GT17

(Gyro Trainer 17)

Semi Scale Electric Gyrocopter

Congratulations on your decision to build a GT17, if you build and trim this model carefully you will be rewarded with the most unusual, attention getting model at your field.

Read This First!

Gyrocopters are a challenging type of aircraft to fly. They possess many of the challenges of helicopters and lack the built in stability of aircraft. Unlike a helicopter the control of the rotor speed is indirect. With the model helicopter , if you want more lift or rotor speed, you simply advance the throttle. With the gyrocopter the lift and rotor speed comes indirectly and sometimes way too slowly. So it takes a very attentive pilot to fly a gyrocopter. This is not a aircraft for the novice pilot.

Gyrocopters are difficult to design. The GT17 was the result of many years of study and a very intense period of design, test, crash and redesign. This involved "unlearning" many accepted ideas about model aircraft. It also exposed what is very important to gyrocopter model design and what is not. Some things that are relatively unimportant to a fixed wing model are critical to a gyrocopter. As you build the model the critical things will be emphasized where appropriate. However as a general rule you should build this model **EXACTLY** as instructed. If you are an experienced modeler you will see things that seem "over designed" or just silly and you will be wrong. I was. Please don't "kit bash" this model because you believe you know a better way to do it. Please build and fly the model exactly as designed and then start changing things to find out what happens. You will find out as I did that gyrocopters are, unlike airplanes, very sensitive to small changes. A tiny change in something can render a gyrocopter difficult to control or impossible to take off with. If you call with technical support about your model the first question you will be asked is "Did you build it exactly according to the instructions?" and if not your first free technical support answer will be "Correct the model to exact design specifications".

In particular here are few items that must be done **precisely** and according to plan. The landing gear, especially the tail wheel assembly must be very solid and have no "spring" or play. This includes the wheels. Do not use different wheels. During takeoff the gyrocopter places very large loads on the tail wheel. If it does not handle this load well and wobbles or deflects under load takeoffs will be difficult at best to impossible. The design of the tail wheel assembly was a major design issue with the development of this model.

The blade weighting, balancing and finishing must be done with great care to obtain a good flying, smooth model. Beg, borrow, buy or steal an electronic scale with 0.1 gram resolution to finish the blades. The leading 1/16"of an inch of the blades is important and the quality (or lack of quality) of the blade finish can make a model a dog or a great flyer.

Now that you have been warned, lets proceed to build this model.

Needed To Complete This Model

You will need the following to complete the GT17:

1) A suitable brushless motor. The Himaxx 2812-850 or the Hacker A20-22L are both excellent choices.
2) A 10-12 amp brushless speed control, such as a Castle Creations Phoenix 10, or Cool Runnings A12
3) A 1000 to 1300 3S1P, later generation LiPoly Battery (8C to 10C minimum). An exact reccomendation is the Thunder Power Prolite 3S1P, 1320 mah.
4) 3 Pico or submicro servos

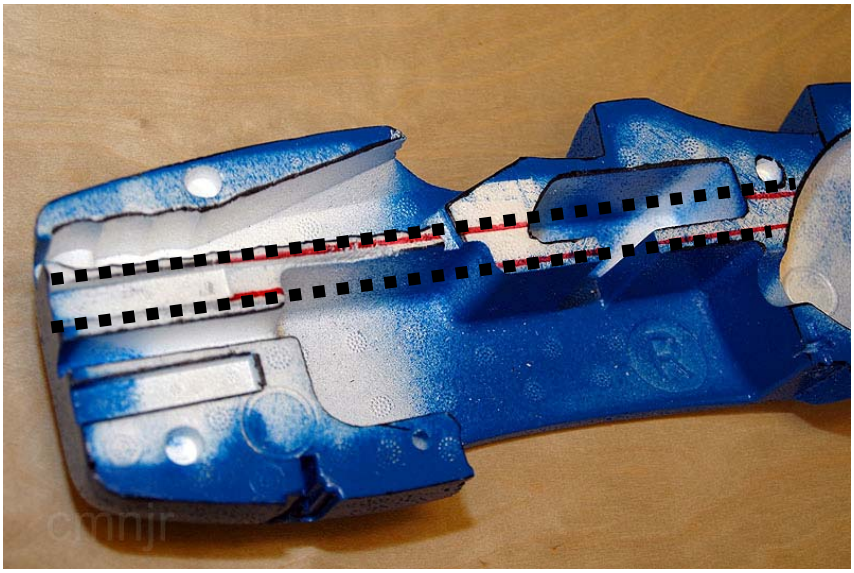
5) Micro receiver
6) Rudder pushrod and choice of fittings (ez-connectors suggested).
7) A GWS PT17, Stearman fuselage kit (left and right halves, plus fake radial motor)
8) Foam safe CA glue

Building

You can build the sub assemblies in any order. Final assembly will of course require the sub-assemblies. The assumption is that you are an experienced modeler. Where some portion of the design is non-critical, this will be pointed out such that builders preference may be satisfied. Glues will not be specified unless they are critical to a step, and this will be pointed out.

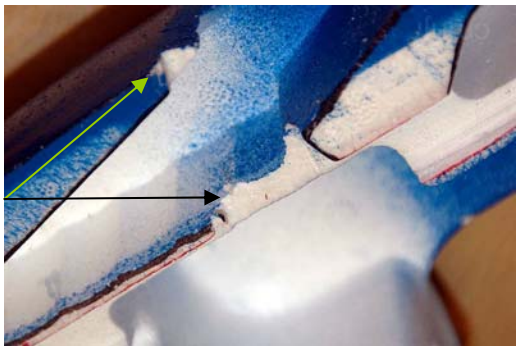
Fuselage.

Main Mast/Motor Mount

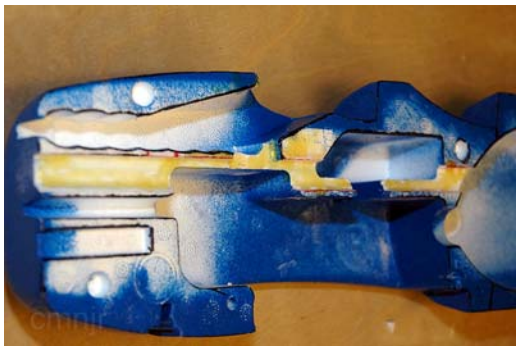


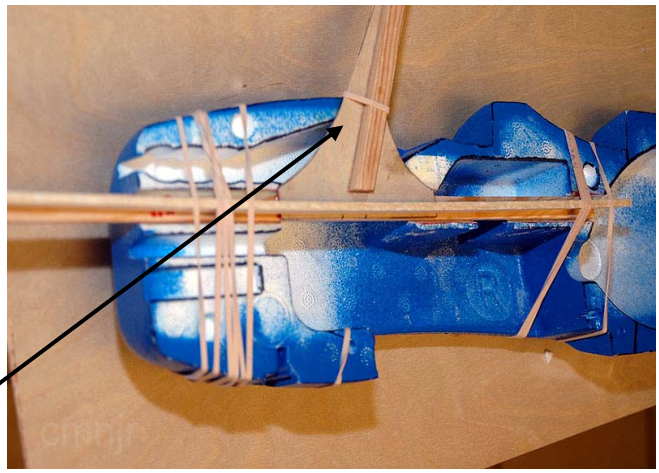
The fuselage is constructed from the GWS PT17 fuselage. Take the right side of the fuselage (right side from the pilot's perspective) and mark the foam as shown. Using a hobby knife and sandpaper wrapped around one of the 5x10mm sticks prepare a U shaped grove in the foam that is the shape of the 5x10mm stick.

