# YAK-54E

## *ELECTRIC ARF*

## Instruction Manual


EXTREME FLIGHT RADIO CONTROL™

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

Thank you for your purchase of the Extreme Flight RC YAK-54E Electric ARF. This aircraft was designed to provide maximum performance and fun in a realistic looking, lightweight, fully aerobatic park flyer. Using an inexpensive and efficient brushless outrunner motor and speed controller and a single high discharge 3S1P or 4S1P Lithium Polymer battery, the Yak-54 provides unlimited performance capability.

Great care was taken to design a light weight yet robust airframe. Expert engineering and modern laser cutting methods in conjunction with a carbon fiber wing tube and composite control horns keep weight to a minimum. Unique features such as the ram air equipped motor box, 2 piece plug in wings, and magnetically retained canopy/hatch make for quick easy assembly and instantaneous access to the interior of the plane and battery tray. The Yak-54 can truly be assembled in an evening-buy it one day, fly it the next!

As with all Extreme Flight RC airplanes, the proof is in the flying! Due to the close proximity of the wing and stab to the thrust line, the Yak-54 is a very neutral flying aircraft. It flies precision aerobatics remarkably well and allows you to practice your IMAC sequence almost anywhere. The slightly stretched fuselage makes for a plane that tracks like a pattern ship and the lightweight wings minimize over rotation in snaps. On a calm day you'll be amazed at how well this thing flies the sequences.

If 3D is your thing then strap in! The Yak-54 does it all with ease. Beautiful, slow high alpha knife edge passes. FLAT spins both upright and inverted, rock solid elevators and harriers. Tremendous aileron authority and insane roll rate from the massive ailerons. The Yak also excels at tumbling maneuvers. You'll be surprised at the range of gyroscopic maneuvers you can perform. True tail over nose tumbles are no problem for the Yak-54.

Sport flyers fear not! Just because you're not a 3D hot dogger or IMAC flyer doesn't mean you can't enjoy the Yak-54. With reduced rates the Yak-54 is a very easy plane to fly. Its super light wing loading allows it to land at a walk. It will instill confidence and allow you to improve your flying skills. When you're ready for more advanced aerobatics, flip the dual rate switch and hang on!

As with any high performance aerobatic aircraft, great care must be taken to avoid excess speed. Excess speed will lead to control surface flutter and quite possibly the complete destruction of your aircraft. Don't let this happen to you! Always have the motor at idle when the airplane is pointed down and reserve full throttle for vertical climbs. Make sure you have adequate mechanical advantage in your control linkage set-up. If you are unsure about this, have a more experienced flyer look over your set-up before flying. Extreme Flight RC, Ltd. in no way warranties its aircraft against flutter. As with all of our planes, we put the Yak through a rigorous flight testing regime and have not experienced any control surface flutter.

The Yak was designed around the Torque 2814T/820 Brushless Outrunner motor and Airboss 45 Amp ESC. This is the best choice for powering the Yak, providing plenty of power for any maneuver imaginable. Other outrunner motors in this class will work as well but may require slight modification to the motor mount.

The Yak is very easy to assemble. Take a few minutes to read this manual before beginning assembly to get familiar with the process.

# Tips for Success

1. Read the instruction manual thoroughly before starting assembly.
2. We are very pleased with the level of craftsmanship exhibited by the workers in our factory. However, these are mass produced models. As with any ARF, take a few minutes to go over the model and add CA to high stress areas or any joints that appear to need more glue. Specific areas to pay attention to are servo mounts, landing gear mounting plate, firewall to fuselage side joint, wing root rib and motor box joints. A few minutes and a few drops of CA will help to insure the longevity of your model.
3. Make sure your prop and spinner are balanced! These aircraft perform as well as they do because they are built light. Excess vibration caused by unbalanced components can cause damage to the airframe.
4. Buy a Watt meter! For less than the cost of a single battery pack you can purchase one of these. This will save you a lot of time, money and frustration and provide you with a lot of valuable information about your set up. One battery pack saved is worth this investment!
5. Observe the C rating of your batteries. If your battery is rated at 2100 mah and 20C continuous discharge rate then you can safely pull 42000 mah or 42 Amps from it (2100 x 20= 42000 mah=42 Amps). Use a watt meter between your battery and ESC to determine the number of Amps you are drawing as well as the number of Watts you are generating. I have found it is best for battery longevity if your maximum amp draw at wide open throttle is in between the continuous rating and the burst rating of the battery. Prop your airplane accordingly.
6. If you plan to run a 4S1P battery in your Yak you will need to purchase a separate BEC. Kool Flight System's (www.koolflightsystems.com) Micro-UBEC and Dimension Engineering's (www.dimensionengineering.com) Park BEC are both excellent units for this application.
7. We have done a lot of experimenting with various props. Using the Torque 2814T/820 on 3S we like the APC 13x6.5E and 14x7E. On 4S we like the APC 12x6E. Depending on your elevation you may or may not like these choices, but they should be a good starting point. Remember to test each new prop with a Watt meter attached to the system to be sure you are not overworking any of the components.

## Wing assembly

1. Locate a wing panel. Check to see that all hinges are centered between the wing and aileron. Hold the aileron fully deflected and apply a drop of thin CA to each hinge. Flip the wing over and repeat.

