85" EXTRA 300EXP 50cc ARF

Assembly Manual



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Congratulations on your purchase of the Extreme Flight RC 85" Extra 300EXP ARF! Purpose built for the multitude of 50cc engines on the market, this brand new airframe is the perfect complement to these venerable power plants that have been neglected for far too long. Our design team started with a very specific goal with careful consideration of weight, wing area and performance parameters to make sure we delivered the ultimate light weight 50cc performance machine. We are happy to report that our lofty goals for this airframe were not only met but exceeded!

Precise, agile and aggressive yet super stable and light on the wing, the 85" Extra excels in all modern aerobatic flight regimes. With reduced control surface throws the Extra is a big pussycat and makes a great sport flyer. Crank up the rates and prepare to be amazed by the truly unlimited potential of this airframe!

The 85" Extra 300 EXP is loaded with features including advanced use of composites for a super strong, rigid, yet light weight airframe, carbon fiber wing spars, main gear, tailwheel assembly, wing and stab tubes. It features a 2 piece removable stab with internally mounted elevator servos. The Extra is available in 2 high visibility Oracover color schemes with high contrast bottom colors and a pro quality hardware package including genuine Dubro ball links. Elevators and ailerons are pre-hinged and hinge lines are sealed with Oracover, facilitating a quick assembly. Experienced modelers should be able to finish assembly in a couple evenings of relaxed shop time.



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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.

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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. Having said that, it is impossible for us to inspect every glue joint in the aircraft. Take a few minutes and apply some medium CA to high stress areas such as the aileron servo mounting trays , landing gear mount, anti rotation pins, wing and stab root ribs, etc.**
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 sealing iron to go over all seams, stripes and sharp points in the covering scheme. You may want to apply a drop of clear fingernail polish at the tip of all sharp points to prevent them from lifting. To remove wrinkles use a 100% cotton tee-shirt or microfiber cloth and your heat gun and heat the covering while gently rubbing the covering onto the wood with the t-shirt or cloth. 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 well over 45 degrees. A lot of servo power is required to prevent flutter and to maintain the required deflection for maneuvers. We absolutely recommend the use of METAL GEARED servos with a minimum of 400 oz. inches of torque.**
5. **Use a high quality epoxy for installing the composite control horns. We highly recommend the use of Pacer Z-Poxy 30 minute formula. We have used this glue for many years with zero failures.**
6. **You may want to add a bead of RC-56 Canopy glue to the intersection of the 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, regular inspection and maintenance is a must. 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 ensure airframe longevity.**
8. **Be sure to put a drop of blue Loctite thread lock on every bolt on this aircraft! Failure to do so may cost you your aircraft! This includes servo arm screws!**
9. **The basic assembly process of the Extra is very similar to that of our previously released 50cc and 100cc aircraft. Some of the photos in this manual may be taken from a previous aircraft release if we determined that the assembly step was illustrated more clearly in these photos.**

If repairs become necessary the Ultracote colors used are as follows:
White/Orange/Blue/Silver color scheme: Orange- # HANU877, White- # HANU870, Midnight Blue- # HANU885, Sky Blue- #HANU875, Silver-#HANU881

Yellow/Blue/Red/Silver color scheme: Cub Yellow-#HANU884 Midnight Blue- # HANU885, True Red- # HANU866, Silver-#HANU881

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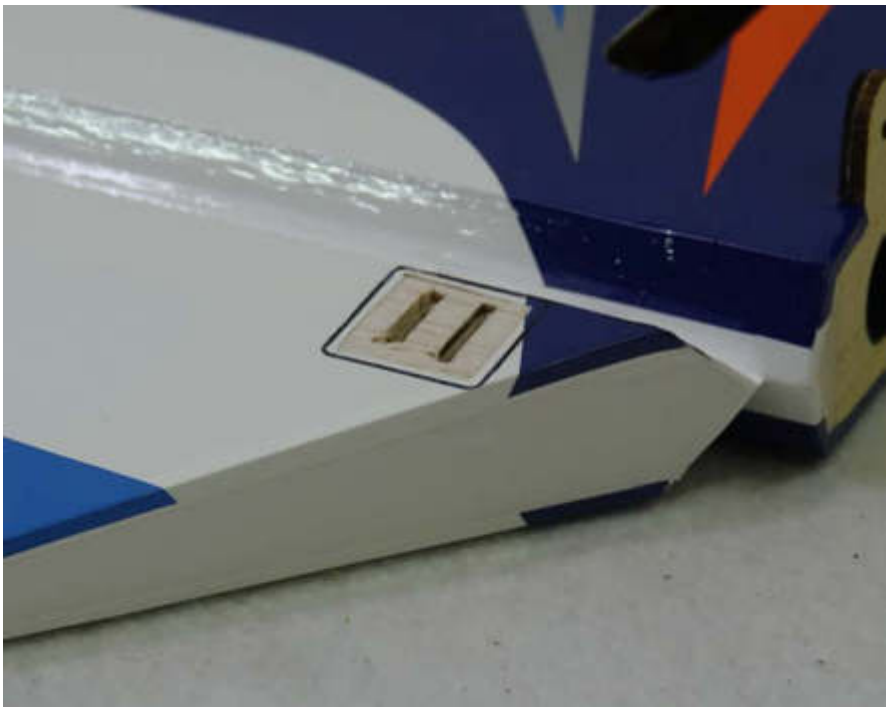
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Since the 85" Extra (and most of our other giant scale models) now come pre-hinged and the hinge gaps sealed, the most time consuming task of the assembly process has been eliminated. This leaves a very minimal amount of gluing for the assembler, which consists of installing the composite control horns in the ailerons, elevators and rudder, with the only the rudder hinges needing to be glued. For this reason we recommend that you spend the first hour or so of assembly completing this task. After this has been completed the rest of the assembly process consists of installing components into and onto the airframe.

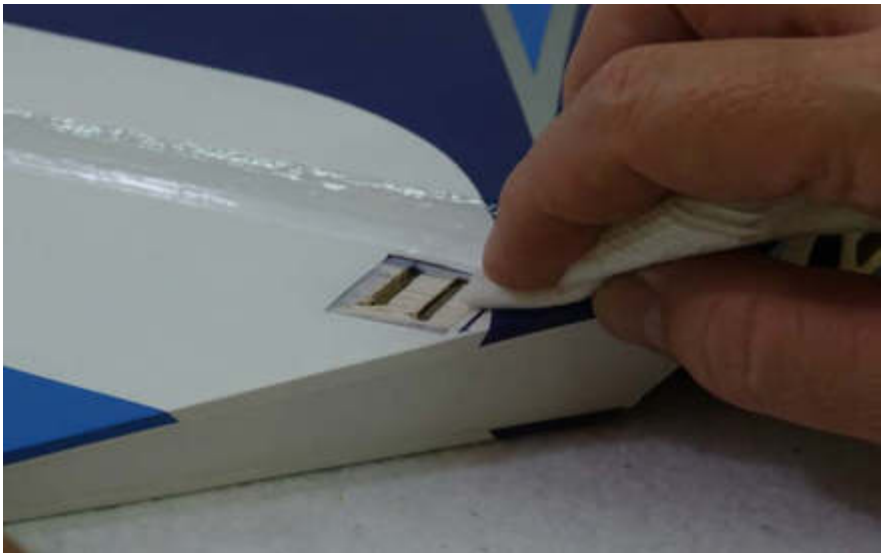
1. Locate the proper control horns and base plates for each flying surface. Place the 2 control horns into the baseplate and carefully insert them into the pre-cut slots in the control surface. Use a fine tipped felt marker to trace around the baseplate.