Trim the ends of the 5x10mm x 9" mast pieces to match the angle at the bottom as scribed on the center plywood reinforcement. Glue both of the mast pieces to the center plywood with the bottoms 10mm from the bottom of the plywood center. Make sure to glue the mast pieces ***together*** all the way to the top. Now *place*, but don't glue, the long 5x10mm stick in the groove on the fuse. Temporarily *place* the mast/plywood in place so that the bottom of the plywood is flush with the long stick in the fuse. Slide this piece around until the mast stick that is touching the right fuse half (on the bottom side in the picture) is aligned where the back edge is even with the front cockpit opening. When properly aligned the back (toward



the rear) edge of 5x10mm mast stick will be lined up with the *front* edge of the *front* cockpit. Press down slighly to dent the foam. This will make a 10mm wide mark just at the front edge of the front cockpit and where the mast crosses the fuse. Now pick up the plywood/mast assembly and carve the 5x10mm groove to clear the mast stick. Cut a similar groove for the mast stick on the other (left) fuse side. Note that the left fuse side does not have the long horizontal groove, only the groove to clear the mast. Trial fit everything to make sure it all fits properly. Adjust the main stick fore and aft so that the rear end, ends at the end of the groove and there is plenty of stick out the front to clear the dummy engine and still mount your motor.





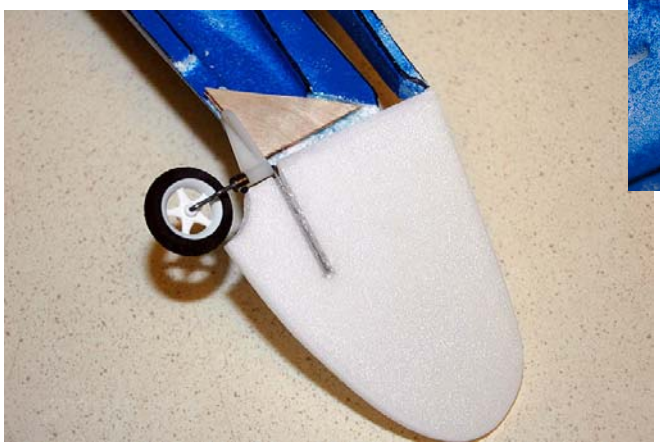
Mark where the center ply assembly fits on the center stick. Now glue the ply assembly to the center stick, making sure to align with your marks and making sure that the bottom edge of the ply is aligned with the bottom edge of the stick. This sets the mast angle accurately. Once this assembly is all complete glue it in place on the right fuselage half using some slow drying goopy glue like 30 minute epoxy or Polyurethane Glue (like Gorilla Glue (TM)). Make sure to glue well where the mast stick connects with the upper fuse near the cockpit area. When this has dried glue the short 5x10mm stick to the center stick to make the motor mount a full 10x10mm. Carve out the left hand fuse to make a recess for the motor stick.

<u>Rudder/Tail Wheel Area</u>

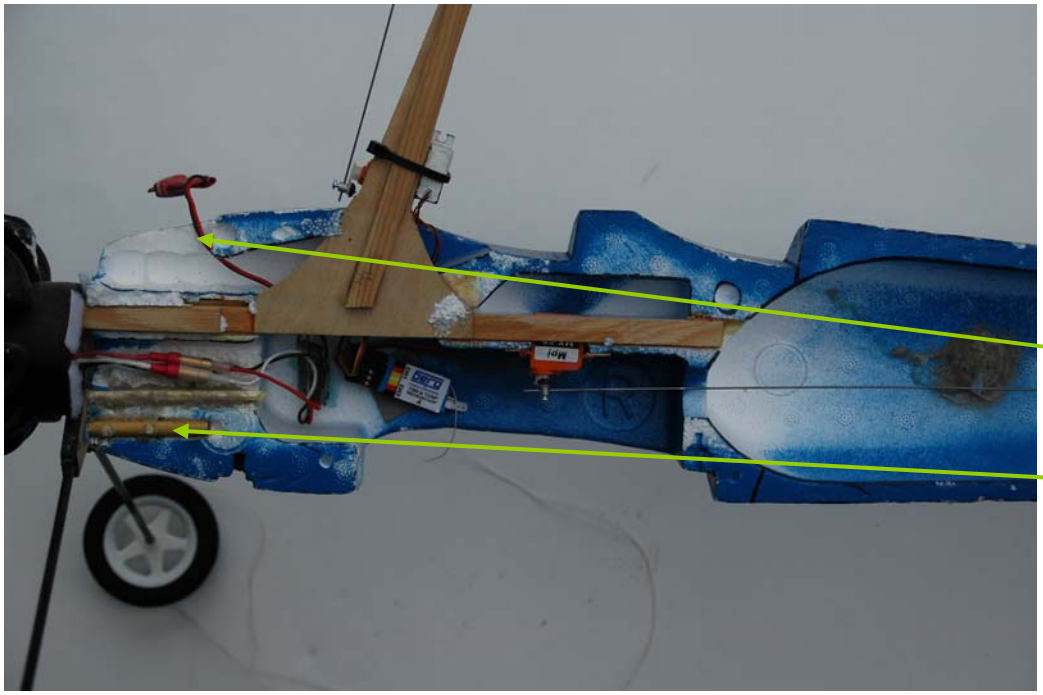
At this point you can cut off the vertical fin and use some scrap foam to fill the space for the horizontal stabilizer. Now bevel the rear of the fuselage in preparation for the rudder.

Before the left fuselage half can be glued the tailwheel assembly, rudder, rudder servo and pushrod need to be mounted. Sandwich the tail wheel between the two plywood triangles with thick CA. Put plenty of glue to go through the holes in the tailwheel bracket. Now take coarse and then fine sandpaper and relieve the rear fuselage in the shape of the triangles.

Bevel the front of the rudder to match the rear of the fuse. Put the plastic tube on the tiller arm and hold the tailwheel assembly, rudder and fuse together loosely. Adjust the positions of things until the rudder lines up with the bevel, the center line of the tailwheel pivot is on the hinge line and everything looks like it's going to move freely. Get as much rudder throw as possible, it's a small rudder. I usually hinge the



rudder at this point. I use clear tape "X" hinges. In this case I "X" hinge the rudder to the right fuselage half letting the inside tape go fairly far into the fuse side so it will stay secure. You can be creative with the hinging, just as long as you get a lot of throw (45 degrees left and right would not be too much, remember it is a very small rudder!). Now using foam safe glue, glue the tailwheel bracket to the fuse with the plastic tube temporarily in place. Make sure there is free movement. Now glue the plastic tube to the rudder and embed the tube in the rudder with glue. Next mount the rudder servo somewhere in the main fuse, route the pushrod to the rudder out the right fuselage half. A rudder horn is provided. If you use a thin wire for a pushrod, a pushrod guide is needed about halfway back. Hook up the radio to the rudder servo and test, making sure that you have lots of throw with no binding. Make sure the pushrod doesn't bow under pressure.



Go ahead and trial fit the motor, dummy radial engine, battery, ESC, etc. to the front of the fuse. The battery will need to be mounted very far forward. I make a recess on the top of the fuse, just behind the dummy radial. Glue the ¼" I.D. black tubing in place for the landing gear (dowel is shown in picture, kits have black fiber tubing), leaving about ¼" protruding out of the front of the fuse. Mount the pitch and roll servos to the mast (see radio section later in the manual) and work out the cable routing to receiver. In other words mount or trial fit as much to the right fuselage half as possible before gluing on the left.

