EDGE 540T EXP

Electric ARF



EXTREME FLIGHT RADIO CONTROL™

STATE-OF-THE-ART R/C AEROBATIC AIRCRAFT AND ACCESSORIES

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Greetings and congratulations on your purchase of the Extreme Flight RC Edge 540T EXP ARF. Loosely based on our favorite variant of the Edge, the 2 seat Edge 540T, we have taken numerous liberties with this design to produce an aircraft that is both unique in appearance and flight ability. The designation EXP does not belong to a full scale Edge, but stands for Experimental Progressive. This name was chosen due to the fact that the Edge 540T EXP incorporates several new forward thinking design and aerodynamic concepts. Having spent several months in development, flight testing and refinement, we are very excited about the end result of our quest. The Edge 540T EXP incorporates carbon fiber and G10 composites into the structure of the airframe, resulting in a lightweight, yet twist free structure capable of handling extreme aerodynamic loads. Carbon and G10 are used in high stress areas such as motor box support, landing gear mounting structure and fuselage longerons to provide enormous strength and durability. A true piece of carbon fiber art, the landing gear is airfoiled and has just enough "give" to cushion those not so perfect landings. The removable wing panels are mounted on a carbon fiber wing tube and are fastened to the fuselage with nylon thumbscrews. The large canopy (which is retained by a spring loaded hatch latch) has been moved forward to place the tallest portion of the aircraft at the center of gravity, resulting in the best knife edge performance of any aircraft we've flown to date. The airfoiled tail surfaces are built using a unique geodetic construction technique which allows the use of less material while creating a structure that is superior in strength and rigidity to typical ARF construction methods. All control surfaces are pushrod driven with short linkages and use ball links for slop free actuation with no binding. Optional Side Force Generators are included and add to the already generous side area, increasing yaw axis authority and adding stability in all angles of sideslip. Expertly painted fiberglass cowl and wheel pants and 2 gorgeous high visibility Ultracote color schemes add the finishing touches and make this an airplane that you will be proud to show up at the flying field with. The combination of these unique elements add up to an aircraft that pushes the boundaries of modern aerobatic flight.

If repairs become necessary, the Ultracote colors used on the Edge 540T EXP are as follows:
Red/black color scheme: True Red, Bright Yellow, Black
Red/white/blue color scheme: True Red, White, Deep Blue, Silver

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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.

3. Use a fresh bottle of thin CA with a fine glue tip when attaching the CA hinges. This will ensure that the proper amount of CA wicks into the hinge and surrounding balsa wood and creates a proper bond between the wood and hinges. We are big fans of the Mercury line of adhesives as well as the glue tips provided by them.

4. Apply a couple drops of CA to high stress areas such as anti-rotation pins, landing gear mounts, servo trays and motor box joints and carbon support mounts.

5. All of the G10 control horns are the same with the exception of the elevator horn. Its base has been shortened to fit the depth of the elevator.

6. When applying decals, first clean the area where the decal will be applied with alcohol. Mist the area lightly with Windex before applying the decal which will allow you to properly position it, 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 by doing this.

Please note: The assembly of the Edge 540T EXP is almost identical to the assembly process of the previously released Extra 300 EXP. Most photos will show the Extra component assembly. Only assembly steps which differ will show the Edge.

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Items needed for completion

-masking tape

-Thin and medium CA. We highly recommend Mercury M5T thin and M100XF medium formulas as well as the Mercury glue tips.

-30 minute epoxy. I have used Pacer Z-Poxy for many years and it is a terrific product. It cures in the allotted time and forms a permanent bond.

-Blue Loctite.

-Silicon based glue (Zap-A-Dap-A-Goo, etc.)

-Electric drill with an assortment of small drill bits.

-Small flat head and Phillips head screw drivers.

-Standard and needle nose pliers.

-Metric balldriver or allen key set.

-4 sub micro metal geared servos. All flight testing was performed with Hitec HS-65MG and HS-5065MG digital servos and we strongly recommend the use of either of these high quality servos.

-Torque 2814T/820 Brushless Outrunner motor.

-Airboss Elite 45 Amp ESC.

-4S 2100-2700 mah LiPo battery. We've had great success with the Zippy Rhino bargain LiPos available from www.hobbycity.com in both 2200 mah and 2350 mah sizes.

-APC 12x6 E prop (NOT the slow fly version!).

-52mm Extreme Flight spinner.

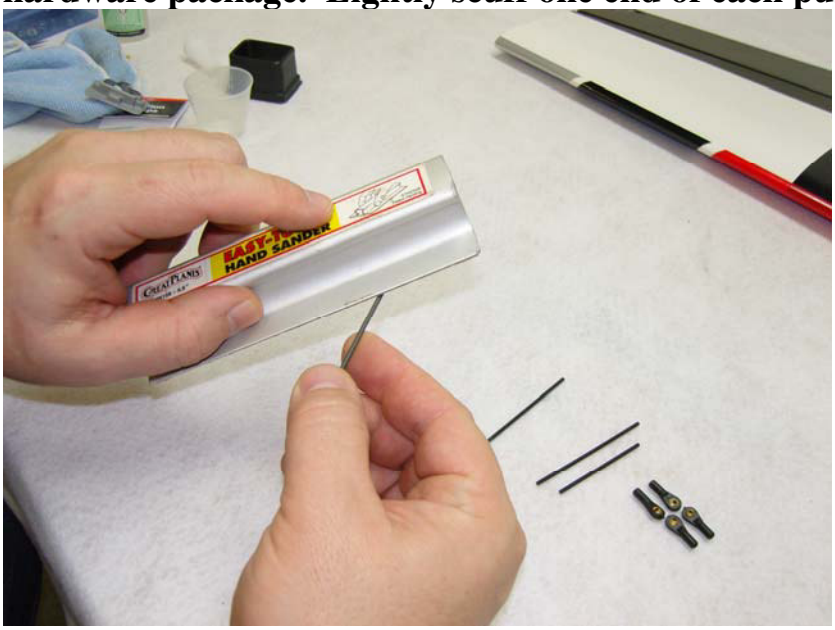
-2 18"-24" extensions for the 2 rear servos and 2 6"-8" extensions to go between the receiver and the aileron servo leads. We recommend the 28 or 32 AWG extensions to save weight.

-Adhesive backed Velcro and Velcro strap for battery retention.

