

# **EXTREME FLIGHT** ✓

**RADIO CONTROL™**

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

## **88 inch YAK-54 ARF**

## **Instruction Manual**



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**Please take a few moments to read this instruction manual 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 build.**

**Please read the following paragraph 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 buyer with a very high quality model aircraft component kit, from which you, the buyer, will assemble a flying model. However 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, Ltd. guarantees this kit to be free of defects in materials and workmanship for a period of 90 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. Please inspect the model immediately upon receipt.**

**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. It is your responsibility to ensure the airworthiness of your model.**

**Congratulations on your purchase of the Extreme Flight RC 88 inch YAK-54 ARF! This all new design is the result of applying what we have learned from 5 years of flying the Yak-54 design. Highly refined and thoroughly tested, this new Extreme Flight Yak-54 is being brought to you as a complete package, including all first rate hardware and components and thorough instructions to ensure a trouble free assembly and set-up. Weight saving components are used throughout, such as carbon fiber wing and stab mounting tubes, aluminum landing gear, titanium pushrods and a carbon fiber tail wheel assembly, all ensuring the lightest, most high performance aircraft possible. You will notice there is a box built into the bottom of the Yak's fuselage. This is a pipe tunnel and will accommodate the full range of canister mufflers and tuned pipes sold for the current makes of 50-60cc engines. Also included is a set of protective wing and stab bags and a canopy/hatch cover to keep your investment looking great season after season.**

**The performance ability of the Extreme Flight RC Yak-54 is phenomenal! With its low weight and enormous control surfaces, the Yak-54 is a 3D monster, capable of all current 3D maneuvers as well as possessing the ability to forge new ground in this exciting new style of flying. The Yak is also a topnotch precision aerobatic machine. It is capable of performing the entire FAI catalog of maneuvers and it has the kind of "big plane" presence in the air that will impress the judges. This makes the 88 inch Yak a great candidate for all classes of IMAC competition.**

**We have spent a great deal of time and effort to provide you, the discriminating aerobatic enthusiast, with the highest quality, most complete package possible. We are very proud of the end result of our labor and wish you great success with the assembly and flying of your Extreme Flight RC 50cc Yak-54!**

## **A few tips to ensure success and airframe longevity**

- 1. We are very pleased with the level of craftsmanship displayed by the builders in our factory. Through many grueling test flights containing maneuvers that no aircraft should be subjected to, our Yak prototypes have remained rigid and completely airworthy. However, it is impossible for us to inspect every glue joint in the aircraft. Take a few minutes and apply some medium CA to high stress areas such as servo mounting trays, landing gear blocks, the intersection of the wing root rib and wing sheeting, anti rotation pins, etc. A few minutes spent here inspecting the joints and applying glue where needed is time well spent**
- 2. Having survived the journey half way around the world while experiencing several climate changes, it is not uncommon for a few wrinkles to develop in the covering. Fear not! These are not manufacturing defects, and are easily removed with a little bit of heat. Use a 100% cotton tee-shirt and your heat gun and heat the covering while gently rubbing the covering onto the wood with the t-shirt. Be careful not to use too much heat as the covering may shrink too much and begin to lift at the edges. Take your time, and a beautiful, paint like finish is attainable. The black covering may require a little bit more attention than other colors due to its tendency to absorb heat.**
- 3. By the time the Yak arrives at your door step it will have been handled by a lot of people. Occasionally there are small dings or imperfections on some of the surfaces. A neat trick to restore these imperfections to original condition is to use a very fine tipped hypodermic needle to inject a drop of water under the covering material and into the ding in the wood. Apply heat to the area with a sealing iron and the imperfection will disappear. Deeper marks may require that this process be repeated a couple of times to achieve the desired result, but you will be surprised at how well this technique works.**
- 4. DO NOT SKIMP ON SERVOS! The Yak-54 is equipped with very large control surfaces that deflect over 45 degrees. A lot of servo power is required to prevent flutter and to maintain the required deflection for maneuvers. We absolutely recommend the use of high torque METAL GEAR servos. We have had great success with the Hitec HS-5955 servos in our prototypes. We recommend this servo or the JR 8611A or new 8711 for all flight surfaces.**
- 5. Use a high quality epoxy for installing the composite control horns and hinges. We highly recommend the use of Pacer Z-Poxy 30 minute formula. We have used this glue for many years with zero failures.**



## Hardware

Your new Extreme Flight 88 inch Yak includes all necessary hardware with the exception of main wheels, axles and collars. These items were omitted as I have been unable to source satisfactory versions of these items in China. I recommend Dubro 3/16" axles and collars and 4 inch main wheels. If you intend to use the wheel spats I highly recommend that you use a stiff set of wheels versus soft foam wheels. This will help to prevent the spats from touching the ground and possibly damaging them.

On the following page is a photo of the various connectors used for the Yak. You will notice 3 sets of 3mm bolts. The 4 shortest of these 3mm bolts are the stab retention bolts which mate up with the pre-installed blind nuts in the rear of the fuselage. The 2 medium length 3mm bolts are for securing the carbon fiber tailwheel assembly (the appropriate blind nuts are already installed in the bottom rear of the fuselage to accept these bolts). The 4 longest 3mm bolts are for securing the cowl.

You will find a complete pull-pull system, as well as high quality heavy duty ball links, titanium turnbuckle pushrods and composite control horns, and a carbon fiber tailwheel assembly. You will also find 3 white ball links. 2 of these are for use with the included 2mm pushrod for the throttle assembly (this set-up is for the DA-50-other engines may require a longer pushrod), the other is for the bottom of the rudder to retain the tailwheel tiller arm.

The bonded sealing washers are used when mounting the cowl and canopy/hatch. When the bolts used to retain the canopy/hatch and cowl are tightened against the bonded sealing washer, the rubber on the washer compresses, preventing the bolt from backing out. The rubber on the washer also protects the surface of the cowl. Tighten the bolts until the rubber compresses, but do not allow the metal part of the washer to make contact with the cowl.

There are 4 titanium pushrods included in the hardware package. The 2 longest are for the elevator linkage, the other 2 for the aileron linkage.

For best results, remove all set screws from the tailwheel assembly and disassemble the unit. File flat spots on the tailwheel wire so that all set screws will seat properly. Place a drop of blue Loctite on all set screws and re-insert them into their holes.



**4mm canopy bolts and bonded sealing washers**



**Nylon wing bolts**

**3mm Stab retention bolts and washers**



**3mm tailwheel bracket bolts and washers**



**Pull-pull cable, crimps and connectors**



**4mm landing gear mounting bolts, washers, and nylon insert locknuts**



**3mm cowl mounting bolts, blind nuts, and bonded sealing washers**

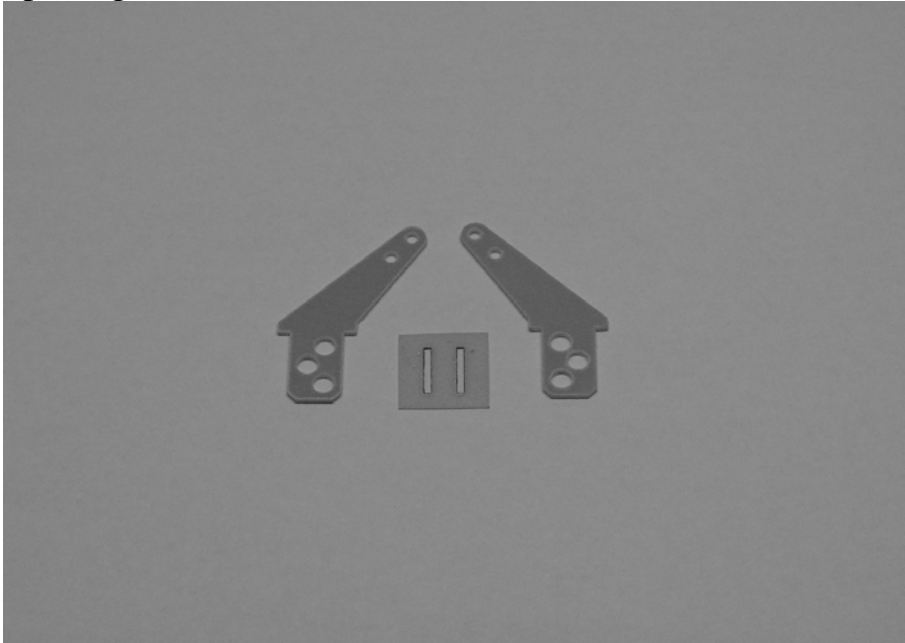


**4-40 wheel spat mounting bolts and blind nuts**

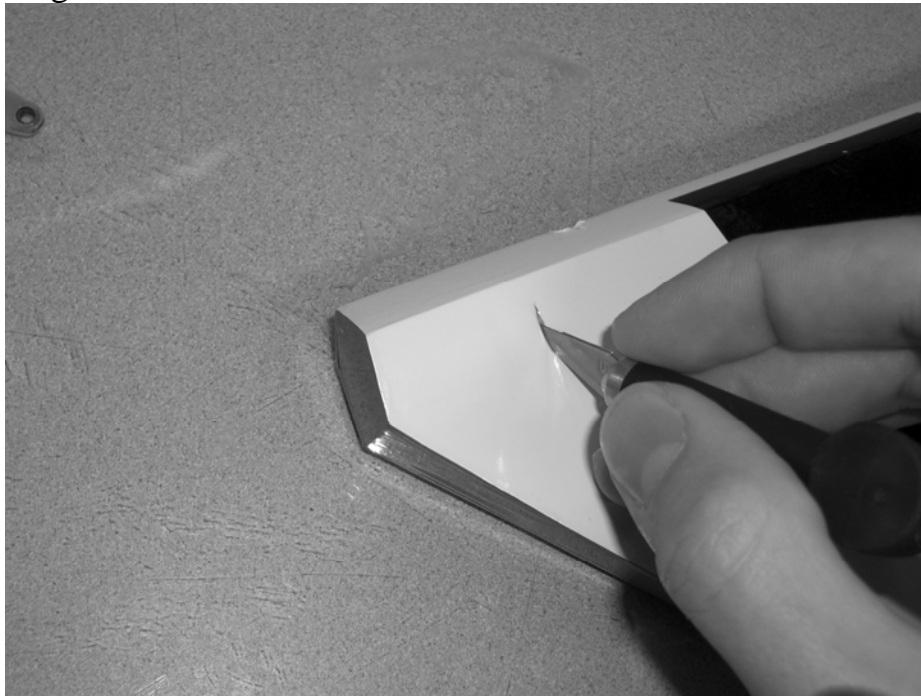
## Let's Begin!

### Elevator Assembly

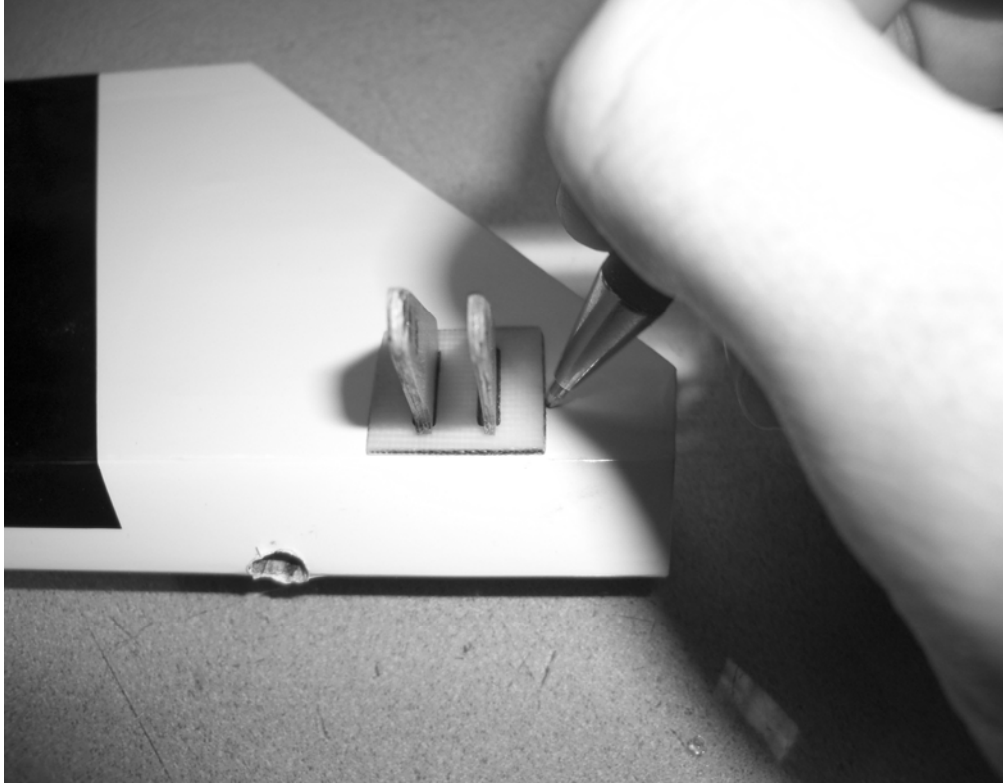
1. Locate the horizontal stabilizer/elevator assemblies as well as the composite control horns and base pieces from the elevator hardware package.



