EXTREME FLIGHT
RADIO CONTROL™
STATE-OF-THE-ART R/C AEROBATIC AIRCRAFT AND ACCESSORIES

83" MXS ARF

Instruction Manual

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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. However, 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 with the AMA safety code. It is highly recommended that you join the Academy of Model Aeronautics in order to be properly insured and 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.

Congratulations on your purchase of the Extreme Flight RC 83 inch MXS!
This aircraft is unique in that it is being offered in two versions: A gas/glow version and a dedicated electric version to satisfy the growing legions of electric power enthusiasts. There are subtle differences in the construction of these two versions to accommodate the installation of the chosen power systems. The gas version can be effectively powered by any of the numerous glow engines in the 1.40-1.80 class or with a 30cc-40cc gas engine. The electric version will perform best when powered with a 3000+ Watt power system on 8S -12S Lithium Polymer batteries. Either version will allow you to perform aggressive 3D maneuvers with an economical power plant, allowing you to experience the performance and stability of a much larger aircraft at a considerable savings.

The Extreme Flight MXS is loaded with unique features, including first rate hardware, components and thorough instructions to ensure a trouble free assembly and set-up. Weight saving components are used throughout, such as carbon fiber structural reinforcement, carbon fiber wing and stab mounting tubes, carbon fiber landing gear, titanium pushrods and a carbon fiber tail wheel assembly, all ensuring the lightest, most high performance aircraft possible. You will notice there is a box built into the bottom of the glow/gas version of the MXS fuselage. This is a pipe tunnel and will accommodate most canister mufflers and tuned pipes sold for the current makes of 30-40cc gas engines.

The performance ability of the Extreme Flight RC MXS 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 MXS is rewriting the rule book on ultra-aggressive 3D maneuvers! Unrivaled in pitch and yaw authority, the MXS will be the machine that introduces a whole new level of gyroscopic gyrations and insane tumbles to the hardcore 3D masses. Rock solid in all aspects of current 3D maneuvers, the MXS will give those that fly on the bleeding edge the confidence and capability to push through and break new ground in expanding the rapidly evolving 3D flight envelope. Utilizing the same lightweight interlocking laser cut construction and carbon reinforcement as our Extra, the MXS is capable of handling the most punishing maneuvers imaginable.

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 83 inch MXS!

Items needed for completion:

- ✓ Masking tape.
- ✓ Hobby knife with #11 blades.
- ✓ Thin and medium CA. We highly recommend Mercury M5T thin and M100XF medium formulas as well as the Mercury glue tips.
- ✓ 30 minute epoxy. Mercury Adhesives Epoxies have worked very well for us.
- ✓ Blue Loctite.
- ✓ Electric drill with an assortment of small drill bits.
- ✓ Small flat head and Phillips head screw drivers.
- ✓ Standard and needle nose pliers.
- ✓ Side cutter
- ✓ Metric ball driver or allen key set.
- ✓ Sanding block and sandpaper.
- ✓ 5 x METAL GEARED servos with a minimum of 300 oz. in of torque.
- ✓ Aluminum Servo Arms – 2 x 1.75" single arms, 2 x 1.5" single arms and 1 x 4" double arm.
- ✓ 2 x 6" Servos Extensions
- ✓ 2 x 12" Servo Extensions
- ✓ 2 x 36" Servo Extensions
- ✓ 76mm Spinner

Gas/Glow version
- ✓ 1.40-1.80 class glow engine
- ✓ 30cc-40cc gas engine

Electric Version
- ✓ 3000+ Watt Brushless Power System
- ✓ 100 to 160 amp HV ESC
- ✓ 8S -12S Lithium Polymer batteries

Tips for Success:

1. **Before starting assembly, take a few minutes to read the entire instruction manual to familiarize yourself with the assembly process.**

2. **Please take a few minutes and go over all the seams on the aircraft with a covering iron on a medium heat setting. Also, due to climate changes, wrinkles may develop in the covering however; these 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. **Take a few minutes and apply CA to high stress areas such as servo mounting trays, landing gear mounts, anti-rotation pins, and motor box joints.**

4. **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 and 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.**

5. **Use a high quality epoxy for installing the composite control horns and hinges. We highly recommend the new Mercury Adhesives 30 minute Epoxy as well as Pacer Hinge Glue. We very pleased with the results and ease of application and cleanup of these products.**

6. **When applying decals, first clean the area where the decal will be applied with alcohol. Mist the area lightly with Windex or Rapid Tack before applying the decal which will allow you to properly position it, and then use a rubber squeegee to push all of the liquid from under the decal. This will result in very few air pockets trapped under the decal.**

7. **Take the time to properly balance and trim your aircraft and set up rates and exponential values. Your flying experience will be greatly enhanced once your plane is properly dialed in.**

# Let's begin!

Elevator Assembly

1. **Locate the horizontal stabilizer/elevator assemblies 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.**

2. **Insert the 2 control horns into the base plate and trial fit the horns into the slot, making sure they seat properly against the base and elevator surface. If necessary, sand the bottom of horns to ensure proper fit in the elevators.**

3. **Trace around the base plate with a felt tipped marker.**
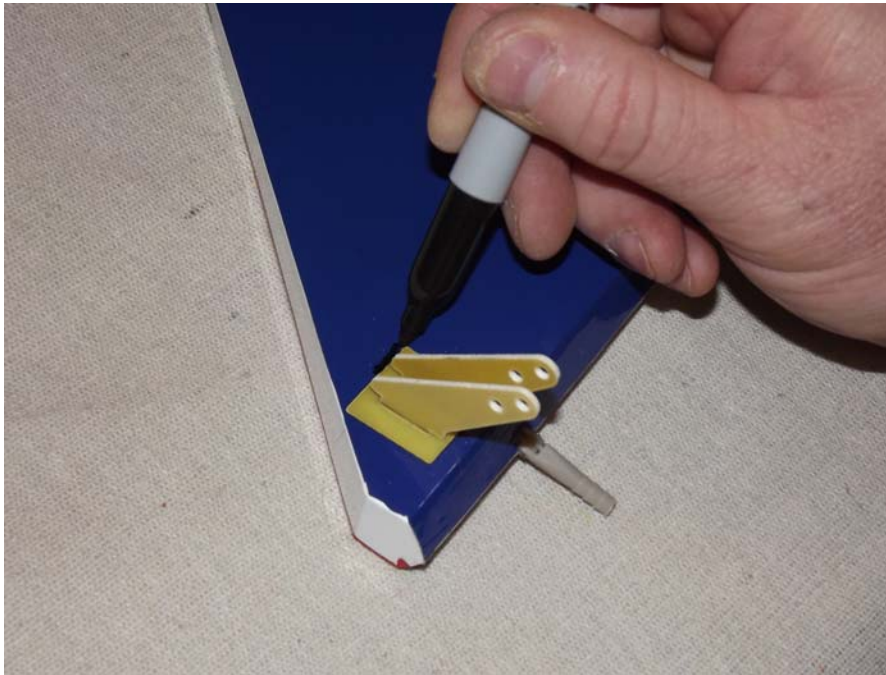
4. **Remove the horn assembly and use a #11 blade to remove the covering from inside the ink line you traced around the control horn base.**

5. **Wipe away the ink line with a cotton cloth or paper towel soaked in denatured alcohol.**