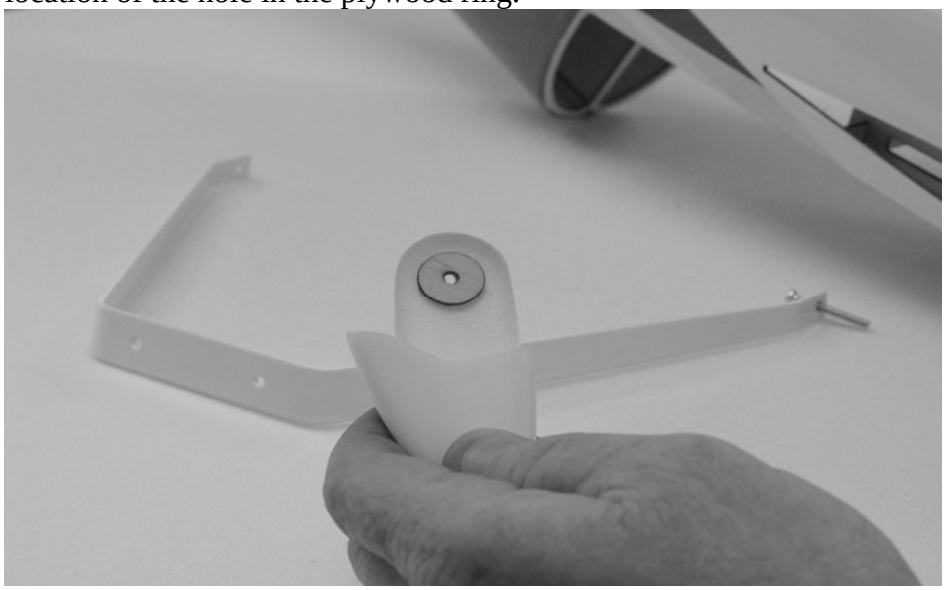
2. Use a #11 hobby blade to remove the covering over the servo bay. Install the aileron servo using the manufacturer supplied mounting screws. Route the servo lead out of the root of the wing.

3. Locate the composite aileron control horn, aileron pushrod with z-bend and ez-connector. Remove the covering over the mounting hole for the control horn with your #11 blade. Scuff the part of the control horn that will glue into the aileron slot with fine sandpaper. Glue the control horn in place with medium CA. Electronically center your servo and mount the ez-connector to the servo arm. Place the z-bend in the aileron control horn and the other end of the wire into the hole in the ez-connector. Center the aileron and tighten the screw in the top of the ez-connector to retain the aileron pushrod wire. Use a small file to grind a flat spot on the pushrod wire so that the set screw will seat properly and maintain a firm grip on the pushrod wire. See picture.

4. Repeat this procedure for the other wing.
   **That's it! You are done with the wings!**

## Fuselage Assembly

1. Lets mount the landing gear first. Locate the aluminum landing gear, (2) 3mm machine screws, (2) 3D Hobbyshop axles, (2) nylon insert lock nuts, (2) wheel collars, (2) wheel spats, (2) wheels and (2) plywood rings. Use medium CA to glue the plywood ring to the inside of each wheel spat, centered in the wheel spat as shown in the photo below. Drill a hole through the fiberglass spat at the location of the hole in the plywood ring.



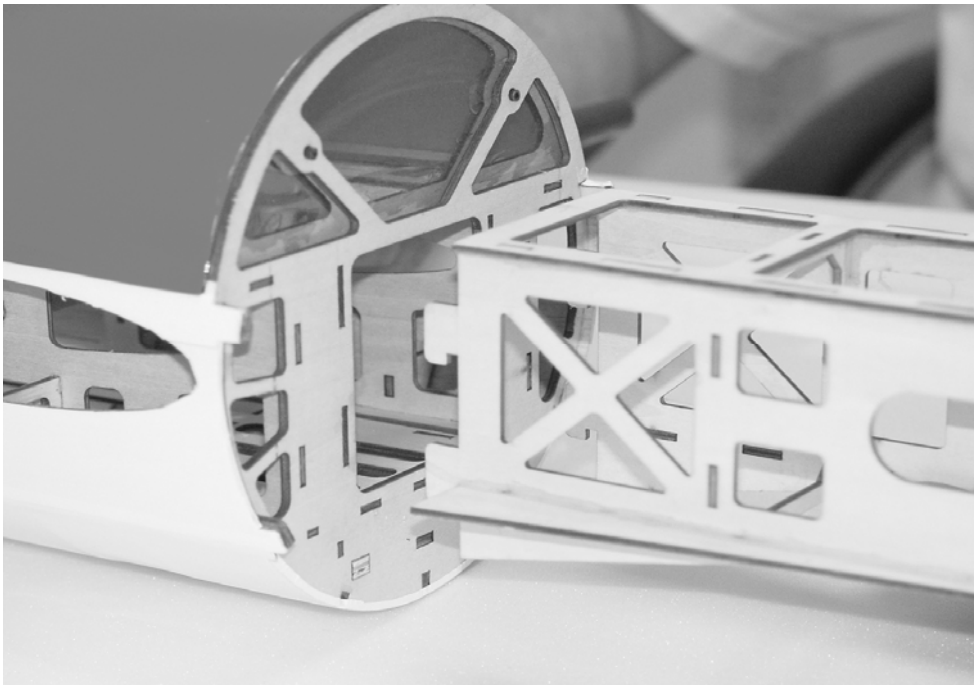
2. Insert the threaded end of the 3D Hobbyshop axle through the hole in the wheel spat and landing gear and secure with the nylon insert locknut as illustrated in the photo.

