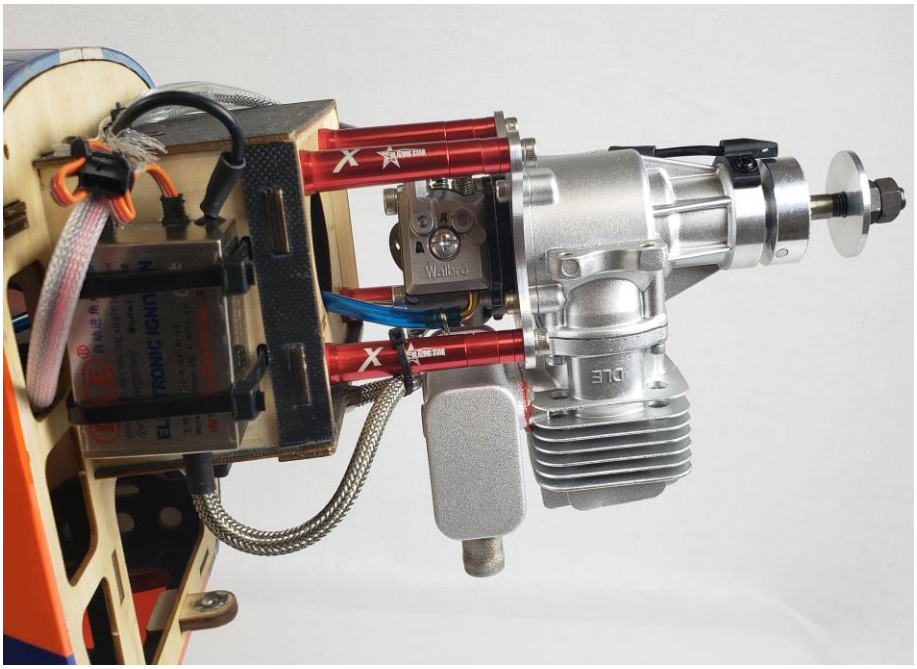




Here are photos of our installation of a DLE-20cc engine on the Extra. Please note we used an aftermarket radial mount available here:
http://www.seaplanesupply.com/aluminum.htm



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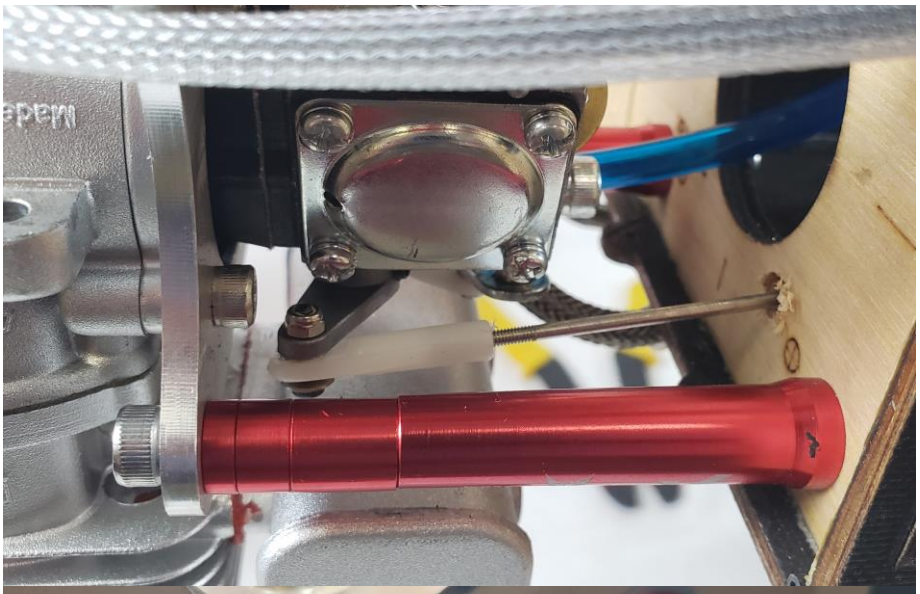