6. **Use sandpaper to scuff the portion of the horns and base plate that will be inserted into the elevator.**
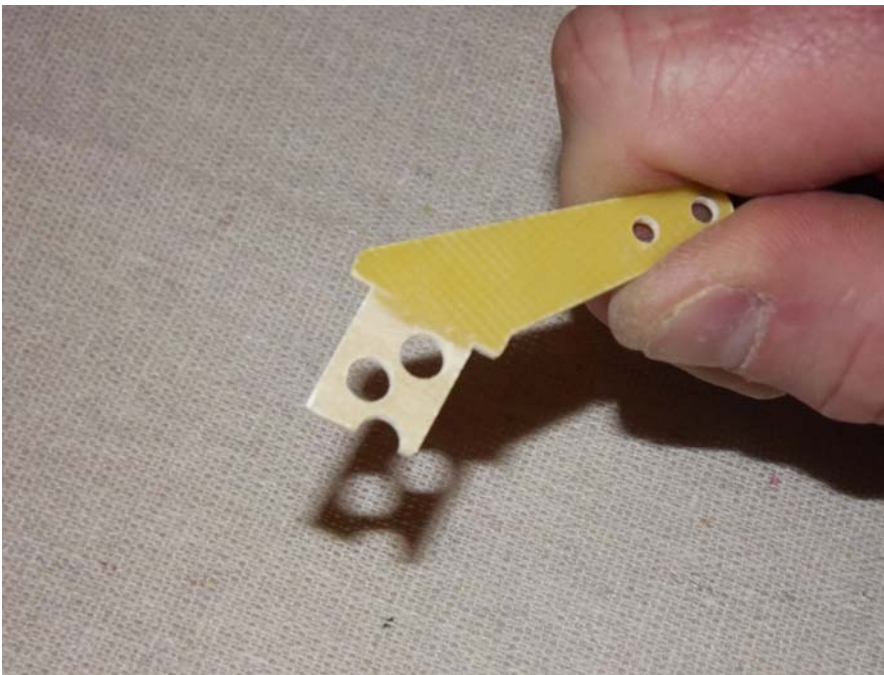
7. **Apply 30 minute epoxy to the elevator slots, G-10 horns and base plate bottom. Use a zip tie to ensure the slots are filled will epoxy.**
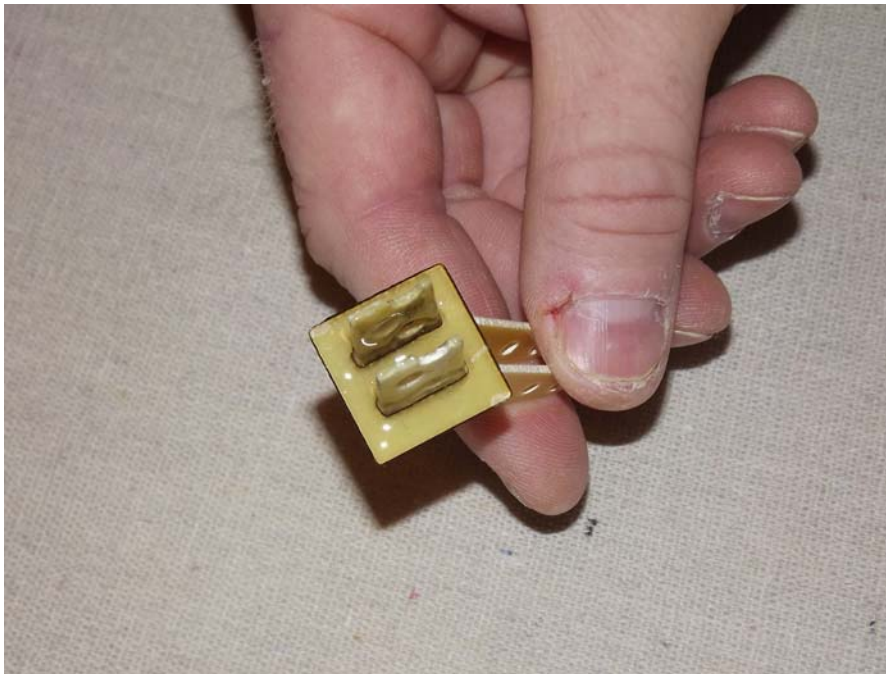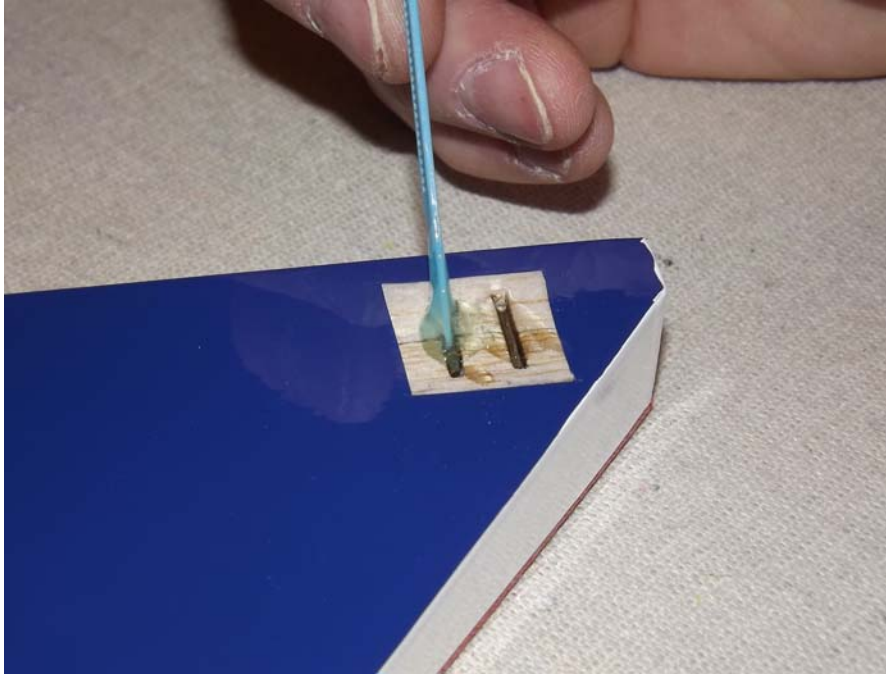
8. **Reinsert the assembly into the elevator and wipe away any excess epoxy with a cloth and denatured alcohol. Place a 3mm bolt through the horns to help insure proper alignment and set aside to dry. Repeat for the other elevator half.**
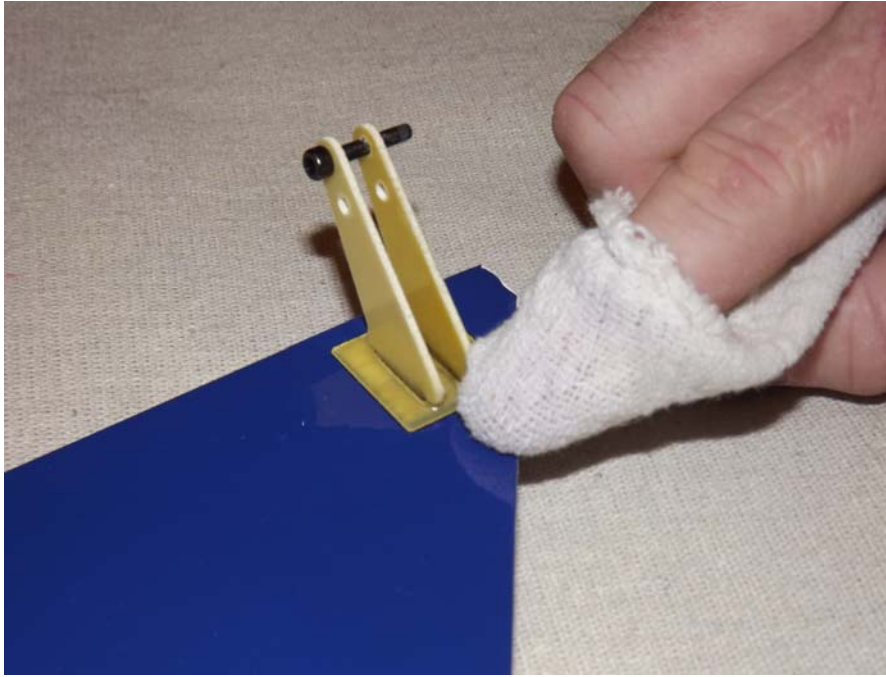
9. **Next remove the pin hinges from the horizontal stabs. Take note that one pin is shorter than the others - this is to allow for clearance of the stab tube.**

Note: There are several methods and adhesives that can be used for installing the hinges. We will describe the way we do it as this method has proven itself over many years of model building.

10. **Use a cotton swab to apply petroleum jelly ONLY to the knuckle of the hinge. This will keep the epoxy from getting into the hinge which can cause it to bind.**