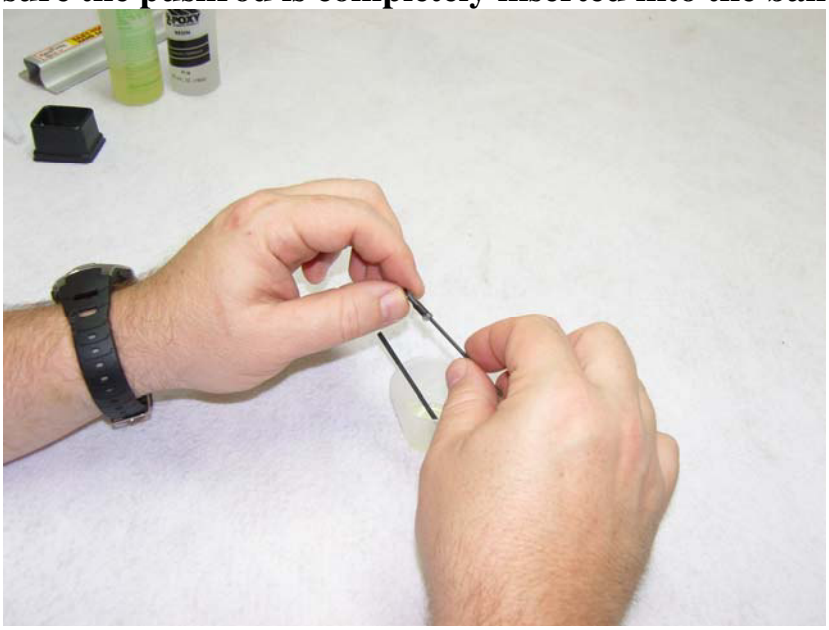
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Let's begin!

1. So that we don't have to wait for the 30 minute epoxy to dry in a later step, let's go ahead and prepare the 4 carbon fiber pushrods and ball links for later use. Locate the 4 carbon fiber pushrods and 4 micro ball links in the hardware package. Lightly scuff one end of each pushrod.

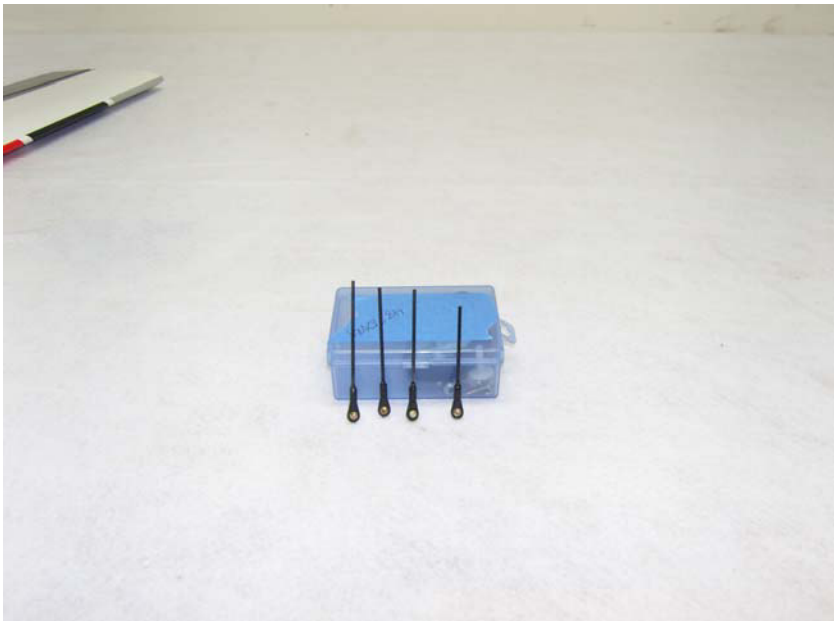


2. Mix up a small batch of 30 minute epoxy. Dip the scuffed end of each pushrod into the epoxy and insert this end into the ball link with a twisting motion to make sure the epoxy is evenly distributed inside the ball link. Make sure the pushrod is completely inserted into the ball link.

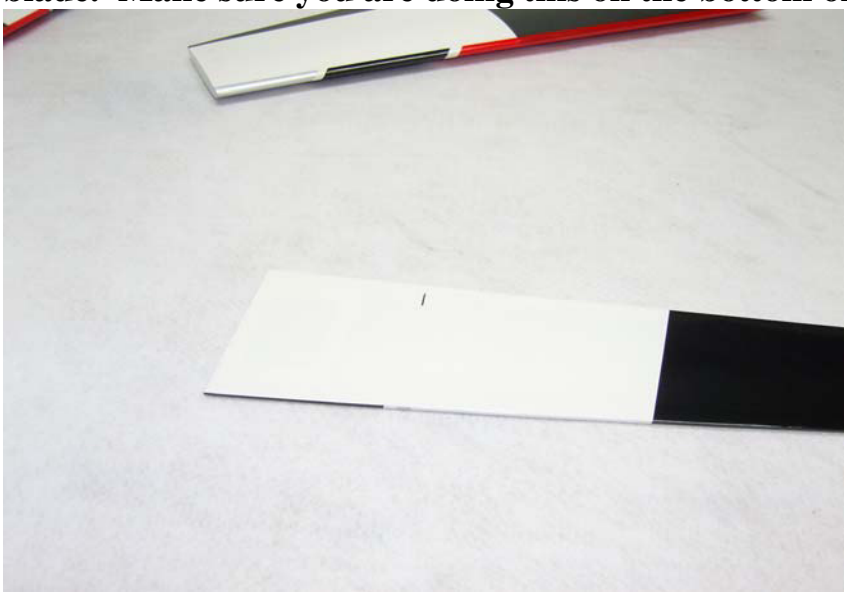


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3. Use a paper towel to wipe away most of the excess epoxy, leaving a small fillet between the carbon pushrod and ball link. Position the pushrods vertically while they cure as illustrated so the fillet remains in position. DO NOT use CA for this bond!



4. Locate the 2 wing panels with ailerons as well as the 2 G10 aileron control horns. Remove the ailerons from the wing and remove the covering over the slot for the aileron horn on the bottom of the aileron with a sharp hobby blade. Make sure you are doing this on the bottom of the aileron!