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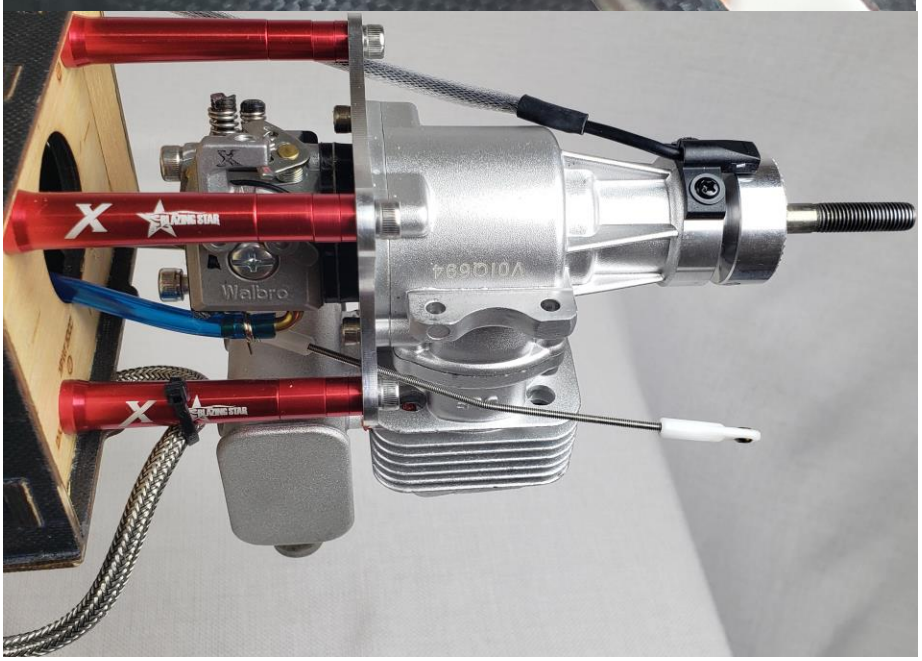
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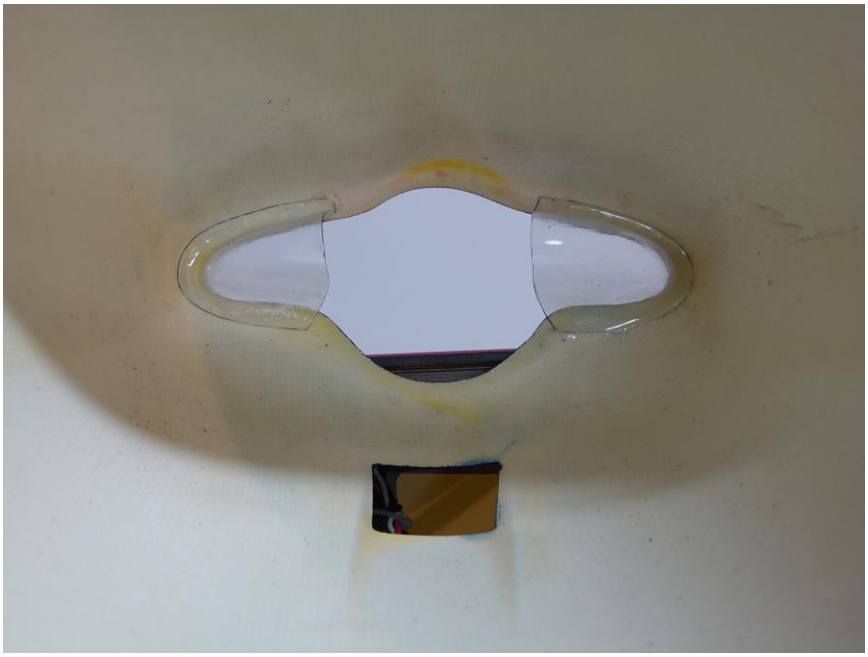
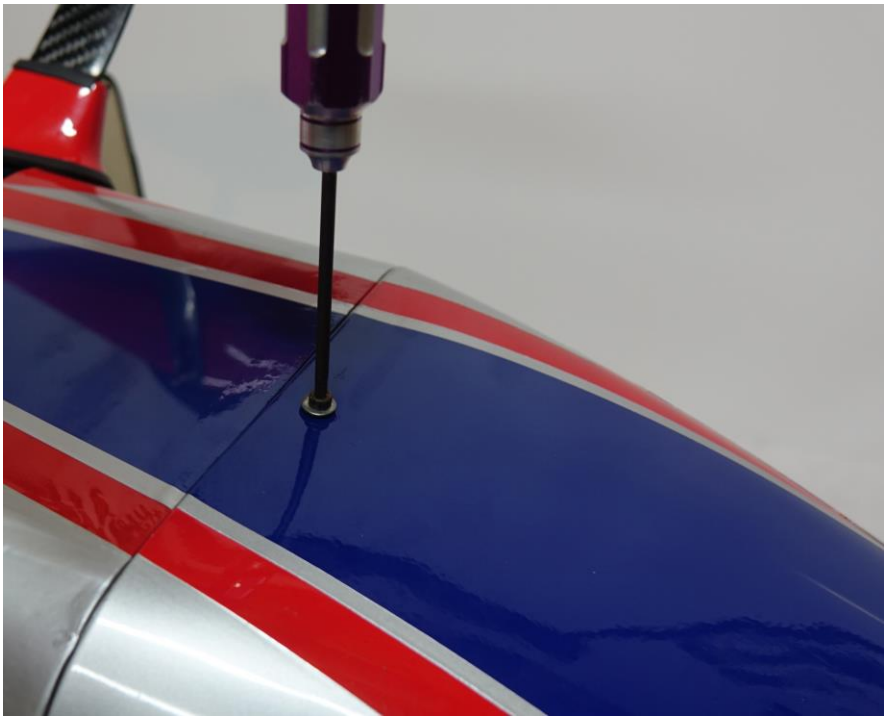
22. There are a pair of clear plastic airflow diverters to force incoming air over the Xpwr. We highly recommend installing these with Goop or epoxy to aid in the cooling of your motor.



