YAK-54

48” Electric Profile ARF

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

Congratulations on your purchase of the Extreme Flight RC Yak 54 48 inch profile Electric ARF. This aircraft was designed to provide maximum performance and fun in a great looking, lightweight, easily transported, fully aerobatic profile ARF aircraft. Using a powerful and efficient brushless outrunner motor and speed controller and a single high discharge 3S or 4S Lithium Polymer battery (2170 - 2500 mah), the 48 inch Yak 54 provides unlimited 3D aerobatic performance. 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. The Yak is quick and easy to assemble and can be ready to fly in a couple of evenings.

Of course the Yak 54 excels at 3D maneuvers. Incredible yaw, pitch and roll authority allow the Yak 54 to obey your every stick command. Sport flyers fear not! 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 could 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 setup. 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 54 through a rigorous flight testing regime and have not experienced any control surface flutter. It is your responsibility to ensure the airworthiness of your aircraft.

The 48 inch Yak 54 was designed around the Torque Revolution 2814/820 Brushless Outrunner motor and Airboss Elite 45 Amp ESC with SBEC. 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. We also recommend the use of the Hitec HS-65 micro servo for aileron, rudder and elevator. If you pan on touching the ground with the rudder repeatedly you may want to upgrade to the metal gear version of the HS-65. Please take a few minutes to read this manual before beginning assembly to get familiar with the process.

Tips for Success-Please read before beginning assembly!!!

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, wing root rib and motor mount 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. For example 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. We have done a lot of experimenting with various props. Using the Torque 2814/820, 4S 2170mah Flightpower lipos and APC 12 X 6E prop will provide maximum performance at or near sea level. Depending on your elevation you may want to experiment to find what works best for you. 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.
7. **Decals-** clean your airplane with glass cleaner and a paper towel before starting to apply the decals. Mist the area where the decal will be applied with glass cleaner or water mixed with a little bit of soap. Use scissors to remove the decal from the sheet. For best results cut as close to the edges of the decal as possible. Position the decal in place and use a credit card or rubber squeegee to push the excess liquid from under the decal and allow to dry. You may need to secure the edges of the decal with masking tape to prevent them from rolling up until the solution has dried and evaporated.

Wing assembly

□ 1. Unwrap wing and disconnect aileron from wing. Align hinges such that they are centered in the slot and exactly ½ of the hinge is exposed to mate with the wing. Set aside and do not glue at this time.

□ 2. Locate the aileron servo hole and cut the covering as desired to reveal the plywood servo mount. We suggest leaving about 1/16" to 1/8" covering that may be ironed to the inside of the hole for a cleaner installation. See figure 1.

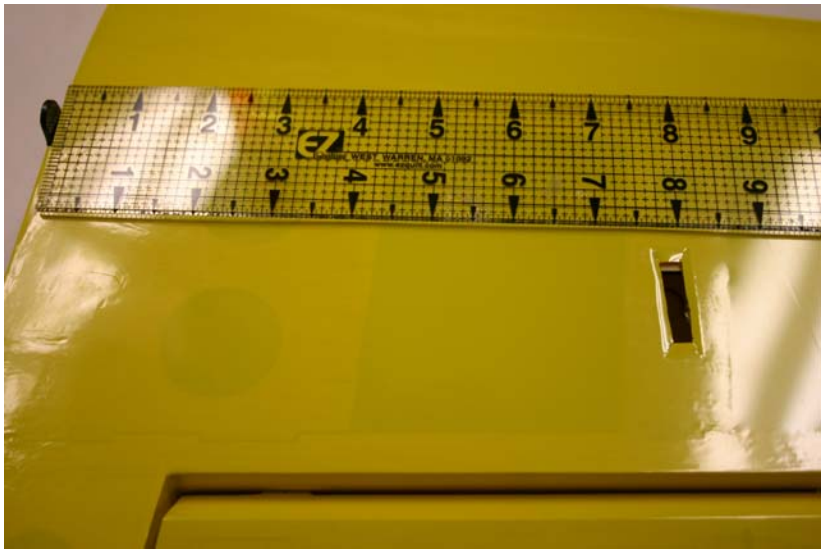


Figure 1

□ 3. Trial fit your servo (we recommend the HS65MG or similar for all surfaces) as you may need to trim for final fit and an extension may be necessary. Once the fit is as desired, mount the servo with the arm oriented to the aileron (if using a half arm have it pointing to the wingtip). See figure 2.