2. Use a sharp #11 blade to open the 2 slots near the bottom leading edge of the elevator.



3. Insert the 2 control horns into the base plate as shown in the following picture. Carefully insert the control horns into the slots and push down until the base plate is flush with the control surface. Use a fine tipped felt marker to trace the outline of the base plate onto the covering. Remove the control horn assembly. Use a sharp #11 hobby blade to remove the covering 1/16" inside the lines you drew. **Do not cut into an open bay area. Make your cut only where there is sheeting below the covering.**





4. Use some denatured alcohol to remove any residue or oils from the composite control horns and base plate. If you wish to paint the control horns for a more finished appearance now is the time to do so. Use some fine sandpaper to prepare the control horns for paint. Mix up some 30 minute epoxy (add a little milled fiberglass if you have it) and fill the 2 slots in the elevator with epoxy. Use an old #11 blade to force glue into the slots and make sure they are thoroughly coated with epoxy. Use an epoxy brush to thoroughly coat both sides of each control horn as well as the bottom of the base plate. Use an abundance of glue here, as any excess will be forced out of the slot when you insert the horns.
5. Insert the horns and push them into the slots until they are seated flush with the base plate and the base plate is flush with the control surface. Insert one of the 3mm bolts through the 2 control horns as shown to insure proper alignment. Use some denatured alcohol and paper towels to remove the excess glue and inspect the assembly. When satisfied set this assembly aside to dry. Repeat this process for the other elevator half.



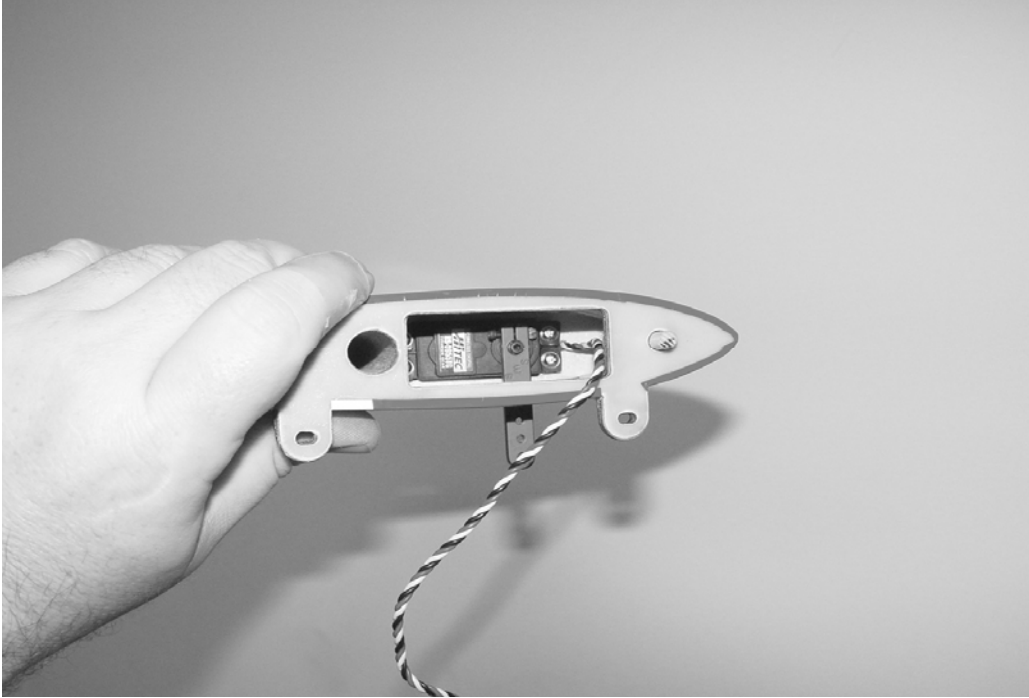
6. Remove the covering from the holes for the hinges. We use an old soldering iron for this and it works well. Locate 4 hinges per elevator half. You will need to cut 2 hinges just beyond the second knuckle to clear the fiberglass tube socket in the stabilizer. Insert the carbon fiber wing tube into the socket while testing for proper hinge length to avoid damaging the fiberglass sleeve.
7. In this step I will outline the procedure we use to install the hinges. There are several ways to do this and several adhesives you can use. We will describe the way we do it, as this method has proven itself over many years of model building. If you are new to this type of hinging process then I recommend that you install a single hinge first just to acquaint yourself with this method. Before starting the process get a few items together that will aid you as you proceed. You will need the following items: 30 minute epoxy (again, we recommend Pacer Z-Poxy), a scrap piece of pushrod or 1/8" dowel, paper towels and denatured alcohol. Mix a generous batch of 30 minute epoxy. Use the pushrod or dowel to thoroughly coat and fill the hinge hole with epoxy, then coat the hinge with epoxy. Push the hinge into its



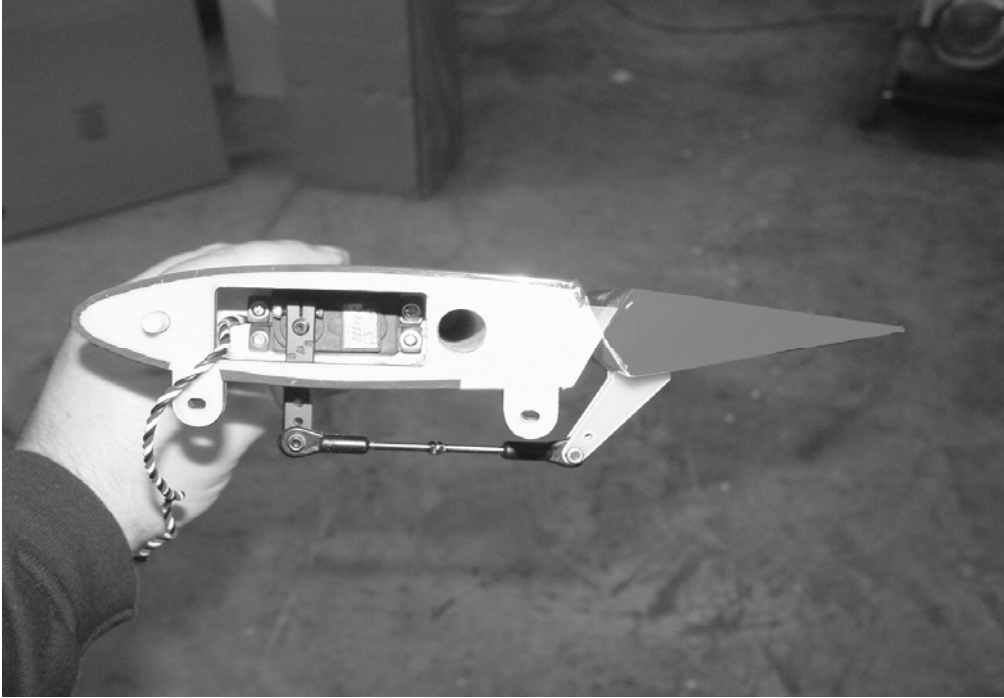
- hole until the joint is about a ¼” from its final position and use a paper towel to remove the excess epoxy that has been forced from the hole. Push the hinge the rest of the way in and make sure the hinge pin is centered in the hinge line. Use some denatured alcohol and a paper towel to remove all excess epoxy, especially on the hinge pin. When you are satisfied with the result set the surface aside to dry. Position the drying piece so that any excess epoxy will pool around the rear of the hinge.
8. When you are comfortable with this process you should be able to do one side of a surface per batch of epoxy. Glue all hinges into the stabilizer first. After the glue has set trial fit the elevator to the stab and adjust if necessary. There should be as little gap as possible between the stab and elevator. When satisfied with the fit remove the elevator and repeat the gluing process outlined above. Be sure to wipe away all excess epoxy! Set aside to dry. Repeat this process for the other stab/elevator half.
  9. After the hinges have dried thoroughly, pull on them to make sure they are properly installed. The hinges will probably feel a little stiff as it is almost impossible to get all of the glue out of the joint. Use a fine tipped hypodermic needle and place one (only one!) drop of acetone on each side of the hinge pin. Move the elevator back and forth a few times and you will feel it loosen up. **Be careful to only use one drop as you don't want to weaken the glue joint!** Add a drop of penetrating oil to each hinge pin and you will ensure a smooth operating surface with no binding. Seal the bottom of the hinge gap with a strip of Ultracote or Blendederm tape. Be sure to fully deflect the control surface when applying the tape or Ultracote to allow full deflection once the gap is sealed.
  10. Use a sharp #11 blade to remove the covering from the slot for the elevator servo control horn. You may have to slightly enlarge this hole to allow for maximum travel.



11. Before installing the elevator servos, I highly recommend that you temporarily install the servo arms and electronically center the servos. It will be much easier to match up the servos at this point than when they are installed. I also recommend that you thin a small amount of epoxy with a few drops of alcohol and apply a light coat to the inside of the stab and to the servo mounting rib as well as to the root rib and mounting tabs. Over time exhaust residue begins to collect here and by sealing it with epoxy you will prevent degradation of the wood.
12. Use the manufacturer supplied mounting hardware and install the elevator servo with the output shaft toward the front of the stab.



13. Thread 2 of the heavy duty ball links onto one of the 2 longer of the titanium pushrods. Remember that the ends of the pushrods are reverse threaded so that they can be adjusted like a turnbuckle without removing the linkage. Insert a 3mm socket head cap screw into the ball link and into the servo arm. If using the SWB arms you will need to drill out the hole to accept the 3mm bolt. Secure with a 3mm nylon insert locknut.
14. Place the servo arm onto the servo (which you should have electronically centered in a previous step) and make sure the elevator is in the neutral position. Adjust the ball links until the linkage fits between the composite control horns and lines up with the pre-drilled top hole. Insert a 3mm socket cap screw, through one side of the composite control horn, through the ball link, and finally through the other composite control horn. Secure with a 3mm nylon insert lock nut. Use blue Loctite on all bolts! Below is the finished set-up.

