TurboRaven 69"



Build Guide

EXTREME FLIGHT

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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. 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 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.

We recommend that you read this build guide entirely before beginning your assembly, to familiarize yourself with the tools needed and materials used.

The Turbo Raven series of aircraft were designed for Extreme Flight by Cody Wojcik and are intended to be extreme performance, no compromises aircraft. As such, some items in assembly may be slightly different than you are used to.

The Raven has a wingspan of 65" without its optional wingtips, and 69" with these tips installed.

The Raven is intended for electric power using either the XPWR22cc brushless motor or the T-Motor AM600 brushless motor. In either case, the recomemended ESC is the T-Motor AM116. We often get questions about whether the Raven can use the T-motor AM670. Note that as a very lightweight airplane with a basic wingspan of 65", the Raven is perfectly powered with the AM600. If you elect to overpower it with the AM670, note that this is not a recommended setup, and we caution you to be careful about flutter and overstress of the airframe.

The Raven has extremely large control surfaces. For this reason, it requires extremely powerful servos to prevent flutter. For our builds, we chose Savox 1261 and EF/Theta 989 servos.

The Raven is an extremely stable aircraft. It does not need a gyro or any stabilization. IF you do elect to install a gyro or any stabilization system onboard, we urge you to do your maiden flights without the system installed on the airplane. We find that aircraft with such systems installed (even if "turned off") are much, much more likely to experience trimming problems. Trim the airplane without the gyro installed/plugged in. This will help to diagnose any problems which arise once the gyro is installed.

The Raven is shipped with ailerons and elevators pre-hinged and gap sealed.

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Your aircraft has been on a journey around the world since it left our factory. Although the covering material was perfectly smooth when it was boxed up, changes in weather and humidity may have wrinkled the covering material. For certain, wrinkles will appear in the covering once you have unpacked your aircraft and it adjusts to the atmospheric conditions in your region. Learning to remove wrinkles from covering is a necessary skill to maintain your wood aircraft.

Your Extreme Flight produced aircraft is covered in Ultracote covering material (US market name), also called Oracover in global markets. If you need replacement covering to repair damage, Ultracote/Oracover is widely available from retail hobby suppliers. Also, each roll of Ultracote/Oracover includes excellent instructions which are also available online. Please refer to them for details about working with and/or repairing your covering.

The basic tools are a covering iron and a hobby heat gun. Start by using the iron at 220F (104C) to seal all of the edges on the covering scheme. This is CRITICAL on the leading edges of wings and stabilizers. Then use the iron at 300F (149C) or a heat gun to shrink out any wrinkles in the covering. Remove the plastic canopy from the aircraft when using a heat gun to protect it from heat damage. GO SLOWLY AND CAREFULLY to avoid over-shrinking or burning the covering. This is a skill which takes a bit of practice. There are many tutorial videos online demonstrating shrinking wrinkles from Ultracote.

Periodically repeat the sealing and shrinking process to keep your aircraft in good condition.





If you need additional covering material to repair your Raven, the color codes are:

Blue/Yellow Scheme	
Oracover colors	Ultracote colors
Blue #50	Deep blue #HANU873
Dark Blue #52	Midnight Blue #HANU885
Cub Yellow #30	Cub Yellow #HANU884
White #10	White #HANU870