□ 4. Fit the aileron to the wing making sure it is flush at the wingtip, this will allow about 1/16" gap at the root. Deflect the aileron one direction and apply thin CA to the 4 hinges. Turn the wing over and do the same to the other side of the hinges. Be sure there is no more than 1/16" gap between the wing and the aileron.

□ 5. Next locate the hardware bags and find the control horns. There will be four of them, the ailerons use the larger of the two sets. The aileron has a slot for this horn, it is located by measuring from the leading edge of the aileron root (closest to fuselage) outward toward the tip 6 ¼" and then back from the aileron leading edge 1/2". Trim this covering and mount the horn with CA or epoxy.
<u>TIP:</u> we suggest scuffing the horn with sandpaper where it mounts into the wing, this will enhance the glue bond.

□ 6. There are 4 pushrods provided, locate the shorter ones for the aileron pushrods they will be 2 ¼" long with a "Z" bend. Insert the Z end into the horn, the servo arm will use the quick connector. Grind a flat surface where the quick connector will secure to the pushrod, be careful not to grind too much material. You should barely be able to see a flat spot if done properly.

□ 7. The quick connector is mounted thru the desired arm hole then finger tighten the nut to the bottom side of the servo arm, be sure to use some thread lock on the nut and that it moves freely, allow thread lock to fully cure. Figures 2 and 3 show detailed photos of a properly installed servo/horn/pushrod installation.

Figure 2

Figure 3

□ 8. Repeat these same procedures for the other wing. Figure 4 shows a completed wing.

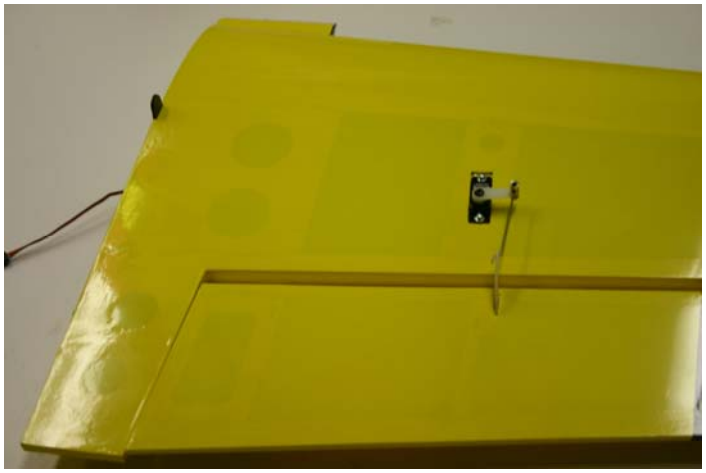


Figure 4

Fuselage assembly

□ 1. Take the fuselage and we will locate several holes and remove the covering to expose the hole. Below are several measurements to aid in locating those holes. You may feel with your finger or slide a warm covering iron over the area to better reveal these holes. For all measurements below the first number is from the nose of the fuselage and the second is from the bottom of the fuselage.

A. 11 ½" and 3 1/4" for the wing tube socket
B. 8" and 3 ½", forward wing alignment pin
   17 1/8" and 3 1/8" aft wing alignment pin.
C. 9 9/16" and ½" gear lower bolt hole
   9 ¾" and 1 ¼" gear upper bolt hole
D. 3 ¾" and 3 ½" forward fuselage side
E. 23", 26", 28 ½", 31 1/2", aft fuselage side

Once located, cut the covering to expose these holes, they are for the fuselage sides. The slot for the horizontal stabilizer is obvious at the rear of the fuselage. See figure 5. Now is a good time to carefully cut the trailing edge of the vertical stab for elevator clearance.