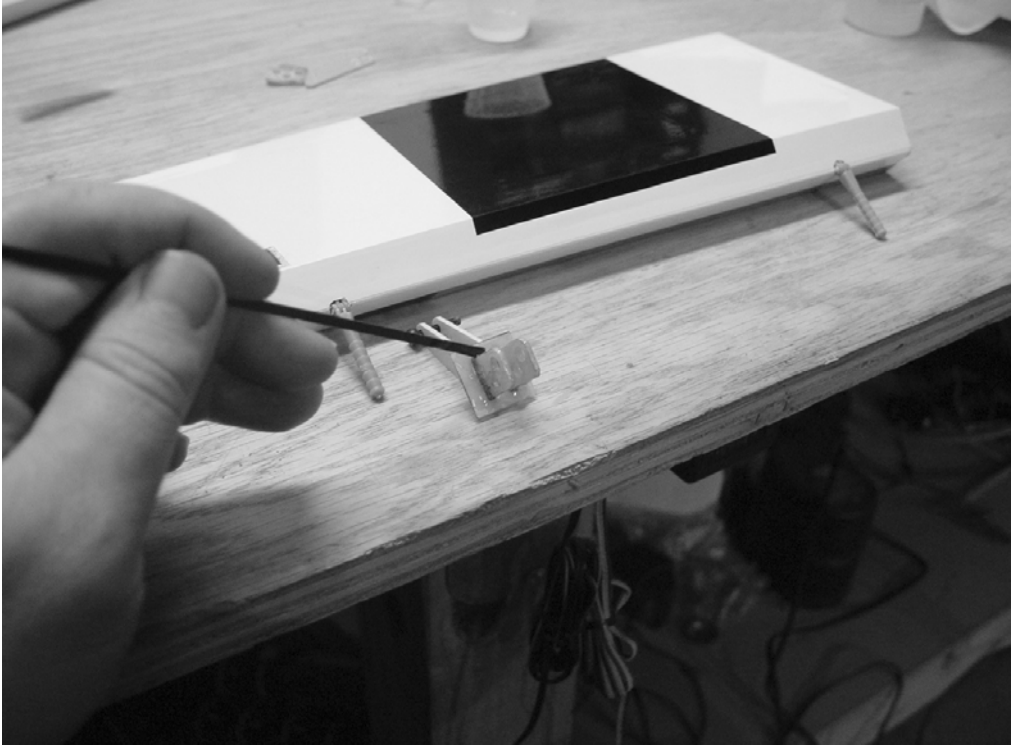
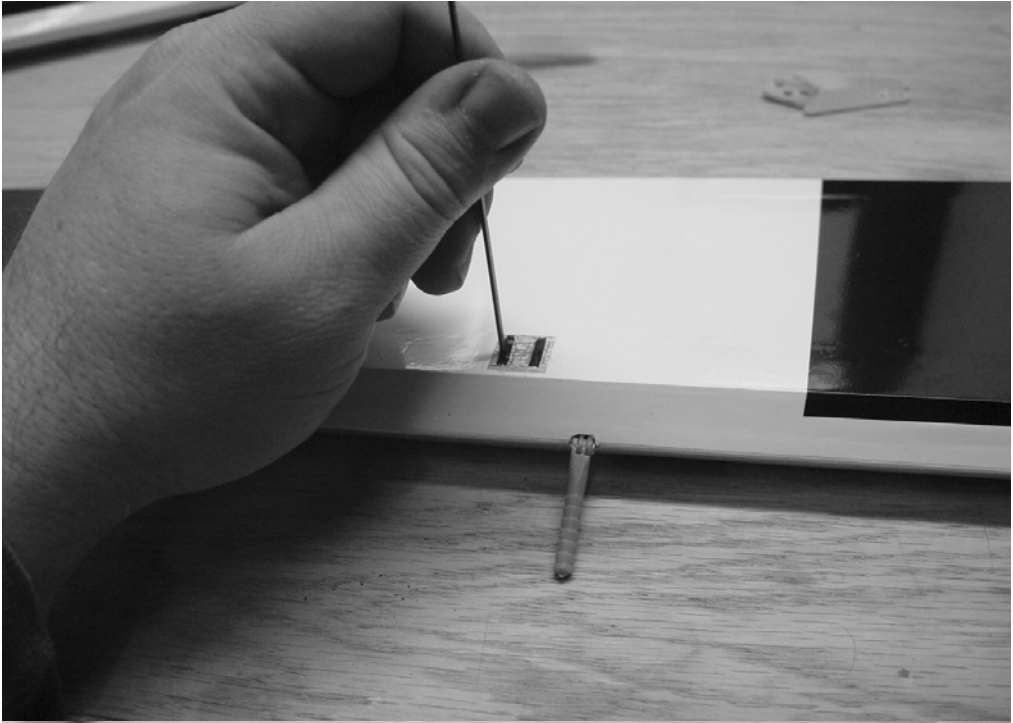


15. As mentioned previously, you may need to adjust the size of the servo arm exit slot to achieve maximum travel. A ¼" Drum sander in a moto-tool makes quick work of this. Repeat these steps for the other stab/elevator half. Before you set aside the stabs take a moment with your covering iron and go over all of the seams with a medium heat setting, paying special attention to the ends of thin trim stripes. At this point clean the 2 elevator/stab assemblies with Windex and a soft cloth and put them away in their protective bag.

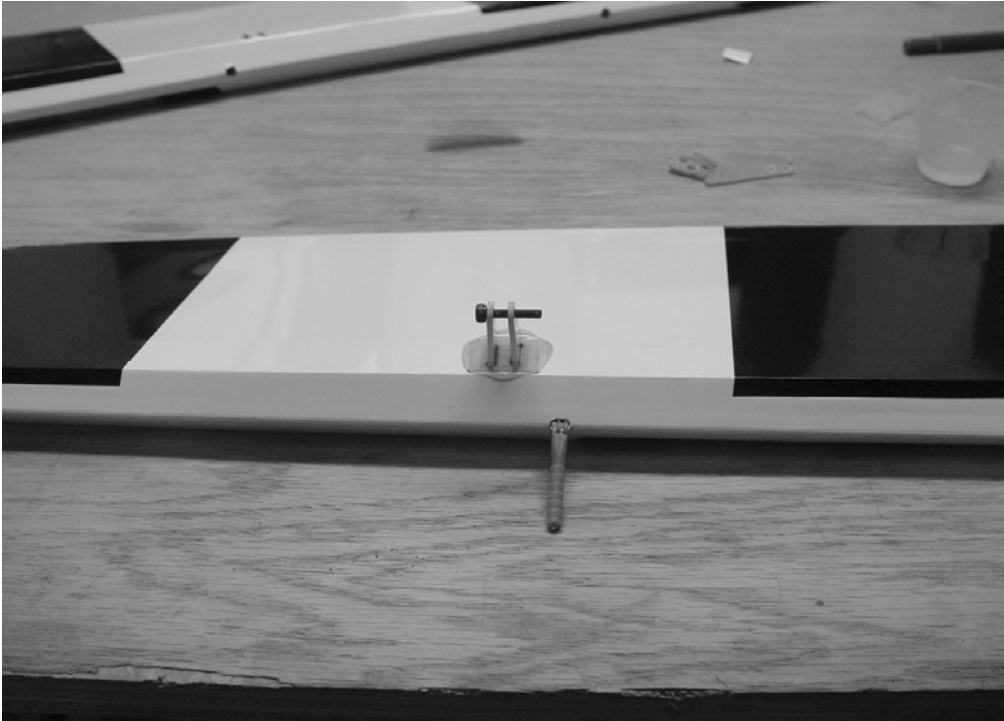
## Wing Assembly

16. The assembly process for the wing is almost identical to that of the stab/elevator. For this reason we will not go into quite as much detail as in the previous procedure. Remove the aileron from the wing panel. Locate the 2 slots for the control horns and remove the covering from the slots with a sharp #11 blade. **Follow the same procedure as outlined previously to install the control horns into the control surface and hinge the wing.** You may need to trim 1/16" from the front of the composite base plate to prevent overhanging the bevel. Repeat this procedure for the other wing.

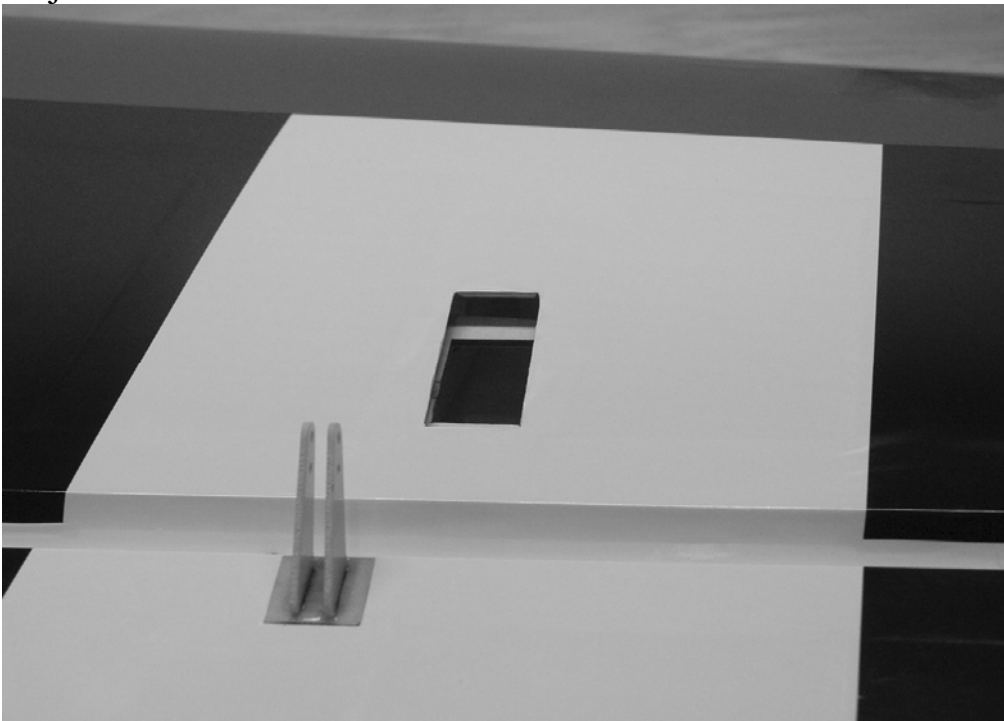




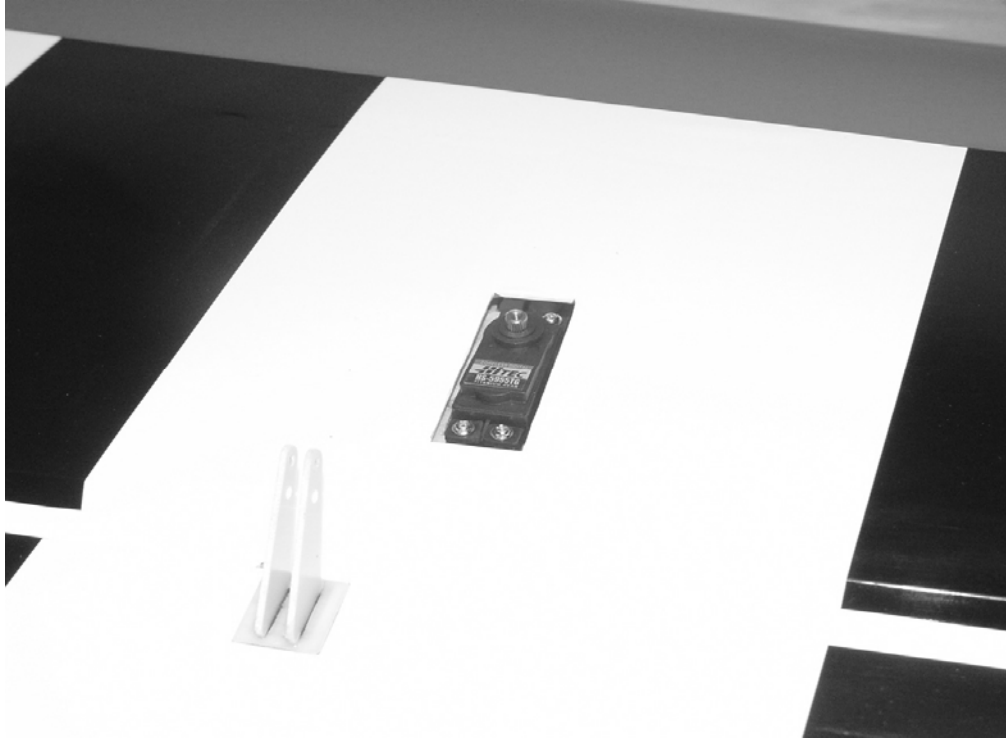




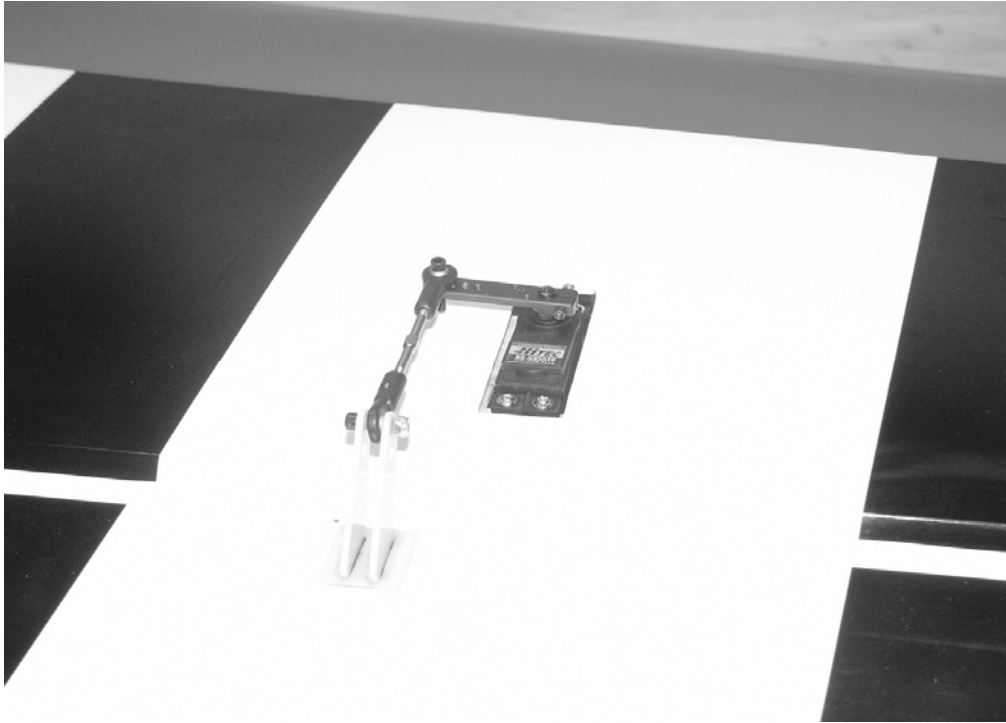
17. Locate the aileron servo mount and remove the covering from this area. Use a sealing iron to seal the edges of the covering to the sides of the servo opening. Take a few minutes to apply some CA to the joints of the servo rails and the ribs.