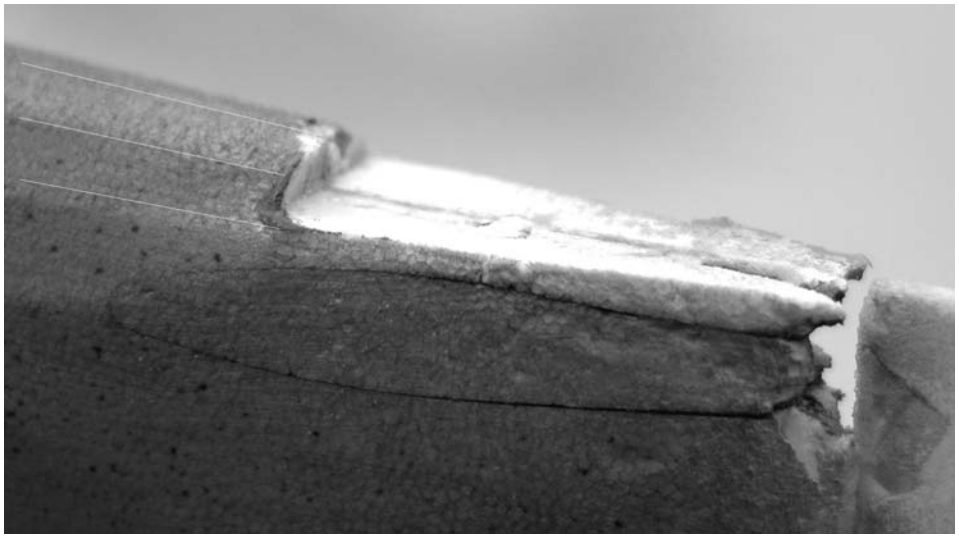
Glue up the main landing gear pieces, the two pieces with extra slots are the inside pieces. Glue this well with slow curing glue, make sure to get enough glue on the lower section where the carbon fiber will go. When done use a 5/32" drill in your hand and slowly round out the whole for the carbon fiber landing gear legs.

You should now be able to mount everything to the right fuse half and get an inital balance. Temporarily tape or pin the stab and rudders in place and slide the main landing gear on the dowel. Temporarily tape the left fuse half in place. The model, when hung from the top of main mast should hang 1 or 2 degrees nose down from the main mast being vertical. In other words, hold the model up by the tip of the main mast with the main mast being vertical. Release the body and the nose should drop just a tiny amount. This makes the CG somewhere along the line just ahead of the main mast. Adjust your receiver, ESC, motor and battery until you get close to this. Everthing will end up very far forward usually. **Make sure you balance with the left fuse half taped on. If not the left fuse half will make a tail heavy condition when glued on!!!. DO NOT SKIP THE BALANCING STEP. DO NOT ATTEMPT TO FLY WITH A TAIL HEAVY MODEL. ADD WEIGHT INSIDE THE FUSE IF NECESSARY TO ACHIEVE PROPER BALANCE.**

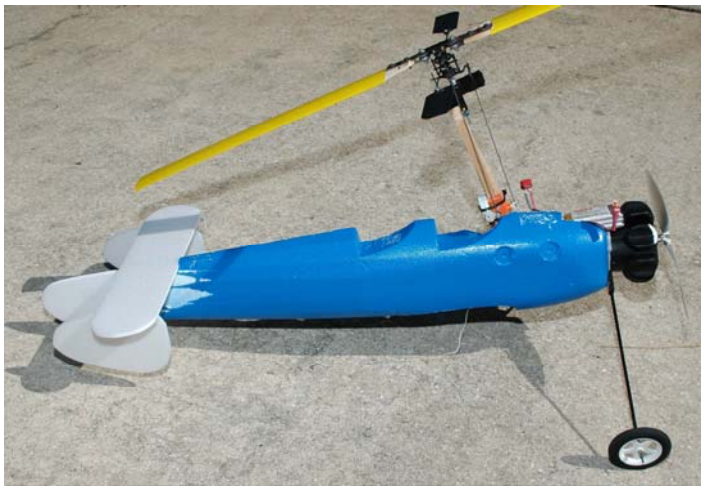
When you are satisfied with all the components, cable routing, etc, glue on the left fuselage half. Use some slow drying glue to give yourself time to make alignment. Pay attention to make sure that there is adequate glue in 3 areas, the landing gear mount dowel, the tail wheel bracket, and especially in the main mast area where it exits the fuse at the front of the front cockpit.

Now take the entire main landing gear assembly and trial fit to the fuse. When you are satisfied with the fit glue the landing gear to the fuse. Slip the landing gear legs into the landing gear block without glue, set the chassis on flat surface and align so the main mast is vertical. Do this on a flat surface so you can make sure the main mast is vertical when the model sits on the main gear. Now drill two 5/32” holes through the landing gear block (avoid drilling through the carbon fiber) and into the foam. Make two 2-3” long giant toothpicks from the bamboo supplied. Glue these “toothpicks into the foam and the landing gear blocks. Trim flush. These keep the landing gear from twisting on the dowel.

Roughen up ½ of the axles with 60 grit sandpaper or by nicking the wire with pliers. Measure the thickness of the wheel and wheel collar in from the smooth end of the landing gear axle and make an approximately 20 degree bend in the wire. Trial fit the wires into the ends of the landing gear legs. Adjust the bend until the axles are parallel with the ground and slightly toed in. When satisified with the bend in the wires, glue the roughened half of the 2mm wire axles into the ends of the landing gear struts with thick CA. It helps to drip some thick CA into the strut and then coat the wire. Use some of the kevlar thread on each gear leg and wrap the last 1/8” of the gear leg to keep it from splitting. Secure with thin CA. Install the wheels and the 2mm wheel collars. Now align the landing gear struts into the landing gear blocks and verify the wheel alignment (vertical or slightly cambered out with a little toe in, like a taildragger airplane). Apply a drop of thin CA to each gear leg/gear block to fix the landing gear struts in place.



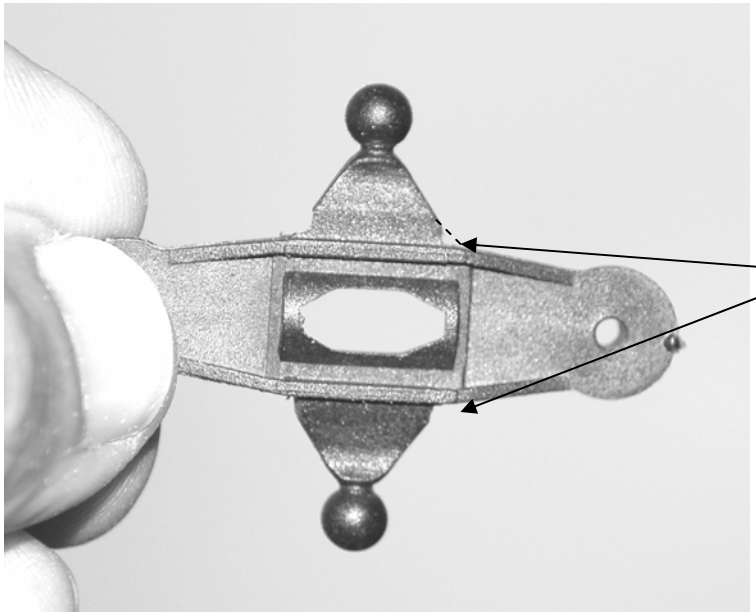
Take a sanding block and prepare the rear fuse for the horizontal stab. Note that there are fake stringer lines on the fuse. You basically want to make a flat spot on the fuse top equal to the chord width (front to back distance) of the stab, in line with the second from the top fake stringer. This is the stringer line that starts from the lower back corner of the rear cockpit. If you sand this properly the top surface of the stab will be flush with the top of the fuse and the bottom of the stab will run parallel to the stringer line. Now round off the edges of the stab and glue in place (paint it before hand if you like). Now add the outer rudders anywhere you like as long as they clear