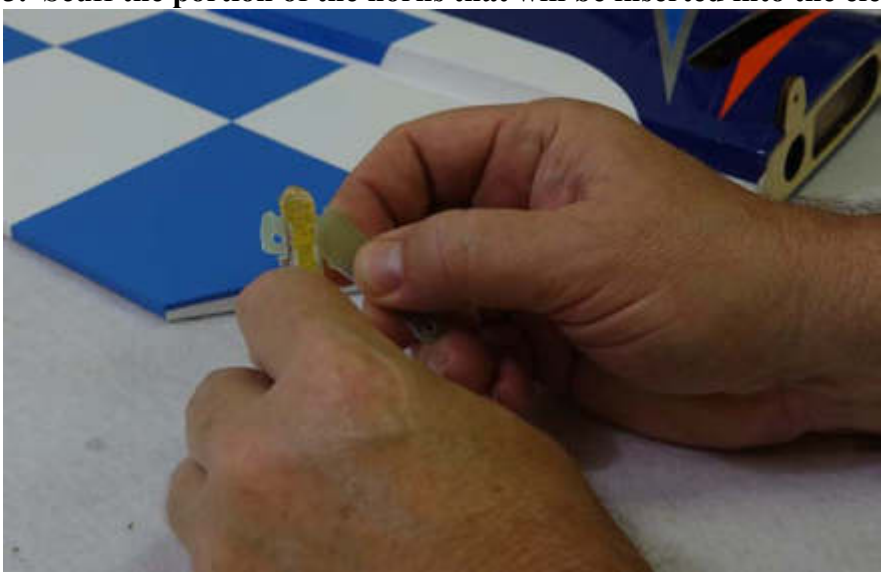
2. Remove the horn assembly and use your #11 blade to remove the covering from inside the ink line that you traced around the control horn base. Wipe away the ink line with a paper towel soaked in denatured alcohol.



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3. Scuff the portion of the horns that will be inserted into the elevator with sandpaper.



4. Locate your epoxy, mixing cup, an old pushrod to stir with and a length of nylon cable tie to apply the epoxy. We have used Pacer 30 minute Z-poxy for over 2 decades with excellent results and zero bond failures and we highly recommend this product.

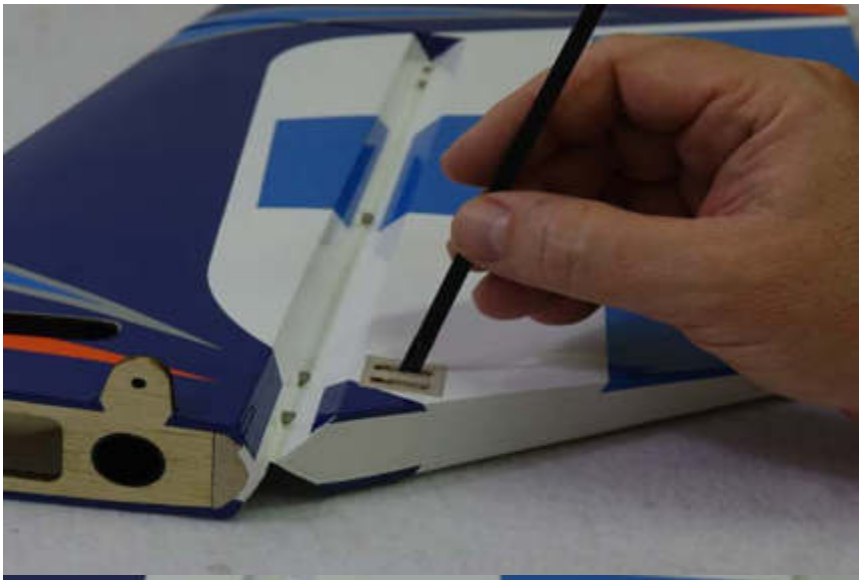


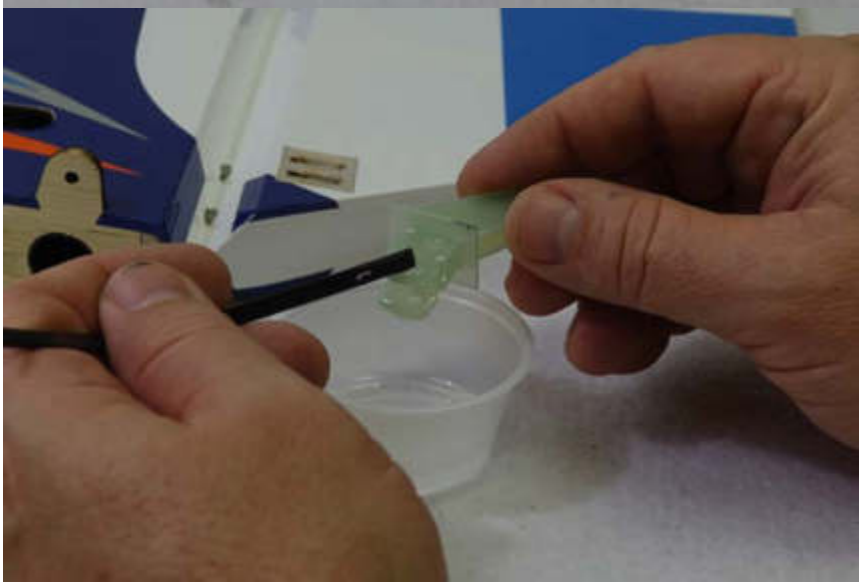
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5. Mix a generous batch of epoxy being careful to use equal parts resin and hardener.



6. Use the nylon cable tie to apply epoxy to the slots and thoroughly coat the control horns on both sides of each horn.

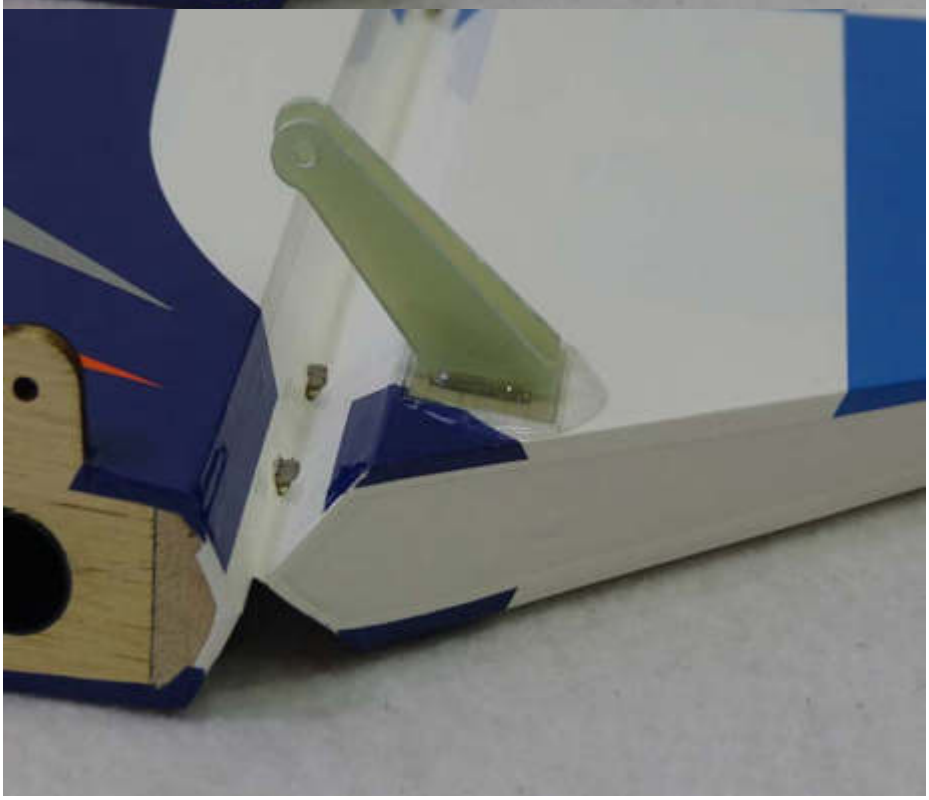




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7. Insert the control horns into the slots and ensure that the horns are properly seated against the base plate and the base plate is flush against the control surface.