18. Attach a 12" servo extension to your servo and secure with thread or heat shrink tubing. Use the manufacturer supplied mounting hardware and install the servo with the output shaft toward the leading edge of the wing.



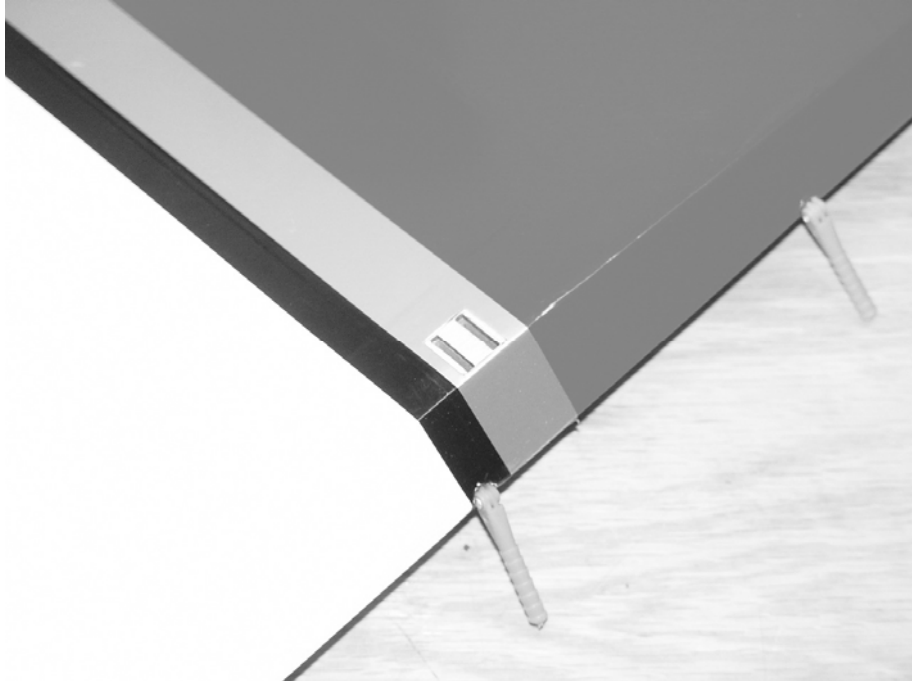
19. Electronically center your servo. We will fabricate the linkage much in the same way as the elevator linkage. Aileron control horn length should be 1.50". As always, use blue Loctite on ALL bolts!



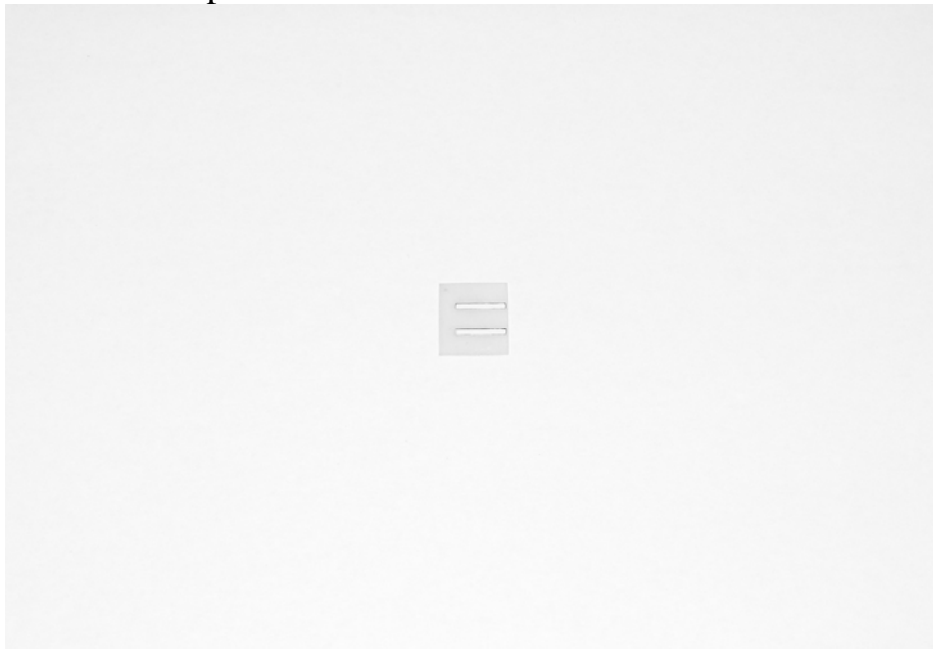
20. Before beginning the next assembly process, take a few minutes with your sealing iron on a medium heat setting and go over all seams, paying special attention to thin trim stripes and the seam at the leading edge of the wing. If there are wrinkles in the covering on the leading edge sheeting use a heat gun with a 100% cotton t-shirt to remove them and prevent digging into the wood with an iron. Use caution and avoid excessive heat as you may cause the Ultracote to shrink too much and lift at the seams. Also take the time to seal the hinge gaps with Ultracote or Blenderm tape. Clean the wings with Windex and put them away in their protective bag.

## Rudder Assembly

21. Locate the rudder, the rudder control horns and the 2 slotted base plates. Use a sharp #11 blade to remove the covering from the 2 pre-cut slots in the rudder.



22. Trial fit the 2 servo horns through the base plate and into their proper position flush against the rudder surface. You will need to trim the front of the base plate so that it does not overhang the hinge line as shown in the photo.



23. Mix up some 30 minute epoxy and milled fiberglass and use a small blade to fill the 2 slots with epoxy. Use plenty of epoxy and be sure to completely fill the two slots. Use an epoxy brush to completely cover the areas on the rudder horns and base plate that will glue into the rudder. Slide the rudder horns back into their proper position and immediately wipe the excess epoxy from the horns. Carefully check and re-check alignment to insure proper positioning. Use some denatured alcohol and a paper towel to remove any excess epoxy. Re-check the alignment one more time and set the assembly aside to dry. Repeat for the other side of the rudder.



24. Locate a 2mm ball link from the hardware bag. Thread the 2-56 ball link onto a scrap piece of 2-56 pushrod. Cut the pushrod using diagonal cutters leaving a 1/2" beyond the ball link. Drill a 1/16" pilot hole in the center of the bottom of the rudder and 2" back from the hinge line. Apply some 30 minute epoxy to the 2-56 threaded rod and screw this flush into the bottom of the rudder. Use a little excess epoxy to form a fillet around the bottom of the ball link.



25. Using the same procedure as before, attach the rudder to the rear of the fuselage with the four hinge points.
26. Use a sharp hobby knife to open the 2 holes in the bottom rear of the fuselage to expose the 2 pre-installed 3mm blind nuts. Slide the tiller arm of the tailwheel into the hole in the ball link and attach the tailwheel assembly to the bottom of the fuselage with the 2 medium length 3mm bolts and washers. Be sure to apply blue Loctite to ALL bolts! Use the supplied wheel collar to retain the tailwheel.



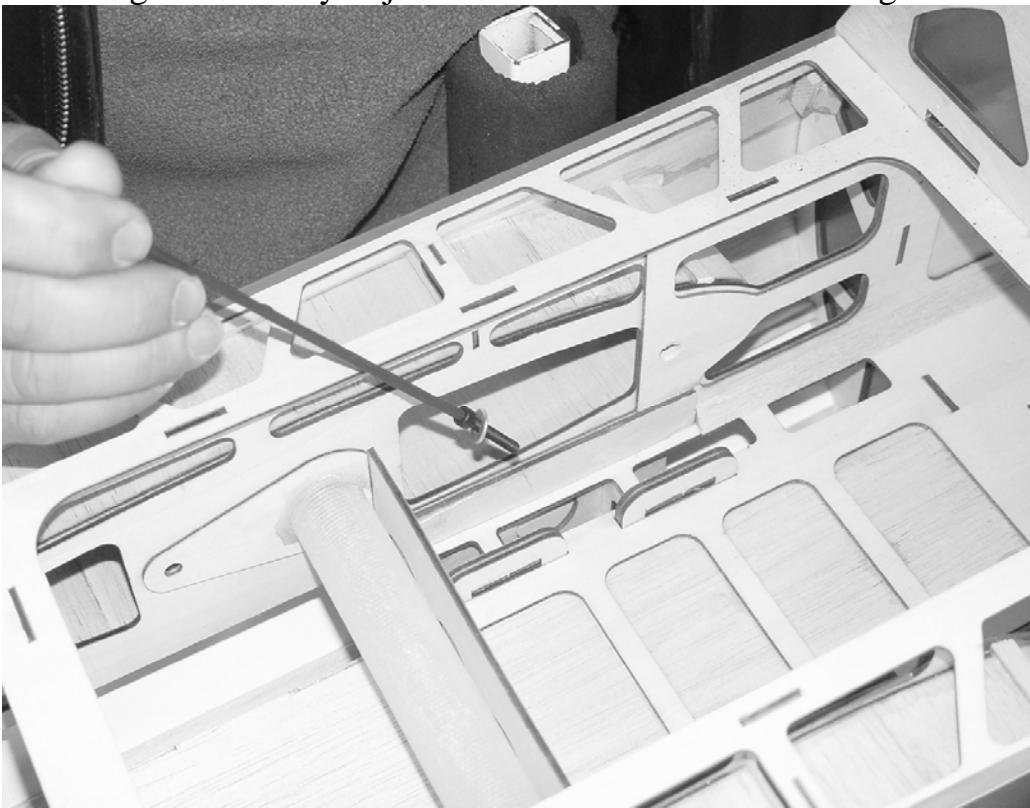


## **Fuselage Assembly**

27. We'll begin by installing the landing gear. Locate the aluminum main landing gear. The gear may appear a bit flexible at first glance. This is by design. The long moment arm of the landing gear puts a lot of stress on the gear mounts. The flexibility of the gear allows it to "give" in rough landing situations. This flexibility has proven itself valuable in our testing as we had a flame out and the Yak fell flat on its gear from about 12 feet. The gear was bent, but nothing was broken or damaged. Insert the gear into the slot on the bottom of the fuselage and center it in the slot. Use the pre-drilled holes as guides and drill through the plywood landing gear plate and aluminum mounting bracket.