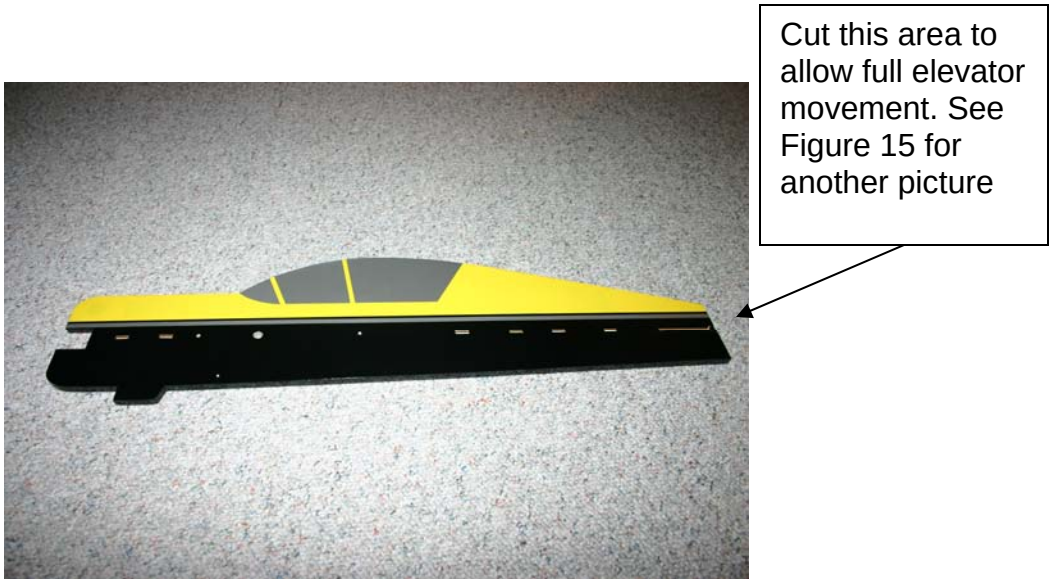


Figure 5

□ 2. Take both wings, the carbon fiber wing tube, (4) allen head bolts 3/8" long with washers and put the tube in the fuse and slide both wing panels onto the tube. Cut the covering on the wing attach points and then mark where the bolts will go into the fuselage. Slide the wing away from the fuse and cut the covering where the wing bolts will enter the fuse. Now attach the wings, insert the bolts and tighten, there are internal threaded nuts and the bolts will thread into them. See figure 6.

Figure 6

□ 3. From the leading edge forward to the motor mount we recommend removing some covering to expose the wood for gluing the forward fuselage sides, providing a wood to wood bond. See figure 7, this picture was taken from the nose of the fuselage. Be sure not to remove more covering than the fuse side will cover and do not cut into the balsa wood. Several light pressure cuts with a sharp Xacto are recommended to pierce the covering only. Repeat for other fuse side.

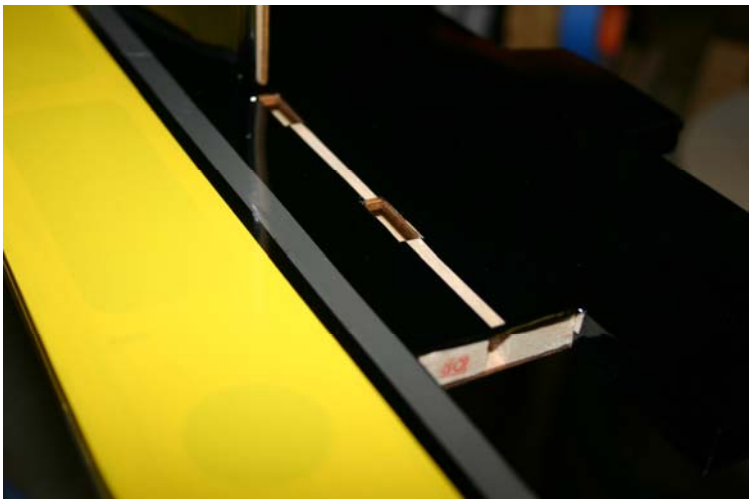


Figure 7

□ 4. Trial fit the motor mount in place as it has to be installed before the horizontal fuselage sides. This mount is made for the Torque 2814/820. Use the supplied 3/8" wood screws to secure the mount to the fuselage, making sure that the mount is oriented to provide right thrust to counter spiral slipstream effect. Locate the forward horizontal fuselage sides and remove the covering on the aft portion where the key on the leading edge of the wing will go. Now trial fit the part and once satisfied glue into place, Medium or thick CA or epoxy is fine. Keep the wings attached to aid in alignment of all the fuselage sides. NOTE: do not glue the fuselage pieces to the wing, only to the vertical fuselage if you would like to have the wings removeable. Repeat for other fuselage side. See figure 8.