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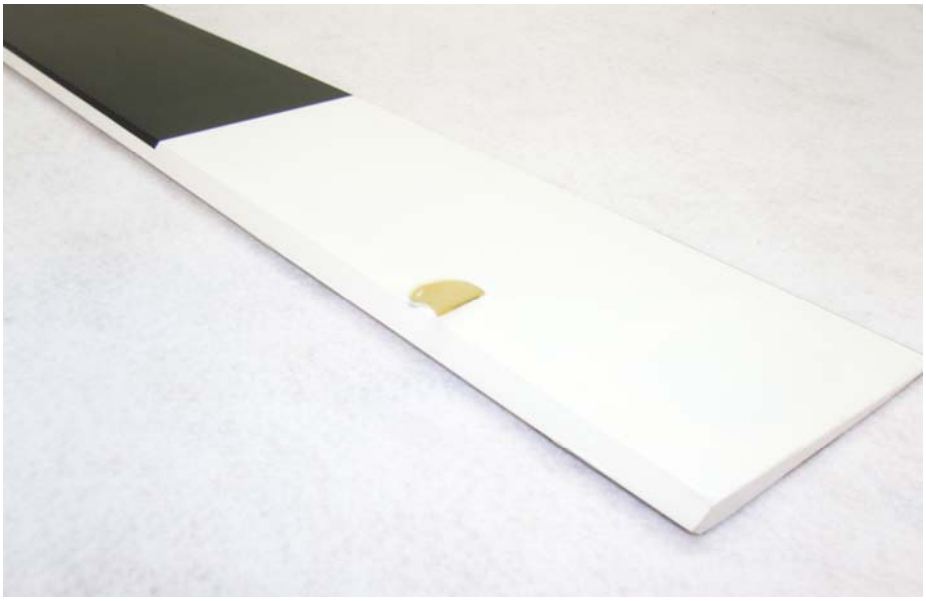
5. Scuff the portion of the control horn that will be glued into the aileron with sandpaper.



6. Use a glue tip on your bottle of medium CA and apply glue to the slot as well as to both sides of the control horn. Insert the control horn into the slot and make sure it seats properly against the surface of the aileron.



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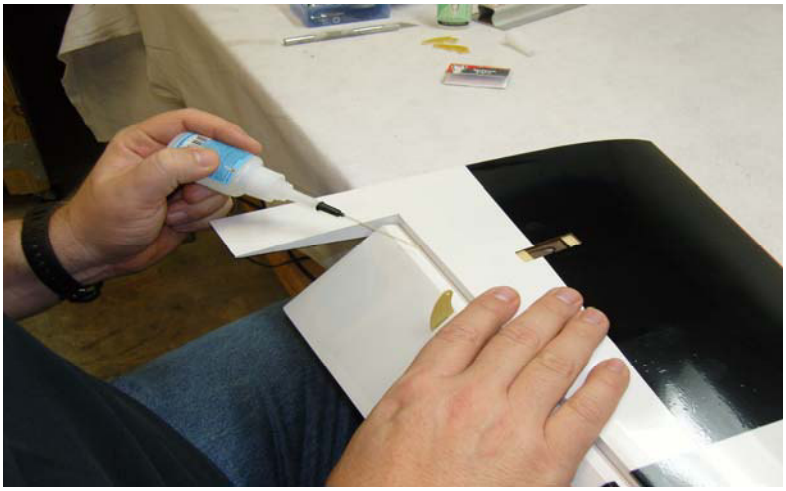


7. Remove the covering from the aileron servo location and make sure the hinges are centered in their slots.



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8. Slide the aileron into position on the hinges and secure with several drops of fresh thin CA. This process is much easier and more effective if a fine glue tip is used. Make sure to deflect the surface as pictured while applying the CA.



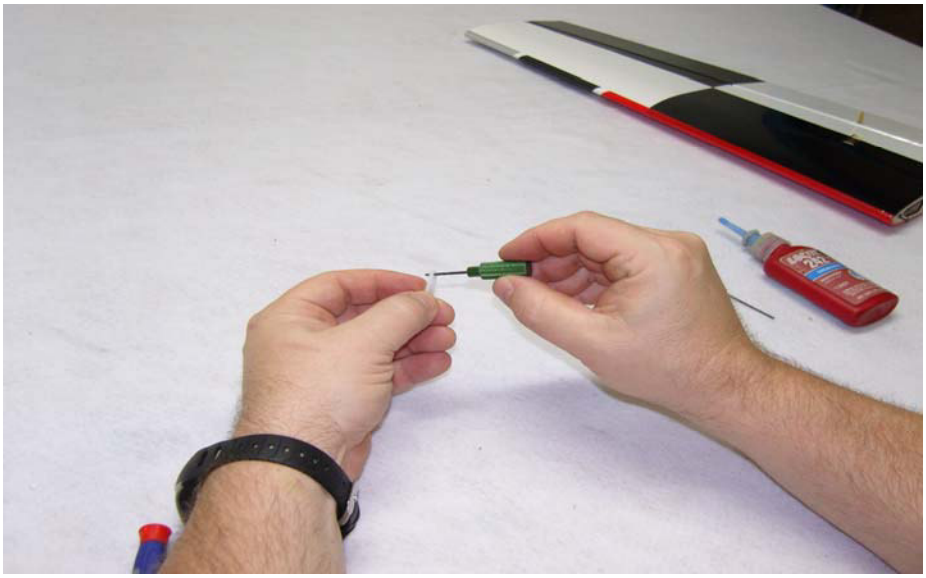
9. Use the screws provided by the servo manufacturer to secure the aileron servo in the designated location. 1 screw installed in the center hole at each end of the servo is adequate to secure the servo. Make sure the output shaft is positioned toward the trailing edge of the wing.