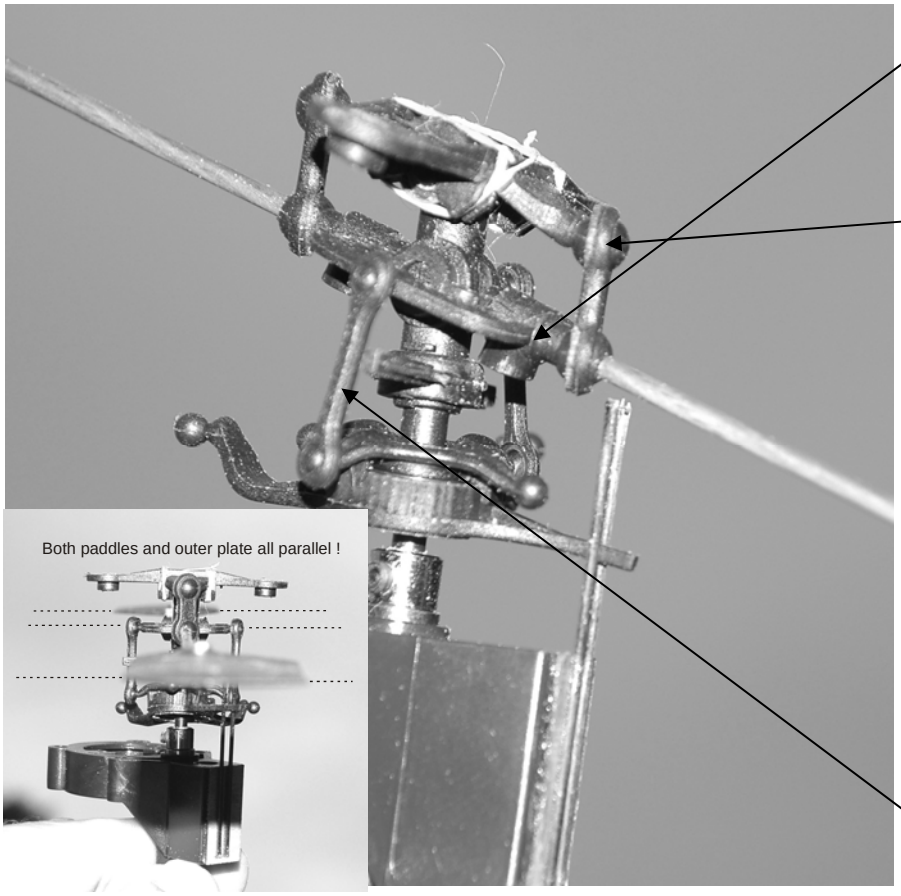
the center rudder. You can dress this up with panel lines and details and some additional bracing if you like, just keep it light.

Remount the radio, motor, ESC, etc. The fuselage is complete. All that remains is the head and blades.

Head

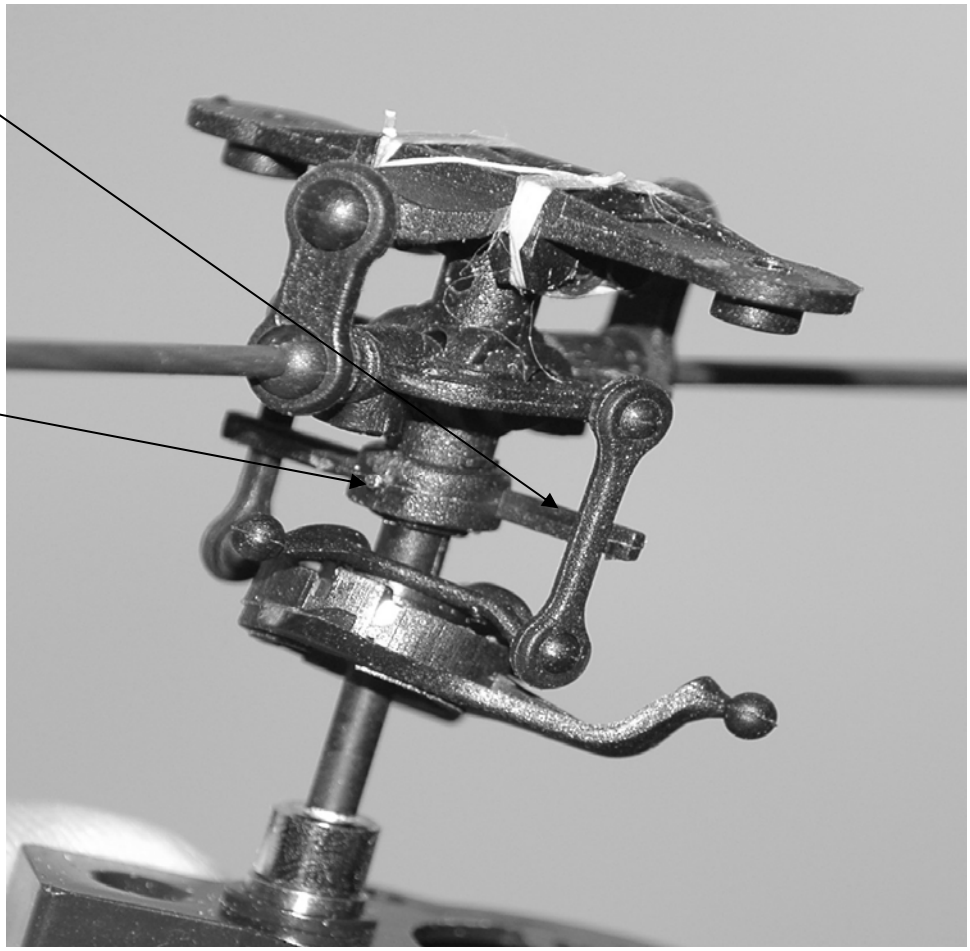


The head has a strengthening modification that can be done during construction or later after a few “mishaps”. Its probably easier to do during construction. Take the head center hub (the part with the bearings) and attach the main head plate by snapping it onto the bearings. Take an Xacto and cut a small (1/16”) notch out of the head blade diagonal bracing directly above the bearings. Line this up with the little grove on the outside of the bearing holders. Now take the kevlar thread and make 3 or 4 turns around the head and the bearings, effectively lashing the bearings into the head. Tie off securely on the top of the head (an extra pair of hands will help here) and then apply a couple tiny drops of CA to the thread on the top of the head only. Be careful not to flood the CA or get any in the bearings. If you happen to get CA in the bearings (not like I’ve ever done this or anything) you can soak them in acetone or debonder until they free up.



Put on the flybar plate (set screws down) and slide the flybar in place. Make sure that it is centered (use a caliper if you have one) and tighten the set screws (1.5mm). Now snap on the little dog bone links that attach the head to the flybar plate. Install the flybar paddles with the 2mm nuts and bolts so that they are level with the flybar plate with the leading edge facing forward in the clockwise rotation direction. It helps to use a pair of diagon al pliers to put some nicks in the wire so the plastic can get a grip on the flybar wire. Make sure you roughen the area under where the 2mm screw and nut are. Slip the follower link on the center hub (note the alignment) and line up the hole with the hub. Connect the smaller of the dog bone links to the flybar plate and the longer of the inner arms on the

swashplate. Make sure the links are on the flat side (forward clockwise direction) of the follower link. Slide the whole assembly, swashplate first onto the main shaft. Use a pin to align the follower link, the center hub and the shaft, then press the 1mm music wire pin through the head assembly/main shaft. Slide on a 3mm wheel collar, then a bearing, then the black gearbox, another bearing, the small 3mm washer and finally another 3mm wheel collar. Adjust the upper wheel collar until the bottom of the swashplate is approximately 3/8" to ½" from the top of the gearbox. Wiggle the swashplate around to make sure it will clear the wheel collar. Once satisfied tighten the set screw on the upper collar. Now push the lower collar up into place against the lower bearings so the whole assembly turns freely but doesn't have any slop.



Glue the 1/32" ply anti-rotation link base to the side of the gearbox opposite the big ring. Sand the surface of the gearbox first. Glue the two carbon fiber rods to the ply so that they are on either side of the little square post on the swashplate. The swashplate needs to be able to spin and slide in the slot you make. The top position of the rods is set by tilting the flybar down as far as possible then making the rods just clear the bottom of the flybar. Put large CA fillets on the carbon rods so they stay on the ply.
Drill a clearance hole for a #2 screw on one side of the gearbox. Slip the gearbox on the main mast with the ring forward. The gearbox should fit very snugly with no wobble. If there is some wobble, apply some thick CA and sand out until the gearbox has absolutely no wobble on the main mast. If the gearbox wobbles on the mast you will have serious control problems in flight. Cut a small groove in the front of the main mast to clear the set screw on the lower wheel collar as it rotates. Use the #2 screw to attach the gearbox to the mast.