3. Place the wheel on the axle and use the wheel collar to retain the wheel.

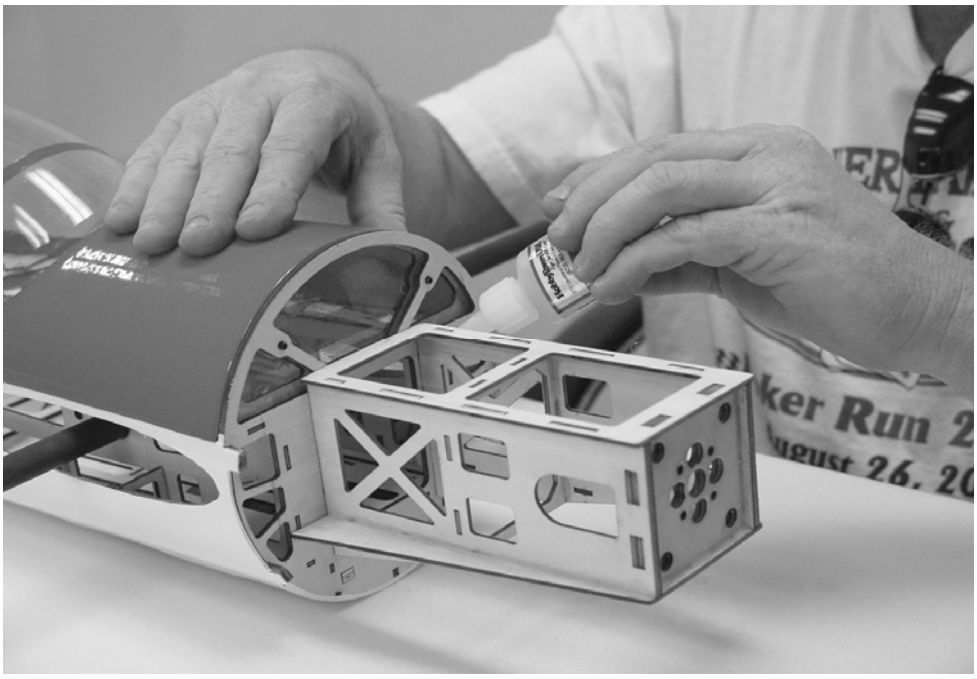
4. Use a #11 blade to remove the covering from the landing gear slot on the bottom of the fuselage. Use your sealing iron to seal the edges of the covering to the landing gear plate. It is also a good time to remove the covering from the wing slot and seal the edges with your sealing iron.

5. Place a drop of blue Loctite on the threads of the 3mm landing gear mounting bolts and insert them through the landing gear and into the pre-installed blind nuts in the landing gear plate.

6. Locate the motor box. Insert the tabs on the motor box into the slots in the F1 former.

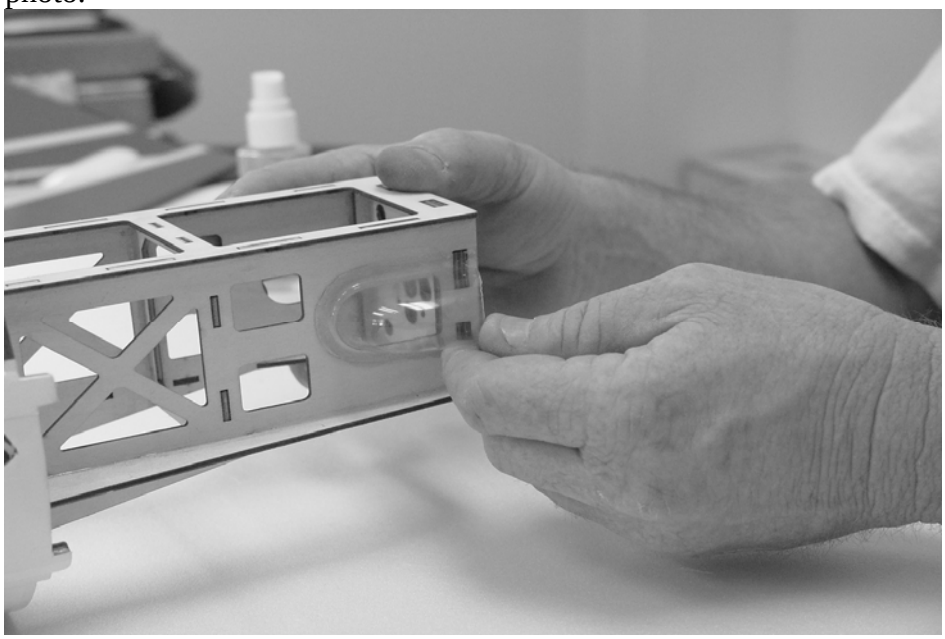


7. Use medium CA to secure the motor box to the F1 former. Make sure to apply CA to all joints on both sides of the F1 former as well as all joints in the motor box.