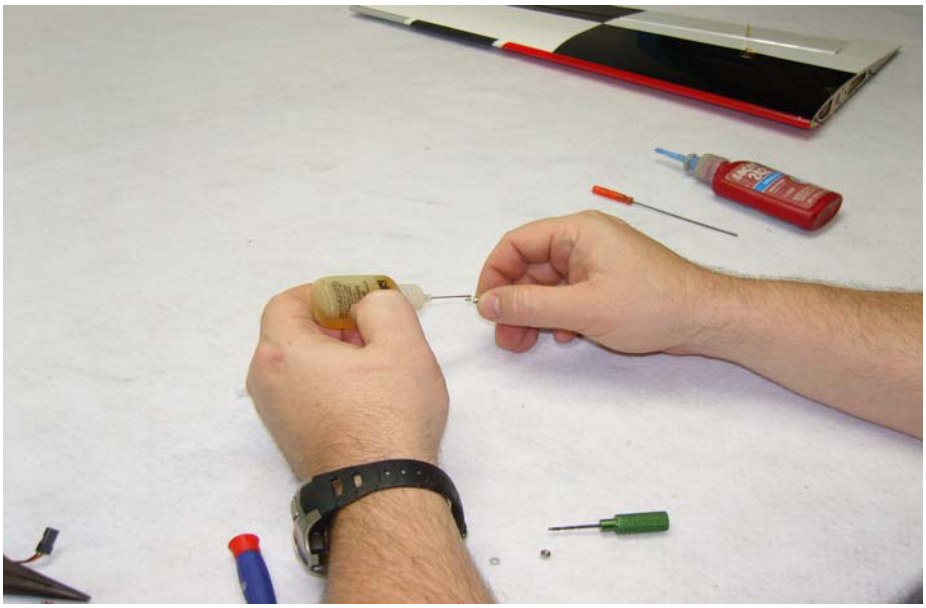


10. Use a 5/64" drill bit to enlarge the outermost hole in the nylon servo arm that is provided with the servo. Use the longest arm included. Locate one of the EZ connectors and insert the shaft of the connector into the 5/64" hole. A drop of oil placed on the shaft of the connector will ensure that it moves freely

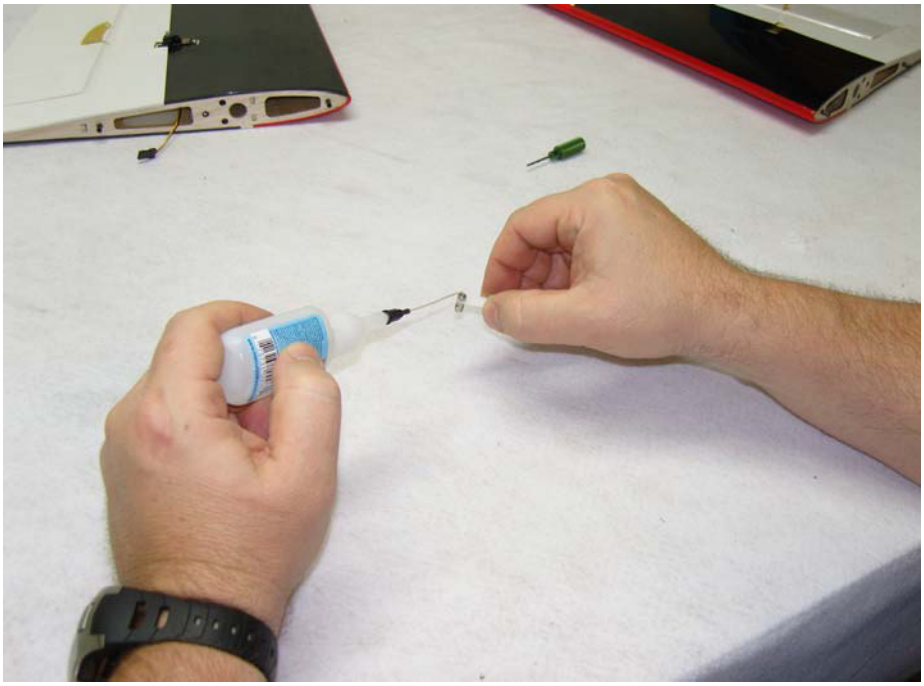
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within the hole. Place the retaining nut on the threaded portion of the connector shaft and screw down until tight, then back off the nut just enough to allow the connector to turn freely. Place a single drop of CA on the end of the threaded shaft to prevent the nut from coming off.