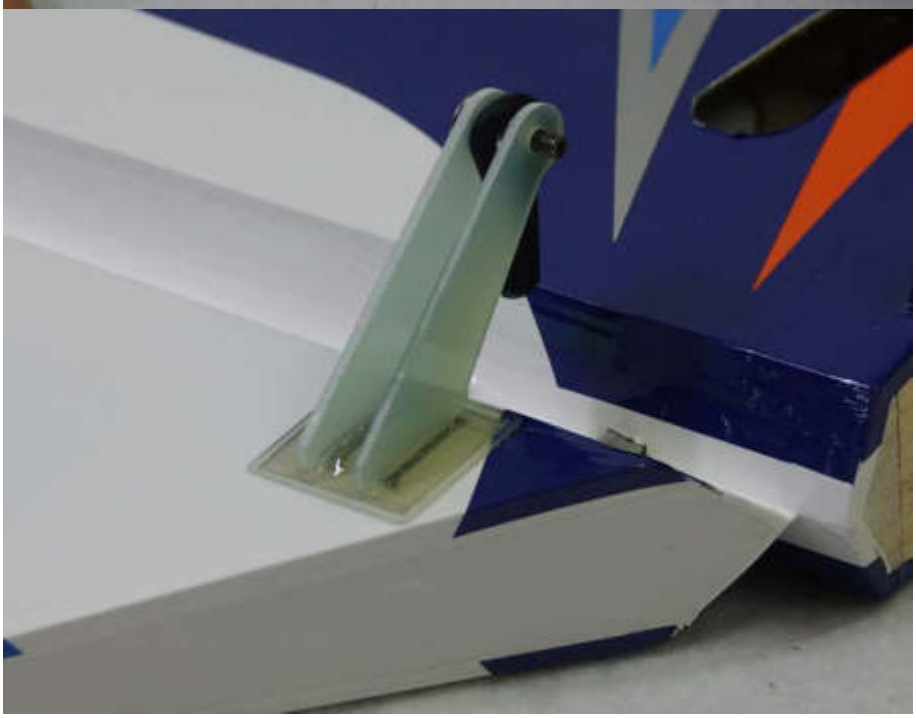




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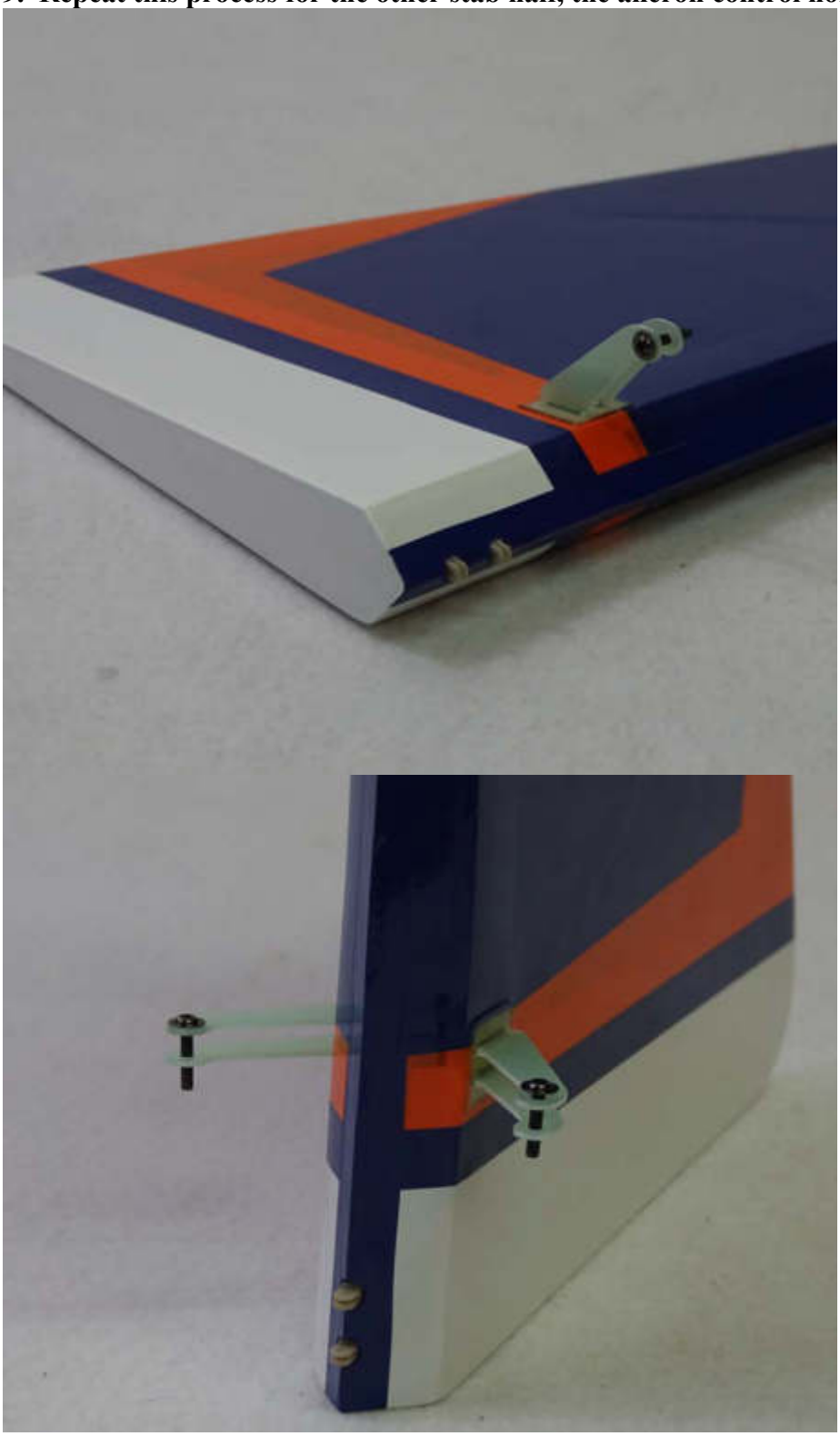
8. Wipe away the excess epoxy with a paper towel soaked in denatured alcohol, making sure to do a good job of cleaning the area. Insert a bolt 3mm bolt and ball link into position and confirm proper alignment before the epoxy sets.





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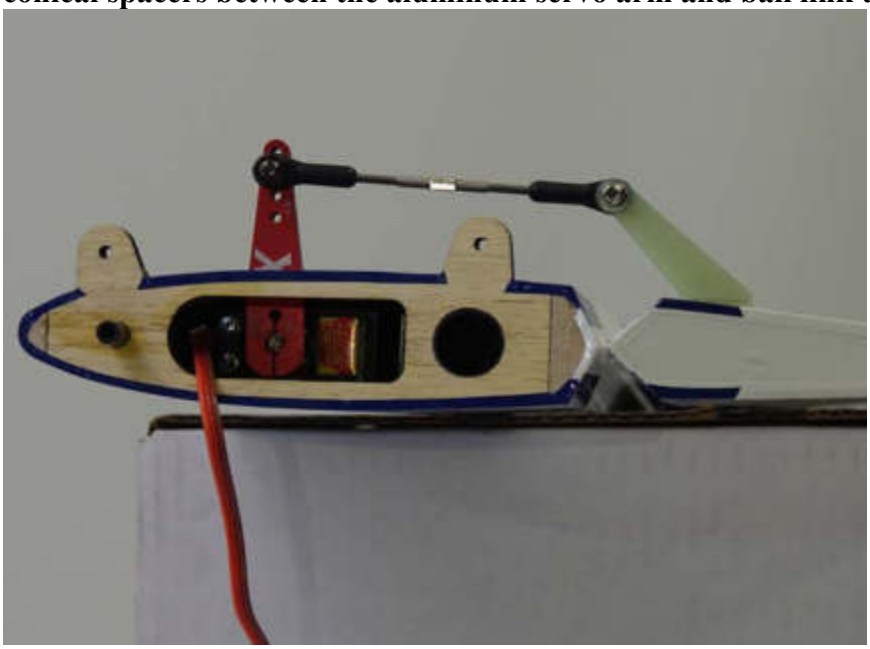
9. Repeat this process for the other stab half, the aileron control horns and the rudder control horns.