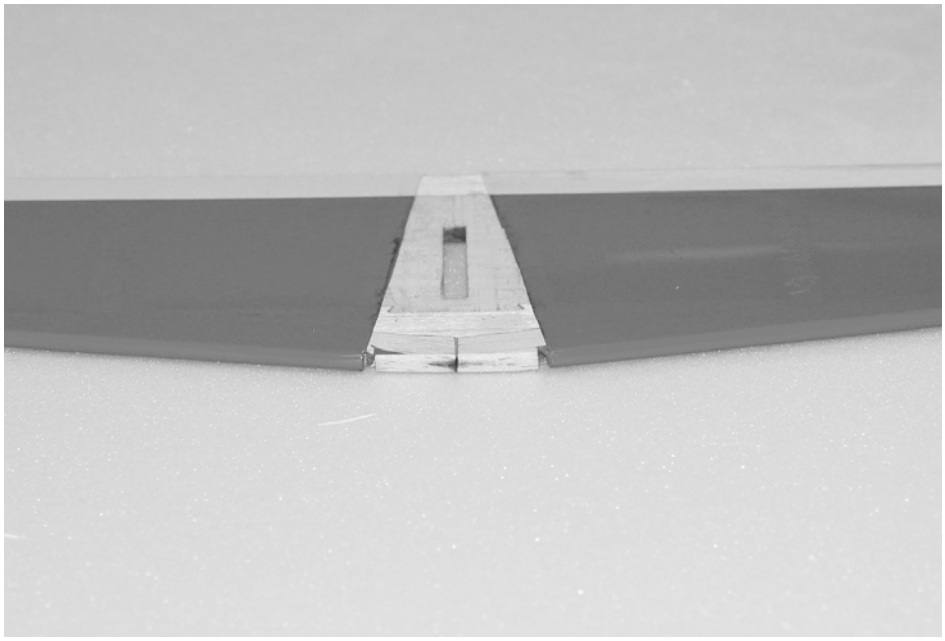


8. Use scissors to remove the air scoops from the plastic sheet.

9. Use medium CA to secure the scoops to the side of the motor box as shown in the photo.



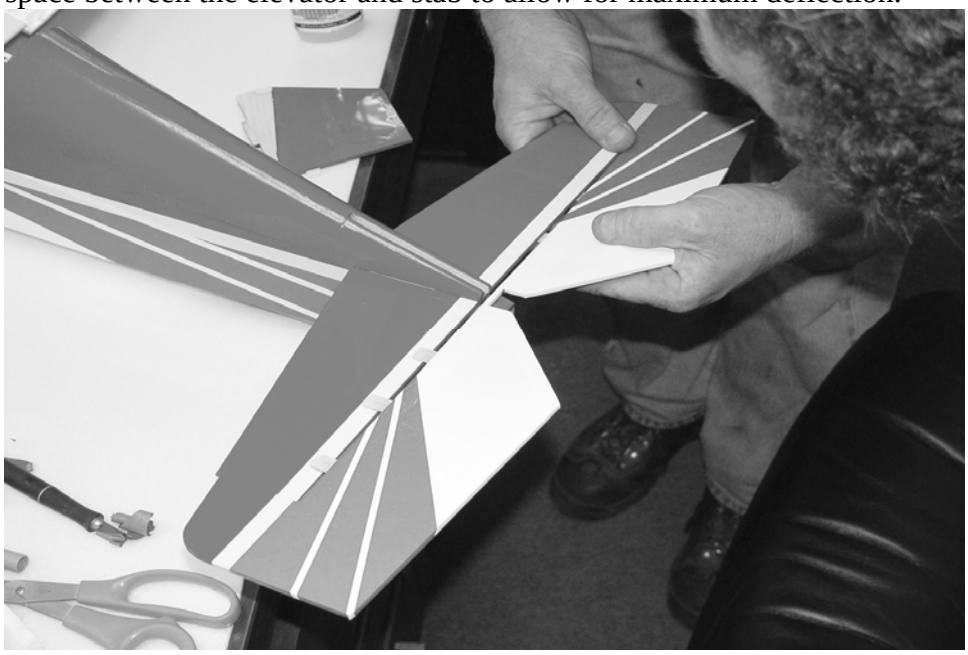
10. Locate the horizontal stab. Trial fit the stab into its slot in the rear of the fuselage and use a felt tipped marker to mark where the covering will need to be removed from the horizontal stab. Remove the stab and use a sharp #11 blade to remove the covering where the stab will mate to the fuselage to insure a good wood to wood bond.



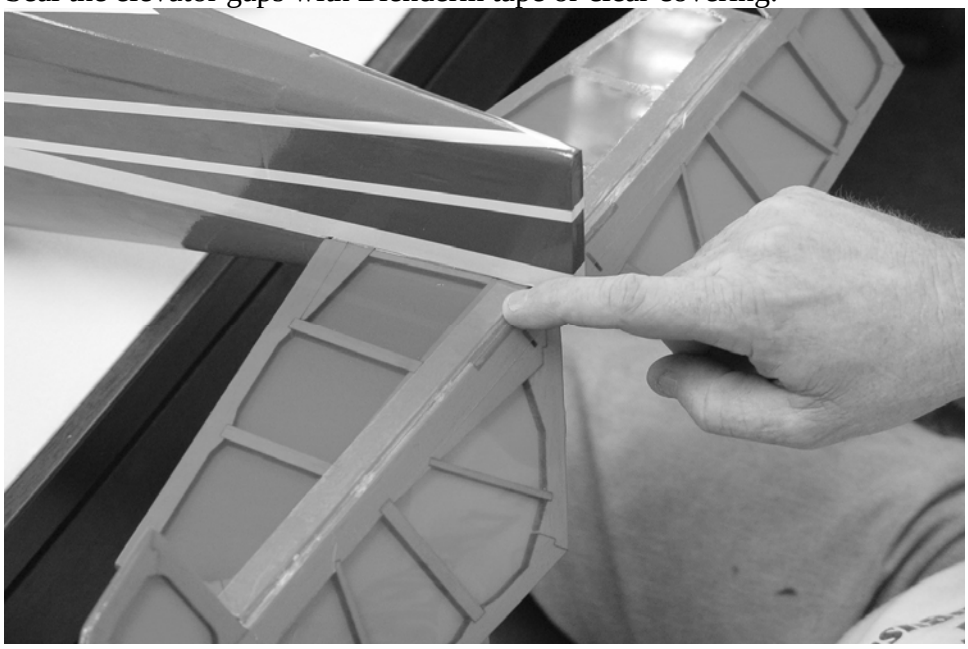
11. Re-insert the stab and trial fit the vertical fin into its slot in the rear of the fuselage. Make sure the tab on the bottom of the fin fits into the slot on the stab and that the trailing edge of the fin is flush with the rear of the fuselage. Once satisfied with the fit, use a felt tipped marker to mark the fin where the covering will need to be removed. Remove the vertical fin from the fuselage and use a #11 blade to remove the covering from the vertical fin where it will mate to the fuselage to insure a good wood to wood bond.