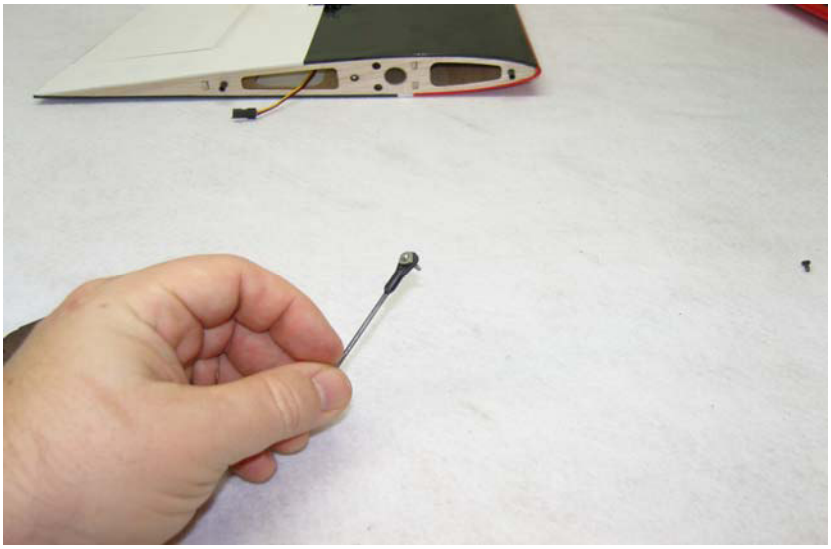


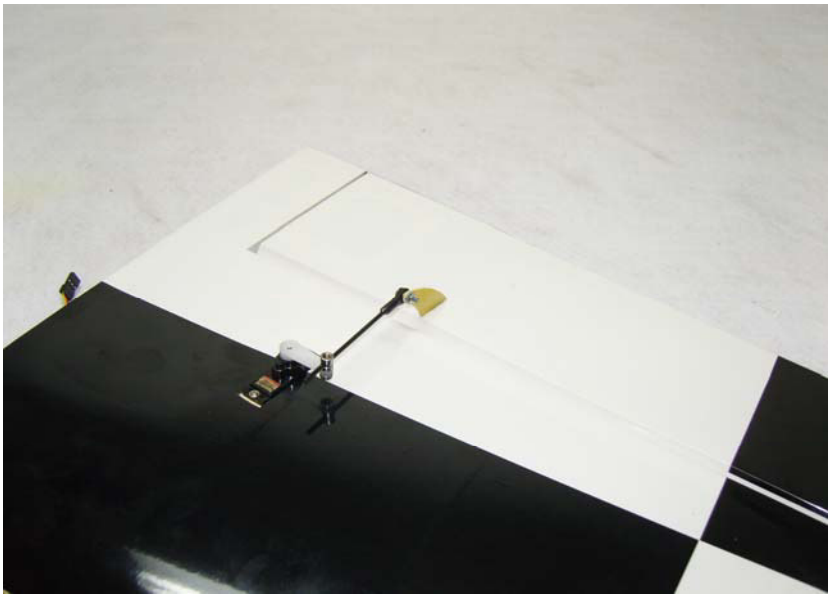
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11. Two of the carbon pushrod/ball link assemblies are the same size. These are the aileron pushrods. In addition locate 2 silver 2 mm screws, washers and nuts from the hardware package. Secure the ball link side of the pushrod to the aileron control horn on the side of the horn that will be closest to the fuselage by inserting a 2mm bolt into a washer, then through the hole in the brass ball and finally through the hole in the G10 control horn. Place a washer onto the screw and secure with a 2mm nut. Be sure to use a drop of blue Loctite to prevent the nut from backing off of the screw. Electronically center your servo and attach the servo arm with the EZ connector that you pre-fabricated in a previous step. Insert the carbon pushrod into the hole in the EZ connector. This process is probably better explained in the following series of pictures.

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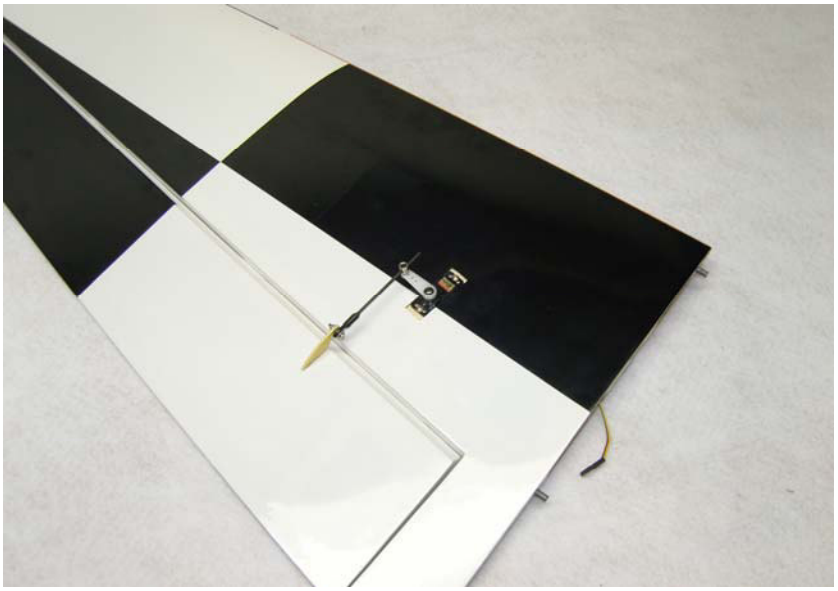


12. Secure the carbon pushrod to the EZ connector with the provided set screw. Take care not to over tighten the set screw and crush the carbon rod. Once you feel the set screw engage the carbon pushrod another 3/4 to 1 turn will supply adequate pressure to retain the pushrod. Make sure that the servo arm is perpendicular to the servo case when the aileron is in the neutral position.

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Here is a photo of the completed installation.



Repeat this process for the other wing half.

13. Locate the fuselage, one piece carbon fiber landing gear, 2 silver 3mm machine screws and 2 washers. Secure the landing gear to the fuselage by inserting a 3mm screw into a washer, through the carbon fiber gear and into the pre-installed blind nut in the fuselage. Make sure to use a drop of blue Loctite on each screw to prevent them from backing out.

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14. 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 carbon 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. Before installing the wheel pant place a drop of silicon based glue onto the wheel pant just above the pre-cut slot. This will prevent the wheel pant from rotating, but allow it to move in the case of a mishap which may help to prevent damage. 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. Repeat this process for the remaining wheel pant. Again this is probably better explained in the following series of pictures.

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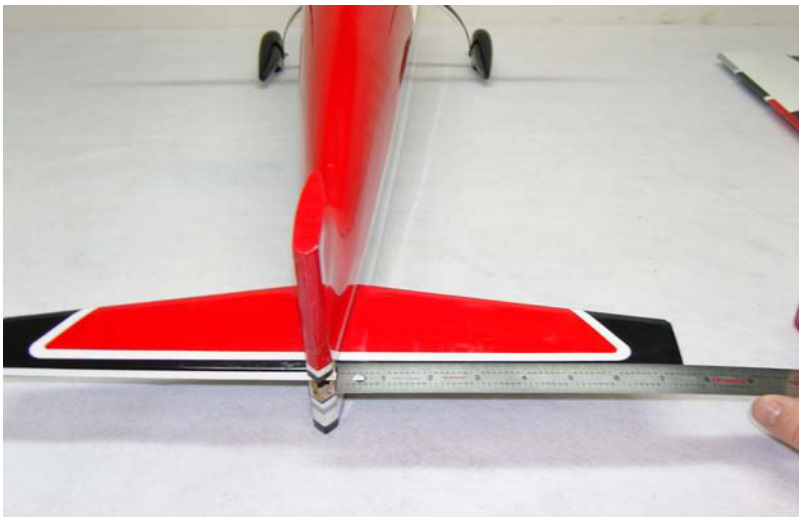




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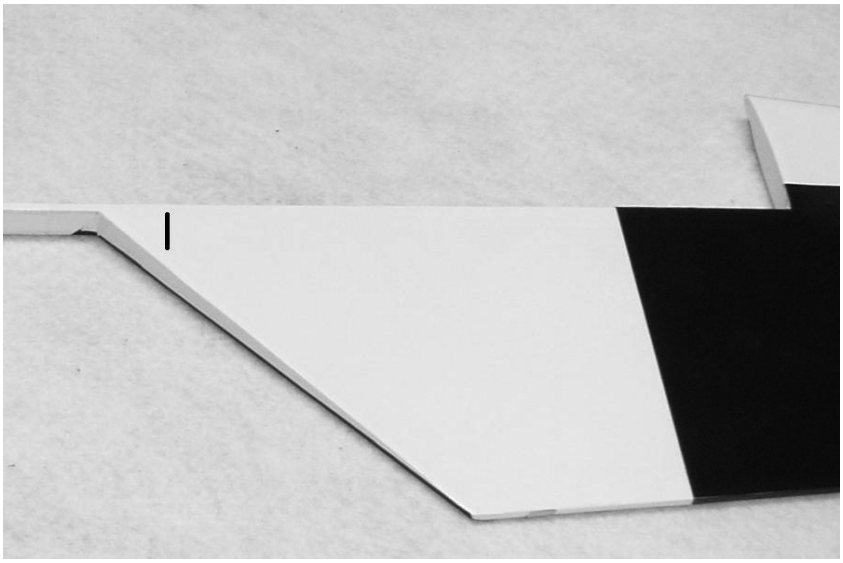