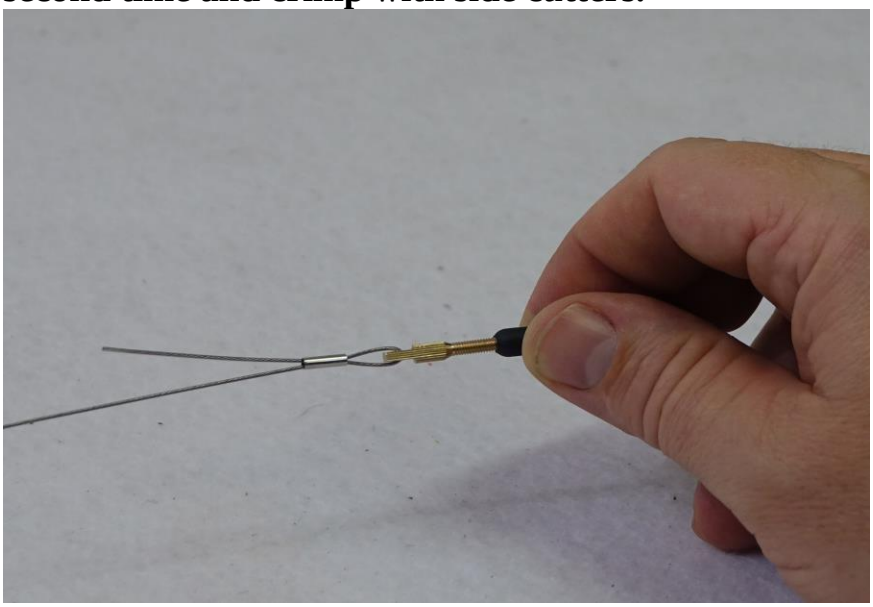
23. Slide the cowl into position and secure with 2 3mm bolts inserted through the F1 former and into the blind nuts in the cowl. A 3rd bolt is installed through the hole in the bottom of the cowl.