TIP: some color schemes may necessitate that there will be a left and right part. The mount comes unpainted, we chose to paint ours black for looks only.

Figure 8

□ 5. Using the same procedures as above, install the aft fuselage sides. See figures 9 and 10. NOTE: Use the trailing edge of the wing for alignment, but do not glue the fuselage piece to the wing if you would like the wing to remain removeable.

Figure 9

Figure 10

□ 6. Locate the horizontal stabilizer and trial fit it into the slot. You will want to be sure it is perpendicular to the fuselage, level with the wing and equal distance to the wing. I will explain how we do this, but there are other methods that work. *Our method*, slide the horizontal stab in the slot, there is a small key from the aft fuse sides that the front of the horizontal will fit in to. I use a small right triangle tool and check for square to the fuselage. If that is good, you can confirm this by measuring from the aft wing tip (not the aileron tip) to the aft tip of the horizontal respectively. Do this to both sides and if it is square to the fuselage, the measurements will be the same. Now place the fuselage on to a surface and prop it up so the wing is level. View the plane from the front and rear and this will show if it is parallel with the wing. Once this is satisfactory, use a low adhesive tape (such as blue painters tape) and place a small strip on the horizontal stab flush to the fuselage. This lets me know where to cut the covering (remain inside of the tape for cutting covering) and when I place the horizontal stab back in to the slot, it will serve as an alignment reference. Remove the horizontal stab and cut the covering. I recommend a slow curing adhesive here such as 15 minute epoxy or thick CA, this will allow

adjustment time. Replace the horizontal stab into the slot and with the tape you should only need to check for level with the wing. Glue in place. See figures 11, 12 and 13.

Figure 11

Figure 12

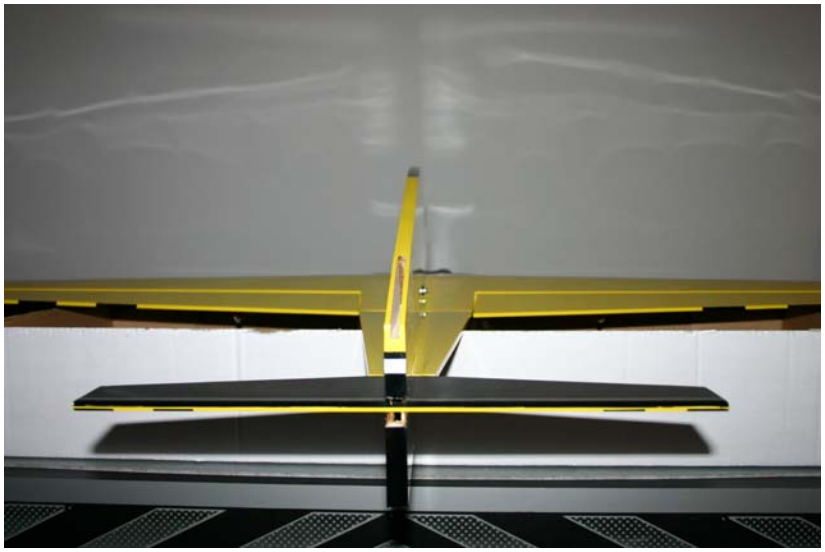


Figure 13

□ 7. Take the rudder and the tail wheel wire and rout a channel in the bottom forward section of the rudder for the tail wheel wire. Be sure the wire will not interfere with rudder movement once installed. Glue wire in place and set aside to dry. See figure 14, this is just before seating the wire and applying glue.

