TURBO RAVEN EXP

69 inch electric ARF assembly manual



EXTREME FLIGHT

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Please take a few moments to read this instruction manual in its entirety 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 assembly.

Please read the following paragraphs 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. As such 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.

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Greetings and congratulations on your purchase of the Extreme Flight RC 69 inch Turbo Raven EXP! This revolutionary new airframe designed by our good friend Cody Wojcik is insanely capable, precise, and pure feeling on just a 6S power system. This aircraft is based on the short-lived full scale Turbo Raven piloted by Wayne Handley, which was initially based on the Giles G-202 with extensive use of composites, and was one of the only full scale aerobatic planes with a greater than one to one thrust to weight ratio. It was capable of full 3D flight including flying straight out of flat spins, torque rolls and stop and start vertical up lines.

With carefully analyzed moments and areas and a CFD analyzed airfoil, the Turbo Raven EXP was designed from the outset to perform best at an extremely low wing loading that would make more traditional designs feel sloppy, floaty, and imprecise. Its narrow fuselage reduces drag and keeps the ailerons in the prop blast for maximum control at near zero airspeed. Knife-edge requires no mixing and pitch response is as smooth as a pattern plane and as powerful as an Edge when you yank on the stick. Huge, counterbalanced ailerons mean the roll rate is fast but extremely predictable and consistent, and it makes rifle rolls easier than any other airplane on the market. The clean design also makes the Turbo Raven shockingly comfortable in the wind!

Paired with modern super torque mini servos such as the MKS HV9767 or Savox SV-1260, DualSky G1500.5 and 17x6 prop (the Torque 4016T-500 and 16x7 will also work well), and a 6S 3700-4500 battery, the Turbo Raven offers unprecedented performance in an extremely affordable and convenient package.

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Tips for Success:

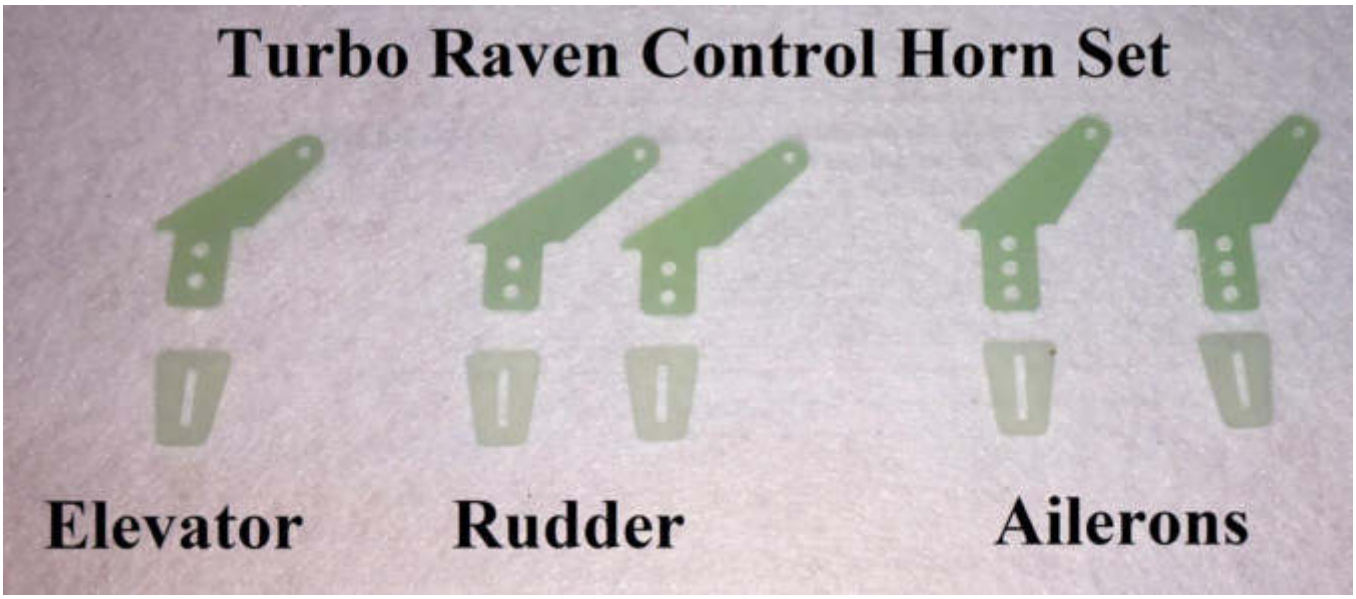
1. Before starting assembly, take a few minutes to read the entire instruction manual to familiarize yourself with the assembly process.

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

4. 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, 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.

5. 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.