11. **Mix a generous batch of 30 minute epoxy. Use a zip tie or an old pushrod to thoroughly coat and fill the hinge holes on the stab AND elevator with epoxy.**
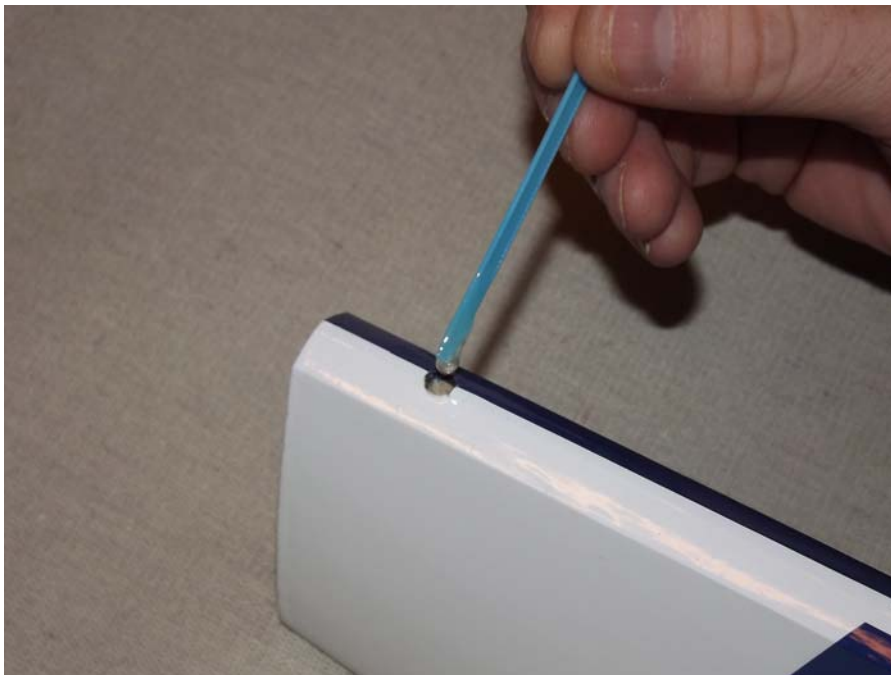
12. Next, coat one side of all 3 hinges with epoxy and push the hinges into the holes of the elevator. Remember the short hinge goes in the hole closest to the fuse.
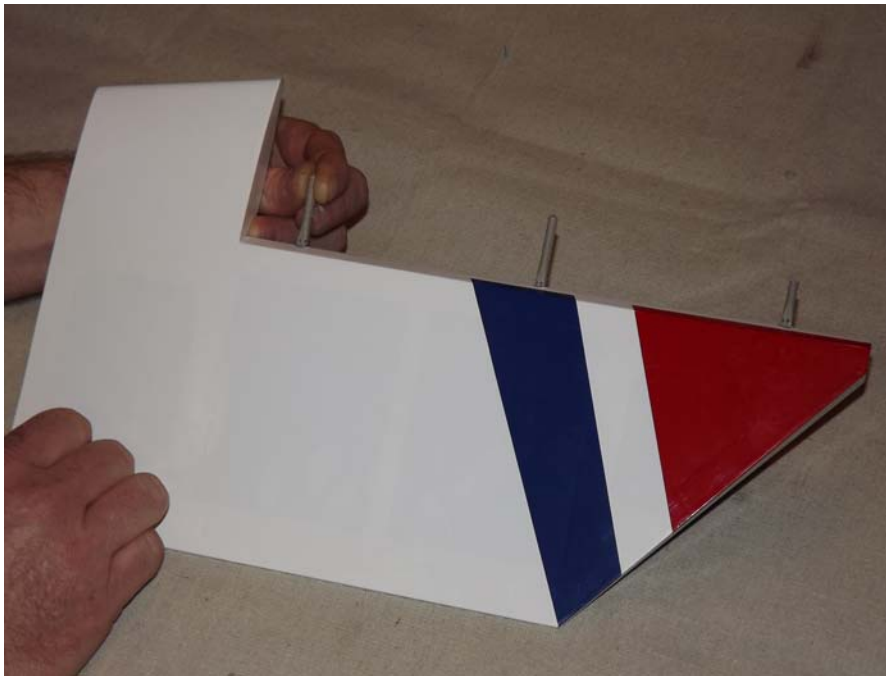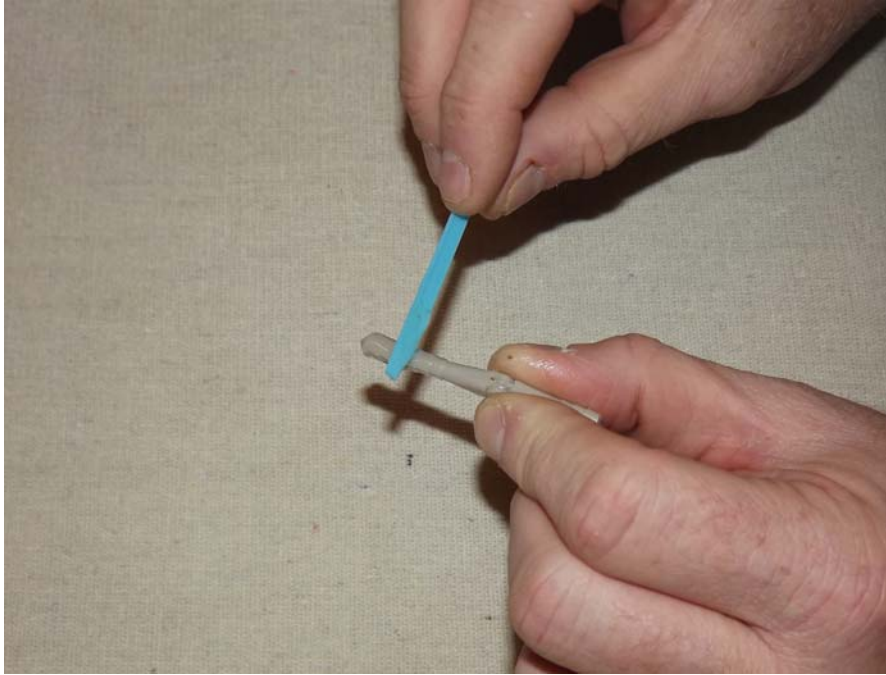
13. Now coat the other side of the hinges with epoxy and install the elevator into the stab, making sure the hinge pins are centered in the hinge gap. Don't forget to apply epoxy in the hinge holes on the stab before installing the stab to the elevator.
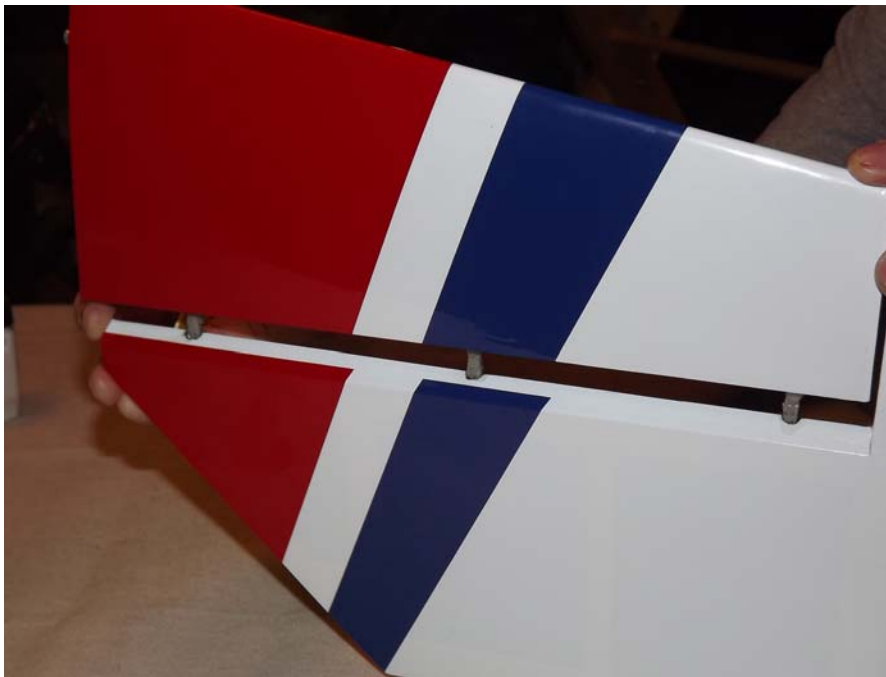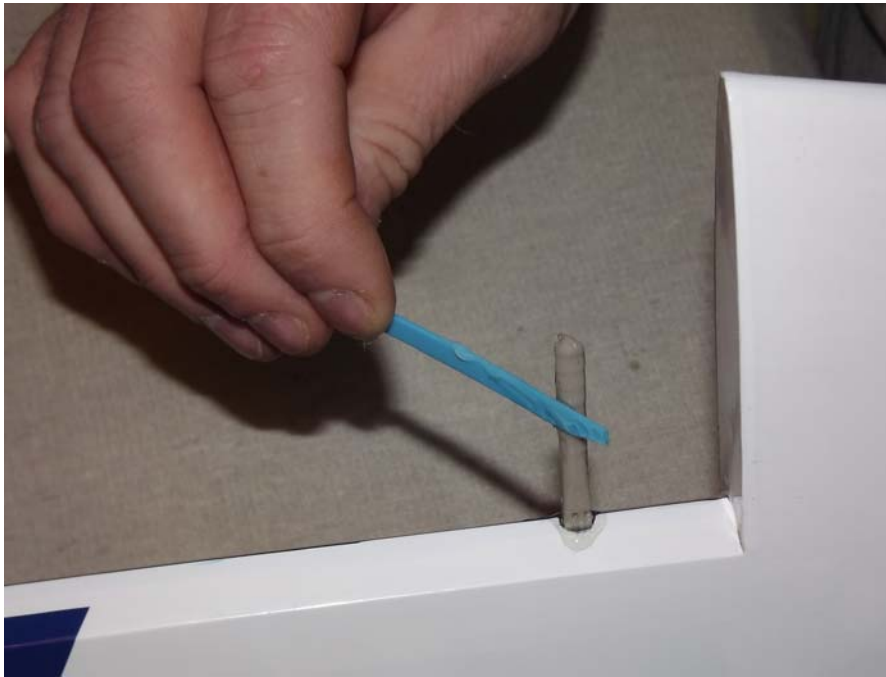
14. Use denatured alcohol and a cloth to remove all excess epoxy, especially on the hinge pin. Make sure you have full deflection in both directions – once satisfied with the results, set the surface aside to dry. After the hinges have dried thoroughly, pull on them to make sure they are properly installed. Repeat this process for the other stab/elevator half.