Blades

Blade construction is important to the overall flying characteristics of the model. Proceed slowly and carefully.
Roll the 1/16" solder on a smooth surface under a flat board until it is smooth and straight. Cut in half. Line the two pieces up and make sure they are the same length. Drop the solder in the blade slots, making sure that the solder does not stick up out of the slot. Place one blade on top of the other with the tips

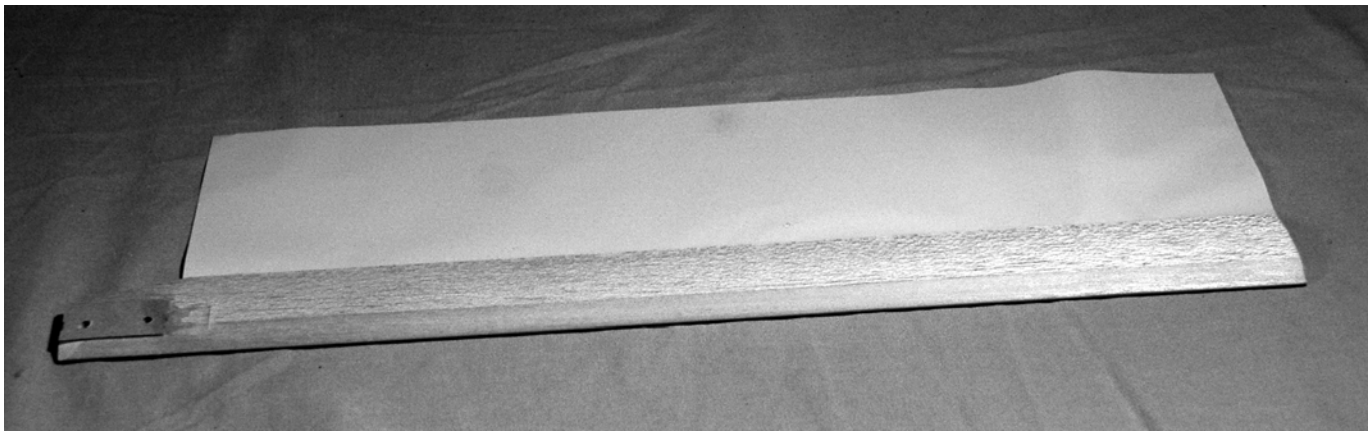
aligned. Now make sure that the solder is in the same place along the span of the blade. Ignore the position to the slot, just make sure the solder is in the same place along the length of the blades. Drop some thin CA in the slots to hold the solder in place. Now put several layers of thick CA (cure with accelerator) until the slot fills up flush or slightly above the surface of the airfoil. Once the CA is all cured, using sandpaper on a block, sand the surface smooth and true to the airfoil. Try not to sand into the wood around the slot. Take your time and match the airfoil as well as possible. Using a block, sand the sharp leading edge to a nice round contour that is about 1/16" to 3/32" diameter and blends with the top and bottom surfaces.

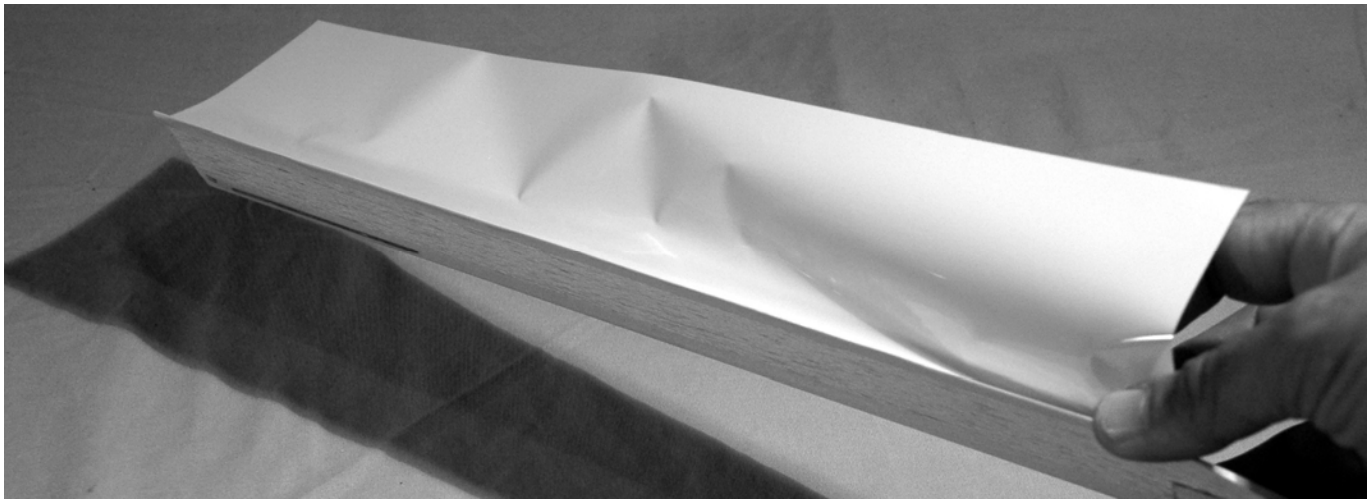
Now sand the blades overall with 220 grit sandpaper. Use a block not your fingers. Wick thin CA down the last 1/8" the whole length of trailing edge. Sand this smooth when cured.

Spray a heavy (but not runny) coat of instant drying lacquer (Ace Hardware is where I get mine) on both blades. Let dry, sand with 320 grit sandpaper, clean the blades with a tack rag and repeat at least one more time. Final sand with 320 or 400 to a smooth surface then apply one LIGHT dusting coat of lacquer. Don't sand this coat out, leave it shiny so the covering will stick to it. Here you can use other hobby materials like dope or other sealer material. The goal is to seal the grain some so the blade covering will stick to the blades, especially near the trailing edge and leave a smooth surface for the blade covering to stick to. The goal is to get a sealed surface but not necessarily fill all the grain like you are going to paint. You just want the wood surface to be smooth and shiny.

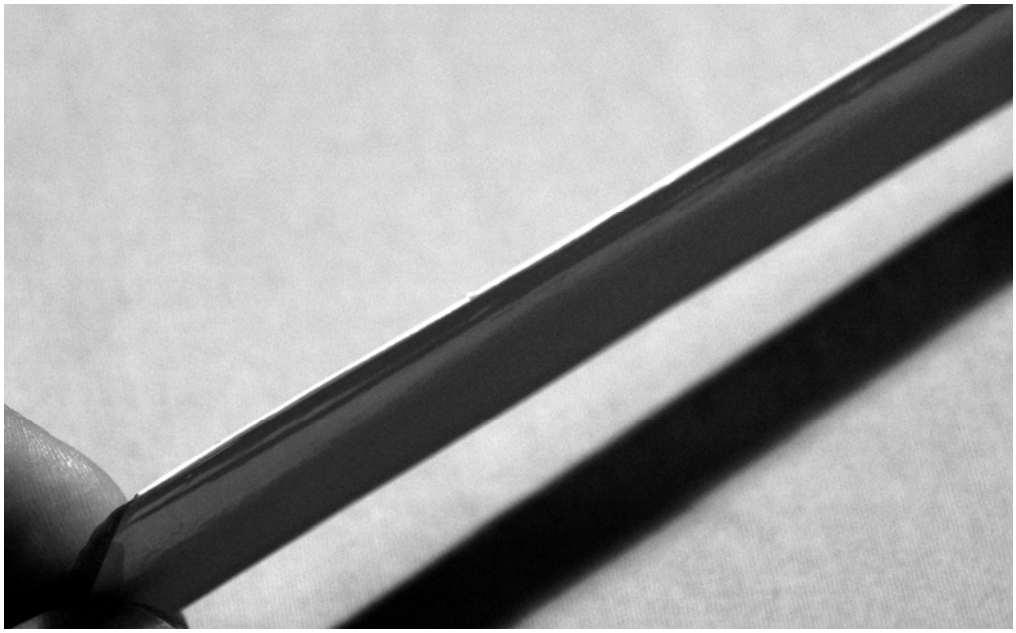
You need a scale that reads to 0.1 gram for this step. Weigh each blade. Apply lacquer or whatever you used to the lighter blade and let dry completely. Continue this process until both blades weigh the same to 0.1 gram. This is where the instant dry lacquer is helpful. If you apply too much lacquer to the lighter blade, making it the heavier blade, its okay to sand the excess off with 400 grit paper. If you do use sandpaper, make certain that you use a tack rag or Prep-Sol on the blades to get the dust off before covering.