12. Insert the carbon fiber wing tube into the fiberglass sleeve in the fuselage and slide both wings onto the tube and into the slots on each side of the fuselage. Make sure the root rib of the wing is flush against the inner fuselage structure.
13. Re-insert the stab and fin into their respective slots and measure to make sure they are properly aligned. Also compare the horizontal stab to the wing and insure that they are parallel. When satisfied with the alignment, glue these surfaces in place with CA.

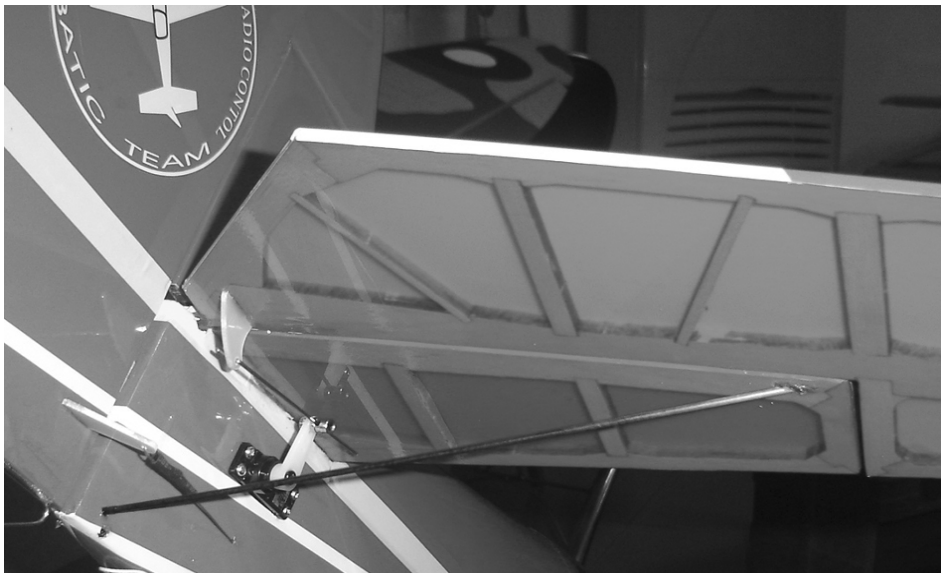
14. Locate the elevator and hinges. Slide the elevator into place, making sure the hinges are centered between the stab and elevators. Deflect the elevators to 45 degrees and place a couple of drops of thin CA on each hinge. Flip the assembly over and do the same for the other side of the hinge. Make sure to leave enough space between the elevator and stab to allow for maximum deflection.



15. Seal the elevator gaps with Blenderm tape or clear covering.

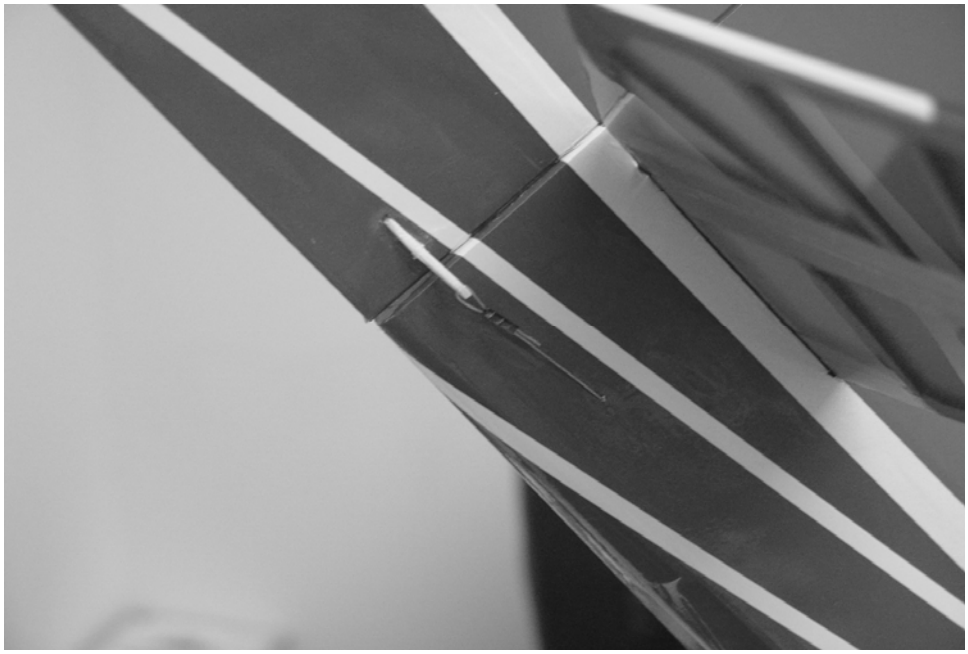


16. Locate the 2 carbon fiber rods. Cut and sand a bevel on one end of each rod to match the angle of the horizontal stab. Drill a small hole in the bottom rear of the fuselage to accept the carbon rod. Also remove a small amount of wood at the attachment point on the stab to allow the rod to penetrate the stab surface. Glue the rod in place with medium CA or epoxy. Repeat for the other side of the fuselage. This will add an enormous amount of strength and rigidity to the horizontal stab.