15. Locate the horizontal stabilizer/elevator assembly and slide the elevator off of the hinges. Insert the stabilizer into its slot and the carbon fiber wing tube into the fiberglass sleeve. Use a ruler to insure that the stabilizer is centered in its slot and compare the stabilizer to the wing tube to make sure it is properly aligned. Sand or shim the slot if necessary to ensure proper alignment. Secure the stabilizer with CA.



16. Remove the covering over the right slot on the bottom of the elevator where the elevator control horn will be installed. The elevator horn is the one with the shortest shank that is glued into the surface. Scuff the portion of the control horn that will insert into the elevator with sandpaper. Secure the control horn with medium CA.

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17. Slide the elevator onto the hinges in the stabilizer and secure with thin CA. Again a fresh bottle of CA and a fine glue tip work best here.



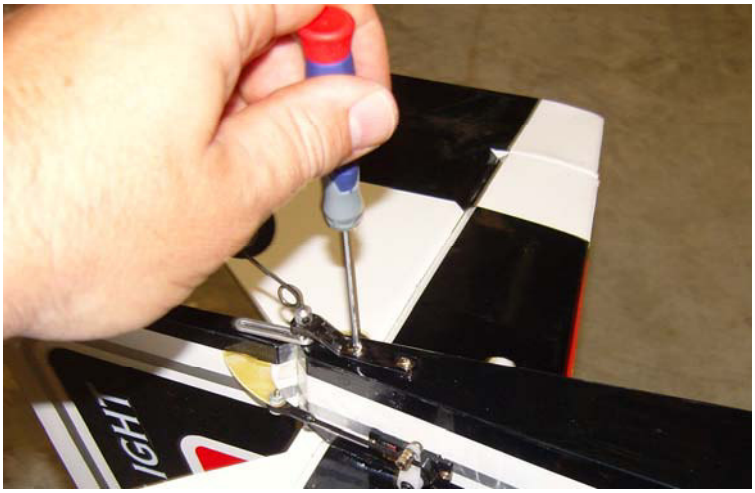
18. Remove the covering over the slot in the lower right side of the rudder where the rudder control horn will be installed. Scuff the portion of the control horn that will glue into the surface and secure the rudder control horn with medium CA.

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19. Using the same process as with the ailerons and elevator, slide the rudder onto the hinges and secure to the vertical stabilizer with thin CA.

20. Locate the carbon fiber tailwheel assembly in the hardware package. Secure the tailwheel bracket to the bottom rear of the fuselage with the provided wood screws. Make sure the pivot point of the assembly is over the hinge line of the rudder for best results.





21. Secure the tiller using the provided screw, but do not over tighten as the tiller should be able to move on the screw as the rudder is deflected.

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22. Place the tailwheel wire in the proper position, aligned with the rudder and lock into place with the 2 set screws.

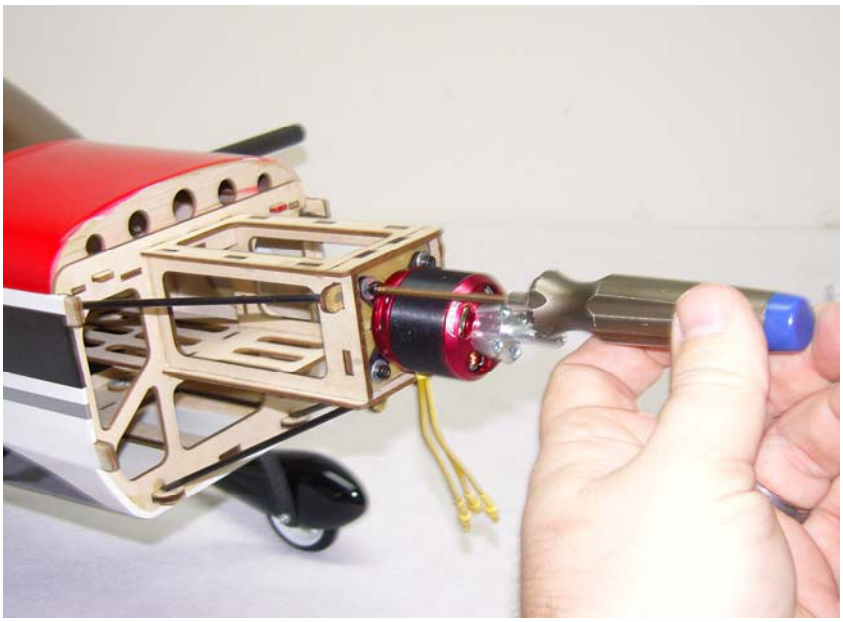
23. Use the hardware provided with the servos to install the rudder and elevator servos in their respective location in the rear of the aircraft. From the pilot's perspective the rudder servo mounts on the right side of the fuselage and the elevator servo mounts on the left side. The elevator servo should have the output shaft toward the rear of the aircraft while the rudder servo output shaft should be toward the front of the aircraft.

24. The rudder and elevator servo linkage assembles and is installed just like the aileron linkage. For maximum elevator travel we have included a G10 control horn which is bolted to the stock control horn provided with the servo. We have found it easiest to tack glue the G10 arm to the nylon arm and then using the holes in the nylon arm as a guide, drill through the composite arm. Secure the arm with the provided screws and bolts. The remaining portion of the linkage installation is the same as the other control surfaces.