Peel the backing off the blade covering and put it sticky side up on a flat surface like a kitchen countertop. Hold a blade with the root to your left, leading edge up and the bottom surface facing yourself. Place the trailing edge down on the covering with the tip aligned with the right hand edge of the covering with the blade 3/16" of an inch in from the edge of the covering closest to you. Lay the blade down on the table towards yourself. You will now have the last 3/16" inch of the bottom surface trailing edge stuck to the blade covering which is now trailing out behind the blade on the table. Press the blade to the covering. Carefully pick up the blade and burnish the covering to the bottom trailing edge. Now, working carefully roll the covering around the trailing edge, making sure it is stuck down. Continue to stick the covering down over the top surface towards the leading edge. Roll the covering around the leading edge, making sure that you don't leave any bubbles or wrinkles. Continue to adhere the covering on the bottom surface to the trailing edge. If the covering sticks past the trailing edge, trim it flush with a sharp blade.





Soak thin CA in the tip and along the edge near the root. If the covering sticks out past the tip, use a sanding block to gently scrub off the excess covering. If you have any bubbles or wrinkles a heat gun can be used carefully to work out some of the problems. Be careful as too much heat will burn a hole quickly.
Re-weigh the blades. Apply clear tape in small amounts to the leading edge of the lighter blade at ½ span until the blades again weigh the same to 0.1 gram. Apply the little black squares of trim to the tips of the leading edges. Put one square ¼" in from one tip and



the other square ¾" in from the other tip. This is so you can tell which tip is out of track when you are trimming. (You will be able to see either the "in" blade or the "out" blade being high.) Using the 3mm bolts and plain nuts, attach the metal blade straps to each blade.

The blades are done!

Radio

Radio installation is usually where each builder will customize. The general instructions will be given here. Customize if you like but please read this section to determine the critical bits.

Roll and Pitch

Two 1mm pieces with "z" bends are provided with two ball links. First figure out the approximate position of the servos. The pitch servo is on the right side of the main mast with the horn protruding to the front of the mast. The roll servo is on the back of the mast, overlapping the pitch servo with the horn sticking out on the left side of the mast. When satisfied, attach with thick CA. A tie wrap will help secure these to the mast. Thread the "z" bend rods into the servos. Attach the ball links to the swashplate (make sure the antirotation pin is in the guides. Hold the swashplate square to the ***rotor shaft*** making certain that the links from the swashplate to the flybar run parallel to the main shaft and that the swashplate is not riding up the shaft. Hold the pushrods up to the ball links and mark where the pushrod bend needs to be at the little hole in the ball link. Remove the wires and bend the 90 degree bend necessary for the ball link. Make sure the bend is out, away from the swashplate. Reinstall the rods in the servos and slip the 90 bends in the ball links, then swing them into place on the pushrod. Trim the excess wire to within about 1/16" from ball link.

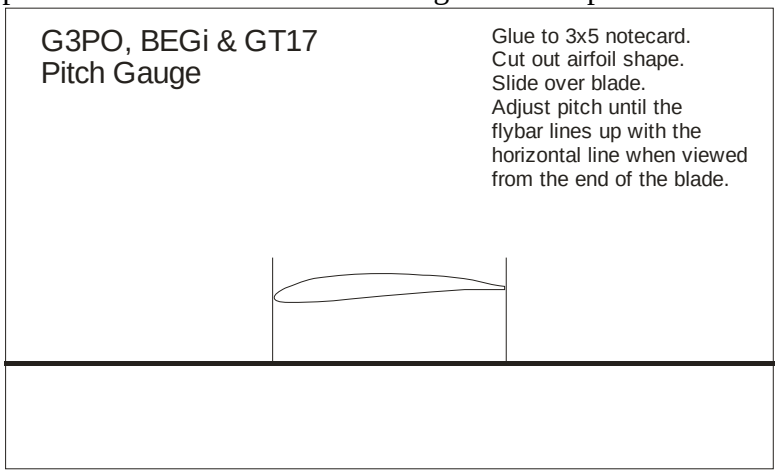
Connect the roll servo to the aileron channel of your receiver, the pitch servo to the elevator and rudder to rudder. Hook up whatever speed control and battery you intend to use to the throttle channel. Make sure the rudder moves right with right rudder stick. Up elevator should tilt the front of the swashplate UP. Down elevator should tilt the front of the swashplate DOWN. Right aileron should tilt the right side of the swashplate DOWN, left aileron should tilt the right side of the swashplate UP (viewed from the rear). Adjust the trims and servo horns as necessary to get the rudder centered and the swashplate square to the ***rotor shaft***. The swashplate should tilt about 30 degrees up or down in all directions at full throw. The rudder needs about 30 degrees of throw. This finishes the radio installation excepting the motor and speed control. Attach the receiver to a convenient place with double sided tape or velcro.

Final setup

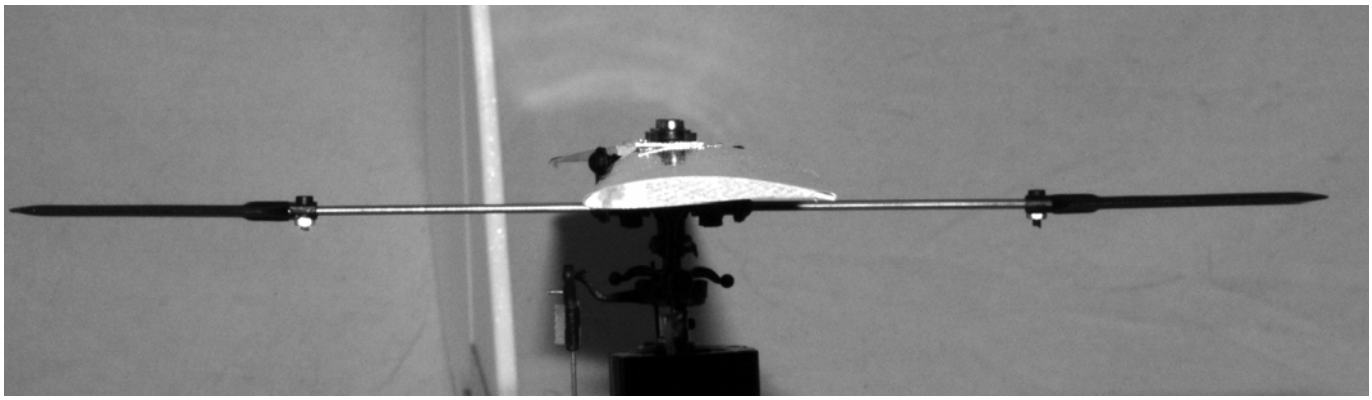
Mount your motor to the motor shaft and install the speed control according to your preference. The last item to mount is the battery. On the prototypes a strip of velcro was attached to the top of the battery plate to adjust the CG. This is recommended until flight testing is done. Then you can mount the battery somewhere else as long as the fore/aft CG is maintained.

To set the CG, pick up the model with two fingers looped over the flybar with the flybar turned perpindicular to the body (blades will be fore and aft). Hold the model up so you can see the side. Adjust the CG until the main mast hangs straight up and down when the model is hung by the flybar. You can sight against a doorframe in your house for a vertical line. Now move the battery a tiny amount backward until the nose comes up 1 or 2 degrees from the previous position. In other words you want the main mast to just past vertical in the nose up direction.

Attach the blades to the head with the #10 washer, the head stiffener and the 3mm bolts and plastic stop nuts. Place two washers on the bottom of the head, and one on top. Slip the metal blade straps around the washers/head. Put the head stiffener in place on top of the metal strap, then screw the whole thing together with the 3mm bolt and lock nut. Don't tighten all the way until both blades are on. Now tighten the blade bolts until the blades are very snug. Very snug means that you can move the blades by hand but if you give the head a quick flip to rotate it the blades won't move.
Using a pair of slip joint pliers to hold the blade attachment bolt and a pair of needlenose on the metal blade straps, adjust the blade pitch. Adjust by looking at the end of the blade and comparing to the **FLYBAR**, not the main shaft or swashplate. Adjust so that the trailing edge is higher than the leading edge by the thickness of the leading edge. Basically make the middle third of the top of the airfoil parallel with the flybar. This is just the starting point. The final position will be determined by flight testing. Make sure you take the pliers with you to the field to adjust the pitch. The pitch gauge can be copied to a piece of card stock to aid in setting the initial pitch.