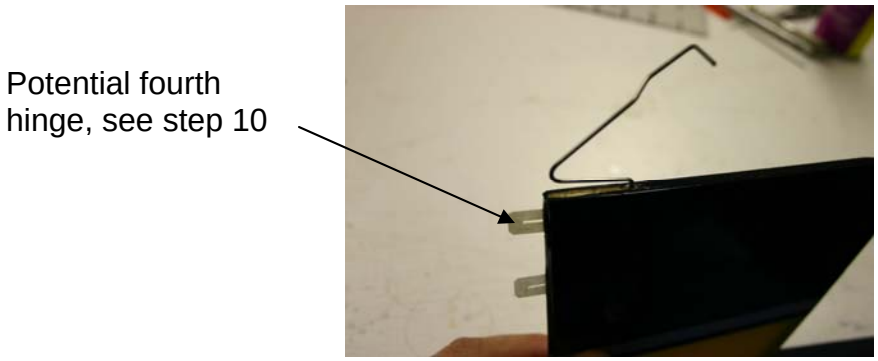


Figure 14

□ 8. Trial fit the vertical stabilizer in the slot on the top rear portion of the fuselage. Check alignment with horizontal stab and the fuselage. Similar techniques to the horizontal alignment may be employed here too. Whichever the case, once it is as desired, glue in place. Check that the vertical is flush with the trailing edge of the fuselage and glue in place. See figure 15.

Figure 15

□ 9. Now remove the wood strip just behind the horizontal stab, see figure 15. Locate the elevator and hinge it to the horizontal using the same procedures as for the ailerons in the wing assembly. There are two hinges per elevator half. See figure 16.

□ 10. The rudder has 3 installed CA hinges, however a fourth hinge should be installed ¼" up from the bottom of the rudder (see figure 14). This is highly recommended to better sustain the forces of the tail wheel during taxi. You may now attach the rudder with thin CA. See figure 16.

Figure 16

Landing gear assembly

□ 1. Locate the aluminum gear, axles, tires, wheel pants (spats), round ply mounting pads and wheel collars. Drill a hole in the spat allowing enough room to clear the tire, you will likely need to trial fit this on the aluminum gear and axles. Once you have the desired location drill it and then glue the round ply mounting pads onto the pant with epoxy. See figure 17 as it shows both sides of the spat install.

Figure 17

□ 2. The order for mounting the spat/tire is to slide the spat onto the threaded portion of the axle, then slide it into the gear hole and tighten with nylon insert nut. Mount the tire with the supplied wheel collar and secure. You may grind a small flat spot on the axle for a better wheel collar mount. The tail wheel slides onto the wire and is held by a supplied wheel collar. See figure 18.

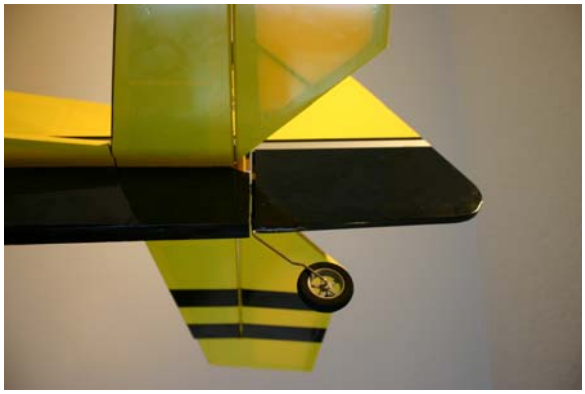


Figure 18

□ 3. Now mount the gear to the fuselage. You will need to drill thru the fuselage to open the mounting holes. Using the 2 supplied 1" bolts with washers each side and nylon insert nut, mount the gear. See figure 19.

Figure 19

Motor installation

□ 1. We will cover the installation of a Torque 2814T/820 available from Extreme Flight RC. The mount is pre-drilled for this motor and you may simply use the four provided wood screws or your own creation. The mount is offset counterclockwise to accommodate the motors wiring. See figure 20.

Figure 20

Tail servos, ESC and battery installation

□ 1. The hole for the rudder and elevator servo is 5” in front of the leading edge of the rudder and 1” up from the bottom. Remove covering as previously described and trial fit your servos, you may need to trim some wood for proper fit. Locate your rudder and elevator control horn holes and remove covering and mount your horns as previously described. See figure 21.

□ 2. Take the two remaining pushrods and decide which way you want to mount your servos’ with regard to their orientation/direction of movement. Then insert the pushrods into the horns and quick connectors as previously described. You will need extension wires and they may be secured to the fuselage or underside of the fuselage sides. See figure 20.

Figure 21

□ 3. Your receiver may be secured to the fuselage under the wing area or you may mount it in the fuselage or wing. If you choose a fuse mount, you will have to have a small receiver. Secure with double sided foam tape or hook and loop. See figure 22 and 23 for the location of the hole we used for mounting the receiver.