The Ultracote colors used on the Turbo Raven are as follows:
True Red #HANU866, Pearl Dark Yellow #HANU843, Midnight Blue #HANU885, White #HANU870 and Transparent Blue #HANU954

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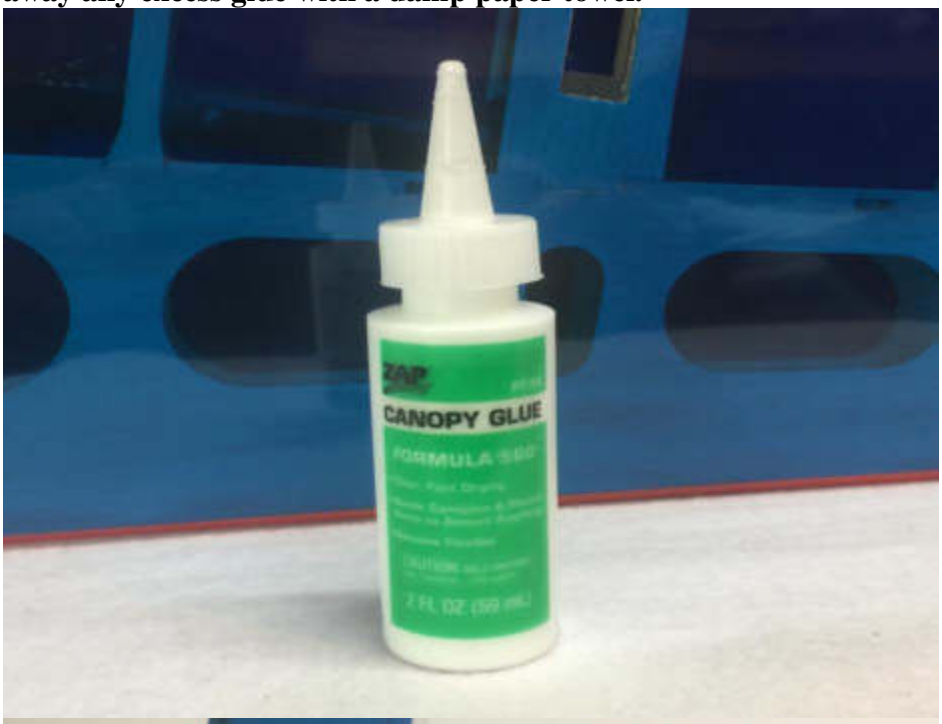
Items needed for completion

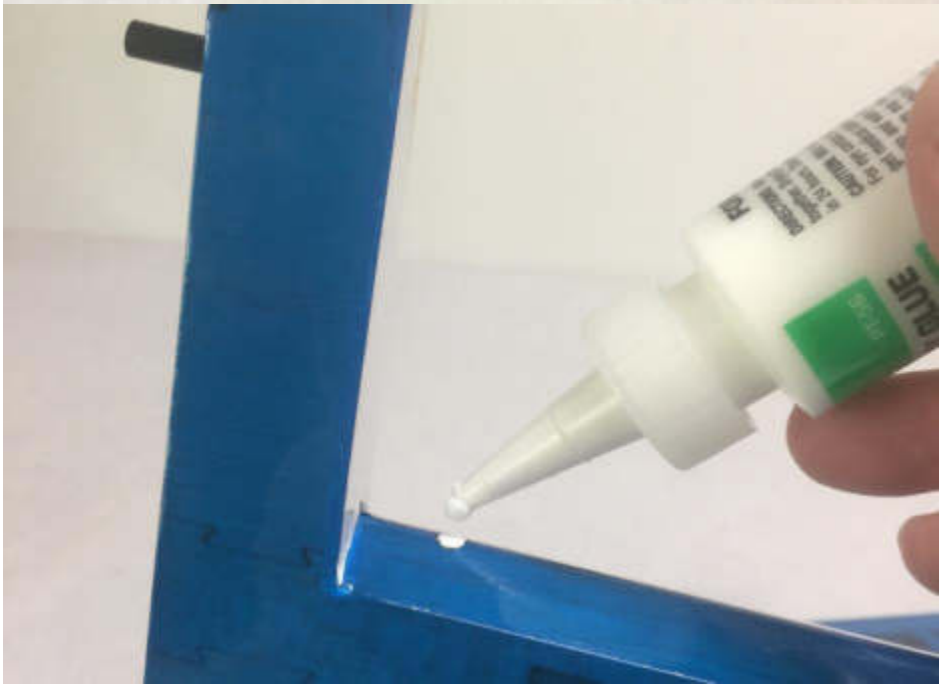
-Masking tape.
-Hobby knife with #11 blades.
-Hobby sealing iron.
-Thin and medium CA. We highly recommend Mercury M5T thin and M100XF medium formulas as well as the Mercury glue tips.
-Pacer Formula 560 Canopy Glue.
-Silicon glue (Goop)
-Blue Loctite.
-Electric drill with an assortment of small drill bits.
-Small flat head and Phillip's head screw drivers.
-Standard and needle nose pliers.
-Metric balldriver or allen key set.
-Sanding block and sandpaper.
-4 high torque mini metal geared servos. All flight testing was performed with MKS 9767 and Savox 1260 servos.
-Extreme Flight 1.25" lightweight servo arms (Qty 3) and 3" double arm with 2mm holes (Qty 1)
-Torque 4016T/500 Brushless or Dualsky GA1500.5 Brushless Outrunner motor.
-Airboss Elite 80 Amp ESC for Torque motor or Dualsky Summit 120 for Dualsky motor.
-6S 3700-5000 mah LiPo battery.
- 16x7 Xoar PJN Electric wood prop for Torque motor or Xoar 17x6 PJN Electric wood prop for Dualsky motor.
1-24" 28 AWG extension for elevator servo
2-6" 28 AWG extensions for aileron servos
2-3" 28 AWG extensions for receiver-aileron interface
1-12" 20 AWG extension for ESC to receiver
-Adhesive backed Velcro and Velcro strap for battery retention.