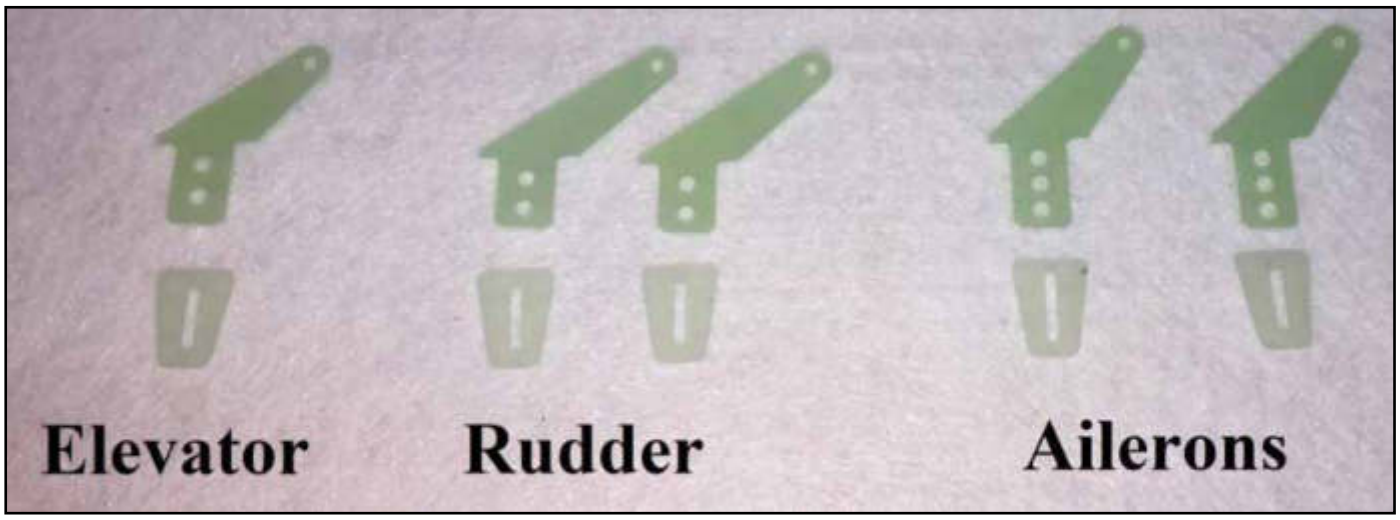
Red/White Scheme	
Oracover colors	Ultracote colors
White #10	White #HANU870
Ferrari Red #23	True Red #HANU 866
Dark Blue #52	Midnight Blue #HANU885
Cub Yellow #30	Cub Yellow #HANU884

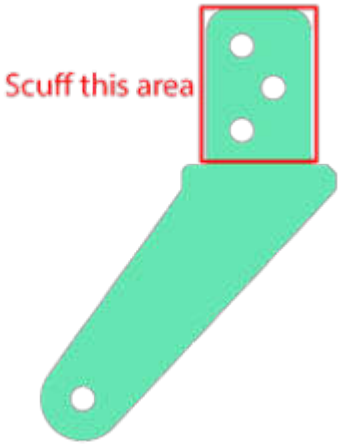
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1.

Locate the control horns for your Raven. The assembly has two parts, the horn itself, and the trim plate. Do not discard the trim plate, it holds the horn in proper position during installation. The Raven uses a pull-pull rudder assembly with two horns, one on each side of the rudder. Begin by using 120-180 grit sandpaper or emery board to scuff the horns where they insert into the surfaces as shown. This provides a good surface for gluing.

Locate the slots in the control surfaces as shown and test fit the horns with no glue; make sure they insert all the way into their slots. When you are satisfied with the fit, glue them in permanently. We use medium CA glue on the horn and in the slot, then a drop of thin CA after the horn is fully inserted. You can also use good-quality epoxy glue of at least 15 minutes cure time.





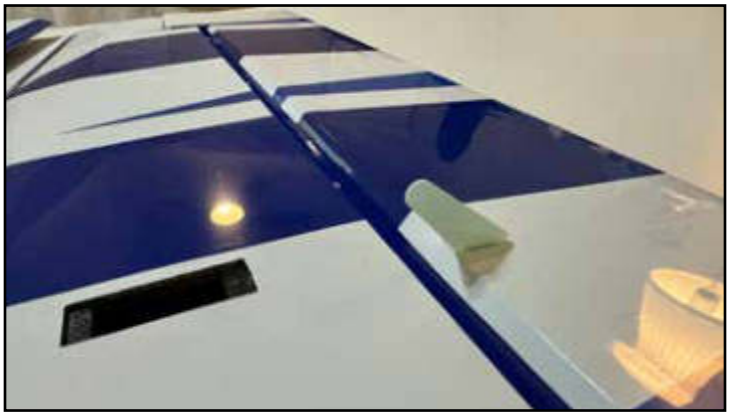






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2. Install your aileron servos with wire extensions; we chose to pre-drill the servo screw locations with a 1/16” drill bit as shown. Assemble the aileron pushrods as shown, we chuck the pushrod into a cordless drill to assist with screwing the nylon ball links on. Install the servo arm and pushrod as shown, using the supplied hardware with washers and locking nuts.