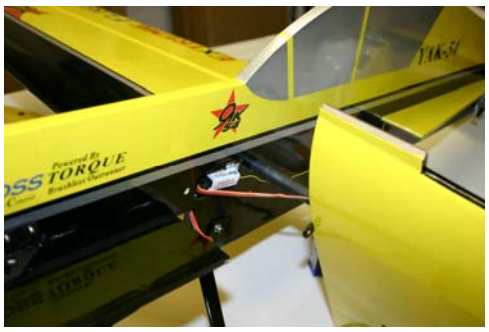


Figure 22

Figure 23

□ 4. Now is a good time to do a preliminary center of gravity (CG) check. The CG range is ½" in front to ½" behind the wing tube. Take the ESC and your intended battery of use and tape them to the fuse and check CG. Move them until you reach your desired CG and note the locations. Under normal circumstances, the ESC and battery will be mounted ahead of the wing leading edge.

□ 5. Under the most forward fuselage side there is a rectangular hole in the fuselage, this is intended to serve as your battery compartment. The ESC may be secured to the underside of the most forward fuse side. See figures 24, 25 and 26.

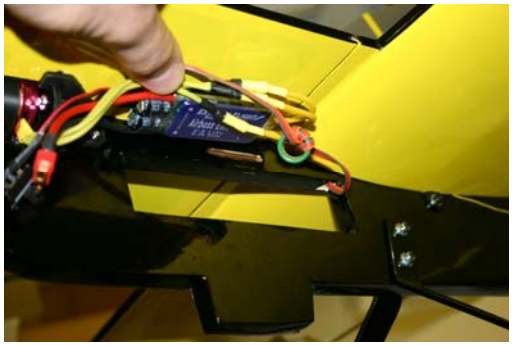
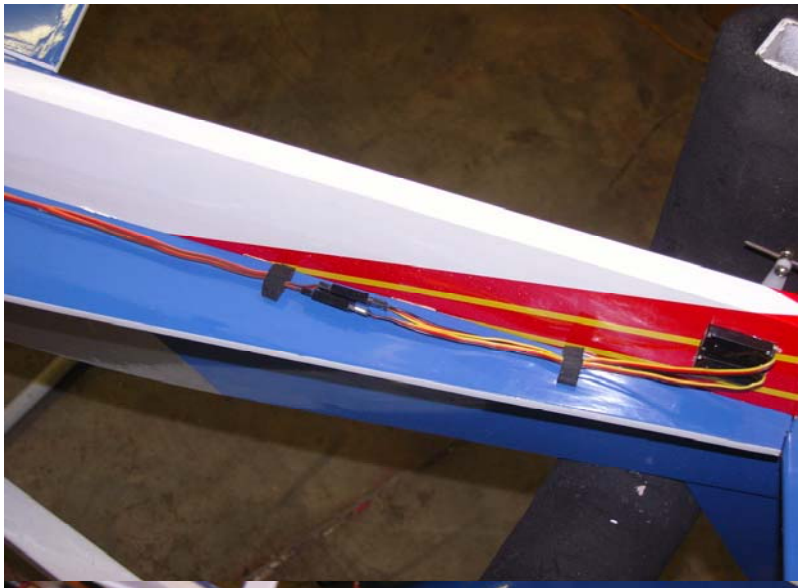