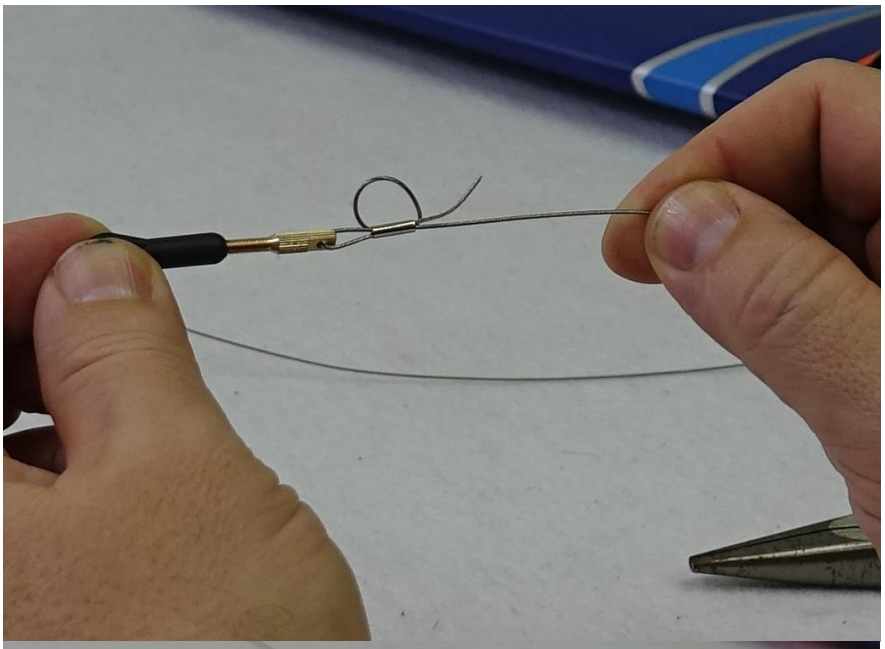


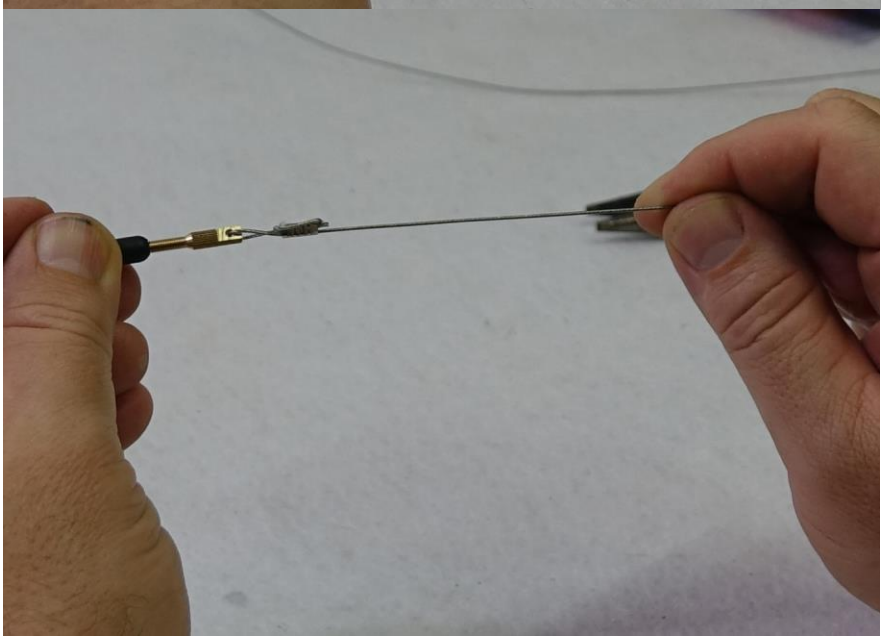
24. Install your rudder servo in the provided location under the canopy using the supplied hardware with the output shaft toward the rear of the plane.

25. Next let's install the pull-pull rudder cables. Look into the rear of the fuselage and you will see a nylon tube installed on each side of the fuselage. Use a piece of wire or T-pin to open the holes for the pull-pull cables on each side of the fuselage.