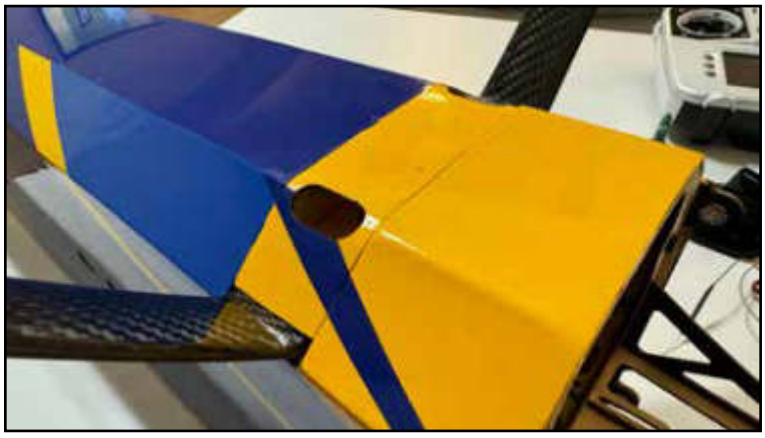
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3.

Install the landing gear into the fuselage with included bolts, washers and blue loctite thread locker. Note that the Raven landing gear sweeps slightly forward when installed correctly. Using Gorilla Clear Bond, Goop, or another rubberized adhesive, install the cover plate for the gear. Locate the gear fairings, and test fit to find the best fit to the fuselage. Apply tape at the end of the fairing as shown, remove the fairing and use sandpaper to scuff the landing gear leg. Apply Clear Bond or Goop to the gear leg and install the fairing. Tape in place to dry.













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Attach the axles to the landing gear with washers and locking nuts as shown. Install the wheel and wheel collar, using loctite on the collar set screw. Note that the axle has a flat spot for the collar set screw machined in. Install the wheel pants, using blue loctite on the pant bolt.









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4.

Remove the trim block from the stabilizer slot in the fuselage. The horizonal stabilizer and elevators slide into the slot. Make sure the stab is oriented correctly top-to-bottom, and test fit the stab into the slot. Push it all the way forward into the slot. Check the fit of the stab, the motion of the elevators, and test fit the trim block back in place to make sure everything has proper clearance for full elevator throw.

When you are satisfied with the position of everything, you have an option for gluing the stab permanently into the slot. We chose to use thin CA glue, and we applied it from the rear of the stab and the bottom of the slot. If you use CA, have acetone and a paper towel ready to clean up any spills. If you get CA on your covering and it hardens, it can be removed later with CA debonder, but it is certainly quicker and easier to catch a drip before it is fully cured.

Or, you can remove the stab, coat the mating surfaces with epoxy (at least 15-minutes curing time) and install the stab. If you use epoxy, have denatured alcohol and paper towel ready to clean up any excess. If you use epoxy, don't use an excessive amount; it isn't necessary and adds weight to the tail. Install the trim block permanently with glue.

The rudder is attached via a wire hinge. Locate the wire and test fit it into the rudder.








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5.

Install the rudder with the wire hinge as shown. Locate the tailwheel, use the two wood screws to install it onto the fuselage as shown. Use the third wood screw to connect the tiller to the bottom of the rudder. NOTE - the tiller screw should not be fully tight and should be free to slide a bit within the slot to ensure smooth rudder motion.









6.

Assemble and install the elevator pushrod as you did for the ailerons. Install the elevator servo with its wire extension. Install the servo arm and hardware as shown.







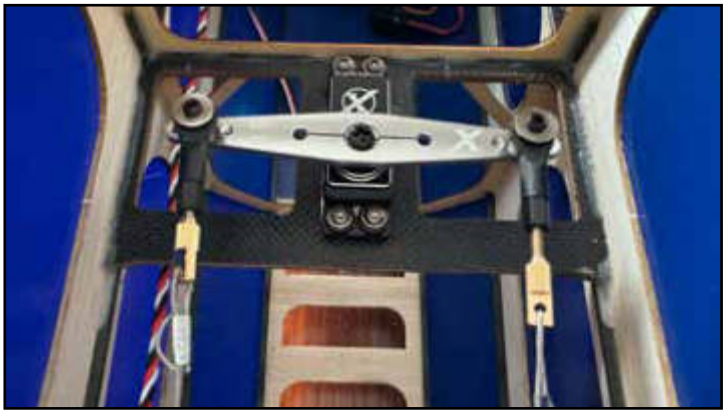
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7. Mount your rudder servo as shown, and feed the pull-pull cables into the fuselage as shown. Feed the cables forward to the servo, crossing them once to make an “X” shape. Screw the ball links onto the metal cable ends. Attach the cable end assemblies onto the rudder servo arms as shown. The photo sequence shows how to assemble cables with crimp tubes onto the cable ends, pulling them tight and crimping the crimp tubes with pliers. Add one drop of thin CA to the crimp tubes to finish.