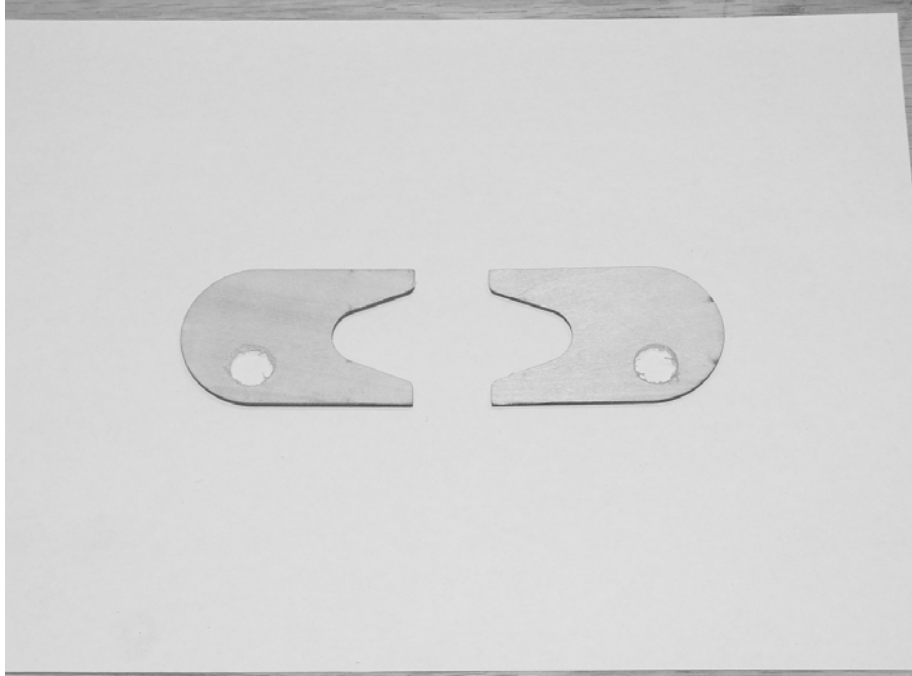
28. Place a washer on one of the 4mm mounting bolts and insert them through the holes you just drilled from inside the fuselage.



29. Secure the landing gear with 4 washers and nylon insert lock nuts.
30. Attach the landing gear fairings with silicon glue.



31. Locate the 2 wheel spats and 2 plywood mounting plates. Use sandpaper to scuff the inside of the spat for better glue adhesion. Drill a hole as shown in each ply plate about  $\frac{1}{4}$ " below center. This will allow the spat to be positioned slightly higher than center to prevent it from making contact with the ground.

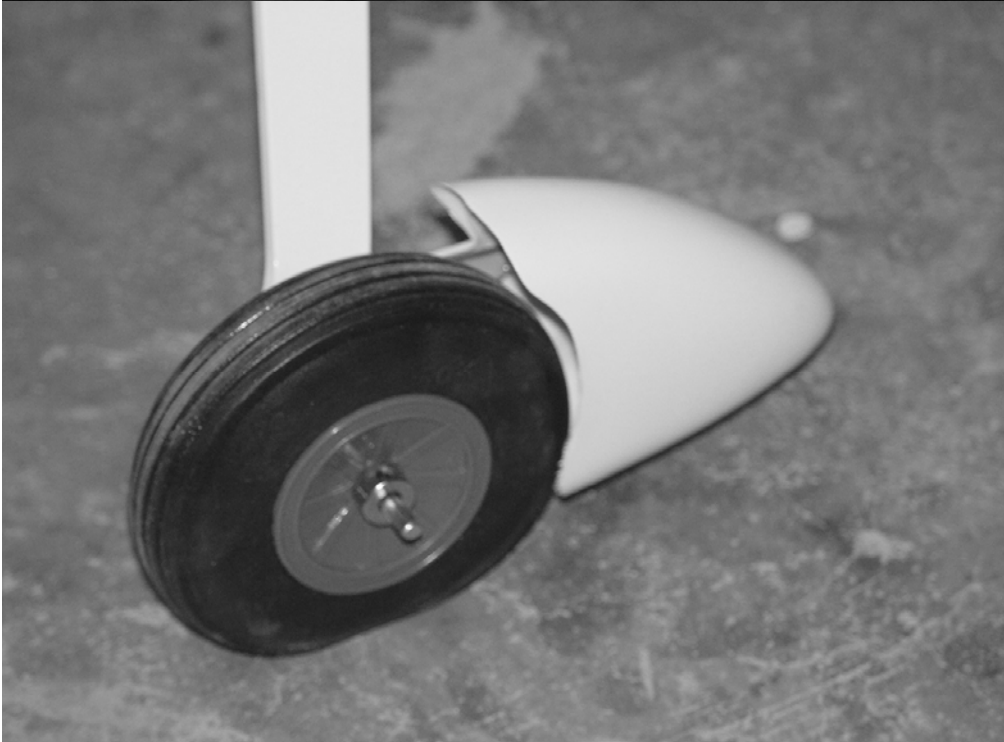
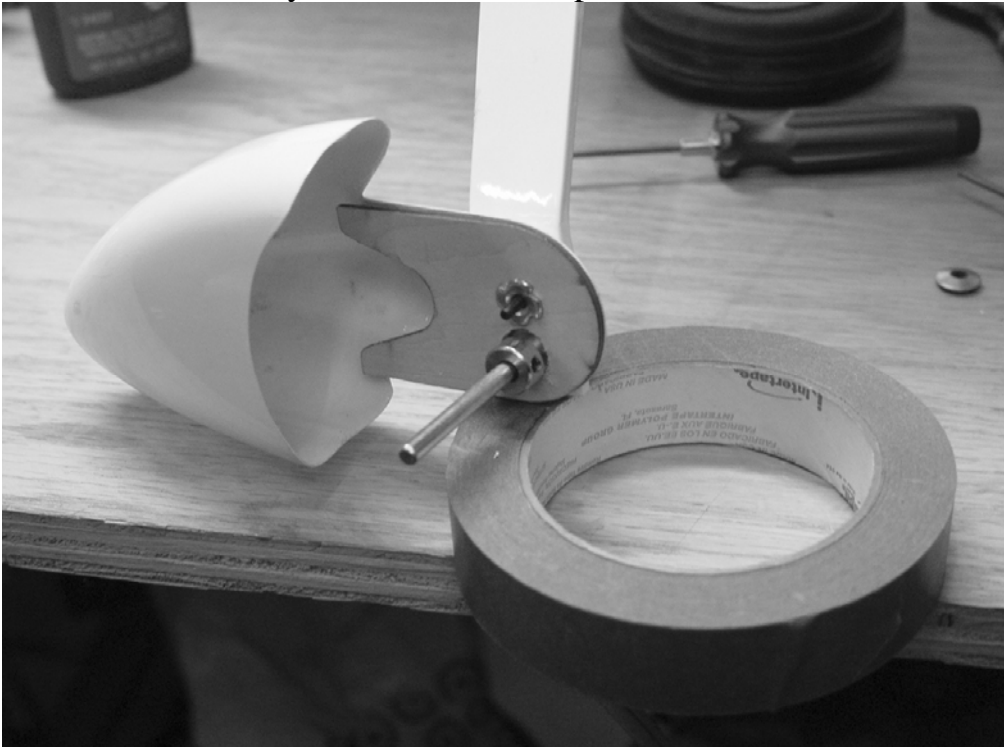


32. Glue the ply mounting plate to the spats as shown with 30 minute epoxy. Once dry drill through the fiberglass spat at the location of the hole in the plywood plate.

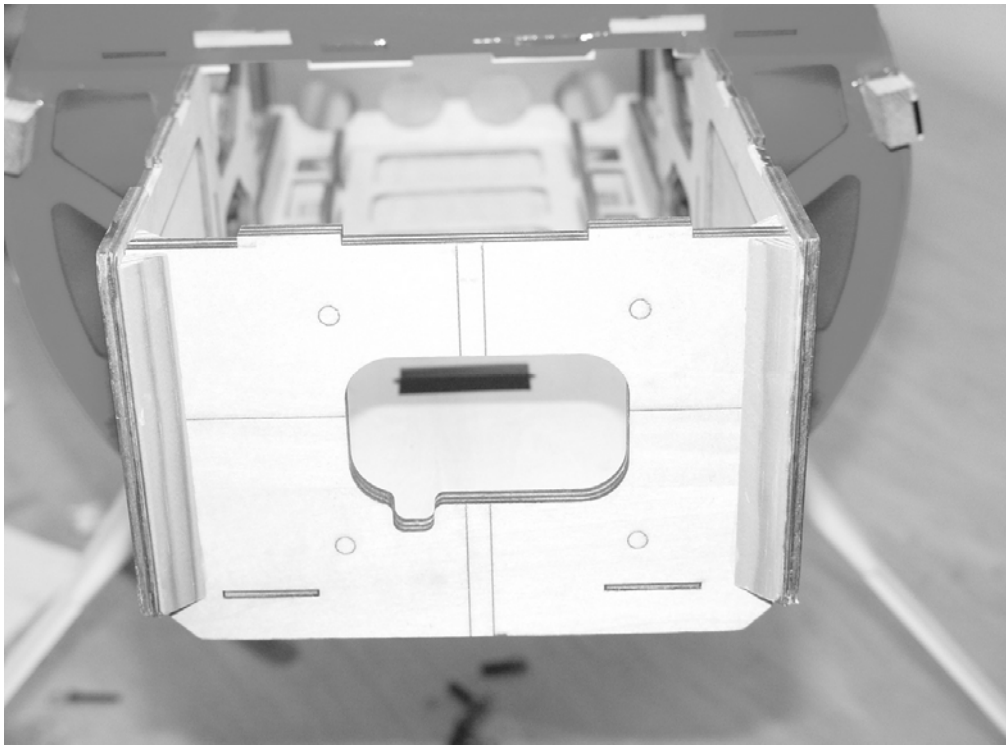


33. Install your choice of axles and slide the spat over the axle and into position against the landing gear leg. Position as desired and mark the location for the blind nut using the pre-drilled hole in the aluminum gear as a guide. Install the 4-40 blind nut and secure the spat with a 4-

40 bolt. Use blue Loctite on ALL bolts. Slide a wheel collar onto the axles followed by the wheel and finally another collar to retain the wheel. You may need to trim the spat to clear the wheel.

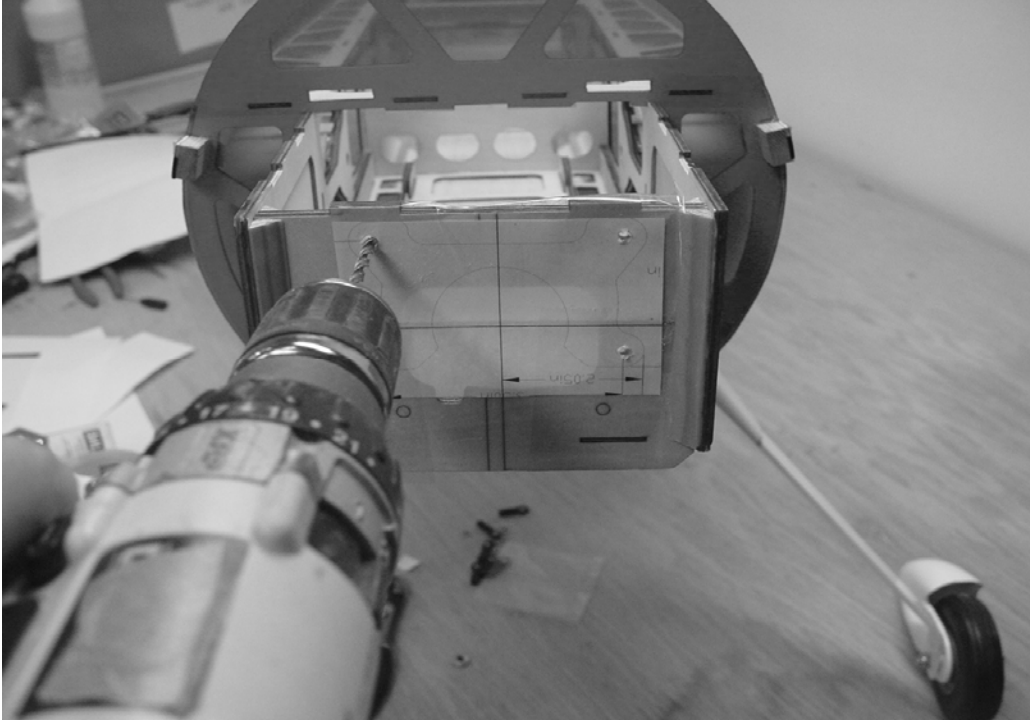


34. Next let's install the engine. We have made this process very easy. The center and offset marks have been scribed into the front of the firewall with a laser. Your firewall may also have holes scribed as well... **DO NOT USE THESE HOLE LOCATIONS**