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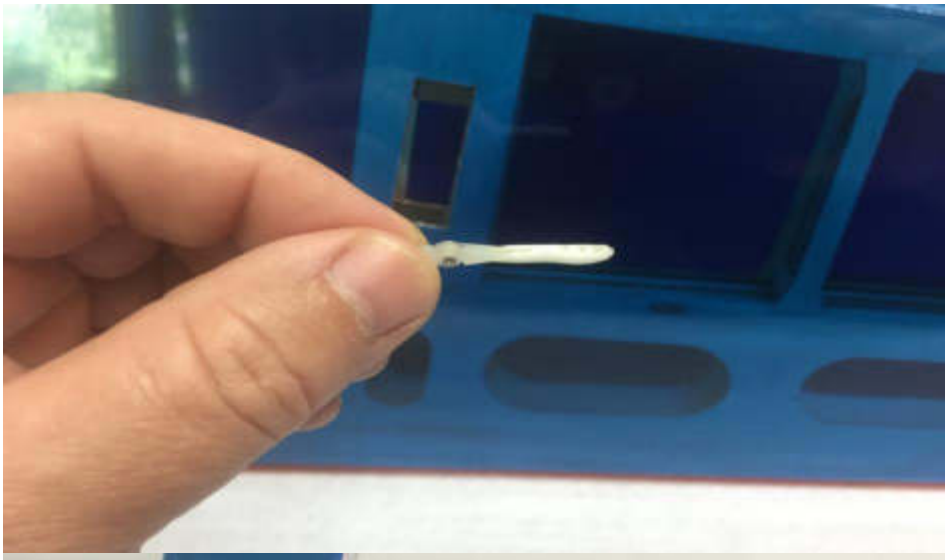
Let's begin!

1. Locate the 2 wing panels with ailerons as well as the 2 G10 aileron control horns and base plates. Remove the aileron and pull the hinges from the wing and aileron. Use Pacer Formula 560 Canopy Glue to secure the hinges. This glue works very well in this application and cleans up easily with water. Apply the glue to both the hinge holes and the hinges themselves and push the surfaces together leaving a minimal gap between them. Use masking tape to keep the aileron in position while the glue sets. Wipe away any excess glue with a damp paper towel.