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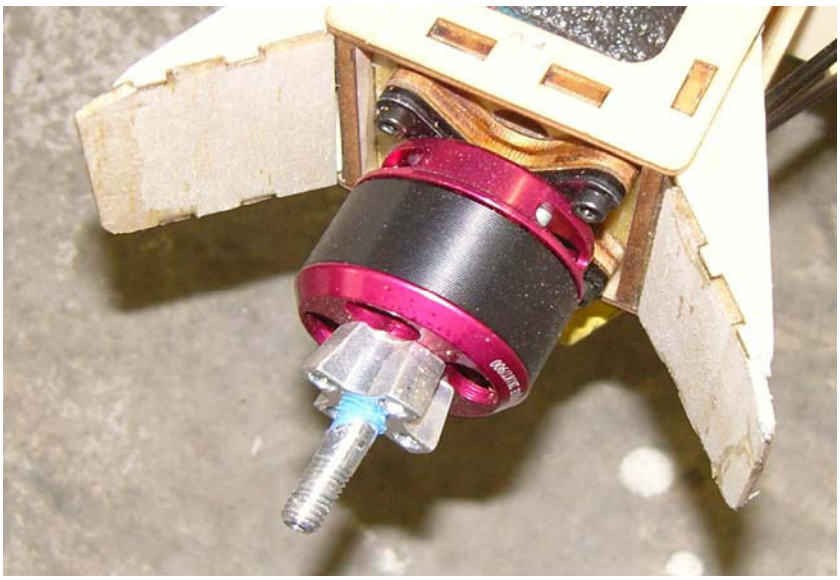


25. Mount the motor using the supplied 3mm black socket head cap bolts which are threaded into the blind nuts which are pre-installed in the motor mount plate. Be sure to put a drop of blue Loctite onto each bolt to prevent them from backing out. <u>Be sure to add some CA to all motor box joints as well as to the attachment points of the carbon fiber motor box supports</u>.



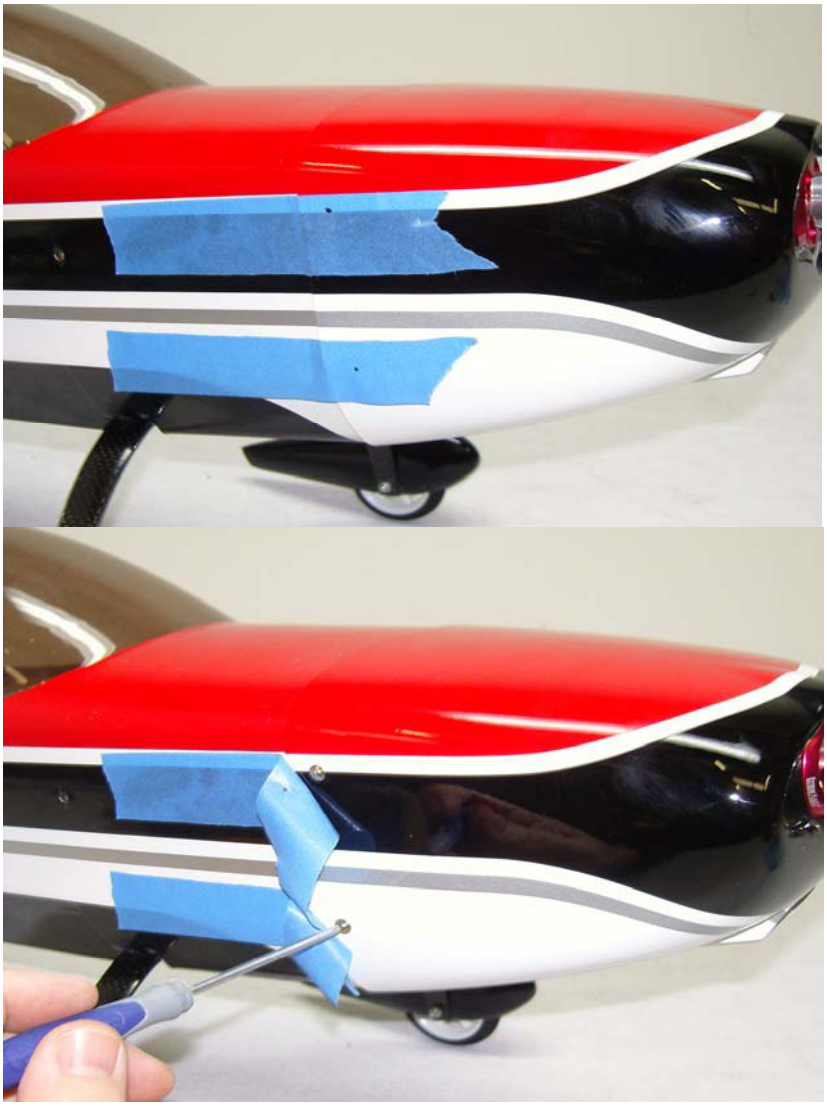
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26. Also notice the laser cut balsa baffles. A set of these is included which can be attached to the motor box to improve cooling by directing air over the motor. We have not found this necessary but depending on the climate in your area you may. Monitor your motor temperatures and if necessary use the baffles. You will find it necessary to lightly sand the top front of edge of the baffle to allow for proper cowl installation.



27. For quick, easy and accurate mounting of the cowl we recommend the following method. Tear 4 short pieces of masking tape from a roll. Place each piece of tape on the side of the fuselage so that each piece corresponds with one of the 4 cowl mounting tabs. Use a fine tipped marker to mark the location of the center of each mounting tab. Roll the tape back and slide the cowl into position. Install an Extreme Flight 52mm spinner onto the motor shaft for reference and once satisfied with the cowl position roll the tape back into place and secure the cowl. Use a 1/16" drill bit to drill a hole at the location of the dot on each piece of tape. Remove the tape and secure the cowl with 4 of the included small wood screws that have large heads. Very simple!