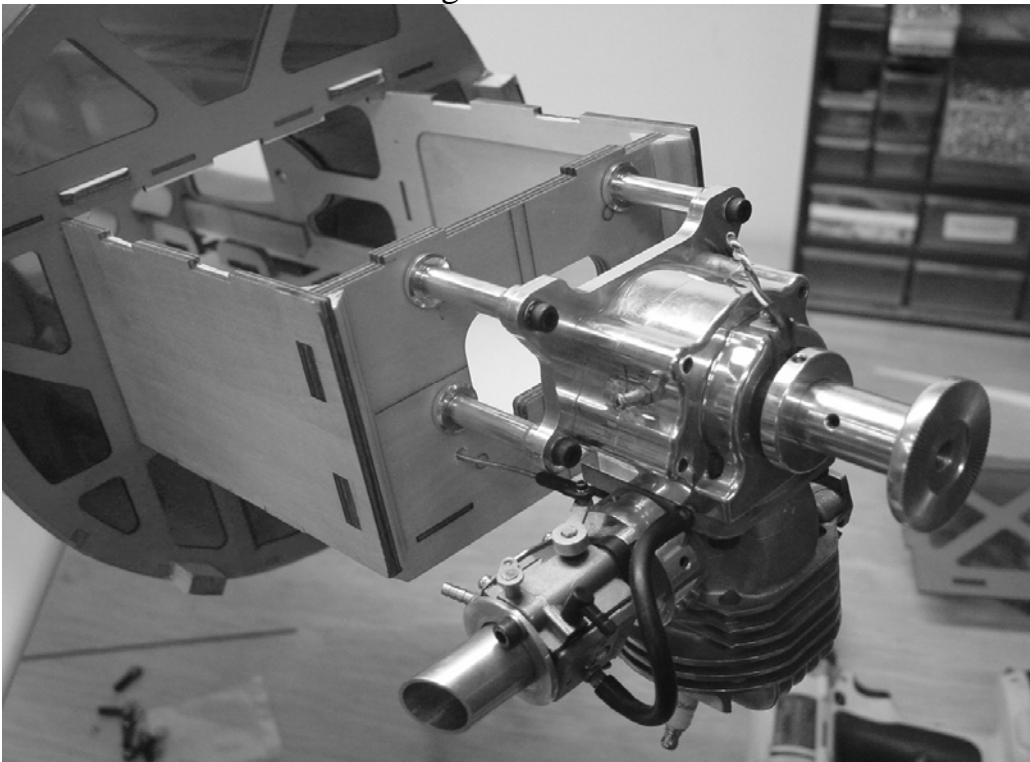


35. Most manufacturers will provide a mounting template for their engines. We have included the DA-50 template at the end of this manual. Simply tape the template to the firewall and drill the mounting holes at the designated location. Be sure to align the vertical line on the template with the thrust offset line (the line to the right of the center line). Shown below is the template for the Brillelli 366GT 60cc engine, another great choice to power the Yak.



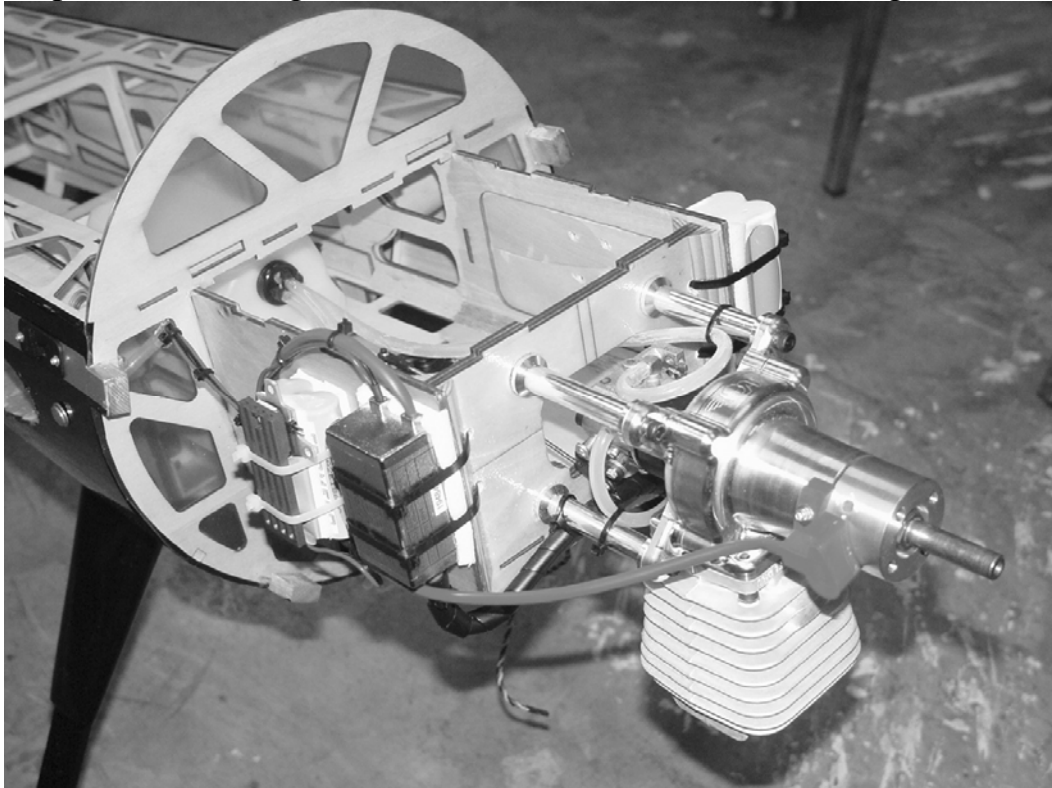


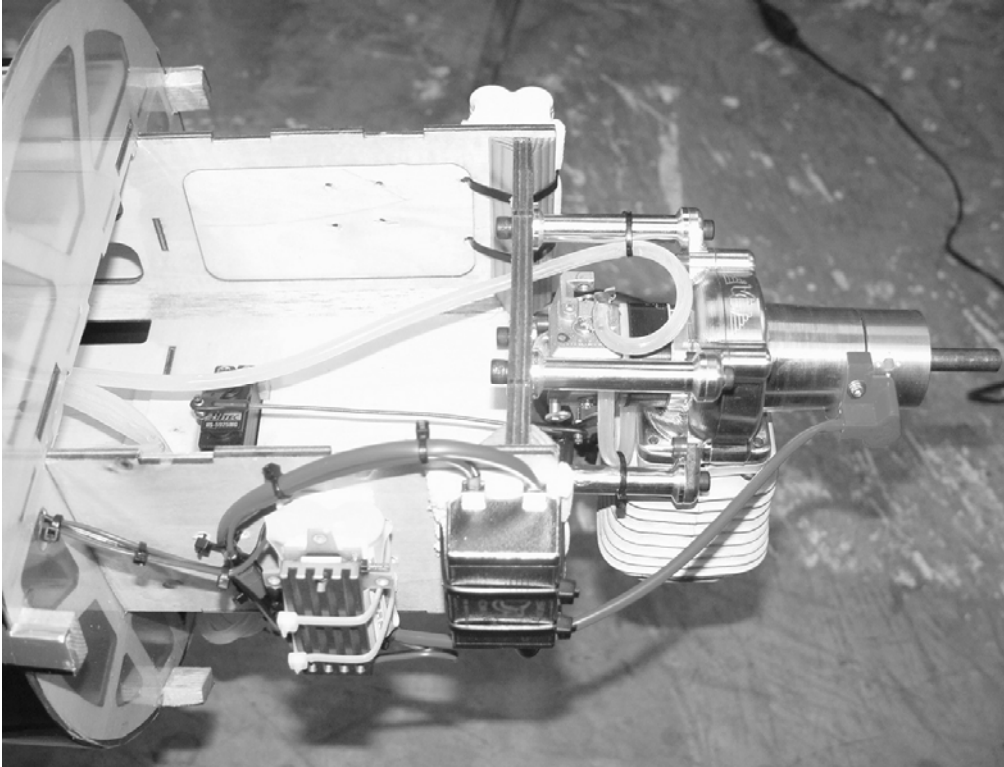
36. Use the recommended mounting bolts to mount the engine to the firewall. You will need to use standoffs to get the motor to 6.7 inches from the firewall to the engine thrust washer.



Remove the engine and brush a coat of alcohol thinned epoxy onto the exterior and interior of the motor box. When dry permanently mount the motor. Be sure to use some large washers behind the firewall to better distribute the load. Again, use blue Loctite on all bolts.

37. Now let's set up the throttle linkage. If you are using a DA-50 this is very easy. You may need to rotate the carburetor on the DA-50 180 degrees so that the throttle arm is facing the bottom. Please contact DA for the proper procedure. It is very easy and only takes a couple of minutes. Mount the servo in the hole in the floor of the engine box and use the 2mm pushrod and white ball links to fabricate the throttle linkage. Very easy! If you plan to use a tuned pipe you will need to install 3/8" hardwood servo rails on each end of the servo hole to raise the servo so it does not touch the header/pipe. Here are a couple of pictures showing the DA-50 installation and servo linkage.





38. Assemble the included Dubro 20 oz tank. Make sure to use the gas conversion stopper and Tygon tubing for all plumbing. Use nylon cable ties to secure the tank to the tank tray. The tank should butt up against the partial former in front of the wing tube.



39. Here is where we installed our fuel dot.



40. Once all plumbing is completed and throttle servo and linkage is installed glue the top of the motor box in place with 30 minute epoxy. This piece is NOT optional as it adds an enormous amount of strength and rigidity to the motor box.



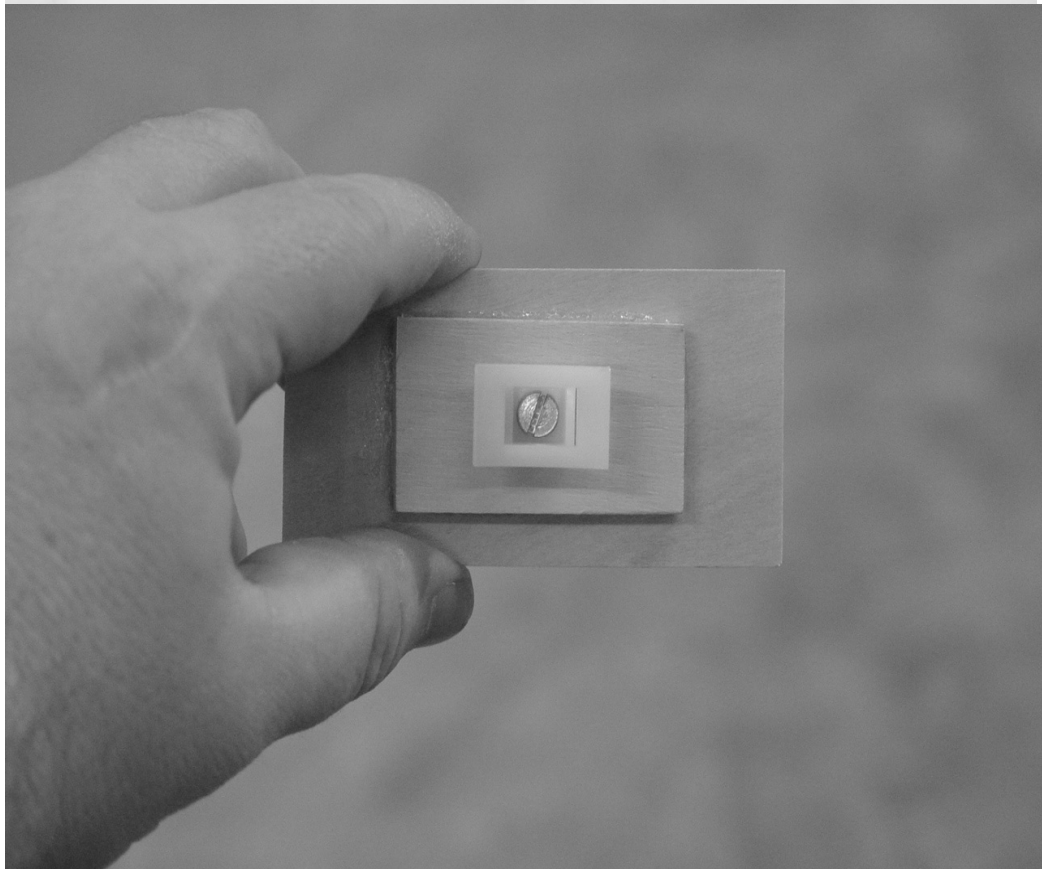
41.If you are planning to use a tuned pipe or canister now is the time to install it.. You will need to remove the covering, center stringer and parts of 2 formers to open the pipe tunnel. Seal the edges of the covering to the edges of the pipe tunnel and paint a thin coat of alcohol thinned epoxy to seal the wood in the tunnel.