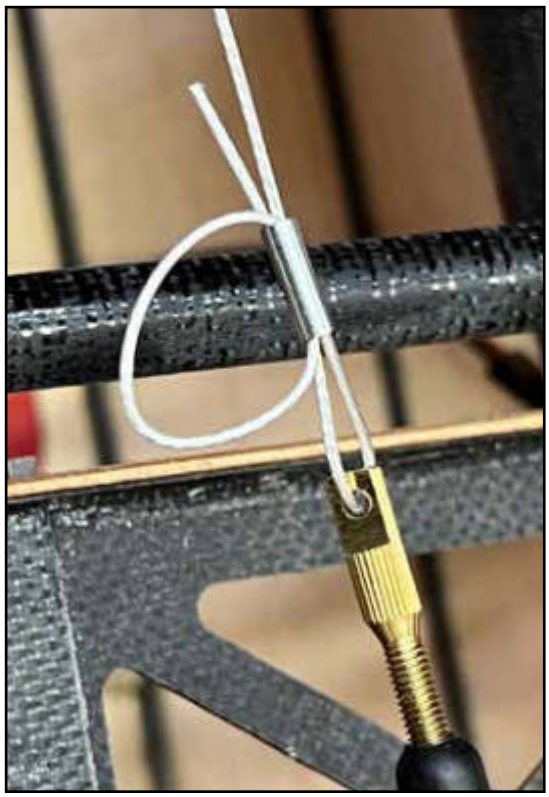


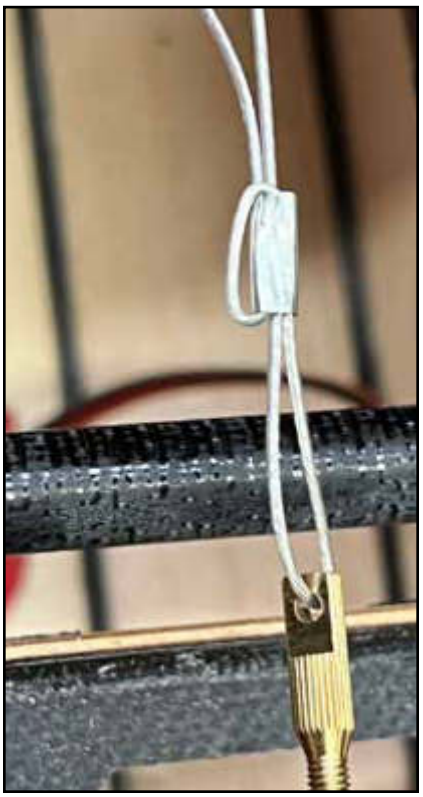




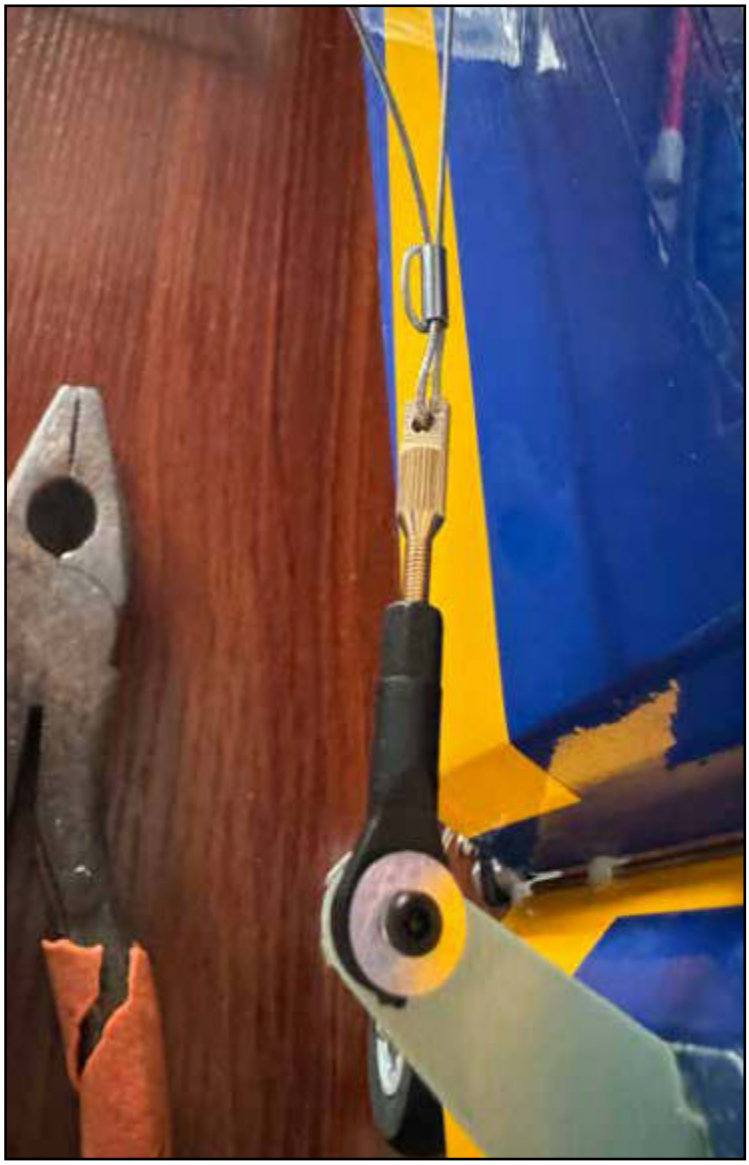


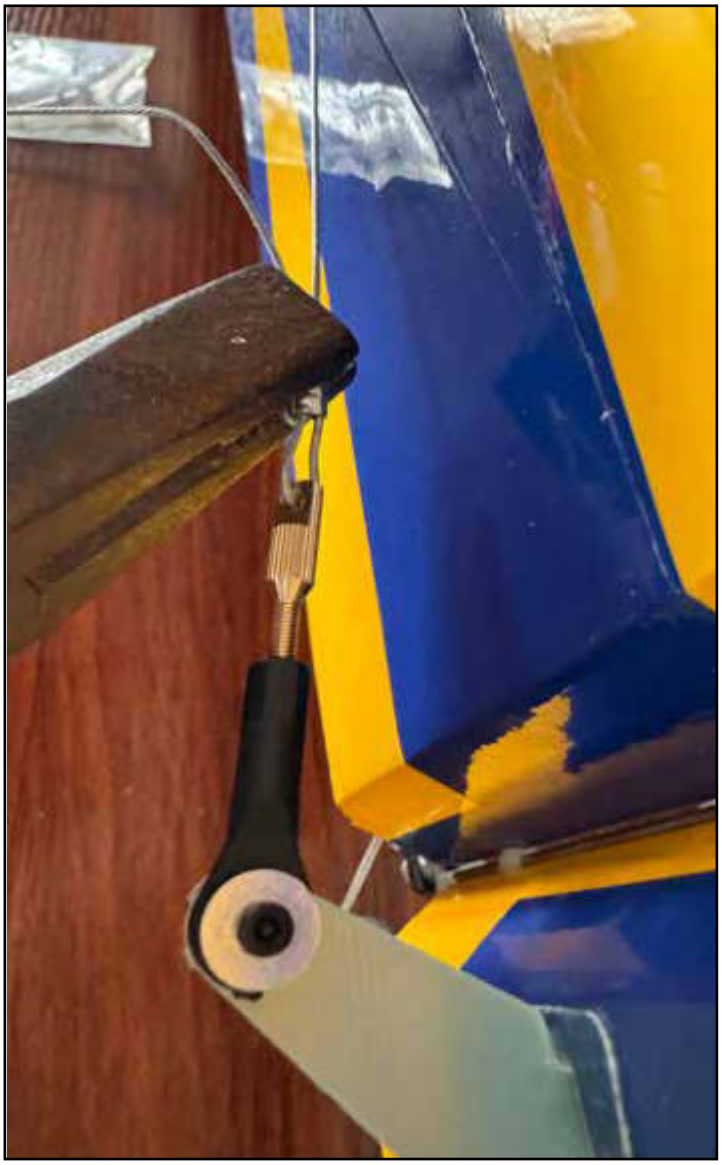






Center the rudder and arm and connect the rear ends of the cables as you did the front. Try to pull as much slack out of the cables as possible. Crimps the tubes and add one drop of thin CA to each tube to finish. After the cables are assembled, take up any remaining slack by screwing the threaded cable ends into the ball links. We want our cables to be taut, with no slack, so the rudder is held firmly in position. We don't