Note: Now is a good time to seal the hinge gap with a strip of Ultracote or Blenderm tape. Be sure to fully deflect the control surface when sealing the gap to allow for full deflection once the gap is sealed.

Wing Assembly

15. Locate the wing/aileron assemblies as well as the composite control horns and base plates from the elevator hardware package. Following the same procedure as outlined with the elevator / stabs, install the control horns and hinges for both wings. Each wing has 5 hinges so it's best to install the hinges in the aileron first then mix a second batch of epoxy to install the aileron hinges to the wing.
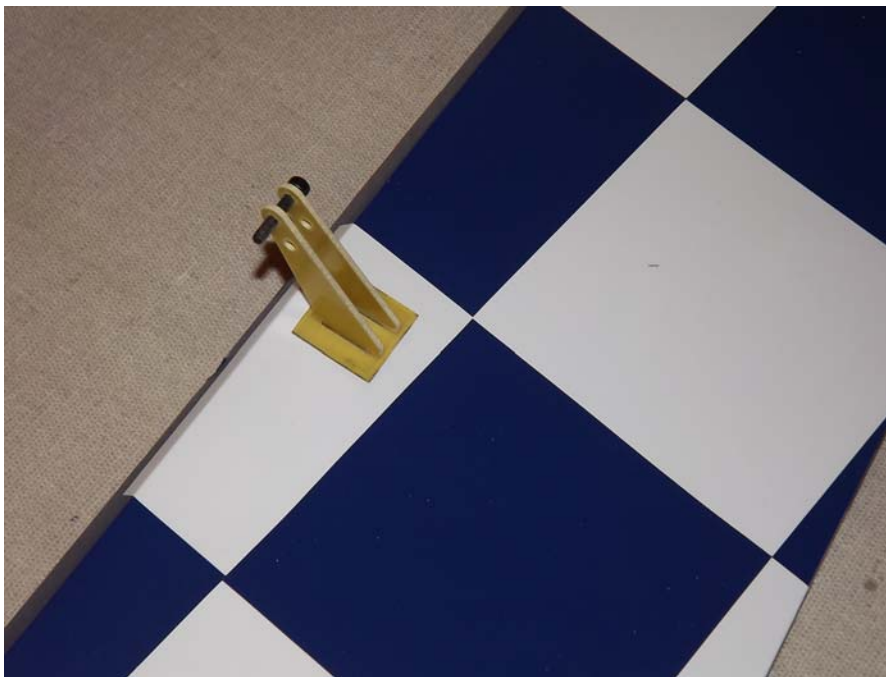
Note: Before moving to the next step – it would be a good time to seal the hinge gap with a strip of Ultracote or Blenderm tape. Be sure to fully deflect the control surface when sealing the gap to allow for full deflection once the gap is sealed.

Also, take a few minutes to go over the wings with a trim iron on a medium heat to seal all the trim seams and remove any wrinkles in the covering. Use caution and avoid excessive heat as you may cause the Ultracote to shrink too much and lift at the seams.

16. 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.


17. Attach a 6" servo extension to your servo and secure with thread or heat shrink tubing. Use the manufacturer supplied mounting hardware to install the servo with the output shaft toward the trailing edge of the wing. Electronically center the servo.

18. Use the recommend 1.50" SWB servo arms and attach 2 ball links onto the titanium turnbuckle pushrod. Secure the pushrod to the control horns and servo arm using the supplied 3mm bolts, washers, and nylon insert locknuts as shown in the picture below. As always, use blue Loctite on ALL bolts!

19. Use a soldering iron or a sharp #11 blade to remove the covering from the blind nuts on the wing tip. This is for attaching the SFG's or Racing Tips.
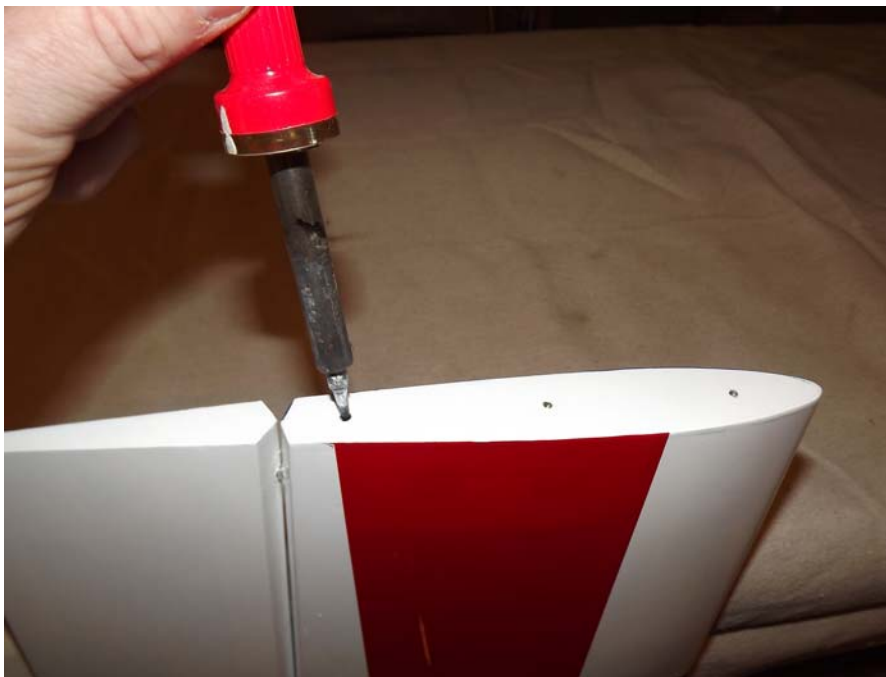
   Note: Repeat this process for the other wing. Clean the wings with Windex and set them aside.

Rudder and Tailwheel Assembly

20. **Locate the rudder, the rudder control horns and the 2 slotted base plates. As with the elevators, use a sharp #11 blade to remove the covering from the 2 pre-cut slots in the rudder.**

21. **Before applying epoxy, measure the control horns to ensure they are centered properly and mark their location with a felt tipped marker. This will make it easy to reinstall control horns when epoxy is applied.**
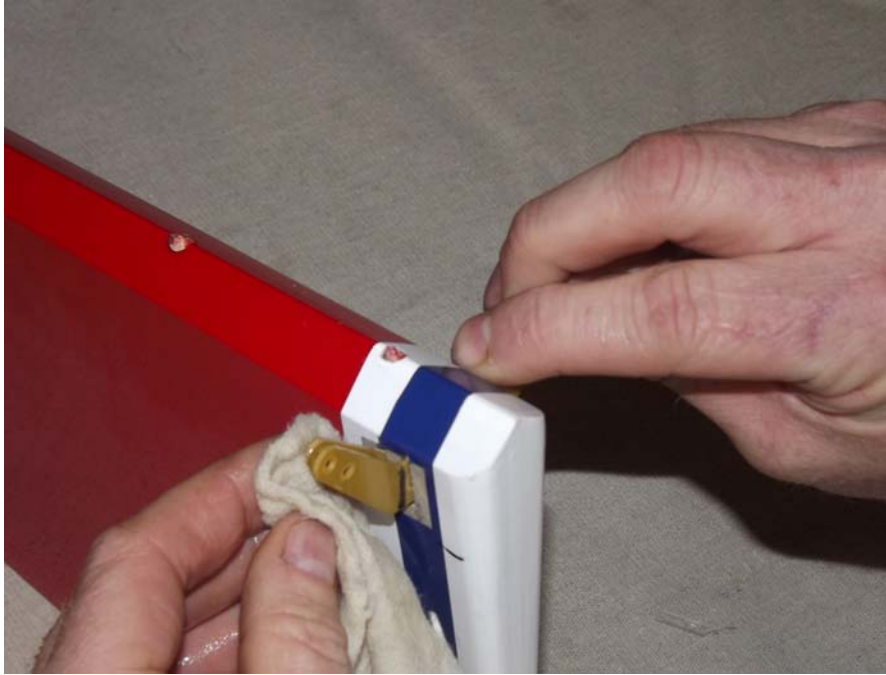
22. Scuff the middle of the horns that will go into the rudder as well as the base plates.
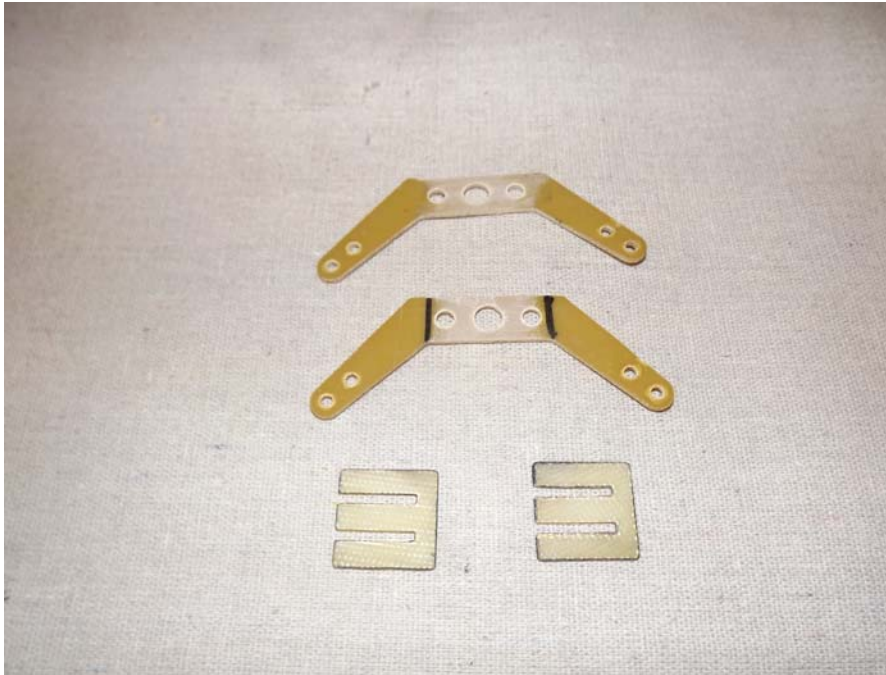