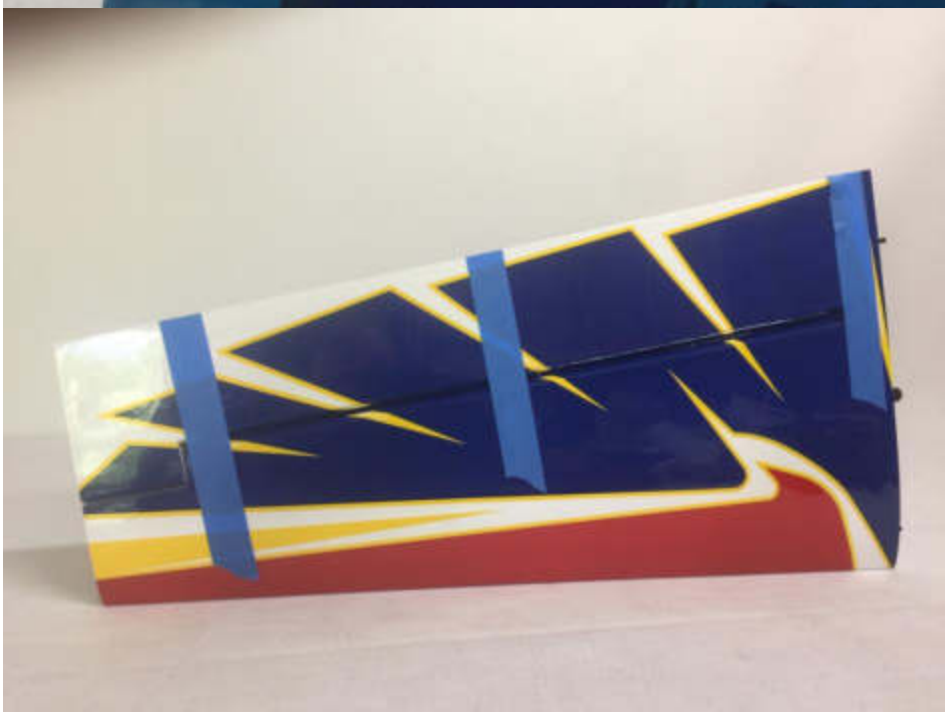




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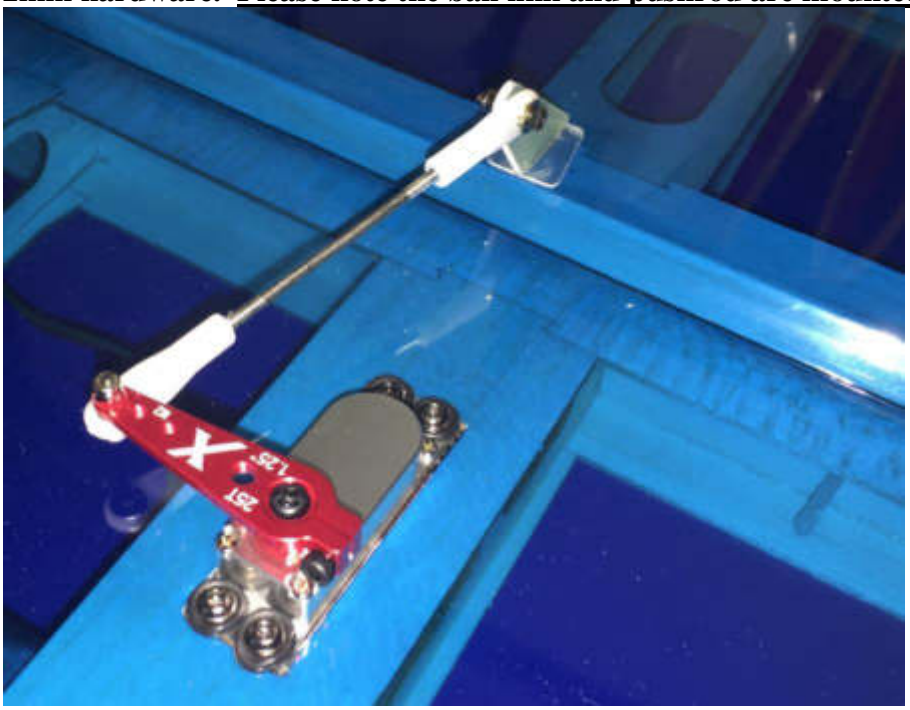


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2. Remove the covering over the slot for the aileron horn on the bottom of the aileron with a sharp hobby blade. Make sure you are doing this on the bottom of the aileron! Insert the horn into the base plate and into the slot in the aileron. Use a fine tipped felt marker to trace the base plate. Use a sharp blade to remove the covering under the base plate. Scuff the control horn's gluing surface with sandpaper and glue the horn and baseplate in place with medium CA.



3. Attach a 6" servo extension to your aileron servo and secure with an Extreme Flight Servo Safety Clip or a piece of heat shrink tubing. Secure the servo into the slot with the output spline facing the leading edge of the wing. Assemble and install the aileron linkage as shown in the picture using the provided 2mm hardware. <u>Please note the ball link and pushrod are mounted to the bottom of the servo arm</u>.



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4. Locate the fuselage, carbon fiber main gear, wheel pants, fairings, wheels, axles and related hardware for mounting the landing gear. Use the provided mounting hardware to secure the main gear to the fuselage. Be sure to apply blue thread lock to the bolts before inserting into the gear and pre-installed blind nuts.



5. Secure the landing gear cover to the carbon gear with a couple beads of white glue or silicon glue and tape in place until the glue sets.

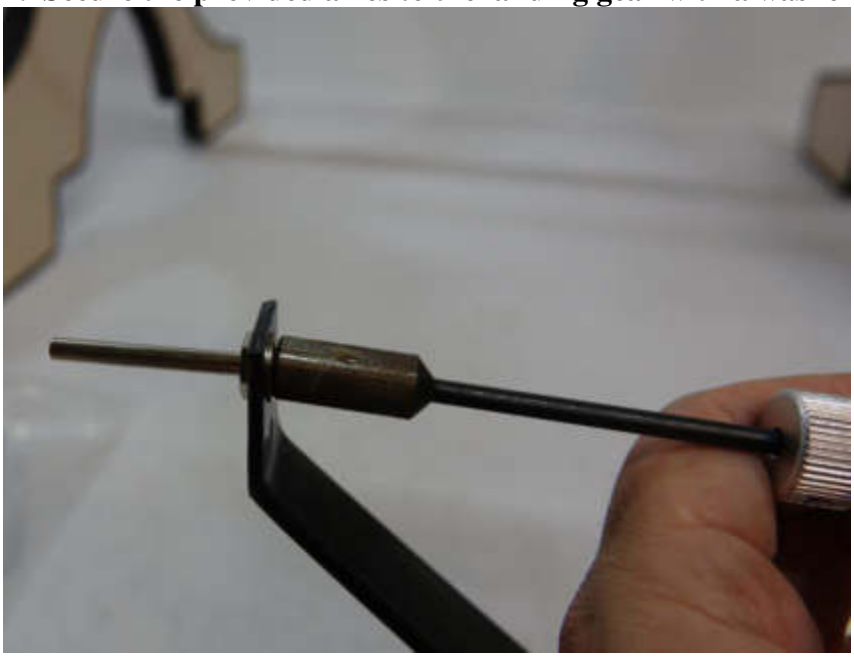


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6. Glue the landing gear fairings into place against the fuselage side with silicon glue or medium CA applied to the carbon gear leg.