want any additional tightness beyond simply taut: if we make the cables "banjo string" tight, it will rob servo torque and wear out components.



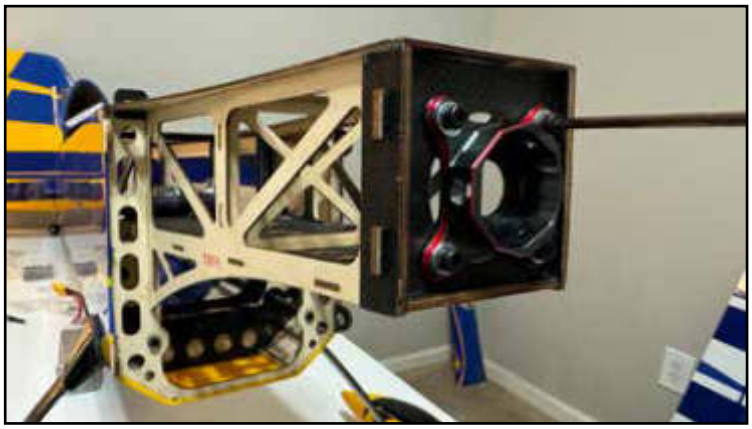




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8.

Here we show the installation of the recommended T-Motor AM600 power combo with AM116 ESC. Apply shims to the mount, and the washers included in the motor package behind the prop adaptor as needed to achieve proper spinner-to-cowl spacing (2-3mm recommended). Use Clear Bond or other rubberized glue to attach the exhaust stacks to the cowl as shown.