23. Mix a generous batch of epoxy and completely fill the two slots as well as the areas on control horns and base plate that will glue into the rudder.

24. Slide the rudder horns back into their proper position. Clean the excess epoxy from the horns, and then install the base plates.

25. Carefully check alignment to insure proper positioning. Remove any excess epoxy from the rudder, re-check the alignment one more time and set the assembly aside to dry.
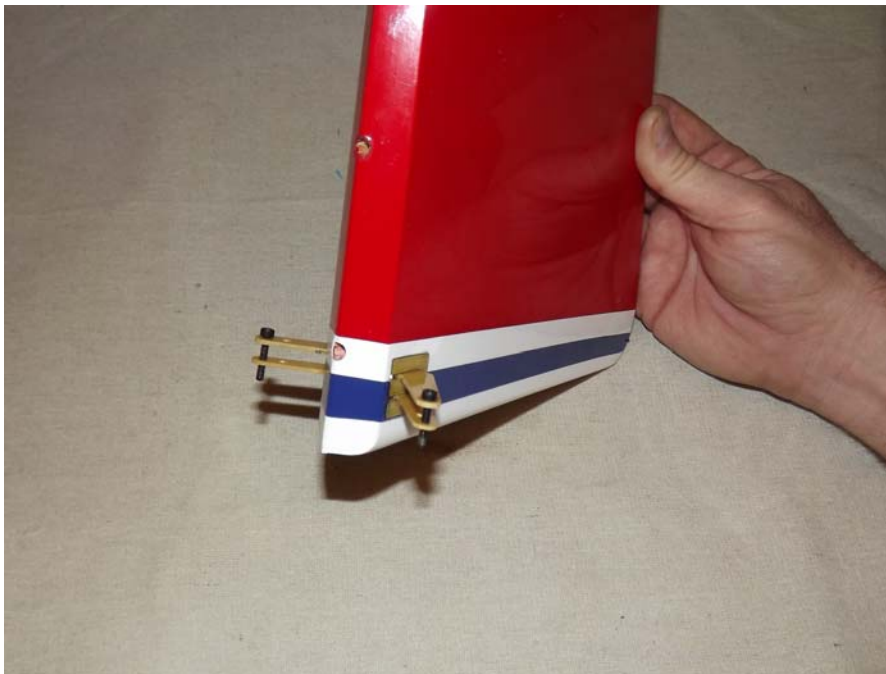
26. Locate a 2mm ball link from the hardware bag. Measure 3" back from the leading edge of the rudder and drill a hole to accept the shank on the ball link. Scuff the shaft of the ball link and glue it in the hole as shown in the picture below.


27. Next install the rudder hinges using the same procedure as with the Ailerons and Elevators.

28. Disassemble the tailwheel assembly and use a rotary tool or a small file to create a flat spot on the tailwheel wire for the set screws in the aluminum cap to seat against. Reassemble the unit and apply Loctite to the threads on the setscrews. Slide the tailwheel onto the wire and secure with the included wheel collars.
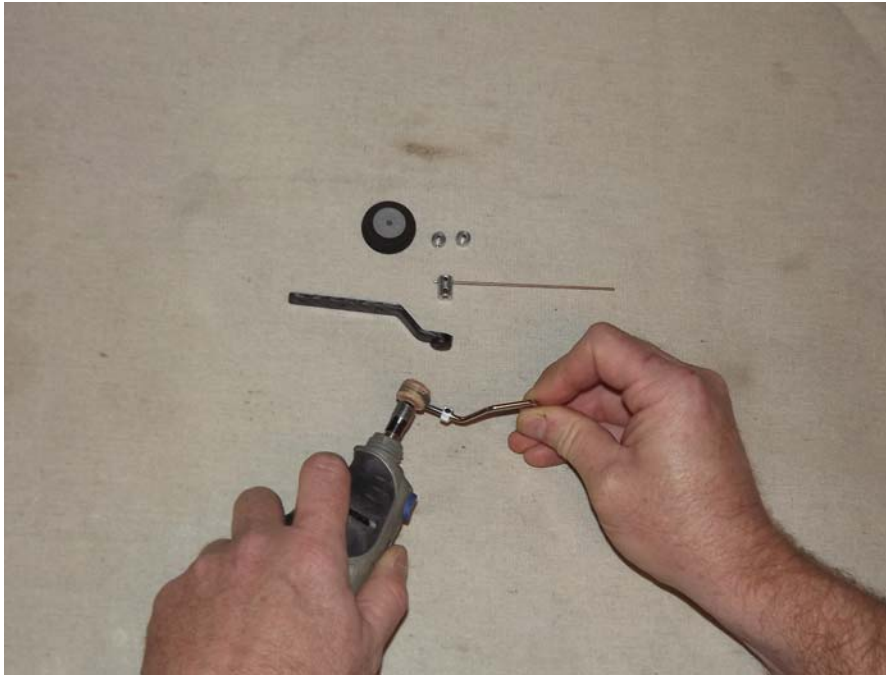

29. Position the tailwheel assembly on the rear bottom of the fuselage, making sure the tailwheel wire is aligned with the rudder hinge line. Use some blue painters tape to hold the assembly in place while you drill 3 holes with a 1/16" drill bit. Apply a few drops of thin CA to the holes and secure the assembly to the bottom of the fuselage with the 3 provided coarse thread wood screws and 3 washers.
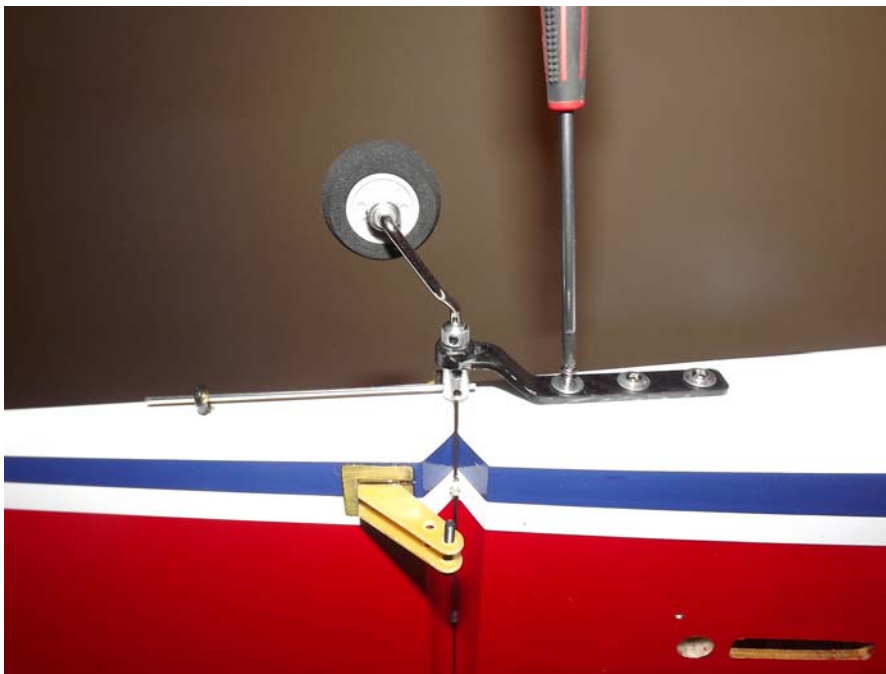
Fuselage Assembly