7. Secure the provided axles to the landing gear with a washer and nylon insert lock nut.



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8. Slide the wheel onto the axle and secure with a wheel collar. Be sure to apply Blue Loctite to the set screw in the wheel collar.



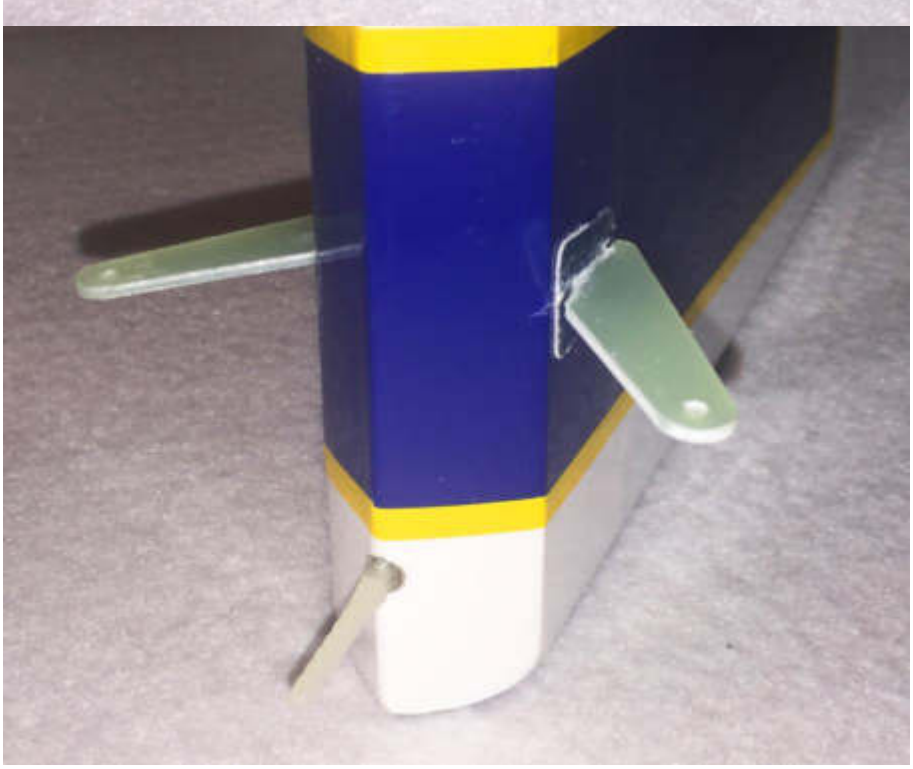
9. Slide the wheel pants into position and secure with a 3mm bolt. You may need to open the slot in the wheel pant for proper fit over the axle. Again use Blue Loctite on the bolt.



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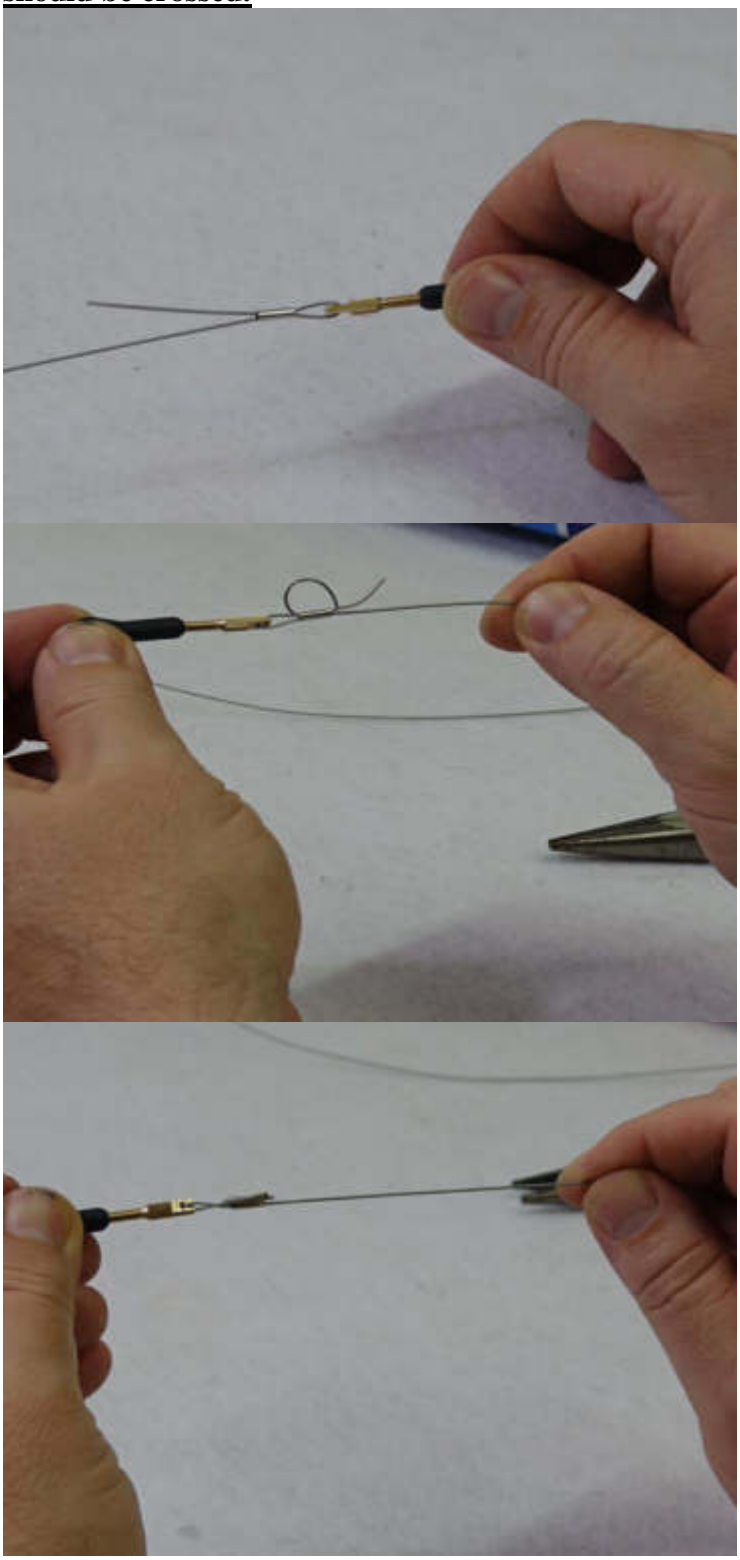
10. Locate the rudder and rudder control horns and base plates. Trial fit the horns into position in their pre-cut slots and confirm alignment. Trace around the baseplate, and remove the covering under the baseplate. Glue the horns into position using 30 minute epoxy. Wipe away any excess epoxy with a paper towel soaked in denatured alcohol, re-confirm alignment and set aside to dry. Once dry glue the rudder into place on the vertical stabilizer using the same method to glue the hinges in place as previously described.