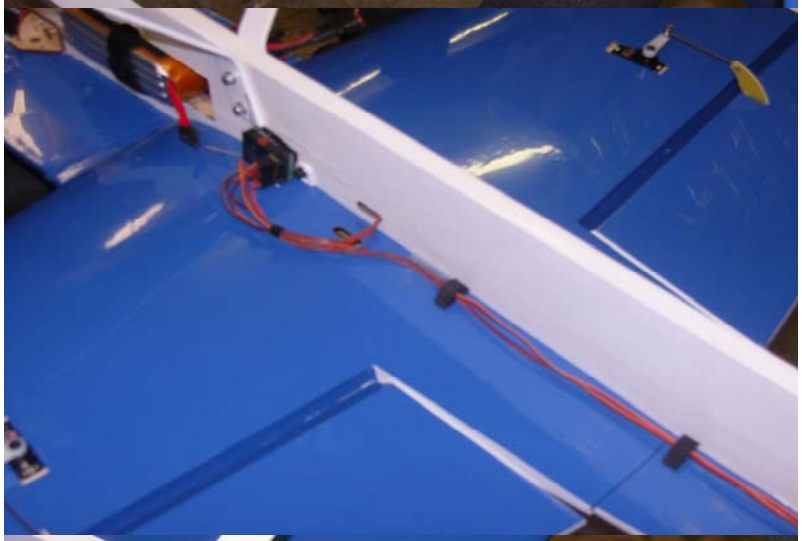
Figure 24

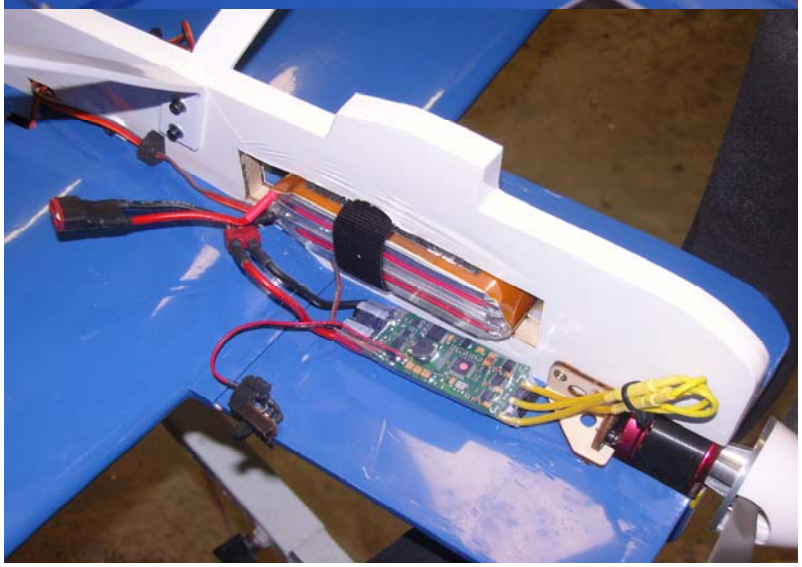
Figure 25

Figure 26

□. The slot above the battery slot is for tie straps or Velcro to keep the battery secured. The tail servo wires may be secured with clear tape or wire holders. I chose to use the small slot in the wing to route those wires to the receiver. See figures 25 for the slot and 26 for the wires clear taped to the fuse. Following are a few more pictures of the bottom of the Yak once complete. On this model I used some of the light weight foam wire keepers that are commercially available to secure the wiring on the bottom of the fuselage. I used Velcro to secure the receiver. Depending on the battery pack used you may find it necessary to trim the battery slot to accommodate your particular battery. Alternately you can mount the battery against the fuselage side. Use which ever method works best for your particular equipment.







Suggested radio setup and flying recommendations

□ 1. Since there are various ways of setting up a radio, we will cover our setup only. The setup we will explain is how our planes are setup on the videos at our website. A plane like this is meant for mainly 3D style flying but precision aerobatics are well within its capabilities. Low rates are for precision flying and high rates are for 3D flying. See Figure 27 for our setup, it is a good place to start if you are not an experienced aerobatic pilot.

Control surface	Low rate/exponential	High rate/exponential
Aileron	1" up, down/ 15 – 20%	45°/ 70%
Elevator	½" up, down/ 20%	45°/ 65%
Rudder	1" left, right/ 15%	45°/ 90%

□ 2. The above high rates could well be more, the saying "all you can get" is applicable, but may not be everyone's desire. We strongly suggest you fly on low rates until you are comfortable, then try high rates at higher altitudes. Your plane ready to fly should be in the 2.75 to 3lb range equipped the same as ours. The plane used in this manual flies with a CG on the aft portion of the wing tube, to stay in the CG range move your battery in fore/aft in the open slot just behind the motor.

Items we used to finish the airplane

These items are available from Extreme Flight RC
Torque 2814/820
Flightpower 4 cell 2170mah
APC 12 X 6E prop
52mm Black spinner
(4) HS-65 servos
(2) 24" 32 awg extensions for tail mounted servos
(2) 6" 32 awg extensions for ailerons
Mercury adhesives CAs

Other items not from EFRC, but recommended for finishing.
One Wrap (Velcro brand)