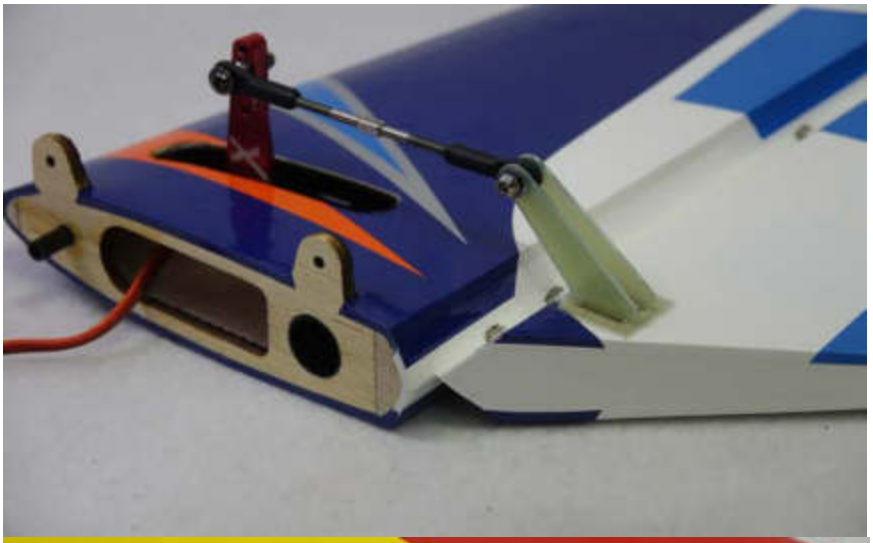
10. Assemble and install the servo mounting grommets. Connect an EF 20 AWG servo extension to each aileron servo lead (secure with heat shrink tubing or an EF Servo Safety Clip) and install the elevator and aileron servos in their designated locations. We highly recommend using the Extreme Flight socket head servo screws to mount your servos. The servo output spline on all of these servos should be oriented toward the front of the model.

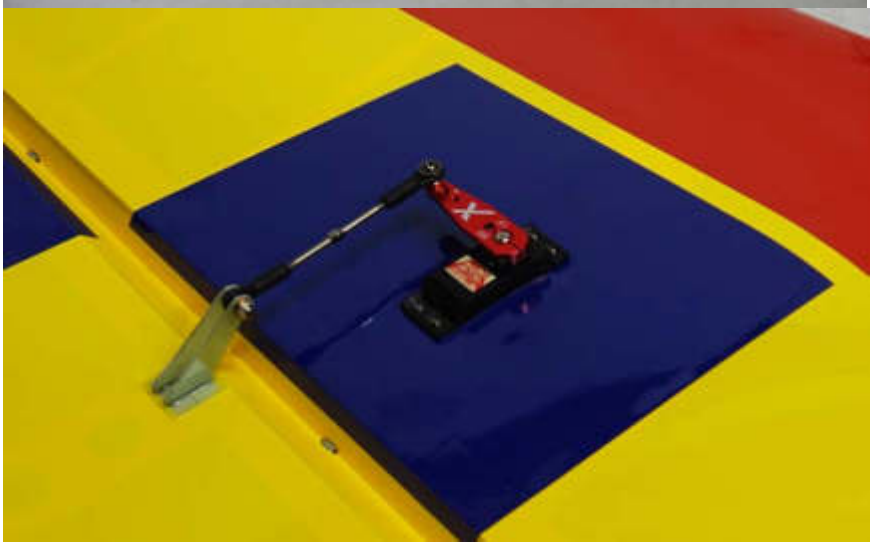
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11. Locate the linkage components from the hardware package and the recommended servo arms for each surface. Thread a ball link onto each end of the provided turnbuckle pushrods. Install the linkages for the elevators and ailerons as pictured using the provided 3mm fasteners. Be sure to use the small conical spacers between the aluminum servo arm and ball link to prevent binding.



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Fuselage Assembly

12. We'll begin by installing the landing gear. Locate the carbon fiber main landing gear, 4-4mm 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 4mm 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 4mm nylon insert lock nuts.

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13. The landing gear fairings add a nice scale touch to the aircraft. Slide the fairing onto the gear and up against the fuselage. Secure the fairing to the gear with "Goop" silicon glue.

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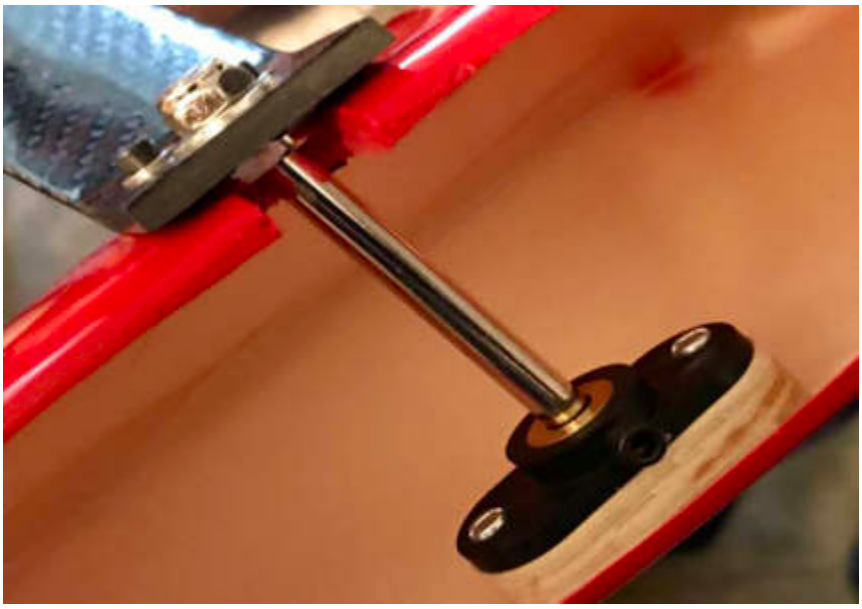


14. Locate the 2 axles, 2 locking nuts, 2 wheels, 4 wheel collars, 2 outer pant supports and plywood spacers and 2 wheel pants from the hardware package. Place the threaded portion of the axle through the hole in the landing gear, place a washer onto the axle and secure the axle with a locking nut.



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15. There is a pre-cut slot in the wheel pant to allow it to fit over the axle. You may need to open this slot with a rotary tool to allow it to slide into position over the axle. Screw the machined aluminum outer wheel pant bracket to the plywood spacers and secure to the interior wall of the wheel pant with epoxy, making sure it fits over the end of the axle and positions the wheel pant correctly.



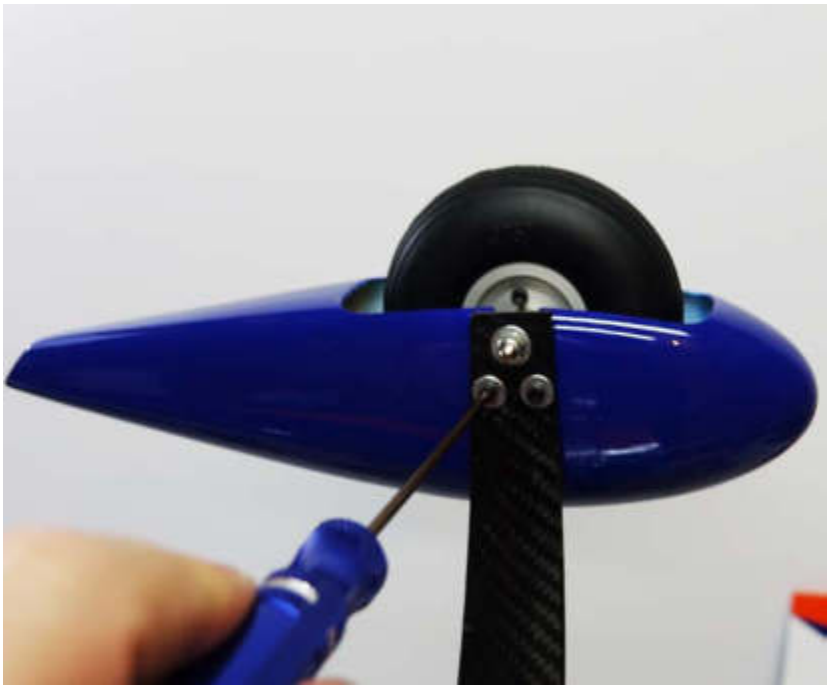
16. Remove the wheel pants and secure the wheel to the axle with the provided wheel collars. We highly recommend that you file a flat spot on the axle for the wheel collar set screws to seat against.