30. Locate the Carbon Fiber main landing gear, 4 x 4mm bolts, lock nuts and washers. Place the gear onto the landing gear plate and align the 4 holes. Use a long T-Handle allen wrench and insert the 4 x 4mm bolts from inside the fuse. Attach the 4 washers and lock nuts to each bolt and tighten.
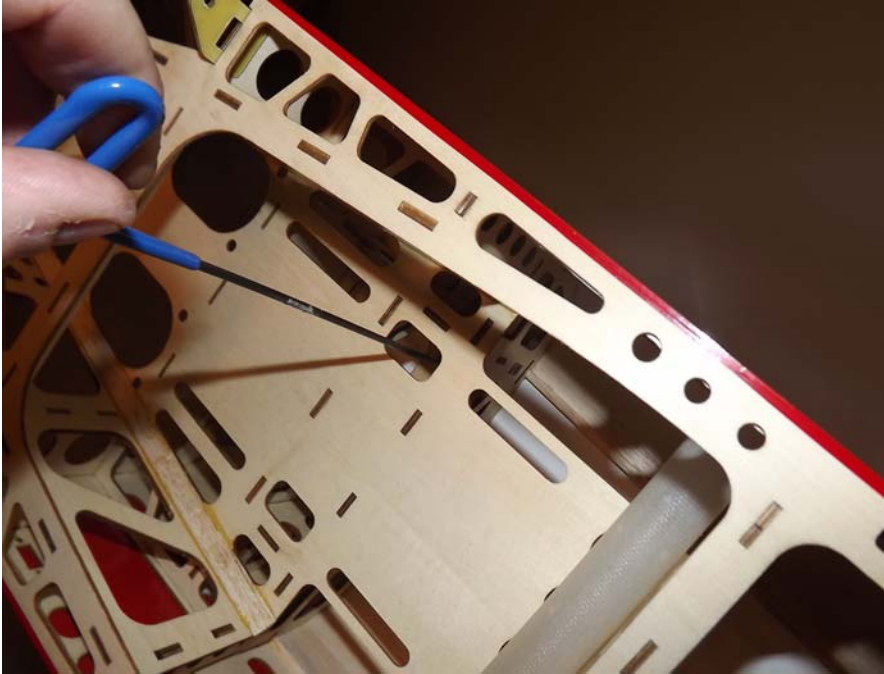
31. Locate the 2 axles, 2 locking nuts, 2 wheels, 4 wheel collars and 2 wheel pants. Place one wheel collar on the axel then slide the wheel onto the axel and secure the well with the second wheel collar. Place the threaded portion of the axle through the hole in the landing gear and attach the lock nut and washer onto the axle. Slide the wheel pant into position over the axle and tighten the nut, making sure the wheel pant is positioned properly.


32. When satisfied with the position of the wheel pant, drill a 1/16th hole through the wheel pant at the location of the hole in the landing gear and secure with a wood screw. Repeat this process for the remaining wheel pant.
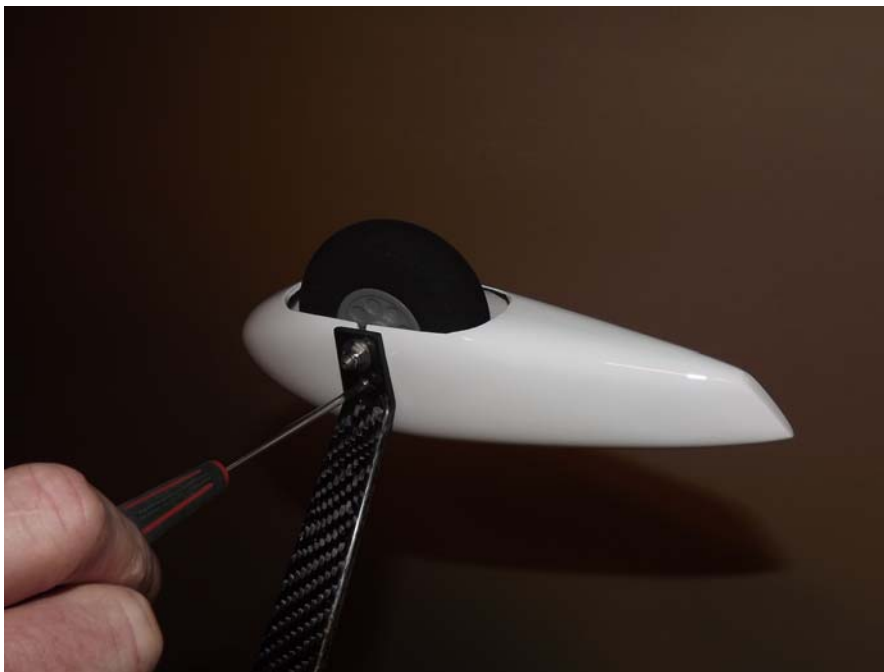
33. Next, install the motor/engine. The center and offset marks have been scribed into the front of the firewall with a laser. Use a mounting template and align with the marks on the firewall. Be sure to use the offset line to the right of the vertical center line to accommodate for the motor offset due to the built in right thrust angle in the motor box. Note: this same procedure should be used for mounting a gas engine.
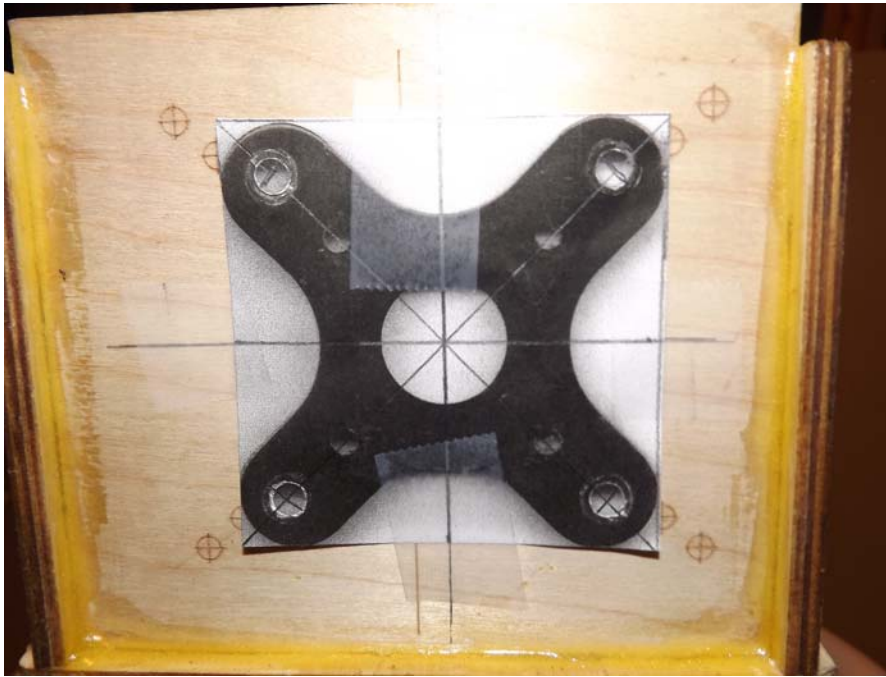
34. The distance from the front face of the motor box to the motor drive washer is <u>5.43"</u> (<u>138mm)</u> on the <u>electric version</u>. On the gas version it is <u>6 3/8"</u> (<u>162mm</u>). Use standoffs in conjunction with your motor to achieve this length. To ensure proper cooling, the recommended location for mounting the ESC is on the bottom of the motor box as shown in the picture below.
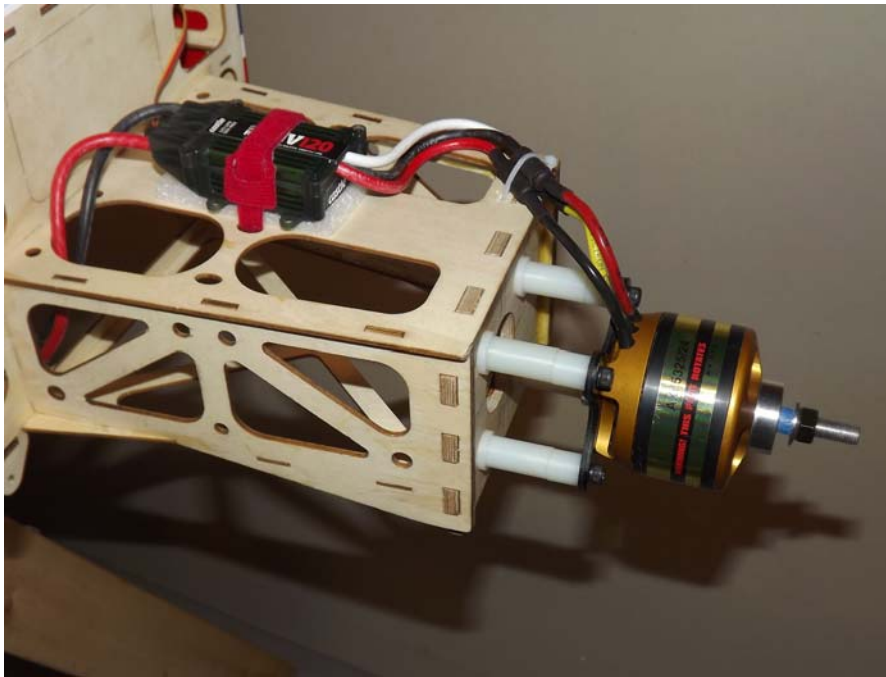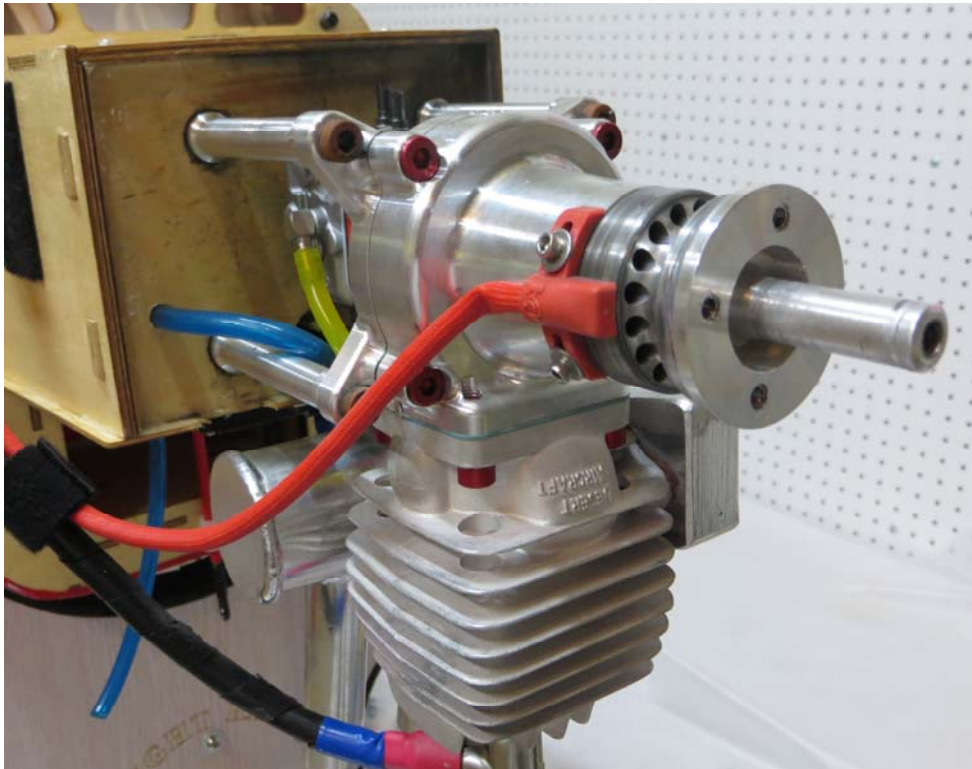
35. **Next, remove the covering for the elevator servos as well as the openings for the pull-pull rudder cables. By removing the covering for the servo holes first, you can easily see where the nylon tubes for the pull-pull wires are installed on each side of the fuse.**