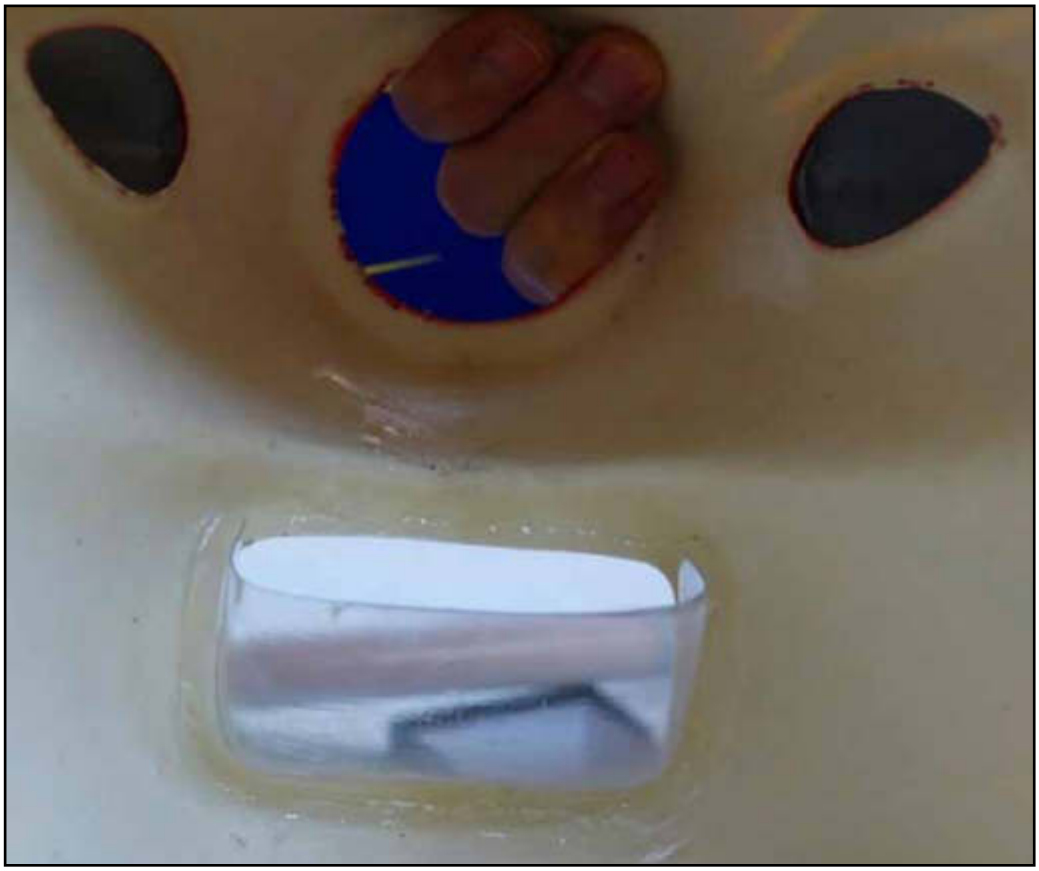






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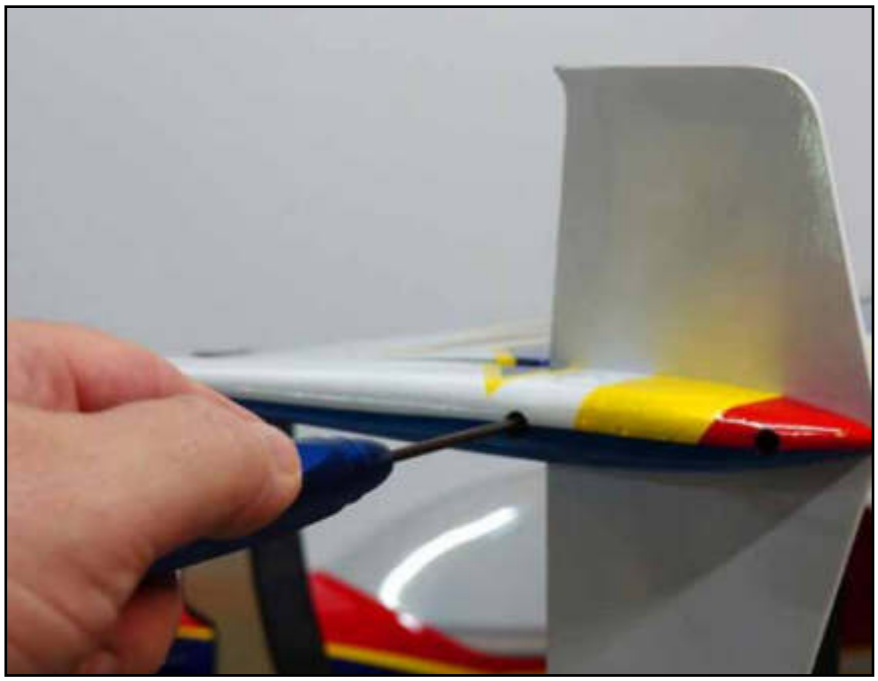
9. Install the clear plastic chin scoop deflector into the cowl with medium CA to deflect air toward the brushless motor. Install the cowl, spinner and prop. NOTE: Never power up your aircraft with the prop attached unless it is pointed in a safe direction and properly restrained. If you are working on your aircraft on your workbench and you need to power the system up, take the time to *REMOVE THE PROP* for safety.





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10. Install the clear wingtip spacers, SFGs and (if desired) extension wingtips. The Raven feels different in each configuration of SFG with tip, SFG without tip, and tip only, so try them all.



TEMPORARY NOTE: The first few shipments of 69" Raven v2 have a mislocated hole in the clear plastic wingtip, this will be corrected on later shipments, you may need to drill the rear hole as shown to correct.



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11.

Center of Gravity : Our preferred C of G for maiden flight is 1/2” (12mm) behind the wing tube.

Control settings:

Elevator: Low Rate 8-10 deg. 15-20% expo
3D Rate 45-60 deg. 60-65% expo

Aileron: Low Rate 15-20 deg. 40-45% expo
High Rate 38-40 deg. 50-60% expo

Rudder: Low Rate 20 deg. 40-45% expo
High Rate 50 deg. 50-60% expo



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