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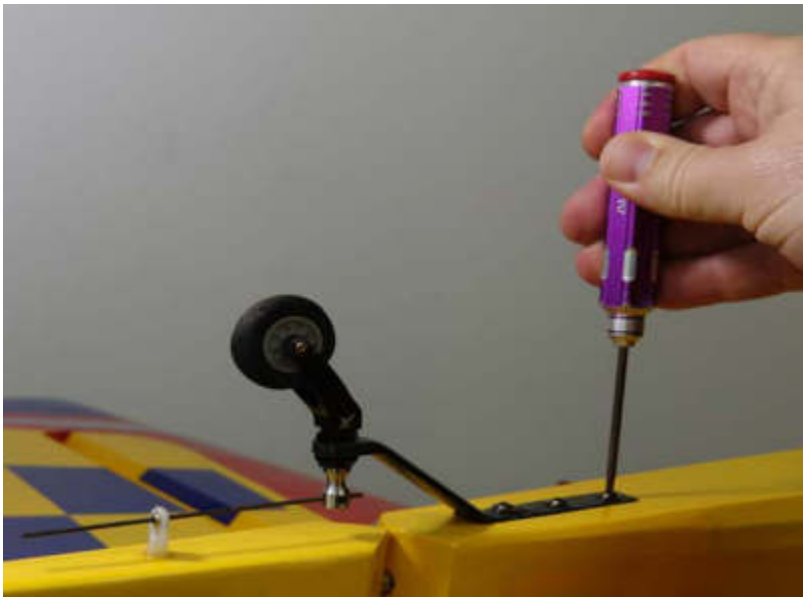
17. Reinstall the wheel pants and secure with 2 3mm bolts inserted through the carbon gear and into the blind nuts in the wheel pants. Be sure to use thread lock on the bolts! Tighten the setscrew to secure the wheel pant bracket to the axle.



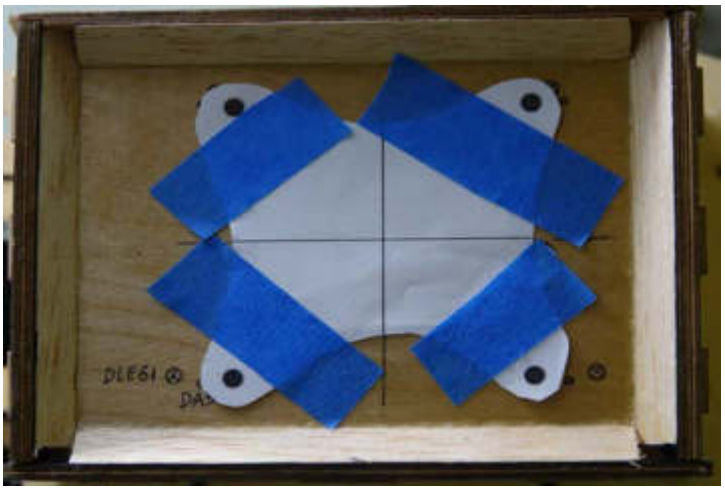
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18. Next let's install the rudder onto the fuselage. Glue the hinges into the rudder first with epoxy and allow to cure. Use a pushrod to apply epoxy to the holes in the rudder post and push the rudder into position and wipe away any excess epoxy with a paper towel and denatured alcohol.

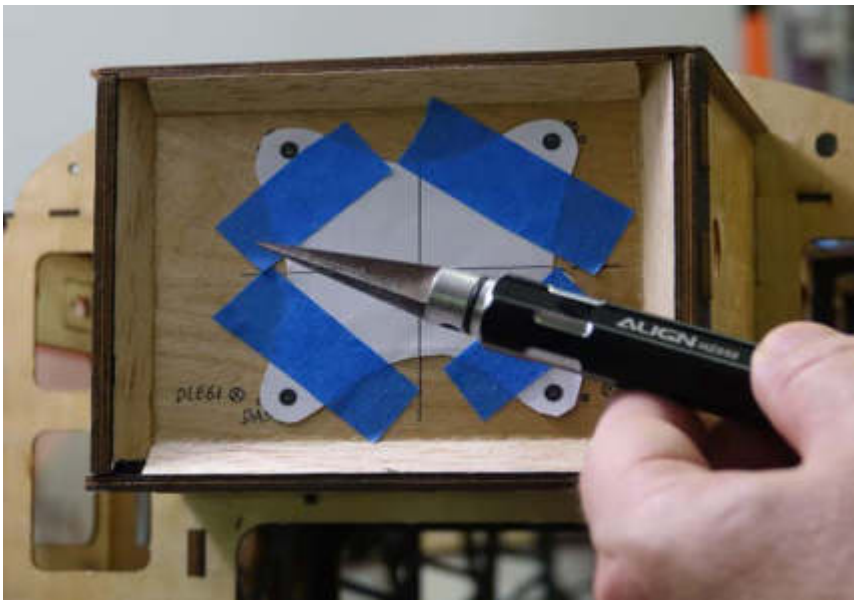
19. Drill a hole in the bottom of the rudder 3 inches back from the front of the bevel to accept the ball link for the tiller arm. Secure the ball link with epoxy. When dry slide the tiller arm into the hole in the ball link and secure the tailwheel assembly to the fuse with the provided 3mm bolts. Again, be sure to use blue Loctite on all bolts!

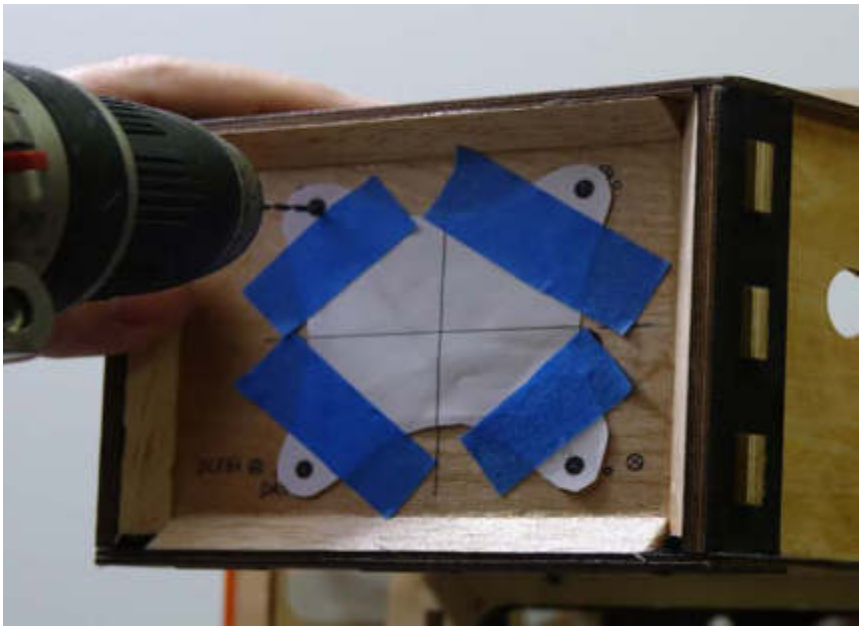


20. Next let's install the engine. We have made this process very easy. If using a DA-50 or DLE-61 there are drill marks laser scribed on the face of the firewall (<u>Please note, the DLE-61 mounting pattern is slightly different than the DLE-55</u>). If using another engine or electric motor simply download a template from their website and tape it in place over the centering marks that have been laser scribed into the front of the firewall. Drill at the location of the mounting holes. For best results I always use a pointed reamer to accurately mark the center of the holes then start drilling with a 1/16" bit and continue with progressively larger bits until I achieve the correct hole diameter. This ensures that the hole is accurately drilled in the correct location and makes a much neater hole in the plywood.