Double check the model over. The controls should move freely. The head should spin freely and not bind. Bend the axles so the main wheels are slightly toed in and cambered out like a good tail dragger should be. Re-check the CG and the trim position of the swashplate.



Flight Test

Here's the magic moment. Ready for flight. It is best to wait for perfect conditions to do the initial trimming, later you can fly in rough conditions. The ideal circumstance is a smooth paved surface and a 3 mph wind right down the runway. Early in the morning at big parking lot is ideal. The first steps are just to get the trim settings correct before actually flying around.
Start with about level aileron trim. The swashplate will be level looking from the rear. Put in about 10 degrees of down elevator. The swashplate will be tilted down about 10 degrees from the main shaft. Line the blades up straight and then give the head a little spin. If you have a breeze the blades should keep turning. Either way put in a little blast of throttle then back off to around ¼ throttle. The blades should begin to spin up. Slowly add throttle until the blades really start spinning, you probably won't need more than about half throttle if you have one of the recommended power plants. Don't take off yet. Throttle back and taxi back. If the blades spun up right away and came up to speed you're ready for a hop. If the blades never sped up and things got all wobbly, reduce the pitch of both blades. Repeat until you get a good rotor speedup in about 50-75 feet. The rotor should be spinning very quickly and be very stable. If the rotor wobbles around and won't speed up and you have the proper pitch, the blades may be loose or not aligned or both. Tighten the main bolts (the ones with the plastic stop nuts) until the blades are difficult to move by hand. Now straighten the blades so they are directly in line with one another. Sight down one blade, the head stiffener and the other blade so that it makes a staight line. Give the head a hard spin by hand and let it wind down. The blades need to be tight enough to not move out of place when you make the hand spin. If you got the blades straight and tight enough a smart spin by hand will result in a nice smooth wobble free rotation. If spinning the rotor makes one of the blades move, the bolts aren't tight enough. Once you have a nice smooth spin by hand you should immediately give some power on the motor and start a fast taxi, at that point the rotor should start accelerating and rapidly come up to flight RPM. If you give the hand spin and taxi and the rotor slowly slows down as you taxi you have the blades set with too much positive pitch. Lower the pitch of both blade and try again until with a good hand spin and a quick taxi, the rotor will accelerate up to flight RPM. Another test of correct settings it to hold the model up nose high about 60 degrees into the wind and spin the rotor head. If you have a wind or can walk or jog forward the rotor will rapidly come up to flight RPM. You will notice that once flight RPM is reached the lift of the rotor will greatly exceed the weight of the model. Once the model is trimmed you can drop the nose to level, add power and fly away from a hand launch. However this is NOT suggested until the inital trimming is done from a runway. It is however a good way to determine if the rotor is set correctly for takeoff.

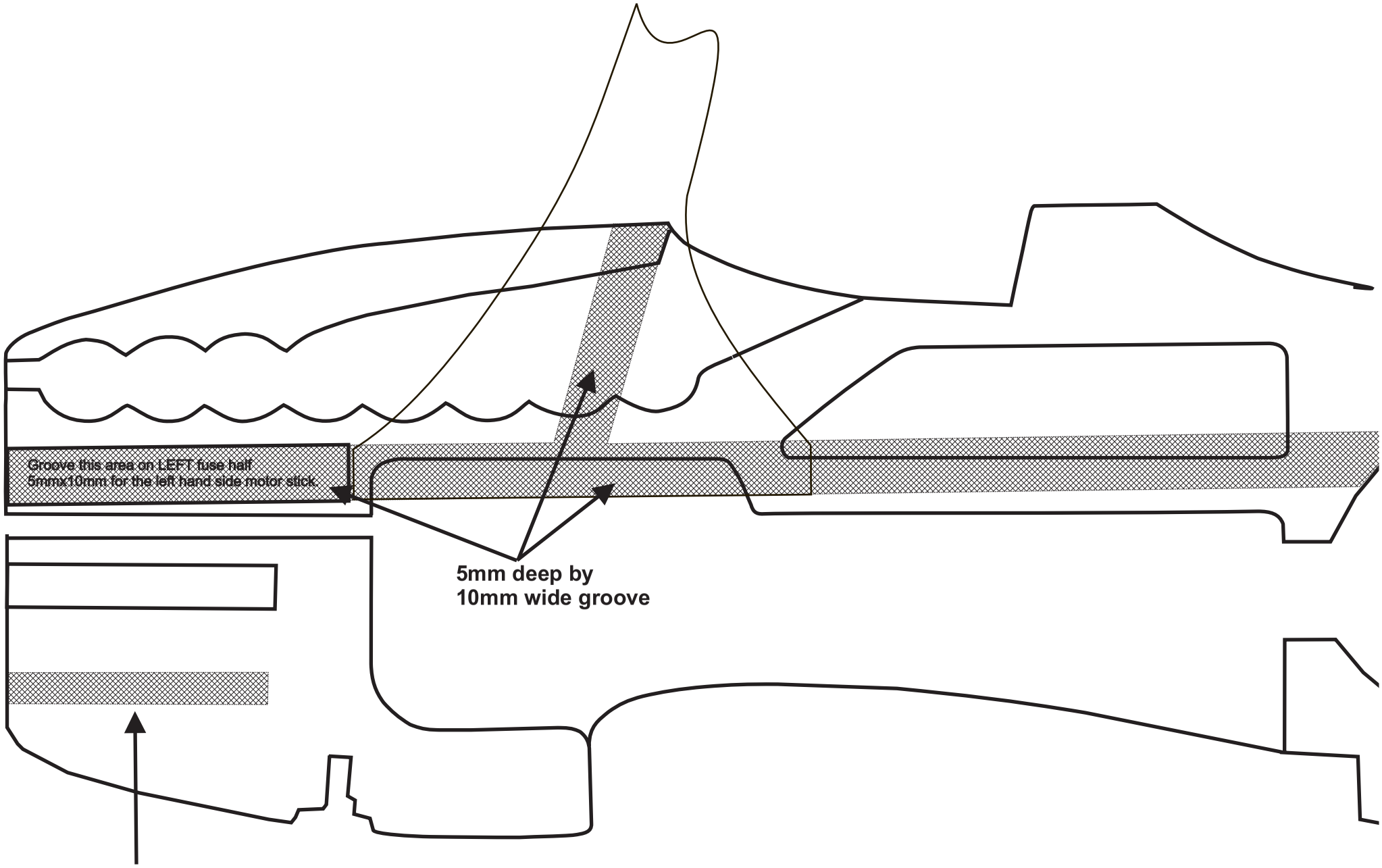
When you have a good reliable startup make a single hop. Repeat the spin, burst of power, power back off, then feed power in cycle. Get the rotor up to speed. Now add power slowly and smoothly to about ¾ throttle. DO NOT PULL UP ELEVATOR. It will simply pitch up, roll over and break something. You ***must*** let it fly off with power all by itself. If you try to force it off with elevator it will simply crash. Takeoff occurs when the rotor is fully up to speed and you have enough forward velocity. At that point the model will simply fly off on it's on.
As soon as the model breaks ground throttle back to ½ or whatever it takes to fly level at a few feet of altitude. If you hold ¾ or full power on it will climb out quickly. Let the model break ground and watch for roll trim. Be ready to put in aileron correction. Also be ready to gently power back and let the gyro settle back in to a landing. **Do not chop throttle!** At the takeoff attitude chopping throttle will result in the model coming to a dead stop and dropping from whatever height you are currently at. The gyrocopter does not stall but this does not mean that it cannot have a very high descent rate! Reduce throttle firmly but smoothly to fly level. Reduce the power until you have a nice descent back to the ground use a little up elevator to come to a nice landing. It will probably take ¼ to 3/8 throttle to maintain a gentle descent. Adjust the trims, roll and rudder should be obvious. If it takes full throttle and very high speed to take off, there is too much down trim. If the model takes off too early and rolls over you have too much up trim. You can hold some down elevator for takeoff or re-trim to correct this. Sometimes I have to hold some down elevator while the rotor is spinning up, especially in windy conditions, then after the rotor is spinning rapidly you can release the down elevator and continue to takeoff normally.
After a few passes you should have a model that will spin up, takeoff smoothly, fly straight and level and land when power is backed out smoothly. If you have enough room I suggest that you make as many straight "hops" as you can for longer and longer distances. Get the feel of how the climb or descent is controlled completely with power, not elevator. Make some gentle "S" turns to get used to how it turns and how to coordinate the rudder. Spend as much time as necessary to get used to using the left stick on the transmitter. If you fly helicopters or 3D airplanes (meaning that you know how to hover an airplane) this should be instinctive and you will know what to do almost right away. If you don't have helicopter or 3D airplane experience it may take some time to get your left thumb limbered up. The gyrocopter flies with the left stick. You make lots of throttle changes, you coordinate heavily with the rudder and you use the right stick to keep the bank angle correct and pull up in the turns. Down elevator is used very little. Use down elevator to stop a zoom, but only gently. Too much down will stop the rotor, resulting in a crash. If you want to go up, add power. If you want to come down, reduce power. Landing approaches are all throttle management.