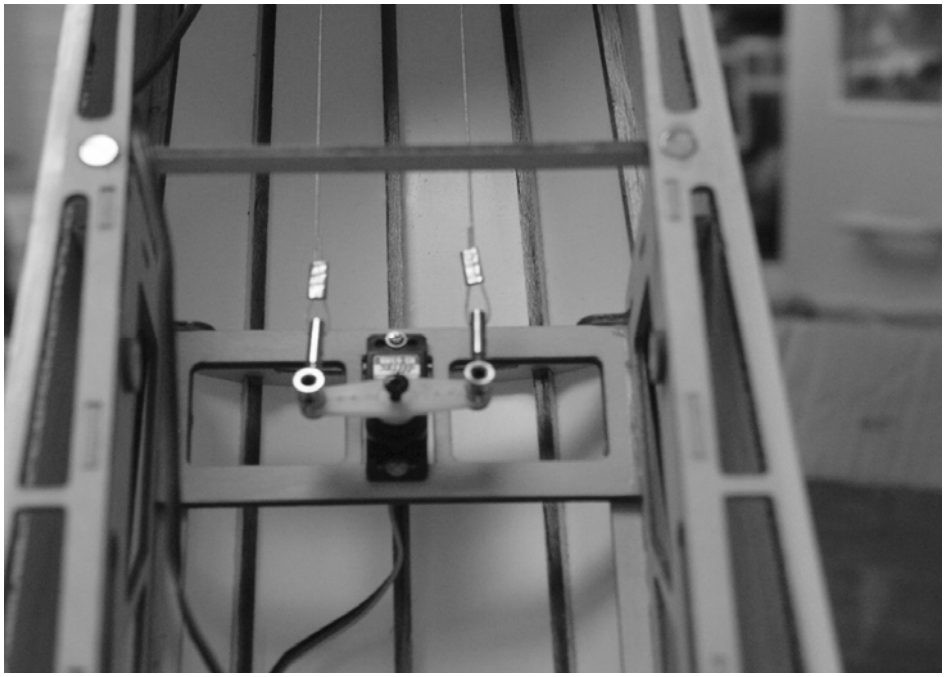



17. Locate the elevator control horn and glue in place with medium CA or epoxy. Make sure to scuff the surface of the control horn before gluing. Use a #11 blade to remove the covering from the elevator servo slot and install the servo using the manufacturer supplied mounting hardware. Place an ez-connector on the servo arm. Locate the elevator pushrod and insert the z-bend into the phenolic control horn and the other end into the ez connector. Electronically center the servo and then tighten the screw in the ez connector to clamp down on the pushrod, while making sure the elevator is in the neutral position. Make sure to file a flat spot on the pushrod to allow the set screw to seat properly and maintain a firm grip on the pushrod wire. You may need to put a small bend in the pushrod. We have had great success with the Hitec HS-65 and the JR 281.

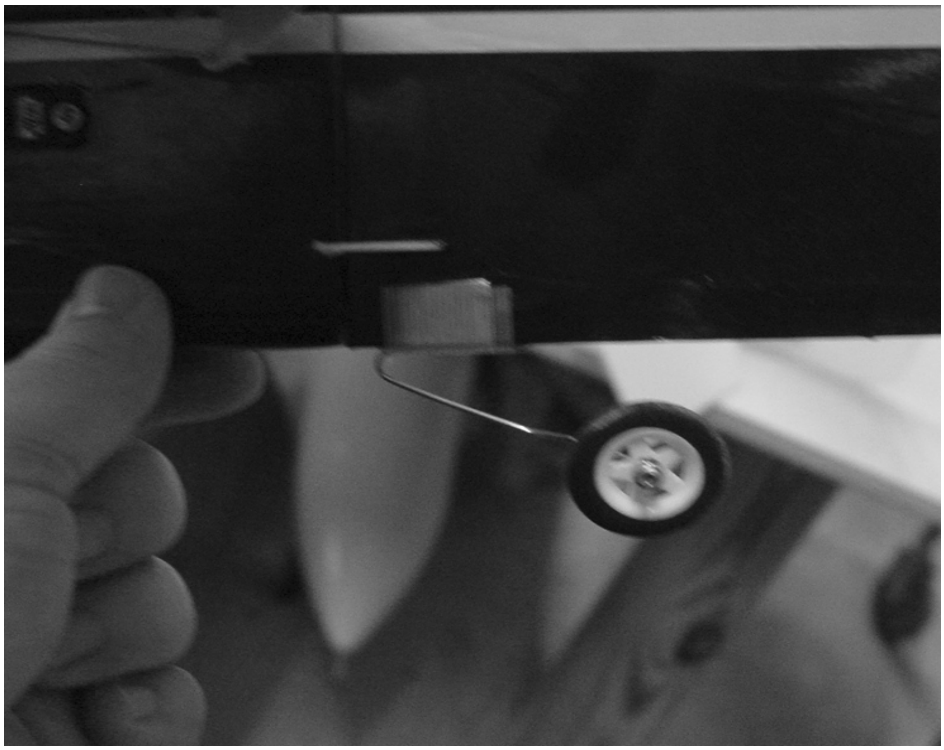
18. Use a #11 blade to remove the covering from the slot near the bottom of the rudder. Locate the composite control horn for the rudder. Scuff the control horn to remove the glossy finish and glue into place in the slot in the rudder. Be sure to center the horn in the slot. Attach the rudder to the fin with thin CA.