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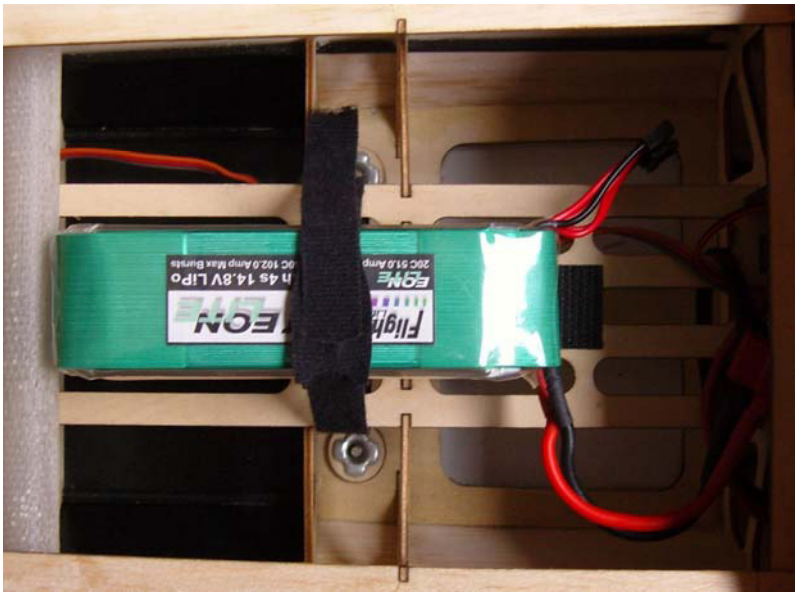
28. There is a laser cut opening in the bottom of the fuselage under the rear of the canopy. Use a sharp hobby knife to remove the covering from this location to allow cooling air to exit the fuselage.

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29. Use nylon cable ties or Velcro to secure the ESC to the bottom of the motor box. There is an opening in the cowl just in front of this location to allow cooling air to enter and be directed over the ESC.

30. Place a strip of Velcro onto the battery tray and onto your battery and use a Velcro strap around the battery and tray to prevent the battery from being ejected during high G maneuvers. Mount your receiver on the portion of the battery tray that extends behind the wing tube with Velcro.



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31. If using the included Side Force Generators now is the time to mount them. Each SFG mounts using 2 3mm bolts and 2 clear plastic washers. There are 2 laser cut holes in each SFG which correspond with 2 laser cut holes in the tip of each wing. Insert the bolts into the plastic washers and through the laser cut holes in the SFG. Mount the SFG onto the wing tip by inserting the 2 bolts into the pre-installed blind nuts in the tip of the wing.



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Set-up and flying tips

The CG range for the Edge starts at 3.75 inches back from the leading edge of the wing and extends back to 4.25 inches, measured at the wing root. There is plenty of room on the battery tray to move your battery to achieve this CG location. This is a safe place to start and depending on your flying style you can adjust the position of the battery to alter the CG to accommodate your flying style. For this type of aircraft where I am going to predominantly fly aggressive 3D I typically set the airplane up with a neutral CG, meaning that when the aircraft is flown inverted straight and level it requires no down elevator to maintain altitude. If your flying style leans more toward precision aerobatics then I recommend setting your CG using the 45 degree line test. Fly the aircraft from left to right or right to left, whichever direction you are more comfortable with at 3/4 to full throttle. Pull the aircraft to a 45 degree up line and establish this line and immediately roll the aircraft inverted.

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Establish this line and let go of the elevator stick. Ideally the aircraft will continue to track on that 45 degree line for several hundred feet before slowly starting to level off. Adjust the position of your battery to achieve this flight condition. Once satisfied with the location of your CG scribe a mark on the battery tray so that you can position the battery in the same location each flight and achieve the same feel and flight characteristics each flight.

I also highly recommend taking the time to properly set up your rates and exponential settings. Setting up low rates for precision maneuvers and high rates for aggressive aerobatics and 3D flight will allow you to experience the best attributes of the Edge 540T EXP or any aircraft for that matter. The included elevator servo arm will allow for close to 80 degrees of throw! While this is great for really aggressive tumbling maneuvers, positive and negative waterfalls and straight down dropping elevators, it can wreak havoc on stable harriers, especially if you are just learning the maneuver. If your radio will allow I suggest setting up 3 elevator rates or a flight condition that will allow you a rate for precision flying, another for harriers and the majority of 3D maneuvers and a final rate with as much travel as you can get for the crazy tumbles and flips.

Here are some suggested rates to get started with. These are the rates and exponential values I feel comfortable with. They may feel awkward to you and if so please adjust to your taste.

Elevator: Low rate-8-10 degrees; 15-20% Exponential

3D rate-45-50 degrees; 60-65% Exponential

Insane tumble rate: As much as possible! 65-70% Exponential

Rudder: Low rate-20 degrees; 45-50% Exponential

3D rate- As much as possible; 80-90% Exponential

Aileron: Low rate-15-20%; 40-45% Exponential

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3D rate- As much as possible; 70-75% Exponential

Again, these are my preferences, adjust to suit your flying style and preferred feel.

The Edge 540T EXP is capable of performing the full range of known 3D and precision maneuvers. It is also capable of performing all kinds of crazy aggressive maneuvers that have yet to be named. A great deal of fun and excitement can be had by just gaining some speed and pushing the sticks into new positions and seeing what happens! We've been able to coax all kind of crazy gyroscopic maneuvers out of this airframe. One of my favorites is to gain some speed and while on 3D rates and the "insane" elevator rate simultaneously chop the throttle while giving positive snap inputs (full up, full left aileron, full left rudder). Typically the EXP will perform 3 aggressive positive tumbles flipping over the wing tube before it runs of out inertia. Experiment with different inputs and vary the speed of your entry and see what happens. We can't wait to hear what you come up with! Be sure to get it on video!

The included SFGs can also act as "training wheels" when learning the harrier maneuver. They can help to stabilize the aircraft in high alpha flight and reduce pilot workload which certainly helps when you are learning a new maneuver.

Another neat set-up to try is to mix the ailerons to act as spoilerons which move in conjunction with your elevator. This mix commands both ailerons to raise as the elevator raises. I typically use this mix at 100% and put it on a switch so I can turn it on when needed and inhibit it when not needed. Some folks feel this type of mix is somehow taboo. To them I say "open your mind"! Anything that enhances flight characteristics or allows me to perform maneuvers that are otherwise not possible I am totally game to try! This mix allows the most straight down dropping elevators you will ever encounter, insane walls that gain no altitude where the tail of the aircraft is basically thrown under the fuselage and the tightest KE spins I've ever seen. This mix

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is also another good training tool for learning the harrier maneuver and by experimenting with the amount of spoileron to elevator mix you can actually determine the angle of attack that the EXP will harrier in. The best advice I can offer is to experiment, burn through lots of battery packs and above all have fun! You are in possession of a completely capable airframe whose flying abilities are only limited by your imagination. We have had a blast during the development and testing stages of this aircraft and I sincerely hope the Edge 540T EXP provides you with as much joy and excitement as it has for me. See ya at the flying field!

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