36. **If you're assembling the electric version, now's a good time to remove the covering on the bottom of the fuse just behind the rudder servo. This will open an exit hole for the incoming air that cools the batteries.**

37. Install the rudder servo using the supplied hardware with the output shaft toward the rear of the plane. Also, install the recommended SWB 4" offset rudder arm.

38. Next, install the pull-pull rudder cables. Assemble one end of the linkage by inserting the pull-pull cable into one of the aluminum crimp tube, through the hole in the brass pull-pull fitting and back through the crimp tube. Loop the cable back through the crimp tube a second time and crimp with side cutters.

39. Insert the bare end of the cable into the slot in the rear of the fuselage and feed it forward into the canopy area. Make the same type of linkage as done previously. Electronically center the servo and secure the linkage at both ends with a 3mm bolt and nylon insert lock nut. Repeat for the other side.


Note: When routing the pull-pull cables through the fuse, they should cross like an "X". Also, the tension on the wires should taut but not overly tightened.

40. Slide both stab/elevator assemblies onto the carbon fiber mounting tube and secure with 2 3mm bolts. Insert the bolts through a washer and the mounting tabs and into the corresponding blind nuts already installed in the fuselage. Use blue Loctite on all bolts!!!

41. Attach a 36" extension to the servo lead and install the servos with the output shafts toward the rear of the fuselage using the manufacturer supplied mounting hardware. Thread a ball link on each end of a titanium pushrod and secure to the servo arm and elevator control horns with a 3mm bolt and nylon insert locknut. If using the SWB 1.5 inch servo arm for elevator actuation use the inner hole on the G10 control horns and trim the outer portion of the horn as shown in the picture. If using a 1.75" servo arm use the outer hole on the G10 control horn. Be sure to use a drop of blue Loctite on all bolts!!!
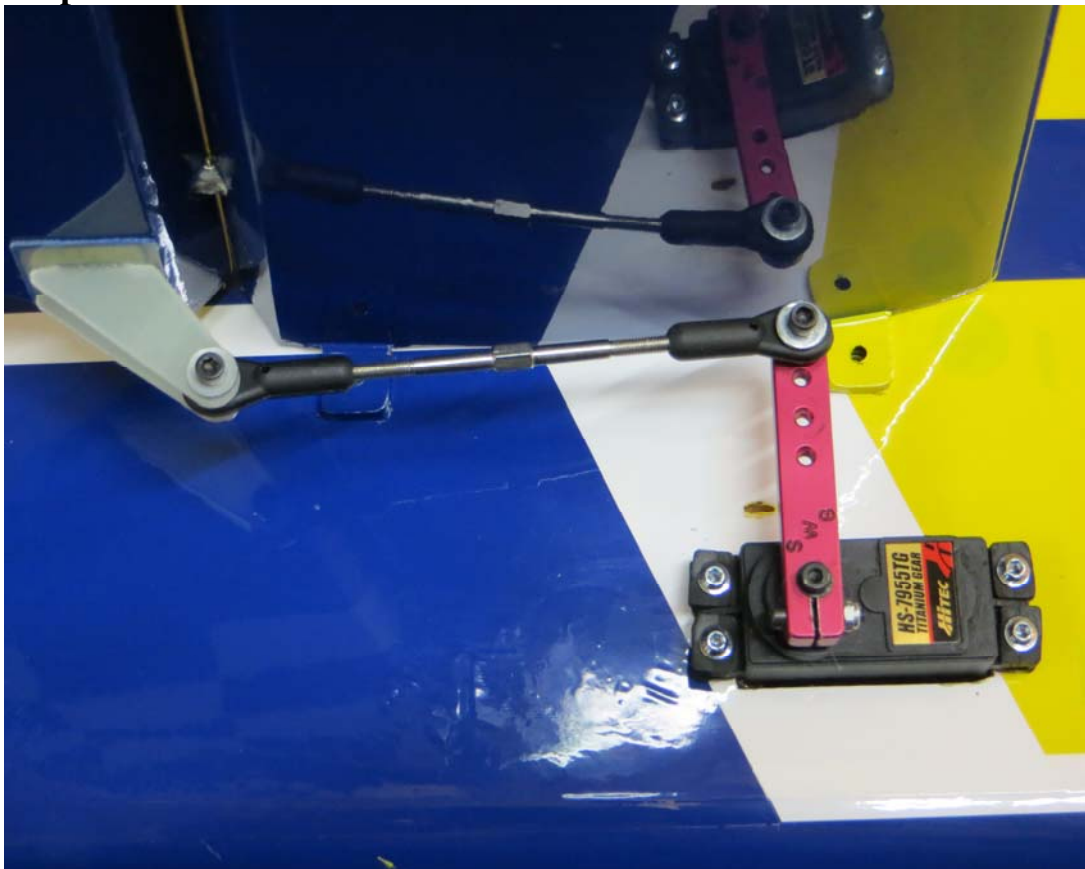
Mounting the cowl

42. The MXS cowl mounts using 4 bolts through the side of the cowl and into blind nuts mounted in the tabs in the fuselage sides. You will probably need to cut an opening in the bottom of the cowl for the engine cylinder to clear before being able to properly align and mount the cowl.