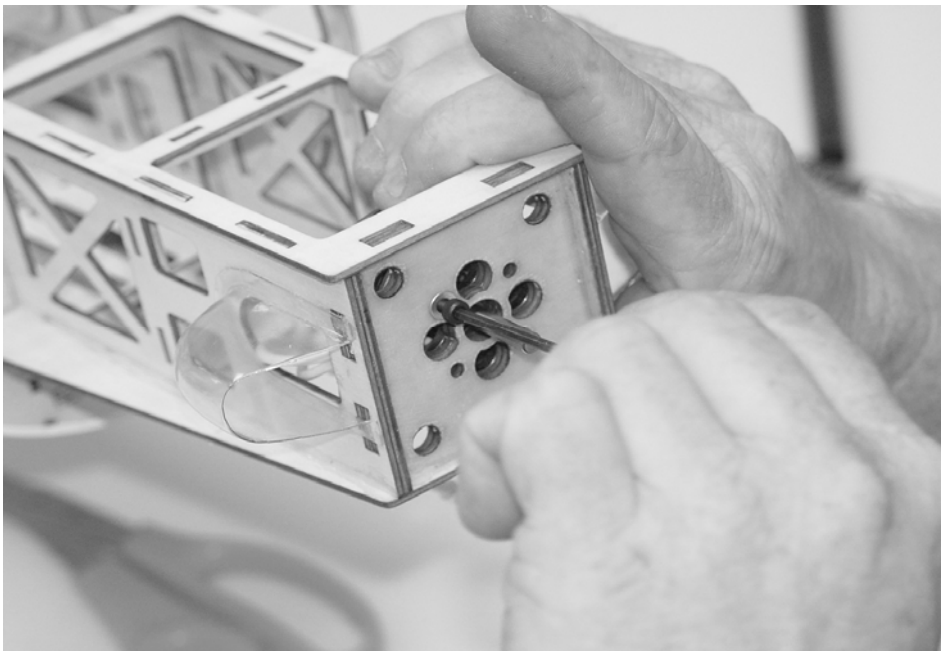
19. Mount the rudder servo as shown inside the fuselage. Use the supplied hardware to assemble the pull-pull cable system. At the rudder control horn end, the cable will be threaded through the control horn and secured with a small aluminum tube which is crimped around the cable as pictured in the photo above. At the servo end, the cable is threaded through the hole in the connector as shown, secured with a crimp and then inserted into the ez connector. Center the servo electronically and make sure the rudder is in the neutral position. Tighten the screw in the ez connector. Make sure the cables are taut, but not overly tight, which may cause the servo to bind.



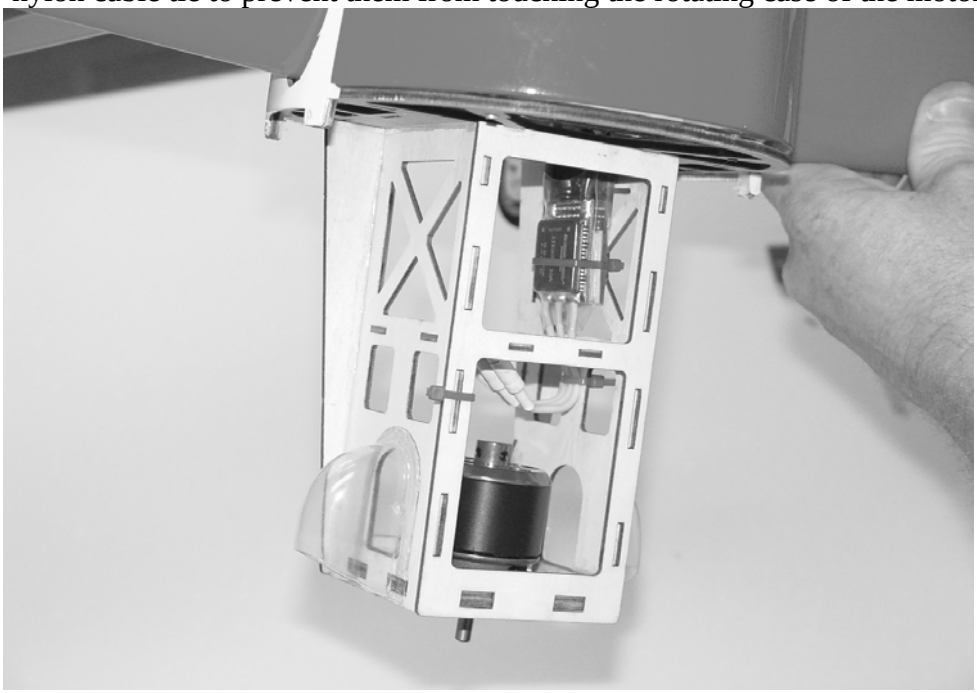
20. Drill a small hole in the bottom of the rudder and insert the pre-bent tailwheel wire into place. Use a piece of strapping tape to secure the tailwheel wire to the rudder as shown. Slide the tailwheel onto the wire and retain with the small wheel collar.



21. Use the supplied bolts and washers to mount the motor to the mounting plate. Put a drop of blue Loctite on the mounting bolts, place a washer on the bolt and insert through the front of the motor mounting plate and into the threaded holes in the face of the motor. Tighten firmly, being careful not to crush the phenolic doubler.