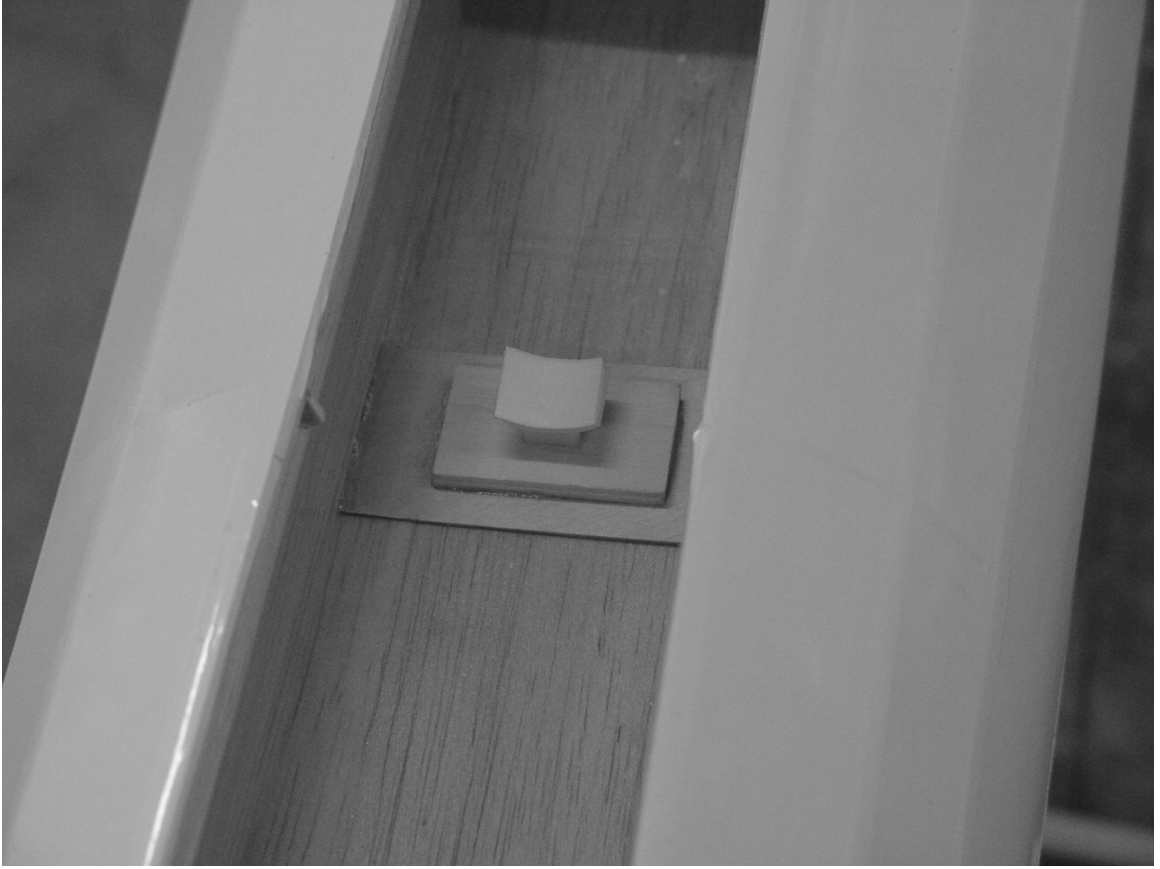


42.I have had great success using the Dave Brown Products tuned pipe mount. With the carbon pipe, heat is not an issue and you can secure the pipe directly to the mount with a nylon cable tie. Using an aluminum pipe, you must slide some silicon fuel tubing over the cable tie to prevent the heat from melting it. You will also need to use a piece of silicon tubing between the pipe and mount to insulate the mount from the heat.

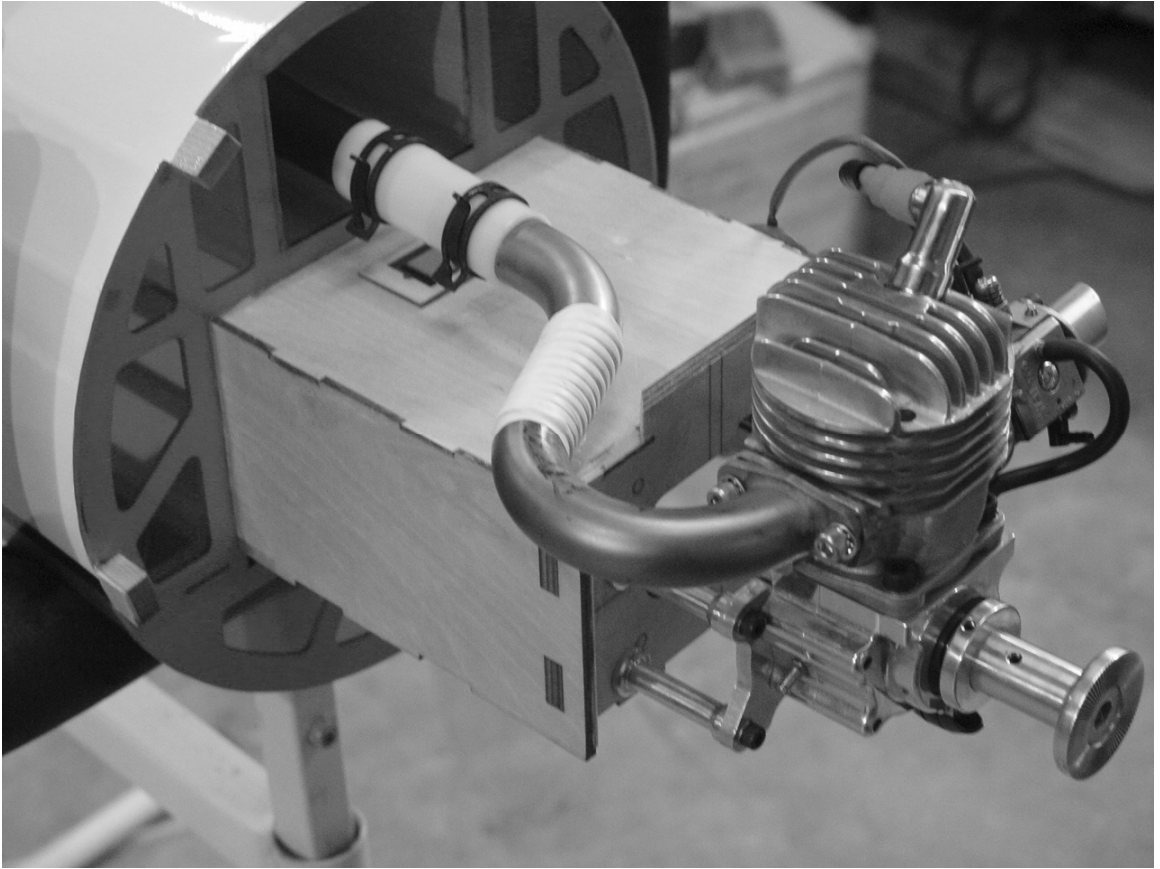
My pipe mount technique is very easy and involves very little hassle. First cut a piece of 1/64 ply to fit the width of the pipe tunnel floor, 2 inches wide. Next cut a piece of 1/4 inch light ply into a 1 inch by 2 inch piece. Drill a hole in the center of the 1/4 inch ply and mount the nylon mount to the ply with the wood screw included with the mount. Place a drop of CA on the threads as you insert it into the hole. Next glue the 1/4 inch ply plate to the 1/64 ply, centered. Finally glue the whole assembly to the floor of the pipe tunnel at 3/4 of the length of the pipe. For the bigger KS 1060 pipe on the DA set-up I glued the pipe mount to the side of the tunnel for better clearance. Secure the pipe to the header using the required hardware and to the

mount with a nylon cable tie.  
Pictures are much better for this!













43. Locate the rudder servo tray in the hardware package. Trial fit the tray to the mounting rails and mark the center on the rails and tray for easy alignment once glue is applied. Apply 30 minute epoxy to the tray and clamp this assembly to the servo rails and allow to dry.



44. Once this assembly has dried install your rudder servo using the supplied hardware with the output shaft toward the front of the plane. We recommend the use of one of the new “mega-torque” standard size servos such as the Hitec HS-5955 or the JR 8611A or 8711 for this position.



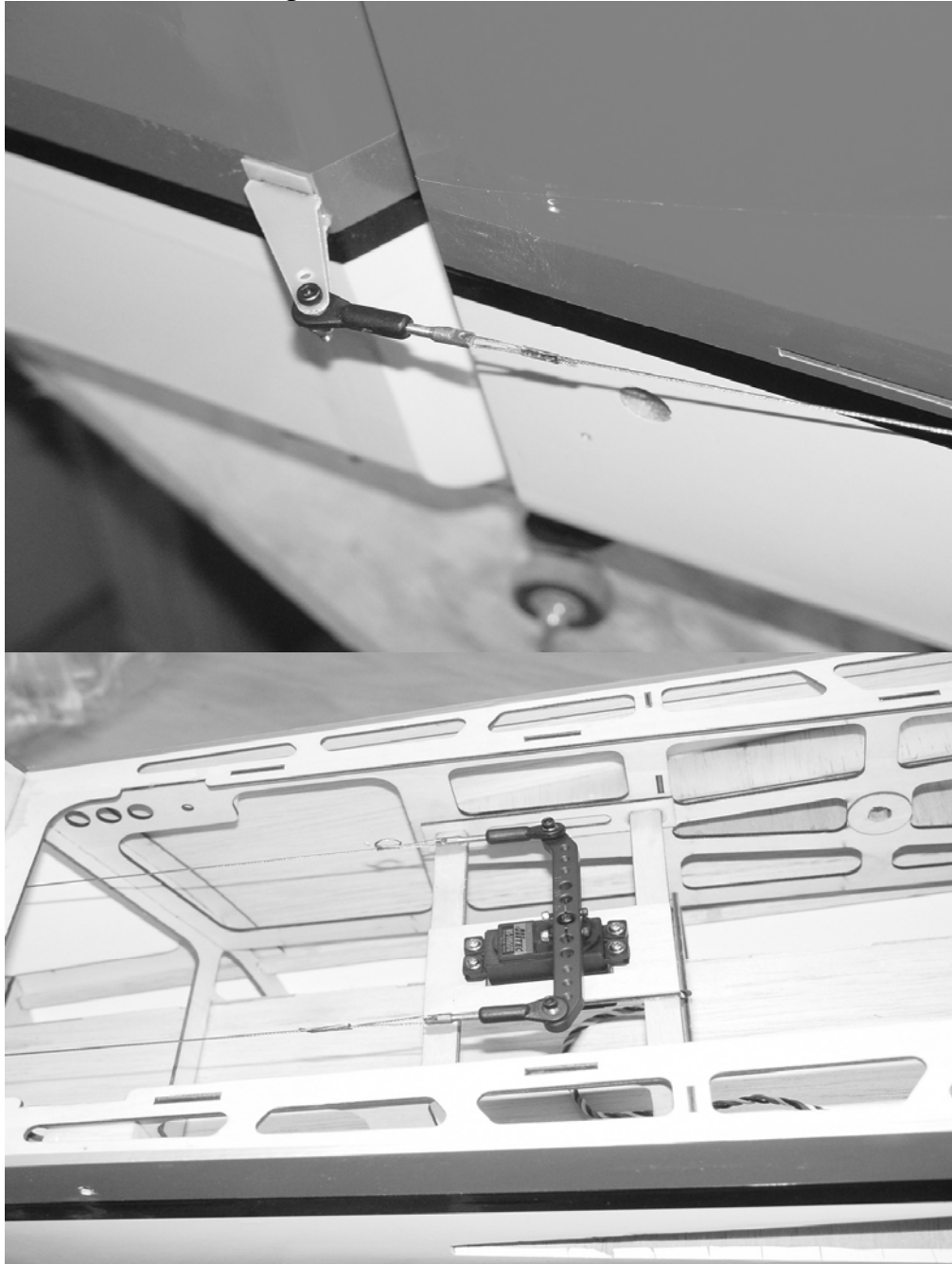
45. Next let's install the pull-pull rudder cables. First remove the covering from the exit slots at the rear of the fuselage as shown.