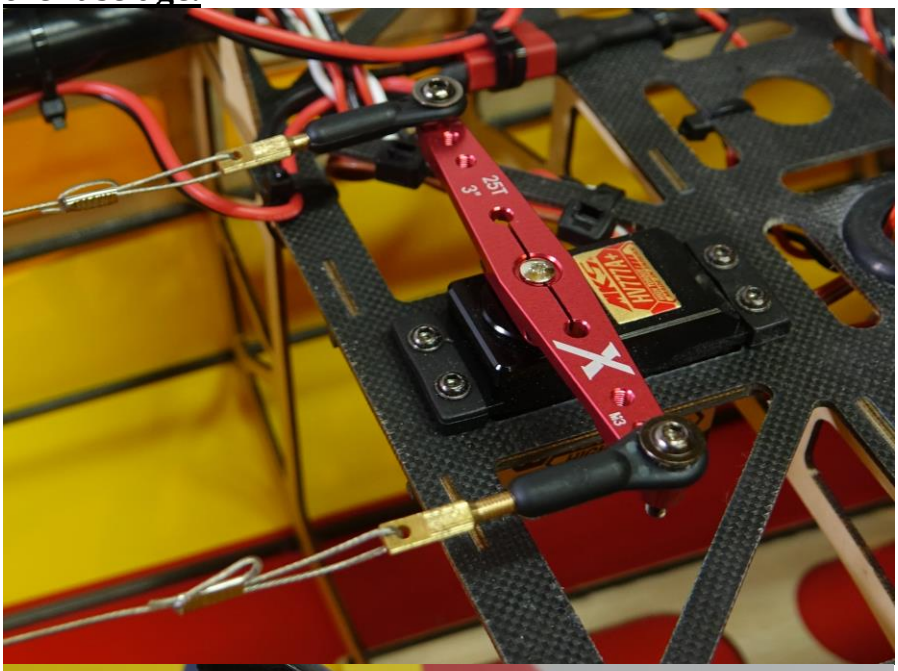
26. Assemble one end of the linkage by inserting the pull-pull cable into one of the aluminum tubes, through the hole in the brass pull-pull fitting and back through the crimp. Loop the cable back through the crimp a second time and crimp with side cutters.



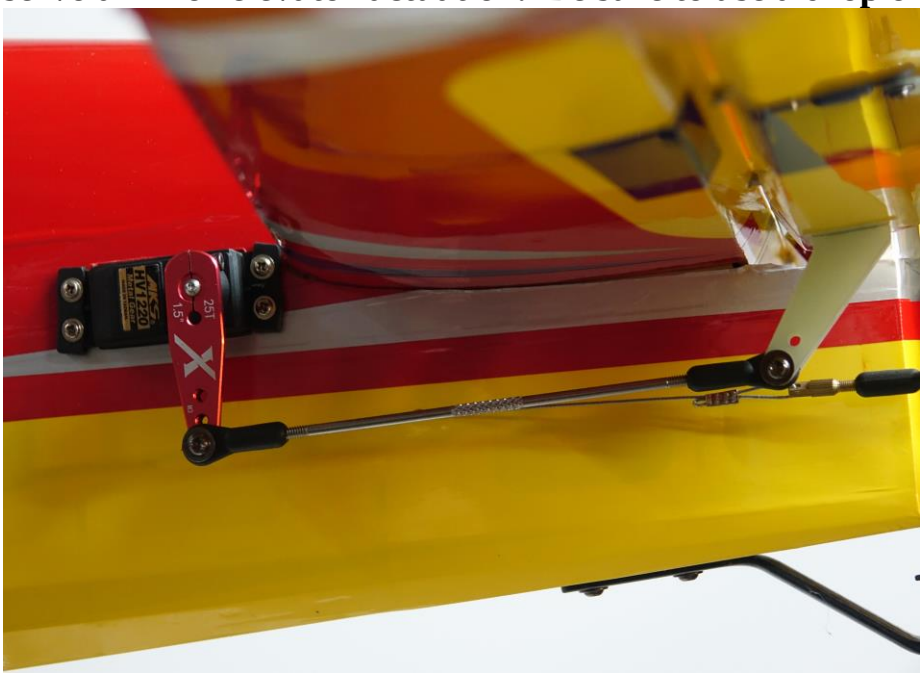




27. Insert the bare end of the cable into the slot in the rear of the fuselage and feed it forward into the canopy area and make up the same type of linkage as you did previously. Electronically center your servo. Secure the linkage at both ends with a 3mm bolt and nylon insert lock nut. Repeat for the other side. <u>The cables should cross inside the rear of the fuselage.</u>