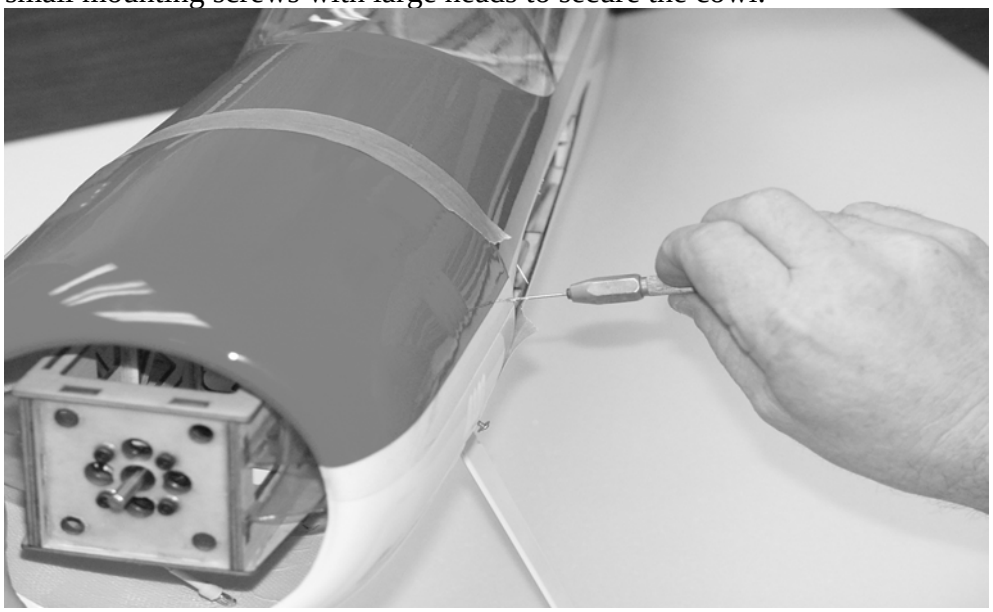


22. Mount the ESC with Velcro or nylon cable ties as shown and plug the bullet connectors into their mating connectors on the motor. Secure the wires with a nylon cable tie to prevent them from touching the rotating case of the motor.



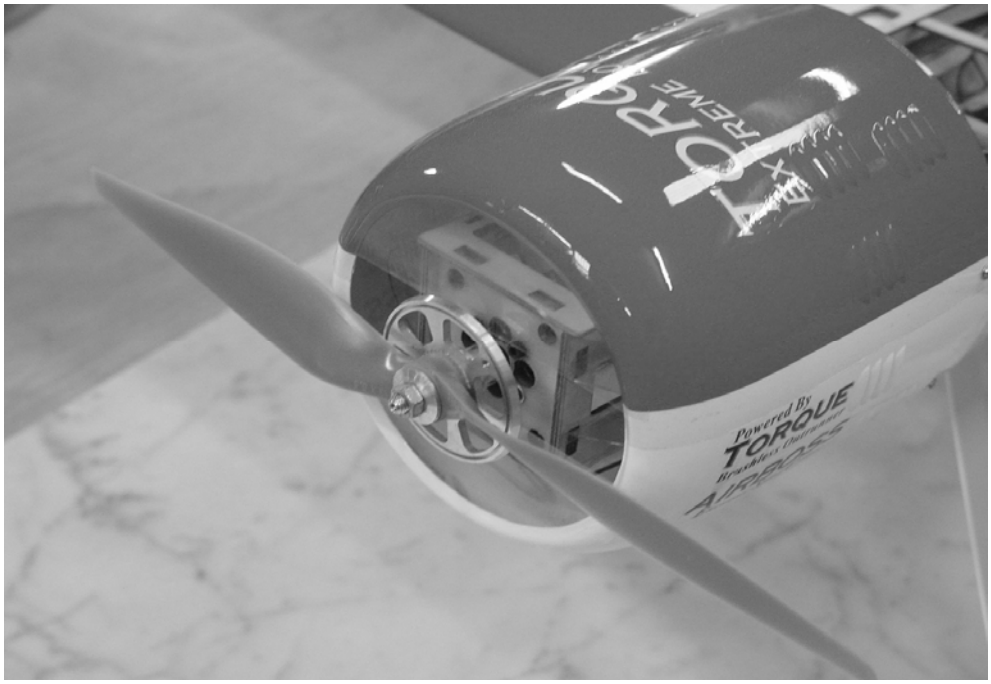
23. Soak the cowl mounting tabs with thin CA

24. Place the canopy/hatch in place on the fuselage and make sure it is positioned properly. Slide the cowling into place and allow it to extend over the F1 former by one-eighth of an inch. Make sure the prop shaft is centered in the cowl opening. You may want to install the spinner at this time to insure that the cowl is properly positioned. We recommend using a 2" spinner for the Yak (we like the Great Planes 2" spinner with lightened aluminum backplate). View the cowl from the front, top and sides and when satisfied with the position, secure the cowl with masking tape. Use a small drill bit mounted in a pin vise to drill through the cowl and into the mounting tabs. You can view through the large opening in the front of the cowl to make sure you are drilling into the center of the tab. Use the 4 small mounting screws with large heads to secure the cowl.



25. Slide the included collet style prop adapter onto the motor shaft and attach the spinner and prop.

26. You may want to close off a portion of the front of the cowl to reduce the amount of airflow getting inside the fuselage and to help direct cooling air into the plastic ducts. We have done this using clear packing tape as shown in the photo. A couple of small pieces of Depron would work as well.




27. Install the receiver at the rear of the battery tray using Velcro. Use Velcro to secure the battery to the battery tray and use a Velcro strap around the battery.
28. Use the supplied nylon bolts to secure the wings to the fuselage.
**This concludes the assembly of the Yak-54.**

**Radio Set-up and flight tips.**
CG range for the Yak-54 is from 3.50"- 4.00" from the leading edge of the wing measured at the wing root. Correct CG should be easy to achieve by moving the battery along the length of the battery tray. Adjust to fit your flying style.
Control surface recommendations are as follows:
Elevator- 10 degrees low rates, 45+ degrees high rates.
Rudder- 20 degrees low rates, 45+ degrees high rates.
Aileron- 20 degrees low rates, 45+ degrees high rates.
Use exponential function to achieve the best "feel" for your particular flying style. I highly recommend that you take the time to set up rates for precision flying and separate rates for 3D. The Yak-54 is capable of flying very precise maneuvers, and proper rates and CG will allow you to experience this to the fullest extent. Trying to fly precision aerobatics with 3D rates is an exercise in futility. Spend some time dialing in and trimming your plane and you will be rewarded with a great flying experience.
Thanks again for your business!
See you at the flying field!