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11. Mount the rudder servo in the rudder tray in the fuselage. Assemble the pull-pull cables as shown and secure to the servo arm and control horns with the provided 2mm hardware. <u>The pull-pull cables should be crossed.</u>

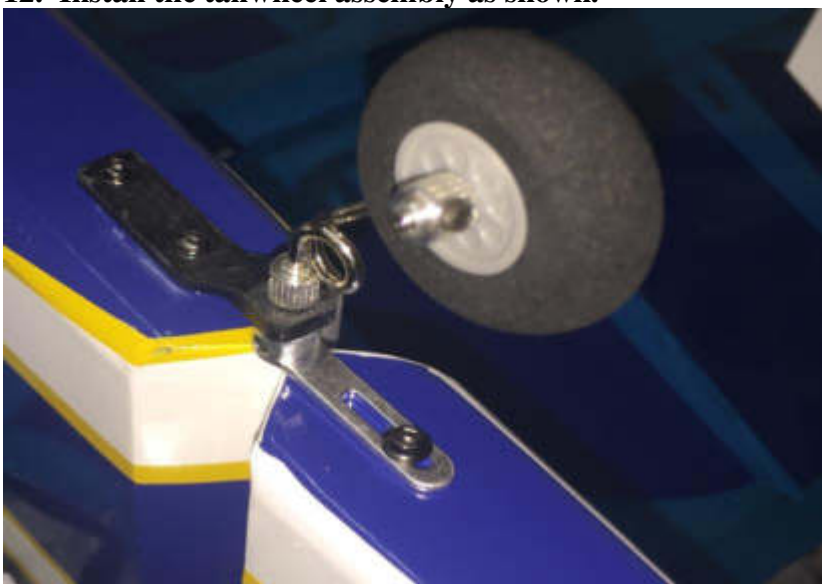


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12. Install the tailwheel assembly as shown.