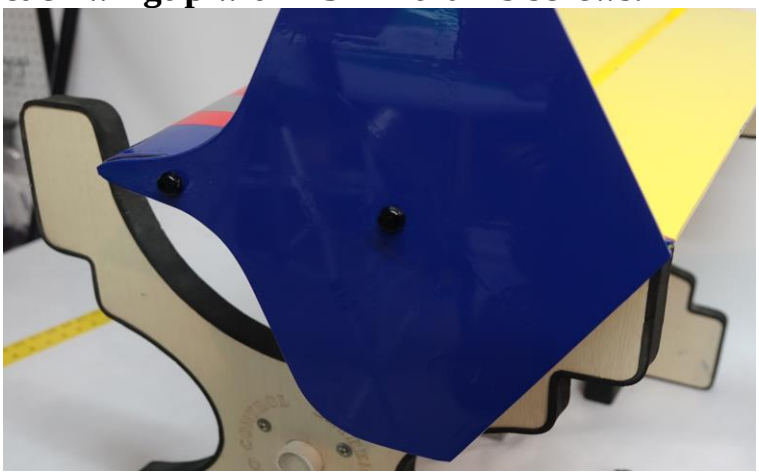


28. Remove the covering over the hole in the rear of the fuselage for the elevator servo. We recommend the MKS 1220 metal gear digital servo for elevator actuation. Attach a 24" extension to the servo lead and install the servo with the output shaft toward the rear of the fuselage using the manufacturer supplied mounting hardware. Thread a ball link on each end of the metal pushrod and secure to the servo arm and elevator control horns with a 3mm bolt and nylon insert locknut. We recommend the Extreme Flight 1.5 inch servo arm for elevator actuation. Be sure to use a drop of blue Loctite on all bolts!!!



29. The canopy is retained by 2 spring loaded hatch latch mechanisms. There are also plywood tabs with blind nuts installed and we recommend using these with 3mm bolts to retain the canopy in addition to the latches when using a gas engine.

30. Included in your Extra kit is a set of side force generators (SFGs). These aerodynamic devices add to the effective side area of the aircraft making knife edge flight and other maneuvers that depend on rudder authority easier and more stable. The SFGs also tend to make the aircraft more stable in high angle of attack maneuvers (harriers). I highly recommend that you install them on your aircraft and experiment. They are secured to each wingtip with 2 3mm thumb screws.



This completes the assembly of the 70 inch Extra 300EXP V2. As a final step clean the entire aircraft with glass cleaner, then apply a coat of spray-on wax and buff the finish to a high gloss. My favorite product for this is Eagle One Wet Wax AS-U-DRY, available in the automotive section of most Wal-Marts, K-marts, Sears, Targets, etc. People often ask me at trade shows how I get the planes to look so shiny, this is my secret. You may wish to apply all of your graphics before applying the coat of wax.

Set-up and trimming

Besides basic assembly, this is the most important part of preparing your airplane for flight. It can also be the most time consuming, but once your plane is properly dialed in you will agree it was time well spent.

The center of gravity range for the 70 inch Extra 300 begins at 5.25" from the leading edge of the wing measured at the root and extends back ¾" from this point. CG is determined with the Extra in the upright position. One of the best ways to dial in the proper CG for your aircraft is the 45 degree line test. Fly the aircraft in front of you from left to right (or right to left if you prefer) at full throttle. Pull the aircraft into a 45 degree up line and establish this line. Roll the aircraft inverted, neutralize the elevator and pay close attention to what the plane does. Ideally the plane will continue on this line for several hundred feet before it starts to slowly level off. If the airplane immediately drops the nose and dives toward the ground it is nose heavy. If it begins to climb inverted toward the gear it is tail heavy. There is no need to have the Extra excessively tail heavy to perform 3D maneuvers.

Control surface throws

I highly recommend that you purchase a throw meter that measures in degrees. There are several units available commercially. These units are a great aid in set-up and definitely beat the "that looks about right" method. For any type of precision flying, surfaces that travel equal distances are a must. The following control surface travels are what I use on my own Extra. These are a good starting point, but are by no means the only way to set up the Extra. Start here and then adjust to fit your own preferences and style of flying.

Elevator: 8-10 degrees low rate, 18-20% exponential; all you can get high rate, 60-65% exponential

Aileron: 15 degrees low rate, 30-40% exponential; 38-40 degrees high rate, 65-70% exponential

Rudder: 20 degrees low rate, 50% exponential; all you can get for high rate, 80-90% exponential.

Again, this is just a starting point. Adjust to your liking.

Thanks again for your purchase of the Extreme Flight RC 70 inch Extra 300EXP V2 ARF. I hope you enjoy assembling and flying yours as much as I have mine.

See you at the flying field!

Chris Hinson

Extreme Flight RC