43. Place 4 strips of masking tape on the sides of the fuselage and mark the center of the mounting tabs with a fine tipped marker.
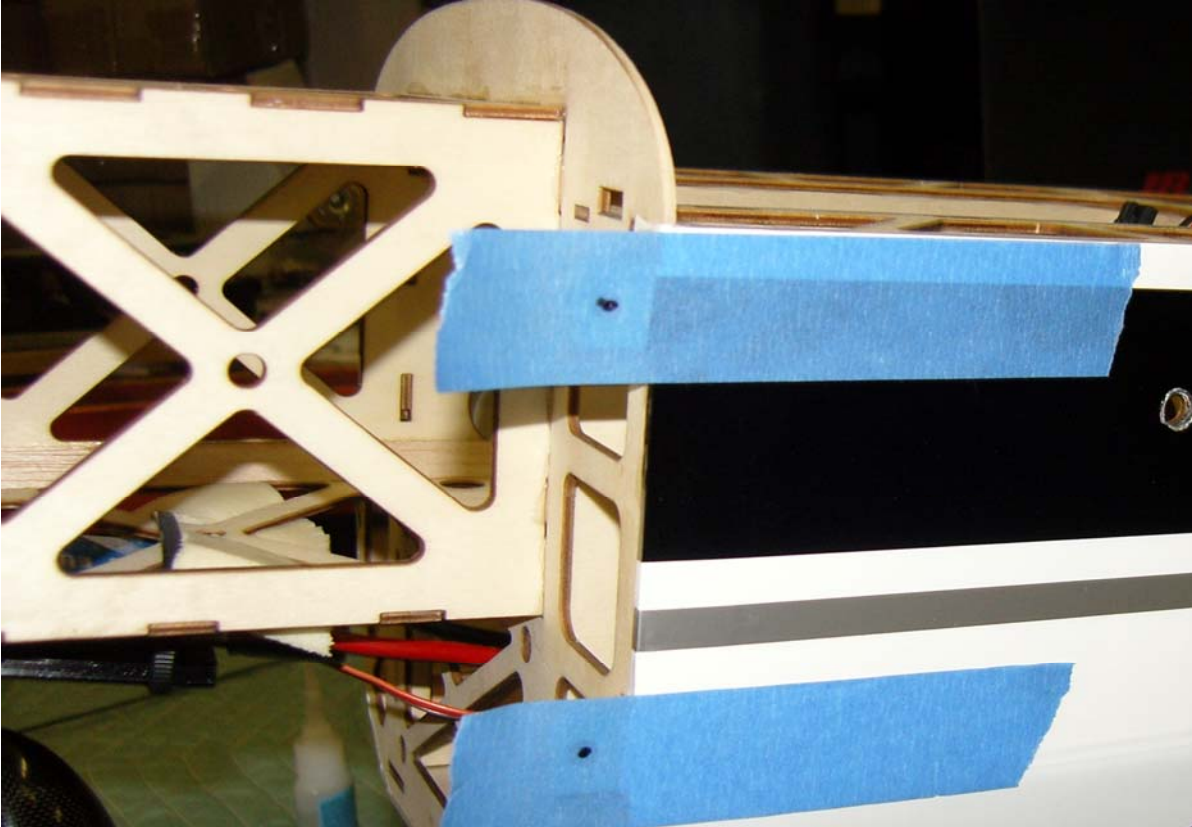
44. Roll the tape back and slide the cowl into position. Use your spinner backplate to help align the cowl properly. I usually use a couple of small pieces of double sided tape to affix the backplate to the front of the cowl ring to insure proper alignment and spinner gap while I drill the mounting holes. Roll the tape back in place on the cowl and drill at the location of the marks you made. Drill one hole at a time and install a screw before moving to the next hole.

45. Secure the cowl using 4 3mm bolts and washers.
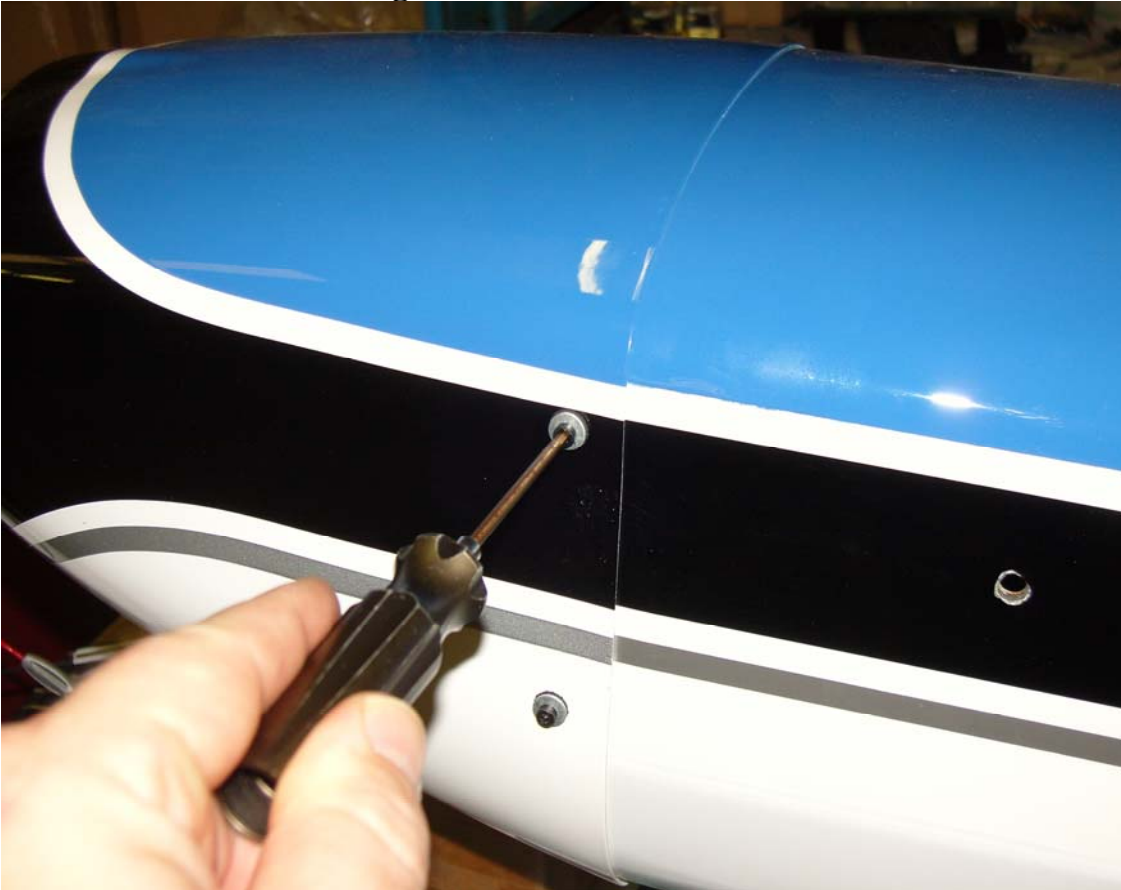
46. The wings are retained by inserting the 1/4x20 nylon bolts through the holes in the fuselage just behind the wing tube and into the pre-installed blind nuts in the root rib of the wing. Be careful not to cross thread the bolts and inspect them periodically to insure thread integrity. Also, included with your MXS is a set of side force generators (SFGs) and fiberglass racing tips. They are secured to each wingtip with 2 x 3mm bolts and a plastic washer inserted into pre-installed blind nuts in each wing tip.

Set-up and trimming

The center of gravity range for the 83 inch MXS begins at 5.25" from the leading edge of the wing measured at the root and extends back to 6.25". CG is determined with the MXS 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 MXS excessively tail heavy to perform 3D maneuvers. At this time you will also want to balance your plane laterally. Add a small amount of weight to the wingtip to achieve proper lateral balance.

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. The following control surface travels are what I use on my own MXS and are a good starting point but are by no means the only way to set up the MXS. 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: 20 degrees low rate, 30-40% exponential; all you can get high rate, 65-70% exponential

Rudder: 20 degrees low rate, 50% exponential; all you can get for high rate, 65-70% exponential.

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

This completes the assembly of the 83 inch MXS. 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 with a microfiber 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 secret. You may wish to apply all of your graphics before applying the coat of wax.

Thanks again for your purchase of the Extreme Flight RC 83 inch MXS 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