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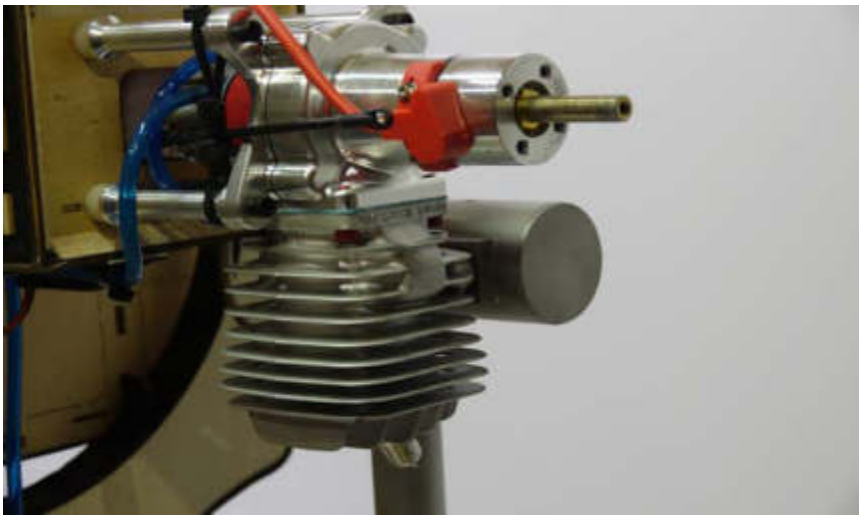


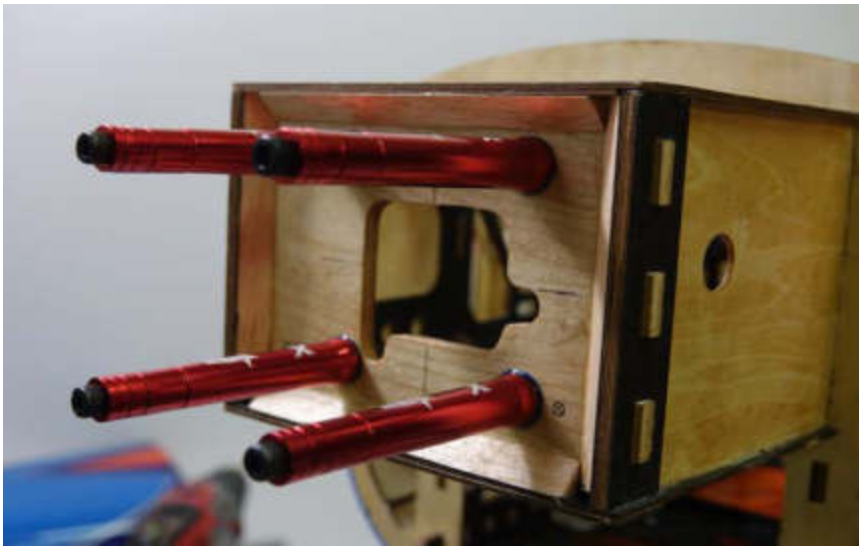
21. The distance from the front face of the motor box to the motor drive washer is 172mm or 6.8 inches (this is the length of the DLE-61, the longest of the engines recommended). Because the DA-50 is the recommended motor we have included a set of machined aluminum standoffs to be used in conjunction with the stock 2.5" standoffs included with the DA-50 to achieve the proper spacing.

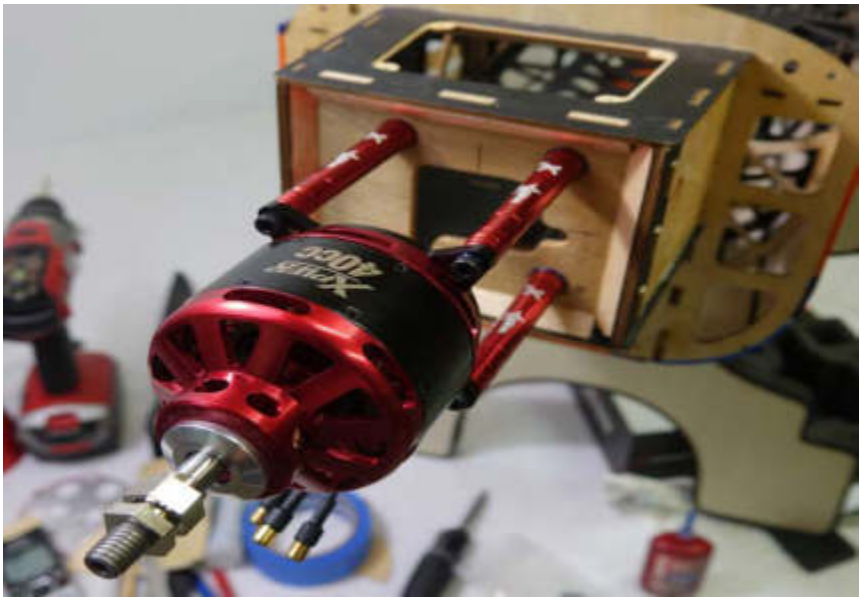


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22. The following photos show the DA-50 and Xpwr 40 mounted on the 85" Extra. We used the full length Blazing Star XXL Standoff Set to achieve the proper spacing with the Xpwr 40.



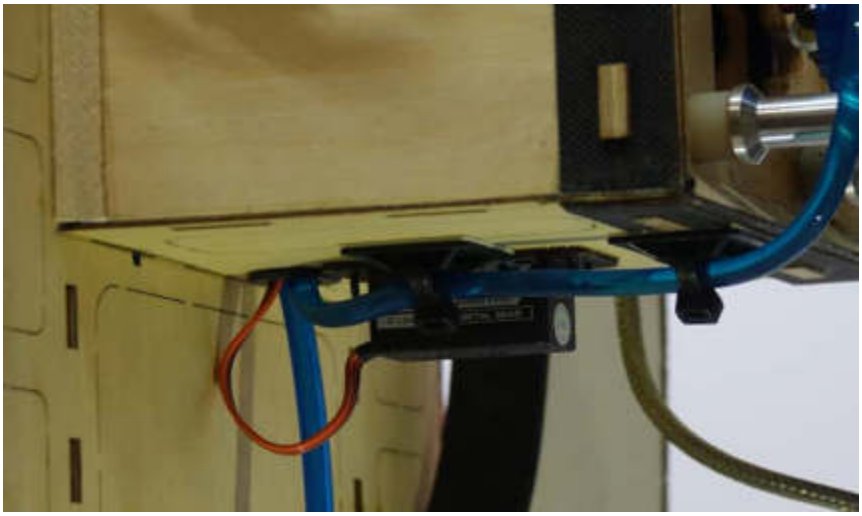




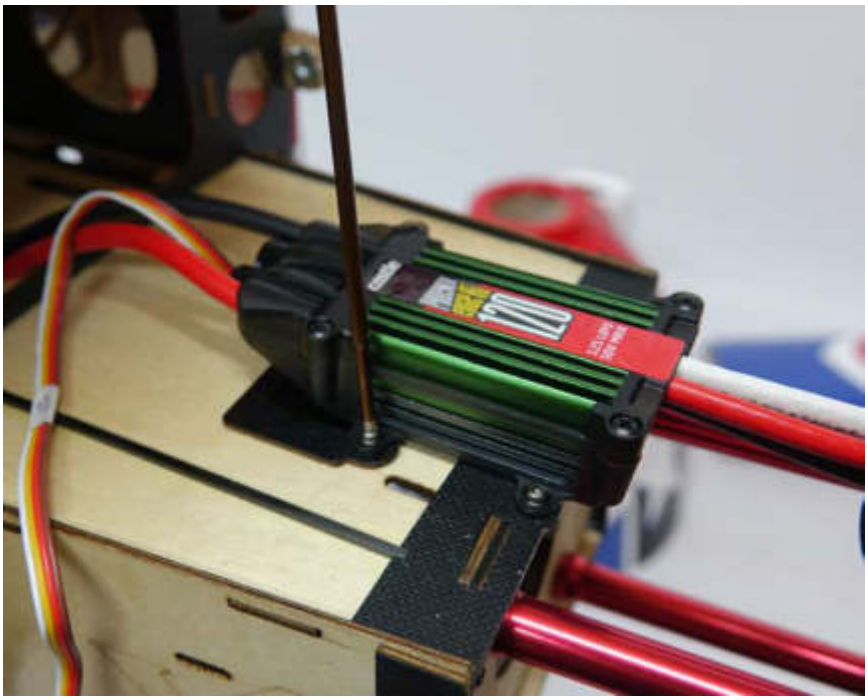
<u>Please note that we removed the laser scribed panels in the F1 former in our electric powered Extra to allow cooling air to reach the batteries</u>

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23. There is a hole in the bottom of the motorbox to mount your throttle servo. This location corresponds to the throttle arm on the DA-50 carb and provides a straight shot from the servo arm to the throttle arm. Other engine makes may require a different location. If using the DA-50 mount the servo in the provided location and fabricate the throttle linkage from the provided components.