Once you have gotten the feel of the model by making straight hops, you are ready to make a circuit around the field.

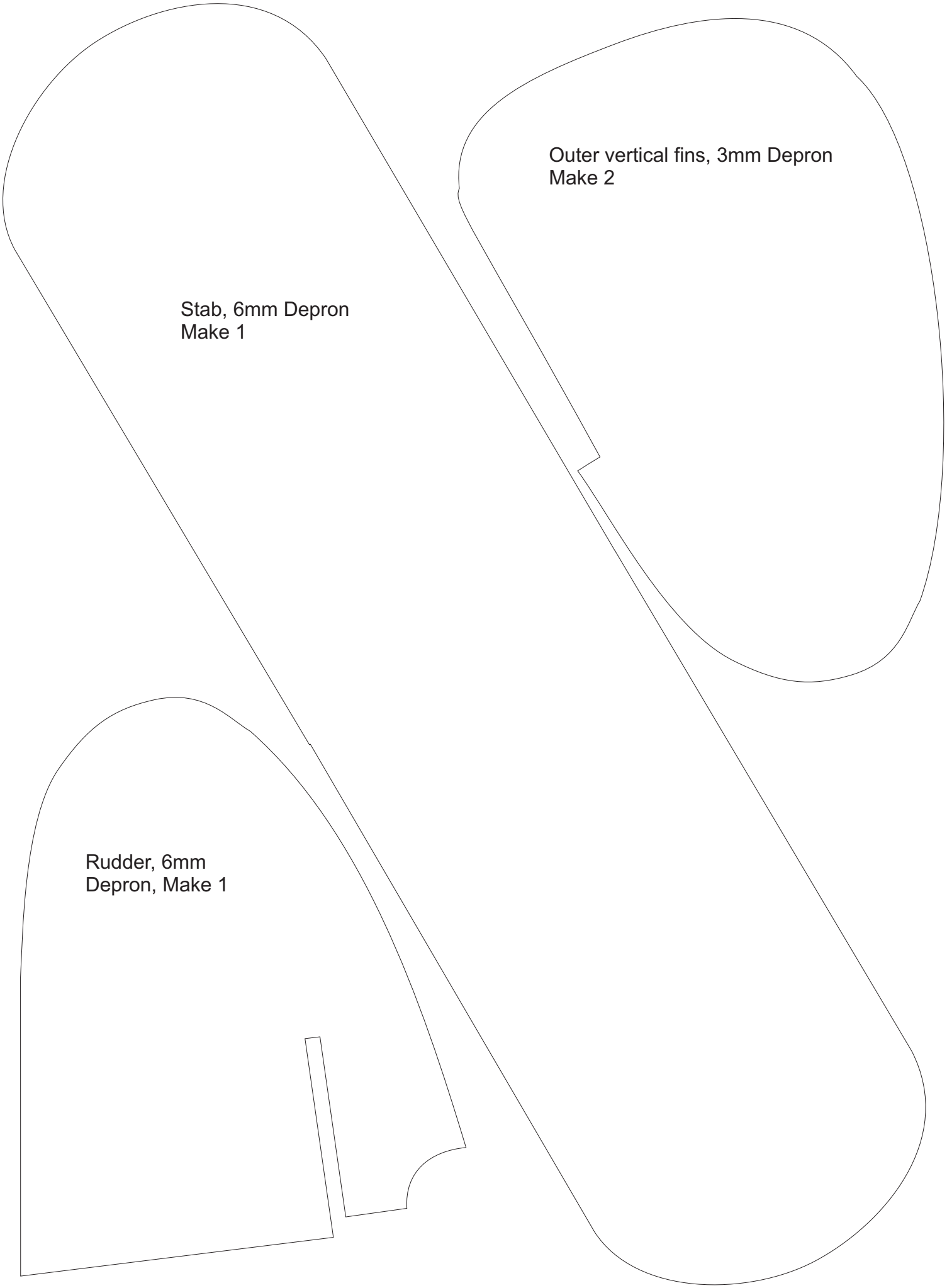
Make sure you have enough room to make a left hand pattern. The model tends to pull out of a left hand turn and tighten up a right hand turn. It's not major but its easier to get a few left handed turns in first. Takeoff as before. Add enough power to climb out smartly. Now make a left hand pattern. It really helps to coordinate rudder with aileron. Trouble happens when the tail is allowed to slide inside the turn, so keep it nice and coordinated. When you make the turn back to final, reduce power until you get a sink rate that will put you anywhere on the field. The rollout is zero so don't worry about runway in front of you, just make the field somewhere. You will probably need something like ¼ to 3/8 throttle to maintain a reasonable descent. As you near the ground feed power in so that you basically fly level with the ground. A little up elevator and killing the throttle will result in a little plop landing with little rollout. Congratulations, you just got checked out in a gyrocopter!

Try to remember the speed and how much power you needed. If the model seems fast or needs full power to fly level, you probably have too much negative pitch. Increase pitch until you don't get a reliable startup on takeoff, then back off a little. This is the best you can get.
Once you can make a circuit have a helper set the track. Remember those little squares on the blades? We put them to use now. Make a left hand pattern but don't land, just make one pass down the field and have your helper look at the tips, then go around once more and land. One of the blades will likely be running higher than the other and giving you a shake. The tape is misaligned so you can see if the "in" blade or the "out" blade is running high. The adjustment procedure is to lower the high blade if you think the rotor speed is too low and/or startup is on the edge of unreliable. Raise the low blade if the rotor speed seems high or the startup is very quick and the model flies fast. If you balanced the blades well the model will get very smooth when the blades are tracking properly.
Now you are all trimmed up. Practice left and right hand turns and start enjoying the unusual flight characteristics of the gyrocopter.
One final note. It is possible to land with the motor off. Go up high, cut the motor and put in some down elevator to maintain some forward speed. GT17 might need some up elevator to keep from getting too fast in the descent. You are looking for a nice, but fairly steep glide slope with some forward speed and good rotor speed. If you get too nose down the rotor speed will get slow. If you are descending too vertically the rotor speed will be good but you won't have any forward energy to flare. A good power off landing takes practice. When you get close to the ground pull up to flare and it should just plop right in for a no rollout landing. If you are quick about it you can quickly add power and takeoff while the rotor speed is still up.

I hope you enjoy your GT17.



Gt17 Fuselage Layout
Charles M. Nowell, Jr.


Outer vertical fins, 3mm Depron
Make 2
Stab, 6mm Depron
Make 1
Rudder, 6mm
Depron, Make 1