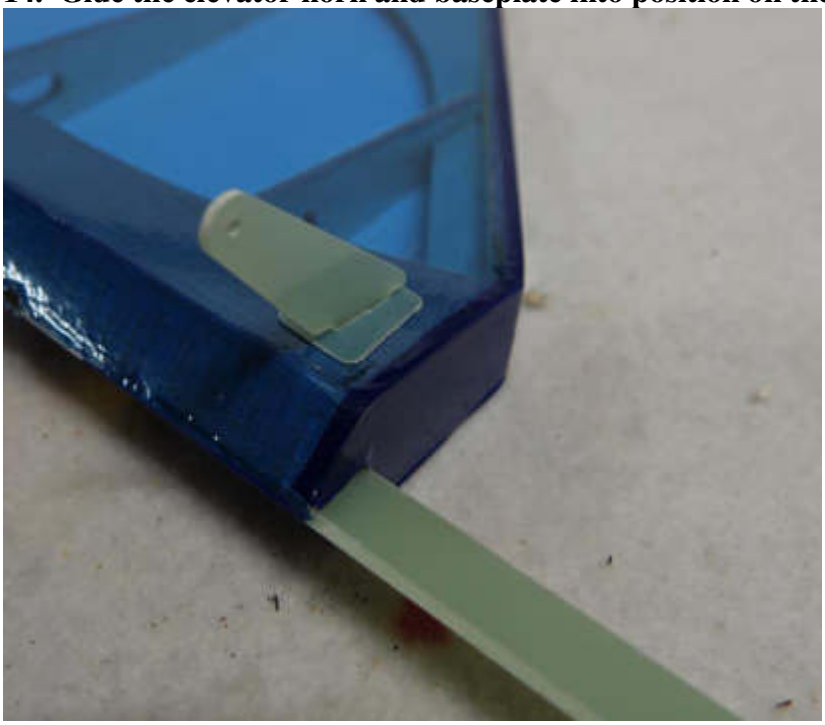


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13. Locate the horizontal stab/elevator assembly. Remove the elevator from the stab. Insert the stab into the fuselage and the wing tube into its socket and confirm alignment. Glue the stab in place with a combination of thin and medium CA.



14. Glue the elevator horn and baseplate into position on the bottom left elevator with medium CA.



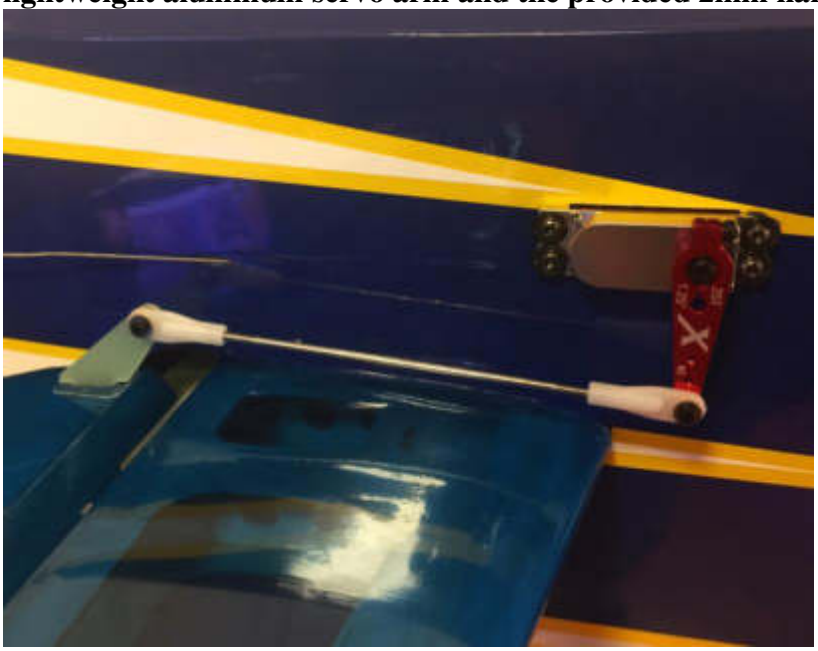
15. Lightly sand the composite elevator joiner and then glue the left elevator half onto the stab using Formula 560 glue on the hinges.

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16. Coat the portion of the elevator joiner that will insert into the slot in the right elevator half with 30 minute epoxy. Coat the slot in the elevator with epoxy as well. Apply glue to the hinges and hinge slots and push the assembly together. Clean up the excess glue and then secure with masking tape until dry. Use a small clamp to ensure that the counterbalances stay aligned with the elevator during the drying process.



17. Attach a 24" servo extension to the elevator servo and secure with an EF servo safety clip or heat shrink tubing. Install the elevator servo and assemble the linkage using an Extreme Flight 1.25" lightweight aluminum servo arm and the provided 2mm hardware as shown.



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18. Prepare your motor of choice for mounting by attaching the prop adapter and radial mount. If using the Dualsky G-1500.5 outrunner you will need to remove the radial mount and secure it to the motorbox first.

19.The Dualsky G-1500.5 motors that Extreme Flight supplies include 8mm standoffs that were specially made by Dualsky to get the total length of the motor to the same length as the Torque 4016/500. Use these standoff when mounting the G-1500.5 in the Turbo Raven.





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20. Install your choice of motor with the provided 4mm mounting bolts making sure to use a generous amount of Blue Loctite on each bolt. Mount the ESC on the bottom of the motor box and secure the motor wires to keep them from flapping around and getting chaffed. I used a piece of scrap foam padding to protect the ESC from vibration and secured the ESC with nylon cable ties. ***Please note at the time this picture was taken we had yet to receive the aluminum standoffs so a wooden spacer was fabricated.***