46. Assemble one end of the linkage by inserting the pull-pull cable into a crimp, through the hole in the brass pull-pull fitting and back through the crimp. Loop the cable back through the crimp a second time and crimp with side cutters.



47. Insert the bare end of the cable into the slot in the rear of the fuselage and feed it forward through the hole in the former that is positioned just in front of the slot. Pull the cable forward into the canopy area and make up the same type of linkage as you did previously. Secure the linkage at both ends with a 3mm bolt and nylon insert lock nut. Repeat for the other side. You will want to use a 4 inch arm for the pull-pull system. I highly recommend the 4 inch offset arm from SWB Manufacturing.



48. Here is where we installed our switches on each side of the fuselage. After opening the hole with a new hobby blade we soaked the surrounding wood with thin CA before installing the switch.



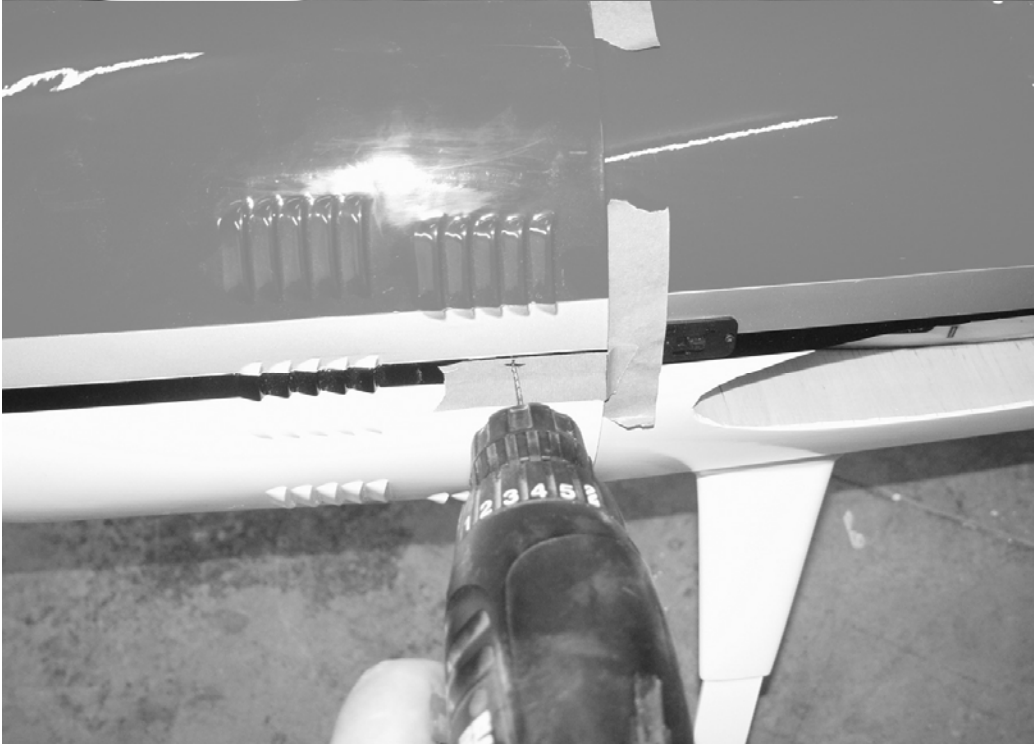
49. If you plan to use the supplied louver plate in the front of the cowl now is the time to install it. Remove the lip from the circumference of the louver plate with a pair of scissors. You will also want to open the louvers in front of the engine cylinder for adequate cooling. Glue the louver plate in place from the rear with 30 minute epoxy. Make sure to scuff the inside of the cowl and edges of the louver plate for better adhesion.



50. Slide the cowl into position. You should allow at least 1 inch clearance between the cowl and spinner backplate for maximum prop efficiency. This means the rear of the cowl will extend beyond the F1 former by about  $\frac{3}{4}$ ". I like to place a strip of Blendederm tape across the top front of the hatch that will fit under the cowl to keep the paint from getting scuffed. I also apply a strip of Blendederm across the bottom of the fuselage in the same location to prevent the cowl from chafing the Ultracote.



51. Use a few pieces of masking tape to secure the cowl in place and view it from several angles to insure that you have it properly aligned. Use a felt tipped marker to make alignment marks to insure you are drilling into the center of the mounting block. Install the 3mm blind nuts in the back of the cowl mounting blocks and secure the cowl with 3mm bolts and bonded sealing washers.







52. Now let's install the stab/elevators. You will need to attach 36 inch servo extensions to the elevator servos. If you plan to remove the stabs for transport you will need longer extensions. Open the holes in the rear side of the fuselage to expose the pre-mounted 3mm blind nuts. You will also need to open a hole for the servo leads to pass through.



53. Slide the stab halves onto the carbon fiber stab tube and secure with a 3mm bolt and washer inserted through the mounting tabs and into the pre-mounted blind nuts. Make sure to use a drop of blue Loctite on these bolts.



54. The canopy is retained by the 2 4mm bolts and bonded sealing washers. Before flying the Yak run a bead of RC-56 canopy glue all along the intersection of the canopy and its wood frame, front and back and both sides. This glue dries clear, is water soluble and is easy to clean up. Allow to dry overnight.



54. The wings are retained by inserting the 1/4x20 nylon bolts through the holes in the fuselage just behind the wing tube and into the pre-installed blind nuts in the root rib of the wing. Be careful not to cross thread the bolts and inspect them periodically to insure thread integrity.

This completes the assembly of the 88 inch Yak. As a final step I recommend you clean the entire aircraft with glass cleaner, then apply a coat of spray-on wax and buff the finish to a high gloss. My favorite product for this is Eagle One Wet Wax AS-U-DRY, available in the automotive section of most Wal-Marts, K-marts, Sears, Targets, etc. People often ask me at trade shows how I get the planes to look so shiny- this is my secret. You may wish to apply all of your graphics before applying the coat of wax. The wax helps to protect the covering and paint and makes clean up easy, as oil residue can simply be wiped away.

## Set-up and trimming

Besides basic assembly, this is the most important part of preparing your airplane for flight. It can also be the most time consuming, but once your plane is properly dialed in you will agree it was time well spent.

A common phone call I get goes like this: “I can’t get my plane to fly right. It doesn’t fly anything like your plane in the video. Something must be wrong with mine”. I am always surprised to learn that the customer usually has not varied his CG, control throws, or anything else since first setting up his plane. Getting your airplane dialed in is a continuing process that may take many flights to achieve. Take the time to do this and you will be rewarded with a great flying aircraft.

The **center of gravity** range for the 50cc Yak begins at 6 3/4” from the leading edge of the wing measured at the root (center of the wing tube) and extends back 3/4” from this point. Make your first flights at the front of the CG range. There is no need to have the Yak excessively tail heavy to perform 3D maneuvers. At this time you will also want to balance your plane laterally. Add a small amount of weight to the wingtip to achieve proper lateral balance.

As mentioned earlier, if you are planning to use a tuned exhaust system you will need to mount all batteries as far forward as possible. The tuned pipe adds several ounces behind the CG and great care must be taken to counter this without adding additional weight (or as little as possible).

## Control surface throws

I highly recommend that you purchase a throw meter that measures in degrees. There are several units available commercially. These units are a great aid in set-up and definitely beat the “that looks about right” method. For any type of precision flying, surfaces that travel equal distances are a must. The following control surface travels are what I use on my own Yak. These are a good starting point, but are by no means the only way to set up the Yak. Start here and then adjust to fit your own preferences and style of flying.

**Elevator:** 8-10 degrees low rate, no exponential; all you can get high rate, 60-65% exponential

**Aileron:** 20 degrees low rate, 30-40% exponential; all you can get high rate, 65-70% exponential

**Rudder:** 20 degrees low rate, 50% exponential; all you can get for high rate, 80-90% exponential.

Again, this is just a starting point. Adjust to your liking.

The Yak exhibits very little coupling in knife edge flight. There is virtually no coupling when using the small amount of rudder needed for point rolls or slow rolls. When flying slow high alpha knife edge you may experience a small amount of coupling. Full rudder rate is typically not needed for this maneuver and too much may result in excessive coupling. Experiment with your throws and CG to find the sweet spot. Save full rate rudder for flat spins. And speaking of flat spins, the Yak performs the flattest, slowest descending flat spins I have ever witnessed. The spin is very controllable and is easily exited by neutralizing the controls and adding power. One of my favorite moves is to allow the plane to flat spin down to 10 or fifteen feet from the ground, then add power and begin climbing back up still in a spin. Lots of fun and it gets the heart racing!

The Yak will also perform the most beautiful, round knife edge loops. It has so much rudder authority that recovery on the backside of the loop is typically at idle! This is an impressive sight to behold.

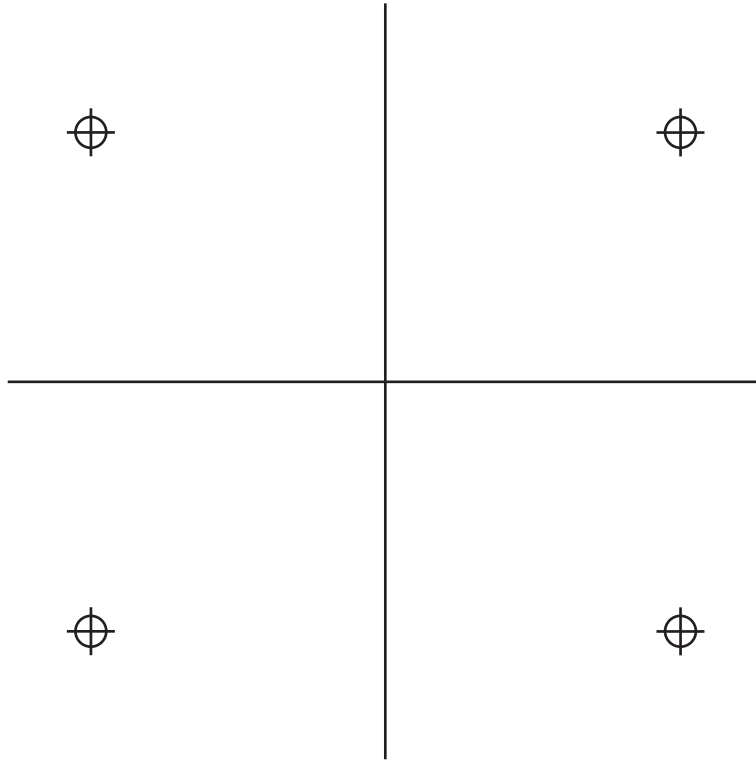
The Yak is a very axial rolling airplane. Its massive ailerons provide tremendous control authority in the roll axis, and high alpha rolling maneuvers are one of its strong points. This incredible control authority allows you to start, stop and change direction of roll instantly. The Yak will obey your every command.

Another of my favorite maneuvers is one I have named "The Aneurysm". This maneuver is basically a medium speed tumble on 3D rates. It is similar to a lomcevak and I have been able to get the Yak to tumble tail over nose 3 times on occasion. This is a very stressful maneuver on the airframe and great care must be taken not to enter it too fast. From medium speed flight pull to a 45 degree upline. Using 3D rates, simultaneously chop the throttle, give full down elevator, full left aileron, and full right rudder. The Yak will tumble tail over nose. Please use caution when performing this maneuver!

As I mentioned, it is very stressful to the airframe!

Please use common sense when flying the 50cc Yak. The Yak's airframe is very robust, but all airplanes have their limits. Take great care to prevent over speeding the airplane which could result in flutter and complete destruction of your Yak. Reserve full power for vertical lines and always have the engine at idle when the nose is pointed down. Inspect your plane thoroughly after each flying session, looking for loose screws, fatigued or worn servo gears, sloppy linkages or loose covering. With proper maintenance, your Yak will provide you with many seasons of aerobatic excitement. Thanks again for your business! See ya at the flying field!

# DA50-R Mounting Template



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