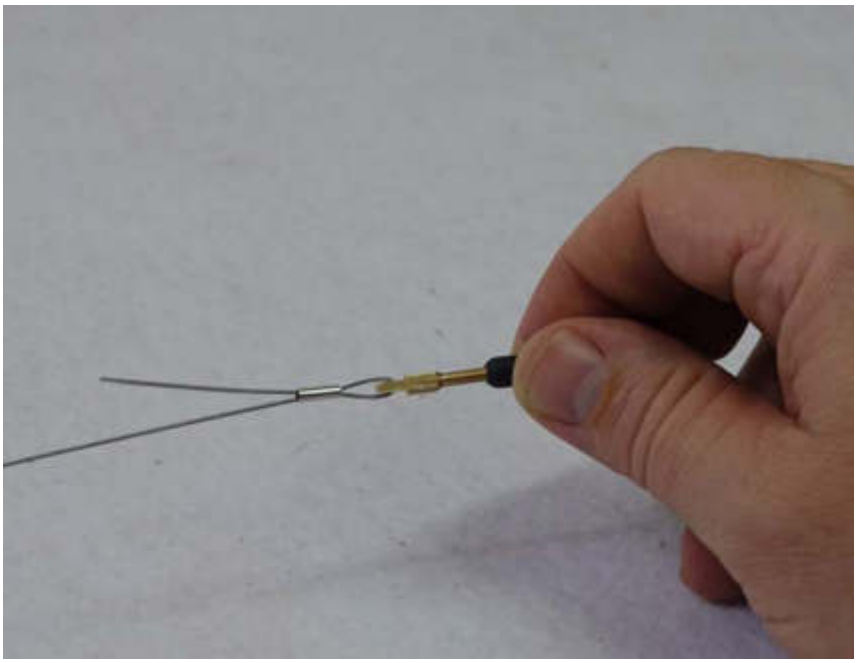


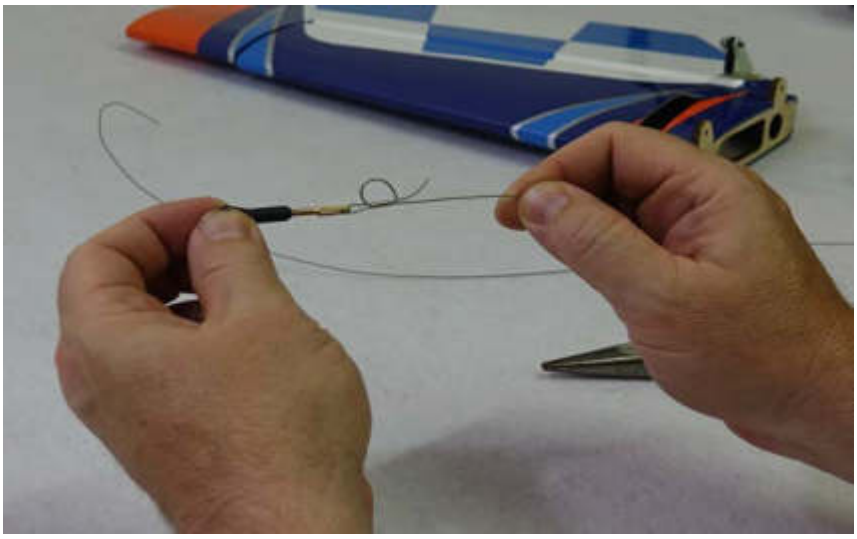
24. If using an electric motor we recommend mounting the ESC to the bottom of the motorbox either with screws, nylon cable ties or Velcro straps.



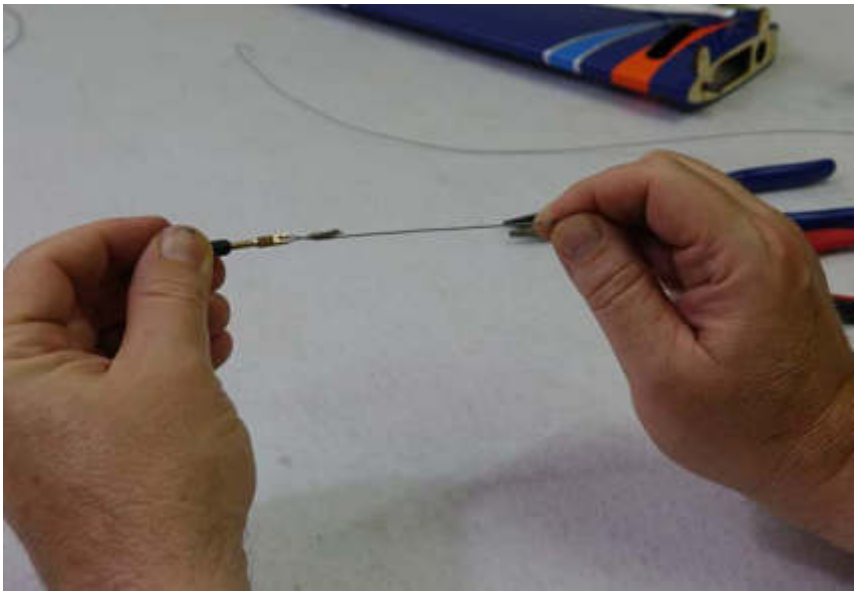
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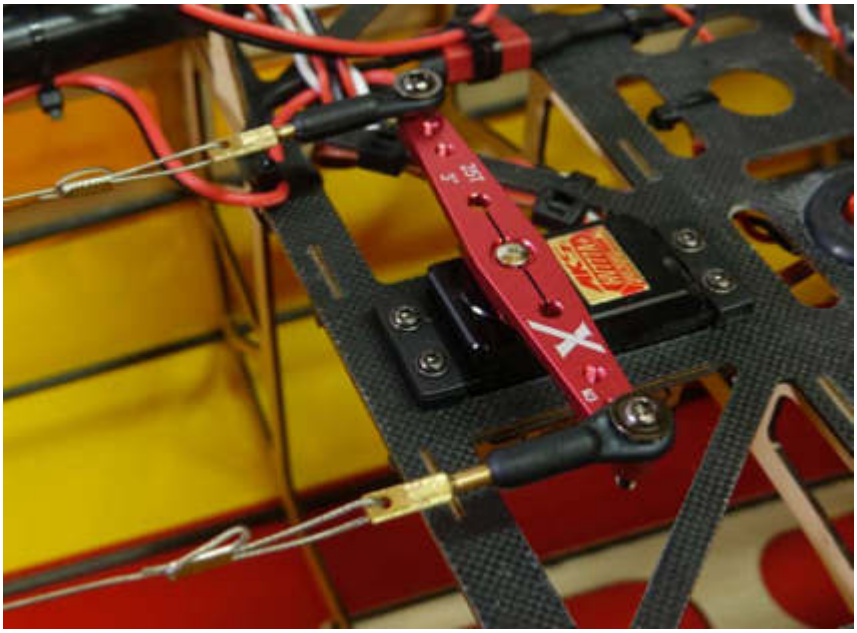
24. Mount your rudder servo in the servo tray under the canopy using the manufacturer supplied mounting hardware. For proper geometry use the Extreme Flight 3" pull-pull rudder arm. Assemble the pull-pull cable linkage as shown by inserting the end of the pull-pull cable into one of the aluminum crimp tubes. Insert the cable through the hole in the brass fitting and back through the crimp tube. Loop the cable one more time through the crimp tube and pull it tight. Use a crimping tool or set of side cutters to carefully crimp the tube in multiple places, taking care not to cut through the crimp tube and cable. Repeat this for the other 3 cable ends and install onto the servo arm and control horns using the provided 3mm hardware.