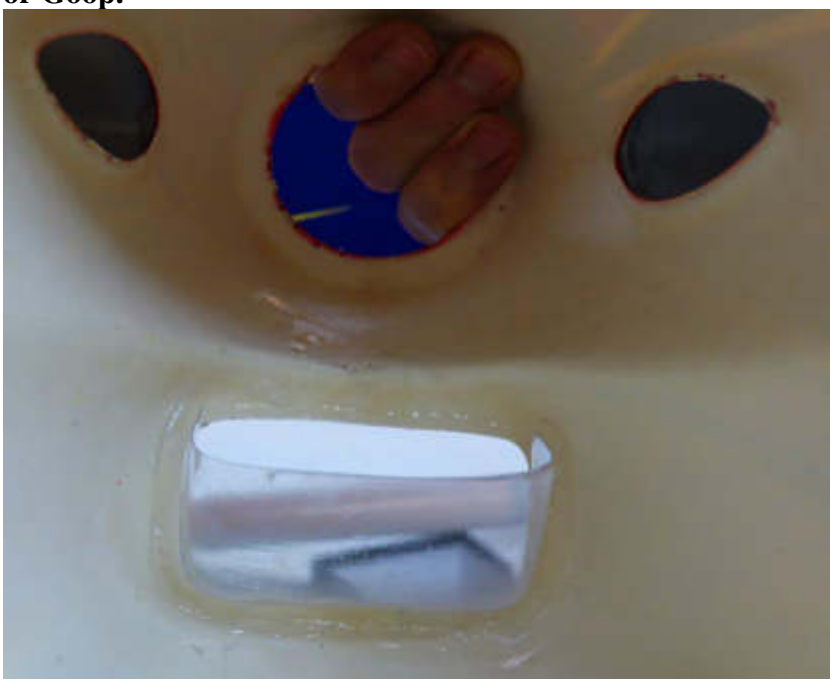


21. Glue the turbine exhaust stacks into the recesses in the cowl with medium CA or Goop silicon glue. Be sure to sand the mating surfaces for best adhesion.



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22. Trim and glue the clear air scoop into the opening in the lower portion of the cowl with medium CA or Goop.



23. Cut 4 strips of masking tape from the roll. Place the strips onto the fuselage and mark the location of the blind nuts that are installed in the cowl mounting tabs with a felt tip pen. Roll the tape back and slide the cowl into position using the spinner to help with alignment. When satisfied roll the tape back into position to secure the cowl. Use a 1/16" drill bit to drill a pilot hole at each of the 4 mounting locations.



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24. Open the holes to accept the 3mm bolts and secure the cowl with 4 3mm bolts and washers. Be sure to apply a drop of Blue Loctite to each bolt.



25. Mount your choice of prop and the included Cyclone vented spinner.

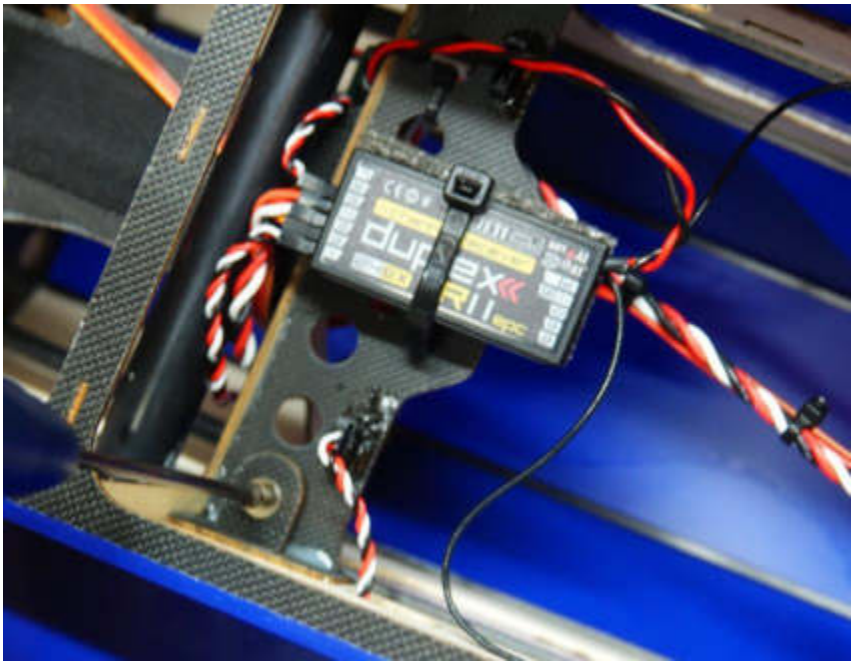


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26. Secure the SFGs and wing tips to the wing with 2 3mm bolts.



27. Slide the wing tube into the fuselage and slide the wings onto the tube. Secure with 2 3mm bolts and washers inserted through the wing retention tabs and into the pre-installed blind nuts. Use a drop of Blue Loctite on the bolts.



28. Mount your receiver on the tray behind the wingtube as shown in the previous picture.
29. Attach a strip of Velcro to the battery tray and use a Velcro strap to secure your battery.

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Set-up and flying tips

I like the CG for the Turbo Raven to be 1/2" behind the back of the wing tube. 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 preferences. 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. 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 Turbo Raven or any aircraft for that matter. Here are some suggested rates to get started with. These are the rates and exponential values I feel comfortable with. They may not be optimal for you so please adjust to your taste.

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

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

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

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

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

3D rate- 40 degrees; 50-60% Exponential

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

A huge thanks goes out to Cody Wojcik for all his work on this very unique aircraft. It is a joy and honor to have the Turbo Raven in our lineup and to be able to offer it to our customers. Enjoy!

See ya at the flying field!

Chris Hinson

Extreme Flight

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