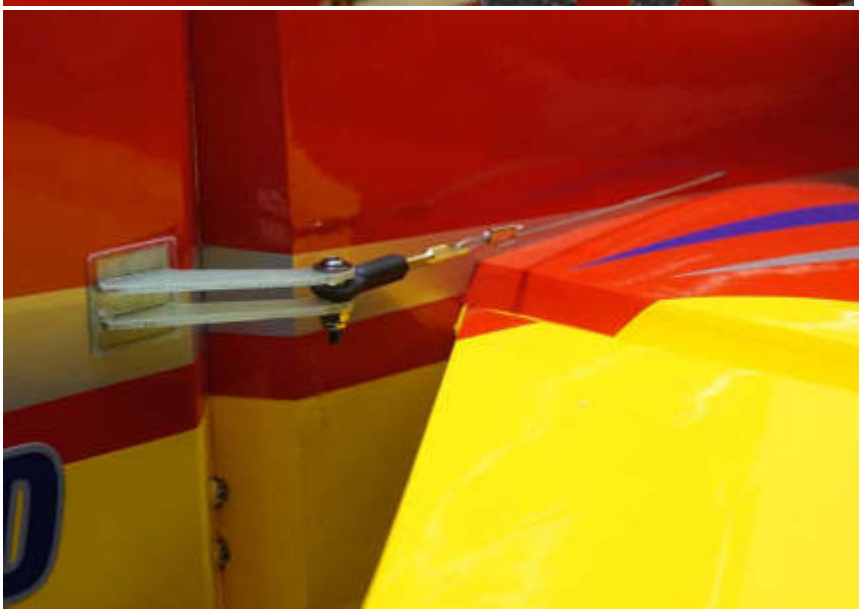




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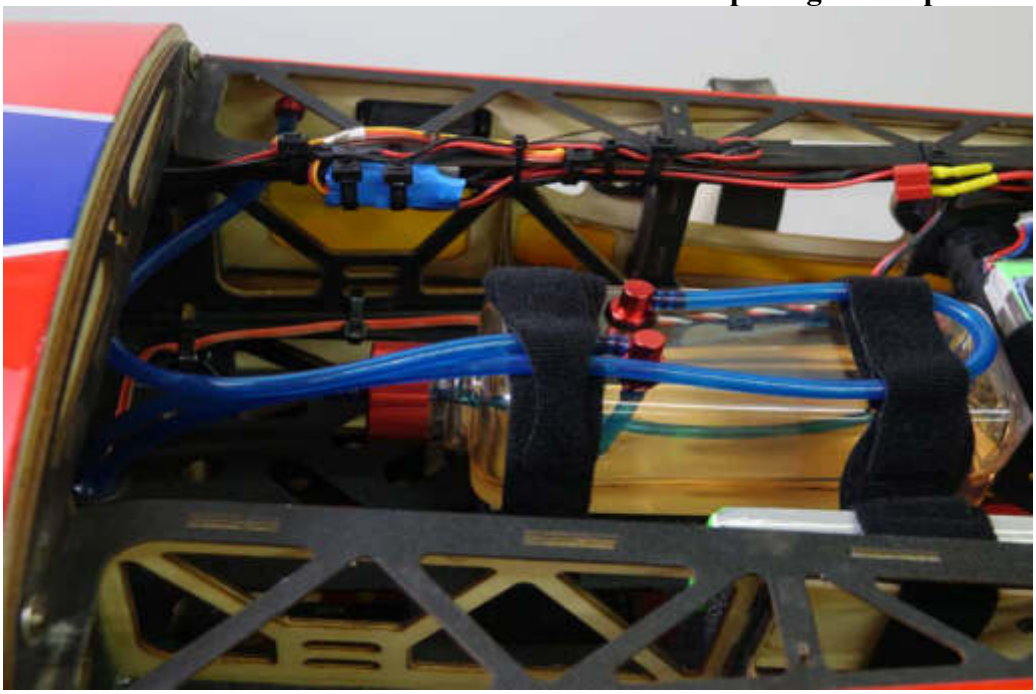


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25. If you plan to keep your stabs attached to the fuselage during transport then a 36" 20Awg servo extension is long enough. If you plan to remove the stabs you will need to use a 48" extension. Secure the extension to the elevator servo lead with an EF Servo Safety Clip or heat shrink tubing. Slide both stab/elevator assemblies onto the carbon fiber mounting tube and secure with 2 3mm bolts inserted through a washer and the mounting tabs and into the corresponding blind nuts already installed in the fuselage. <u>Be sure to use a drop of blue Loctite on all bolts!!!</u>



26. If using a 50-60cc gas engine install a Flowmaster 17 ounce tank onto the tank tray and plumb with EF Flowmaster Blue Fuel Line. There is a laser cut opening to accept an EF Fuel Dot as well.



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27. Mount your ignition to the interior side of the motor box lid and secure the lid with 4 screws. Next cut the cowl to clear the mufflers and make an air exit. Take a minute to add some thick CA or Epoxy to the intersection of the cowl and plywood cowl ring. Slide the cowl into position and secure with the 2-3mm bolts inserted into washers, through the holes in the top of the F1 former and into the blind nuts installed in the cowl ring and the 3mm bolt in the bottom of the cowl. Be sure to use blue Loctite on all bolts!!!



28. Install your choice of prop (if using the DA-50 we highly recommend the Falcon 23x8 Carbon Fiber prop) and Extreme Flight 4" carbon fiber spinner. We have spinners available that are painted to match these color schemes.

29. Install your switches (there are suggested switch mounting locations laser scribed in the fuselage sides visible from the interior of the fuselage), batteries and receiver. In our prototypes flown with the DA-50 and DLE-55 we mounted our batteries on either side of the fuel tank for correct balance. We used Pulse receiver batteries, 2S 2550mah for ignition and 3600mah for servos/receiver.

30. Included with your Extra are a set of Side Force Generators (SFGs) along with 2 clear spacers to be installed between the SFGs and wing tip to prevent them from interfering with aileron movement. They are to be installed using the supplied white thumb screws threaded through the holes in the SFG, through the clear spacer and into the pre-installed blind nuts in the wing tip.

31. The wings are mated to the fuselage by sliding them onto the carbon fiber wing tube and retained using a bolt inserted through the protruding mounting tab and into the preinstalled blind nut in the fuselage.

32. The canopy is attached to the fuselage using the 2 spring loaded latches. This is sufficient if using an electric motor. If using a gas engine use the 2 3mm bolts in addition to the latches to retain the canopy.

34. If using an electric power system you will want to open the laser cut louvers in the bottom of the fuselage just behind the cowl and in front of the landing gear.

This completes the assembly of the 85" Extra 300EXP. As a final step clean the entire aircraft with glass cleaner, apply your choice of graphics, then apply a coat of spray-on wax and buff the finish to a high gloss with a micro fiber cloth. 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 method.

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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 range for the center of gravity begins at 7 inches from the leading edge of the wing measured at the root and extends back .75"

One of the best ways to fine tune the 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: 10-12 degrees low rate, 18-20% exponential
all you can get for high rate, 50-60% exponential

Aileron: 18-20 degrees low rate, 30-40% exponential
all you can get for high rate, 50-60% exponential

Rudder: 20 degrees low rate, 50% exponential
all you can get for high rate, 60-70% exponential.

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

Thanks again for your purchase of the Extreme Flight RC 85" Extra 300EXP 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

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